DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 19, 2018

Mr. Scott Glenn, Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 S. Beretania Street, Room 702
Honolulu, Hawaii 96813

Dear Mr. Glenn:

Final Environmental Assessment and Finding of No Significant Impact for DLNR Kealaloa Tank Site Exploratory Water Well TMK (2nd.) 2-3-007:037, Makawao District, Island of Maui

With this letter, the Department of Land and Natural Resources hereby transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the DLNR Kealaloa Tank Site Exploratory Water Well in Makawao, Island of Maui. Please publish the FEA-FONSI in the next available edition of the Environmental Notice.

Public comments and corresponding responses that were received during the 30-day public comment period for the draft environmental assessment are included in the FEA-FONSI. Based on the significance criteria outlined in Title 11, Chapter 200, Hawaii Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

Enclosed is a completed OEQC Publication Form, a copy of the FEA-FONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word.

If there are any questions, please contact Mr. Gayson Ching of our Engineering Division at 587-0232 or by email at *gayson.y.ching@hawaii.gov*.

Sincerely,

Suzanne D. Case

SUZANNE D. CASE
Chairperson

Enclosures
c: Geometrician Associates LLC (w/out attachments)

18-687

AGENCY
PUBLICATION FORM

Project Name:	DLNR Kealaloa Tank Site Exploratory Water Well
Project Short Name:	Kealaloa Tank Exploratory Well
HRS §343-5 Trigger(s):	Use of State Funds
Island(s):	Maui
Judicial District(s):	Makawao
TMK(s):	2nd. 2-3-007:037
Permit(s)/Approval(s):	State of Hawai'i DLNR Commission on Water Resource Management (CWRM) Well Construction / Pump Installation Permit; State of Hawai'i Dept. of Health (DOH) National Pollutant Discharge Elimination System (NPDES) Permit; State of Hawai'i DOH Noise Variance; County of Maui Dept. of Public Works (DPW) Grading Permit;
Proposing/Determining Agency:	State of Hawai'i Department of Land and Natural Resources
Contact Name, Email, Telephone, Address	Gayson Ching Gayson.Y.Ching@hawaii.gov (808) 587-0232 DLNR Engineering Division - Project Planning Section 1151 Punchbowl Street, Room 221 Honolulu, HI 96813
Accepting Authority:	(for EIS submittals only)
Contact Name, Email, Telephone, Address	
Consultant:	Geometrician Associates
Contact Name, Email, Telephone, Address	Ron Terry, rterry@hawaii.rr.com, (808) 969-7090 PO Box 396 Hilo HI 96721

Status (select one)	**Submittal Requirements**
___ DEA-AFNSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
_x_ FEA-FONSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
____ FEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.

FEIS Statutory Acceptance	Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions.
____ Supplemental EIS 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 or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary. The Hawai'i State DLNR Engineering Division proposes to develop an exploratory potable water well on a pasture property owned by Haleakalā Ranch, near the Maui Department of Water Supply (MDWS) Kealaloa Tank Site in Makawao. The well is intended to determine potential groundwater resources and their potential to provide potable water for future State projects. Because of the context of the well site and drilling practices, no adverse impact upon the aquifer should occur as a result of drilling and testing the exploratory well. The site is on lightly wooded pasture land adjacent to a site that has been completely converted to water utility uses, and no sensitive native flora or fauna or historic sites are present. Noise, traffic and visual impacts will be negligible. If a water source of adequate quality and quantity is determined to be present, the well could be converted to a production well at the appropriate time in the future, if and when sufficient demand exists. DLNR would likely enter into an agreement with MDWS to integrate this new source into the existing MDWS water system and transfer ownership to the County of Maui. If a production well is proposed, another EA will be conducted. That EA would address the specific impacts of the use of the water, based on the proposed rate of withdrawal, proposed land uses, and the contexts of the aquifer and the municipal water system as they exist at that time.

DLNR Kealaloa Tank Site Exploratory Water Well

FINAL ENVIRONMENTAL ASSESSMENT

TMK (2nd) 2-3-007:037 (por.)
Island of Maui, State of Hawai‘i

Submitted Pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS)

State of Hawai‘i
Department of Land and Natural Resources

June 2018

DLNR Kealaloa Tank Site
Exploratory Water Well

FINAL ENVIRONMENTAL ASSESSMENT

TMK (2nd) 2-3-007:037 (por.)
Island of Maui, State of Hawai‘i

PROPOSING AGENCY:

State of Hawai‘i
Department of Land and Natural Resources
Engineering Division
1151 Punchbowl Street, Room 221
Honolulu, HI 96813

CONSULTANT:

Geometrician Associates
PO Box 396
Hilo, HI 96721
rterry@hawaii.rr.com

and

Akinaka and Associates, Ltd.
1100 Alakea Street, Suite 1800
Honolulu, HI 96813

CLASS OF ACTION:

Use of State Funds

This document is prepared pursuant to:
the Hawai‘i Environmental Protection Act,
Chapter 343, Hawai`i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai‘i Department of Health Administrative Rules (HAR).

SUMMARY

The Hawai‘i State Department of Land and Natural Resources, Engineering Division (DLNR) proposes to develop an exploratory potable water well on a pasture property (TMK (2nd.) 2-3-007:030) owned by Haleakalā Ranch, adjacent to the Maui Department of Water Supply (MDWS) Kealaloa Tank Site on Kealaloa Avenue in Makawao. The well is intended to determine potential groundwater resources of the subject area and their potential to provide potable water for future State of Hawai‘i projects. If a water source of adequate quality and quantity is determined to be present, the well could be converted to a production well at the appropriate time in the future, if and when sufficient demand exists. DLNR would likely enter into an agreement with MDWS to integrate this new source into the existing MDWS water system and transfer ownership to the County of Maui. This arrangement would also provide some portion of the water for other uses that are needed in the MDWS Upcountry water systems, such as to supplement the water system during drought conditions. If a production well is proposed, another Environmental Assessment (EA) will be conducted. That EA would address the specific impacts of the use of the water, based on the proposed rate of withdrawal, proposed land uses, and the contexts of the aquifer and the municipal water system as they exist at that time.

Because of the context of the well site and drilling practices, no adverse impact upon the aquifer should occur as a result of drilling and testing the exploratory well. The site is on lightly wooded pasture land adjacent to a site that has been completely converted to water utility uses, and no sensitive native flora or fauna or historic sites are present. Noise, traffic and visual impacts will be negligible.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ALISH	Agricultural Lands of Importance to the State of Hawai‘i
AWUDP	Agricultural Water Use and Development Plan
BMP	Best Management Practice
CWRM	Hawai‘i State DLNR Commission on Water Resource Management
DHHL	Hawai‘i State Department of Hawaiian Home Lands
DLNR	Hawai‘i State Department of Land and Natural Resources
DOFAW	Hawai‘i Division of Forestry and Wildlife
DPW	Maui County Department of Public Works
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
gpm	Gallons per minute
GWPP	Groundwater Protection Program
HEER	Hawai‘i State DOH Hazard Evaluation and Emergency Response
HDOA	Hawai‘i Department of Agriculture
HDOH	Hawai‘i State Department of Health
HAR	Hawai‘i Administrative Rules
HEPA	Hawai‘i Environmental Policy Act
HRS	Hawai‘i Revised Statutes
MCGP	Maui County General Plan
MCL	Maximum Contaminant Level
MDWS	Maui Department of Water Supply
MECO	Maui Electric Light Company
mgd	Million gallons per day
mg/L	Milligrams per liter
MLP	Maui Land & Pineapple Company
OEQC	Hawai‘i State Office of Environmental Quality Control
SFHA	Special Flood Hazard Area
SHPD/O	State Historic Preservation Division/Officer
SMA	Special Management Area
SWAP	Source Water Assessment Program
SWPP	State Water Projects Plan
UH	University of Hawai‘i
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNRCS	U.S. Natural Resources Conservation Service
WRPP	Water Resources Protection Plan
WQP	Water Quality Plan
WUDP	Water Use and Development Plan
WTP	Water Treatment Plant

[this page intentionally left blank]

1 PROJECT LOCATION, DESCRIPTION, PURPOSE AND NEED

1.1 Project Location and Background

The Hawai‘i State Department of Land and Natural Resources, Engineering Division (hereafter referred to as DLNR) proposes to develop an exploratory potable water well on a portion of a pasture property (TMK (2nd.) 2-3-007:037) owned by Haleakalā Ranch, adjacent to the Maui Department of Water Supply (MDWS) Kealaloa Tank Site on Kealaloa Avenue in Makawao (Figures 1-1 to 1-3).

The well is intended to determine potential groundwater resources of the subject area and their potential to provide potable water for future State of Hawai‘i projects. If a water source of adequate quality and quantity is determined to be present, the well could be converted to a production well at the appropriate time in the future, if and when sufficient demand exists. DLNR would likely enter into an agreement with MDWS to integrate this new source into the existing MDWS water system and transfer ownership to the County of Maui. This arrangement would also provide some portion of the water for other uses that are needed in the MDWS Upcountry water systems, such as to supplement the water system during drought conditions. If a production well is proposed, another Environmental Assessment (EA) will be conducted. That EA would address the specific impacts of the use of the water, based on the proposed rate of withdrawal, proposed land uses, and the contexts of the aquifer and the municipal water system as they exist at that time.

As background, after a 2012 review of six potential exploratory well sites in the Makawao to Pukalani area, DLNR in 2013 chose a site at the existing MDWS Pukalani Reservoir for advancement. This site appeared to offer the best combination of desirable characteristics for development of an exploratory well. A Draft Environmental Assessment (EA) was prepared and released on January 8, 2014. Comments received on the Draft EA as well as subsequent environmental research indicated that the aquifer under this site had some potential to be contaminated with pesticides formerly used on pineapple fields to an extent that could make the water quality unsuitable. DLNR decided to not utilize this site, cancelled that project, and withdrew the Draft EA and the Anticipated Finding of No Significant Impact for that project on February 23, 2017.

The need for data on groundwater in the Upcountry area remained, however. DLNR identified the current proposed site near the Kealaloa Tank. It has many of the advantages of the Pukalani Tank site but is outside the area that regulatory agencies consider at high risk from contamination. Based on extensive previous hydrological research, groundwater hydrologists anticipate that a well at this site could produce between 0.7 and 1.0 million gallons per day (mgd). The site, which is currently in pasture, is adjacent to the DWS Kealaloa Tank and has a potential access along the tank’s driveway, which is on an easement to DWS through TMK 2-3-007:037. Construction of the well, well pad and appurtenant facilities would either utilize this driveway or create an alternative access from another point on Kealaloa Road.

Figure 1-1a. USGS Location Map

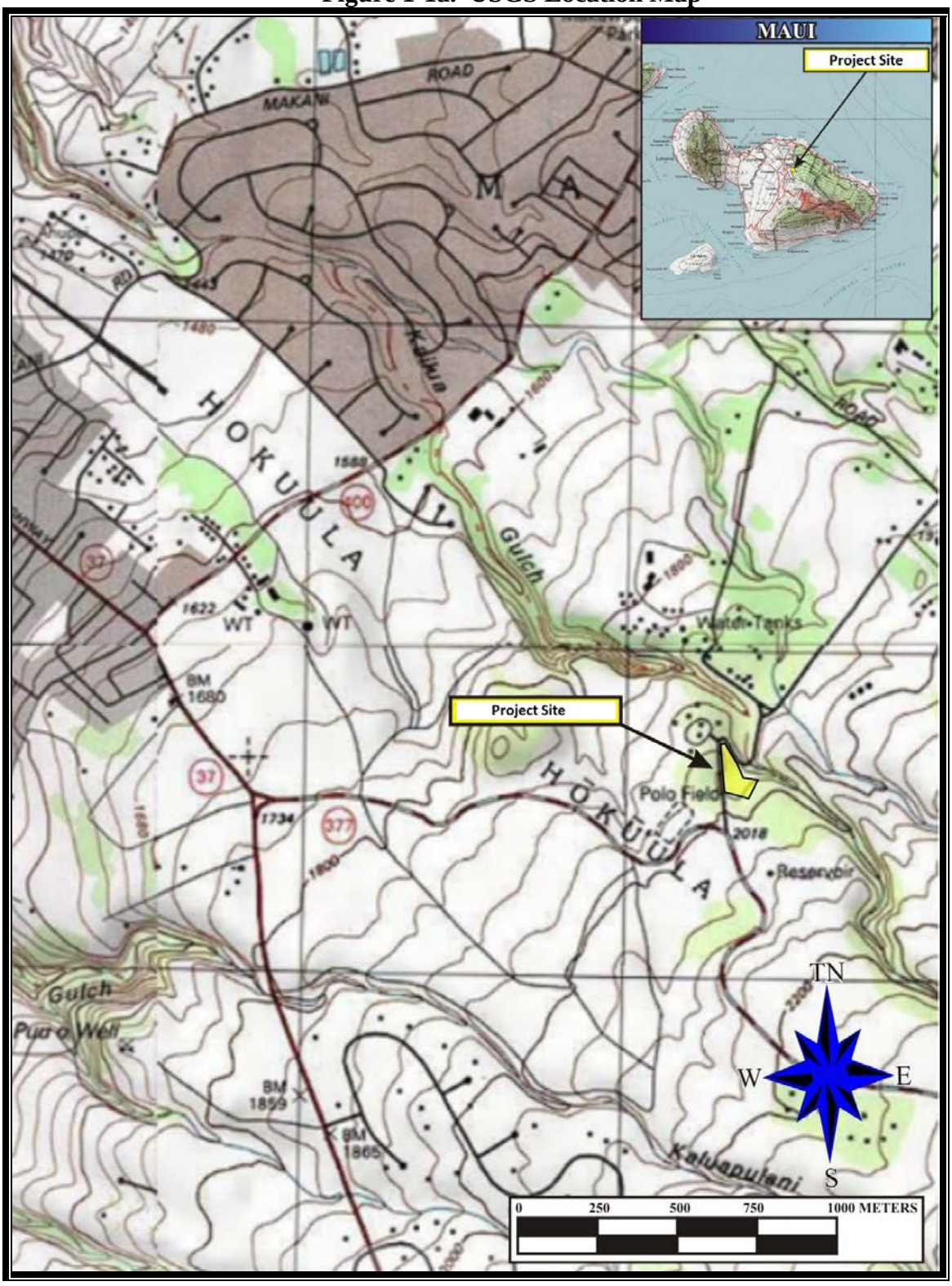


Figure 1-1b Project Site Map

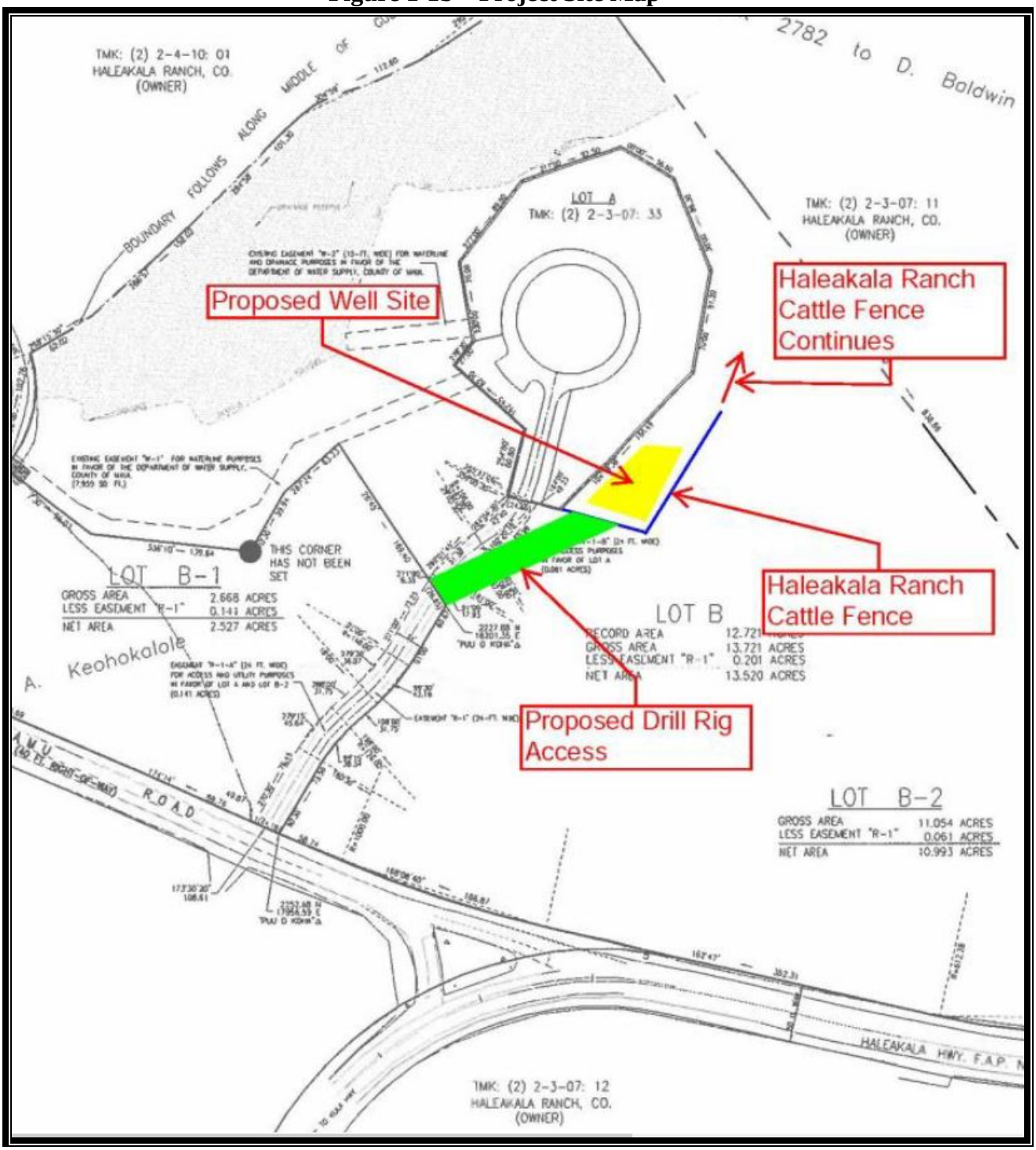


Figure 1-2 Project Site Photos

1-2a Project Site ▲

▼ 1-2b Driveway

AVENUE
Existing Power
MAKAWAO
1600
1700
HALEAKALA RANCH
TMK: 2-4-10: 002
1800
KEALALOA AVENUE
MEHA ROAD
Existing Water Main
QLINDA RD
Power
PUKALANI TANK
[TK-251]
Existing Water Main
Existing Water Main
1900
ROAD
Existing Power
MALUHIA TANK
[TK-255]
2000
2100
HANAMU
2200
Potential Power Infrastructure Required
KEALALOA TANK
[TK-287]
HALEAKALA HWY
Potential Well Piping Infrastructure Required
HALEAKALA RANCH
TMK: 2-3-07: 037
Existing Power

Existing Water Main
Existing Power
Potential Water Infrastructure Required
Potential Well Site
Potential Power Infrastructure Required

CREATED: 06/22/2012
CREATED BY: SHU
REVISED: 03/28/2018
SOURCES:
Aerial - Google Earth Dated 03/09/2018

Upcountry Maui Exploratory Potable Water Well

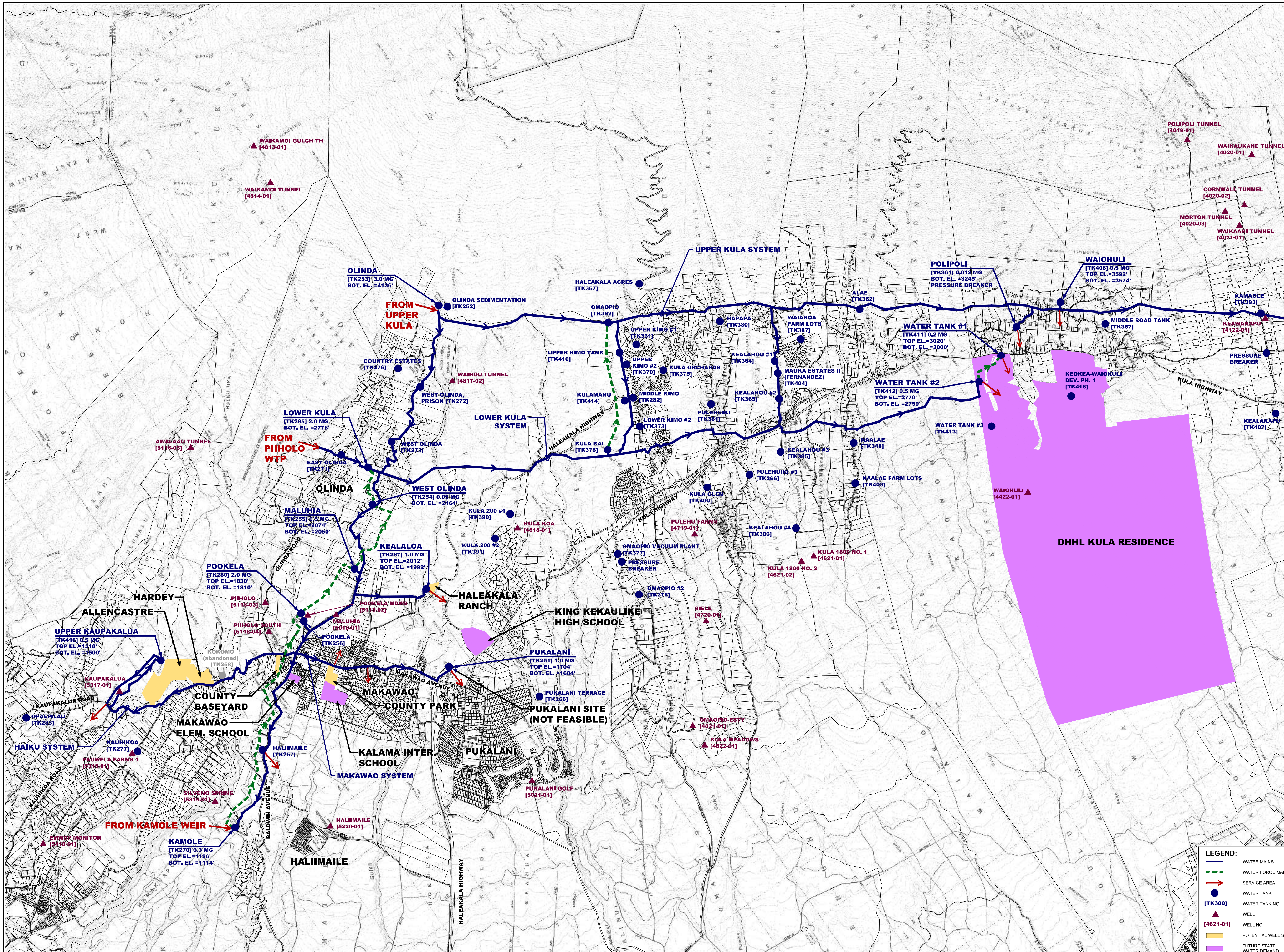
Site Plan
Proposed Kealaloa Tank Site

N

0 125' 250' 500'

FIGURE
1-3

FILE: G:\DLNR11-02 Upcountry Maui Ground Water Exploratory Well\700 RSP\700 Reports\708 EA - Haleakala Ranch\04 Civil Exhibits\Figure 1-3 Holokaia Ranch Site.dwg


UPPER KULA SYSTEM
OLINDA
[TK253] 3.0 MG
BOT. EL. =4136'
OLINDA SEDIMENTATION
[TK252]
FROM UPPER KULA
HALEAKALA ACRES
[TK367]
OMAOPIO
[TK392]
UPPER KIMO #1
[TK361]
HAPAPA
[TK380]
WAIAKOA FARM LOTS
[TK387]
ALAE
[TK362]
POLIPOLI
[TK361] 0.012 MG
BOT. EL. =3245'
PRESSURE BREAKER
WAIOHULI
[TK408] 0.5 MG
TOP EL.=3592'
BOT. EL. =3574'
MIDDLE ROAD TANK
[TK357]
KAMAOLE
[TK393]
KEAWAKAPU
[4122-01]
PRESSURE BREAKER
KULA HIGHWAY
KEALAKAPU
[TK407]
POLIPOLI TUNNEL
[4019-01]
WAIKAUKANE TUNNEL
[4020-01]
CORNWALL TUNNEL
[4020-02]
MORTON TUNNEL
[4020-03]
WAIKAANI TUNNEL
[4021-01]
WAIKAMOI GULCH TH
[4813-01]
WAIKAMOI TUNNEL
[4814-01]
WATER TANK #1
[TK411] 0.2 MG
TOP EL.=3020'
BOT. EL. =3000'
WATER TANK #2
[TK412] 0.5 MG
TOP EL.=2770'
BOT. EL. =2750'
WATER TANK #3
[TK413]
KEOKEA-WAIOKULI DEV. PH. 1
[TK416]
WAIOHULI
[4422-01]
DHHL KULA RESIDENCE
COUNTRY ESTATES
[TK276]
WAIHOU TUNNEL
[4817-02]
WEST OLINDA, PRISON [TK272]
UPPER KIMO TANK
[TK410]
UPPER KIMO #2
[TK370]
KULA ORCHARDS
[TK375]
KEALAHOU #1
[TK364]
MAUKA ESTATES II (FERNANDEZ)
[TK404]
KULAMANU
[TK414]
MIDDLE KIMO
[TK282]
KEALAHOU #2
[TK365]
PULEHUIKI
[TK381]
LOWER KIMO #2
[TK373]
LOWER KULA
[TK285] 2.0 MG
BOT. EL. =2778'
LOWER KULA SYSTEM
HALEAKALA HIGHWAY
KULA KAI
[TK378]
NAALAE
[TK348]
KEALAHOU #3
[TK385]
FROM PIIHOLO WTP
AWALAAU TUNNEL
[5116-05]
WEST OLINDA
[TK273]
EAST OLINDA
[TK271]
OLINDA
WEST OLINDA
[TK254] 0.05 MG
BOT. EL. =2464'
PULEHUIKI #3
[TK366]
NAALAE FARM LOTS
[TK405]
KULA GLEN
[TK400]
MALUHIA
[TK255] 0.5 MG
TOP EL.=2074'
BOT. EL. =2050'
KULA 200 #1
[TK390]
KULA KOA
[4818-01]
KULA HIGHWAY
PULEHU FARMS
[4719-01]
KEALAHOU #4
[TK386]
KULA 200 #2
[TK391]
KEALALOA
[TK287] 1.0 MG
TOP EL.=2012'
BOT. EL. =1992'
OMAOPIO VACUUM PLANT
[TK377]
PRESSURE BREAKER
KULA 1800 NO. 1
[4621-01]
KULA 1800 NO. 2
[4621-02]
POOKELA
[TK280] 2.0 MG
TOP EL.=1830'
BOT. EL. =1810'
OLINDA ROAD
OMAOPIO #2
[TK378]
HARDEY
PIIHOLO
[5118-03]
POOKELA MDWS
[5118-02]
HALEAKALA RANCH
ALLENCASTRE
KING KEKAULIKE HIGH SCHOOL
SELE
[4720-01]
PIIHOLO SOUTH
[5118-04]
MALUHIA
[5018-01]
UPPER KAUPAKALUA
[TK416] 0.5 MG
TOP EL.=1516'
BOT. EL. =1500'
KOKOMO (abandoned)
[TK258]
POOKELA
[TK256]
PUKALANI
[TK251] 1.0 MG
TOP EL.=1704'
BOT. EL. =1684'
KAUPAKALUA
[5317-01]
MAKAWAO AVENUE
KAUPAKALUA ROAD
COUNTY BASEYARD
MAKAWAO
COUNTY PARK
PUKALANI TERRACE
[TK266]
PUKALANI SITE (NOT FEASIBLE)
OPAEPILAU
[TK263]
MAKAWAO ELEM. SCHOOL
OMAOPIO ESTY
[4821-01]
HAIKU SYSTEM
KAUHIKOA
[TK277]
PAUWELA FARMS 1
[5318-01]
HALIIMAILE
[TK257]
KALAMA INTER. SCHOOL
PUKALANI
KULA MEADOWS
[4822-01]
MAKAWAO SYSTEM
KAUHIKOA ROAD
SILVEIRO SPRING
[5319-01]
PUKALANI GOLF
[5021-01]
BALDWIN AVENUE
HALIIMAILE
[5220-01]
FROM KAMOLE WEIR
EMWDP MONITOR
[5418-01]
KAMOLE
[TK270] 0.3 MG
TOP EL.=1126'
BOT. EL. =1114'
HALIIMAILE
HALEAKALA HIGHWAY
LEGEND:
WATER MAINS
WATER FORCE MAINS
SERVICE AREA
WATER TANK
[TK300] WATER TANK NO.
WELL
[4621-01] WELL NO.
POTENTIAL WELL SITE
FUTURE STATE WATER DEMAND
0' 800' 1600'

SOURCES:
- Distribution Maps dated 2010
- Maui DWS Correspondence

CREATED: 06/26/2012
CREATED BY: KHAA
REVISED: 3/28/18

Upcountry Maui Exploratory Potable Water Well

Upcountry Water System Schematic And Alternate Well Sites Considered

Prepared For: DLNR

AKINAKA & ASSOCIATES, LTD.
CONSULTING CIVIL ENGINEERS

FIGURE
1-4

FILE: G:\DLNR11-02 Upcountry Maui Ground Water Exploratory Well\700 RSP\700 Reports\708 EA - Haleakala Ranch\04 Civil Exhibits\Figure 1-4 Upcountry Water System.dwg

This Environmental Assessment (EA) concerns development of an exploratory well only. The viability of producing water on this site is not yet known. If testing of the exploratory well indicates an adequate quantity of water of acceptable water quality, another EA will be prepared to discuss the impacts related to conversion to a production well and subsequent use. The proportion that would be allocated for State projects versus that available to increase supply in the MDWS system would be subject to future negotiations based on the results of the well tests and system conditions at the time of negotiations. Therefore, discussion of future uses of the water will occur during the follow-on EA for a production well, should the exploratory effort prove successful.

In the event that a decision was made to convert the exploratory well to production, the proposed well's location near electric lines and the DWS Kealaloa Tank would facilitate well development and connection of the new source into the existing MDWS system. The location also integrates well into the Upcountry System from an operational perspective. Additional grading and other site work will be required to accommodate the construction of the production well and appurtenant facilities. Offsite work on Kealaloa Avenue and within nearby pastures may also be required for water transmission and electrical system improvements.

1.2 Purpose and Need for Project

The Hawai‘i DLNR is responsible for managing State-owned lands in ways that will promote the social, environmental and economic well-being of Hawai‘i's people and for insuring that these lands are used in accordance with the goals, policies and plans of the State. The purpose of development of an exploratory well is to gather data about the potential for utilizing groundwater as a supplement to surface water in the Upcountry area.

Currently, about 70 percent of average of 7.90 mgd water used in the Maui DWS's Upcountry system still relies on surface water intakes and treatment plants, including Olinda Water Treatment Plant (WTP), Piiholo WTP and Kamole WTP (Brown and Caldwell 2014). Well sources include Haiku Well, Kaupakalua Well, and the largest supplier, Pookela Well, which can produce 1.3 mgd. Even with all these sources, the reliable groundwater production capacity accounting for extended dry periods of about 2.0 mgd, leaving a shortfall.

Although surface water can be a good drinking water source under some conditions, there are many advantages to relying primarily on groundwater as opposed to surface water. The supply of groundwater is far less variable than surface water, the availability of which can be significantly reduced during droughts. The amount of treatment required is generally much less involved and also less expensive. In the Upcountry area, for example, water treated at Olinda has high levels of natural organic matter that includes dissolved organic carbon requiring chloramines to treat, which creates a different chemistry that prevents it from being mixed with other water. Even with treatment, there can be an earthy or musty taste or odor in drinking water, caused by naturally occurring compounds produced by the decaying of leaves and other organic material. Known as Geosmin and MIB (2-methyl isoborneol). Although not harmful to people, the

substances are detectable by the human nose even at very low concentrations, and some individuals are extremely sensitive to Geosmin.

Wells can be expensive to drill, pump and maintain (especially deep wells in higher elevation areas such as Upcountry). Surface water also requires considerable maintenance of intakes and miles of ditches. When the water utility does not own the water infrastructure or permits for leases and diversions, the water source can be insecure and unreliable in the long-term, as is the case with the water derived from the East Maui Irrigation System. Finally, over-dependence on surface water can lead to a situation where drinking water is competing with other beneficial uses such as habitat for native stream organisms and use for agriculture and native Hawaiian traditional and customary uses, as occurs with the stream sources of the Upcountry water.

Having an additional secure and reliable source can assist the State in meeting the potable water needs of future State projects in the Maui Upcountry area with required water demand. At this time, there are only limited potable water needs for Department of Education facilities. The demand was estimated at about 0.06 million gallons per day (mgd) in the latest comprehensive State Water Projects Plan (SWPP) (Hawai‘i CWRM 2003), although current anticipated needs are probably less. Sufficient potable water is also a critical element for Department of Hawaiian Home Lands (DHHL) in its Kēōkea-Waiohuli Tract Residential, Subsistence Agriculture and Community Use project (Hawai‘i DLNR 2017). Current needs are estimated at 0.8097 mgd, and which probably can be met by wells that could be located on site. This demand is just a snapshot in time, and there could be greater demand for this and other State projects in the future.

The DLNR does not operate a water system in Upcountry Maui, and instead would expect that any production well that might subsequently be developed at the Kealaloa Tank site, if the exploration well proves successful, would be integrated into the source inventory for the MDWS system. There is currently, and for the foreseeable future, a shortage of water in the Upcountry District. Requests for water service have far exceeded the existing supply. The MDWS maintains an “Upcountry Water Service Priority List for Building Permit Applications, Subdivision & Water Service Requests.” As of November 30, 2017, there were 1,728 requests pending, dating back to December 4, 2000. Part of MDWS strategy for meeting these needs involves incremental development of basal wells.

There are no additional surface sources available, and in fact the supply from existing stream sources is likely to diminish due to competing agricultural and beneficial instream uses. Additional research in groundwater availability will provide important information concerning the resource in the Upcountry region and ensure that State projects can be planned for the future with adequate water supply. **The purpose of the project is to explore the potential to develop groundwater of the appropriate quality and quantity to supply future State projects in the region as well as help provide a more stable balance of groundwater versus surface water for the local water system.**

1.3 Water System Details

The Maui County Department of Water Supply (DWS) is responsible for planning and operating water sources and systems that implement the County's General Plan. Island-wide, MDWS operates systems in four basic districts on the Island of Maui, with about 35,700 services. Island-wide, MDWS currently relies on groundwater for about 70 percent of its supply and stream water for about 30 percent. Each source has its advantages and disadvantages. The use of streams for potable water requires treatment, competes with agriculture, and may harm beneficial instream uses, while groundwater development faces high pumping costs, agricultural pollutants in many areas, and expensive new infrastructure.

According to the *Maui General Plan 2030*, the water systems of the Upcountry area serve the community plan region of Makawao-Pukalani-Kula and the Haiku portion of the Paia-Haiku community plan region (Figure 1-4). As discussed in the previous section, the Upcountry District has been supplied primarily by surface water sources; however, groundwater sources, particularly the Pookela Well, are available to supplement service the Upcountry system during periods of drought. The Upcountry District is one of the more complex MDWS areas, with its separate systems, range of source and service area elevations, and heavy reliance on surface water, making it vulnerable to drought conditions. The Upcountry District consists of the inter-connected Upper Kula System, the Lower Kula System and the Makawao System. The service area for the Makawao System is Haiku, Haliimaile, Makawao and Pukalani (Maui DWS 2017).

The Pookela Tank is the major hub for the water system. The MDWS has the ability to move water from the Haliimaile region to the Lower Kula System. The typical operation of the system consists of the Kamole WTP pumping water up to the Pookela Tank. The Pookela Tank then services the Makawao region, and supplies water to the Pukalani Tank and Haliimaile Tank. The Pookela Tank is also connected to the Upper Kaupakalua Tank. However, there are pressure breaks that prevent Pookela water from reaching the Upper Kaupakalua Tank. The Pookela Tank and Upper Kaupakalua Tank service the Haiku area, with the Upper Kaupakalua Tank being the primary source and the Pookela Tank as a backup. The source for the Upper Kaupakalua Tank is the Kaupakalua Well. The Pukalani Tank services the Pukalani region, and the Haliimaile Tank services the Haliimaile region. The Pookela Tank also pumps to the Maluhia Tank, which services the upper Makawao region and supplies the Kealaloa Tank, which is adjacent to the proposed well site. The Maluhia Tank pumps to the West Olinda Tank, then to the Lower Kula Tank, which services the Olinda and Lower Kula regions. The Upper Kula system is serviced by the Olinda Tank, whose source is the Olinda WTP, and services Olinda and Upper Kula. The system is also interconnected by gravity mains from the Olinda Tank, down to the Lower Kula Tank, then to the West Olinda Tank, the Maluhia Tank and finally back down to the Pookela Tank. In instances where upper elevation stream flows are good, the system can be operated from higher elevation to lower without requiring pumping.

If the exploratory well proves viable and a decision at some point is made to advance to a production well, a new well at the proposed site would present minimal problems of integration

into the existing MDWS system, since the Kealaloa Tank is directly adjacent. Development of a new source would relieve the Pookela Tank, allowing it to provide more water to the remainder of the Upcountry District.

1.4 Project Components and Budget

The project consists of an exploratory water well that would have a 27-inch diameter to about 100 feet below msl. The annular space between the 20-inch ASTM A-53 well casing and the bore would be properly grouted and sealed to prevent contamination.

If exploratory well testing indicates an adequate quantity of water of acceptable quality, it may be converted to a production well, with appurtenant facilities such as a control building, valves, water transmission piping, access driveway, electrical facilities, storm drains, and fencing. Some new on-site grading would likely be required to accommodate the construction of the appurtenant facilities. These facilities would be designed and evaluated if and when a decision is made to advance to a production well.

The budget for the exploratory well project, which is funded by the Hawai‘i State DLNR, is $3.2 million. Design would be finished and construction is planned to begin within six months of completion of the EA process. Drilling and testing of the well would take approximately one year.

1.5 Alternatives Considered

1.5.1 Exploratory Well Alternative at Kealaloa Tank

This refers to the proposed project, which is described in Section 1.4, above.

1.5.2 Alternative Exploratory Well Sites

The feasibility of various alternative well sites was considered during the planning process for the exploratory well. Akinaka & Associates, Ltd. was retained by DLNR in May 2012 to prepare a Site Assessment Study for six potential exploratory Upcountry well sites based on several criteria: Pukalani Tank, Haleakala Ranch, County Park, County Baseyard, Allencastre and Hardey (see Figure 1-4 for location of sites). Four sites had been identified by DLNR and two by MDWS. The purpose of this study was to evaluate the attributes of the six sites and to provide a recommendation based on a comparative analysis of political boundaries and legal issues, anticipated hydrogeological conditions, well drilling operations, infrastructure and integration, and general environmental considerations. Factors were weighted based on their importance.

The result of the original analysis was that the Pukalani Tank site represented the optimal site for development of an exploratory well. The site presented no boundary issues, lacked sensitive cultural or biological resources, integrated well into the DWS system, and had the potential to

produce sufficient water and the required infrastructure to support well drilling operations. Therefore, as discussed in Section 1.1, DLNR proceeded with an EA for an exploratory well at the Pukalani Tank site. Comments on the Draft EA as well as subsequent environmental research indicated that a well at this site may have a higher potential to be contaminated with pesticides formerly used on pineapple fields than the hydrologist had expected, to an extent that could make the water quality unsuitable. DLNR decided to not utilize this site and withdrew the Draft EA and the Anticipated Finding of No Significant Impact for that project on February 23, 2017.

The need to acquire data concerning the developable groundwater resources of the Upcountry region remains. In the six years since the original analysis, the DWS and others have identified pesticide contamination risk as one of the primary decision factors, and DLNR has also decided to include estimates of drilling costs as a factor in the analysis. Inclusion of these criteria has provided a broader and more robust basis of comparison. The general area was also re-evaluated to determine if any new sites with characteristics sufficiently distinct from those originally proposed might offer advantages. During this process, the site originally proposed for Haleakalā Ranch, which was at 1,800 feet in elevation on Kealaloa Avenue on TMK 2-4-060:005, was dropped in favor of a better site near Kealaloa Tank. For all these reasons, when the current project to develop an exploratory well in Upcountry was re-initiated, a new comparison of the alternative sites was undertaken. The following provides a site by site comparison of each alternative site, along with the reason that only the Kealaloa Tank site has been advanced for detailed consideration in the Draft EA. The criteria considered to be of most importance in the comparative analysis were the following:

Land Use Classification, Land Acquisition and Legal Issues. This factor considers the effort and expense with which land could be acquired in fee or as an easement and legally utilized. For comparative purposes, the property tax market land value has been used as a basis for cost per acre for non-government land. The land values listed are not intended to be used as a basis for cost estimation and simply represent values derived from a common source that can be used for comparison purposes only. This criterion also considers whether a land use permit or special environmental permit would be required to develop the site as not only an exploratory but also a production well. Per the Maui County Code of Ordinances Chapter 19.08, Residential Districts, public utility substations that are not and will not be hazardous or a nuisance to the surrounding area are declared special uses, and approval of the appropriate planning commission shall be obtained. Per Chapter 19.30A, Agricultural District, minor utility facilities are permitted without a land use permit, which include water wells, tanks and distribution equipment. Finally, this factor considers whether development of a well on the site could have legal issues that might prevent or significantly slow construction of a well.

Infrastructure/Integration. This criterion relates to the ease with which an exploratory well could be developed and eventually converted to a production well and integrated into the Maui DWS system of wells, reservoirs, and transmission water lines. Offsite costs when an exploratory well is converted into a production well figure into this criterion.

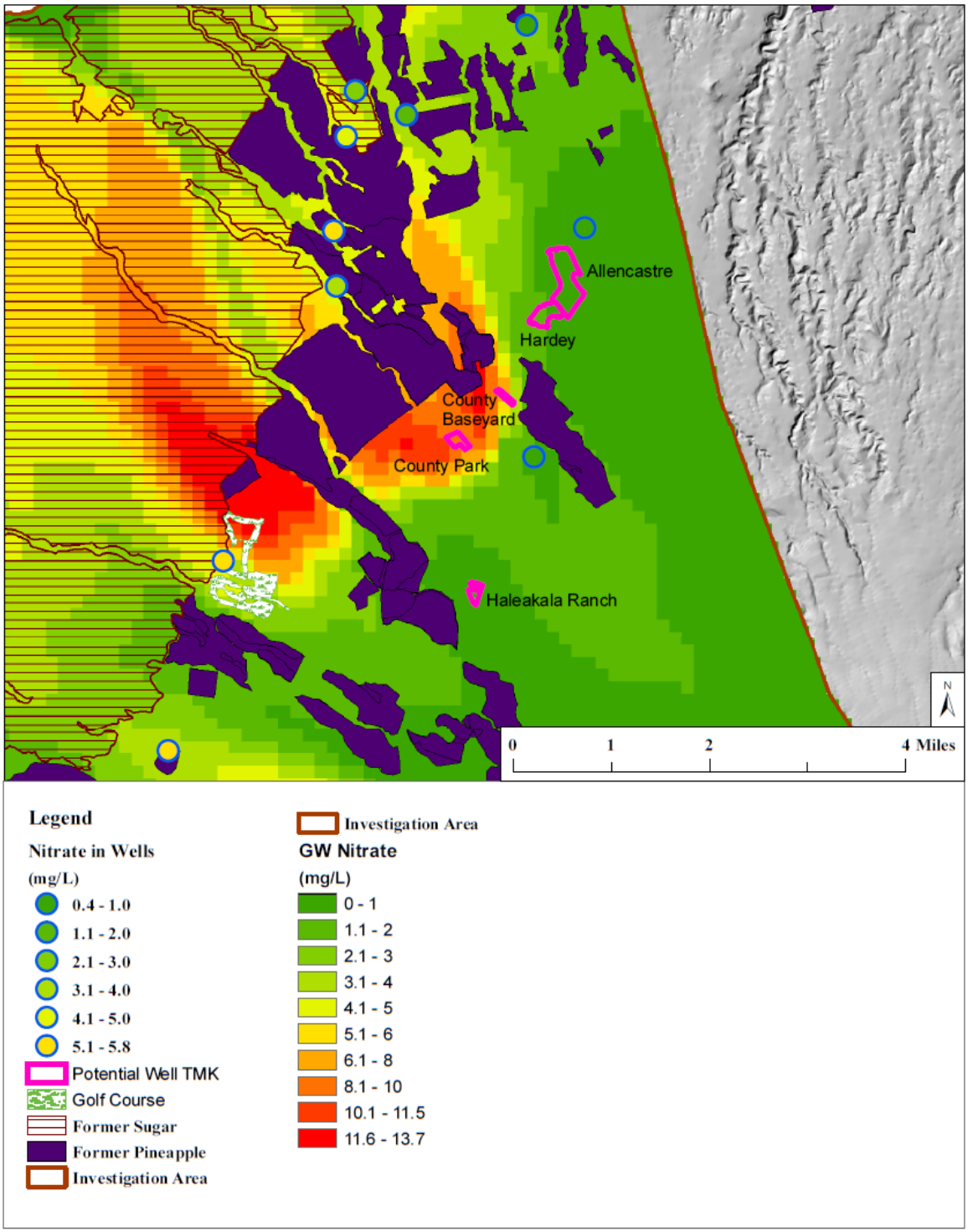
General Environmental. General environmental factors include sensitive native species, dense vegetation that provides wildlife habitat or scenic value, nearby watercourses that require avoidance and protection, known archaeological resources, and onsite recognized environmental conditions such as fuel storage tanks, registered hazardous material users, and nearby cesspools.

