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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

March 25, 2015

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Jessica E. Wooley, Director
Office of Environmental Quality Control
Department of Health, State of Hawai'i
235 S. Beretania Street, Room 702
Honolulu, Hawai'i 96813

Dear Director Wooley:

With this letter, the Hawai'i State Department of Agriculture hereby transmits the draft environmental assessment and anticipated finding of no significant impact (DEA-AFONSI) for the Waimānalo Irrigation System Upgrade situated at TMK (1) 4-008:080 and (1) 4-026-:004, in the Ko'olaupoko District on the island O'ahu for publication in the next available edition of the Environmental Notice.

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

If there are any questions, please contact John Kirkpatrick of Belt Collins Hawaii LLC at (808) 521-5361.

Sincerely,

Scott E. Enright, Chairperson
Board of Agriculture

Enclosures



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

Project Name **Main Line Extension, Waimānalo Irrigation System**

Island: O'ahu

District: Ko'olaupoko

TMK: (1) 4-1-008-080 and (1) 4-1-026:004

Permits: Grading, grubbing and stockpiling permits; HRS 6-E consultation

Proposing/Determination Agency: **Hawai'i State Department of Agriculture**

(Address, Contact Person, Telephone) Glenn M. Okamoto, Agriculture Resource Management
Division, 1428 S. King Street, Honolulu, HI 96814, (808) 973-9436

Accepting Authority:

(for EIS submittals only)

Consultant: John Kirkpatrick, Belt Collins Hawaii LLC, 2153 N. King St., #200, Honolulu, HI 96819,
(808) 521-5361

(Address, Contact Person, Telephone)

Status (check one only):

- _x_ DEA-AFNSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.
- __ FEA-FONSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- __ FEA-EISPN** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.
- __ Act 172-12 EISPN** Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.
- __ DEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.
- __ FEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- __ Section 11-200-23 Determination** The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.
- __ Section 11-200-27 Determination** The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.
- __ Withdrawal (explain)**

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

The proposed action consists of upgrading a portion of the Waimānalo Irrigation System through the installation of approximately 1,800 linear feet of 8-inch irrigation line. The Irrigation System provides water from Maunawili for farm operations in Waimānalo. The project will improve the reliability of the irrigation system and reduce the water loss currently experienced in this portion of the system.

DRAFT ENVIRONMENTAL ASSESSMENT

WAIMĀNALO IRRIGATION LINE UPGRADE

Waimānalo, Koʻolaupoko District, Island of Oʻahu, Hawaiʻi

Tax Map Key: 4-1-008:080; 4-1-026:004; Waikupanaha Street in 4-1-008, no parcel number



Prepared for:
State of Hawaiʻi Department of Agriculture

Prepared by:
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, HI 96819

April 2015

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APPENDICES

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Appendix B	Cultural Impact Assessment
Appendix C	Biological Resources Assessment
Appendix D	Early Consultation Letters
Appendix E	Wetland Determination Correspondence

ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
AECOS	AECOS, Inc.
AFONSI	Anticipated Finding of No Significant Impact
AG-1	Restricted Agricultural District
ALISH	Agricultural Lands of Importance to the State of Hawaii
AWUDP	Agriculture Water Use and Development Plan
BMPs	Best Management Practices
BWS	Board of Water Supply
CIA	Cultural Impact Assessment
City	City and County of Honolulu
CO	carbon monoxide
CTAHR	University of Hawai'i, College of Tropical Agriculture and Human Resources
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DEA	Draft Environmental Assessment
DHHL	Department of Hawaiian Homelands (State)
DLNR	Department of Land and Natural Resources (State)
DOA	Department of Agriculture (State)
DOH	Department of Health (State)
DPP	Department of Planning and Permitting (City)
EA	Environmental Assessment
EMS	Honolulu Department of Emergency Management Services
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawai'i Administrative Rules
HFD	Honolulu Fire Department
HRS	Hawaii Revised Statutes
HWP	Hawai'i Water Plan
KWMP	Ko'olaupoko Watershed Management Plan
LUO	Land Use Ordinance (City)
MBTA	Migratory Bird Treaty Act
msl	mean sea level
NRHP	National Register of Historic Places