Potential for Nitrate Contamination. The Hawai‘i Department of Health (2017) prepared a draft report to determine the source and pathways of the elevated nitrate concentrations in the groundwater in Upcountry Maui. The report included an analysis of the chemical and physical parameters of the groundwater in Upcountry Maui based on sampling of wells. Elevated nitrates can adversely impact current and future public drinking water sources, as nitrate in drinking water can interfere with the transport of oxygen in the bloodstream of young children, and its presence in groundwater is thus strictly regulated. A well at the Pukalani Golf Course and another at Baldwin Ranch Estates (BRE-1) were found to have nitrate concentrations of more than 6.0 milligrams per liter (mg/L), close to the 10 mg/L State and Federal Maximum Contaminant Level (MCL) for nitrate in drinking water. Nitrate removal systems can ensure the safety of the water customers but increase the cost of the water. In areas of Hawai‘i with little human impact, concentrations of nitrates are generally very low, less than 0.5 mg/L, although naturally high levels can occur. Most areas with higher nitrate values are associated with sugar cane or seed corn agriculture. Onsite sewage disposal systems (OSDS), confined animal feed operations, golf courses, and former pineapple agriculture may also contribute. Analysis of nitrogen isotopic compositions can help pinpoint the source. The Hawai‘i DOH draft report mapped nitrate concentrations based on these factors, and an edited map from the report is included as Figure 1-5.

Potential for Pesticide Contamination. Two soil fumigants previously used by pineapple growers, 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane or ethylene dibromide (EDB), have been detected in several wells on O’ahu and Maui. The potential for aquifer pesticide contamination associated with former pineapple fields was evaluated based on 1) proximity to former pineapple fields, particularly on or directly uphill from the site, and 2) proximity to known areas of pesticide mixing, storage or spills/ mishandling. Former pineapple fields are included on the Hawai‘i DOH map reproduced as Figure 1-5.

Cost to Construct. This criterion considers the approximate cost to acquire permits, mobilize at the site, to prepare the site through grading, vegetation removal and fencing, to drill and case the well, and to perform all necessary well tests. The major factor influencing the cost of the well is the presumed depth to the water table. The cost to integrate with the Maui DWS system is not considered here, but it is a factor in the infrastructure/integration criterion.

Figure 1-5 Groundwater Nitrate Levels and Former Sugarcane and Pineapple Lands



The following five sites, four of which were considered in the 2012 study, with one new site on Haleakala Ranch adjacent to Kealaloa Tank, were considered for detailed comparison (see Figure 1-4). They represent diverse locations and land use contexts and are all potentially useable.

- County Park
- Kealaloa Tank
- County Baseyard
- Hardey
- Allencastre

The five sites are described below individually and compared utilizing the evaluation criteria.

County Park. 13.68-acre County of Maui property in Makawao, at 931 Makawao Avenue on TMK 2-4-006:005.

The site is currently open space, adjacent to playing fields in the County Park. Development of this site for an exploratory well would require approvals and potential costs related to the use of County land. If, in the future, DLNR reached an agreement and transferred ownership of a production well to the Maui DWS, no land acquisition would be required, because the site is already County land. The site is zoned residential, and approval of the planning commission would be required for development of a production well.

The site contains adequate access, overhead power lines from Makawao Avenue, and paved surfaces sufficient to support the required construction equipment. The site is secure with perimeter fencing. It is already relatively level. Minimal additional grading would be required, not exceeding four feet in vertical height and extending to less than an acre, exempting the work from the need for a Grading Permit. The approximate cost of the exploratory well here would be $2.7 million.

An important consideration for this site is the problem of eventual integration into the existing Maui DWS system. This would require approximately one mile of force main installed along Makawao Avenue and Olinda Road to supply the Pookela Tank. New force mains within these streets would be challenging to construct and highly disruptive to traffic, due to the high density of existing utilities, especially at the intersection of Makawao Avenue and Olinda Road. Furthermore, future expansion of this site to accommodate the infrastructure necessary for a production well and associated facilities may be limited due to the existing playfields, courts and parking needs of the County Park. Both the exploratory and any subsequent production well could have temporary or permanent negative effects on the aesthetics and sound levels of the park.

As with all of five of the alternative sites considered, biological survey determined that virtually all the plants on the sites were non-natives, with none listed or proposed as

threatened or endangered species. There are no nearby watercourses that require special protection during construction or operation. Because of the urban setting, there are a number of industrial and commercial facilities nearby that required investigation for potential recognized environmental conditions. A Phase I Environmental Site Assessment (ESA) found one leaking underground storage facility (LUST) approximately 1,500 feet northeast of the site at the Minit Stop Makawao. Six individual wastewater treatment systems (septic tanks) were identified at the County Park/Eddie Tam Center, and a number of other cesspools and septic tanks were noted within a quarter mile of the site. Based upon maps provided by the State DOH, as shown in Figure 1-5, the site would be expected to have high levels of groundwater nitrates, possibly in excess of MCLs that would entail the need for treatment. It is surrounded on three sides by former pineapple fields, but mostly at a distance of one-half mile or more, with none upslope.

Kealaloa Tank. 11.054-acre Haleakalā Ranch Co. site located adjacent to the Maui DWS Kealaloa Tank, on Haleakalā Ranch, at 675 Kealaloa Avenue on TMK 2-4-010:002.

The site is currently in use as pasture. Development of this site for an exploratory well would require an agreement with the land owner for monetary compensation or compensation of water credits or service; if, in the future, DLNR or DWS developed a production well, land acquisition or an easement would likely be required. The market value of land on this property as listed in County tax records is approximately $52,000 per acre. The site is zoned Agricultural, and no land use permits are necessary.

Existing access to the site is through a driveway to the DWS Kealaloa Tank off Kealaloa Avenue and a proposed well site access road could use the existing driveway, or another access off Kealaloa Road if necessary. Although grading would only involve a little over half an acre, the quantity of material moved and the vertical depth of grading will require a grading permit. Electrical power will need to be brought to the site from electrical lines within Kealaloa Road. With grading of more than an acre a vertical depth of grading of more than four feet, a Grading Permit will be required. The approximate cost of the exploratory well here would be $3.20 million.

Integration into the existing Maui DWS system would be fairly simple, as the new exploratory well site is located next to the existing Maui DWS Kealaloa Reservoir Tank [TK287]. A relatively short length of pipe could be installed to connect the well pump to the influent line of the Kealaloa Tank. The Kealaloa Tank receives water from the DWS system from the Maluhia Tank through a waterline running down Olinda Road and then along Kealaloa Road. The Kealaloa Tank provides water to King Kekaulike High School and some areas in upper Pukalani region.

There are no nearby watercourses that require special protection during construction or operation. The Phase I ESA conducted for the site did not indicate any recognized environmental conditions in the area. Two septic systems and one cesspool are known to

be located within a quarter mile of the site. Based upon maps provided by the State DOH, as shown in Figure 1-5, the site would be expected to have very low levels of groundwater nitrates. It is near former pineapple fields on only one side, with no field directly upslope (the southwest) surrounded on three sides by former pineapple fields, but mostly at a distance of one-half mile or more.

County Baseyard. 5.3-acre County of Maui property located at 1285 Makawao Avenue, on TMK 2-4-017:021.

The site is currently in use as part of parking area for the baseyard. Development of this site for an exploratory well would require approvals and potential costs related to the use of County land; if, in the future, DLNR reached an agreement and transferred ownership of a production well to the Maui DWS, no land acquisition would be required. The site is zoned Agricultural, and no land use permits are necessary.

The site contains adequate access and overhead power lines from Makawao Avenue and paved surfaces sufficient to support the required construction equipment. It is already relatively level. An access road may be required to access the site from the existing paved areas, but the total grading area is anticipated to be less than one acre, and site work would probably be exempt from the need for a Grading Permit. The approximate cost of the exploratory well here would be $3.20 million.

Integration into the existing Maui DWS system would require approximately 0.65 miles of force main installed along Makawao Avenue and Olinda Road to supply the Pookela Tank. Just as with the County Park site, new force mains within these streets would be challenging to construct and highly disruptive to traffic, due to the high density of existing utilities, especially at the intersection of Makawao Avenue and Olinda Road. Future expansion of this site to accommodate the infrastructure necessary for a production well and associated facilities may be limited, since the County Baseyard is also on this site, and expansion of either would limit expansion of the other.

There are no nearby watercourses that require special protection during construction or operation. As with the County Park site, because of the urban setting, there are a number of industrial and commercial facilities nearby that required investigation for potential recognized environmental conditions. A Phase I Environmental Site Assessment (ESA) determined that one leaking underground storage facility (LUST) was present approximately 1,690 feet southwest of the site at the Minit Stop Makawao. One individual wastewater treatment system (septic tank) was identified onsite, and a number of other cesspools and septic tanks were noted within a quarter mile of the site. Based upon maps provided by the State DOH, as shown in Figure 1-5, the site would be expected to have moderate high levels of groundwater nitrates, probably not in excess of MCLs that would entail the need for treatment, although this would of course require

verification through water testing. It is directly downslope of former pineapple fields, which creates concern for contamination by potential pesticides.

Hardey. 29.9-acre site owned by the William Groves Hardey Trust, located at 2741 Kaupakalua Road in Haiku, on TMK 2-7-001:055.

The site is currently in use as pasture. Development of this site for an exploratory well would require an agreement with the land owner for monetary compensation or compensation of water credits or service; if, in the future, DLNR or DWS developed a production well, land acquisition or an easement would likely be required. The market value of land on this property as listed in County tax records is approximately $103,000 per acre. The site is zoned Agricultural, and no land use permits are necessary.

Infrastructure improvements needed at this site would include an access road, well site grading and development, and an electrical power connection. Existing access to the site is off Kaupakalua Road, and a proposed well site access road could use the existing driveway. The property already has electrical power through overhead lines from Kaupakalua Road, and a developed well site could receive power from this point as well. The extent of new power lines would be dictated by the precise location selected for the exploratory well on this large property. With grading of more than an acre and a vertical depth of grading of more than four feet, a Grading Permit would be required. The approximate cost of the exploratory well here would be $2.59 million.

Integration into the existing MDWS system would require approximately 1.8 miles of force main installed along Kaupakalua Road, Makawao Avenue and Olinda Road to supply the Pookela Tank. As with the County Park and County Baseyard sites, new force mains within these streets would be challenging to construct and highly disruptive to traffic, due to the high density of existing utilities, especially at the intersection of Makawao Avenue and Olinda Road.

There are no nearby watercourses that require special protection during construction or operation of the well. No recognized environmental conditions or septic tanks existed on the site, and in particular there were no LUSTs, USTs or ASTs identified within a quarter mile of the site. However, with a quarter mile radius there were five septic tanks and four cesspools, as well as three confined animal feeding facilities and a gas station. Based upon maps provided by the State DOH, as shown in Figure 1-5, the site would be expected to have low to very low levels of groundwater nitrates. Although former pineapple fields are within about one-half mile to the south, they are not directly uphill from the site.

A very significant issue related to this site is that it is within the boundaries of a Consent Decree between the Coalition to Protect East Maui Water Resources v. Board of Water Supply, Civil No. 03-1-0008(3). The Consent Decree requires "...studies to be conducted

before any further effort is made to develop groundwater resources in the agreed-upon portion of the East Maui region". Additionally, as part of this consent decree "the County agrees to consult with representatives or designees of Plaintiffs with respect to any future plan to develop water resources in the agreed-upon portion of the East Maui Region, including but not limited to on the studies, reports, analyses reference above, any new plan to develop groundwater in the agreed-upon portion of the East Maui Region and any new EA or EIS for this new plan." It is not known whether the extensive efforts necessary to conduct such studies and environmental documents would result in a well site that satisfied the plaintiff's concerns sufficiently. Although DLNR is developing the well and the Consent Decree is an agreement between the County of Maui Board of Water Supply and named Plaintiffs, since DLNR intends to transfer ownership of the well to the County of Maui, the Consent Decree requirements may be applicable. There are a number of uncertainties regarding developing any well inside the Consent Decree area.

Allencastre. 88.055-acre site owned by Audrey A. Allencastre Trust, located at 2299 Kaupakalua Road, Haiku, on TMK 2-7-027:012.

The site is currently in use as pasture. Development of this site for an exploratory well would require an agreement with the land owner for monetary compensation or compensation of water credits or service; if, in the future, DLNR or DWS developed a production well, land acquisition or an easement would likely be required. The market value of land on this property as listed in County tax records is approximately $34,000 per acre. The site is zoned Agricultural, and no land use permits are necessary.

Infrastructure improvements at this site would include an access road, well site grading and development, and electrical power connection. Existing access to the site is off Kaupakalua Road and a proposed well site access road could use this existing driveway. Maui DWS identified a possible well site location near the property line between the Hardey and Allencastre sites. Separating these two sites is the Kapuaahoo Gulch. The access to the site would is currently over a 2,000-foot long, 4WD road. The existing dwellings on site have electrical power through overhead lines from Kaupakalua. Power could be brought to the well site from Kaupakalua Road through an easement which follows the graded access road. With grading of more than an acre and a vertical depth of grading of more than four feet, a grading permit would be required. The approximate cost of the exploratory well here would be $2.45 million.

Integration into the existing MDWS system would require approximately 2.18 miles of force main, assuming the pipeline crossed the Kapuaahoo Gulch and pipeline easements were obtained through the Hardey Site. Crossing the Kapuaahoo Gulch would be complex. In order to avoid costly, uncertain and time-consuming Section 404 and Section 401 of the Clean Water Act permit procedures, it is advised that the crossing not affect the stream bed or channel. This would require bridging, tunneling, or other methods, which could also be costly. The force main would then be installed along Kaupakalua

Road, Makawao Avenue and Olinda Road to supply the Pookela Tank. As with the County Park, County Baseyard and Hardey sites, new force mains within these streets would be challenging to construct and highly disruptive to traffic, due to the high density of existing utilities, especially at the intersection of Makawao Avenue and Olinda Road.

No watercourses would be affected by the well site itself, but as discussed above, ultimate connection to the water system would require several that require special protection during construction or operation. These include crossings of Maliko Gulch and Kapuaahoohui Gulch at locations where no stream crossing structure currently exists. Extensive vegetation disturbance would be necessary, including some riparian habitat in the gulch. Timing woody vegetation removal to avoid impacts to Hawaiian hoary bats would be a critical factor, as so much vegetation would require removal. No recognized environmental conditions or septic tanks existed on the site, and particular there were no LUSTs, USTs or ASTs identified within a quarter mile of the site. However, within a quarter-mile radius there were two septic tanks and three cesspools, as well as two confined animal feeding facilities. Based upon maps provided by the State DOH, as shown in Figure 1-5, the site would be expected to have low to very low levels of groundwater nitrates. Although former pineapple fields are within about one-half mile to the south, they are not directly uphill from the site.

This site is also within the area covered by the Consent Decree, and planning, studies and development of any well in this area shares the same risks and uncertainties.

Comparison of Alternative Exploratory Well Sites

After consideration of the advantages and disadvantages of each of these potential sites, only the Kealaloa Tank Site was advanced for full consideration as an alternative for the EA. The only disadvantages of the site are that it would require land acquisition and is the most expensive of the alternatives to construct. Conversely, it would among the least expensive and difficult to integrate into the existing system should a production well ever be proposed at the site, because if would avoid the significant issues related to construction of force mains associated with all other sites. It would also avoid substantial traffic disruption in Makawao Town associated with any production well. The site appears, along with the Hardey and Allencastre sites, to be free of any substantial risk of nitrate or pineapple pesticide contamination, based on land use maps and DOH groundwater models. Also, like the Hardey and Allencastre sites, it would not require discretionary land use approvals, but unlike them, it is not subject to the consent decree that might prevent use of the well in the DWS system. The Kealaloa Tank Site was the only potential site without a number of deficiencies.

1.5.3 Other Options

It is recognized that there are other alternative strategies to supply and/or conserve additional water that can be used to satisfy some of the potable and non-potable water needs in Upcountry Maui. These include not only surface water, as discussed above, but also catchment, wastewater re-use and desalination. Wastewater re-use can be particularly important. The County of Maui enacted a mandatory recycled water use ordinance in 1995, and in 1997 became the only county in the State to establish rules for recycled water use. Soon after, the Kihei and Lahaina Wastewater Reclamation Facilities upgraded to produce R-1 quality recycled water for its customers. The Wastewater Reclamation Division uses recycled water from all five of its facilities. Distribution systems have been developed in South Maui and West Maui. South Maui has the most complete distribution system at this time and as a result, the most water reuse projects. The South Maui system now provides recycled water to eighteen separate projects, with more scheduled to connect to the distribution system in the near future. Uses include landscape irrigation, agricultural irrigation, fire control, industrial cooling, composting, construction activities, and toilet and urinal flushing.

There is also value in optimizing the distribution of existing potable and non-potable supplies. Gradually under development is a modern and efficient agricultural water system that is a cooperative project among the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), the Hawai‘i Department of Agriculture, the Maui DWS and the Olinda-Kula Soil and Water Conservation District. For several decades there has been a long-range plan to supply untreated irrigation water from the Kahakapo Reservoir to farmers in the Upper Kula area, to be operated by MDWS. The $9.274 million project, which requires over 29 miles of main or lateral pipeline, will benefit over 170 farmers with approximately 500 acres of unique, high value truck and ornamental crops.

Additional interconnection of adjacent water systems can sometimes increase supply, particularly when an emergency exists in only one of the systems. Demand-side management (DSM) encompasses actions taken by a utility to promote conservation by the utility’s customers. This is now a critical strategy in resource planning for water utilities. Although such actions often have substantial costs, they provide net savings relative to the costs the utility and its customers would otherwise incur to develop and operate new supply resources. This is particularly apt for the Upcountry District, where new supplies involving pumped groundwater are inherently costly. Additional implementation and monitoring of such measures is required.

However, as important as the above programs are in the overall scheme of supplying potable water in the County of Maui, additional development of groundwater is critical for the Upcountry system. None of these strategies satisfy the purpose and need of the project to explore the potential to develop groundwater of the appropriate quality and quantity to supply future State projects in the region as well as help provide a more stable balance of groundwater versus surface water for the local water system.

1.5.4 Selection of Project Alternative

DLNR has determined that the most rational and efficient strategy for exploring the groundwater resources of the Upcountry area is to construct an exploratory well at the Kealaloa Tank site. The decision to advance this alternative was based on satisfaction of the following criteria:

- Based on its location in the aquifer, the well is expected to produce water of a quality that meets all applicable requirements at a rate of between 0.7 and 1.0 million gallons per day.
- No substantial adverse biological, cultural, historical, socioeconomic or environmental effects are expected.
- When all environmental, land use, system integration and cost factors are considered, there are no alternative sites that offer a better, or even comparable, location for an exploratory well.
- No alternative strategies would supply the information that DLNR requires to determine if an adequate groundwater source exists.

1.6 Consistency with Government Plans and Policies

The project is highly consistent with government plans and policies, which in general call for water systems that meet the needs of residents, support planned growth, and minimize environmental degradation. The following sections discuss consistency with key plans.

1.6.1 Hawai‘i State Plan

The Hawai‘i State Plan was adopted in 1978. It was revised in 1986 and again in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended). The Plan establishes a set of goals, objectives and policies that are meant to guide the State’s long-term growth and development activities. The proposed project is consistent with State goals and objectives that call for increases in employment, income and job choices, and a growing, diversified economic base extending to the neighbor islands.

The sections of the Hawai‘i State Plan most relevant to the proposed project are centered on the theme of facility systems. The following objectives and policies are taken from the section dealing with water development.

- Objective a): Planning for the State’s facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational and other needs within resource capacities.
- Objective b: To achieve the facility systems water objective, it shall be the policy of this State to:
    (1) Coordinate development of land use activities with existing and

potential water supply.

(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.

(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.

(4) Assist in improving the quality, efficiency, service and storage capabilities of water systems for domestic and agricultural use.

(5) Support water supply services to areas experiencing critical water problems.

(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.

The proposed project supports all relevant objectives and policies of the Hawai‘i State Plan.

1.6.2 Hawai‘i State Water Plan

The State Water Code, Chapter 174C, HRS, recognizes the need for a program of comprehensive water resources planning to address the problems of supply and conservation of water and establishes the Hawaii Water Plan as the guide for implementing this policy. The Hawai‘i Water Plan consists of five constituent parts: 1) a Water Resource Protection Plan (2008), prepared by the Commission on Water Resource Management (CWRM); 2) a Water Quality Plan (1990), prepared by the Department of Health; 3) a State Water Projects Plan (2003), prepared by the Engineering Division of the Department of Land and Natural Resources; 4) an Agricultural Water Use and Development Plan, prepared by the Department of Agriculture (2004); and 5) Water Use and Development Plans prepared by each separate county, which, for Maui, was developed in 1990 and is in the process of being updated (see Section 1.6.3, below).

The Water Resource Protection Plan and the Water Quality Plan provide the overall legal and policy framework that guide the development, conservation, and use of water resources. The State Water Projects Plan and Agricultural Water Use and Development Plan provide information on State and agricultural water needs and development plans. All this information is then integrated into the County Water Use and Development Plans (WUDP), which set forth the broad allocation of land to water use within each county.

Water Resource Protection Plan (WRPP)

The objective of the Water Resource Protection Plan (WRPP) is to protect and sustain ground and surface water resources, watersheds, and natural stream environments statewide. Such protection requires a comprehensive study of occurrence, sustainability, conservation, augmentation and other resource management measures.

Specifically, the State Water Code provides that the WRPP shall include, but not be limited to:

- Nature and occurrence of water resources in the State;
- Hydrologic units and their characteristics, including the quantity and quality of available resource, requirements for beneficial instream uses and environmental protection, desirable uses worthy of preservation by permit, and undesirable uses for which permits may be denied;
- Existing and contemplated uses of water, as identified in the water use and development plans of the State and the counties, their impact on the resources, and their consistency with objectives and policies established in the water resource protection quality plan; and
- Programs to conserve, augment, and protect the water resource.

The 556-page plan presents abundant background information, data, policies and recommendations. Most relevant to the proposed action are the following goals:

- Foster the collaborative development, implementation, and update of short- and long-range plans for conserving and augmenting water supplies.
- Promote coordination and cooperation among agencies and private entities.
- Provide guidance, assistance, and oversight in the establishment, development, and implementation of statewide water conservation and augmentation programs.
- Encourage coordination between conservation activities and augmentation planning.
- Promote the utilization of the best available information and technology in planning and implementing conservation and augmentation projects.
- Provide the regulatory and planning framework for integrating resource conservation and augmentation into a comprehensive water management program.
- Support county and community-based conservation efforts by providing information resources and advisory assistance.
- Encourage water conservation and use of alternative water sources, whenever possible, through comments provided during land use planning and permitting review.

In relation to the proposed project, these goals are being met through development of a groundwater resource in a sustainable manner by an agency for use in necessary public projects that will incorporate water conservation measures in the form of low-use fixtures, xeric landscaping, etc.

Water Quality Plan (WQP)

The Department of Health (DOH) is responsible for the preparation of the Water Quality Plan (WQP). The WQP outlines the regulations, standards, and resource management policies that define the quality to be maintained in ground- and surface-water resources, such as:

- Federal/state/county goals, objectives, and policies related to water quality.

- Water quality criteria for designation of water management areas.
- Water quality standards, monitoring requirements and enforcement provisions.
- The identification of any substances which DOH reasonably believes may present a danger to the water quality of the State.

The DOH is currently undertaking numerous program efforts that will contribute to the update of the WQP. Such programs include the Source Water Assessment Program (SWAP), and various other water quality efforts, including the surface water studies regarding total maximum daily loads and identification of impaired water bodies. Results of these ongoing program efforts, such as SWAP, will be outlined in an updated WQP.

The proposed Kealaloa Tank exploratory well project is consistent with the WQP in that it will provide data that would assist in developing a source of high-quality groundwater for potable use that substitutes for surface water of lesser quality that may have more beneficial instream or agricultural uses that do not require treatment.

State Water Projects Plan (SWPP)

The Engineering Division of the DLNR has accountability for State projects and is responsible for the preparation of the State Water Projects Plan (SWPP) in conjunction with CWRM and other State agencies. The purpose of the SWPP is to provide a framework for planning and implementation of water development programs to meet projected demands for State projects over a 20-year planning horizon. The objective of the SWPP is to review current and future state water projects to insure orderly authorization and development of the State's water resources. The SWPP includes:

- An inventory of existing State wells, stream diversions and water systems;
- Identification of proposed States projects/developments;
- Assessment of future water demand projections;
- A water development strategy, strategy implementation and recommendations; and
- Incorporation of State agricultural water needs as outlined in the Agricultural Water Use and Development Plan.

Each State department is surveyed to inventory existing and proposed State sponsored projects, associated water requirements by island and hydrologic unit, and proposed sources to meet the demand. Agency plans for future source development should be coordinated with DLNR and integrated within the County Water Use and Development Plans.

The first SWPP report covering all agencies was completed in 2000, and a revised SWPP report was completed in 2003. In 2007, the State Water Master Plan for O‘ahu was completed, which examined water requirements only for O‘ahu State projects and analyzed in depth the implementation costs associated with meeting such requirements. The SWPP was partially updated in 2017 (http://dlnr.hawaii.gov/cwrm/planning/hiwaterplan/swpp/). Due to budgetary

constraints, DLNR decided that only the Department of Hawaiian Home Lands (DHHL) projects would be considered for this update of the SWPP. DHHL was selected for the following reasons: DHHL possesses the largest area of land of all State agencies and thus could have significant impact and requirements on water resources. In addition, water needs of DHHL are public trust uses of water and have a special protection and priority in the State Water Code.

DHHL requirements in the Upcountry service area involve Kēōkea/Waiohuli, which is a large mixed-use tract. The future Residential, Subsistence Agriculture and Community Use land use areas that will require water are limited to the *mauka* half of the tract in the time frame of the SWPP update. DHHL has a Water Credits Agreement with the County of Maui Department of Water Supply (MDWS) signed on December 9, 1997 in which MDWS committed 0.5 MGD of potable water per average day to DHHL for homesteading use in exchange for DHHL improvements to the water system. The agreement stipulates that MDWS shall not impose any time limitations on DHHL to draw or use such reservation of potable water from the MDWS system. Two existing developments, the 321-unit Kula Unit 1, and the 44-unit Hikina infill developments, already used 0.219 MGD of the water credits, leaving a remaining balance of 0.281 MGD for future use. The Kēōkea Phase 1-4 project proposes 320 Residential units, 66 Subsistence Agriculture units and 69 acres of Community Use, for which the total potable demand is 0.3489 MGD; therefore, these remaining credits will not be able to service all of this development. According to the Maui Island Plan (MIP), the existing storage and transmission infrastructure is adequate to service the Residential and Sub Ag lots; however, LDD has indicated that the existing well is “at the end of the line” for reliability. The remaining 768 proposed Residential units and approximately 40 acres of Community Use that will be located below the 2,400-foot elevation will require a new water system. To meet this demand, DHHL plans to upgrade an existing exploratory well at the 1,900-foot elevation in the Waiohuli Tract (located in the Kamaole Aquifer System, south of and outside the Makawao Aquifer System) to a production well, and to eventually construct another well (Hawaii State DLNR 2017).

Non-potable water will be required for irrigation of the Subsistence Agriculture lands, which could be supplied by the USDA-NRCS Upcountry Maui Irrigation System, discussed in Section 1.5.3. The 1997 Final Watershed Plan Environmental Impact Statement indicated that there would be nine lateral systems supplied by the main pipeline, including the DHHL Kēōkea area. Due to budgetary considerations, DOA has indicated that they do not have any plans to construct the lateral to service the Kēōkea area, but that DHHL could construct this lateral at its own cost. Nevertheless, it is expected that the DHHL demands will be reflected in the upcoming AWUDP update. DOA indicated that the current supply of water from MDWS may not be adequate to even service the proposed project area identified in the 1997 watershed plan. The 2017 SWPP Update recommended that a coordinated effort be undertaken between DHHL, DOA and MDWS to determine the feasibility of utilizing the Upcountry Maui Irrigation System to supply the non-potable demands and, if so, to ensure that costs of the Kēōkea lateral are reflected in the AWUDP.

The proposed Kealaloa Tank exploratory well project is consistent with the SWPP in that it will provide data that may eventually assist in developing a source of high-quality groundwater for potable use for State projects that are currently proposed or may be proposed in the future.

Agricultural Water Use and Development Plan (AWUDP)

The Hawai‘i Department of Agriculture (HDOA) is responsible for the preparation of the Agricultural Water Use and Development Plan (AWUDP), which originated as a response of the State Legislature to the closing of large sugarcane plantations in the 1990s. Agricultural lands are extensive and can require significant quantities of water to maintain productivity.

The AWUDP (current plan dates from 2003) is intended to promote the agricultural self-sufficiency of the State and protect this important State resource. The major objective of the AWUDP is to develop a long-range management plan that assesses State and private agricultural water use, supply and irrigation water systems. The plan is intended to be a master irrigation inventory plan which identifies demand and system rehabilitation needs and prioritizes system repair. It includes identifying options for development of additional and alternative irrigation water sources and for conserving irrigation water and/or managing the uses to reduce the total irrigation water demand. It also develops strategies encompassing both demand management and resource development options.

As discussed in Section 1.5.3, the one vital project of concern in the subject area is the Upcountry Maui Irrigation System, which is a cooperative agency project that will include 29 miles of pipeline and benefit over 170 farmers with approximately 500 acres of crops. Bypassing the treated municipal water supply with a parallel pipeline system will greatly reduce water rates for farmers and also benefit the MDWS and domestic water customers with the elimination of treatment at the Olinda Water Treatment Facility for one million gallons per day of agricultural water.

The proposed Kealaloa Tank exploratory well project is consistent with the AWUDP because it will provide data that State and County agencies need to determine how to meet both potable and non-potable demand for State projects and other uses in the area.

1.6.3 Maui Water Use and Development Plan

State law requires each county to prepare, periodically update, and adopt by ordinance a Water Use and Development Plan (WUDP) to serve as the long-range planning blueprint for all uses of water in each county. Each plan must be approved by the CWRM. Each county in Hawai‘i prepared and approved a WUDP for the year 1990. The 1990 Maui County WUDP is the latest Maui plan that has been completely adopted.

The WUDP is meant to aid CWRM in granting permits for water use and designating water management areas, as well as serving as a reference document of current and future water

resource conditions. It includes an inventory of existing water uses and developments by hydrologic units, addresses future land uses and related water needs, and is consistent with State and County land and water policies. This plan also guides DWS in future operations and to identify the improvements and facilities required to continue to provide safe, affordable and reliable water service to the island of Maui in a sustainable and financially secure manner.

The need for additional water supply in the Makawao area was discussed in detail in the 1990 Plan. Source, storage and transmission improvements including upgrades to the Kamole and Olinda Treatment Plant, a possible well field at Haiku, new reservoirs at Waiakamoi and other locations, and a new 36-inch transmission pipeline were discussed. However, there was no specific reference to State projects in the Makawao area and the source of required water. Some of these improvements were conducted, but the context of water supply in the Upcountry area has changed substantially since that time.

The MDWS is in the process of updating its WUDP. Maui County requires a WUDP update each time the County General Plan is amended or revised. According to the MDWS website:

> Initially the Department of Water Supply proposed to prepare a WUDP for each County water system on Maui and prepared a draft plan for the Central system. However, the State Commission on Water Resource Management advised the County to prepare one plan for Maui Island as a whole, addressing all water systems – not just the County's water systems. Much analysis and public input has already occurred and will be integrated into the plan which allocates water to projected growth and land use in the Maui Island Plan.

The WUDP is still in draft and is available at http://www.co.maui.hi.us/2051/Maui-Island-Water-Use-Development-Plan.

The Maui WUDP update has adopted key components of the integrated resource planning process, "...including definition of multiple planning objectives as a basis for criteria against which resource scenarios are evaluated, and strong community involvement. Alternative planning scenarios and resource strategies are presented that consider cost, benefits, social and environmental impacts. Integrated planning assumes that trade-offs among conflicting planning objectives are necessary. Informing decision-makers about legal, regulatory, or practical constraints and uncertainties are important in order to make difficult trade-offs" (Maui County DWS Maui 2017). The Maui WUDP update is intended to allocate water to existing and planned land use. The Maui Island Plan identified the following challenges related to water systems:

- Native Hawaiian water rights must be incorporated into water planning.
- Lack of scientifically based interim flow standards which relate to water rights and public trust purposes and planning for surface-water resources.
- Future agricultural water use is uncertain.
- Comprehensive water resources planning and system control, while the County controls a

relatively small percentage of the water on the island.
- MDWS budget constraints in the face of rising costs and infrastructure repair and replacement needs.
- Energy production and efficiency is a substantial component of MDWS costs.
- Private water systems and wells can undermine public systems or have the potential for contamination of water resources.

The following planning objectives are meant to encompass these tenets:

- Ecologically holistic and sustainable
- Based on ahupuaa management principles
- Legal, science and community-based
- Action-oriented

The Maui WUDP update is highly detailed and cannot be fully explained in the context of this EA. However, it is useful to note several conclusions derived from the above planning objectives based on integrated resource planning:

> "Sustainable yield estimates adopted by the CWRM do not take into consideration a variety of factors that affect groundwater development. The sustainable yields provide an estimate for the entire aquifer system area assuming a single homogeneous geologic formation. The sustainable yield of basal aquifers represents the maximum aquifer pumping rate assuming optimal placement of wells and pump sizes. Groundwater may interact with streams due to dike influences and therefore availability may be subject to amendments of the interim IFS" (Ibid: Chapter 1, p. 47).
>
> "There are cases where pumping wells located near streams have been determined not to affect proximal streamflow, such as when the streambed is higher than the ground water table. For example, wells (e.g. Mokuhau wells) in Wailuku which pump ground water from 10 feet above sea level do not impact the nearby ʻIao Stream, which is located several hundred feet above sea level" (Ibid: Chapter 1, p. 44).
>
> "Climate change patterns already being seen in Hawaiʻi are projected to become increasingly serious before the middle of the 21st century, including (a) declining rainfall, (b) reduced stream flow, (c) increasing temperature, and (d) rising sea level. Each poses serious consequences for the replenishment and sustainability of groundwater and surface water resources. These trends are further compounded by potential changes in the trade wind regime, the intensity and frequency of drought and storm events, the El Nino-Southern Oscillation, and the Pacific Decadal Oscillation" (Ibid: Chapter 1, p. 49).
>
> "The availability of surface water is uncertain due to multiple factors such as information about surface water resources and the effects of diversions on the ecosystem, as well as lack of numerical instream flow standards and legal issues. The main issues related to

> surface water in Hawai‘i are: (1) streamflow availability; (2) the reduction of streamflow by surface diversions and, in some areas, ground-water withdrawals; (3) floods; (4) water-quality changes caused by human activities; and (5) erosion and sediment transport. The use of surface water in Hawai'i by agricultural and municipal water users and streamflow reduction caused by diversions often conflicts with traditional Hawaiian practices (taro cultivation and gathering of stream fauna), stream ecology, water quality, recreational activities, and aesthetics" (Ibid: Chapter 1, p. 47).

Many of the water system challenges identified in the MIP are specific to the Maui DWS water systems. As discussed above, the Maui WUDP update was initially being prepared in six sections according to geographic district. The *Upcountry District Final Candidate Strategies Report* (current draft dated July 27, 2009) was expected to be the final document draft addressing the Upcountry Department of Water Supply District until a complete Water Use and Development Plan that includes all six districts is compiled. This document still serves as background information. According to that draft:

> "The WUDP process for the Upcountry district began with identification of planning objectives. These objectives include a broad range of considerations including water service availability, reliability, quality, cost and broader considerations including protection of streams, water resources, cultural resources, sustainability, equity, viability, and conformance with general and community plans. Strategies to meet future water needs were evaluated with respect to each of the planning objectives. Several programs and 'resources' were incorporated into the strategies to address particular objectives as necessary."

Water consumption for the MDWS Upcountry District system was expected to grow from 7.2 million gallons per day (mgd) in 2005 to 8.8 mgd in 2030. It was noted that the major sources of the inexpensive water for the region, the Upper Kula and Lower Kula surface water systems, are finite. In the drier summer months and during droughts, they are already at their limits. Additional reservoir capacity can assist but not solve the problem, and any new growth would require substantially more expensive resources, even with more emphasis on conservation.

Complicating the issue is the fact that surface water, which is derived from stream diversion, must be allocated between municipal uses, agricultural uses and the need for restoration of water to East Maui streams. It is very likely that in the future, less water will be available for both municipal and agricultural purposes, as amendments are made to the streams' Instream Flow Standards.

To accommodate the need for potable water, a series of strategies that were narrowed into "final candidate strategies" were characterized and analyzed:

A. Incremental Basal Well Development
B. Expansion of Raw Water Storage Capacity

C. "Drought-Proof" Full Basal Well Backup
D. Improved Kamole Water Treatment Plant Capacity
E. Limited Growth with Extensive Conservation Measures

After analysis, the report went on to provide a plan that included recommendations for short-term resources, long-term resources, regulatory mechanisms, resource protection and restoration, energy efficiency and energy production, and water allocation policies. The integration of all of these strategies can help achieve a balance between the objectives of minimizing cost, providing reliable water service and enhancing the sustainability of the system operations.

Although the scope of the recommendations is too wide-ranging to discuss in this EA, the plan to provide an exploratory well at the Kealaloa Tank site is in general highly consistent with the Maui WUPD update. New data are groundwater quantity and quality are required to implement the objectives and accomplish integrated resource planning.

In the future, the data provided by the exploratory well may combine with decisions by State and County officials to proceed with a production well in order to accommodate the additional demand that will be placed on the system by new or expanded State of Hawai‘i facilities. In general, this would seem highly consistent with the tenets, objectives and area-specific recommendations contained in the plan. All components of the Maui WUDP update note that the sustainable yield of the Upcountry District area is sufficient to accommodate new basal groundwater well development. A basal well avoids diversion of water from streams and impacts to instream values, while also obviating the need for extensive water treatment, provided there are no or minimal contaminants. The considerable energy required to pump water from a depth of more than 1,300 feet needs to be a factor that is weighed, particularly given uncertainty in energy costs. However, it is also possible that in the future, locally produced energy from small wind turbines or photovoltaic solar can offset pumping costs. A new production well would fulfill one of the short-term resource augmentation recommendations to acquire new wells installed by non-DWS developers as appropriate. Such wells must comply with MDWS standards and provide resources that will be of long term value to the MDWS Upcountry District, which is the case for the proposed well. At the present time, if DLNR were to develop a production well, the intention is to integrate this new source into the existing MDWS water system and through an agreement, transfer ownership to the County of Maui. All these factors would require analysis in an EA for the production well, which would take into account conditions and policies at that time.

1.6.4 Maui County General Plan and Community Plans

The Maui County General Plan is a long-term, comprehensive blueprint for the physical, economic, environmental development and cultural identity of the County. The Countywide Policy Plan, adopted on March 24, 2010, provides broad goals, objectives, policies, and implementing actions that portray the desired direction of the County's future. Furthermore, this Countywide Policy Plan provides the policy framework for the development of the Maui Island Plan and the nine Community Plans. The Countywide Policy Plan is the outgrowth of, and

includes the elements of, the earlier General Plans of 1980 and 1990. The Maui Island Plan was adopted on December 28, 2012 and establishes urban and rural growth areas that indicate where development is intended and will be supported. Growth areas will provide for less costly services, reduced commuting, protection of community character and the preservation of agriculture, open space and cultural and natural resources.

Each of the nine community plans is meant to provide recommendations concerning land use, density and design, transportation, community facilities, infrastructure, visitor accommodations, commercial and residential areas and other matters related to development that are specific to the region of the plan. Although the latest Makawao-Pukalani-Kula Community Plan dates from 1996 and contains recommendations that may be superseded by the General Plan, it is included here for reference.

This section is organized to list all Goals and Objectives, and where directly relevant to the proposed action, the Policies and Implementing Actions, contained in the General Plan and Community Plan, by subject area. Discussions of consistency are provided after each subject area.

Population

> Goal 1.1 Maui's people, values, and lifestyles thrive through strong, healthy, and vibrant island communities.
> Objective 1.1.1 Greater retention and return of island residents by providing viable work, education, and lifestyle options.
>
> *Discussion*: The acquisition of data on groundwater quality and quantity is a step towards providing additional potable water sources to support strong communities that are able to retain residents and support lifestyle values.

Heritage Resources

> Goal 2.1 Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.
> Objective 2.1.1 An island culture and lifestyle that is healthy and vibrant as measured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section 7, Hawai'i State Constitution, and Section 7-1, Hawai'i Revised Statutes (HRS).
> Policy 2.1.1.c Ensure traditional public access routes, including native Hawaiian trails, are maintained for public use.
> Objective 2.2 A more effective and efficient planning and review process that incorporates the best available cultural resources inventory, protection techniques, and preservation strategies.

Policy 2.1.3.c Support regulations to require developers, when appropriate, to prepare an Archaeological Inventory Survey, Cultural Impact Assessment, and Ethnographic Inventories that are reviewed and commented upon by the Office of Hawaiian Affairs, Native Hawaiian advisory bodies, the State Historic Preservation Division (SHPD), and the Office of Environmental Quality Control, and systematically comply with the steps listed in SHPD's administrative rules, including consultation and monitoring during construction phases of projects.
Policy 2.1.3.f Support opportunities for public involvement with the intent to facilitate the protection and restoration of historic and archeological sites, including consultation with stakeholders.

Discussion: The project has included systematic, professional archaeological survey, which determined that no historic properties were present or would be affected.

Shoreline, Reefs, and Nearshore Waters and Watersheds, Streams, and Wetlands

Goal 2.2 An intact, ecologically functional system of reef, shoreline, and nearshore waters that are protected in perpetuity.
Objective 2.2.1 A more comprehensive and community-based ICZM program.
Objective 2.2.2 Improved reef health, coastal water quality, and marine life.
Objective 2.2.3 Water quality that meets or exceeds State Clean Water Act standards.
Policy 2.2.3.a Reduce the amount of impervious surface and devise site plan standards that aim to minimize storm runoff and NPS pollution.
Goal 2.3 Healthy watersheds, streams, and riparian environments.
Objective 2.3.1 Greater protection and enhancement of watersheds, streams, and riparian environments.
Objective 2.3.2 Decreased NPS and point source pollution.
Objective 2.3.4 Greater preservation of native flora and fauna biodiversity to protect native species.
Objective 2.3.5 Limited development in critical watershed areas.
Objective 2.3.6 Enhance the vitality and functioning of streams, while balancing the multiple needs of the community.

Discussion: The project minimizes additional impermeable surface by siting the exploratory well infrastructure in a compact way in a pasture. The project will include BMPs during construction to minimize erosion and sedimentation.

Wildlife and Natural Areas

Goal 2.4 Maui's natural areas and indigenous flora and fauna will be protected.
Objective 2.4.1 A comprehensive management strategy that includes further identification, protection, and restoration of indigenous wildlife habitats.

Policies 2.4.1.b Require flora and fauna assessment and protection plans for development in areas with concentrations of indigenous flora and fauna; development shall comply with the assessment and protection plan and shall use the avoidance, minimization, and mitigation approach respectively, with an emphasis on avoidance.
Objective 2.5.2 Reduce impacts of development projects and public-utility improvements on scenic resources.
Policy 2.5.2.f Ensure little or no effect on scenic resources from utility improvements, primarily power poles.
Objective 2.5.3 Greater protection of and access to scenic vistas, access points, and scenic lookout points.

Discussion: The project included coordination with wildlife resource and regulatory agencies as well as a systematic flora and fauna assessment that determined that no rare, threatened or endangered species would be adversely affected by the action.

Natural Hazards

Goal 3.1 Maui will be disaster resilient.
Objective 3.1.1 Increased inter-agency coordination.
Objective 3.1.2 Greater protection of life and property.
Policy:3.1.2.d Encourage the use of construction techniques that reduce the potential for damage from natural hazards.
Policy 3.1.2.e Increase the County's resilience to drought.
Objective 3.1.3 A more coordinated emergency response system that includes clearly defined and mapped evacuation routes.
Objective 3.1.4 A more educated and involved public that is aware of and prepared for natural hazards.

Discussion: The project will be designed to current seismic standards and has the potential, if a decision is ultimately made to develop a production well, to contribute to the County's resilience to drought.

Economic Development

Goal 4.1 Maui will have a balanced economy composed of a variety of industries that offer employment opportunities and well-paying jobs and a business environment that is sensitive to resident needs and the island's unique natural and cultural resources.
Objective 4.1.1 A more diversified economy.
Objective 4.1.2 Increase activities that support principles of sustainability.

Discussion: This step towards providing a solution to sustainable water development for the Upcountry District will positively affect the economy.

Tourism

Goal 4.2 A healthy visitor industry that provides economic well-being with stable and diverse employment opportunities.
Objective 4.2.1 Increase the economic contribution of the visitor industry to the island's environmental well-being for the island's residents' quality of life.
Objective 4.2.2 Comprehensively manage future visitor-unit expansion.
Objective: 4.2.3 Maximize residents' benefits from the visitor industry

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to tourism.

Agriculture

Goal 4.3 Maui will have a diversified agricultural industry contributing to greater economic, food, and energy security and prosperity.
Objective 4.3.1 Strive for at least 85 percent of locally-consumed fruits and vegetables and 30 percent of all other locally-consumed foods to be grown in-State.
Objective 4.3.2 Maintain or increase agriculture's share of the total island economy.
Objective 4.3.3 Expand diversified agriculture production at an average annual rate of 4 percent.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to agriculture. Ultimately, providing additional sources of potable water helps free up surface water for use on agricultural lands. Developing the well in a compact site within a pasture avoids extensive use of agricultural land for well infrastructure.

Employment

Goal 4.4 A diverse array of emerging economic sectors.
Objective 4.4.1 Support increased investment and expanded activity in emerging industries.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to employment, and the construction will provide jobs.

Small Business Development

Goal 4.5 Small businesses will play a key role in Maui's economy.
Objective 4.5.1 Increase the number of and revenue generated by small businesses and decrease the percentage of small business failures.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to small business development.

Health Care Sector

Goal 4.6 Maui will have a health care industry and options that broaden career opportunities that are reliable, efficient, and provide social well-being.
Objective 4.6.1 Expand the economic benefits of the health care sector.
Objective 4.6.2 Be more efficient in the delivery of health care services and in minimizing health care costs.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to the health care sector.

Education

Goal 4.7 Maui will have effective education and workforce development programs and initiatives that are aligned with economic development goals.
Objective 4.7.1 Improve preschool and K-12 education to allow our youth to develop the skills needed to successfully navigate the 21st century.
Objective 4.7.2 Encourage an increase in the number of certificate recipients and associate, bachelors, and graduate degrees conferred.
Objective 4.7.3 Strive to ensure that more of Maui's jobs are developed in STEM-related sectors by 2030.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to education.

Housing

Goal 5.1 Maui will have safe, decent, appropriate, and affordable housing for all residents developed in a way that contributes to strong neighborhoods and a thriving island community.
Objective 5.1.1 More livable communities that provide for a mix of housing types, land uses, income levels, and age.
Objective 5.1.2 Better monitoring, evaluation, and refinement of affordable housing policy in conjunction with the economic cycle.
Objective 5.1.3 Provide affordable housing, rental or in fee, to the broad spectrum of our island community.
Objective 5.1.4 Provide infrastructure in a more timely manner to support the development of affordable housing.
Objective 5.1.5 A wider range of affordable housing options and programs for those with special needs.

Objective 5.1.6 Reduce the cost to developers of providing housing that is affordable to families with household incomes 160 percent and below of annual median income.
Objective 5.1.7 Increased preservation and promotion of indigenous Hawaiian housing and architecture.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to housing.

Solid Waste

Goal 6.1 Maui will have implemented the ISWMP thereby diverting waste from its landfills, extending their capacities.
Objective 6.1.1 Meet our future solid waste needs with a more comprehensive planning and management strategy.
Objective 6.1.2 Divert at least 60 percent of solid waste from the island's landfills

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to solid waste.

Wastewater

Goal 6.2 Maui will have wastewater systems that comply with or exceed State and Federal regulations; meet levels-of-service needs; provide adequate capacity to accommodate projected demand; ensure efficient, effective, and environmentally sensitive operation; and maximize wastewater reuse where feasible.
Objective 6.2.1 A wastewater planning program capable of efficiently providing timely and adequate capacity to service projected demand where economically feasible and practicable.
Objective 6.2.2 Adequate levels of wastewater service with minimal environmental impacts
Objective 6.2.3 Increase the reuse of wastewater.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to wastewater.

Water Systems

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.

Policy 6.3.1.a Ensure that DWS actions reflect its public trust responsibilities toward water.
Policy 6.3.1.b Ensure the WUDP implements the State Water Code and MIP's goals, objectives, and policies.
Policy 6.3.1.f Encourage and improve data exchange and coordination among Federal, State, County, and private land use planning and water resource management agencies.
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.
Policy 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.
Policy 6.3.2.d Work with appropriate State and County agencies to achieve a balance in resolving the needs of water users in keeping with the water allocation priorities of the MIP.
Policy 6.3.2.e Ensure water conservation through education, incentives, and regulations.
Policy 6.3.2.f Acquire and develop additional sources of potable water.
Objective 6.3.3 Improve water quality and the monitoring of public and private water systems.
Policy 6.3.3.a Protect and maintain water delivery systems

Discussion: The acquisition of data on groundwater quality and quantity is a step towards providing additional potable water sources to supply an environmentally sustainable, reliable, safe, and efficient water system that supplies needed potable water and helps replace diversion of stream water that may have more beneficial instream value and/or agricultural uses.

Transportation

Goal 6.4 An interconnected, efficient, and well-maintained, multimodal transportation system.
Objective 6.4.1 Provide for a more integrated island-wide transportation and land use planning program that reduces congestion and promotes more efficient (transit-friendly) land use patterns.
Objective 6.4.2 Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network.
Objective 6.4.3 An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community's character.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to transportation.

Transit

Goal 6.5 An island-wide transit system that addresses the needs of residents and visitors and contributes to healthy and livable communities.
Objective 6.5.1 An integrated transit system that better serves all mobility needs of Maui's residents and visitors.
Objective 6.5.2 Plan for a more diversified and stable funding base to support transportation goals.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to transit.

Parks

Goal 6.6 Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all.
Objective 6.6.1 More effective, long-range planning of parks and recreation programs able to meet community needs.
Objective 6.6.2 Achieve parks and recreation opportunities to meet the diverse needs of our community.
Objective 6.6.3 An expanded network of greenways, trails, pathways, and bikeways.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to parks.

Schools and Libraries

Goal 6.8 Maui will have school and library facilities that meet residents' needs and goals.
Objective 6.8.1 Assist in providing appropriate school and library facilities in a timely manner and in strategic locations.
Objective 6.8.2 Provide a more expansive network of safe and convenient pedestrian-friendly streets, trails, pathways, and bikeways between neighborhoods and schools where appropriate.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to schools and libraries.

Health Care Public Facilities

Goal 6.9 All of Maui residents will have the best possible health care to include healthy living, disease prevention, as well as acute and long-term care.

Objective 6.9.1 Greater autonomy to the Maui region in their efforts to improve medical care on the island.
Objective 6.9.2 An expansion of long-term care facilities and long-term care alternatives to meet the needs of our aging population.
Objective 6.9.3 More support to home-care and community-based programs so they become alternatives to traditional nursing homes.
Objective 6.9.4 Improved preventative medicine and primary health care.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to health care facilities.

Energy

Goal 6.10 Maui will meet its energy needs through local sources of clean, renewable energy, and through conservation.
Objective 6.10.1 Reduce fossil fuel consumption. Using the 2005 electricity consumption as a baseline, reduce by 15 percent in 2015; 20 percent by 2020; and 30 percent by 2030.
Policy 6.10.1.a Support energy efficient systems, processes, and methods in public and private operations, buildings, and facilities.
Objective 6.10.2 Increase the minimum percentage of electricity obtained from clean, renewable energy sources. By 2015, more than 15 percent of Maui's electricity will be produced from locally-produced, clean, renewable energy sources, 25 percent by 2020, and 40 percent by 2030.
Objective 6.10.3 Increased use of clean, renewable energy.

Discussion: The exploratory well will require only a modest amount of energy to acquire the needed data. Ultimately, although groundwater development in the Upcountry area has many environmental benefits relative to stream diversion, it is relatively energy intensive. It is also possible that in the future, locally produced energy from small wind turbines or photovoltaic solar can offset pumping costs.

Harbors and Airports

Goal 6.11 Maui will have harbors and airports that will efficiently, dependably, and safely facilitate the movement of passengers and cargo.
Objective 6.11.1 Upgraded harbor facilities to handle larger volumes of freight and passengers and additional small boat harbors.
Objective 6.11.2 Establish more economically thriving and environmentally sensitive small boat harbors accommodating resident and business activity, including fishing, recreation, and tour boats.
Objective 6.11.3 Upgraded airport facilities and navigation aids to serve the needs of passengers, freight movements, and general aviation.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to harbors and airports.

Land Use: Agricultural Lands

Goal 7.1 Maui will have a prosperous agricultural industry and will protect agricultural lands.
Objective 7.1.1 Significantly reduce the loss of productive agricultural lands.
Policy 7.1.1.f Strongly discourage the conversion of productive and important agricultural lands (such as sugar, pineapple, and other produce lands) to rural or urban use, unless justified during the General Plan update, or when other overriding factors are present.
Objective 7.1.2 Reduction of the island's dependence on off-island agricultural products and expansion of export capacity.
Objective 7.1.3 Support and facilitate connectivity between communities.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to agricultural lands. Providing data on additional sources of groundwater water helps free up surface water for use on agricultural lands. Siting the exploratory well in a compact manner on a pasture adjacent to existing water supply uses avoids creating additional impermeable surface and the use of undeveloped land on the rural/agricultural interface for well infrastructure.

Land Use: Rural Areas

Goal 7.2 Maui will have a rural landscape and lifestyle where natural systems, cultural resources and farm lands are protected and development enhances and complements the viability and character of rural communities.
Objective 7.2.1 Reduce the proliferation and impact of residential development outside of urban, small town, and rural growth boundaries.
Policy 7.2.1.a Focus development to areas inside urban, small town, and rural growth boundaries to preserve natural, cultural, and agricultural resources.
Objective 7.2.2 More appropriate service/infrastructure standards to enhance and protect the island's rural character and natural systems.
Policy 7.2.2.a Minimize impermeable surfaces within rural areas.
Policy 7.2.2.c Use infrastructure, public service, and design standards that are appropriate to rural areas.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to rural areas. Siting the exploratory well in a compact manner on a pasture adjacent to existing water supply uses avoids creating additional impermeable

surface and the use of undeveloped land on the rural/agricultural interface for well infrastructure.

Land Use: Urban Areas

Goal 7.3 Maui will have livable human-scale urban communities, an efficient and sustainable land use pattern, and sufficient housing and services for Maui residents.
Objective 7.3.1 Facilitate and support a more compact, efficient, human-scale urban development pattern.
Objective 7.3.2 Facilitate more self-sufficient and sustainable communities.
Objective 7.3.3 Strengthen the island's sense of place.
Objective 7.3.4 Strengthen planning and management for the visitor industry to protect resident quality of life and enhance the visitor experience.
Objective 7.3.5 Ensure that Maui's planning and development review process becomes more transparent, efficient, and innovative.

Discussion: No aspect of the proposed action is inconsistent with goals, objectives or policies related to urban areas. Ultimately, provision of potable water supports approved urban land uses.

Directed Growth Plan

Goal: 8.1 Maui will have well-serviced, complete, and vibrant urban communities and traditional small towns through sound planning and clearly defined development expectations.
Goal: 8.2 Maui will maintain opportunities for agriculture and rural communities through sound planning and clearly defined development expectations.

The following four themes provide a broad island-wide framework for the identification of areas that are appropriate for future growth, the identification of areas that should be preserved, and the implementation of the directed growth plan.

Theme One: Limit Development in Northwest and East Maui.
Theme Two: Protect Maui's agricultural resource lands, especially prime and productive agricultural lands.
Theme Three: Direct growth to areas proximate to existing employment centers, where infrastructure and public facility capacity can be cost-effectively provided, and where housing can be affordably constructed.
Theme Four: Within the Urban Growth Boundaries, promote livable, mixed-use communities, defined by a high quality of life.

Nine planned growth areas have been identified for the Makawao-Pukalani-Kula community plan region: Makawao Makai, Makawao Town Expansion, Makawao

Affordable Residential, Seabury Hall, Pukalani Expansion, Pukalani Makai, Hāli‘imaile, Anuhea Place, and Ulupalakua Ranch. Planned growth areas are depicted in Figure 8-8 and on Directed Growth Maps of the General Plan. New water source and development and water storage are recommended.

Discussion: The project supports the directed growth identified for the Makawao-Pukalani-Kula community plan region, for which water source development is specifically called for. The provision of data on water quality and quantity provided by an exploratory well can assist in this.

2 ENVIRONMENTAL ASSESSMENT PROCESS

The project involves the use of State of Hawai‘i funds and County of Maui lands, and therefore requires compliance with Chapter 343, Hawai‘i Revised Statutes (HRS), the Hawai‘i Environmental Policy Act (HEPA). The State of Hawai`i, Department of Land and Natural Resources, Engineering, (DLNR) is the proposing and determining agency for this Environmental Assessment (EA).

HEPA was enacted by the Hawai‘i State Legislature to require State and County agencies to consider the environmental impacts of various actions as part of the decision-making process. Agencies are required to conduct an investigation and evaluation of alternatives as part of the environmental impact analysis process, prior to making decisions that may impact the environment. The implementing regulations for HEPA are contained in Title 11, Chapter 200, Hawai‘i Administrative Rules (HAR).

This Environmental Assessment (EA) process was conducted in accordance with HEPA. According to HEPA and its implementing regulations, a Draft EA is prepared to document environmental conditions and impacts, to develop mitigation measures that avoid, minimize or compensate for adverse environmental impacts, and determine whether or not an action has significant impacts upon the environment. Impacts are evaluated for significance according to thirteen specific criteria as presented in HAR 11-200-12. If no significant impacts are expected, then a Final EA with a Finding of No Significant Impact (FONSI) may be issued. When the Draft EA determines that significant impacts are present, then a Notice of Intent is prepared and the Final EA facilitates preparation of an Environmental Impact Statement (EIS).

The environmental assessment process for this project includes early consultation with agencies and organizations. Letters from these agencies are contained in Appendix 1a.

As discussed in Section 1.1., this EA concerns development of the exploratory well only. If testing of the exploratory well indicates an adequate quantity of water of acceptable water quality, another EA will be prepared to discuss the impacts related to conversion to a production well and subsequent use.

3 ENVIRONMENTAL SETTING AND IMPACTS

This section describes the existing social, economic, cultural, and environmental conditions surrounding the proposed project along with the probable impacts of the proposed action and mitigation measures designed to reduce or eliminate adverse environmental impacts. For many categories, the No Action Alternative would result in no impacts. Therefore, unless explicitly mentioned, discussion of impacts and mitigation relates to the Action Alternative only.

3.1 Physical Environment

3.1.1 Surface Geology, Soils and Hazards

Existing Environment, Impacts and Mitigation Measures

The project site is located on the western slope of Haleakalā Volcano, which can be described as a broad upland slope. The Kula Volcanic series covers the entire northwest flank of Haleakalā Volcano and was erupted .98 – 1.5 million years ago during the Pleistocene epoch. The risk of lava flows in the foreseeable future is minimal.

The U.S. Department of Agriculture, Natural Resources Conservation Service classifies the soil at the project site as Haliimaile silty clay loam, 3-15 percent slopes. Typically, this soil is well-drained and composed of silty clay loam from 0 to 15 inches, silty clay from 15 to 41 inches, and clay from 41 to 65 inches (USDA-NRCS 2017).

The volcano that makes up the eastern part of Maui, known as Haleakalā, has erupted many times in the last 10,000 years, with the most recent occurring in the two centuries prior to 1600. Geologists believe that this eruptive history indicates future eruptions will occur. The most vulnerable areas are on and near the rift zones that form a line from southwest to northeast through Haleakalā Crater (https://volcanoes.usgs.gov/volcanoes/Haleakalā/). Seismic hazards are those related to ground shaking. Engineers, seismologists, architects, and planners have evaluated seismic hazards related to building construction and devised a system of classifying seismic hazards on the basis of the expected strength of ground shaking and the probability of the shaking actually occurring within a specified time. The entire Island of Maui is rated in Seismic Design Zone D1. This zone has some chance of experiencing very strong shaking. Damage from large earthquakes here is generally slight in specially designed structures, but there may be considerable damage in ordinary substantial buildings with partial collapse. There can be great damage in poorly built structures (http://hvo.wr.usgs.gov/earthquakes/hazards/; https://www.fema.gov/earthquake-hazard-maps).

In general, geologic conditions impose no constraints on the project, and no mitigation measures are expected to be required. The design for the well and accessory structures will be appropriate to the soil and seismic setting and in conformance with all applicable codes.

3.1.2 Hydrogeology

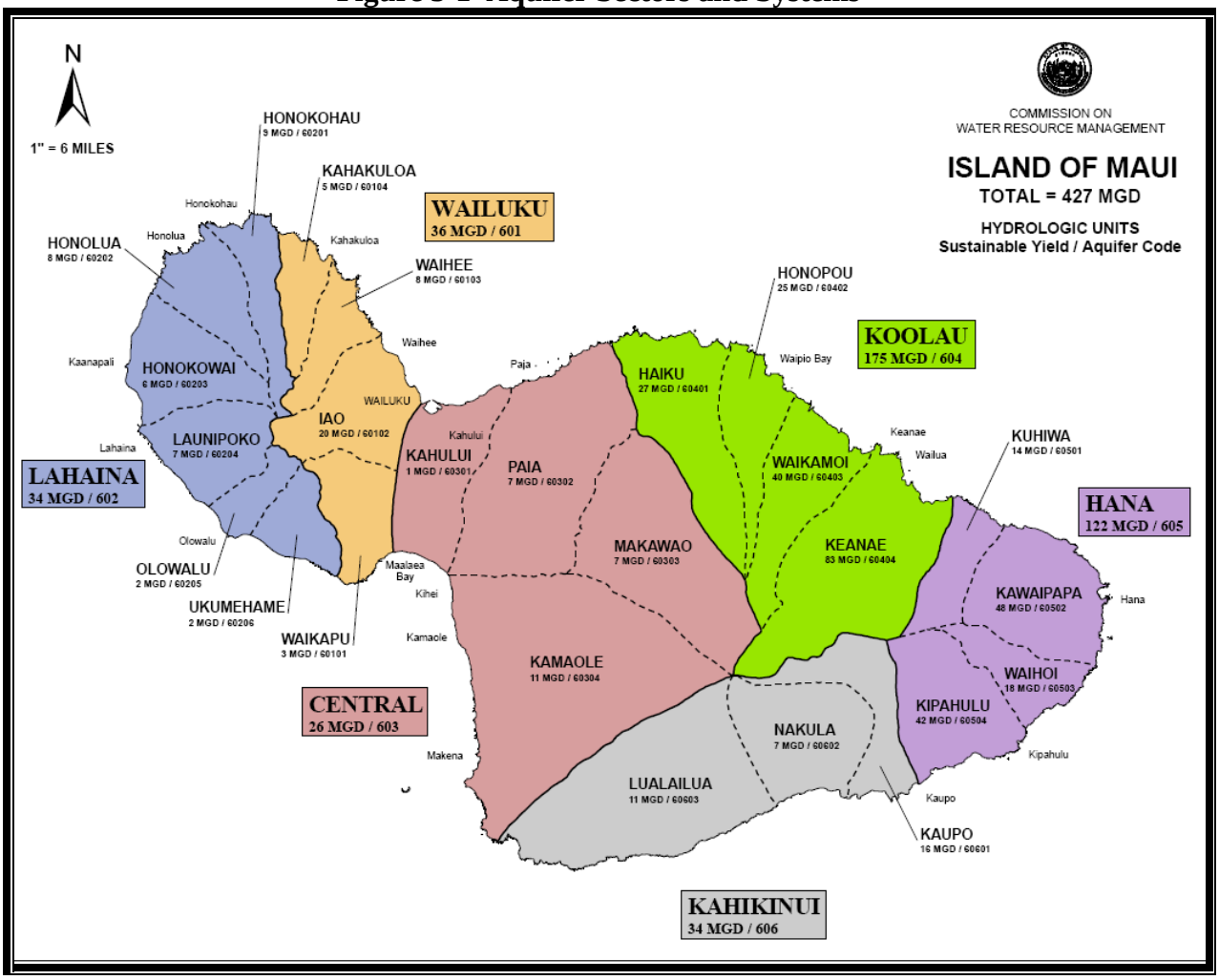
Existing Environment

In the Hawaiian Islands, precipitation that is not cycled into evapotranspiration or conducted through streams into the ocean percolates into the ground to collect in the aquifers under the island before slowly making its way to the sea. As streams in Hawai‘i are generally flashy or even ephemeral, underground water is the most reliable source of water supply, because there is less daily or seasonal change in water tables. Water may be trapped between vertical confining layers such as dikes or perched above horizontal confining layers such as volcanic ash soil, forming high level aquifers. This water may overflow, creating natural streams or springs. Such aquifers may be within a few feet of the surface and are susceptible to contamination by nitrates, phosphates, pesticides and permeate from septic tanks, leach fields and cesspools. Though their use is fairly common in other areas, shallow aquifers are not generally used for domestic water on Maui.

If water continues to diffuse through the layers of rock, sand, soil and gravel, it will reach sea level. Fresh water has a lower density than seawater and will floats above the salt water-permeated rock in a body shaped much like a lens, most of which ends up below sea level. Due to the difference in densities, for every foot the lens extends above sea level it extends 40 feet below sea level, although the lower areas contain a zone of mixing. Basal water tables have inland gradients that can rise as much as four feet per mile in high rainfall areas. This fresh water is the source of most of the State’s groundwater.

Separate and distinct from the geographical subdivisions used by DWS in producing and distributing water are groundwater regulatory areas. The State Commission on Water Resources Management (CWRM) classification of aquifers locates this part of Maui within the Makawao Aquifer System, Code 60303 (Fig. 3-1). This coding refers to Maui Island (6), Central Aquifer Sector (03), and Makawao Aquifer System (03). The surface boundaries of the aquifer encompass the towns of Makawao, Pukalani and Kula, as well as the drainage basins of a number of mostly intermittent streams. The surface drainage network was extensively modified through a series of ditches constructed to supply water for sugar cane agriculture. Previous studies have estimated the sustainable yield of this hydrologic unit as approximately 7 mgd, although it is recognized that CWRM sustainable yield estimates for this and other aquifers in the State of Hawai‘i are usually very rough estimates.

Figure 3-1 Aquifer Sectors and Systems



Source: Hawai‘i State Commission on Water Resources Management

The basic characteristics of the Makawao Aquifer System are determined by the regional geology. The Kula Volcanic Series lava flows that underlie the project area can generally be characterized as thicker, narrower, and far less permeable than the deeper, underlying Honomanu basalts. The thickness of the Kula flows is a function of the chemical composition, which generally contains a higher percentage of silica than the Honomanu flows. This increase in silica content causes the Kula flows to be more massive with smaller fractures. The flows vary in thickness from about 20 feet in the higher summit elevations to 50 feet near the edges; flows 200 feet thick can also be found. The large number of erosional unconformities and interstratified soil beds suggests that the upper Kula lavas accumulated in the waning phase of Haleakalā Volcano, when the time between flows became progressively longer. This allowed the lavas the necessary time to weather into deep soils.

This assemblage of interstratified soils, vitric tuff beds, weathered clinker zones, and wide bands of dense rock that make up the Kula Volcanic Series greatly affects the flow of groundwater. Most of the individual lava beds are permeable and unable to perch water. When the formation is considered as a unit, it contains enough impermeable layers, even though discontinuous, to greatly retard the downward percolation of water.

The Makawao aquifer unit covers about 37,523 acres and has limited groundwater development opportunities because of elevations more than 1,500 feet above sea level. Groundwater has, however, been developed by several deep wells, most of which are small capacity units used by private owners. Groundwater sources to date have only produced water from the basal lens, where fresh water is floating in equilibrium with underlying salt water. To date, no well drilling has discovered developable water from a high-level dike or fault confined aquifer. One well, Piiholo South, appears to terminate in a poorly permeable formation which had limited yield and may actually lie in the northeast volcanic rift zone of Haleakalā. In contrast to the normal water level response to pumping, this well exhibited behavior similar to that found in dike confined aquifers, but this may be a very local condition.

Because of the lack of developed groundwater, the MDWS presently relies largely on the surface water diversions that are treated and distributed via the primary transmission system depicted in Figure 1-4. Rather than groundwater, the major MDWS water supplies to the project area consist of three stream diversions that capture primarily direct runoff from stream flow at Piiholo, Olinda and Kamole. The two upper diversions, Olinda and Piiholo, enter the MDWS system by gravity and are routed throughout the upper Kula system. The Kamole treatment plant obtains its water from lower down the East Maui Irrigation System and pumps it up to a major distribution hub located at the Pookela Well. After use in households, these imported waters ultimately add to the local groundwater recharge entering the Makawao Hydrologic System.

Current Installed Capacity and Water Use

As detailed in Appendix 2, each well producing water in the State of Hawai‘i is required to provide monthly pumpage data to the CWRM. This data is used by the State to assess and monitor active pumpage for each aquifer unit throughout the State. The active pumpage from wells within the aquifer unit would essentially be deducted from the total sustainable yield allotted to each aquifer unit.

CWRM maintains a database of wells that provides information on, among other aspects, well name, installed capacity, water quality and user reported pumpage. Because not all well operators report their use in a timely manner, pumpage data may not be complete or up to date. As shown in Table 3-1 and Figure 3-2, there are 12 wells and two tunnels that the CWRM currently has on record within the Makawao Aquifer unit. Out of the 12 wells, there are 9 that have been actively reporting pumpage data to the CWRM. The two closest wells to the proposed Kealaloa Tank Well site are the Maluhia Well (5018-001) to the north and Pulehu Farms Well (4719-001) to the

south. Both of these wells are over one mile in distance away from the proposed well site and are highly unlikely to interact with the proposed exploration well. The Pulehu Farms Well has an installed pump capacity of 0.46 mgd, but the CWRM has no reported data from this well. This is typical of wells that are not utilized, but if data is reported in the future to CWRM, it would be included in any future EAs in the event that a production well is proposed for the site. The Maluhia Well has an installed pump capacity of 0.069 mgd and has actually pumped an average of 0.0013 mgd with a total of 0.018 million gallons during the most recent reporting annual period of September 1st, 2016 and September 30th, 2017. **The total installed capacity of all 12 wells within the Makawao Aquifer unit is 5.256 mgd, but the total average pumpage over the last year for all twelve wells combined is roughly 0.604 mgd.**

Table 3-1. Current Estimated Installed Capacity and Water Use

Well Number	Well Name	Installed GPM	Installed MGD	Start Date	End Date	Pumpage (mgy)	Pumpage (gpy)
6-4719-001	Pulehu Farms	320	0.46				
6-4720-001	Siele	85	0.122				
6-4817-001	Waihou Tunnel						
6-4817-002	Waihou Tunnel						
6-4818-001	KulaKoa	220	0.316	11/1/2016	11/30/2017	0.005	205,458
6-4819-001	Kalialinui Steven 1						
6-4821-001	Omaopio-Esty	65	0.093	10/1/2016	10/31/2017	0.495	15,091,300
6-4920-001	Anuhea Place	109	0.157	11/1/2016	11/30/2017	0.025	736,220
6-5018-001	Maluhia	48	0.069	9/1/2016	9/30/2017	0.018	569,756
6-5021-001	Pukalani Golf	1000	1.44	11/1/2016	11/30/2017	3.811	116,112,000
6-5118-002	Pookela MDWS	900	1.296	10/1/2016	10/31/2017	3.496	104,972,400
6-5118-003	Piiholo			11/25/2016	11/20/2017	0	0
6-5118-004	Piiholo South	205	0.295	3/1/2016	3/31/2017	0.002	362,100
6-5220-001	Haliimaile	700	1.008	11/25/2016	11/20/2017	0	0

Existing Water Quality

The MDWS regularly conducts microbiological analysis and contracts for extensive chemical testing in order to comply with U.S. Environmental Protection Agency (EPA) and State of Hawai‘i standards. In conformance with the federal Consumer Confidence Report rule, MDWS produces an annual report on the quality of drinking water and provides it to all customers. The Water Quality Report describes the sources and measures the quality of drinking water. The MDWS tests for more than 100 substances in the water, including bacteria, pesticides and herbicides, asbestos, lead, copper, petroleum products, and by-products of industrial and water treatment processes.

The latest report reviews testing conducted and compiled in 2016 for reporting by July 2017 and is available at https://www.mauicounty.gov/247/Water-Quality-Report (accessed March 2018). The Upper Kula System, which serves Kula, Waiakoa, Keokea, Ulupalakua, Kanaio, derives its water from the Kaipuaena Intake, and is fully surface water. Although several contaminants were present, including total trihalomethanes, haloacetic acid, and copper, the tests showed that they

Figure 3-2. Location of Wells in Makawao Aquifer

Note: Proposed Kealaloa Exploratory Well is labeled Upcountry Maui Exploratory Well in figure

were well below EPA allowable limits and action levels, and the water is deemed safe and the system compliant. The Makawao System, which serves Haiku, Haliimaile, Makawao and Pukalani, derives its water from the Wailoa Ditch and the Haiku, Kaupakalua and Pookela Wells. A larger range of contaminants was present, many of them resulting from the natural geology, while others were derived from man-made chemicals and their breakdown products. The tests showed that they were well below EPA allowable limits and action levels, and the water is deemed safe and the system compliant. There are a number of unregulated contaminants that are also tested for. EPA uses the Unregulated Contaminant Monitoring Rule to collect data for contaminants suspected to be present in drinking water but do not have health-based standards

set under the Safe Drinking Water Act. The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should be regulated. In summary, no violations were recorded for radioactive, inorganic, organic or lead and copper contaminants, with all contaminants far below EPA allowable limits and action levels.

The State Department of Health publishes *Hawaii's Groundwater Contamination Maps* (http://health.hawaii.gov/sdwb/groundwater-contamination-viewer/ accessed March 2018) as an integral part of Hawai'i's Groundwater Protection Program (GWPP). The GWPP's goal is to protect human health and sensitive ecosystems by fostering protection of groundwater resources and emphasizing water quality assessment, pollution prevention and protection measures. These maps identify the location and amount of organic and other contaminants detected and confirmed present in public drinking water wells and select non-potable wells. The latest maps available illustrate that various contaminants are known to have been present in Maui wells, particularly near current or former agricultural operations. Although most contaminants were measured at levels below the applicable drinking water standard, any contamination is of concern. Some wells have been removed from use, and others have required treatment to reduce contaminants to below levels that are recognized by the EPA as acceptable, which has generated controversy on Maui among many residents (see discussion concerning Hamakuapoko Well at: http://maui-tomorrow.org/category/wai/hamakuapoko-wells/ - Maui Tomorrow website).

Of particular concern for new wells in the Makawao Aquifer System is the potential for widespread surface contamination associated with former pineapple. Two soil fumigants previously used by pineapple growers, 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane or ethylene dibromide (EDB), have been detected in several wells on the lower part of Makawao Aquifer System, at Maunaolu, Puunene and Kaheka (some of which are irrigation wells). An impurity of the soil fumigant DD, 1,2,3-trichloropropane (TCP), has also has been detected in a number of wells. DBCP, EDB, and TCP are of concern to State public health officials due to known and possible unknown health effects associated with these compounds.

Other toxic chemicals have also been used in agriculture in this area. A Limited Phase II Surface Investigation of the Former Corn Mill Camp in Pukalani, which was several hundred feet downslope of the originally proposed well site at the DWS Pukalani Reservoir, was conducted in in 2001. This area was used for mixing and storing of agricultural chemicals, including pentachlorophenol phenate, DDT, and disodium methanearsenate. Due to practices at the property over the decades, there was a high potential for these chemicals to have spilled. Soil samples found organochlorine pesticides (4,4-DDE and 4,4-DDT) were detected above the State of Hawai'i DOH Tier I Soil Action Level ("SAL") in ten of the eleven samples analyzed. Phenols analysis revealed concentrations of pentachlorophenol above the Preliminary Remediation Goals in one sample. Arsenic was detected in soil samples at concentrations ranging from 6.0 to 150 milligrams per kilogram (mg/kg). The horizontal and vertical extent of pesticide contamination could not be delineated by the limited investigation.

As discussed in detail Section 1.5., above, the State DOH has also investigated nitrate in the Upcountry area. This substance is present at low levels under natural conditions but become elevated due to effluent from wastewater, cattle grazing and confined animal feeding. The map presented as Figure 1-5, above, indicates the potential for nitrate contamination in groundwater.

Clearly, there is a high potential for contaminants associated with current and former agricultural operations as well as wastewater to be present at the surface at various areas within the Makawao Aquifer System and to have migrated into the soil to unknown depths and horizontal extents.

Impacts and Mitigation Measures

Quantity of Water in Aquifer, Adjacent Wells and Streams

The exploratory water well would be drilled with a 12-inch pilot hole to a predetermined depth, and then test pump would be installed in order to perform a 4 to 8-hour test to check drawdown and measure chlorides. The results would determine whether the process would continue or the well would be abandoned and sealed per CWRM standards to ensure that no aquifer contamination occurs.

If the process continues, the well might be deepened and it would be reamed to its final 27-inch diameter to about 50 feet below mean sea level, with a 40-inch diameter to 100 feet below mean sea level. A 20-inch ASTM A-53 casing would be installed, and the annular space between the well casing and the bore would be properly grouted and sealed to prevent contamination. A test pump with a 600 HP motor would be installed and the drillers would perform a constant rate test and specific capacity test according to CWRM standards. The tests measure the response of the aquifer to being pumped. The goal is to determine when drawdown of the water table stabilizes, indicating that the rate of recharge to the well equals the rate of discharge. This generally involves about 100 to 120 hours of pumping for both tests.

Water quality samples would be taken by a certified third-party contractor during the pump tests and sent to a certified laboratory for testing. Water would be analyzed for chloride content, temperature, and field pH and contaminants to ensure that it meets standards. Based on these tests, hydrologists will be able to determine if the well is capable of producing potable water of acceptable quality at a particular rate. When tests were complete, the drillers would pour a cement slab around the casing on surface and obtain an official benchmark for future reference. The driller would demobilize from the site and DLNR would go about compiling the data needed concerning the viability of proceeding with a production well.

With a sustainable yield of 7 mgd estimated for the Makawao Aquifer unit, and the limited pumpage of the surrounding area, responsible water development for the project could be explored without negatively impacting the aquifer or other existing wells. Furthermore, the

Kealaloa Exploratory Well is being drilled to assess the availability of groundwater through pump testing and sampling. The well will be drilled and cased in accordance with CWRM rules. The upper section of the well will be fully grouted and concrete pad will be constructed around the well casing to prevent intrusion of surface runoff and upper-level waters from reaching the aquifer. Therefore, no impacts to ground water quality are anticipated due to the construction of the exploratory well.

As streams in Hawai‘i are often ephemeral, underground water is the most reliable source of water supply, because there is less daily or seasonal change in water tables. As discussed above, most water is maintained in the basal freshwater lens that essentially floats on the salt-water permeated basaltic rock below, rather than in perched aquifers capable of being intersected by downcutting streams. There are several ephemeral streams within the Makawao Aquifer Unit, but data is limited for them. The closest to Kealaloa Well is Kailua Gulch, located approximately 400 feet away. The watershed of Kailua Gulch extends above 7,000 feet in elevation, but typically flow is only observed intermittently. The Waihou Spring Tunnels may contribute to the surface flow of the Kailua Gulch, but there is no surface flow data recorded for this stream. The Kealaloa Tank exploratory well would have a basal water source, which means that the only streams and wells that could be affected would have to be in reasonable proximity to the well and at sea level. No such springs or streams are present, with elevations in even the deepest nearby gulches (Kailua, Maliko and Kalialinui Streams) perched more than 700 feet above sea level at distances of three miles from the proposed well. Thus, there will be no streams or springs in the area whose water flow would be affected by the well drawdown. Mitigation during the drilling process can prevent any rock cuttings or drilling water to enter any of the surrounding streams and thus affecting stream water quality.

This EA considers only the effects of the exploratory well. Long-term impacts to the water resources would be analyzed in a separate environmental assessment for a permanent well if the proposed exploratory well is deemed to be a suitable potable water source.

Water Quality

As discussed above, there is always at least some potential for water from a new well to contain microbial, metal, chemical or other contaminants that require treatment or are so severe as to be too costly to remediate. Therefore, DLNR examined various data sources in order to determine the likelihood of contamination. The process of evaluating alternatives is discussed above in Section 1.5 and will not be repeated here, but it bears mention that the process included evaluation of the potential for pesticides associated with former pineapple and sugarcane cultivation, as well as pesticide storage and mixing areas. It also examined the Hawai‘i DOH 2017 report on nitrates, specifically verifying that there were not significant numbers of cesspools or septic tanks nor confined animal feeding operations in the areas directly upslope. A Phase 1 Environmental Site Assessment was also conducted to research the potential for onsite hazardous materials (see Section 3.16, below, for specifics).

In terms of agricultural chemicals, the hydrologists determined that the potential to reach the basal lens is very low in the Kealaloa Tank Site area. This potential is greatest in areas of high rainfall and in old wells not constructed to modern standards. If the annular space between the well casing and the bore is not properly grouted and sealed, the migrating water may find its way downward into the production well bore, as has been evidenced in certain wells in the lower Kula and Haiku regions. This can be completely avoided in properly constructed wells.

To summarize, although there are certainly sources of potential groundwater contamination in the area, DLNR believes there is a strong likelihood of uncontaminated basal water underneath the site that can successfully be used in the potable water system, with minimal or no treatment for contaminants. This can only be determined through drilling and testing an exploratory well.

The following measures will be implemented to prevent or mitigate for chemical contaminants:

- The well will be constructed in conformance with best practices to have the annular space between casing and bore hole grouted to within 5 feet of mean sea level as a precaution against shallow, perched water reaching the basal water table.
- The well water will undergo standard testing for a suite of contaminants, and if found, DLNR will determine the proper course of action.

3.1.3 Floodplains and Surface Water Quality

Existing Environment

Floodplain status for the proposed Kealaloa Tank Site has been determined by FEMA, the Federal Emergency Management Agency (Fig. 3-2). The entire area is classified as Zone X, or Special Flood Hazard areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area.

Impacts and Mitigation Measures

No impact to flooding or flood zones would occur with development of the project. The project will add very minimally to the area of impermeable surface and will not adversely affect drainage. In any project, uncontrolled excess sediment from soil erosion during and after excavation and construction has the potential to impact natural watercourses, water quality and flooding potential. Contaminants associated with heavy equipment and other sources during construction may also impact receiving stream, ocean and ground water.

Figure 3-3. Flood Zone Map

Source: DLNR: Hawai‘i National Flood Insurance Program Flood Hazard Assessment Tool http://gis.hawaiinfip.org/fhat/

Provisions will be made during the construction grading and earthwork to minimize the potential for soil erosion and off-site sediment transport. A Pollution Control Plan and a Stormwater Pollution Prevention Plan will be implemented as part of a County of Maui Grading Permit and, if required, a National Pollutant Discharge Elimination System (NPDES) permit, to ensure that the proposed improvements do not cause drainage or water quality impacts. Best Management Practices (BMPs) for soil erosion and sediment control shall be implemented. These may include measures such as the following:

- Limiting the amount of surface area graded at any given time to reduce the area subject to potential erosion;
- Utilizing soil erosion protective materials such as mulch or geotextiles on areas where soils have a high potential for erosion until permanent provisions such as lawns and grasses can be developed;
- Planting vegetation as soon as grading operations permit to minimize the amount of time soils are exposed to possible erosion; and

- Building sedimentation basins to collect sediment which enters runoff waters.

The project will be regulated through review, revision and approval by the Maui County Department of Public Works (DPW) to ensure compliance with standards related to storm runoff containment.

3.1.4 Climate and Air Quality

Existing Environment

The climate of the Makawao to Pukalani area can be described as mild and semi-moist due to its location at about 2,000 feet in elevation on the windward side of the island. Average annual rainfall at the project site is about 49 inches (Giambelluca et al 2013), with a moderate winter maximum. Winds are generally trades from the east-northeast, which are occasionally replaced by light and variable southerly "kona" winds, most often in winter (UH-Manoa, Dept. of Geography 1998).

Air quality in the project area is generally good. There are occasional impacts from agricultural dust and sulfur particulates from volcanic emissions from Kilauea Volcano on the Big Island, called vog.

Impacts and Mitigation Measures

The proposed project will not produce any permanent substantial air quality impacts. Construction has the potential to produce very localized and temporary fugitive dust emissions. No homes are present within several thousand feet, but the Assistance Dogs of Hawaii facility is located about 150 feet away from the well site and adjacent to the access corridor. A dust control plan will need to be implemented for construction activities with potential to generate substantial dust. The elements of the plan may include some or all of the following:

- Watering of active work areas;
- Cleaning adjacent paved roads affected by construction;
- Covering of open-bodied trucks carrying soil or rock;
- Limiting area to be disturbed at any given time;
- Mulching or stabilizing disturbed inactive areas with geotextile; and
- Paving and landscaping of project areas as soon as practical in the construction schedule.