NWI	National Wetlands Inventory
OWMP	O'ahu Water Management Plan
PM	particulate matter
ROH	Revised Ordinance of Honolulu
SCP	Sustainable Communities Plan
SCS	Soil Conservation Service (now the Natural Resource Conservation Service)
SHPD	State Historic Preservation Division, DLNR
SMA	Special Management Area
SO ₂	sulfur dioxide
State	State of Hawai'i
State Plan	Hawai'i State Planning Act
TMK	Tax map key (land parcel identifier)
UIC	Underground Injection Control
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
WRPP	Water Resource Protection Plan
ZCTA	Zip Code Tabulation Area

GENERAL INFORMATION

Project:	Waimānalo Irrigation Line
Location:	Waimānalo, Ko'olaupoko District, Island of O'ahu, Hawai'i
Proposed Action:	The proposed action calls for upgrading a portion of the Waimānalo Irrigation System through the installation of approximately 1,800 linear feet of 8-inch irrigation line and appurtenances.
Proposing Agency:	State of Hawai'i Department of Agriculture
Approving Agency:	State of Hawai'i Department of Agriculture
Recorded Fee Owner:	State of Hawai'i (State)
Anticipated Determination:	Anticipated Finding of No Significant Impact (FONSI)
Property Profile:	
TMK	(1) 4-1-008:080; (1) 4-1-026:004; Waikupanaha Street in 4-1-008
Land Area	The proposed action would involve work in a narrow area approximately 1,800 feet long.
Existing Use:	Agriculture
Proposed Use:	Agriculture accessory use
Land Use Designations:	
State Land Use	Agriculture
County Zoning	AG-1 – Agriculture Restricted
Ko'olaupoko Sustainable Communities Plan	Agriculture
Special Management Area (SMA)	Not within the SMA
Major Permits and Approvals Required:	Stockpiling, Grading, and Grubbing Permits from the City and County of Honolulu Department of Planning and Permitting; Hawai'i Revised Statutes Chapter 6E determination from State Historic Preservation Division

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1 1 INTRODUCTION

2 The Hawai'i State Department of Agriculture (DOA) is proposing upgrades to a portion of the
3 Waimānalo Irrigation System in the Ko'olaupoko District, Island of O'ahu. The project will involve
4 the installation of approximately 1,800 feet of irrigation pipe and accessory structures in the
5 distribution system. The properties served by the irrigation pipe are owned by the State of Hawai'i
6 (State) and the City and County of Honolulu (City). See Figure 1-1 for a project location map. This
7 section provides background information, identifies the reasons for the proposed action, and
8 describes the environmental review associated with this proposed action.

9 1.1 BACKGROUND

10 1.1.1 DEPARTMENT OF AGRICULTURE

11 DOA is the State's lead agency responsible for supporting, enhancing, and promoting the state's
12 agricultural industry. Under the powers established by Chapter 167, Hawai'i Revised Statutes
13 (HRS), the DOA Agriculture Resource Management Division manages six irrigation systems,
14 including the Waimānalo Irrigation System.¹

15 1.1.2 WAIMĀNALO IRRIGATION SYSTEM

16 The Waimānalo Irrigation System supplies approximately 0.4 million gallons of water per day to
17 approximately 1,174 acres of farm land in Waimānalo.² The system collects water from Maunawili
18 Stream, Ainoni Stream, and Makawao Stream within the Maunawili Watershed, transports it via a
19 tunnel under Aniani Nui Ridge, and then distributes the water to over 160 farmers in Waimānalo.³
20 The irrigation system is used to supply a diversity of agriculture crops including corn, banana,
21 papaya, vegetables, soybeans, nursery flowers, and landscape plants.⁴

22 The Waimānalo Irrigation System was established in the late 19th century by the Waimānalo Sugar
23 Company.⁵ The system has received significant improvements over the last 30 years. In 1981, the
24 Waimānalo Watershed Plan and Environmental Impact Statement (EIS) laid out a plan to
25 rehabilitate and improve the antiquated and deteriorated irrigation system's distribution system
26 through a partnership between the United States Department of Agriculture Soil Conservation
27 Service (SCS) and the State Department of Land and Natural Resources (DLNR). The plan estimated
28 that approximately 75 percent of water within the distribution system was lost. In order to address
29 this loss, a key part of the plan's proposed action was the replacement of 15.7 miles of open, unlined
30 ditches with irrigation pipe.