3.1.5 Noise and Scenic Value

Existing Environment

Noise levels on the site is low and mostly derived from nearby roads and the adjacent reservoir pump. No sensitive noise receptors such as churches, residences, parks or schools are present within 2,000 feet of the Kealaloa Tank Site (see Figure 1-3). However, the facility for the Assistance Dogs of Hawaii, a non-profit that provides people with physical disabilities specially trained dogs to live independent lives, is directly adjacent to the water tank and about 150 feet from the proposed well site.

The proposed well site is on wooded pasture land adjacent to the existing Kealaloa Tank. It exhibits the typical rural scenery of the area, albeit with a fenced water tank in the background for many views (see photos in Figure 1-2).

Impacts and Mitigation Measures

Construction will elevate noise levels during short periods over the course of several months. Rules of the Department of Health (DOH), at Title 11, Chapter 46, HAR (Community Noise Control), specify the maximum permissible sound levels based on zoning district. The rules apply to any excessive noise source emanating within the property to any point at or beyond the property line. The Kealaloa Tank site (as well as all adjacent land) is within the State Land Use Agricultural District, where daytime and nighttime maximum permissible levels are both 70 decibels, which is about the volume of a typical vacuum cleaner.

Noise levels are not allowed to exceed the maximum permissible sound levels for more than ten percent of the time within any twenty-minute period, except by permit or variance. The maximum permissible sound level for impulsive noise (i.e., sudden increases in sound levels) is ten decibels above the maximum permissible sound levels. A noise variance may be required for the 96-hour pump test of the exploratory well. Noise levels will vary based on construction equipment used, and if louder equipment is used, noise attenuation techniques can be employed. DOH will be consulted, and if appropriate, the contractor will be required to obtain a permit prior to construction. DOH would review the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers.

Operational impacts would be systematically analyzed in a subsequent EA, if the results of the exploratory well testing are successful and DLNR eventually decides to proceed with development of a production well. In general, such wells utilize either a submersible pump located deep within the well, which here would be nearly 2,000 feet below the ground surface and barely audible on the site, or a line shaft pump on the surface, which emits more noise. A fan

located within the control building would also generate small amounts of noise, and the control building would also have an audible alarm that would be triggered only during emergencies.

The General Plan identified the rural and serene environment as one of the primary attributes that defines Upcountry Maui's character. Loss of this rural ambience is of significant concern to the region's residents. Consequently, the preservation of this rural setting and open space through comprehensive planning, public participation, and orderly plan implementation is viewed as an important goal for the region. The construction and operation of the well would not result in adverse impacts to scenery or ambience. The construction on the well site and supporting facilities will convert a small area of wooded pasture to water supply use, but it would be in keeping with the existing water supply-oriented use directly adjacent to the site. The maximum height of any future permanent structures would be approximately 14 feet, much lower (as well as less bulky) than the reservoir itself (see photos in Figure 1-2), and structures would not protrude into views of the coast or nearby roads.

3.1.6 Hazardous Substances

Existing Environment

A Phase I Environmental Site Assessment (ESA) was conducted for the project site by Myounghee Noh and Associates (MNA). The Phase I ESA is reproduced as Appendix 4. A Phase I ESA aims to identify *recognized environmental conditions* (REC) that exist on the project site and existing recognized environmental conditions in the project area that have the potential to impact the project site. The term recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on the site that indicates an existing release, a past release, or a material threat of a release into structures on the site or into the ground, groundwater, or surface water of the site. The Phase I ESA included site reconnaissance, interviews with land owners and managers, and research using a variety of State and federal databases.

MNA performed the site reconnaissance in March, 2017. No RECs were located on the project site. During the site reconnaissance, MNA observed one aboveground storage tank (AST) located on the adjoining property to the north, TMK (2) 2-3-007:033. The AST is the Kealaloa Tank itself, owned by the County of Maui DWS, and was in good condition. As the focus of the Phase I ESA is on hazardous materials and petroleum products, this water tank is not a concern, and is not considered an REC. MNA also observed one pole-mounted transformer on the adjoining property to the west. The Maui Electric Company (MECO) confirmed that this transformer does not contain polychlorinated biphenyls.

Database research using the Hawai‘i State Department of Health (DOH) Hazard Evaluation and Emergency Response (HEER) records identified one State hazardous waste site located at a non-geocoded location within the same zip code as the subject property. The site, the Maui Pineapple

Company, Ltd. Corn Mill Camp, was identified as having dichlorodiphenyltrichloroethane (DDT), arsenic, pentachlorophenol (PCP), dieldrin, toxaphene, and dioxin in the soils within a 24,000 square foot pesticide mixing area. According to historical topographic maps, the Corn Mill Camp, was located approximately 1.25 miles northwest and downgradient from the subject property. Due to the distance and proximity of this site from the subject property, it is not considered an REC.

In summary, no records were identified at the project site of National Priorities List (NPL) sites, federal Resource Conservation and Recovery Act (RCRA) CORRACTS (RCRA Facilities that are undergoing "corrective action") and Non-CORRACTS Treatment Storage Disposal Facilities, Delisted NPL sites, federal or state Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites, federal CERCLIS No Further Remedial Action Planned (NFRAP) sites, landfill or solid waste disposal sites, State Leaking Underground Storage Tank (UST) list sites, State Voluntary Cleanup sites, federal RCRA Generator sites, State registered UST sites, Institutional Controls/ Engineering Controls registries, federal Emergency Response Notification System (ERNS) list sites, or federal or State Brownfields sites. No recognized environmental conditions were identified on the subject property based on the historic aerial photograph or topographic map review. During the site reconnaissance, MNA observed no indication of REC.

Impacts and Mitigation Measures

No impacts would be expected as the site is prepared for the project and well drilling is conducted. Operational impacts of having a production well would be systematically analyzed in the production well EA, if the results of the exploratory well testing are successful and DLNR decides to proceed. In general, operation of a production water well involves some limited use of hazardous materials. Water purification involves disinfection with chlorine gas, which is usually stored in 150-pound cylinders within a fire-rated enclosure in the control building. These systems are designed with a manual switchover, and each cylinder has an automatic shutoff. A chlorine gas monitoring and alarm system is provided, which activates a fan to purge the chlorine gas from the enclosure. Chlorine is a hazardous substance that is inventoried through a Tier-2 Reporting Form, and this information is filed with State and County Civil Defense Agencies and the County Fire Department. The design is being coordinated the County of Maui Fire Department. Given the proper design and appropriate coordination with the Fire Department, as well as the extensive safety precautions for use of the chlorine, there is negligible hazard to the public or the natural environment.

3.2 Biological Environment

Biological Consultation

In order to gain information concerning the potential presence of and impacts to important biota, early consultation included informing the U.S. Fish and Wildlife Service (UWFWS) and the DLNR Division of Forestry and Wildlife (DOFAW) about the action. No replies were received in response.

However, previous USFWS communications concerning the former proposed Pukalani Reservoir site provided information useful in general habitat analysis. In an email of August 8, 2013 (see App. 1a, *Draft EA Pukalani Tank Site Exploratory Water Well*, dated January 8, 2014), Ian Bordenave of USFWS had provided the following information:

> "Based on information you provided as well as information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, the Service has determined that there is no designated critical habitat within the proposed project footprint. However, four species protected by the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), may occur in or transit through the proposed action area:
>
> The endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus auricularis newelli*), collectively referred to as seabirds, may transit through the proposed action area while flying between the ocean and nesting sites in the mountains during their breeding season (March through December). Seabird fatalities resulting from collisions with artificial structures that extend above the surrounding vegetation have been documented in Hawaii where high densities of transiting seabirds occur. Additionally, artificial lighting, such as flood lighting for construction work and site security, can adversely impact seabirds by causing disorientation which may result in collision with utility lines, buildings, fences, and vehicles. Fledging seabirds are especially affected by artificial lighting and have a tendency to exhaust themselves while circling the light sources and become grounded. Too weak to fly, these birds become vulnerable to depredation by feral predators such as dogs, cats, and mongoose. Therefore, the Service recommends that project-related lighting should be minimized. All outdoor lights should be shielded so the bulb is not visible at or above bulb-height. Moreover, motion sensors and timers should be installed on any necessary outdoor lighting to minimize periods of illumination.
>
> Additionally, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) is known to occur throughout the island of Maui. This bat roosts in both exotic and native woody vegetation and, while foraging, leaves young unattended in "nursery" trees and shrubs. If trees or shrubs suitable for bat roosting are cleared during the hoary bat breeding season (June 1 to September 15), there is a risk that young bats could inadvertently be harmed or

killed. As a result, the Service recommends that woody plants greater than 15 feet tall should not be removed or trimmed during the Hawaiian hoary bat breeding season. Additionally, Hawaiian hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When barbed wire is used in fencing, Hawaiian hoary bats can become entangled. The Service therefore recommends that barbed wire not be used for fencing as part of this proposed action.

Lastly, the Blackburn's sphinx moth (*Manduca blackburni*) may presently breed and feed within the proposed action area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), ilie‘e (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*); larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothocestrum latifolium*). Blackburn’s sphinx moth pupae may occupy the soil within 250 feet of larval host plants for up to a year. The Service recommends that a qualified biologist survey the project area, and areas adjacent to the project footprint, for the presence of native and non-native Blackburn’s sphinx moth larval host plants. It is also recommended that these surveys be conducted during the wettest portion of the year (usually November-April) and approximately four to eight weeks following a significant rainfall event. Surveys should include looking for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage). If presence of the Blackburn’s sphinx moth is confirmed, the Service should be contacted for further guidance."

It should be noted that since the August 2013 date of that email, an additional relevant species has been listed as endangered, the band-rumped storm petrel (*Oceanodroma castro*), which has been historically observed in Maui.

Biological Reconnaissance Surveys

As shown in the photos in Figure 1-2, the project site is basically a wooded pasture with kikuyu grass (*Cenchrus clandestinus*) and eucalyptus (*Eucalyptus* sp.) trees. No trace of the original native vegetation remains. Table 3-2 provides a full list of plants observed during a July 2015 site visit by Dr. Ron Terry. No plants listed, or proposed for listing, as threatened or endangered by the U.S. Fish and Wildlife Service, were found on the project site, and none would be expected, given the context.

Table 3-3. Plant Species on Project Site

Scientific Name	Family	Common Name	Life Form	Status
Abutilon grandifolium	Malvaceae	Hairy abutilon	Herb	A
Ageratum conyzoides	Asteraceae	Ageratum	Herb	A
Asclepias physocarpus	Apocynaceae	Balloon plant	Herb	A
Cenchrus clandestinus	Poaceae	Kikuyu grass	Grass	A
Chamaecrista nictitans	Fabaceae	Partridge pea	Herb	A
Chamaesyce hirta	Euphorbiaceae	Garden spurge	Herb	A
Chloris barbata	Poaceae	Swollen fingergrass	Grass	A
Conyza bonariensis	Asteraceae	Hairy horseweed	Tree	A
Desmodium incanum	Fabaceae	Desmodium	Vine	A
Emilia fosbergii	Asteraceae	Flora's paintbrush	Herb	A
Eragrostis amabilis	Poaceae	Lovegrass	Grass	A
Eucalyptus sp.	Myrtaceae	Eucalyptus	Tree	A
Indigofera suffruticosa	Fabaceae	Indigo	Shrub	A
Ipomoea indica	Convolvulaceae	Morning glory	Vine	I
Jacaranda mimosifolia	Bignoniaceae	Jacaranda	Tree	A
Leonotis nepetifolia	Lamiaceae	Lion's ear	Herb	A
Megathyrsus maximus	Poaceae	Guinea grass	Grass	A
Melinis repens	Poaceae	Natal red top	Grass	A
Neonotonia wightii	Fabaceae	Glycine	Herb	A
Plantago lanceolata	Plantaginaceae	Narrow-leaved plantain	Herb	A
Ricinus communis	Euphorbiaceae	Castor bean	Shrub	A
Schinus terebinthifolius	Anacardiaceae	Christmas berry	Shrub	A
Senecio madagascariensis	Asteraceae	Fireweed	Vine	A
Solanum linnaeanum	Solanaceae	Sodom apple	Shrub	A
Sporobolus africanus	Poaceae	Smutgrass	Herb	A
Taraxacum officinale	Asteraceae	Dandelion	Herb	A
Trifolium repens	Fabaceae	White clover	Herb	A
Urochloa mutica	Poaceae	California grass	Herb	A
Verbena litoralis	Verbenaceae	Verbena	Herb	A
Verbesina encelioides	Asteraceae	Golden crown beard	Herb	A

* A = alien; I = indigenous; E= endemic (none)

The alien vegetation on the project site and pasture on surrounding properties appears to provide habitat for non-native bird species such as Japanese white-eyes (*Zosterops japonica*), common mynas (*Acridotheres tristis*) and cardinals (*Cardinalis cardinalis*). No endangered or otherwise rare forest bird species were observed or would be expected in this lowland area. No mammals

were observed during the brief botanical reconnaissance, but axis deer (*Axis axis*), mongooses (*Herpestes auropunctatus*), feral cats (*Felis catus*), rats (*Rattus* spp.) and mice (*Mus musculus domesticus*) may inhabit or use the area.

No tree tobacco or other documented host plants for any stage of Blackburn's Sphinx Moth were present. Although no Hawaiian hoary bats or seabirds were observed in the surveys, these species often require specialized detection methods and their possible presence in the region was noted by the U.S. Fish and Wildlife Service. There is no habitat suitable for nesting by Hawaiian seabirds, but several trees potentially tall enough to be utilized by Hawaiian hoary bats are present.

No aquatic environment is present in or near the proposed well. The nearest stream-like feature is Kailua Gulch, an intermittent stream located approximately 300 feet to the east. Pumping of the basal aquifer in the Makawao area, which is near sea level and more than six miles from the coastline, will not affect streams or springs. Despite the large flux of fresh groundwater into the coastal waters off Maui, steep bathymetry and rough seas induce almost instantaneous mixing of fresh and salt water. No effects on aquatic biology of coastal waters would be expected from the absence in this net flux of the relatively minor quantity of water that would be withdrawn by the well and not returned to the aquifer through use.

Impacts and Mitigation Measures

In order to avoid or minimize to negligible levels impacts to listed threatened or endangered species, the following actions, which conform to the recommendations of the U.S. Fish and Wildlife Service, will be required to be implemented as part of the project.

- Project-related lighting is not expected, but if any is required, it will be minimized, and all outdoor lights will be shielded so the bulb is not visible at or above bulb-height. Motion sensors and timers will be installed on any necessary outdoor lighting to minimize periods of illumination.
- Woody plants taller than 15 feet t will not be removed or trimmed during the Hawaiian hoary bat breeding season (June 1 to September 15). Additionally, no barbed wire will be utilized for fencing.

3.3 Socioeconomic

3.3.1 Social Factors and Community Identity

Existing Environment

This Upcountry region of Maui is characterized by abundant open space, agricultural lands, and rural towns. Because of its cool climate, spectacular views, and country lifestyle, it is a popular

area to live. Makawao is one of the region's two main settlement areas. As noted in the General Plan, Makawao has a strong historic connection to cattle ranching and is traditionally known as the last *paniolo* town on Maui. Commercial and institutional land uses in town are concentrated near the Baldwin Avenue and Makawao Avenue intersection. Residential areas are composed of suburban and rural subdivisions, and the town is surrounded by ranch land and farm fields. Pukalani is the second main town in the area, with a shopping center, a community center, several schools and suburban and rural subdivisions. Kula has a mixture of rural residential and agricultural uses, with diversified agriculture very important to the economy. Small rural service centers are sprinkled throughout the Kula region, including Waiakoa and Kēōkea.

Like most of the State of Hawai'i, Upcountry is diverse in its social makeup (Table 3-3). Compared to the State as a whole, it has a generally greater proportion of whites and those reporting two or more races; a smaller proportion of Asians; fewer immigrants; more persons recently relocated to their current home; and more persons likely to live in single-family rather than multi-family homes.

This area saw significant increases in population in the 1980s, but less growth subsequently. One reason for the decrease in the pace of development was water supply problems. Job growth occurred at a much faster rate, but the Maui General Plan forecast calls for economic growth to continue at a slower pace. With only one job located in this area for every 2.5 households, most of the area's residents commute outside the area for work. This will continue to be the case; by 2030, the forecast shows only 2.1 local jobs per household.

As shown in Table 3-4, the General Plan 2030 forecast that the total population of Maui would not increase equally throughout the island, but overall would grow from 144,444 in 2010 to 194,630 in 2030, an increase of 35 percent. The Makawao-Pukalani area was forecast to grow during the same period from 23,919 to 29,635, an increase of 15 percent.

Some important socioeconomic trends were noted in the General Plan:

- The population is aging; median age increased from 34.1 to 36.2 years from 1990-2000
- Households are becoming smaller over time; Maui's household size is projected to decline from 2.94 persons per household in 2000 to 2.66 persons per household in 2030.
- Wage and salary jobs are expected to increase by about 1.1 percent annually.
- Per capita income will increase very little (in constant dollars).
- Visitor counts will increase by about 1 percent annually.
- Because of high occupancy rates, construction of new units is expected to resume, and the supply of visitor units is expected to grow at 1 percent annually.
- The past rate of growth in resident population, housing, and jobs is higher than the rate of visitor growth. This indicates that Maui's economy has diversified and is less driven by tourism than in the past.

Table 3-3: Selected Socioeconomic Characteristics

CHARACTERISTIC/AREA	Makawao CDP	Pukalani CDP	State of Hawai‘i
POPULATION			
Population, 2010	7,184	7,574	1,360,301
Persons under 5 years, percent, 2010	7.1%	5.5%	6.4%
Persons under 18 years, percent, 2010	24.2%	24.0%	22.3%
Persons 65 years and over, percent, 2010	10.8%	12.4%	14.3%
Female persons, percent, 2010	50.9%	49.7%	49.9%
RACE			
White alone, percent, 2010 (a)	38.2%	33.2%	24.7%
Black or African American alone, percent, 2010 (a)	0.4%	0.4%	1.6%
American Indian and Alaska Native alone, percent, 2010 (a)	0.6%	0.3%	0.3%
Asian alone, percent, 2010 (a)	15.9%	23.9%	38.6%
Native Hawaiian and Other Pacific Islander alone, percent, 2010 (a)	8.4%	9.5%	10.0%
Two or More Races, percent, 2010	35.5%	30.9%	23.6%
Hispanic or Latino, percent, 2010 (b)	15.1%	12.0%	8.9%
White alone, not Hispanic or Latino, percent, 2010	33.9%	30.5%	22.7%
SOCIAL CHARACTERISTICS (2011-2015)			
Living in same house 1 year & over, percent	83.5%	89.5%	85.1%
Foreign born persons, percent	11.1%	7.9%	17.7%
Language other than English spoken at home, percent age 5+	14.0%	12.4%	25.6%
High school graduate or higher, percent of persons age 25+	94.9%	94.5%	91.0%
Bachelor's degree or higher, percent of persons age 25+	27.4%	26.9%	30.8%
Veterans	418	556	110,238
Mean travel time to work (minutes), workers age 16+	26.5	27.2	26.8
HOUSING CHARACTERISTICS (2011-2015)			
Homeownership rate	54.4%	61.7%	56.9%
Median value of owner-occupied housing units	$486,000	$584,200	$515,300
Households	2,286	2,804	450,572
Persons per household	2.80	2.88	3.02
INCOME (2015 dollars)			
Per capita money income in the past 12 months	$24,070	$31,021	$29,822
Median household income	$61,023	$75,515	$69,515
Persons below poverty level, percent*	15.3%	8.3%	10.6%

Notes: (a) Includes persons reporting only one race. (b) Hispanics may be of any race, so also are included in applicable race categories

Source: U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, County Business Patterns, Economic Census, Survey of Business Owners, Building Permits, Census of Governments

* This geographic level of poverty estimates is not comparable to other geographic levels of these estimates

Table 3-4. Community Plan Area Population 2000 – 2030

Community Plan Area	2000	2005	2010	2015	2020	2025	2030
West Maui	17,967	19,852	22,156	29,103	31,410	33,743	36,058
Kīhei-Mākena	22,870	25,609	27,244	37,850	40,850	43,885	46,896
Wailuku-Kahului	41,503	46,626	54,433	52,343	56,492	60,689	64,853
Makawao-Pukalani-Kula	***21,571***	***23,176***	***25,198***	***23,919***	***25,815***	***27,732***	***29,635***
Pāʻia-Haʻikū	11,866	12,210	13,122	11,332	12,230	13,139	14,040
Hāna	1,867	1,998	2,291	2,541	2,743	2,947	3,149
Total Maui Island	117,644	129,471	144,444	157,087	169,540	182,135	194,630

Source: Maui County General Plan 2030

Impacts and Mitigation Measures

No relocation of residences, businesses, community facilities, farms or other activities would occur because of the project. In the long-term, should exploratory well results prove successful and DLNR decides eventually to construct a production well, most direct impacts to the social environment would be beneficial. A stable alternative groundwater source of potable water would improvs the quality, quantity, and reliability of potable water for State projects such as schools and Hawaiian Home Lands projects, as well as for Maui residents and businesses as a whole.

This EA concerns development of an exploratory well, which would not it itself produce or involve a commitment that would generate secondary impacts, such as population growth and consequent traffic, infrastructure, social services and lifestyle impacts. Section 3.4 discusses the impact analysis that would be required to be conducted if the exploratory well results are successful and DLNR decides to move forward with an EA for a production well.

3.3.2 Public Services, Facilities and Utilities

Utilities

Drilling the well will likely involve a portable, trailer-mounted drill rig utilizing a gasoline engine that requires approximately 500 gallons of fuel per 24 hours of drilling, over the course of days to weeks. Operating the well and supporting facilities will require electrical power, which is already available at the site. As discussed previously, considerable energy is required to pump water, and the MDWS is the largest consumer of power from MECO (Maui Electric Company) on the island of Maui. The well pump would use 345 to 770kW of power during operation, which could occur 8 to 20+ hours per day. Although this involves a substantial load, sufficient power is available and there would likely be no adverse effect to MECO or its customers. It is also possible that in the future, locally produced energy from small wind turbines or photovoltaic solar can offset pumping costs. The EA for the production well, if results of exploratory well testing are successful and the project proceeds, would examine the energy use and supply issues that were current and determine impacts and mitigation measures.

Roadways

As shown in Figure 1-3, access to the site for construction and maintenance will be via Kealaloa Avenue via Haleakalā Highway, State Highway 377. No adverse impacts to public roads will occur.

If the exploratory well is successful, and DLNR moves forward with a production well, the need to place electric and water utilities inside or crossing the right-of-way of various County roads and State highways will require coordination and permitting with the Maui County Department of Public Works and the State Department of Transportation.

Police, Fire, Emergency Medical, Recreation, Schools, and other Public Facilities and Services

All such facilities and services are present in the Upcountry area, and none would be affected in any adverse way.

3.3.3 Cultural Resources

Chapter 343, HRS, requires consideration of cultural impacts for projects subject to an Environmental Assessment. The purpose of this is to ensure that significant cultural features and uses are identified, and to provide information to address the constitutional duty of agencies of the State of Hawai'i to protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians, to the extent feasible, in connection with activities requiring State or County permits.

Existing Environment

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Kirch (2011), in a review of 150 years of literature regarding settlement of the Hawaiian Islands, suggests earliest occupation of the islands occurred between A.D. 900 and 1000. The earliest populations purportedly used local resources and seldom ventured into upland valleys. Greater population expansion to inland areas, including upland *kula* zones, appears to have begun in the 12th century A.D., continuing through the 16th century AD.

Around the 14th century, the various *mōʻi* (kings/monarchs) of the Hawaiian Islands decided to formalize land tenure, mainly in order to better manage disputes between neighboring *aliʻi* (chiefs). Land was surveyed and land boundaries were marked. Hawaiian lands were divided into *moku* (districts), *ahupuaʻa*, and numerous smaller divisions, called ʻ*okana*, ʻ*ili*, etc. These land divisions generally encompassed land from the mountain to the sea, thereby allowing access to

both marine and mountain resources. Rather than denoting ownership of the lands by *ali‘i*, the *ahupua‘a* boundaries signified a trusteeship between the caretakers of the land (*konohiki*), designated by the *ali‘i,* and the nature gods worshipped by Hawaiians (Handy and Handy 1972).

The project site is located on the periphery of the town of Makawao, which is used to denote the parcel’s postal address. Makawao is translated by Pukui et al (1974) as “forest beginning”, which aptly describes the change in climate and vegetation upcountry. The project site is also on the periphery of the town of Pukalani, which translates to the “heavenly gates” (Ibid). The original name may have been “Pu‘u ka lani”, or hill of the heavens, alluding to the upland nature of the town and afternoon cloud formations over the area. This area is now within Kukuiaeo Ahupua‘a, a name that was not translated by Pukui et al (1974). Archaeologists have determined that traditionally it was within Hōkū‘ula Ahupua‘a, a land division that is unusual in in that it does not run all the way from the mountain to the ocean, but rather is entirely composed of high agricultural lands (*kula*). Wailuku Moku marks the northwestern *makai* border of the *ahupua‘a*, cutting off access to marine resources in this particular land division. The project site traditionally belonged to the *moku* of Kula but since 1848 has belonged to the larger Makawao District.

Upland areas of Maui such as this contained large garden enclosures, ceremonial structures, and permanent habitation sites by about A.D. 1600. Of Kula District, Handy (1940: 161) wrote:

> “On the coast, where fishing was good, and the lower westward slopes of Haleakalā, a considerable population existed, fishing and raising occasional crops of potatoes along the coast, and cultivating large crops of potatoes inland, especially in the central and northeastern section including Keokea, Waiohuli, Koheo, Kaonoulu, and Waiakoa, where rainfall drawn round the northwest slopes of Haleakalā increases toward Makawao.”

Handy and Handy (1972) described the aridness of Kula, and the dependence of its people on receiving *poi* from the wetter valleys of Waikapu and Wailuku to supplement their diet. Yet Kula was “…famous for its sweet potato plantations. ‘Uala [the sweet potato] was the staple of life here” (Handy and Handy 1972: 510-511).

Makawao Ahupua‘a, on the other hand, was once a vast area containing both wet and dry forests (Sterling 1998); its name literally means “forest beginning” (Pukui et al., 1976: 142). There are many references to the rains of Makawao, and it is likely that hunting and gathering took place in its diverse native forests (Sterling 1998; Pukui 1983). Tree species included *koa* (*Acacia koa*), sandalwood and *‘ōhi‘a lehua*; *maile* and ferns including *palapalai* and *pala‘a* thrived in these forests (Sterling 1998: 98). In the drier regions of Makawao, sweet potato was cultivated extensively, as it was in Kula. From Pukalani to historic Po‘okela Church, there are many oral accounts of sweet potato patches.

However, no studies in the project area have firmly identified permanent habitation sites such as those found in the Kēōkea-Waiohuli area of Kula. Rather, evidence of occupation includes petroglyphs, such as the canoe petroglyphs of Kaluapulani gulch in Makaʻeha Ahupuaʻa (Sterling 1998). Numerous *heiau* (large religious structures) have also been recorded in Hōkūʻula and surrounding *ahupuaʻa*. Oral evidence of a large sweet potato patch is recorded by Manu in Sterling (1998) for the *ahupuaʻa* of Makaʻeha. These petroglyphs, religious structures and agricultural accounts attest to human activity in the project area, but do not provide evidence of permanent habitation. Rather, the area was most likely significant in terms of gathering of upland forest resources and dryland agricultural endeavors, primarily the cultivation of sweet potato.

By the early historic period in Hawaiʻi, significant natural and cultural changes had taken place throughout the islands, not only due to contact with Westerners, but also because of internal social and environmental restructuring and external social and environmental factors (e.g., foreign species being introduced as well as foreign ideologies). These combined to have a severe impact on Hawaiian environments, land-tenure, and social structures.

By the 1800s, agriculture in the *moku* of Kula had transitioned from a subsistence activity to a commercial one (Kuykendall 1965 in Pantaleo 2004). Demand from new populations such as whalers encouraged the cultivation of vegetables, meat and fruit in Upcountry Maui. In the mid-19th century, demand for Irish potatoes by California gold rush workers caused a boom on Maui; Irish potato farms thrived in Kula, and soon Kula was known as the "potato district" (Kuykendall 1965: 313 in Pantaleo 2004).

On the other side of Hōkūʻula Ahupuaʻa, in Makawao, cattle ranching became a prominent means of employment and adopted lifestyle. Livestock was introduced to the Hawaiian Islands in 1793 when Captain Vancouver transported cattle and sheep aboard his ship the Discovery, with the intention of giving the four cows, two bulls, four ewes, and two rams to Kamehameha I as a gift of goodwill. The rough seas and intense heat of the journey took its toll on the health of the cattle and several of the animals died. In order to ensure that the cattle population would increase, a ten-year *kapu* (ban) was placed on slaughtering them. Eventually the cattle did increase in number to the point of becoming a dangerous nuisance. As they were allowed to roam wild, gardens were destroyed and the Native Hawaiians were terrified of being attacked. Managing and controlling the unruly animals became a necessity. In order to solve this problem Kamehameha I employed "a varied crew with unsavory reputations who had immigrated to the islands to escape their pasts" as bullock hunters to capture the animals (Cowan-Smith and Stone 1988:8).

The stage was set for the first cowboys in what is now the U.S., when in 1803, Captain Richard Cleveland and his partner Captain William Shaler introduced horses to the Islands. These men brought aboard their ship, the HMS Lelia Byrd, several horses including a stallion and a mare with foal, which they presented as gifts to Kamehameha. Soon the horses, like the cattle, were roaming freely across the Islands. The horses adapted rapidly to the rough terrain where the cattle

grazed and "their ability to work the livestock [did not] go unnoticed" (Cowan-Smith and Stone 1988:12). Around 1830, Kamehameha III brought Mexican *vaqueros* from Veracruz to the Big Island to teach the local men how to rope and handle the animals. As the cattle and horse populations proliferated, the animals were transferred to the various Hawaiian Islands and the *vaqueros*, which now included local cowboys, were needed on the outer islands. In addition to cattle ranching, agricultural activities were pursued. Despite claims that "the soil in this area of Maui grows rocks" (Fredericksen et al 1991:5) due to the many areas of exposed bedrock and scattered boulders and gravel in the surrounding fields, oral accounts of historic agricultural endeavors listed crops such as sweet potato, potatoes, corn, beans, and wheat, plantings of which had expanded exponentially in the first half of the nineteenth century (Sterling 1998: 99; Bartholomew 1994: 120).

During the historic period, traditional land tenure was fundamentally altered throughout the Hawaiian Islands. The transition from traditional Hawaiian communal land use to private ownership and division is commonly referred to as the Māhele (Division). The Māhele of 1848 set the stage for vast changes to land holdings within the islands as it introduced the foreign (western) concept of land ownership to the Islands. Although it remains 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 system of the production and exchange of goods and services to a market economy (Kuykendall Vol. I, 1938:145 footnote 47, 152, 165–166, 170; Daws 1968:111; Kelly 1983:45; Kame‘eleihiwa 1992:169–170, 176). Kame‘eleihiwa (1992: 209) stated that Makawao District was the first area in Hawai‘i to experiment with land sales. In January 1846, land was made available for eventual ownership to the commoners (*maka‘āinana*).

For native Hawaiians who had been cultivating and living on the lands, lengthy and costly procedures enabled them to petition for a claim to some of the plots. These claims could not include any previously cultivated or presently fallow land, stream fisheries or many other resources necessary for traditional survival (Kelly 1983; Kame‘eleihiwa 1992:2; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed Land Commission Award (LCA), issued a Royal Patent number (RP), and could then take possession of the property (Chinen 1961: 16).

According to Chinen (1961), land was sold for $1.00 per acre in Makawao District; this would mark the beginning of land grants. Lots purchased by Hawaiians ranged from five to ten acres, with a total land area of approximately 900 acres of grant lands purchased in Makawao. If applicants met all of the requirements (and were notified of the procedures), they eventually received the title to their land. Much of the granted lands in Makawao not purchased by native Hawaiian homesteaders was leased to foreign ranchers (Pantaleo 2004). During the mid-nineteenth century many Chinese immigrants began leasing lands from native Hawaiians and ranchers, developing a thriving agricultural community in Kula (ibid).

LCA Award 8452:7 is the closest LCA to the project site, located across Kealaloa Avenue (see Figure 6 of Appendix 3). LCA Award 8452-7 is part of a series of LCAs awarded to Keohokalole in 1848 in the *ahupua'a* of Kukuiaeo and Aapueo (among others) in Kula District. The LCA extends from the uplands to the coast, with other portions of the overall LCA (8452) also occurring on other islands (see sub-Appendix A of Appendix 3). In Kula, Keohokalole only claimed one taro and three sweet potato plots.

As time advanced, the change in land tenure coupled with a growing world market for Hawai'i crops and political entanglement with the United States eventually set up a dramatic change in agriculture. Throughout Makawao District, sugar and pineapple production grew rapidly. The area which had once been "developed as an agricultural and stock-raising area" later expanded "into pineapple upon the formation of the Pukalani Dairy and Pineapple Company in 1907" (Bartholomew 1994: 121). By the end of the nineteenth century, sugarcane and pineapple proved profitable; plantations of these crops only recently disappeared from the Upcountry area.

Along with sugarcane and pineapple farming, ranching also became a prominent land use. The project site is above the agricultural lands of the district and part of the ranching lands. Haleakalā Ranch, incorporated into the Kingdom of Hawai'i in 1888, owns the current project site. The ranch has 33,817 acres of holdings in upcountry Maui through the Kihei area. The current project site was not subject to pineapple cultivation, as were many areas of the Makawao region, but was used instead for ranching pasture. This land use continued for almost a century, leaving a thin footprint of past land use. The project site and the larger parcel of which it is a part have remained undeveloped to the time of this writing.

Impacts and Mitigation Measures

In the case of the proposed exploratory well project, it is important to reiterate that all ground disturbance will occur on a small portion of a lightly used, fenced pasture area with no archaeological or cultural resources or associations. The fenced site is out of the way and the project does not involve visual impacts. No streams, springs, wetlands or anchialine pools are fed or affected by the area of the aquifer that would be pumped by the project, and no hydrological impacts upon these or any marine resources would be expected. No biological resources (e.g., valuable native or Polynesian gathering plants) are found on the project site or would be expected to be impacted by project activities.

The archaeological inventory survey (Appendix 3), the Phase I Environmental Site Assessment (Appendix 4) and the early consultation process for the EA itself (Appendix 1a) involved consultation of agencies, groups and individuals who might have knowledge of cultural resources or practices that be affected. No information relative to such practices or resources was received. It is reasonable to conclude, based upon the limited range of resources, that the exercise of native Hawaiian rights related to gathering, access or other customary activities will not be affected, and there will be no adverse effect upon cultural sites, practices or beliefs. The Draft EA was

distributed to agencies and groups who might have knowledge in order to confirm this finding, including the Office of Hawaiian Affairs and the State Historic Preservation Division. No party reviewing the Draft EA supplied any additional cultural information.

3.3.4 Historic Sites/Archaeological Resources

An archaeological inventory survey of the property was conducted by Scientific Consultant Services, Inc. (SCS). The study is attached as Appendix 3 and summarized below, with historical and cultural information summarized above.

Existing Environment

A cultural and historical review of the literature as well as previous archaeology indicates that Hōkūʻula Ahupuaʻa in Kula District, at the edge of Makawao Ahupuaʻa, was primarily a source of forest resources and agricultural land. There is a lack of evidence, both in oral accounts and archaeological remains, for permanent settlement in this particular area of upcountry Maui. Southeast of the project area, on the leeward slopes of Haleakalā in Kula Moku, where sweet potatoes were more extensively cultivated, there is evidence for permanent settlement. Activities in this somewhat wetter and lower elevation area centered on hunting, gathering and more limited dryland cultivation. However, the presence of several petroglyphs and ceremonial structures attest to the significance of this area, and it is clear that humans have utilized Hōkūʻula Ahupuaʻa from pre-Contact through the entire historic period.

Fieldwork was conducted on January 25, 2017 by SCS personnel Ian Bassford, B.A., and Nikki Andricci, B.A., under the direction of Principal Investigator Michael Dega, Ph.D. The inventory survey included a 100 percent pedestrian survey of the project area in transects spaced 10 feet or less apart. As discussed above, the project site consisted of a two-acre portion of a fenced parcel adjacent to a DWS water tank. No sites or cultural deposits were encountered during the survey of the project site.

Impacts and Mitigation Measures

The inventory survey resulted in an archaeological assessment report concluding that no sites were present and there would be no effects to significant historic properties. This was officially transmitted on behalf of DLNR Engineering Division to the DLNR State Historic Preservation Division (SHPD) for review, comment and concurrence on April 24, 2017. DLNR Engineering is currently awaiting results of the review.

In the unlikely event that archaeological resources or human remains are encountered during future development activities within the project site, contract specifications will require that work in the immediate area of the discovery shall be halted and DLNR-SHPD contacted as outlined in Hawaiʻi Administrative Rules 13§13-275-12.

3.3.5 Agricultural Land

Existing Farming Operations and Value of Agricultural Land

Consultation of maps of important farmland from the U.S. Natural Resources Conservation Service (USNRCS) (as displayed in the Hawai‘i State Geographic Information System) determined that the pasture adjacent to Kealaloa Tank, where the exploratory well would be located, is land classified as Other Important Agricultural Land in the *Agricultural Lands of Importance to the State of Hawaii* (ALISH) map series.

Impacts and Mitigation Measures

No adverse impacts to farmland or farming would occur, because the well site area is only marginally used for pasture. The landowner, Haleakalā Ranch, foresees no impacts on their operations. If results of testing the exploratory well are favorable and DLNR decides to proceed with a production well, the EA will examine direct and secondary effects to farming and farmland.

As discussed in Section 3.1.2, Best Management Practices will be employed during grading of the well site and access driveway and during construction of all improvements, in order to minimize erosion or sedimentation and any adverse effects on adjacent land.

3.4 Growth-Inducing, Cumulative and Secondary Impacts

Growth-Inducing Impacts

Analysis of growth-inducing impacts examines the potential for a project to induce unplanned development, substantially accelerate planned development, encourage shifts in growth from other areas in the region, or intensify growth beyond the levels anticipated and planned for without the project. Provision of needed infrastructure such as roads, water supply, sewer facilities, etc., is often seen as growth-inducing. Of key importance is whether infrastructure fulfills existing demands/needs of planned growth, or whether it instead enables unplanned growth and/or diverts growth away from planned areas.

An analysis of these factors will be conducted if and when there are favorable results from testing the exploratory well data and DLNR decides to move forward with an EA for a production well. At that time, it will be possible to determine whether, and at what quantities, water of acceptable quality can be produced from the well. The outcome of subsequent negotiation between DLNR and MDWS will allow determination of what amount of water can be utilized for State projects and what can be used for other needs of MDWS.

Cumulative Impacts

Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures.

All adverse impacts of the exploratory well project related to hydrology, native species/habitat, wetlands, water quality, erosion, historic sites, and other areas of concern, are either non-existent or extremely restricted in geographic scale, negligible, and capable of mitigation through proper enforcement of permit conditions. Consultation of files and notices published in the Office of Environmental Quality Control's *Environmental Notice* did not indicate any nearby projects in planning or construction. There are no known appreciable adverse impacts that might accumulate with those of other past, present and future actions to produce more severe impacts.

Secondary Impacts

Construction projects sometimes have the potential to induce secondary physical and social impacts that are only indirectly related to project. For example, construction of a new recreation facility can lead to changes in traffic patterns that produce impacts to noise and air quality for a previously unimpacted neighborhood. In this case, the project's impacts are limited to direct impacts at the site itself, and there does not appear to be any potential for secondary impacts.

3.5 Required Permits and Approvals

Several permits and approvals will or may be required to implement this exploratory well project. The need for some of these permits will be determined in later stages of design.

- *State of Hawai'i DLNR Commission on Water Resource Management (CWRM) Well Construction/Pump Installation Permit*.
- *County of Maui Dept. of Public Works (DPW) Grading Permit*: Required for grading that exceeds 100 cubic yards or four feet in vertical height. A Minor Grading Permit applies when the graded area is under one acre and the maximum height/depth of excavation or fill less than 15 feet. A Major Grading Permit applies when the graded area exceeds one acre or the maximum height/depth of excavation or fill is over 15 feet.
- *State of Hawai'i Dept. of Health (DOH) National Pollutant Discharge Elimination System (NPDES) Permit*. An NPDES General Permit covers discharges composed entirely of storm water runoff associated with construction activities, including clearing, grading, and excavation that results in the disturbance of one acre or more of total land area.
- *State of Hawai'i DOH Noise Variance*. If construction may exceed maximum permissible sound levels based on the Agricultural zoning district, the permit may be required.

4 COMMENTS AND COORDINATION

4.1 Agencies and Organizations Contacted

The following agencies and organizations received a letter inviting their participation in the preparation of the Environmental Assessment.

County of Maui

- Department of Planning
- Department of Fire/Public Safety
- County Council
- Department of Public Works
- Department of Environmental Management
- Police Department
- Department of Water Supply

State of Hawai‘i

- Department of Land and Natural Resources
- Department of Health
- Office of Hawaiian Affairs
- Hawaiian Homes Commission
- Department of Transportation

Federal

- Haleakalā National Park
- U.S. Fish and Wildlife Service

Organizations and Individuals

- Assistance Dogs of Hawaii
- Haleakalā Ranch
- Makawao Community Association
- Maui Tomorrow
- Sierra Club
- Richard Mayer

Copies of correspondence from agencies with substantive comments during the preparation of the EA are included in Appendix 1A and are cited in appropriate sections of the text of this EA. Comments to the Draft EA and responses to these comments are contained in Appendix 1b. Non-procedural text changes from the Draft EA are denoted by double underlines, as in this sentence.

5 LIST OF DOCUMENT PREPARERS

This Environmental Assessment was prepared for the State of Hawai‘i, Department of Land and Natural Resources by Ron Terry, Ph.D., of Geometrician Associates, with assistance from Akinaka & Associates, the engineering contractor for the well project, Scientific Consultant Services, for archaeology, Waimea Water Services, for hydrological studies, and Myounghee Noh and Associates, for Phase I Environmental Site Assessment.

6 STATE OF HAWAI'I ENVIRONMENTAL ASSESSMENT FINDINGS

Section 11-200-12 of the State Administrative Rules sets forth the criteria by which the significance of environmental impacts shall be evaluated. The following discussion paraphrases these criteria individually and evaluates the project's relation to each.

1. *The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources*. No natural resources will be irrevocably committed or lost. The vegetation on the site consists of non-native pasture grasses, trees and weedy herbs and shrubs, with no valuable native fauna habitat. No sensitive water bodies or other natural resources are present. The State Historic Preservation Division is expected to concur with the archaeologist's finding that the project would have no effect to historic sites.

2. *The project will not curtail the range of beneficial uses of the environment*. No future beneficial use of the environment will be affected in any way by the proposed project. The exploratory well will have no effect on water quality or quantity with standard mitigation. Based on existing uses in the aquifer, it would appear that development of a production well would not result in total water use approaching or exceeding the sustainable yield of the aquifer, a finding that would be further assessed in an EA if and when a production well is proposed. The existing use of the site for a reservoir will not be affected.

3. *The project will not conflict with the State's long-term environmental policies*. The State's long term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. A number of specific guidelines support these goals. No aspect of the proposed project conflicts with these guidelines. The project's goal of providing data that may eventually assist in developing a source of high-quality groundwater for potable use for State projects and other beneficial uses in support of the orderly development of planned growth, while conserving natural resources, satisfies the State's environmental policies.