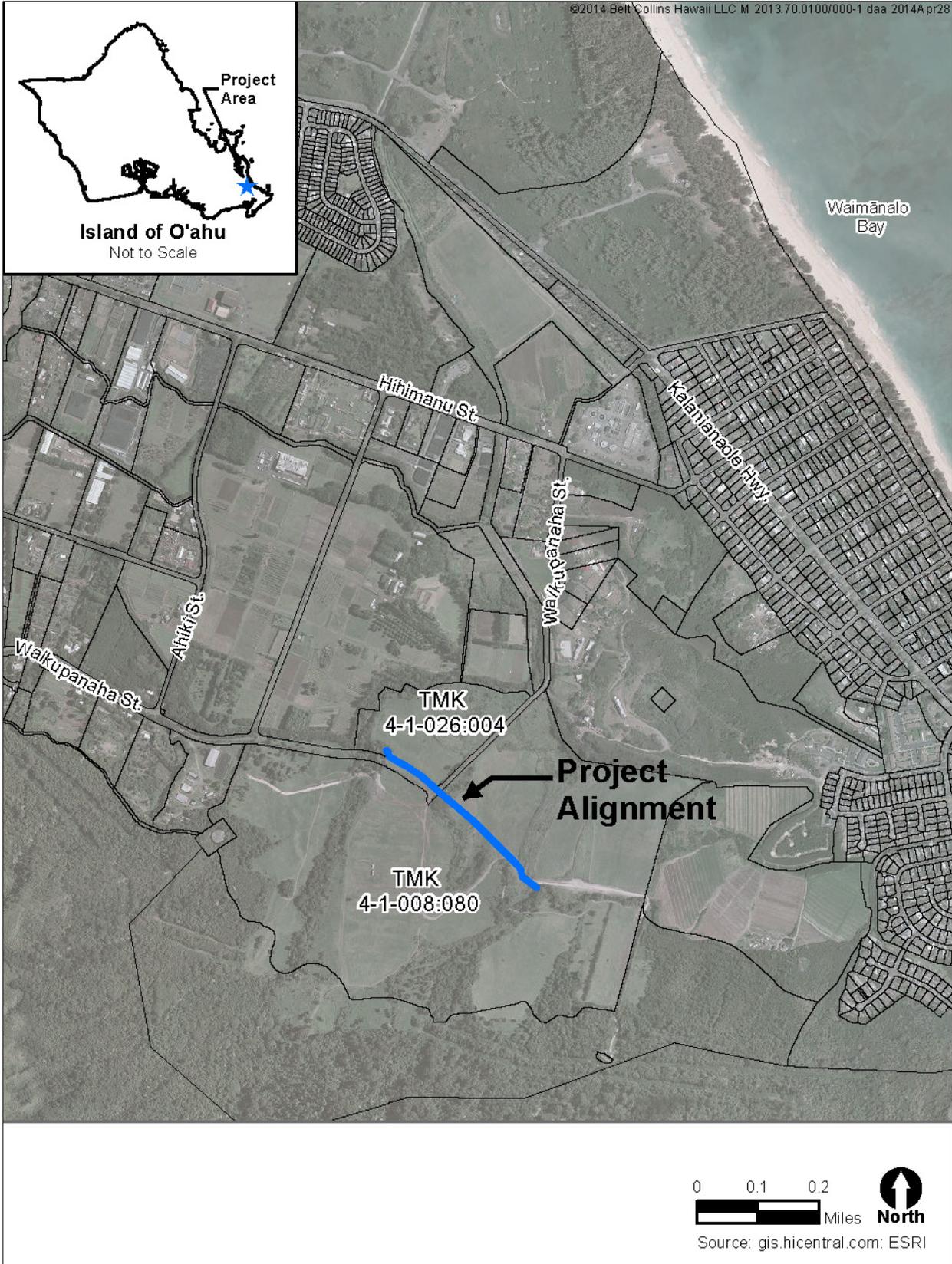
1 State of Hawai'i, Office of Planning. 2012. Increased Food Security and Food Self-Sufficiency Strategy, Volume III: Assessment of Irrigation Systems in Hawai'i.