4. *The project will not substantially affect the economic or social welfare of the community or State*. The improvements will benefit the social and economic welfare of Hawai'i by providing data that will assist in developing a source of high-quality groundwater for the potable water supply for State projects, including schools and Hawaiian Home Lands, as well as other planned uses.

5. *The project does not substantially affect public health in any detrimental way*. No adverse effects to public health are anticipated. The project will provide data that could assist in developing a source of high-quality groundwater for public water supply systems.

6. *The project will not involve substantial secondary impacts, such as population changes or effects on public facilities*. No adverse secondary effects are expected. The project for an exploratory well will provide data that can ultimately assist in further groundwater development, which is evaluated on multiple levels to assure it is consistent with planned growth.

7. *The project will not involve a substantial degradation of environmental quality*. The implementation of best management practices for all construction will ensure that the project will not degrade environmental quality in any substantial way.

8. *The project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat*. No endangered species of flora are known to exist on the project site; effects to wide-ranging endangered Hawaiian hoary bats can be mitigated by timing of vegetation removal.

9. *The project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions*. Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures. Adverse impacts will either not occur or will be reduced to negligible levels through mitigation measures, and will therefore not tend to accumulate in relation to this or other projects.

10. *The project will not detrimentally affect air or water quality or ambient noise levels.* The project will have negligible effects in terms of water quality, air quality and noise.

11. *The project will not affect or will likely be damaged as a result of being located within an environmentally sensitive area such as flood plains, tsunami zones, erosion-prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters*. No floodplains, tsunami zones, geologically hazardous areas, or other such sensitive land is involved in the area planned for development.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No protected viewplanes will be impacted by the project, which will have no adverse scenic effects.

13. *The project will not require substantial energy consumption*. Some, but not substantial, input of energy is required for the construction of the facilities and the operation of the pump for the exploratory well. Further studies and planning that would be discussed in the EA for the production well will be necessary to determine the energy implications.

Based on the above, the State of Hawai‘i, Department of Land and Natural Resources has determined that the proposed project will not have any significant effect in the context of Chapter 343, Hawai‘i Revised Statues and section 11-200-12 of the State Administrative Rules, and has thus issued a Finding of No Significant Impact.

REFERENCES

Bartholomew, G. 1994, *Maui Remembers: A Local History*. Honolulu: Mutual Publishing.

Brown and Caldwell. 2014. Letter of 12/23/2014 to Caleb P. Rowe, Dep. Corp. Counsel, County of Maui. Subject: Petition to Amend Interim Flow Standards....Case No. CCH-MA-13-01.

Chinen, J.J. 1961. *The Great Mahele: Hawaiian Land Division of 1848.* Honolulu: University of Hawai‘i Press.

Cowan-Smith, V. and B. Stone. 1988. *Aloha Cowboy*. Honolulu: University of Hawai‘i Press.

Daws, G. 1968 *Shoal of Time: History of the Hawaiian Islands*. Honolulu: University of Hawai‘i Press.

Fredericksen, D. L., W. M. Fredericksen, and E. M. Fredericksen. 1991. *Preliminary Report on Additional Archaeological Data Collection of Problematical Feature on a Parcel in a Pukalani, Maui, HI*. Xamanek Researches, Pukalani, Maui, HI.

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte, 2013: Online Rainfall Atlas of Hawai‘i. Bull. Amer. Meteor. Soc. 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.

Handy, E.S. 1940. *The Hawaiian Planter*. Honolulu: Bishop Museum Press.

Handy, E.S. and E.G. Handy. 1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum, Bulletin 233. Honolulu.

Hawai‘i Department of Health, Safe Drinking Water Branch. 2018. FEBRUARY 2018 DRAFT *Upcountry Maui Groundwater, Nitrate Investigation Report, Maui, Hawaii*. Honolulu.

Hawai‘i State Department of Land and Natural Resources (DLNR), Commission on Water Resources (CWRM). 1980. *State Water Resources Development Plan*. Honolulu.

_____. 1990. *Draft Hawai‘i Stream Assessment: A Preliminary Appraisal of Hawai‘i’s Stream Resources*. Prep. for CWRM by Hawai‘i Cooperative Park Service Unit. Honolulu: National Park Service.

_____. 1990. *Hawaii Water Plan: Water Resources Protection Plan*, Vol. II. Honolulu.

_____. 2003. *State Water Projects Plan, Hawai‘i Water Plan, Volumes 1* – 5. Prep. for CWRM by Fukunaga & Associates, Inc. Honolulu.

_____. 2008. *Water Resource Protection Plan*. Prep. for CWRM by Wilson Okamoto Corp. Honolulu.

_____. 2012. Maui DWS Upcountry System, EMI System, and System Users. Retrieved 8/6/12 from http://hawaii.gov/dlnr/cwrm/activity/iifsmaui3/MDWSandEMISystemUsers.pdf

Hawai‘i State Department of Land and Natural Resources, Engineering Division. 2017. *State Water Projects Plan Update. Department of Hawaiian Home Lands*. Prep. for DLNR by Fukunaga & Associates, Inc. Honolulu.

Juvik, J.O., and Ekern, P.C. 1978. *A climatology of mountain fog on Mauna Loa, Hawaii*: Honolulu: University of Hawai‘i Water Resources Research Center Technical Report 118.

Kame’eleihiwa, L. 1992. *Native Land and Foreign Desires: Pehea La e Pono Ai? How Shall We Live in Harmony*? Honolulu: Bishop Museum Press.

Kelly, M. 1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

Kirch, P.V. 1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory.* Honolulu: University of Hawai‘i Press.

____ 2011. *When Did the Polynesians Settle Hawai‘i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer.* Hawaiian Archaeology.

Kirch, P.V. and M. Sahlins.1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Vols. 1 and 2. Chicago: University of Chicago Press.

Kuykendall, R.S. 1938. *The Hawaiian Kingdom. Vol. 1*. Honolulu: University of Hawai‘i Press.

Macdonald, G.A., A.T. Abbott, and F.L. Peterson. 1986. *Volcanoes in the Sea: The Geology of* Hawai‘i. 2nd ed. Honolulu: University of Hawai‘i Press.

Maui County Department of Water Supply (DWS). 2009. *Maui County Water Use and Development Plan, Upcountry District, Final Candidate Strategies Report*. Review Draft. Prep. for Upcountry Water Advisory Committee. 2009. Carl Freedman, Haiku Design & Analysis.

____. 2017. *Maui Island Water Use and Development Plan, June 2017 Draft.* Wailuku, HI.

McKnight, J.H., and Juvik, J.O. 1975. *Methodological approaches in Hawaiian fog research*. Honolulu: University of Hawaii Water Resources Research Center Technical Report 85.

Pantaleo, J.P. 2004. *Archaeological Inventory Survey of the Proposed Kualono Residential Subdivision, Pukalani, Makawao District, Maui Island (TMK 2-3-11: 1 and 2).* Prep. for Dowling Company, Inc. On file, SHPD Maui.

Pukui, M.K., S.H. Elbert, and E.T. Mookini. 1976. *Place Names of Hawaii*. Honolulu: University of Hawai‘i Press.

Pukui, M.K. 1983 ‘*Olelo No‘eau.* Bishop Museum Special Publication 71. Honolulu: Bishop Museum Press.

Shade, P. J. 1999. *Water budget of East Maui, Hawaii*. Honolulu, Hawaii, U.S. Geological Survey, Water Resources Investigation WRI 98-04159.

Sterling, E. P. 1998 *Sites of Maui*. Honolulu: Bishop Museum Press.

U.S. Bureau of the Census. U.S. Census of Population, 2010. American Fact Finder web page (http/factfinder/census.gov). Accessed March 2018.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Retrieved January 31, 2017, from Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

U.S. Fish and Wildlife Service (USFWS). 2017. *USFWS Threatened and Endangered Species System (TESS).* Washington: GPO. http://ecos.fws.gov/tess_public/

University of Hawai‘i at Hilo, Dept. of Geography. 1998. *Atlas of* Hawaii. 3rd ed. Honolulu: University of Hawai‘i Press.

[This page intentionally left blank]

DLNR Kealaloa Tank Site
Exploratory Water Well

ENVIRONMENTAL ASSESSMENT

Appendix 1a
Comments Received in Response to Early Consultation

[This page intentionally left blank]

ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

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

GLEN A. UENO, P.E., P.L.S.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

LESLI L. OTANI, P.E., L.S.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

March 28, 2017

Ron Terry, Ph.D.
GEOMETRICIAN ASSOCIATES, LLC
P. O. Box 396
Hilo, Hawaii 96721

Dear Dr. Terry:

SUBJECT: EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENT FOR PROPOSED DLNR WELL SITE ON HALEAKALA RANCH NEAR KEALALOA TANK WELL SITE TMK: (2) 2-3-007:037

We reviewed your early consultation request and have no comments at this time.

If you have any questions regarding this memorandum, please call Rowena Dagdag-Andaya at (808) 270-7845.

Sincerely,

DAVID C. GOODE
Director of Public Works

DCG:RMDA:da
xc: Engineering Division
S:\DSA\Engr\CZM\Draft Comments\23007037_DLNR_kealaloa_tank_well_site.rtf

ALAN M. ARAKAWA
Mayor

WILLIAM R. SPENCE
Director

MICHELE CHOUTEAU McLEAN
Deputy Director

COUNTY OF MAUI

DEPARTMENT OF PLANNING

April 5, 2017

Mr. Ron Terry, Project Environmental Consultant
Geometrician Associates, LLC
PO Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

SUBJECT: COMMENTS ON REQUEST FOR EARLY CONSULTATION OF ENVIRONMENTAL ASSESSMENT ON PROPOSED HAWAII STATE DEPARTMENT OF LAND AND NATURAL RESOURCES (DLNR) EXPLORATORY WELL ON HALEAKALA RANCH NEAR KEALALOA TANK WELL SITE, LOCATED AT TMK: (2) 2-3-007:037, MAKAWAO, ISLAND OF MAUI, HAWAII (RFC 2017/0038)

The Department of Planning (Department) is in receipt of the above-referenced request for pre-consultation comments. The Department understands that the proposed exploratory well will be converted to a production well if testing indicates an adequate supply of water of acceptable quality. If converted, the production well supply potable water to upcoming State of Hawaii projects including projects for the Departments of Education and Hawaiian Home Lands. Further, the well would supply water to the Maui Department of Water Supply (MDWS) to support system needs. DLNR would integrate this new source into the existing MDWS system, with anticipation to transfer ownership to the County of Maui.

The Department offers the following comments:

1. **Confirmed Land Use Districts/Designations**

   - State District: Agriculture
   - Maui Island Plan: Outside Growth Boundary; Outside Protected Areas
   - Makawao-Pukalani-Kula Community Plan: Agricultural
   - County Zoning District: Agricultural
   - Flood Hazard Area Zone: Zone X
   - Not in the Special Management Area

2. Please transmit the draft environment assessment to the Department when available.

Thank you for the opportunity to comment. Should you require further clarification, please contact by email at livit.callentine@mauicounty.gov or by phone at (808) 270-5537.

Sincerely,

LIVIT U. CALLENTINE, AICP
Staff Planner

for WILLIAM SPENCE
Planning Director

xc: Clayton I. Yoshida, AICP, Planning Program Administrator (PDF)
Livit U. Callentine, AICP, Staff Planner (PDF)
Project File
General File

WRS:LUC:xxx
K:\WP_DOCS\PLANNING\RFC\2017\0038_HaleakalaRanch_DLNRWell\Planning_Comment.doc

DAVID Y. IGE
GOVERNOR

FORD N. FUCHIGAMI
DIRECTOR

Deputy Directors
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

IN REPLY REFER TO:

STP 8.2103

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

March 31, 2017

Mr. Ron Terry, Ph.D.
Project Environmental Consultant
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

Subject: DLNR Well Site on Haleakala Ranch Near Kealaloa Tank Well Site
Early Consultation for Environmental Assessment
Pukalani, Maui, Hawaii
TMK: (2) 2-3-007:037

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project. DOT understands the Department of Land and Natural Resources (DLNR) has identified the need to develop an exploratory potable water well near the Maui Department of Water Supply (MDWS) Kealaloa Tank Site on Haleakala Highway.

DOT does not anticipate any significant adverse impacts to the State transportation facilities (Haleakala Highway) at this time. We do ask that the DLNR consult with the DOT Highways Division, Maui District Office, throughout the planning and design phase of the project to identify the appropriate access requirements, permits and approval for construction traffic and construction of the reservoir access road as they prepare the Draft Environmental Assessment.

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Sincerely,

FOR FORD N. FUCHIGAMI
Director of Transportation

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
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

April 12, 2017

Geometrician Associates, LLC
Attention: Mr. Ron Terry
P.O. Box 396
Hilo, Hawaii 96721

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for the Proposed DLNR Well Site on Haleakala Ranch near Kealaloa Tank Well Site – Maui

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, enclosed are comments from the (a) Engineering Division and (b) Division of Forestry & Wildlife 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

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2017 MAR 20 AM 11: 2

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 14, 2017

3/20

MEMORANDUM

TO: From

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

FROM: To:
Russell Y. Tsuji, Land Administrator

SUBJECT: Early Consultation for Environmental Assessment for the Proposed DLNR Well Site on Haleakala Ranch Near Kealaloa Tank Well Site

LOCATION: Kula, Makawao, Island of Maui; TMK: (2) 2-3-007:037

APPLICANT: DLNR, Engineering Division

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **April 11, 2017**.

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.
(X) We have no comments.
( ) Comments are attached.

Signed: _____

Print Name: Carty S. Chang, Chief Engineer

Date: 3/21/17

cc: Central Files

17-1-288

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2017 MAR 29 AM 11:01
DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 14, 2017

FR: DOFAW

MEMORANDUM

TO: TO: LD

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for the Proposed DLNR Well Site on Haleakala Ranch Near Kealaloa Tank Well Site
LOCATION: Kula, Makawao, Island of Maui; TMK: (2) 2-3-007:037
APPLICANT: DLNR, Engineering Division

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **April 11, 2017**.

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: [signature]

Print Name: SCOTT FRETZ
Date: 3/21/17

cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
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

April 17, 2017

Geometrician Associates, LLC
Attention: Mr. Ron Terry
P.O. Box 396
Hilo, Hawaii 96721

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for the Proposed DLNR Well Site on Haleakala Ranch near Kealaloa Tank Well Site – Maui

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments previously sent you on April 12, 2017, enclosed are comments from the Commission on Water Resource 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

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2017 APR 13 AM 11:06
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
COMMISSION ON WATER RESOURCE MANAGEMENT
2017 MAR 15 PM 12:54

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 14, 2017

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for the Proposed DLNR Well Site on Haleakala Ranch Near Kealaloa Tank Well Site
LOCATION: Kula, Makawao, Island of Maui; TMK: (2) 2-3-007:037
APPLICANT: DLNR, Engineering Division

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **April 11, 2017**.

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.
(x) Comments are attached.

Signed: /s/ Jeffrey T. Pearson, P.E.

Print Name: Deputy Director
Date: April 11, 2017

cc: Central Files

RTD 4582 6
4567

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

April 11, 2017

REF: RFD.4582.6

TO: Mr. Russell Tsuji, Administrator
State of Hawaii, DLNR Land Division Oahu, DLNR-LD

FROM: Jeffrey T. Pearson, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Early Consultation for Environmental Asessment for the Proposed DLNR Well Site on Haleakala Ranch Near Kealaloa Tank Well Site

FILE NO.: RFD.4582.6
TMK NO.: (2) 2-3-007:037

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://dlnr.hawaii.gov/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 EAP as having high water efficiency can be found at http://www.epa.gov/watersense.

☐ 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://planning.hawaii.gov/czm/initiatives/low-impact-development/

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

☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

☐ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at

http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

☐ 9. 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.

☐ 10. 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.

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

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

☐ 13. 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.

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

☐ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.

☐ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 18. 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:

If you have any questions, please contact W. Roy Hardy of the Commission staff at 587-0225.

Lucienne de Naie
laluz@maui.net
808 214-0147

Aloha Ron

Maui Tomorrow would like to be a consulted party on this DEA and would appreciate receiving notification of the DEA when it is released. We very much support the state developing a sound strategy to develop or manage water resources to help meet the needs of the Hawaiian Homelands , King Kekaulike School and other state projects in the upcountry area.

We reviewed the DEA for the previously proposed DLNR well at the Pukalani Tank site and wrote comments.

We are glad that the plan is to pursue another site, however the purpose of an EA is to review possible alternatives and select the one that actually presents "No Significant Impacts". It appears that once again after an earlier study that included a number of potential sites and strategies, a site has been pre- determined based apparently on convenience to county infrastructure, in spite of the fact that the previous sites suggested were not thoroughly discussed, compared or analyzed in the last DEA.

In reviewing the DEA for the past proposed site we found the following concerns:

• The DEA did not thoroughly evaluate all alternative options in enough depth to make a decision re: which option would accomplish this goal with the least amount of environmental impact and the greatest chance of beneficial outcome.

• the DLNR appeared to be committed to promoting a site ton the basis of its convenient location to county infrastructure, even though it was also located near highly contaminated former agricultural fields. We would recommend that the new DEA actually compare the various sites and strategies for their overall impacts and benefits.

The DEA is silent on what options the DLNR would pursue if the Pukalani well site did not prove to have a suitable yield, or if over time it exhibited contamination from agricultural chemicals? This should be part of the discussion of mitigations and alternatives.

While the DLNR states that it is not expecting any potential contamination issues at the new site, there are options to deal with the costs of any potential DBCP treatment. The proposed project shoulddiscuss if the DLNR/County plans to secure approval for the well as a future county drinking water site under the 1999 DBCP Settlement agreement between Maui County Department of Water Supply and Shell Chemical Co, et al. This would mean the County DWS would be reimbursed for costs of filters and other treatment expenses that may be needed until 2039

The DEA should discuss whether or not the proposed well site has been discussed in advance with Shell Chemical Company as specified in the 1999 DBCP Settlement Agreement.

Other possible alternatives to accomplish the project objectives should be evaluated in sufficient detail to allow sound decision making. These include:

a. Utilization of existing wells on private land

Discussion: The alternative option of utilizing existing wells on private land that are near Hawaiian Homelands (Kula 1800 wells, state well no. 4621-01 and 02 with pump capacity .45 mgd each) is described in the hydrological report as a desirable future option for the State and county, but no comparison of comparative costs associated with the two potential actions is offered in the DEA to decision makers or the public, who are financing the project.

a. Reducing DHHL project demand through funding water conservation and reuse measures

Discussion: The DEA states that total increased demand for the Upcountry area will be 1.8 mgd by 2030. DHHL demand is set at 1.5 mgd. It is not made clear if the 1.8 mgd includes the DHHL allocation, or if that is separate? This would be important information to know.

Further, the DEA does not break down potable and non-potable use in the DHHL projects. The option of providing an onsite sewage treatment facility for the HHL areas upcountry and reusing the R-1 effluent for the non-potable needs of the area should be discussed and costs provided. Costs for such facilities are available from other proposed projects.

On a parallel note, costs and water savings of installing indoor gray water reuse systems in DHHL project lands in Kula should also be considered. It is possible that investment in reuse strategies may reduce potable water demand by a sizable percentage and be offset by reduction of longterm pumping costs for any high elevation well supplying the project area. This could be an important mitigation measure if the yield of the Pukalani site was less than expected (which is often the case in Maui.)

In the DEA as it stands, no information on comparative pumping costs of the various well options is given, just the statement in section 3.1 that "energy required to pump water from a depth of more than 1,300 feet is considerable, and needs to be a factor that is weighed, particularly given uncertainty in energy costs."

Since all the proposed well site options are located above 1,300 ft elevation, those pumping costs should be discussed and compared in greater detail with each other and reuse options.

HAR 11-200-12 sets criteria that must be met for a FONSI to be issued. Criteria 13. states: "*The project will not require substantial energy consumption.*"

The DEA clearly acknowledges that the proposed well site is at 1,600 ft elevation and the "energy required to pump water from a depth of more than 1,300 feet is considerable" yet it concludes that a FONSI should be issued and an EIS is not needed because it will not be known until phase 2 of the proposed project, whether or not a production well will be established at the site.

We ask that the Final EA include a cost-benefit analyses of the various alternatives in order to allow the accepting agency (DLNR) the ability to make the best long range decision on the well location and alternatives to well construction. This type of analyses is widely found in environmental review documents where different options are considered to accomplish the same goal. This EA appears to have reached a foregone conclusion of a preferred outcome without thorough cost analyses of viable alternatives or a combination of possible alternative actions. No information on comparative pumping costs of the various well options is given.

The brief discussion in the Hydrological Report (Appendix 2) of three well site alternatives that would avoid conflicts with existing wells: Haleakala Ranch site, King Kekaulike School site and Pukalani Tank site gives no comparative costs associated with the projects and provides minimal information to the public. We would ask that the new DEA include this infomation.

The Kula 1800 wells are discussed briefly as a future DHHHL source but insufficient information is provided. These wells are already a known entity in terms of water production and water quality. This information is available from Water Commission and DOH records, yet it is not included in the EA.

The OEQC Guidelines for Assessing Water Well Development Projects specifies that any EA for a new well project should include a Contamination Analysis and Vulnerability Assessment. This is defined as:

"A record of contamination problems in the aquifer or hydrologic unit including but not limited to saltwater intrusion, turbidity, heavy metals, inorganic and organic chemicals, microbiological agents, water quality parameters (such as pH, alkalinity, calcium, conductivity and temperature), and radioactivity. If contamination exists, the sources and duration of the contamination should be listed. Water quality data from nearby wells should be presented as well as any anticipated need for treatment or filtering systems. Discuss past and existing land uses within the likely wellhead protection area and the potential for future contamination from those uses."

We would ask that the DEA for the new site comply with this requirement.

The DEA should include specific information about the various private wells proposed or existing unused in the aquifer in regard to their potential use and overall demands on the Makawao aquifer.

The OEQC Guidelines for Assessing Water Well Development Projects specifies that any EA for a new well project should include a Data table presenting the following information as appropriate

- Current water use totals, including subtotals for individual users
- Current installed capacity including subtotals for individual wells and/or groups of wells.
- Pending installed capacity and/or use for the proposed well and subtotals for individual wells and/or groups of wells within the aquifer

Thank you for this opportunity to comment and for your consideration of these remarks. Fell free to contact us regarding any questions.We truly want this project to succeed, and in order for that to happen it should be based on he best possible information.

Lucienne de Naie

President, Maui Tomorrow Foundation

Lucienne de Naie

From: Dick Mayer [mailto:dickmayer@earthlink.net]
Sent: Wednesday, March 8, 2017 4:52 PM
To: 'Ron Terry' <rterry@hawaii.rr.com>; gayson.y.ching@hawaii.gov
Subject: RE: Early consultation letter for Kealaloa Tank Environmental Assessment

Mahalo for including me on your consultation letter. Yes, I would like to get a copy of the Draft-EA when it is available.

You have asked for specific items that should be included in the Draft-EA. Here are 2 recommendations:

#1 One impact that I would expect to see in the Draft-EA is a complete financial analysis of the relative costs:
- to operate this well and in particular the costs to pump the water up to the surface;
- as compared to increasing the use of the East Maui Irrigation system water, now that HC&S has stopped sugar production with its former high use of irrigation water.

In other words it may be cheaper to use EMI water (most of which comes from state lands) than constructing and operating a deep well in the upcountry area.

#2 This proposed project seems to be based on the justification of getting the water to the Hawaiian Homes project in Keokea. There will be a need in the Draft-EA to **guarantee** that most of the water will be available to and reserved for the HHL project, and not be merely a ruse to get water for other non-Hawaiian Homes developments.

Dick Mayer, Vice President Kula Community Association
cell 808-283-4376
dickmayer@earthlink.net

[This page intentionally left blank]

DLNR Kealaloa Tank Site
Exploratory Water Well

ENVIRONMENTAL ASSESSMENT

Appendix 1b
Comments to Draft EA and Responses

[This page intentionally left blank]

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

EPO 18-119

April 24, 2018

Mr. Ron Terry
Geometrician Associates
P.O. Box 396
Hilo, Hawaii 96721
Email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment (DEA) for DLNR Kealaloa Tank Site Exploratory Water Well, Maui
TMK: 2nd, 2-3-007:037

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your DEA to our office via the OEQC link:
http://oeqc2.doh.hawaii.gov/EA_EIS_Library/2018-04-23-MA-DEA-Kealaloa-Tank-Site-Exploratory-Well.pdf

We understand from the OEQC publication form project summary that *"The Hawai'i State DLNR Engineering Division proposes to develop an exploratory potable water well on a pasture property owned by Haleakala Ranch, near the Maui Department of Water Supply (MDWS) Kealaloa Tank Site in Makawao. The well is intended to determine potential groundwater resources and their potential to provide potable water for future State projects. Because of the context of the well site and drilling practices, no adverse impact upon the aquifer should occur as a result of drilling and testing the exploratory well. The site is on lightly wooded pasture land adjacent to a site that has been completely converted to water utility uses, and no sensitive native flora or fauna or historic sites are present. Noise, traffic and visual impacts will be negligible. If a water source of adequate quality and quantity is determined to be present, the well could be converted to a production well at the appropriate time in the future, if and when sufficient demand exists. DLNR would likely enter into an agreement with MDWS to integrate this new source into the existing MDWS water system and transfer ownership to the County of Maui. If a production well is proposed, another EA will be conducted. That EA would address the specific impacts of the use of the water, based on the proposed rate of withdrawal, proposed land uses, and the contexts of the aquifer and the municipal water system as they exist at that time."*

Hawaii's environmental review laws require Environmental Assessments (EAs) and Environmental Impact Statements (EISs) to consider health in the discussion and the mitigation measures to reduce negative impacts. In its definition of 'impacts,' §11-200-2, Hawaii Administrative Rules (HAR) includes health effects, whether primary (direct), secondary (indirect), or cumulative. Further, §11-200-12(b)(5), HAR, lists public health as one of the criteria for determining whether an action may have a significant impact on the environment.

In the development and implementation of all projects, EPO strongly recommends regular review of State and Federal environmental health land use guidance. State standard comments to support sustainable healthy design are provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

We suggest you review the requirements of the Clean Water Branch (Hawaii Administrative Rules {HAR}, Chapter 11-54-1.1, -3, 4-8) and/or the National Pollutant Discharge Elimination System (NPDES) permit (HAR, Chapter 11-55) at: http://health.hawaii.gov/cwb. If you have any questions, please contact the Clean Water Branch (CWB), Engineering Section at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov. If your project involves waters of the U.S., it is highly recommended that you contact the Army Corps of Engineers, Regulatory Branch at: (808) 835-4303.

Any waste generated by the project (that is not a hazardous waste as defined in state hazardous waste laws and regulations), needs to be disposed of at a solid waste management facility that complies with the applicable provisions (HAR, Chapter 11-58.1 "Solid Waste Management Control"). The open burning of any of these wastes, on or off site, is strictly prohibited. You may wish you review the Minimizing Construction & Demolition Waste Management Guide at: http://health.hawaii.gov/shwb/files/2016/05/constdem16.pdf Additional information is accessible at: http://health.hawaii.gov/shwb. For specific questions call (808) 586-4226.

If noise created during the construction phase of the project may exceed the maximum allowable levels (HAR, Chapter 11-46, "Community Noise Control") then a noise permit may be required and needs to be obtained before the commencement of work. Relevant information is online at: http://health.hawaii.gov/irhb/noise EPO recommends you contact the Indoor and Radiological Health Branch (IRHB) at (808) 586-4700 with any specific questions.

To better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed an environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.

We hope this information is helpful. If you have any questions please contact us at DOH.epo@doh.hawaii.gov or call us at (808) 586-4337. Thank you for the opportunity to comment.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Environmental Planning Office

LM:nn

c: Gayson Ching, DLNR Engineering Division) (via email: Gayson.Y.Ching@hawaii.gov)
DOH: DHO Maui, CWB, SDWB, IRHB {via email only}

Attachment: U.S. EPA EJSCREEN Report for Project Area

Attachment: U.S. EPA EJSCREEN Report for Project Area

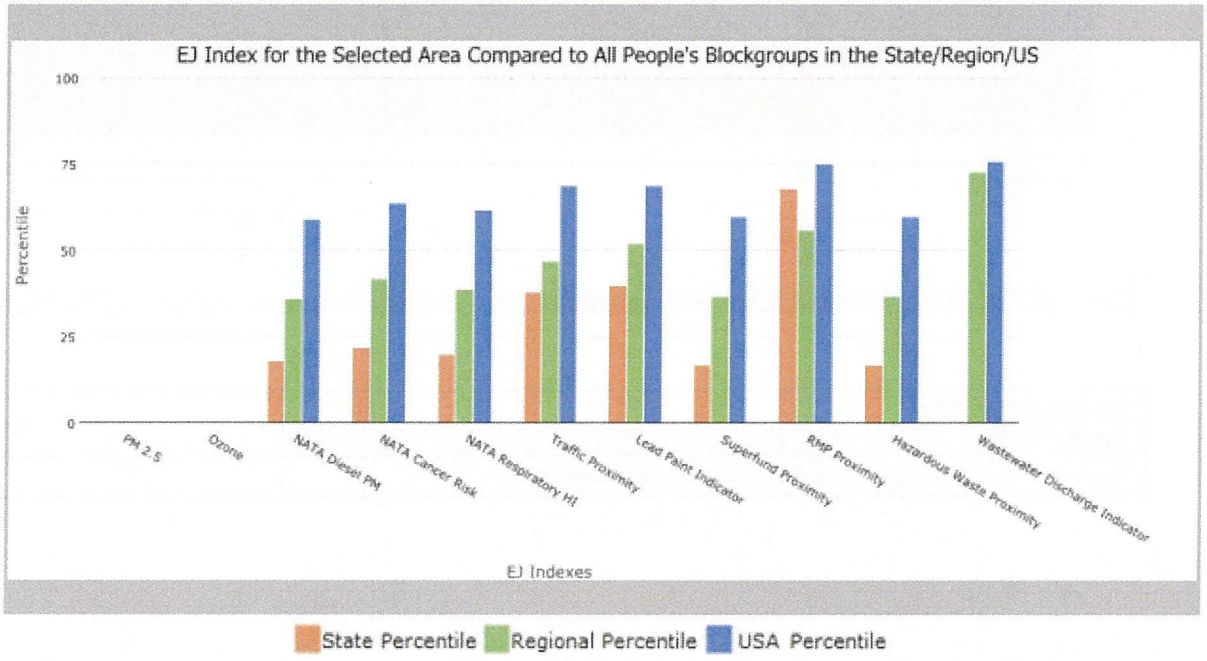
EJSCREEN Report (Version 2017)

1 mile Ring Centered at 20.828968,-156.314815, HAWAII, EPA Region 9

Approximate Population: 1,304

Input Area (sq. miles): 3.14

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	18	36	59
EJ Index for NATA* Air Toxics Cancer Risk	22	42	64
EJ Index for NATA* Respiratory Hazard Index	20	39	62
EJ Index for Traffic Proximity and Volume	38	47	69
EJ Index for Lead Paint Indicator	40	52	69
EJ Index for Superfund Proximity	17	37	60
EJ Index for RMP Proximity	68	56	75
EJ Index for Hazardous Waste Proximity	17	37	60
EJ Index for Wastewater Discharge Indicator	N/A	73	76



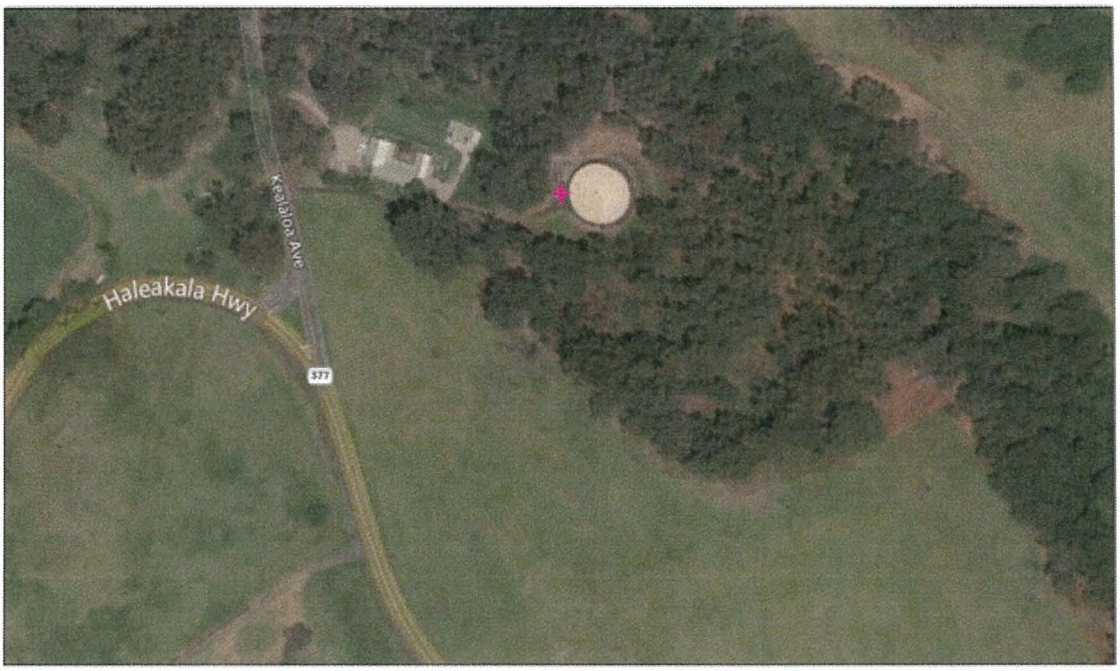
This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report (Version 2017)

1 mile Ring Centered at 20.828968,-156.314815, HAWAII, EPA Region 9

Approximate Population: 1,304

Input Area (sq. miles): 3.14



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0

EJSCREEN Report (Version 2017)

1 mile Ring Centered at 20.828968,-156.314815, HAWAII, EPA Region 9

Approximate Population: 1,304

Input Area (sq. miles): 3.14

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.9	N/A	9.14	N/A
Ozone (ppb)	N/A	N/A	N/A	41.8	N/A	38.4	N/A
NATA* Diesel PM (µg/m³)	0.0194	0.149	13	0.978	<50th	0.938	<50th
NATA* Cancer Risk (lifetime risk per million)	26	34	14	43	<50th	40	<50th
NATA* Respiratory Hazard Index	0.55	1	14	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	49	1000	38	1100	28	590	40
Lead Paint Indicator (% Pre-1960 Housing)	0.094	0.16	46	0.24	44	0.29	35
Superfund Proximity (site count/km distance)	0.0054	0.1	14	0.15	5	0.13	1
RMP Proximity (facility count/km distance)	0.68	0.39	84	0.98	59	0.73	67
Hazardous Waste Proximity (facility count/km distance)	0.0056	0.1	15	0.12	2	0.093	1
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0	0.04	N/A	13	59	30	40
Demographic Indicators							
Demographic Index	41%	51%	18	47%	42	36%	64
Minority Population	61%	77%	19	59%	51	38%	74
Low Income Population	21%	26%	43	36%	31	34%	32
Linguistically Isolated Population	2%	6%	41	9%	30	5%	57
Population With Less Than High School Education	4%	9%	28	17%	19	13%	21
Population Under 5 years of age	4%	6%	22	7%	24	6%	25
Population over 64 years of age	15%	16%	48	13%	69	14%	61

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

May 29, 2018

Laura Leialoha McIntyre, Program Manager
Hawai'i State Department of Health EPO
epo@doh.hawaii.gov

Subject: Comment to Draft Environmental Assessment on DLNR Kealaloa Tank Site Exploratory Water Well, Makawao, Island of Maui

Dear Ms. McIntyre:

Thank you for your comment letter dated April 24, 2018, on the Draft EA. In answer to your specific comments:

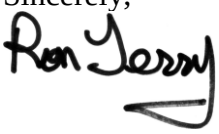
1. *Effects to public health*. Although the Draft EA only covers the exploratory well activities, during which public health will be protected by extensive mitigation measures, this activity sets up the potential for providing high quality groundwater to a community mostly dependent on surface sources. The project is highly consistent with advancing public health.

2. EPO standard comments, Environmental Health Portal, rules water quality and solid waste. Thank you for referencing these websites and regulations. The design team is developing the project with all DOH rules in mind. As discussed in Section 3.1.2 of the Draft EA, an NPDES permit will be required for the project and will be applied for at the appropriate time. All waste generated from the project will be properly disposed of.

3. *A noise permit as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control" may be required and should be obtained before the commencement of work.* As construction work is planned, the contractor will coordinate with the DOH IRH Branch and obtain permits, if they are required, as discussed in Section 3.1.5 of the EA.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Cc: Gayson Ching, DLNR; Scott Kunioka, Akinaka and Associates

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
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

May 23, 2018

Geometrician Associates, LLC
Attention: Mr. Ron Terry
P.O. Box 396
Hilo, Hawaii 96721

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment and Anticipated Finding of No Significant Impact for the **DLNR Kealaloa Tank Site Exploratory Water Well** located at Kula, Makawao, Island of Maui; TMK: (2) 2-3-007:037

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, enclosed are comments from the Engineering Division on the subject matter. Should you have any questions, please feel free to call Darlene Nakamura at (808) 587-0417. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure
cc: Central Files
DLNR Engineering Division
Project Planning Section
Attn: Mr. Gayson Ching (via email: gayson.y.ching@hawaii.gov)

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
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

2018 MAY -3 AM 11:04
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
LAND DIVISION

April 25, 2018

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Assessment and Anticipated Finding of No Significant Impact for the **DLNR Kealaloa Tank Site Exploratory Water Well**
LOCATION: Kula, Makawao, Island of Maui; TMK: (2) 2-3-007:037
APPLICANT: Geometrician Associates on behalf of DLNR Engineering Division

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **May 21, 2018.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on The Environmental Notice in the middle of the page.)

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 Darlene Nakamura at 587-0417. Thank you.

Attachments

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

Signed: _____

Print Name: ~~Carty S. Chang, Chief Engineer~~

Date: 5/2/18

cc: Central File

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

May 29, 2018

Russell Y. Tsuji, Administrator
Hawai‘i State DLNR Land Division
P.O. Box 621
Honolulu HI 96809

Subject: Comment to Draft Environmental Assessment on DLNR Kealaloa Tank Site Exploratory Water Well, Makawao, Island of Maui

Dear Mr. Tsuji:

Thank you for your comment letter dated May 23, 2018, on the Draft EA, in which you provided a memo indicating that the Engineering Division it had no comments on the EA.

We very much appreciate your review of the document, including circulation to various DLNR agencies. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

Cc: Gayson Ching, DLNR; Scott Kunioka, Akinaka and Associates

DLNR Kealaloa Tank Site
Exploratory Water Well

ENVIRONMENTAL ASSESSMENT

Appendix 2
Hydrology Report

[This page intentionally left blank]

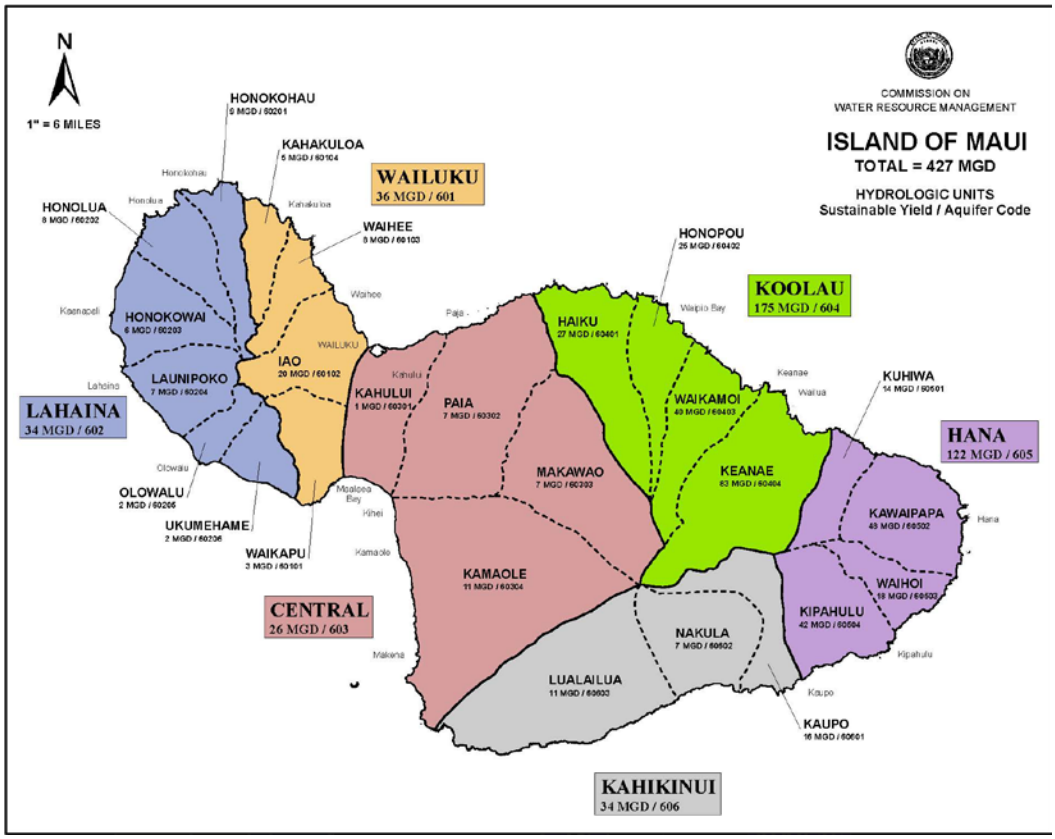
Effects to the Makawao Aquifer, Maui

Geographic Setting

The proposed Upcountry Maui Exploratory Well is located at an elevation of 2,000 feet on land owned by Haleakala Ranch. The well site is on the flank of Haleakala volcano, upslope of Pukalani, Maui. The current access road to the well site is accessed from the Haleakala Highway. The area surrounding the well is primarily dedicated to pasture, but there is the existing Kealaloa MDWS water tank and a service dog training facility Makai of the proposed well site.

Hydrogeological Setting

The State Commission on Water Resource Management (CWRM) classifies the proposed well site as being in the Makawao Aquifer System (60303) of the Central Maui Aquifer Sector. The aquifers of the island of Maui are shown below in the figure provided by the CWRM.



Source: Hawaii State Commission on Water Resources Management

The sustainable yield (SY) of the Makawao aquifer unit is set by the CWRM at 7 million gallons per day (mgd) out of the 26 mgd allocated to the entire Central Maui aquifer sector. Sustainable yield is defined as the amount of groundwater that can be pumped on a sustained basis. Each well producing water in the State of Hawaii is required to provide monthly pumpage data to the CWRM. This data is used by the state to assess and monitor active pumpage for each aquifer unit throughout the state. The active

pumpage from wells within the aquifer unit would essentially be deducted from the total sustainable yield allotted to each aquifer unit.