2 State of Hawai'i, Department of Agriculture, Agriculture Resource Management Division. No date. *Irrigation Systems*. Available as of April 9, 2014 at hdoa.hawaii.gov/arm/irrigation-systems/

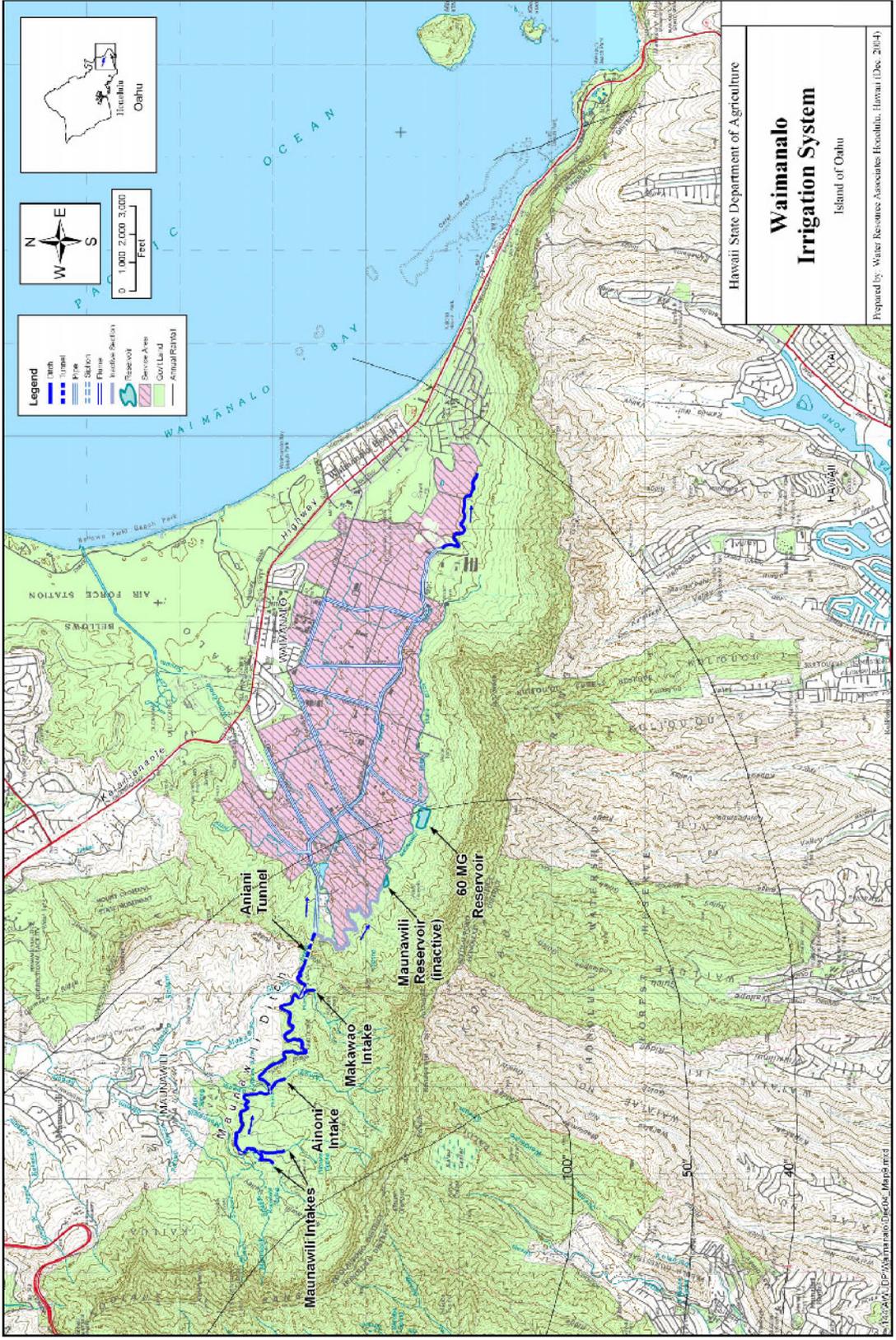
3 State of Hawai'i. 2004. *Agriculture Water Use and Development Plan*.