CWRM maintains a database of wells that provides information on, among other aspects, well name, installed capacity, water quality and user reported pumpage. Because not all well operators report their use in a timely manner, pumpage data may not be complete or up to date. As shown in the table and map below, there are 12 wells and two tunnels that the CWRM currently has on record within the Makawao Aquifer unit. Out of the 12 wells, there are 9 that have been actively reporting pumpage

Current Estimated Installed Capacity and Water Use

Well Number	Well Name	Installed GPM	Installed MGD	Start Date	End Date	Pumpage (mgy)	Pumpage (gpy)
6-4719-001	Pulehu Farms	320	0.46				
6-4720-001	Siele	85	0.122				
6-4817-001	Waihou Tunnel						
6-4817-002	Waihou Tunnel						
6-4818-001	KulaKoa	220	0.316	11/1/2016	11/30/2017	0.005	205,458
6-4819-001	Kalialinui Steven 1						
6-4821-001	Omaopio-Esty	65	0.093	10/1/2016	10/31/2017	0.495	15,091,300
6-4920-001	Anuhea Place	109	0.157	11/1/2016	11/30/2017	0.025	736,220
6-5018-001	Maluhia	48	0.069	9/1/2016	9/30/2017	0.018	569,756
6-5021-001	Pukalani Golf	1000	1.44	11/1/2016	11/30/2017	3.811	116,112,000
6-5118-002	Pookela MDWS	900	1.296	10/1/2016	10/31/2017	3.496	104,972,400
6-5118-003	Piiholo			11/25/2016	11/20/2017	0	0
6-5118-004	Piiholo South	205	0.295	3/1/2016	3/31/2017	0.002	362,100
6-5220-001	Haliimaile	700	1.008	11/25/2016	11/20/2017	0	0

Data provided by: Hawaii State Commission on Water Resources Management and modified by WWS.

data to the CWRM. The two closest wells to the proposed Upcountry Maui Exploratory Well site are the Maluhia Well (5018-001) to the North and Pulehu Farms Well (4719-001) to the South. Both of these wells are over one mile in distance away from the proposed well site and are highly unlikely to interact with the proposed exploration well. The Pulehu Farms Well has an installed pump capacity of 0.46 mgd,

but the CWRM has no reported data from this well. This is typical of wells that are not utilized, but if data is reported in the future to CWRM, it will should be included in a future EA of this region. The Maluhia Well has an installed pump capacity of 0.069 mgd and has actually pumped an average of 0.0013 mgd with a total of 0.018 million gallons during the most recent reporting annual period of September 1st, 2016 and September 30th, 2017. The total installed capacity of all 12 wells within the Makawao Aquifer unit is 5.256 mgd and yet the total average pumpage over the last year for all twelve wells combined is roughly 0.604 mgd.

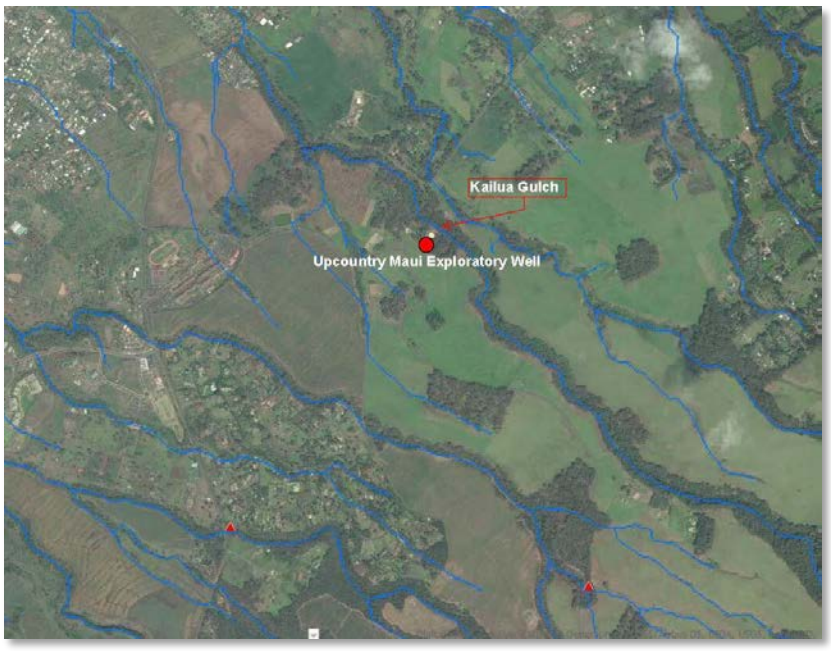
With a sustainable yield of 7 mgd allotted to the Makawao Aquifer unit, and the limited pumpage of the surrounding area, responsible water development for the project could be explored without negatively impacting the aquifer or other existing wells. Furthermore, the Upcountry Exploratory Well will be drilled to assess the availability of groundwater through pump testing and sampling. The well will be drilled and cased in accordance with CWRM rules. The upper section of the well will be fully grouted and concrete pad will be constructed around the well casing to prevent intrusion of surface runoff and upper-level waters from reaching the aquifer. Therefore, no impacts to ground water quality are anticipated due to the construction of the Upcountry Maui Exploration Well.

Long-term impacts to the water resources should be analyzed in a separate environmental assessment for a permanent well if the proposed exploratory well is deemed to be a suitable potable water source.

Surface water setting

As streams in Hawai'i are often ephemeral, underground water is the most reliable source of water supply, because there is less daily or seasonal change in water tables. Most water is maintained in the basal freshwater lens that essentially floats on the salt-water permeated basaltic rock. There are several ephemeral Streams within the Makawao Aquifer Unit, but data is limited for these intermittent streams. The closest of which is located approximately 400 ft away from the proposed well site and is known as the Kailua Gulch. The watershed of the Kailua Gulch extends above 7,000 ft, but typically flow is only observed intermittently. The Waihou Spring Tunnels may contribute to the surface flow of the Kailua Gulch, but there is no surface flow data recorded for this stream.

No adverse impacts to any of the streams within the aquifer unit are anticipated due to the construction and pump testing of the Upcountry Maui Exploratory Well. Mitigation during the drilling process can prevent any rock cuttings or drilling water to enter any of the surrounding streams.



Map Source: USGS Streamstats Application

Report Prepared By:

David R. Barnes
Waimea Water Services, LLC.

[This page intentionally left blank]

DLNR Kealaloa Tank Site
Exploratory Water Well

ENVIRONMENTAL ASSESSMENT

Appendix 3
Archaeology Report

[This page intentionally left blank]

SCS Project No. 1429-4 AA

ARCHAEOLOGICAL ASSESSMENT FOR THE PROPOSED DLNR WELL SITE

KUKUIAEO AHUPUA`A, MAKAWAO DISTRICT, ISLAND OF MAUI HAWAI`I

TMK: (2) 2-3-007:034 (por.)

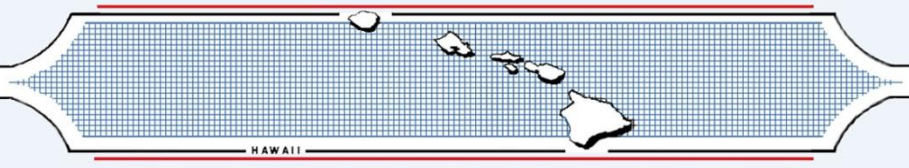
Prepared by:
Rachel Hodara, M.Sc.,
David Perzinski, B.A.,
and
Michael Dega, Ph.D.

March 2017

DRAFT

Prepared for:
State of Hawai'i
Department of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl St.
Honolulu, HI 96813

SCIENTIFIC CONSULTANT SERVICES, Inc.



1347 Kapiolani Blvd., Suite 408 Honolulu Hawai`i 96814

ABSTRACT

Scientific Consultant Services, Inc. conducted Archaeological Inventory Survey (AIS) level investigations on undeveloped land in upcountry Maui, to the south of Makawao Town, for construction of a new water well tank site. The project is located in Kukuiaeo Ahupua`a, Makawao District, Island of Maui, Hawai'i [TMK: (2) 2-3-007:034]. Full pedestrian survey was completed during this project over a 2.0 acre project area, the overall parcel (034) being 11.059 acres. No subsurface trenching was done due to the absence of surface sites and also the lack of any indicators for subsurface cultural materials. The present project area is bordered by an existing water tank and associated infrastructure, the larger parcel (034) having formerly been in ranch lands and still being owned by Haleakala Ranch. No historic properties were identified during the project. As no historic properties were identified during the study, the following report is being presented as an Archaeological Assessment. No further work is recommended for the project area.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

At the request of Geometrician Associates, LLC., under contract by the State of Hawai`i Department of Land and Natural Resources (DLNR), Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory survey-level investigations on a 2.0-acre portion of an overall 11.059 acre parcel in upcountry Maui. Directly adjacent to this 2 acre area is an existing water tank and related infrastructure. The current proposal calls for the DLNR exploratory well site to be constructed adjacent to the current Kealaloa water tank location (Figures 1 through 3). The project area is located in Kukuiaeo Ahupuaʻa, in the traditional district (*moku*) of Kula (Makawao District), on TMK (2) 2-3-007-034 (see Figure 1). The existing, used land (Kealaloa water tank; parcel 033) is owned by the Maui County Department of Water Supply (MDWS), with the adjacent proposed well site and access road for this project (parcel 034) being owned by Haleakala Ranch, who has given permission for this project to proceed.

The present report is being written as an Archaeological Assessment as a determination of "no findings" was made during fieldwork. Fieldwork consisted of full pedestrian survey of the project area landscape. No historic properties were identified on the surface and there were no locations thought to contain sites in subsurface contexts. Overall, Archaeological Inventory Survey-level work was conducted in order to identify and document historic properties, to gather sufficient information on these properties, to evaluate the significance of any newly identified historic properties, to determine the project effect on these properties, and to make mitigation recommendations to address possible adverse impacts to identified historic properties, pursuant to Hawaii Administrative Rules (HAR) § 13-276. As this archaeological project did not lead to the identification of any historic properties, this report is being written in accordance with HAR 13-275-5, which provides guidelines for writing Archaeological Assessment reports.

The overall purpose of this archaeological project 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. In sum, no sites were identified across the surface of the project area. Alteration of parcel 034, particularly the 2 acre portion of the project area, has been minimal. The parcel has not been graded or altered, it was simply utilized as pasture by Haleakala Ranch through time.

PROPOSED PROJECT DETAILS

The DLNR proposes to develop an exploratory potable water well adjacent to the MDWS Kealaloa Tank Site on TMK (2) 2-3-007:034 (see Figures 1 and 2; Figures 3 and 4). The well is intended primarily to provide potable water for future State of Hawai‘i projects, including school projects for the Department of Education and residential developments of the Department of Hawaiian Home Lands. DLNR intends to enter into an agreement with MDWS to integrate this new source into the existing MDWS water system and transfer ownership to the County of Maui. This arrangement would also provide some portion of the water for other uses that are needed in the MDWS Upcountry water systems.

ENVIRONMENTAL SETTING

PROJECT AREA LOCATION

The project area consists of a 2.0-acre portion of parcel 034, which is 11.059 acres in overall size. Parcel 033, occurring adjacent, currently contains a one-million gallon water tank. The project area parcel is bounded to the north by Kailua Gulch, parcel 033 and the water tank to the east, Hanamu Road to the immediate west, and Haleakala Ranch lands (parcel 037 on which is currently occupied by Assistance Dogs of Hawaii). Haleakala Highway runs near the southern boundary as well (see Figures 1 and 4). The project parcel gently slopes to the north and west, at an elevation of ~500 m (1,640 ft) above mean sea level (amsl) (Figure 5).

SOILS

Soils found within the project area are a part of the Haliimaile series (HgB and HgC) that consists of a silty clay loam on 3 to 7 percent and 7 to 15 percent slopes respectively (Foote *et al.* 1972: Sheet 115). Foote *et al*. (35-36) note that the soil is composed primarily of silty clay and is associated with pineapple, pasture, and homesites. The series is composed of silty clay derived from the *in situ* development of underlying igneous rock. In addition to these soils, which were observed in the cut faces around the water tank at the well site, abundant fill deposits were observed along Hanamu Road and Haleakala Highway, both to the south of the project area proper.

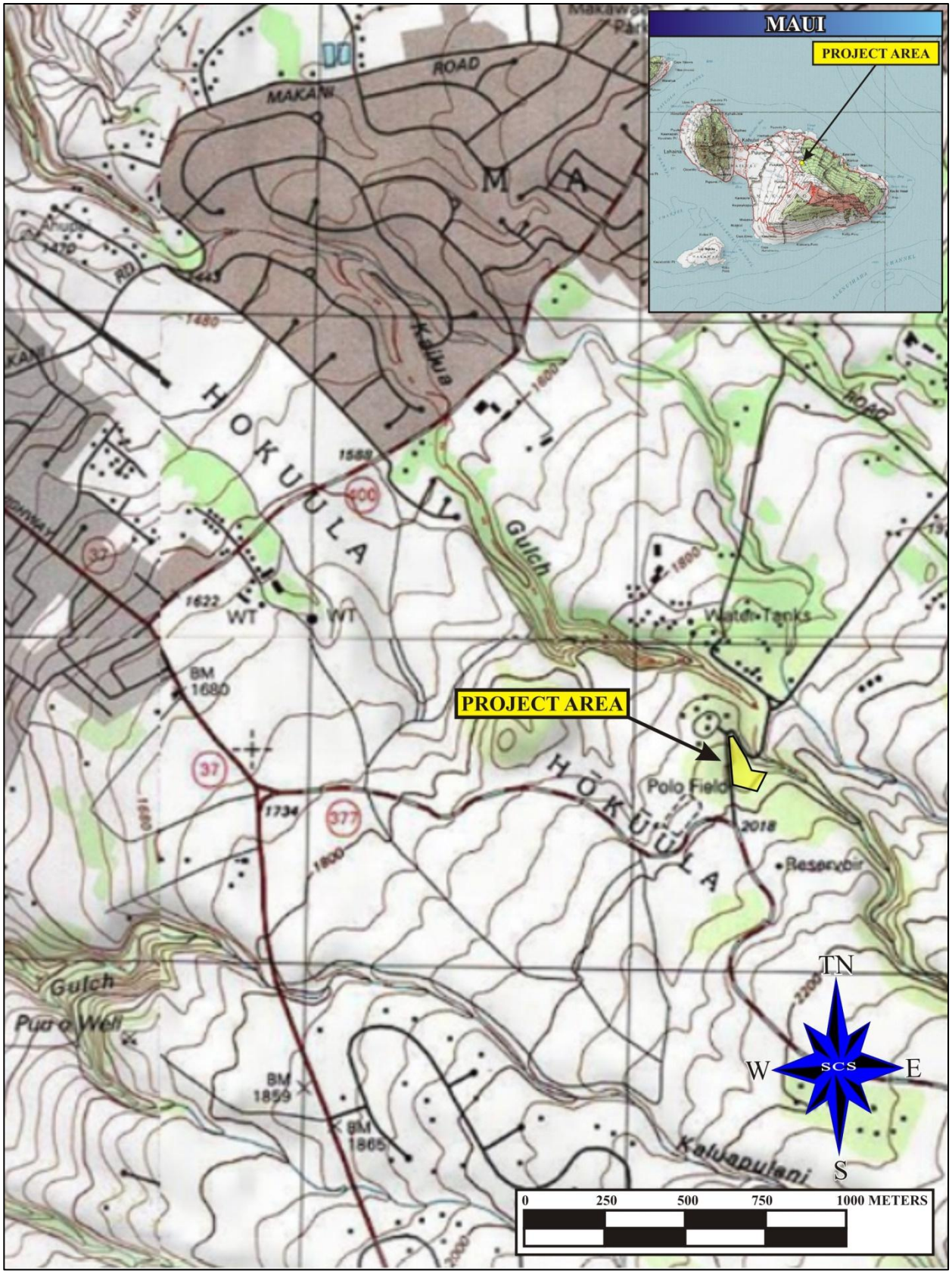


Figure 1: Portion of USGS Topographic Map Showing the Location of the Project Area.

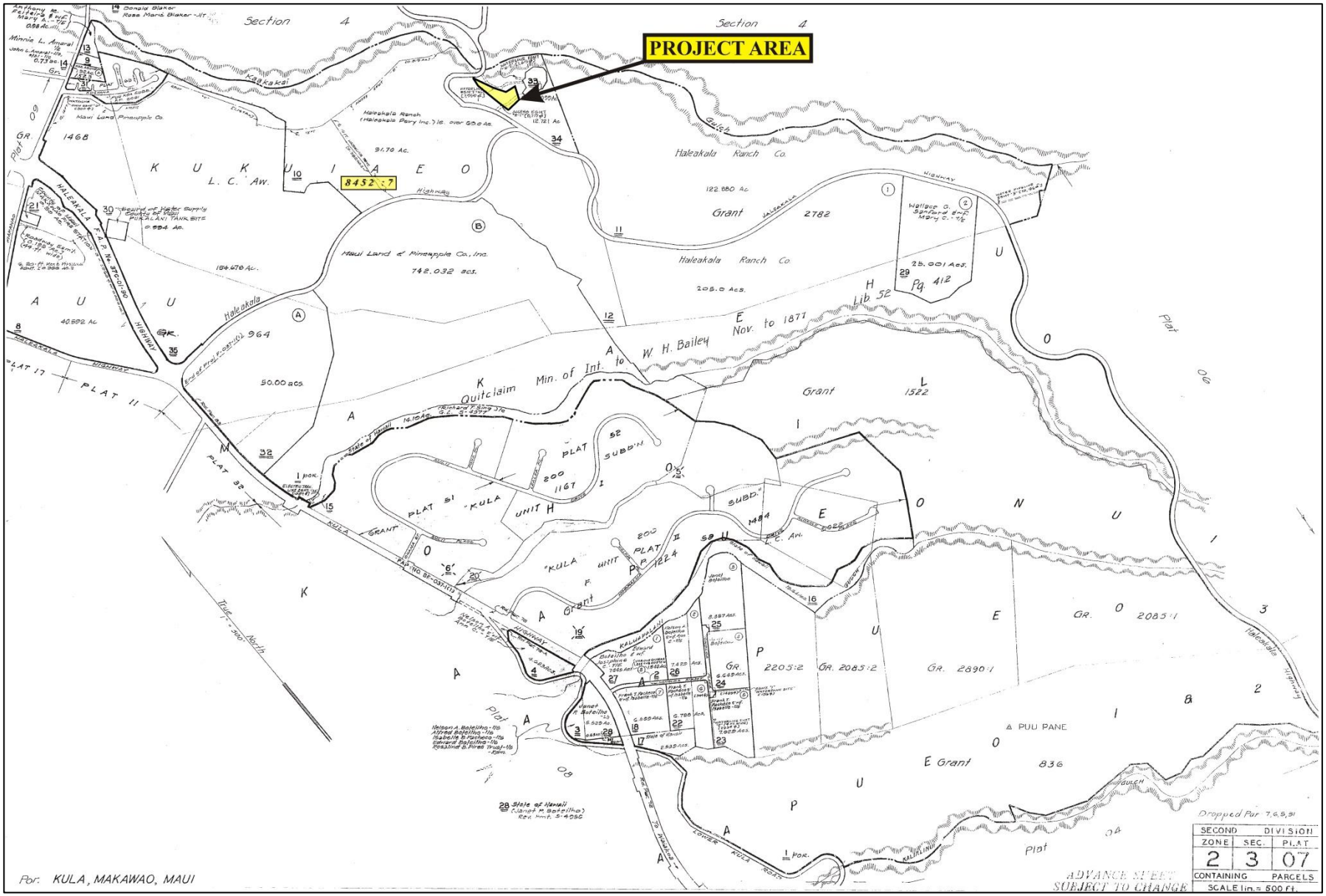


Figure 2: TMK Showing Location of Project Area.

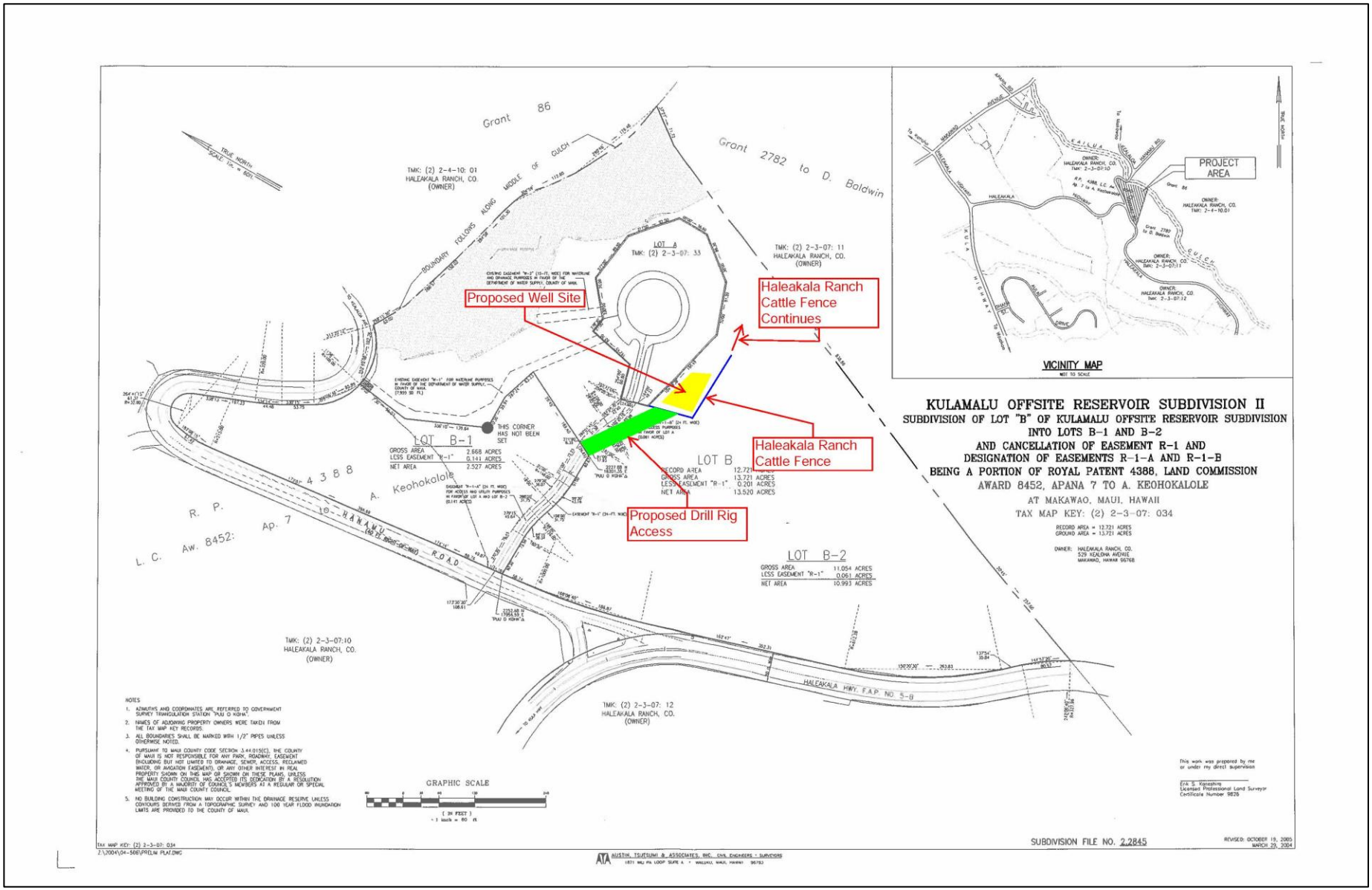


Figure 3: Planview Map of Project Area with Existing Tank, Access Road, and Proposed Well Location..

Figure 4: Aerial Photograph of the Project Area and Surroundings (Google Earth 2016).

RAINFALL

The project area is located on the northwestern slope of Haleakalā within East Māui. The area is subject to an average annual rainfall of 1031 mm (41 in), as measured by the nearby Maui Pine rain gauge (Giambelluca *et al.* 2013). The wettest months fall between November and April, when the northeast trade winds blow. During the summer months, when drier Kona winds are more common, the level of precipitation drops.

TRADITIONAL AND HISTORIC SETTING

PRE-CONTACT ERA AND MYTHOLOGICAL ACCOUNTS

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Kirch (2011), in a review of 150 years of literature regarding settlement of the Hawaiian Islands, suggests earliest occupation of the islands occurred between A.D. 900 and 1000. The earliest populations purportedly used local resources and seldom ventured into upland valleys. Greater population expansion to inland areas, including upland *kula* zones, appears to have begun in the 12th century A.D., continuing through the 16th century AD.

Around the 14th century, the various *mōʻi* (kings/monarchs) of the Hawaiian Islands decided to formalize traditional land tenure in Hawaiʻi, mainly in order to better manage disputes between neighboring *aliʻi* (chiefs). Land was surveyed and land boundaries were marked. Hawaiian lands were divided into *moku* (districts), *ahupuaʻa*, and numerous smaller divisions, called *ʻokana*, *ʻili*, etc. These land divisions generally encompassed land from the mountain to the sea, thereby allowing access to both marine and mountain resources. The current project area is present in Kakuiaeo Ahupua`a, Kula Moku. Rather than denoting ownership of the lands by *aliʻi*, the *ahupuʻa* boundaries signified a trusteeship between the caretakers of the land (*konohiki*), designated by the *aliʻi*, and the nature gods worshipped by Hawaiians (Handy and Handy 1972).

The project area is located in what is now generally called Pukalani, which translates to the "heavenly gates" (Pukui *et al.* 1974). The original name may have been *Puʻu ka lani*, or hill of the heavens (*ibid*), alluding to the upland nature of the town and afternoon cloud formations over the area. The project area *ahupua`a*, Kukuiaeo, has not been translated by Pukui *et al*. (1974), and none have been found to date. We will not attempt to literally translate the name herein. Traditionally, the parcel appears to have belonged to Hōkūʻula Ahupuaʻa, or "red star"

ahupuaʻa; legendary and mythological references to Hōkūʻula are scarce. The project parcel is also near to Makaʻeha and Makawao Ahupuaʻa, which are referenced more commonly in oral accounts. Hōkūʻula Ahupuaʻa is unique in that it does not run all the way from the mountain to the ocean, but rather is entirely composed of high agricultural lands (*kula*). Wailuku *moku* marks the northwestern *makai* border of the *ahupuaʻa,* cutting off access to marine resources in this particular land division. The parcel traditionally belonged to the *moku* of Kula but since 1848 has belonged to the larger Makawao District.

Figure 5: Overview of Project Parcel. View to the Northwest.

Upland areas of Māui such as the Kēōkea-Waiohuli area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c*. A.D. 1600. Of Kula District, Handy (1940: 161) writes,

> On the coast, where fishing was good, and the lower westward slopes of Haleakala, a considerable population existed, fishing and raising occasional crops of potatoes along the coast, and cultivating large crops of potatoes inland, especially in the central and northeastern section including Keokea, Waiohuli, Koheo, Kaonoulu, and Waiakoa, where rainfall drawn round the northwest slopes of Haleakala increases toward Makawao.

Handy and Handy (1972) describe the aridness of Kula, and the dependence of its people on receiving *poi* from the wetter valleys of Waikapu and Wailuku to supplement their diet. Yet, Kula was "wildly famous for its sweet potato plantations. *ʻUala* was the staple of life here" (Handy and Handy 1972: 510-511).

Makawao *ahupuaʻa*, on the other hand, was once a vast area of wet and dry forest (Sterling 1998); its name literally means "forest beginning" (Pukui *et al.*, 1976: 142). There are many references to the rains of Makawao, and it is likely that hunting and gathering took place in its diverse native forests (Sterling 1998; Pukui 1983). Tree species included *koa (Acacia koa)*, sandalwood and *ʻohiʻā lehua; maile* and ferns including *palapalai* and *palaʻa* thrived in these forests (Sterling 1998: 98). In the drier regions of Makawao, sweet potato was cultivated extensively, as it was in Kula; from Pukalani to historic Poʻokela Church, there are many oral accounts of sweet potato patches.

However, no sites in the project area have firmly identified permanent habitation sites such as those found in the Kēōkea-Waiohuli area of Kula. Rather, evidence of occupation includes petroglyphs, such as the canoe petroglyphs of Kaluapulani gulch in Makaʻeha *ahupuaʻa* (Sterling 1998). Numerous *heiau* have also been recorded in Hōkūʻula and surrounding *ahupuaʻa*. Oral evidence of a large sweet potato patch is recorded by Manu in Sterling (1998) for the *ahupuaʻa* of Makaʻeha. These petroglyphs, religious structures and agricultural accounts attest to human activity in the project area, but do not provide evidence of permanent habitation. Rather, the area was most likely significant in terms of gathering of upland forest resources and dryland agricultural endeavors, primarily the cultivation of sweet potato (*ʻuala*).

HISTORIC PERIOD

By the early historic period in Hawai‘i, significant natural and cultural changes had taken place throughout the islands, not only due to contact with westerners, but also because of internal social and environmental restructuring and external social and environmental factors (*e.g.*, foreign species being introduced as well as foreign ideologies). These combined to have a severe impact on Hawaiian environments, land-tenure, and social structures.

By the 1800s, agriculture in the *moku* of Kula had transitioned to a commercial rather than subsistence activity (Kuykendall 1965 in Pantaleo 2004b). Demand from new populations such as whalers encouraged the cultivation of vegetables, meat and fruit in upcountry Māui. In the mid-nineteenth century, demand for Irish potatoes by California gold rush workers caused a boom on Māui; Irish potato farms thrived in Kula, and soon Kula was known as the "potato district" (Kuykendall 1965: 313 in Pantaleo 2004b).

On the other side of Hōkū‘ula Ahupua‘a, in Makawao, cattle ranching became a prominent position of employment and adopted lifestyle. Livestock was introduced to the Hawaiian Islands in 1793 when Captain Vancouver transported cattle and sheep aboard his ship the *Discovery* with the intention of giving the four cows, two bulls, four ewes, and two rams to Kamehameha I as a gift of goodwill. The rough seas and intense heat of the journey took its toll on the health of the cattle and several of the animals died. In order to ensure that the cattle population would increase, a ten-year *kapu* (ban) was placed on slaughtering them. Eventually the cattle did increase in number to the point of becoming a dangerous nuisance. As they were allowed to roam wild, gardens were destroyed and the Native Hawaiians were terrified of being attacked. Managing and controlling the unruly animals became a necessity. In order to solve this problem Kamehameha I employed "a varied crew with unsavory reputations who had immigrated to the islands to escape their pasts" as *bullock hunters* to capture the animals (Cowan-Smith and Stone 1988:8).

Things were about to change in 1803 when Captain Richard Cleveland and his partner Captain William Shaler introduced horses to the Islands. These men brought aboard their ship, the HMS *Lelia Byrd*, several horses including a stallion and a mare with foal, which they presented as gifts to Kamehameha. Soon the horses, like the cattle, were roaming freely across the Islands. The horses (*lio*) adapted rapidly to the rough terrain where the cattle grazed and "their ability to work the livestock [did not] go unnoticed" (Cowan-Smith and Stone 1988:12).

Around 1830, Kamehameha III brought Mexican *vaqueros* from Vera Cruz to the Big Island to teach the local men how to rope and handle the animals. As the cattle and horse populations proliferated, the animals were transferred to the various Hawaiian Islands and the *vacqueros*, which now included local cowboys, were needed on the outer islands. In addition to cattle ranching, agricultural activities were pursued. Despite claims that "the soil in this area of Māui grows rocks" (Fredericksen, *et al*. 1991: 05) due to the many areas of exposed bedrock and scattered boulders and gravels in the surrounding fields, oral accounts of historic agricultural endeavors listed crops such as sweet potato (*`uala; Ipomoea batatas*), potatoes, corn, beans, and wheat, which had expanded exponentially in the first half of the nineteenth century (Fredericksen *et al*. 1991: 03–05; Sterling 1998: 99; Bartholomew 1994: 120).

Finally, throughout Makawao District (encompassing Kula *moku*), sugar and pineapple production grew rapidly. The area which had once been "developed as an agricultural and stock-raising area" later expanded "into pineapple upon the formation of the Pukalani Dairy and Pineapple Company in 1907" (Bartholomew 1994: 121). By the end of the nineteenth century, sugarcane and pineapple proved profitable crops; patches of the crops still exist in the upcountry areas today.

MAHELE

During the historic period, extreme modification to traditional land tenure occurred throughout all of the Hawaiian Islands. The transition from traditional Hawaiian communal land use to private ownership and division was commonly referred to as the *Māhele* (Division). The Māhele of 1848 set the stage for vast changes to land holdings within the islands as it introduced the foreign (western) concept of land ownership to the Islands. Although it remains 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 (Kuykendall Vol. I, 1938:145 footnote 47, 152, 165–166, 170; Daws 1968:111; Kelly 1983:45; Kame`eleihiwa 1992:169–170, 176).

Kame`eleihiwa (1992: 209) states that Makawao District was the first area in Hawai`i to experiment with land sales. In January 1846, land was made available for eventual ownership to the commoners (*maka`āinana)*. For native Hawaiians that had been cultivating and living on the lands, lengthy and costly procedures enabled them to possibly claim some of the plots. These claims could not include any previously cultivated or presently fallow land, 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 Land Commission Award (LCA), issued a Royal Patent number (RP), and could then take possession of the property (Chinen 1961: 16).

According to Chinen (1961), in Makawao District land was sold for $1.00 per acre; this would mark the beginning of land grants. Experimental lots purchased by Hawaiians ranged from five to ten acres, with a total land area of approximately 900 acres of grant lands purchased in Makawao. If applicants met all of the requirements (and were notified of the procedures), they eventually received the title to their land. Much of the granted lands in Makawao not purchased by native Hawaiian homesteaders were leased to foreign ranchers (Pantaleo 2004b). During the mid-nineteenth century a large population of Chinese immigrants began leasing lands from native Hawaiians and ranchers and developing a thriving agricultural community in Kula (*ibid*).

LCA Award 8452: 7 occurs in closest vicinity to the project area parcel (Figure 6). LCA Award 8452-7 is part of a series of LCAs awarded to Keohokalole in 1848 in the *ahupuaʻa* of Kukuiaeo and Aapueo (among others) in Kula District. The LCA extends from the uplands to the coast, with other portions of the overall LCA (8452) also occurring on other islands (Appendix A). For the Kula, Maui region near the project area, Keohokalole only claimed a *malo* taro and three sweet potato plots.

MODERN ERA

Haleakala Ranch, incorporated into the Kingdom of Hawaii in 1888, owns the current project area lands. The ranch has 33,817 acre of holdings in upcountry Maui through the Kihei area. The current project area was not subject to pineapple cultivation, as were many areas of the Makawao region, but rather, was used for pasture/ranching. This land use continued for almost a century, leaving a thin footprint of past land use. The project area and larger parcel (034) has remained undeveloped to the time of this writing.

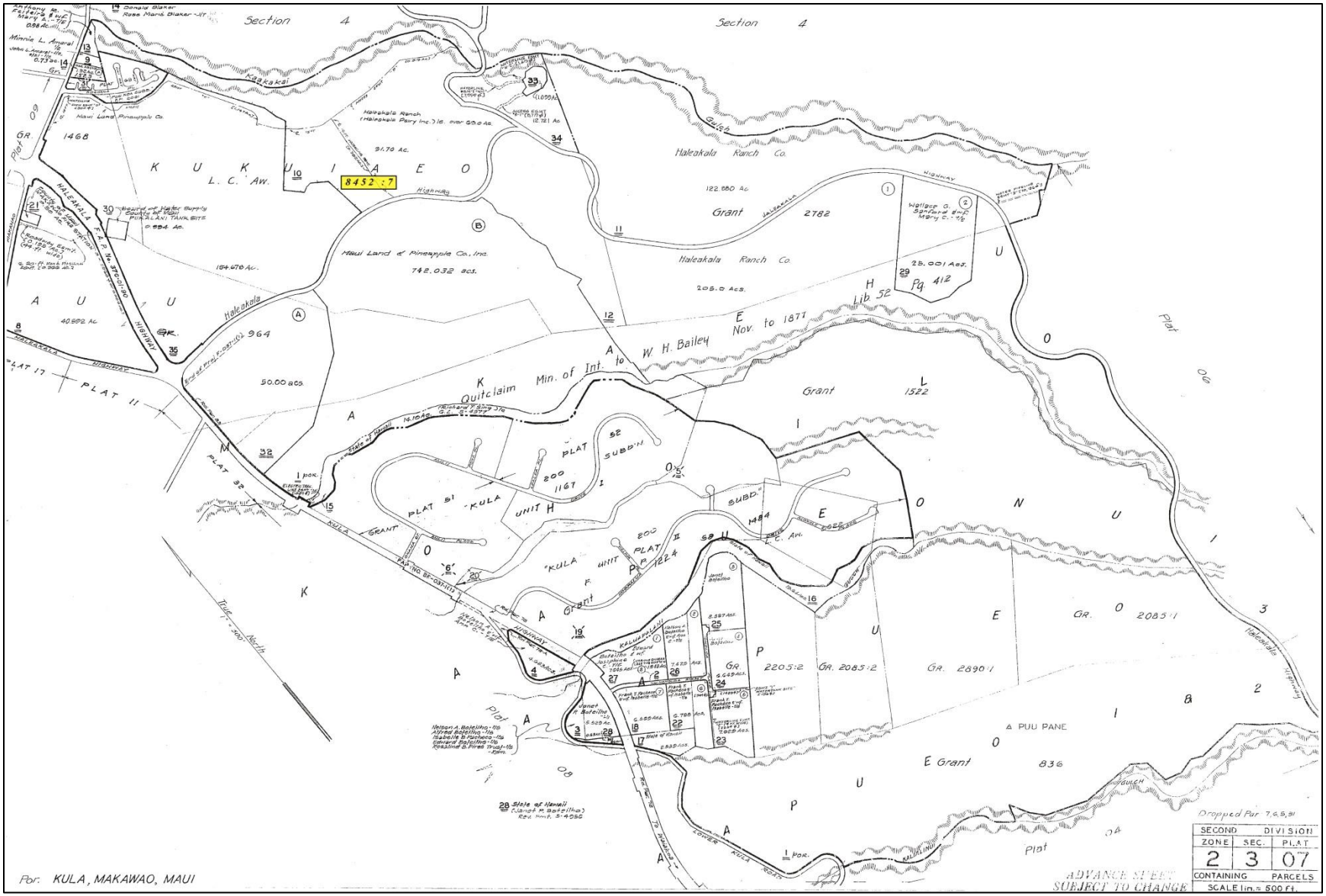


Figure 6: TMK Map of Project Area Showing Main Land Commission Award in Area.

PREVIOUS ARCHAEOLOGY

Several archaeological surveys have been conducted in the vicinity of the current project area. Figure 7 illustrates the overlap of surveys and identified sites located in the vicinity of the project area.

In 1973, Connolly re-identified Site 50-50-10-1062 under the direction of Bernice Pauahi Bishop Museum. The area consisted of a traditional petroglyph site containing at least 87 glyphs within the northern section of Kaluapulani Gulch, in Makaʻeha Ahupuaʻa. Site -1062 is located west of Kula Highway near the present upcountry location of Kamehameha Schools. Preservation planning for the site was completed during building of Kamehameha Schools and Kulamalu subdivision (Spear and Carson, 2003).

Donham (1992) performed an Archaeological Field Inspection and summarized findings of another Petroglyph site (State site 50-50-11-2920) further upland in the Kaluapulani Gulch, in the Kula 200 Subdivison. This 20-meter long site, identified on a vertical rock face, includes at least 32 individual glyphs, with the principal theme of canoes and paddlers.

Bordner (1980), in affiliation with the Environmental Impact Statement Corporation, conducted a Reconnaissance Survey of the proposed Makawao Subdivision. The project area, which was located between Kailua Gulch and Apana Road, was said to have been a plantation camp. However, no archaeological surface remains were located during the survey and no further work was recommended.

Donham (1990), in association with Paul H. Rosendahl, Ph.D., Inc. (PHRI), conducted an Archaeological Inventory Survey for five potential upcountry Maui High School sites in Haliʻimaile, Hokuʻula, Kailua and Makaʻeha Ahupuaʻa, Makawao District. Historic materials and traditional Hawaiian artifacts were discovered during this project: Parcel 1 contained ceramic shards; Parcel 2 contained a horseshoe and metal; Parcel 3 contained water-worn coral and marine shell; and Parcel 4 contained four lithic artifacts and a ceramic shard. Even though cultural remains were located on some of the investigated parcels, no State Site Numbers were issued for any of the findings. No further work was recommended for Parcels 1-3 and 5; however, further research was warranted for Parcel 4.

Xamanek Researches conducted an Archaeological Inventory Survey in Hokuʻula Ahupuaʻa, Makawao District (Fredericksen and Fredericksen 1995). A rock aggregation was

recorded and issued SIHP Site Number 50-50-05-3929. Testing resulted in the discovery of historic materials including metal, bottle glass, agricultural sheeting, cut animal bone, and ceramics. Traditional Hawaiian artifacts consisted of *kukui* nut *(Aleurites moluccana*), water-worm pebbles (*`ili`ili* stones) and marine shell. No additional archaeological work was required for the site.

Xamanek Researches conducted an Archaeological Inventory Survey for the Kulamalu water tank and water line improvements in Hoku`ula Ahupua`a, Makawao District (Fredericksen and Fredericksen 1999). Five archaeological sites were identified and each was issued a SIHP Site number. Site 50-50-10-4677 through -4681 consisted of two historic retaining walls, two shelter caves and a probable historic gravesite. The sites were not to be affected by the proposed work and no further investigations were deemed necessary.

PHRI conducted an Archaeological Inventory Survey for the proposed Pukalani Terrace Subdivision III in `A`apueo Ahupua`a, Makawao District (McPhatter and Rosendahl 1996). During this survey, additional petroglyph panels were documented in Kaluapulani Gulch. The glyphs are located on the south bank of the gulch and were issued Site 50-50-05-4179. There was also a rock wall identified (Site 50-50-05-4180) and agricultural terraces (Site 50-50-05-4181). No additional work was required for the wall and terraces; however, permanent preservation was recommended for the petroglyph panel.

Aki Sinoto Consulting completed an Archaeological Inventory Survey of the proposed Upcountry Town Center (Sinoto and Pantaleo 2002). The historic Corn Mill Camp was identified and issued Site Number 50-50-06-5169. All features associated with the historic camp were recommended for permanent preservation.

Archaeological Services Hawai`i, LLC recorded a Chinese Cemetery while monitoring the construction of Kulamalu Commercial Subdivision in `A`apueo Ahupua`a. No archaeologist was on site during the excavations; however, a construction supervisor contacted the archaeological firm upon the discovery of disturbed human bones. The site contained coffin and burial pits, burning episodes, animal burial, associated historic glass bottles and beads. The site was slated for permanent preservation (Pickett and Pantaleo 2003).

Pantaleo and Tusha (2003) completed an Archaeological Inventory Survey for the proposed Pi`iholo water well (TMK 2-4-12: portion of 6). Nothing of archaeological significance was identified.

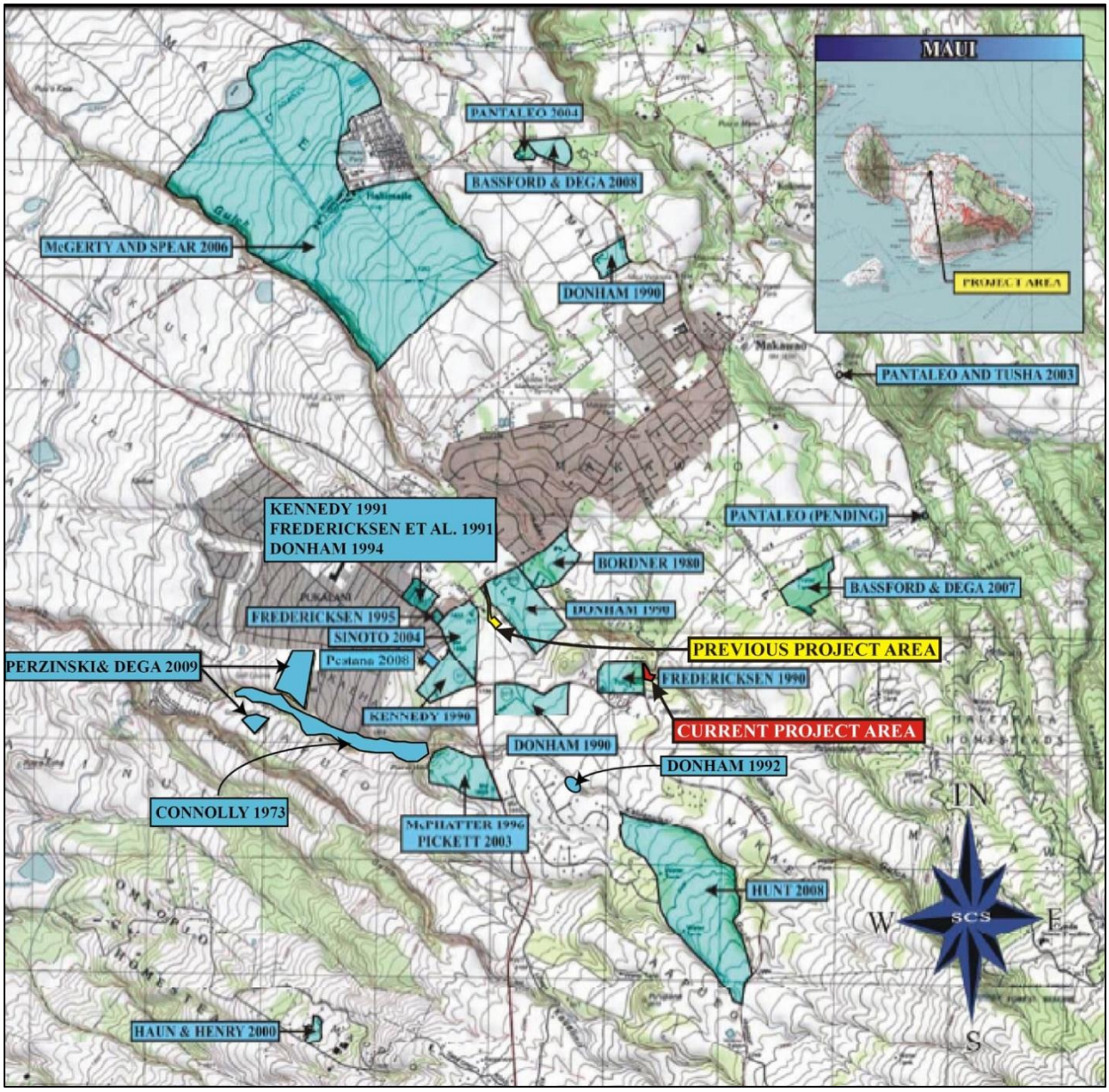


Figure 7: USGS Map Showing Location of Previous Archaeological Studies. Note: Previous Project Area was for the same project (exploratory well), until changed to the current location.

Pantaleo (2004a) prepared an Archaeological Inventory Survey report of the Taylor-Fewell subdivision and Grove Ranch Agricultural Subdivision in Hāli`imaile [TMK: (2)-2-4-1-:004, 019). Two archaeological sites were give numbers 50-50-06-5554 and -5555. The sites consisted of a Portuguese ferno (Site -5554) and a historic cattle scale (Site -5555). Since historic remains were encountered, Archaeological Monitoring was recommended.

In March 1991, an Archaeological Inventory Survey for the proposed Pukalani Highlands Property in Hokuʻula Ahupuaʻa was completed by Archaeological Consultants of Hawaiʻi, Inc.

(TMK: 2-3-44: 20) (Kennedy 1991). A total of three structures were recorded; four test units were excavated. According to Kennedy, evidence collected suggested the structures (referred to as "mounds") were pre-Contact as all historic materials (e.g., wire, nails, bovine teeth, a plastic bottle) were all collected at least 14 cm above the base of the structures and because the rock walls were stacked and faced, rather than being reinforced by concrete.

Site 50-50-05-2497 was concluded to be a *heiau* (shrine, temple) due to the structure's formal construction. Kennedy also concluded that Site -2498 was a *heiau* based upon oral accounts of the structure and its formal construction. Volcanic glass considered to be prehistoric was found below historic materials. In addition, coral found on the platform and in a test unit furthered the belief that the site was a *heiau*, "for there are ethnographic accounts of fist sized chunks of coral being brought to and used as offerings on such structures" (Kennedy 1991: 27). Site 50-50-05-2499 was not as well constructed as Site -2497, but was determined to be a burial due to its close proximity to Sites -2497 and -2498. Preservation efforts were recommended for Site -2497 due to its excellent condition and cultural value; Data Recovery was recommended for Sites -2498 and -2499 due to their potential to yield cultural data (and also an examination of a stone wall, which is absent from Kennedy's report). Sites -2497, -2498, and -2499 continued to be of interest and generated much controversy.

In June 1991, Xamanek Researchers tested Site -2499; preliminary excavations suggested the feature was the result of modern agricultural clearing activities (Fredericksen, *et al.* 1991). A trench *makai* of the bedrock at Site -2499 was excavated in order to determine if the feature covered an old lava tube which might contain a burial. Pre-Contact artifacts were recovered: a round stone, possibly a "crude or unfinished *pohaku hu*" (a rock used to snare birds, according to Brigham in Fredericksen, *et al.* 1991: 08), charcoal, several coral chunks, *kukui* (candlenut tree; *Aleurites moluccana*), shell fragments, an adze tip, two polished adze flakes, basalt flakes, and a possible hammerstone and polishing stone. Historic artifacts were also noted: metal nails, cut bovine bone, glass sherds, rusty metal, and wire. Xamanek Researchers concluded that Site -2499 was not a lava tube and that the mix of artifacts infers activities from both pre- and post-Contact eras. A 2.0 by 3.0 m area 5.0 m north of Site -2497 was cleared and a small piece of coral, some concrete, and rusty metal pieces were recovered. Pieces of a concrete irrigation flume were found west of Site -2497. Radiocarbon dating from Site -2498 was dated at AD 1540-1680; Site -2499 returned a` date of 1620 to 1750. The location may have been chosen as "repository of stones because it is an outcrop of rock which could not be utilized in other ways" (Fredericksen, *et al*. 1991: 10). Oral histories of the area confirmed agricultural cultivation and clearing occurred for many years "in recent times" (*ibid*: 10). It was recommended that further

excavation on the *mauka* sides of Sites -2497 and -2498 was needed to obtain more data and that the placement and location of the two sites was "problematic" – they may be historic clearing piles, pre-Contact religious structures, or a combination of prehistoric and historic sites. Finally, a stone alignment, absent from Kennedy's 1991 report, was deemed State Site 50- 50-05-3527. The alignment was composed of "angular, quarried rocks intermixed with boulders and cobbles" (*ibid*: 07).

In January 1992, Xamanek Researchers began "dismantling work at Site 2498" (Fredericksen and Fredericksen 1992: 02). More historic articles and a charcoal layer were encountered. A bulldozer uncovered human bone, and the disarticulated remains of seven individuals were identified and disinterred. One adult coffin burial was determined to be a primary interment; all others (three adults, two infant, and one child) were secondary interments, brought from "somewhere else" (*ibid*: 14). Due to the burial style and one Hawaiian artifact found in the fill, the burials were thought to be of Hawaiian ancestry. The presence of a wooden casket and other historic remains indicated that all of the burials were interred (and reinterred in regards to the secondary burials) in historic times, possibly from bones kept by a Hawaiian family and from a family burial cave. After conferral with SHPD, the remains were moved to Lot 60, which was located on an easement that could not be developed. Monitoring and further excavation were recommended in order to explore the site and stone alignment further.

In February 1994, the SHPD and Maui/Lāna`i Island Burial Council (MLIBC) was notified of an inadvertent discovery of human skeletal remains at the Pukalani Highlands Subdivision (TMK: 2-3-44: 19). The remains (Site 50-50-05-3520) were uncovered when a section of a trench wall collapsed: "The disposition of the remains in *in situ* indicated that the elements were not articulated and that the burial had been disturbed prior to its recent exposure during construction" (Donham 1994: 01). Due to the location of the remains in an area of likely future disturbance, the decision was made to relocate the remains to a previously established burial preserve within Pukalani Highlands Subdivision (Site 50-50-05-3725). Historic period fragments not associated with the burial were also present. Scattered charcoal was interpreted as a by-product of sugarcane burning in the vicinity of the project area.

Xamanek Researches summarize other sites in the vicinity of the project area, including Site 50-50-05-3426, an agricultural clearing pile from the historic period, as suggested by the presence of black plastic, common in cultivation pursuits (Fredericksen and Fredericksen 1994a). The Site -3527 stone alignment was interpreted as part of the historic roadway, perhaps Paku Lane. In May of 1990, Kennedy identified a stone feature, which he determined to be a *heiau*, in

a pineapple field (Site 50-50-05-2701). Excavations outside of the feature included volcanic glass, basalt flakes, and *kukui* nutshells. Radiocarbon dating suggested a construction date of 1620-1770 (Fredericksen and Fredericksen 1994a).

Kennedy's previous documentation regarding Site 50-50-05-2701 required further archaeological investigation on the land parcel. Archaeological Services Hawai'i, LLC conducted an Archaeological Inventory Survey of the Kualono Residential Subdivision in Pukalani (Pantaleo 2004b). A total of 26 backhoe trenches were excavated and no culturally significant findings were encountered during subsurface testing. However, approximately 2.5 acres were set aside from the proposed development in order to preserve Site -2701. Archaeological Monitoring was recommended to protect the purported *heiau,* and in case of any subsurface cultural remains.

In December 1994, excavations occurred at Site 50-50-05-3929, a rock aggregation at TMK: 2-3-44: 31, adjacent to the Pukalani Highlands Subdivision (Fredericksen and Fredericksen 1994b). Modern trash material was noted: rusty metal, plastic, black plastic mulch associated with historic agricultural practices, and bottle glass. No significant finds were made; no further work was recommended.

PROJECT AREA

Three historic properties sites were documented in Kailua Gulch, just to the north of the current project area. These sites are present well outside the current area of work, all on TMK (2) 2-3-007:011. Site 50-50-10-4677 consisted of a wall occurring in the gulch. The dry-stack wall measured 40+ meters (m) long by 1.0-2.2 m high (1999 Xamanek Researches, LLC.). Site 50-50-10-4678 was a small cave, also occurring in Kailua Gulch, that measured 6 m long, 1.8 m wide, and 2.2 m deep. The cave was interpreted as a habitation/storage area (1999, 2005 Xamanek Researches, LLC.). The third site, Site 50-50-10-4680, was present to the west of Hanamu Road near the floor of the gulch. Site -4680 consisted of a road retaining wall measuring 13.5 m long by 1 m wide by 0.70 m high (1999 Xamanek Researches, LLC.; 1990 PHRI).

In sum, a survey of previous archaeological undertakings in the area suggests that this area of upcountry Māui may have been utilized from pre-Contact times into the historic period. The gathering of upland resources in traditional times seems a more likely use than more permanent habitation and agricultural practices, like those in the Kēōkea-Waiohuli area to the south. Although the presence of petroglyphs and ceremonial structures suggests at least

temporary habitation, more evidence is needed to support this claim, especially in the Pukalani area. Historic sites were located nearby (Sites -4677, 4680), likely related to the ranching period.

SETTLEMENT PATTERN

A review of the literature as well as previous archaeology indicates that Hōkūʻula Ahupuaʻa in Kula District, at the edge of Makawao Ahupuaʻa, was primarily a source of forest resources and agricultural land. There is a lack of evidence, both in oral accounts and archaeological remains, for permanent settlement in this particular area of upcountry Māui. There is evidence for temporary use during pre-Contact times (Site -4678) and historic era wall construction, likely related to ranching endeavors. Southeast of the project area, on the leeward slopes of Haleakalā in Kula *moku*, where sweet potatoes (ʻ*uala*) were more extensively cultivated, there is much evidence for permanent settlement. However, in this somewhat wetter and lower elevation area near Pukalani, hunting and gathering, with more limited dryland cultivation of ʻ*uala* appears more likely. Many petroglyphs and ceremonial structures attest to the significance of this area, and it is clear that humans have temporarily occupied Hōkūʻula Ahupuaʻa from pre-Contact through the entire historic period.

METHODS

Fieldwork was conducted on January 25, 2016 by SCS personnel Ian Bassford, B.A. and Nikki Andricci, B.A., under the direction of project Principal Investigator, Michael Dega, Ph.D. Fieldwork focused on a 100% pedestrian survey of the project area in <3 m, north-south transects. Photographs were taken of the proposed well location (Figures 7 and 8). Written notes and descriptions of the topography and natural environment were also taken. No testing was done during the current work as no sites were identified on the surface of the project area and no areas suggested to potentially contain subsurface cultural materials were identified.

Archival research entailed investigating the historic and archaeological background of the general project area. This examination included a documentary search of previous archaeological research conducted in this region of Maui as well as a review of archival literature relating to Land Commission Awards and local mythology. The review of historical documents was accomplished in order to understand the impact of post-Contact events on the cultural and archaeological landscape of the region.

Laboratory tasks were conducted in the Honolulu office of SCS and included the drafting of project area illustrations, cataloguing photographs, and reporting. All documentary materials are currently being curated at the SCS office in Honolulu.

RESULTS OF FIELDWORK

The 2.0-acre project area is wooded pasture adjacent to a parcel that currently houses a 1 million gallon water tank and infrastructure (Figures 8 and 9). The purpose of the current project is to construct an exploratory well in 2 acres of the overall 11 acre parcel. The project area will, as it evolves, be dedicated to water system use through time. Adjacent to the project area, the water tank parcel has undergone extensive cutting and filling for the existing water tank and includes a 4 m cut on the southern portion of the parcel and up to 5 m of fill on the north and eastern sides of the tank site. The exploratory well site is directly adjacent to this area.

The well site is relatively undisturbed, comparatively, having been under pasture/ranching for almost a century. No surface sites or cultural deposits were encountered during the survey of the well site. In addition, no locations thought to contain possible subsurface cultural materials were thought to be in the project area as well. The surface of the project area was only minimally disturbed, leading to the inference that no/few sites occurred in the project area through time. The level of disturbance was minimal and would not have rendered any historic properties destroyed. There are three known sites (see above) occurring in Kailua Gulch to the north, which may have been a more preferable occupation/activity area.

SUMMARY AND CONCLUSIONS

The current study did not lead to the identification of any historic properties. None were present on the mostly undisturbed surface, and no areas thought to contain subsurface cultural materials were encountered as well. Known sites in the area occur to the north, in Kailua Gulch, what appears to be a preferential occupation area. It is our estimation, based on the field and archival research for this archaeological assessment, that the proposed undertaking would not have an adverse impact on any archaeological sites or features.

Figure 8: Photograph of Exploratory Well Location. View to Northwest. Note: Existing Tank in Background.

Figure 9: Photograph of Exploratory Well Location. View to Northeast.

Archaeological Monitoring is not recommended during construction activities for the exploratory well site. 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.

REFERENCES CITED

Bartholomew, G.
1994 *Maui Remembers: A Local History.* Mutual Publishing, Hawai‘i.

Bassford, S. and Dega, M.
2008 *Archaeological Inventory Survey on 3.291 acres located at 111 Makawao Avenue in Hōkū‘ula Ahupua‘a, Makawao District, Island of Maui, Hawai‘i [TMK: (2) 2-3-044: 038].* Prepared by Scientific Consultant Services, Honolulu HI.

Bordner, R.M.
1980 *Archaeological Reconnaissance, Makawao Subdivision (TMK 2-3-07: por 8).* Environmental Impact Statement Corporation, Maui.

Chinen, J.J.
1961 *The Great Mahele: Hawaiian Land Division of 1848.* University of Hawaii Press, Honolulu.

Connolly, R.A. III
1973 *Site 50-50-1-1062, Kaluapulani Petroglyphs, Makawao, Maui.* Hawai‘i State Archaeological Survey Form on file, Department of Land and Natural Resources. Ms. In Dept. Anthropology. Bishop Museum, Honolulu.

Daws, G.
1968 *Shoal of Time: History of the Hawaiian Islands*. University of Hawai`i Press. Honolulu.

Donham, T.K.
1990 *Archaeological Inventory Survey of Potential Upcountry Maui High School Sites, Lands of Haliimaile, Hokuula, Makaeha, and Kailua, Makawao District, Island of Maui.* Prepared for State of Hawaii, Department of Accounting and General Services, Honolulu, by PHRI, Hilo, Hawaii.

1992 *Field Inspection of Petroglyphs near the Kula 200 Subdivision, Makaehu, Makawao, Maui [TMK: 2-3-01:15).* On file, SHPD, Wailuku, Hawai‘i.

1994 *Recovery of an Inadvertently Discovered Burial at Site 50-50-05-3520, Hoku`ula, Makawao, Maui. TMK: 2-3-44: 019.* Manuscript On File at the State Historic Preservation Division. Kapolei, HI.

Foote D.E., E.L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Dept. of Agriculture, Soil Conservation Science and University of Hawaii Agricultural Experimentation Station. Washington D.C., U.S. Govt. Printing Office.

Fredericksen, D. L. and E. M. Fredericksen
1994a *An Archaeological Inventory Survey of 2 Parcels of Land in Proposed Pukalani Highlands Subdivision, Phase II, Hokuʻula Ahupuaʻa, Makawao District, Island of Maui [TMK: 2-3-44: 41 and 42).* Xamanek Researchers. Pukalani, Hawaiʻi.

Fredericksen, W.M., and D.L. Fredericksen
1992 *Report on Data Recovery During Excavations to Disinter Human Remains Inadvertently Discovered at Site 2498, Pukalani, Maui, Hawai`i TMK: 2-3-44: 20*. Xamanek Researches, Pukalani, Maui, HI.

1994b *An Inventory Survey of a 1.78-acre Parcel located in Hokuula Ahupua`a, Makawao District, Maui Island [TMK: 2-3-44:31].* Prepared for Plantation Properties II. Xamanek Researches, Pukalani, Maui, HI.

1999 Archaeological *Inventory Survey for the Kulamalu Watertank and Waterline Improvements, Hoku`ula Ahupua`a, Makawao District, Maui Island (TMK 2-3- 07:por. 10 & 11)*. Xamanek Researches, Pukalani, Maui, HI.

Fredericksen, D. L., W. M. Fredericksen, and E. M. Fredericksen
1991 *Preliminary Report on Additional Archaeological Data Collection of Problematical Feature on a Parcel in a Pukalani, Maui, HI*. Xamanek Researches, Pukalani, Maui, HI.

1995 *An Inventory Survey of a 1.78-acre Parcel Located in Hoku`ula Ahupua`a Makawao District, Maui Island (TMK 2-3-44:31).* Prepared for Plantation Properties II. Xamanek Researches, Pukalani, Maui, HI.

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte
2013 Online Rainfall Atlas of Hawaiʻi. *Bull. Amer. Meteor. Soc.* 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.

Handy, E.S.
1940 *The Hawaiian Planter.* Bishop Museum Press. Honolulu.

Handy, E.S. and E.G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum, Bulletin 233. Honolulu, Hawaii.

Kame'eleihiwa, L.
1992 N*ative Land and Foreign Desires: Pehea La e Pono Ai? How Shall We Live in Harmony*? Bishop Museum Press: Honolulu.

Kelly, M.
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

Kennedy, J.
1990 *Archaeological Inventory Survey and Test Results for the Proposed Pukalani Highlands Property Located at Pukalani, TMK:2-3-44, Ahupua`a of Kailua, District of Makawao, Island of Maui.* Prepared for Pukalani Highlands Partners.

Kirch, P.V.
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory.* University of Hawaii Press.

Kirch, P.V.
2011 *When Did the Polynesians Settle Hawai'i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer.* Hawaiian Archaeology.

Kirch, P. V. and M. Sahlins
1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Vols. 1 and 2. University of Chicago Press. Chicago, IL.

Kuykendall, R.S.
1938 *The Hawaiian Kingdom. Vol. 1*. University of Hawai'i Press. Honolulu.

McPhatter, B. and P. H. Rosendahl
1996 *Archaeological Reconnaissance Survey 250-Acre Pukalani Project Area, Land of Aapueo, Makawao District, Island of Maui (TMK: 2-3-08:Por. 5).* PHRI. Hilo, HI.

Motooka, P., L. Castro, D. Nelson, G. Nagai and L. Ching
2003 *Weeds of Hawaii's Pastures and Natural Areas; An Identification and Management Guide.* College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa.

Pantaleo, J.P.
2004a *Archaeological Inventory Survey Report of the Taylor-Fewell Subdivision and Grove Ranch Agricultural Subdivision No. 2 Hali`imaile Ahupua`a, Makawao* 35 *District, Island of Maui, TMK 2-4-001:004,019*. Prepared for A&B Properties. On file, Archaeological Services Hawai`i, LLC.

2004b *Archaeological Inventory Survey of the Proposed Kualono Residential Subdivision, Pukalani, Makawao District, Maui Island (TMK 2-3-11: 1 and 2).* Prepared for Dowling Company, Inc. On file, SHPD Maui, Hawai'i.

Pantaleo, J. and K. Tsuha
2003 *Archaeological and Cultural Assessment of the Proposed Pi`iholo Road Well Site, Hali`imaile Ahupua`a, Makawao, Maui Island (TMK 2-4-12:por6).* Prepared for Maui Land and Pineapple Co. On file, Jeffrey Pontaleo Consultants, LLC, Honolulu, HI.

Pestana, E. and M. Dega
2008 *Archaeological Inventory Survey on 2.79 acres of undeveloped land located in Maka`eha Ahupua`a, Makawao District, Maui Island, Hawai`i [TMK (2) 2-3-011: 008].* On file, Scientific Consultant Services, Inc., Honolulu, HI.

Paul H. Rosendahl, Ph.D. (PHRI)
1990 *Archaeological Inventory Survey, Potential Upcountry Maui High School Sites, Lands of Hali`imaile, Hoku`ula, Kailua, and Makaeha, Makawao District, Island of Maui*. PHRI, Hilo.

Pickett, J. and J Pantaleo
2003 *Archaeological Monitoring Report for the Kulamalu Commercial Subdivision, `A`apueo Ahupua`a, Kula District, Island of Maui (TMK 2-3-08:39)* Dowling. Archaeological Services Hawai`i, LLC.

Pukui, M.K.
1983 *'Olelo No'eau.* Bishop Museum Special Publication 71. Bishop Museum Press, Honolulu.

Pukui, M.K., S.H. Elbert, and E.T. Mookini
1976 *Place Names of Hawaii.* University of Hawaii Press, Honolulu.

Sinoto, A and J. Pantaleo
2002 *An Archaeological Inventory Survey of the Pukalani Triangle, Makaeha Ahupua`a, Makawao, Maui (TMK 2-3-07:08).* Aki Sinoto Consulting. Honolulu, HI.

Spear, R.L. and M. Carson
2003 *A Preservation Plan for Site 50-50-10-1062, A'apueo Ahupua'a, Makawao District, Island of Maui (TMK: 2-3-98: 5).* Prepared for PBR Hawaii, Inc. On file, SHPD Maui, Hawai'i.

Sterling, E. P.
1998 *Sites of Maui*. Bishop Museum Press, Honolulu.

Xamanek Researches, LLC.
1999 *Archaeological Inventory Survey for the Kulamalu Watertank and Waterline Improvements, Hoku`ula Ahupua`a, Makawao District, Maui*. Xamanek Researches, LLC., Wailuku.

2005 *Letter Report on the Archaeological Field Inspection of a c. 2 ½ Acre Portion of Land along Hanamu Road, Hoku`ula Ahupua`a, Makawao District, Maui*. Xamanek Researches, LLC., Wailuku.

Waihona `Aina Corporation
2008 Mahele Database, www.waihona.com

APPENDIX A: LCA 8452 KEOHOKALOLE

Number: 08452*M

Claim Number:	**08452*M**
Claimant:	**Keohokalole, A. wahine**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Kula, Lahaina, Hana**
Ahupuaa:	**Aapueo, Alae 3, Kamehame, Kealahou 3 & 4, Koheo 2, Kukuiaeo, Paeohi, Hana, Kuhua, Kooka**
Ili:	**Paeohi, Pahoa, Muolea**

Apana:	**0**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**567v5**
Mala Taro:		FT:	**573v3**
Kula:		NT:	**326v10**
House lot:		RP:	**4388,7453**
Kihapai/Pakanu:		Number of Royal Patents:	**2**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**

Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**Yes**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	0
Other Mammals:	**o**	Miscellaneous:	

No. 8452*M, Keohokalole, Waikiki, Oahu, February 5, 1848
N.R. 567-568v5

I, the one whose name is below, hereby state my claims in my lands to enter in the lands of the Mo'i. These are things done by my own hands, with my people.

At Waiomao, one orange tree and my cultivated valley, an `Ili in Waikiki, with seven lo'i.
At Kapiwai are two mala of coffee and one mala of lauhala, one lo'i, and also a cultivated lot. This in an 'Ili in the Ahupua'a of Honolulu, Island of Oahu.
At Makua, on the Island of Oahu, one orange tree.

At Aamakao, an Ahupua'a on the Island of Hawaii, is one lo'i, and a house lot and an orange tree.
In the District of Kau, Ahupua'a of Wailau, is a house lot in the land.
In the Ahupua'a of Kaalaiki is a lot like that /in Wailau/. These are on the Island of Hawaii.

At Lahaina, in Kuhua Ahupua'a, is a mala of lauhala.

At Honouliwai, an Ahupua'a on the Island of Molokai are two orange trees.

At Kula, Island of Maui, Keokea Ahupua'a, there are three small mala of sweet potatoes and one mala of taro, made by our own hands, not by /those of/ the /people of the/ land.
At Kooka, an Ahupua'a in Lahaina, are four coconut trees and a single coconut tree at the shore in the lot of Kualaula, in Kiika, a /total of/ five coconut trees, and some kou trees at Pahoa, which have not been counted, also a hala clump is there, at the seashore.
I am with aloha, respectfully,
KEOHOKALOLE, who affirms this is my name, signed by Z. Kaauwai

F.T. 573v3
No. 8452, Keohokalole

Awahua, sworn, says he knows the House lots claimed by Keahokalole at Kaawaloa, Hawaii. The first one is fenced all round with a stone wall.

It is bounded:
Makai by the sea shore
On Kailua side by the Government land
Mauka by the land of Kahaku and Awahua
and on the other side by the road.

Claimant derived this lot from her ancestors, who held it from very ancient times. There is a stone house and several grass houses in it, belonging to claimant, besides a Tomb.

The second Lot is called "Aeoili" and is fenced all round.

It is bounded:
Makai by Government land
On Kailua side by the same
Mauka the same
On the side next the Pali by the Road.

Claimant derived this lot from her ancestor, who held it from olden times.

Witness knows the three House Lots in Kealakeakua claimed by Keohokalole. The first Lot is called "Kulou" and is fenced in.

It is bounded:
Makai by the Sea beach
Kaawaloa side by Government land
Mauka by the Road
South Kona side by a lot belonging to T. Cummings.

The second Lot is called "Kaahaloa" it is enclosed all round, and [is] bounded on:
Kona Hema by a lot belonging to T. Cummings
Mauka by the lot of Nakoko
North Kona by an old Heiau
Makai by the Road.

The third Lot is called "Hailokoalii" and is bounded on:
The south Kona side by an old Heiau
Mauka by a Government Lot & the lot of Ialua
Makai by the Sea Beach
On the other side by a pali.

Claimant inherited these Lots from her ancestors by the mother's side, who possessed them from ancient times.

Kekaalua, sworn, says he knows there lots perfectly & confirms in full the testimony of Awahua.

N.T. 326-327v10
No. 8452, A. Keohokalole; K. Kapaakea

To His Highness, John Young, Minister of Interior
Greetings:
This is to inform you and the Privy Council of my desire to convey some of my lands for the Governments one third in the land which remain as mine. Grant me this, of course, with the approval of the Privy Council

Below is a list of the lands I wish to convey to the government.

Aapueo ahupuaa, Kula, Maui
5 Omaopio ahupuaa, Kula, Maui.
Makehu ahupuaa, Kula, Maui
Kuikuiaeo ahupuaa, Kula, Maui
2 Kailua ahupuaa, Kula, Maui
2 Pukalani ahupuaa, Kula, Maui.
Kukuiula ahupuaa, Kipahulu, Maui.
Alaakua ahupuaa, Kaupo, Maui.

Kanakau ahupuaa, Kona, Hawaii.
Kaipuhao ahupuaa, Kohala, Hawaii.
Halaula ahupuaa, Kohala, Hawaii,
Keahakea ahupuaa, Hamakua, Hawaii.
Kaioula ahupuaa, Kau, Hawaii.
2 Makahakupa ahupuaa, Kau, Hawaii.
Kouhuhuula ahupuaa, Kau, Hawaii.
Pohina ahupuaa, Kau, Hawaii.
Puhalanui ahupuaa, Kau, Hawaii.
Wiliwilinui ahupuaa, Kau, Hawaii.
2 Papohaku ahupuaa, Kau, Hawaii.

The boundaries of all of these lands above have been established.

With appreciation,
(sign) A. Keohokalole

Honolulu, Jan. 3, 1850
To Your Highness, John Young, Minister of Interior
Greetings:

Here is a list of the names of my lands which has been left for me pending for an approval of its distribution.

Kahana ahupuaa, Koolauloa, Oahu.
Hamohamo ili, Waikiki, Oahu.
Malaekahana ahupuaa, Koolauloa, Oahu.

Paeohi ahupuaa, Lahaina, Maui.
2 Koheo ahupuaa, Kula, Maui.
3 Alae ahupuaa, Kula, Maui.
2 Kealahou 3,4, ahupuaaa, Kula, Maui.
Aapueo ahupuaa, Kula, Maui.
Kamehame ahupuaa, Kula, Maui.
Kuikuiaeo ahupuaa, Kula, Maui.
Muolea, Hana, Maui.

Kealakekua, Kona, Hawaii.
Kaawaloa ahupuaa, Kona, Hawaii.
Onouli ahupuaa, Kona, Hawaii.
Keahuolu ahupuaa, Kona, Hawaii.
Pau ahupuaa, Kohala, Hawaii.
Paauhau ahupuaa, Hamakua, Hawaii.
Puna ahupuaa, Puna, Hawaii.
Keaiwa ahupuaa, Kau, Hawaii.
Kawela ahupuaa, Kau, Hawaii.

With appreciation,

A. Keohokalole,
Honolulu, Jan. 3, 1850

Resolved, that the Minister of the Interior be and is hereby authorized to transfer to the list of lands belonging to Keohokalole, Kaapuna, Kona, Hawaii, and Aapueo 2, Kula, Maui, and transfer to the Government and list one of the Alae's in Kula, Maui, in lieu of Aapueo 2, sold by Kapaakea through mistake.

By order of Privy Council
December 22, 1850
Resolved, that the Government shall accept the division of lands of the chiefs as made by them, and those laid off for the Government shall be the government third of their lands.
By order of the King and Council
August 27th, 1850

I hereby certify the foregoing to be true copies of the original documents now on file in this Department.
(sign) A.G. Thruston, Chief Clerk, Interior Department
November 9th, 1853

[Award 8452 (Maui); R.P. 4388; 1 ap. Aapueo Kula Ahupuaa; Alae 3 Kula 1 ap. (ahupuaa), Kamehame Kula, R.P. 4388 & 7453 Kealahou 3-4 Kula (Apana 6); R.P. 7453; Kamehamenui Kula (Apana 21) together 5067 Acres; Koheo 2 Kula Ahupuaa Ap. 19; R.P. 4388; Kukuiaeo Kula; Muolea Hana; 1 ap.; ahupuaa; Paeohi Lahaina; Kukuiokaea Kula Ahupuaa Ap. 7; (Hawaii): Kealakekua S. Kona R.P. 7533 & 3607; Honohina Hilo R.P. 4386 & 7693; Kaawaloa S Kona R.P. 7532 & 4386, & 4385; Onouli S Kona R.P. 4386 & 7146; Keahuolo N. Kona R.P. 6886; Paauhau Hamakua R.P. 87123; Pau N. Kohala R.P. 8083; Puua Puna R.P. 7788; Kawela Kau R.P. 6886; Keaiwa Kau; (Oahu) R.P. 4386 & 7876; Malaekahana Koolauloa R.P. 5616; Kapiwai Pauoa R.P. 4389; Hamohamo Waikiki R.P. 5588 & 8330; Kahana Koolauloa R.P. 4387; See Award MA 3 for Hamoa Hana award]

DLNR Kealaloa Tank Site
Exploratory Water Well

ENVIRONMENTAL ASSESSMENT

Appendix 4
Phase I Environmental Site Assessment

Note: Phase I ESA appendices not included; available by request to rterry@hawaii.rr.com

[This page intentionally left blank]

PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT FOR DLNR UPCOUNTRY MAUI EXPLORATORY WELL KEALALOA TANK SITE MAKAWAO, ISLAND OF MAUI

TMK (2) 2-3-007:037 (POR.)

MNA PROJECT 01378_2

MARCH 9, 2017

Myounghee Noh & Associates

Environmental Studies and Consulting Services

200 Kohola Street, Hilo, Hawaii, USA 96720 • 808.935.8727
99-1046 Iwaena Street, Suite 210A, Aiea, Hawaii, USA 96701 • 808.484.9214

This Phase I ESA report is prepared for:

Geometrician, LLC
P.O. Box 396
Hilo, Hawaii 96720

PHASE I
ENVIRONMENTAL SITE ASSESSMENT REPORT
FOR
DLNR UPCOUNTRY MAUI EXPLORATORY WELL
KEALALOA TANK SITE
MAKAWAO, ISLAND OF MAUI

TMK (2) 2-3-007:037 (por.), approximately 2 acres

State Project No. DLNR1102
MNA Job No. 1378_2

March 9, 2017

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental professional* as defined in §312.10 of 40 CFR 312.

I have the specific qualifications based on education, training, and experience to assess a *property* of the nature, history, and setting of the subject *property*. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR 312.

Jessica Walsh
Environmental Professional

Myounghee Noh & Associates, L.L.C.
Environmental Studies and Consulting Services
200 Kohola Street, Hilo, HI 96720
Tel (808) 935-8727
www.noh-associates.com

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

Appendix A Environmental Data Resources Report and Maps
Appendix B Site Reconnaissance Photographs

CONTRIBUTORS

Project Manager	Jessica Walsh
Site Assessor	Bryan Chinaka
Report Writer	Jessica Walsh
Drafter/Illustrator	Herbertson Santos
Technical Editor	Bryan Chinaka

LIST OF ABBREVIATIONS

AST	Aboveground Storage Tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generators
CORRACTS	RCRA Facilities that are undergoing "corrective action"
DDT	Dichlorodiphenyltrichloroethane
DLNR	Department of Land and Natural Resources
DWS	Department of Water Supply
EC	Engineering Control
EDR	Environmental Data Resources, Inc.
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
HDOH	Hawaii Department of Health
HEER	Hazard Evaluation and Emergency Response
IC	Institutional Control
LQG	Large Quantity Generator
MECO	Maui Electric Company
MFD	County of Maui Fire Department
MNA	Myounghee Noh & Associates, L.L.C.
NFRAP	No Further Remedial Action Planned
NLR	No Longer Regulated Generators
NPL	National Priorities List
PCB	Polychlorinated Biphenyls
PCP	Pentachlorophenol
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
SHWB	Solid and Hazardous Waste Branch
SQG	Small Quantity Generator
TMK	Tax Map Key
TSD	Treatment, Storage, and Disposal
USGS	United States Geological Survey
UIC	Underground Injection Control
UST	Underground Storage Tank
VRP	Voluntary Response Program

EXECUTIVE SUMMARY

Myounghee Noh & Associates, L.L.C. (MNA), was retained by Geometrician Associates, LLC in November 2016 to conduct a Phase I Environmental Site Assessment (ESA) for the subject property located in Makawao, Island of Maui, and identified by Tax Map Key (TMK) Island 2, Zone 2, Section 3, Plat 007, and Parcel 037 (por.). The subject property was owned by the Haleakala Ranch Company. This Phase I ESA was completed for the State of Hawaii Department of Land and Natural Resources (DLNR) for the potential development of the subject property for a well site.

The purpose of this Phase I ESA is to identify *recognized environmental conditions* (REC) at the subject property, with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and petroleum products. A Phase I ESA consists of four parts. Three of those parts are intended to collect information that will aid in the identification of REC at the subject property. The information generating parts of the Phase I ESA consists of a review of state, federal, and local environmental records; a site reconnaissance visit; and interviews with key site personnel and other individuals with knowledge regarding the subject property. The fourth part of a Phase I ESA is a report that documents the collection of information about the subject property and evaluation of that information towards making a determination of the presence of REC at the subject property.

The subject property was located in Makawao, in upcountry Maui, just less than one mile east of the intersection between the Kula Highway (SR 37) and the Haleakala Highway (SF 377). The subject property was an unimproved vacant lot with no structures or roads present, and directly adjacent to and south of an existing County of Maui Department of Water Supply (DWS) aboveground water tank, Kealaloa Tank.

FINDINGS

No records of NPL sites, Federal RCRA CORRACTS and Non-CORRACTS Treatment Storage Disposal Facilities, Delisted National Priority List sites, Federal CERCLIS sites, Federal CERCLIS NFRAP sites, landfill or solid waste disposal sites, State Leaking Underground Storage Tank List sites, State Voluntary Cleanup sites, Federal RCRA Generator sites, State registered UST sties, Institutional Controls/Engineering Controls registries, Federal ERNS list sites, Federal or State Brownfields sites were identified at the subject property or in the area surrounding the subject property.

MNA conducted an interview with Scott Meidell, Vice President of Real Estate & Land Management at Haleakala Ranch Company, owner and manager of the subject property, and Tom Ochwat with the County of Maui DWS. The interviews did not indicate any RECs. The User Questionnaire was completed by Gayson Ching, an engineer with the State of Hawaii DLNR, and did not indicate any RECs. Based on a review of historic aerial photographs and topographic maps, no RECs were identified.

MNA requested records for review regarding the subject property, adjoining properties, and surrounding area from the State of Hawaii Department of Health (HDOH) Solid and Hazardous Waste Branch (SHWB) and the County of Maui Fire Department (MFD). SHWB and MFD responded that they had no records regarding the subject. MNA reviewed HDOH Hazard

Evaluation and Emergency Response (HEER) Office publicly available files and sources online. No sites or incidents were listed for the subject or adjoining properties.

Limitations/Data Gaps/Deviations

During the site reconnaissance, it was noted that the subject property was divided by a pasture fence constructed of chicken wire and stakes. MNA did not cross the fence, but visually inspected the northeast third of the property from the opposite side of the fence. This is considered a minor data gap, as there was no indication leading to suspicion of hazardous material or petroleum products throughout the rest of the subject property or adjoining properties, or through visual inspection. The fenced area was relatively small, and the environmental professional was satisfied with the visual inspection.

There were no deviations from the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM International, 2013).

Non-REC

Subject Property

During the site reconnaissance, MNA observed no indication of REC.

Surrounding Area

During the site reconnaissance, MNA observed one aboveground storage tank (AST) located on the adjoining property to the north, TMK (2) 2-3-007:033. The AST was a water storage tank owned by the County of Maui DWS, and was in good condition. As ASTM focus is on hazardous materials and petroleum products, this water tank is not a concern, and is not considered a REC. MNA also observed one pole-mounted transformer on the adjoining property to the west. The Maui Electric Company (MECO) confirmed that this transformer does not contain polychlorinated biphenyls.

EDR identified one state hazardous waste site located at a non-geocoded location within the same zip code as the subject property. The site, the Maui Pineapple Company, Ltd. Corn Mill Camp, was identified as having dichlorodiphenyltrichloroethane (DDT), arsenic, pentachlorophenol (PCP), dieldrin, toxaphene, and dioxin in the soils within a 24,000 square foot pesticide mixing area. According to historical topographic maps, the Corn Mill Camp, was located approximately 1.25 miles northwest and downgradient from the subject property. Due to the distance and proximity of this site from the subject property, it is not considered a REC.

RECOGNIZED ENVIRONMENTAL CONDITIONS

MNA performed a *Phase I Environmental Site Assessment* in conformance with the scope and limitations of ASTM E 1527-13 of the subject property identified as a two-acre portion of TMK (2) 2-3-007:037 in Makawao, Island of Maui. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report. This assessment has not revealed evidence of *recognized environmental conditions*.

1.0 INTRODUCTION

This report presents the results of a Phase I Environmental Site Assessment (ESA) conducted during December 2016 and January 2017 for the subject property identified by the Tax Map Key (TMK) of Island 2, Zone 2, Section 3, Plat 007, and Parcel 037 [TMK (2) 2-3-007:037] in Makawao, Island of Maui. The location of the subject property is identified in Figure 1.

This Phase I ESA was conducted by Myounghee Noh & Associates, L.L.C., herein referred to as MNA, for the Geometrician Associates, LLC, and the State of Hawaii Department of Land and Natural Resources (DLNR). At the time of this Phase I ESA, the subject property was owned and operated by Haleakala Ranch Company.

1.1 PURPOSE

The purpose of this Phase I ESA is to identify any *recognized environmental conditions* (RECs) at the subject property, with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and petroleum products. This practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner defense to CERCLA liability, "all appropriate inquiry into the previous ownership and uses of the site consistent with good commercial or customary practice." The term *recognized environmental condition* denotes the presence, or likely presence, of any hazardous substances or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the property or into the ground, groundwater, or surface water of the property (ASTM International, 2013).

This report is part of the Phase I ESA conducted for the subject property. The assessment was conducted in accordance with the practices described in Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM International, 2013).

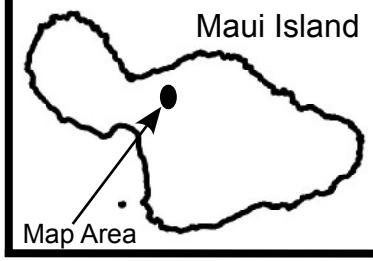
1.2 DETAILED SCOPE OF SERVICES

A Phase I ESA has four components: records review, site reconnaissance, interview, and report. MNA conducted this ESA using information sources with the potential to identify past or current releases of hazardous substances or petroleum products into the subject property. Adjoining properties were also evaluated for their potential to impact the subject property. Per the ASTM International Phase I ESA Standard, adjoining properties include parcels touching the subject property as well as those properties across a roadway (ASTM International, 2013).

1.2.1 Site History

Where available and as needed, MNA researched historical and current topographic maps, tax records, fire insurance maps, and aerial photographs to identify previous and current uses of the property, adjoining properties, and the surrounding area.

Figure 1. Site Location Map



Phase I Environmental Site Assessment
DLNR Upcountry Maui Exploratory Well
Kealaloa Tank Site TMK (2) 2-3-007:037 (por.)
Makawao, Island of Maui

Myounghee Noh & Associates, L.L.C.

1.2.2 Regulatory Records

MNA examined government records with respect to environmental conditions, citations, complaints, and permits at the subject property, at adjoining properties, and within the surrounding area. MNA utilized a records search provided by Environmental Data Resources, Inc. (EDR), to review records from the following federal and state programs:

- National Priorities List (NPL)
- Delisted NPL
- Resource Conservation and Recovery Act (RCRA) facilities that are undergoing "corrective action" (CORRACTS)
- RCRA-Treatment, Storage, & Disposal (TSD)
- Comprehensive Environmental Response, Compensation & Liability Information System (CERCLIS) List
- CERCLIS No Further Remedial Action Planned (NFRAP) List
- Federal and Hawaii State Brownfields
- Hawaii Solid Waste & Landfill
- Leaking Underground Storage Tank (Leaking UST)
- RCRA-Violators/Enforcement
- Underground Storage Tank (UST)
- Emergency Response Notification System (ERNS)
- RCRA – Generators, including those No Longer Regulated (NLR)
- Hawaii Sites of Interest
- Hawaii Releases
- Federal and Hawaii State Land Use Controls
- Hawaii Voluntary Cleanup Sites
- Tribal Lands

Additionally, MNA requested state environmental case files from the Hawaii Department of Health (HDOH), the County of Maui Fire Department (MFD), and Maui Electric Company (MECO).

1.2.3 Site Reconnaissance

MNA performed a site reconnaissance to obtain information indicating the likelihood of contamination, to interview available site personnel, and to conduct a brief assessment of the adjoining properties. During the site reconnaissance, MNA looked for a variety of indicators of environmental hazards including, but not limited to, stained surface soil, dead or stressed vegetation, hazardous substances, aboveground and underground storage tanks, disposal areas, groundwater wells, drywells, and sumps. Sampling and testing of soil, surface water, or groundwater were not part of this assessment.