4 State of Hawai'i, Department of Land and Natural Resources, Commission on Water Resource Management. 2003. *State Water Projects Plan: Hawai'i Water Plan*. Prepared by Fukunaga and Associates, Inc.

5 Ibid.



1
2 **Figure 1-1. Project Location Map**



Source: State Department of Agriculture, 2004. Agriculture Water Use and Development Plan.

1
2 **Figure 1-2. Waimanalo Irrigation System Map**

1 Per an agreement with SCS, the State prepared the Maunawili Ditch Improvements EIS in 1984 to
2 cover improvements to the Waimānalo Irrigation System’s collection system within the Maunawili
3 Watershed. Over the course of the subsequent years, many of the actions proposed in the two EISs
4 have been completed, including the replacement of most of the open, unlined ditch with a pipe
5 system. Figure 1-2 depicts the system as of 2003; since then, additional work has been done to
6 upgrade the collection system within the Maunawili Watershed.⁶

7 The Agricultural Water Use and Development Plan adopted in 2003 and the Ko’olau Poko
8 Watershed Management Plan adopted in 2012 have carried forward many uncompleted
9 components proposed in the Waimānalo Watershed Plan and EIS and the Maunawili Ditch
10 Improvements EIS. Both of these plans include recommendations to complete the replacement of
11 the remaining portions of the open, unlined ditch with pipe. The project will implement the
12 recommendation for one of the last remaining sections of open, unlined ditch in the distribution
13 system.

14 1.2 PURPOSE AND NEED

15 The proposed action is needed to support DOA’s management of the Waimānalo Irrigation System.
16 The project will replace a portion of existing open, unlined ditch which currently experiences
17 significant water loss due to seepage and evaporation, with a pipe system that will reduce water
18 loss to a minimum. It will increase reliability of water supply within the system and increase the
19 amount of water available for distribution by DOA.

20 1.3 ENVIRONMENTAL REVIEW

21 This Environmental Assessment (EA) has been prepared because State funds and State lands are
22 being used for the proposed action. It has been prepared in accordance with Chapter 343,HRS, and
23 Title 11, Chapter 200, Hawai’i Administrative Rules (HAR). DOA anticipates a Finding of No
24 Significant Impact (FONSI) for the proposed action.

25 1.4 PROPOSED AGENCY ACTION AND ACCEPTING AGENCY

26 Hawaii Revised Statutes Chapter 343, Environmental Impact Statement, establishes an
27 environmental review process whereby a government agency or private entity proposing a project
28 must prepare an environmental assessment that considers potential adverse impacts from the
29 project. The requirement to prepare a Chapter 343 environmental assessment is triggered by,
30 among other factors, the use of public funds and the use of public lands. The proposed action would
31 be constructed with public funds on land that is publicly owned.

32 For this proposed action, the DOA is the proposing agency and accepting agency.

⁶ City and County of Honolulu, Board of Water Supply. 2012. *Ko’olau Poko Watershed Management Plan*. Prepared by Townscape, Inc. The State of Hawai’i treats Koolaupoko as one word; the City and County of Honolulu views it as two (Ko’olau Poko). In this report, the two-word form is used for City and County documents.

1 2 PROPOSED ACTION AND ALTERNATIVES
2 CONSIDERED

3 This section describes the proposed action, identifies the estimated cost, outlines the preliminary
4 schedule, and briefly summarizes the alternatives considered.

5 2.1 PROPOSED ACTION

6 The proposed action calls for upgrading a portion of the Waimānalo Irrigation System through the
7 installation of approximately 1,800 linear feet of 8-inch irrigation line and appurtenances.