1.2.4 Site Geology and Hydrogeology

MNA reviewed published information for the property and surrounding area on surface and subsurface conditions such as topography, drainage, surface water bodies, subsurface geology, and groundwater. MNA used this information to assess the potential for migration and impact of the subject property by releases of hazardous substances or petroleum products at off-site properties.

1.2.5 Data Evaluation and Reporting

MNA evaluated the information collected, and prepared this report as part of the assessment. Section 2 presents the site background information; Section 3 user questionnaire, Section 4 information collected from records review; Section 5 site reconnaissance; Section 6 interviews; Section 7 data gaps; Section 8 key findings and opinion; and Section 9 conclusion.

1.3 SIGNIFICANT ASSUMPTIONS

The conclusion presented in this report is based upon the assumption that reasonably ascertainable and relevant information pertaining to the environmental condition of the subject property was made available to MNA during the assessment. Information obtained from government agencies and other resources is presumed to be accurate and updated. Additionally, information collected in interviews is collected in "good faith" and believed to be true and accurate to the best knowledge of the interviewee.

1.4 LIMITATIONS AND EXCEPTIONS

The Phase I ESA provides a "snapshot" of the property conditions at the time of the assessment. Findings, opinions, and conclusions apply to property conditions existing at the time of the investigation and those reasonably foreseeable. They do not apply to conditions at, or changes to, the property, of which MNA is not aware, could not reasonably be aware, and has not had the opportunity to evaluate.

This report is based upon visual observations of the subject property and its vicinity, interpretation of the available historical and regulatory information and documents reviewed, and interviews of individuals with knowledge of the subject or surrounding property. MNA cannot ensure the accuracy of the historical or regulatory information. This report is intended exclusively for the purpose outlined and applies only to the subject property.

This Phase I ESA excludes asbestos, lead paint, and investigation of geotechnical concerns. No surface or subsurface sampling was involved.

1.5 SPECIAL TERMS AND CONDITIONS

This Phase I ESA was conducted and prepared by MNA for the exclusive use of Geometrician and the DLNR. This report shall not be relied upon or transferred to any other party without written authorization from either Geometrician or DLNR.

1.6 USER RELIANCE

This report is an instrument of service of MNA, which summarizes its findings and opinions with respect to *recognized environmental conditions* at the subject property. Findings and opinions are predicated on information that MNA obtained on the dates and from individuals stated herein, from public records reviewed, a site reconnaissance, and ancillary Phase I ESA activities. This assessment relies upon the accuracy and completeness of the information provided. The information obtained for this assessment is used without extraordinary verification. It is possible that other information exists and is discovered, or environmental conditions change subsequent to the submittal of this Phase I ESA report, to which MNA shall not be held responsible for exclusion.

2.0 SITE DESCRIPTION

This section contains location and legal description; site and vicinity general characteristics; current subject property use; structures, roads, and other improvements; past subject property use; and current and past use of adjoining properties.

2.1 LOCATION AND LEGAL DESCRIPTION

The subject property is located at an approximately 2-acre portion of TMK (2) 2-3-007:037 in Makawao, Island of Maui. According to the County of Maui tax records, there is no physical address assigned, and the parcel is zoned as agricultural (County of Maui, 2016). The site is accessed via Kealaloa Avenue, approximately 300 feet north of the intersection with Haleakala Highway. A TMK map is presented in Figure 2.

2.2 SITE AND VICINITY GENERAL CHARACTERISTICS

The subject property is located in Makawao, in upcountry Maui, approximately 2¾ miles north of Kula. The subject property was an unimproved vacant vegetated lot with no structures or roads present. It was adjacent to a County of Maui Department of Water Supply (DWS) aboveground water tank, Kealaloa Tank.

The land use in the area surrounding the subject property is primarily agricultural.

2.3 GEOLOGY

The Island of Maui is the second youngest and second largest island in the Hawaiian Archipelago. Maui Island is the largest of Maui County, which also includes the islands of Molokai, Lanai, and Kahoolawe. Maui is known as the "Valley Isle" because it was formed into a single island from two separate shield volcanoes, which overlapped and created a depression between the two. Where the lava intersected, an isthmus was formed. The low flat area known as Central Maui connects the older northwestern "West Maui Volcano," elevation of 5,778 feet, with the much larger southeastern "East Maui Volcano" (Haleakala). Haleakala's tallest peak is 10,023 feet above sea level. This is almost double the summit of the West Maui Mountains, which were formed from the now extinct volcano, Puu Kukui. The Haleakala volcano is dormant (George A.L. Yuen and Associates, Inc., 1990).

In 1990, Mink and Lau described the geology in the vicinity of the subject property as follows:

> Kula constitutes the entire surface; northwest rift zone from Haleakala as series of cones; no evidence of dikes or significant alluvium (Mink & Lau, Technical Report No. 185: Aquifer Identification and Classification for Maui: Groundwater Protection Strategy for Hawaii, 1990).

The United States Department of Agriculture Natural Resources Conservation Service classifies the soil at the subject property as Haliimaile silty clay loam, 7-15 percent slopes. Typically, this soil is well-drained and composed of silty clay loam from 0 to 15 inches, silty clay from 15 to 41 inches, and clay from 41 to 65 inches (United States Department of Agriculture, 2017).

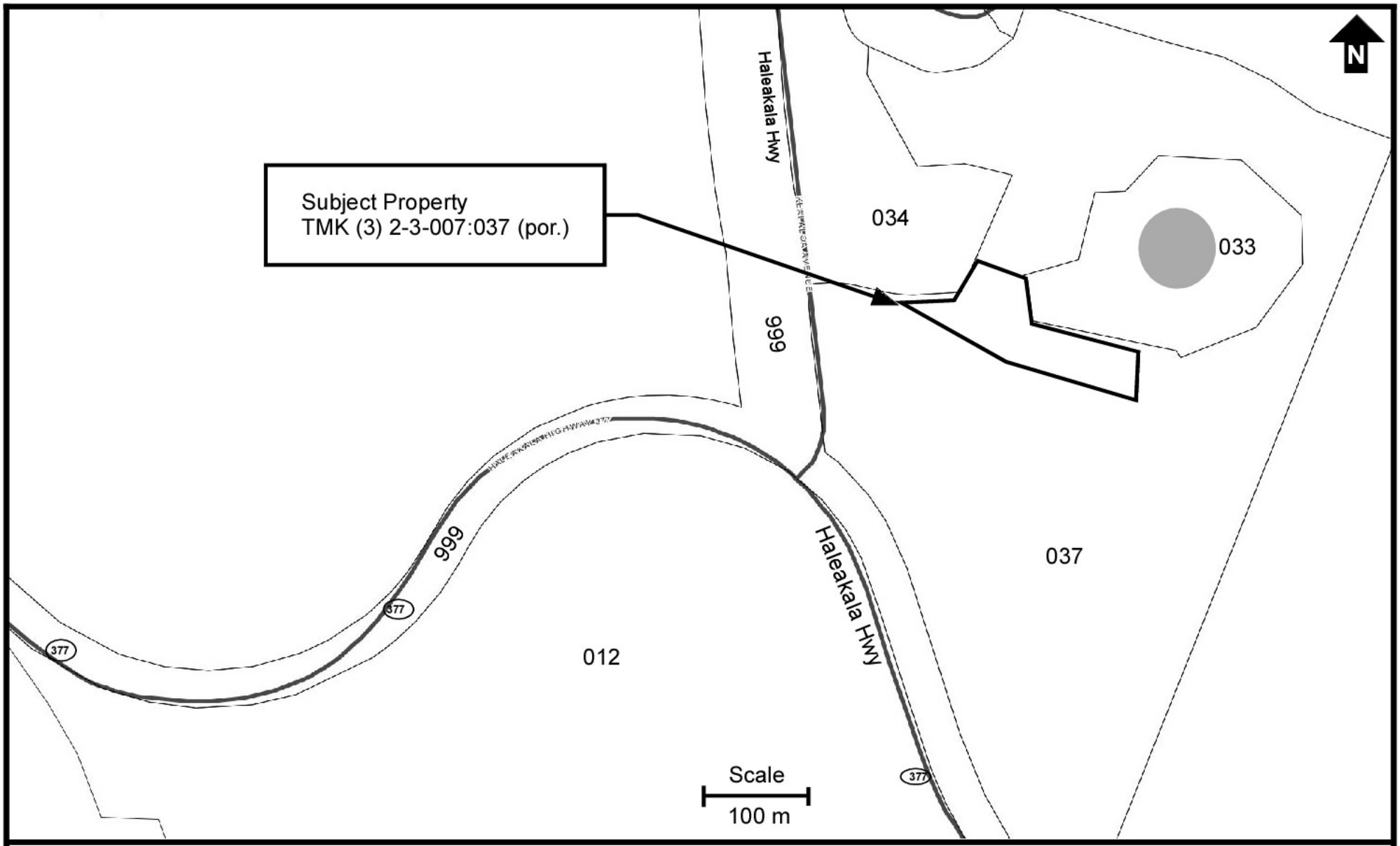
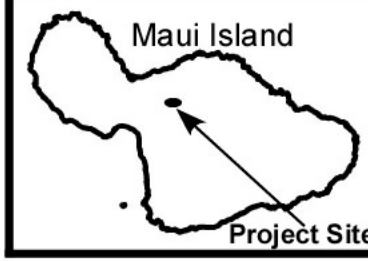


Figure 2. TMK Map



Phase I Environmental Site Assessment
DLNR Upcountry Maui Exploratory Well
Kealaloa Tank Site TMK (2) 2-3-007:037 (por.)
Makawao, Island of Maui

Myounghee Noh & Associates, L.L.C.

2.4 HYDROLOGY AND HYDROGEOLOGY

The HDOH Safe Drinking Water Branch has established an Underground Injection Control (UIC) line to serve as a boundary between drinking water and non-drinking water portions of Hawaii's aquifers. In general, areas above (mountainside) the UIC line are within drinking water portions of the aquifer, while areas below (ocean side) the UIC line are in the non-drinking water portions of the underlying aquifer. The subject property is located above the UIC line, therefore is within a drinking water portion of the aquifer (Hawaii Department of Health Safe Drinking Water Branch, 1999).

The hydraulic gradient of the basal groundwater within basaltic formations, in general, are from mountain areas to the shoreline. According to the Mink and Lau Technical Report #185, the subject property is located above the Makawao Aquifer. Mink and Lau described the hydrogeology and aquifer as follows:

> The Makawao Aquifer System is a volcanic aquifer, consisting of unconfined basal, high-level dike, and high-level perched. Very little is known about the occurrence and distribution of groundwater in this system. The entire region is covered by Kula lava, and nowhere does the aquifer system border along a coastline. Basal groundwater in Honomanu basalt underlies about three fourths of the total area. Where high-level water occurs, it lies far below the surface in the Wailuku basalt. Minimum elevation in the system is approximately 1,000 feet (304.8 meters). Drilling of deep wells would be very costly and operating costs expensive. Virtually no subsurface exploration has been done in the region (Mink & Lau, 1990).

Generally, groundwater flow patterns reflect topographic features. Since the topographic contours display a decreasing elevation from southeast to northwest, the groundwater flow is assumed to flow in the same direction. Aquifer classification information for the Makawao lower and upper aquifers is provided in Table 1 (Mink & Lau, 1990).

Information for the Makawao Lower and Upper Aquifers is provided in Table 1 (Mink & Lau, 1990).

Table 1. Upper Makawao Aquifer Classification System

Aquifer Code	**60303214**
Island Code	6–Maui
Aquifer Sector	03–Central
Aquifer System	03–Makawao
Aquifer Type, hydrogeology	2–High Level
Aquifer Condition	1–Unconfined
Aquifer Type, geology	4–Perched
Status Code	**11121**
Development Stage	1–Currently Used
Utility	1–Drinking
Salinity (in mg/L Cl^-)	1–Fresh (<250)
Uniqueness	2–Replaceable
Vulnerability to Contamination	1–High

mg/L Cl^--milligrams per liter of chloride

Table 2. Lower Makawao Aquifer Classification System

Aquifer Code	**60301111**
Island Code	6–Maui
Aquifer Sector	03–Central
Aquifer System	01–Makawao
Aquifer Type, hydrogeology	1–Basal
Aquifer Condition	1–Unconfined
Aquifer Type, geology	1–Flank
Status Code	**21112**
Development Stage	2–Potential Use
Utility	1–Drinking
Salinity (in mg/L Cl^-)	1–Fresh (<250)
Uniqueness	1–Irreplaceable
Vulnerability to Contamination	2–Moderate

mg/L Cl^--milligrams per liter of chloride

The Federal Emergency Management Agency (FEMA) flood map for the area (1500030625E, 04 November 2015) indicates that the subject property is within the Kailua Gulch watershed. The subject property is within Zone Z, indicating the area is outside of the 0.2% annual chance floodplain (Federal Emergency Management Agency, 1988).

2.5 CURRENT USE OF THE SUBJECT PROPERTY

The subject property was owned and operated by Haleakala Ranch Company. There are no structures on the subject property. It is vacant pasture land.

2.6 STRUCTURES, ROADS, AND OTHER IMPROVEMENTS

No structures were present on the subject property. No electrical, telephone, sewer, or water service was connected at the subject property. A ranch fence runs along the south boundary of the subject property. The subject property is accessed from an east/west running unnamed, gated, paved road, which connects to Kealaloa Avenue. A site map is presented in Figure 3.

2.7 PAST USES OF THE SUBJECT PROPERTY

Information regarding past uses of the subject property was obtained from a review of tax records (County of Maui, 2016), historic topographic maps and aerial photographs, and interviews. According to the County of Maui Real Property Tax Office, the Haleakala Ranch Company owns the subject property, and has since before 1963. Table 3 summarizes available information regarding the historical use and users of the subject property.

Table 3. Users and Primary Uses of Subject Property

Period (approx.)	Owner/Lessee/Sub-Lessee	Area (acres)	Primary Use
TMK (2) 2-3-007:037 (Portion); 675 Kealaloa Avenue, Makawao			
2007-Present	Haleakala Ranch Co.	1.5	Agriculture/ Pasture
2007	**11.054 acres from TMK (2) 2-3-007:034**		
2007	**Area revised to 13.722 acres**		
2000-2007	Haleakala Ranch Co.	12.721	Agriculture/ Pasture
2000	**12.721 acres from TMK (2) 2-3-007:011**		
1998-2000	Haleakala Ranch Co.	122.88	Agriculture/ Pasture
1998	**13.82 acres to MECO and GTE Hawaiian Telephone Company**		
1988-1998	Haleakala Ranch Co.	136.7	Agriculture/ Pasture
1988	**0.1 acre to TMK (2) 2-3-006:007**		
1973-1988	Haleakala Ranch Co.	136.6	Agriculture/ Pasture
1973	**0.4 acre to TMK (2) 2-3-006:007**		
Prior to 1963-1973	Haleakala Ranch Co.	137	Agriculture/ Pasture

TMK - Tax Map Key

2.8 CURRENT AND PAST USES OF ADJOINING PROPERTIES

Information regarding past uses of the adjoining properties was obtained from review of tax records (County of Maui, 2016), historic topographic maps and aerial photographs (Environmental Data Resources, Inc., 2016) and interviews. The property use information is summarized in Table 4.

Table 4. Users and Primary Uses of Adjoining Properties

Period (approx.)	Owner/Lessee/Sub-Lessee	Area (acres)	Primary Use
TMK (2) 2-3-007:037 (Portion); 675 Kealaloa Avenue, Makawao Adjoining Property to the South, East, and West			
2007-Present	Haleakala Ranch Co.	9.5	Agriculture/ Pasture
2007	**11.054 acres from TMK (2) 2-3-007:034**		
2007	**Area revised to 13.722 acres**		
2000-2007	Haleakala Ranch Co.	12.721	Agriculture/ Pasture
2000	**12.721 acres from TMK (2) 2-3-007:011**		
1998-2000	Haleakala Ranch Co.	122.88	Agriculture/ Pasture
1998	**13.82 acres to MECO and GTE Hawaiian Telephone Company**		
1988-1998	Haleakala Ranch Co.	136.7	Agriculture/ Pasture
1988	**0.1 acres to TMK (2) 2-3-006:007**		
1973-1988	Haleakala Ranch Co.	136.6	Agriculture/ Pasture
1973	**0.4 acres to TMK (2) 2-3-006:007**		
Prior to 1963-1973	Haleakala Ranch Co.	137.0	Agriculture/ Pasture
TMK (2) 2-3-007:033; 0 Kealaloa Avenue, Makawao Adjoining Property to the North			
2001-Present	DWS County of Maui	1.099	Water Tank
2000-2001	Haleakala Ranch Co.	1.099	Agriculture/ Pasture
2000	**1.099 acres from TMK (2) 2-3-007:011**		
1998-2000	Haleakala Ranch Co.	122.88	Agriculture/ Pasture

Period (approx.)	Owner/Lessee/Sub-Lessee	Area (acres)	Primary Use
1998	**13.82 acres to MECO and GTE Hawaiian Telephone Company**		
1988-1998	Haleakala Ranch Co.	136.7	Agriculture/ Pasture
1988	**0.1 acres to TMK (2) 2-3-006:007**		
1973-1988	Haleakala Ranch Co.	136.6	Agriculture/ Pasture
1973	**0.4 acres to TMK (2) 2-3-006:007**		
Prior to 1963-1973	Haleakala Ranch Co.	137.0	Agriculture/ Pasture

TMK - Tax Map Key

3.0 USER PROVIDED INFORMATION

MNA personnel obtained user provided information by interviewing State of Hawaii DLNR engineer Gayson Ching on 17 January 2017. The following information was obtained from the interview.

3.1 ENVIRONMENTAL LIENS OR ACTIVITY AND USE LIMITATIONS

Mr. Ching was unaware of any environmental cleanup liens or activity and land use limitations for the subject property.

3.2 SPECIALIZED KNOWLEDGE

Mr. Ching indicated that he had no specialized knowledge or experience related to the property or nearby properties, nor did he have reasonably ascertainable information of any spills, chemical releases or environmental cleanups at the site.

When asked of the presence of specific chemicals, spills, or chemical releases at the subject property, Mr. Ching indicated that there were none that he was aware of.

3.3 VALUATION REDUCTION

The user had no information pertaining to the valuation reduction of the site.

3.4 OWNER, PROPERTY MANAGER, AND OCCUPANT INFORMATION

The parcel :037 including the subject property was owned and operated by Haleakala Ranch Company.

3.5 REASON FOR PERFORMING THE PHASE I ESA

The purpose of this Phase I ESA is to identify any REC at the subject property, within the scope of ASTM Standard 1527-13, to satisfy the Environmental Assessment/Environmental Impact Statement requirements for the DLNR exploratory well project at this property.

4.0 RECORDS REVIEW

Under ASTM 1527-13, records are to be reviewed by the environmental professional who may help identify RECs in connection with the subject property.

4.1 STANDARD ENVIRONMENTAL RECORD SOURCES

MNA used Environmental Data Resources, Inc. (EDR), to search standard federal and state government databases for hazardous substance or petroleum product releases that could impact the subject property. A copy of the EDR report is provided in Appendix A.

ASTM E 1527-13 specifies a minimum search distance for specific environmental record sources. The following sources are specified for incidents or sites within one mile of the subject property:

- Federal NPL site list
- Federal RCRA CORRACTS TSD facilities list
- State Sites of Interest

The following sources are specified for incidents or sites within ½ mile of the subject property:

- Federal Delisted NPL site list
- Federal CERCLIS list
- Federal CERCLIS NFRAP site list
- Federal RCRA non-CORRACTS TSD facilities list
- State Brownfield Sites
- State Hazardous Waste Sites
- State landfill and/or solid waste disposal site list
- State leaking UST list
- State voluntary cleanup program sites

The following sources are for incidents on the subject and adjoining properties:

- Federal RCRA generators list
- State registered UST list

Finally, the following are for incidents for the subject property:

- Federal ERNS list
- Federal Institutional Controls (IC) and Engineering (EC) Registries
- State IC and EC Registries
- State releases list

The following subsections summarize the results of the EDR records review for the datasets listed above (Environmental Data Resources, Inc., 2016).

4.1.1 Federal National Priorities List

The NPL, maintained by the United States Environmental Protection Agency (EPA), is a list of highly contaminated sites that have been identified by Superfund Amendments and

Reauthorization Act of 1986. There were no NPL sites identified within one mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.2 Federal RCRA CORRACTS TSD Facilities List

The RCRA CORRACTS TSD facilities list maintained by the EPA contains generators, transporters, treaters, storers, and disposers of hazardous waste that have reported violations and are subject to corrective actions. No RCRA CORRACTS TSD facilities were identified within one mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.3 Delisted NPL Site List

This site list, maintained by the EPA, contains delisted NPL sites. No delisted NPL sites were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.4 Federal CERCLIS List

The CERCLIS list, maintained by the EPA, contains sites that are either proposed to be or are on the NPL list, as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. No federal CERCLIS sites were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.5 Federal CERCLIS NFRAP Site List

The CERCLIS NFRAP list, maintained by the EPA, contains designated CERCLA sites that, to the best of the EPA's knowledge, assessment has been completed and has determined that no further steps will be taken to list the sites on the NPL. No CERCLIS NFRAP sites were identified within ½ mile of the subject property the subject property (Environmental Data Resources, Inc., 2016).

4.1.6 Federal RCRA non-CORRACTS TSD Facilities List

The RCRA non-CORRACTS TSD facilities list, maintained by the EPA, contains RCRA permitted facilities that treat, store, or dispose of hazardous waste. No RCRA TSD facilities listed were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.7 State Brownfield Sites

The State Brownfield Sites database, maintained by the HDOH Hazard Evaluation and Emergency Response (HEER) Office, is an inventory of state designated brownfield sites. Under the Small Business Liability Relief and Brownfields Revitalization Act, a brownfield is defined as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." The EPA provides grants and loans to state and local governments for the assessment, cleanup, and redevelopment of these properties. Properties located on the state brownfield list may have received federal funding under this program or be designated a brownfield for state administration or funding purposes. No state brownfield sites were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.8 State Hazardous Waste Sites

The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds are identified along with sites where cleanup will be paid for by responsible parties. No state hazardous waste sites were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016). One state hazardous waste site was identified at a non-geocoded location within the same zip code as the subject property. The site, the Maui Pineapple Company, Ltd. Corn Mill Camp, was identified as having dichlorodiphenyltrichloroethane (DDT), arsenic, pentachlorophenol (PCP), dieldrin, toxaphene, and dioxin in the soils within a 24,000 square foot pesticide mixing area. Please refer to Section 8.2 for determination of impact of this site on the subject property.

4.1.9 State Landfill/Solid Waste Disposal Sites

The HDOH records contain an inventory of permitted landfills in the State of Hawaii. No permitted solid waste landfills, incinerators, or transfer stations were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.10 State Leaking UST List

The state Leaking UST list, maintained by the HDOH Solid and Hazardous Waste Branch (SHWB), maintains an inventory of sites with Leaking USTs. EDR identified no Leaking UST facilities within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.11 State Voluntary Cleanup Sites

The state voluntary cleanup sites list, maintained by the HDOH HEER Office, contains sites participating in the state's Voluntary Response Program (VRP). No facilities participating in the state VRP were identified within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.12 Federal RCRA Generators List

The RCRA Generators list, maintained by the EPA, contains small and large quantity generators of RCRA hazardous waste. The determination of generator size is used to establish the risk that the facility poses to public health and the environment and consequently, the amount of regulation and reporting required. Large Quantity Generators (LQG) are facilities that generate more than a 1,000 kg/month of hazardous waste and/or more than 1 kg/month of acute hazardous waste. Small Quantity Generators (SQG) are facilities that generate less than 1,000 kg/month but more than 100 kg/month of hazardous waste and/or less than 1 kg/month of acute hazardous waste. Conditionally Exempt Small Quantity Generators (CESQG) are facilities that generate less than 100 kg/month of hazardous waste and/or less than 1 kg/month of acute hazardous waste. The EPA also maintains the RCRA NLR list. This list contains facilities that were once on the RCRA generators list, but are no longer in business, no longer in business at the listed address, or are no longer generating hazardous waste substances in quantities that require reporting. No SQG, LQG, or CESQG were identified on the subject or adjoining properties (Environmental Data Resources, Inc., 2016).

4.1.13 State Registered UST List

The HDOH SHWB maintains a database of known UST. EDR identified no UST facilities within ½ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.14 Federal ICs and ECs Registries

Federal ICs and ECs sites are federally listed sites that are required to implement institutional controls or engineering controls. Because the sites may continue to be impacted by past use, future use of the property may be restricted in order to protect human health and the environment. Land use controls can be either ICs or ECs. Institutional controls are limitations on how the property may be used such as limiting use to industrial activities. Engineering controls are physical structures or devices located on the property that contain or limit exposure to contamination. Engineering controls need to be maintained or protected to be effective. No Federal ICs or ECs were identified within one mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.15 State ICs and ECs Registries

These sites are state listed sites that have either state-required institutional controls or engineering controls in place. Because the sites may continue to be impacted by past use, future use of the property may be restricted in order to protect human health and the environment. Land Use Controls can be either ICs or ECs. ICs are limitations on how the property may be used such as limiting use to industrial activities. ECs are physical structures or devices located on the property that contain or limit exposure to contamination. ECs need to be maintained or protected to be effective. No State IC or EC were identified within one mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.16 Federal ERNS List

The ERNS list, maintained by the EPA, contains CERCLA hazardous substance releases or spills, as maintained at the National Response Center. No incidents were identified on the subject property (Environmental Data Resources, Inc., 2016).

4.1.17 State Releases List

The HDOH HEER Office maintains a database of known releases to the environment of hazardous material or petroleum products. No release incidents were identified within ⅛ mile of the subject property (Environmental Data Resources, Inc., 2016).

4.1.18 U.S. Brownfields

U.S. Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence of a hazardous substance, pollutant, or contaminant. No U.S. Brownfields sites were identified within one mile of the subject property (Environmental Data Resources, Inc., 2016).

4.2 ADDITIONAL RECORD SOURCES

MNA reviewed additional environmental records as needed and available. Additional record sources filed by the HDOH SHWB, MFD, and MECO were requested. MNA reviewed HDOH HEER Office online records for the subject and adjoining properties.

4.2.1 Subject Property

MNA requested records for review from the HDOH SHWB on 02 December 2016, MFD on 16 December 2016, and MECO on 26 January 2017. HDOH SHWB, MFD, and MECO responded that they had no records on file for the subject property.

MNA reviewed publicly available information posted on the HDOH HEER Office website, http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/public-records, and found that the subject property was not listed on the HEER Sites of Interest Lookup Spreadsheet, the HEER Emergency Response Lookup Spreadsheet, or the iHEER-Hazard Evaluation and Emergency Response System (https://eha-cloud.doh.hawaii.gov/iheer/#/incident/list). MNA reviewed the HDOH Environmental Health Warehouse (http://eha-web.doh.hawaii.gov/ehw/), and found that there were no sites of interest shown on the subject property.

4.2.2 Surrounding Properties

MNA requested records for review from the HDOH SHWB on 02 December 2016, MFD on 16 December 2016, and MECO on 26 January 2017. HDOH SHWB and MFD responded that they had no records on file for the adjoining properties. MECO responded that the one pole-mounted transformer (Transformer No. 21905) located on the adjoining property to the west, within the same TMK as the subject property, was purchased in May 2006 (Serial No. 06A030423), and was not polychlorinated biphenyls (PCB)-containing. Please refer to Section 8.2 for discussion of potential impact to the subject property related to this transformer.

MNA reviewed publicly available information posted on the HDOH HEER Office website, http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/public-records, and found that the adjoining properties were not listed on the HEER Sites of Interest Lookup Spreadsheet, the HEER Emergency Response Lookup Spreadsheet, or the iHEER-Hazard Evaluation and Emergency Response System (https://eha-cloud.doh.hawaii.gov/iheer/#/incident/list). MNA reviewed the HDOH Environmental Health Warehouse (http://eha-web.doh.hawaii.gov/ehw/), and found that there were no sites of interest shown on the adjoining properties.

4.3 HISTORICAL USE INFORMATION ON THE SUBJECT PROPERTY

MNA reviewed historical use information for the subject property, including aerial photographs and United States Geological Survey (USGS) topographic maps. No fire insurance maps were available.

4.3.1 Historical Aerial Photographs

Aerial photographs of the subject, adjoining, and surrounding properties were provided by EDR (Environmental Data Resources, Inc., 2016). Photographs from the years 1950, 1976, 1978, 1992, and 2001 were reviewed. Table 5 provides the details for those photos.

Table 5. Aerial Photograph Details

Date	Image Type	Approximate Scale
2001	C	1":500'
1992	C	
1978	B/W	
1976	B/W	
1950	B/W	

B/W - Black and white photograph
C - Color

For the reviewed aerial photographs, the following observations were made:

1950: No building structures were visible on the subject and adjoining properties. The subject property is mostly forested. The surrounding area was mostly agricultural. Roadways at the present day SR377 and Haleakala Highway are present. A few building structures were observed approximately 500 feet northwest of the subject property.

1976: The subject property was entirely forested. No other changes from the 1950 photograph.

1978: The subject property was mostly cleared for apparent agricultural use. No other changes from the 1976 photograph.

1992: The subject property was mostly vegetated. No other changes from the 1978 photograph.

2001: The subject property was approximately 50% forested. An aboveground water tank is visible on the adjoining property to the north of the subject property. No other changes from the 1992 photograph.

4.3.2 Historical Topographic Maps

USGS topographic maps that cover the subject property and vicinity were reviewed. Maps were available for the years 1954/1957, 1983, 1991/1992, and 2013 (Environmental Data Resources, Inc., 2016). A copy of the historical topographic maps provided by EDR is included in Appendix A. The maps of the subject property and surrounding area depicted the following:

1954/1957: The subject property was depicted to lie within a vegetated area. No structures were depicted on the subject property or in the surrounding area. Residential development is indicated approximately ¼ mile to the northwest. The Haleakala Highway is depicted as a secondary highway to the southwest of the subject property.

1983: A polo field is indicted directly west of the subject property. A reservoir is depicted approximately ¼ mile south of the subject property. No other change at the subject property or surrounding area from the 1954/1957 map.

1991/1992: No change at the subject property or surrounding area from the 1983 map.

2013: The Haleakala Highway is depicted as a primary highway, intersection with Hanamu Road just west of the subject property. A Filipino Camp and Corn Mill Camp are depicted southwest of Makawao, approximately one mile northwest of the subject property.

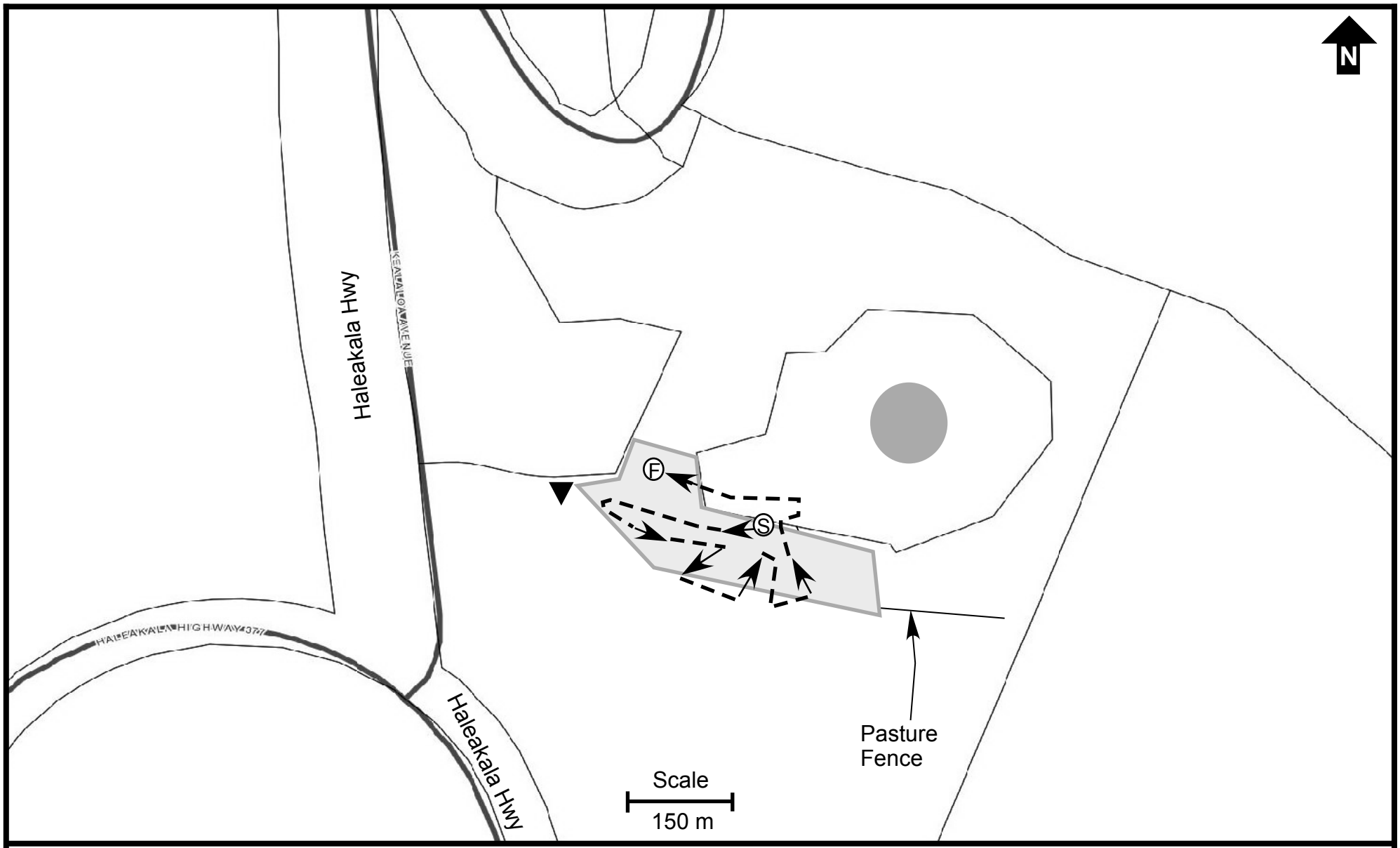


Figure 3. Site Map

Notes:

Tank

Transformer

Ⓢ - - ➤Ⓕ Path Walked (Start to Finish)

Subject Property

Phase I Environmental Site Assessment
DLNR Upcountry Maui Exploratory Well
Kealaloa Tank Site TMK (2) 2-3-007:037 (por.)
Makawao, Island of Maui

Myounghee Noh & Associates, L.L.C.

4.3.3 Sanborn Fire Insurance Map

No Sanborn Fire Insurance maps were available for the subject property.

5.0 SITE RECONNAISSANCE

The site reconnaissance was conducted by Bryan Chinaka of MNA on 23 January 2017. The site reconnaissance focused on identifying recognized environmental conditions with the ability to impact the subject property. A site map of the subject property is presented in Figure 3.

5.1 METHODOLOGY AND LIMITING CONDITIONS

The site reconnaissance was conducted by visually inspecting the subject property and adjoining properties on foot. MNA looked for a variety of environmental hazard indicators including, but not limited to, stained surface soil, dead or stressed vegetation, hazardous substances, aboveground and underground storage tanks, disposal areas, groundwater wells, drywells, and sumps. Figure 3 presents the path walked. Photographs from the site reconnaissance are presented in Appendix B.

5.2 GENERAL SITE SETTING

The subject property is located southeast and upgradient from the town of Makawao. The entrance to the subject property is located on the east side of Haleakala Highway just before the intersection of Haleakala Highway and Highway 377 (Photographs 1-2). The subject property can be accessed by the DWS access road (Photograph 3). The immediate surroundings of the subject property consist of a DWS water aboveground storage tank (AST) and pastureland properties. The subject property was adjoined on the north by a DWS water tank and was adjoined to the south, east, and west by pastureland.

5.3 EXTERIOR OBSERVATIONS

At the time of the site reconnaissance, there were no structures observed on the subject property. The subject property was observed to be pastureland (Photographs 4-5). Along the west side of the subject property, a fence that divides the pasture was observed (Photographs 6-7). One pole-mounted transformer was observed on the adjoining property to the west, within the parent TMK (Photography 8).

The adjoining property to the south, east, and west of the subject property was pastureland, similar to the subject property (Photographs 9-10). A DWS water tank to the north of the subject property was observed (Photograph 11).

5.4 INTERIOR OBSERVATIONS

No structures were observed on the subject property; therefore, no interior observations were warranted.

5.5 HAZARDOUS SUBSTANCES AND PETROLEUM PRODUCTS

Hazardous substances and petroleum products were not observed on the subject property during the site reconnaissance.

5.6 ABOVE GROUND AND UNDERGROUND STORAGE TANKS

MNA did not observe any indications of underground storage tanks (USTs) or ASTs (other than the DWS water tank) or associated accessories, such as vent pipes, fill ports, or dispensers, on the subject property or the adjoining properties.

6.0 INTERVIEWS

MNA interviewed Scott Meidell, the Vice President of Real Estate & Land Management, with the Haleakala Ranch Company, the owner/operator of the subject property. The interview was administered in person by Bryan Chinaka of MNA. MNA interviewed Tom Ochwat, Maui DWS. The interview was administered over the phone by Jessica Walsh of MNA.

6.1 SCOTT MEIDELL

On 23 January 2017 MNA interviewed Scott Meidell. Mr. Meidell is the Vice President of Real Estate & Land Management with the Haleakala Ranch Company, the owner of the subject property. He indicated that the past use of the subject and adjoining properties was pastureland. He indicated that he didn't know of any specific chemicals present or once present at the subject property.

Mr. Meidell indicated that he had no knowledge of any spills, chemical releases, environmental cleanups, environmental cleanup liens, engineering controls, land use restrictions, or institutional controls at the site. He stated that there was a transformer with electrical lines in close proximity and west of the subject property.

6.2 TOM OCHWAT

On 06 February 2017 MNA interviewed Tom Ochwat. Mr. Ochwat is the Capital Improvements Program Manager with the County of Maui DWS. He has held this position for the past five years. Maui DWS is the owner/operator of the adjoining property to the north, where they have a water tank. Mr. Ochwat indicated that the past use of the subject property and surrounding area is and has been mostly rural. He indicated that he didn't know of any specific chemicals present or once present at the adjoining property to the north.

Mr. Ochwat indicated that he had no knowledge of any spills, chemical releases, environmental cleanups, environmental cleanup liens, engineering controls, land use restrictions, or institutional controls in the area surrounding the subject property.

7.0 DATA GAPS AND DEVIATIONS

During the site reconnaissance, it was noted that the subject property was divided by a pasture fence of chicken wire and stakes. MNA did not cross the fence, but visually inspected the eastern third of the property from the opposite side of the fence. This is considered a minor data gap, as there was no indication leading to suspicion of hazardous material or petroleum products throughout the rest of the subject property or adjoining properties. The fenced area was relatively small, and the environmental professional was satisfied with the visual inspection.

There were no deviations from the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM International, 2013).

8.0 KEY FINDINGS AND OPINION

This section evaluates the key findings of this assessment and makes a determination as to the presence RECs, if any.

8.1 SUBJECT PROPERTY

No records of NPL sites, Federal RCRA CORRACTS and Non-CORRACTS Treatment Storage Disposal Facilities, Delisted National Priority List sites, Federal or state CERCLIS sites, Federal CERCLIS NFRAP sites, landfill or solid waste disposal sites, State Leaking Underground Storage Tank List sites, State Voluntary Cleanup sites, Federal RCRA Generator sites, State registered UST sties, Institutional Controls/Engineering Controls registries, Federal ERNS list sites, Federal or State Brownfields sites were identified at the subject property.

Information provided as part of the interview conducted or the User Questionnaire or interviews did not indicate any RECs. No *recognized environmental conditions* were identified on the subject property based on the historic aerial photograph or topographic map review. During the site reconnaissance, MNA observed no indication of REC.

8.2 SURROUNDING AREA

No records of NPL sites, Federal RCRA CORRACTS and Non-CORRACTS Treatment Storage Disposal Facilities, Delisted National Priority List sites, Federal CERCLIS sites, Federal CERCLIS NFRAP sites, landfill or solid waste disposal sites, State Leaking Underground Storage Tank List sites, State Voluntary Cleanup sites, Federal RCRA Generator sites, State registered UST sties, Institutional Controls/Engineering Controls registries, Federal ERNS list sites, Federal or State Brownfields sites were identified in the area surrounding the subject property.

Information provided as part of the interviews or User Questionnaire conducted did not indicate any RECs. No *recognized environmental conditions* were identified in the surrounding area based on the historic aerial photograph or topographic map review.

8.2.1 Non- REC

During the site reconnaissance, MNA observed one AST located on the adjoining property to the north, TMK (2) 2-3-007:033. The AST was a water storage tank owned by the County of Maui DWS, and was in good condition. ASTM standard primary concern is hazardous materials and petroleum products. Therefore, this water tank is not of concern and not considered a REC. MNA also observed one pole-mounted transformer on the adjoining property to the west. MECO confirmed this transformer to not contain PCB; therefore, it is not considered a REC.

EDR identified one state hazardous waste site located at a non-geocoded location within the same zip code as the subject property. The site, the Maui Pineapple Company, Ltd. Corn Mill Camp, was identified as having DDT, arsenic, PCP, dieldrin, toxaphene, and dioxin in the soils within a 24,000 square foot pesticide mixing area. According to historical topographic maps, the Corn Mill Camp, was located approximately 1.25 miles northwest and downgradient from the subject property. Due to the distance and proximity of this site from the subject property, it is not considered a REC.

9.0 CONCLUSION

MNA performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM E 1527-13 of the subject property identified as an approximately 2-acre portion of TMK (2) 2-3-007:037 in Makawao, Island of Maui. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report. This assessment has not revealed evidence of recognized environmental conditions.

REFERENCES

ASTM International. (2013). *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* West Conshohocken: ASTM International.

County of Maui. (2016, December 16). *Maui County Real Propery Tax Office Property Search*. Retrieved December 14, 2016, from Maui County Real Property Tax Office: http://www.mauipropertytax.com

Environmental Data Resources, Inc. (2016). *FirstSearch Report for DLNR Upcountry Maui Exploratory Well: Kealaloa Site.* Shelton

Federal Emergency Management Agency. (1988, 09 16). *FEMA Flood Map Service Center*. Retrieved January 31, 2017, from https://msc.fema.gov/portal/

George A.L. Yuen and Associates, Inc. (1990, June). *Commission on Water Resource Management.* Retrieved November 6, 2011, from Commission on Water Resource Management: http://www.state.hi.us/dlnr/cwrm/planning/wrpp1990.pdf

Hawaii Department of Health Safe Drinking Water Branch. (1999, September). *UIC Map of Maui.* Retrieved July 8, 2013, from Underground Injection Control (UIC) Program: http://hawaii.gov/health/environmental/water/sdwb/uic/pdf/mauuic.pdf

MacDonald, G. A., & Abott, A. T. (1996). *Volcanoes in the Sea.* Honolulu: Univeristy of Hawaii Press.

Mink, J. F., & Lau, L. S. (1990). *Technical Report No. 185: Aquifer Identification and Classification for Maui: Groundwater Protection Strategy for Hawaii.* University of Hawaii, Water Resources Research Center.

Morgan, J. (1996). *Hawai'i: A Unique Geography.* Honolulu: The Bess Press, Inc.

Stearns, H. T. (1985). *Geology of the State of Hawai'i.* Palo Alto: Pacific Books.

United States Department of Agriculture. (2017, January 31). *Natural Resources Conservation Service.* Retrieved January 31, 2017, from Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm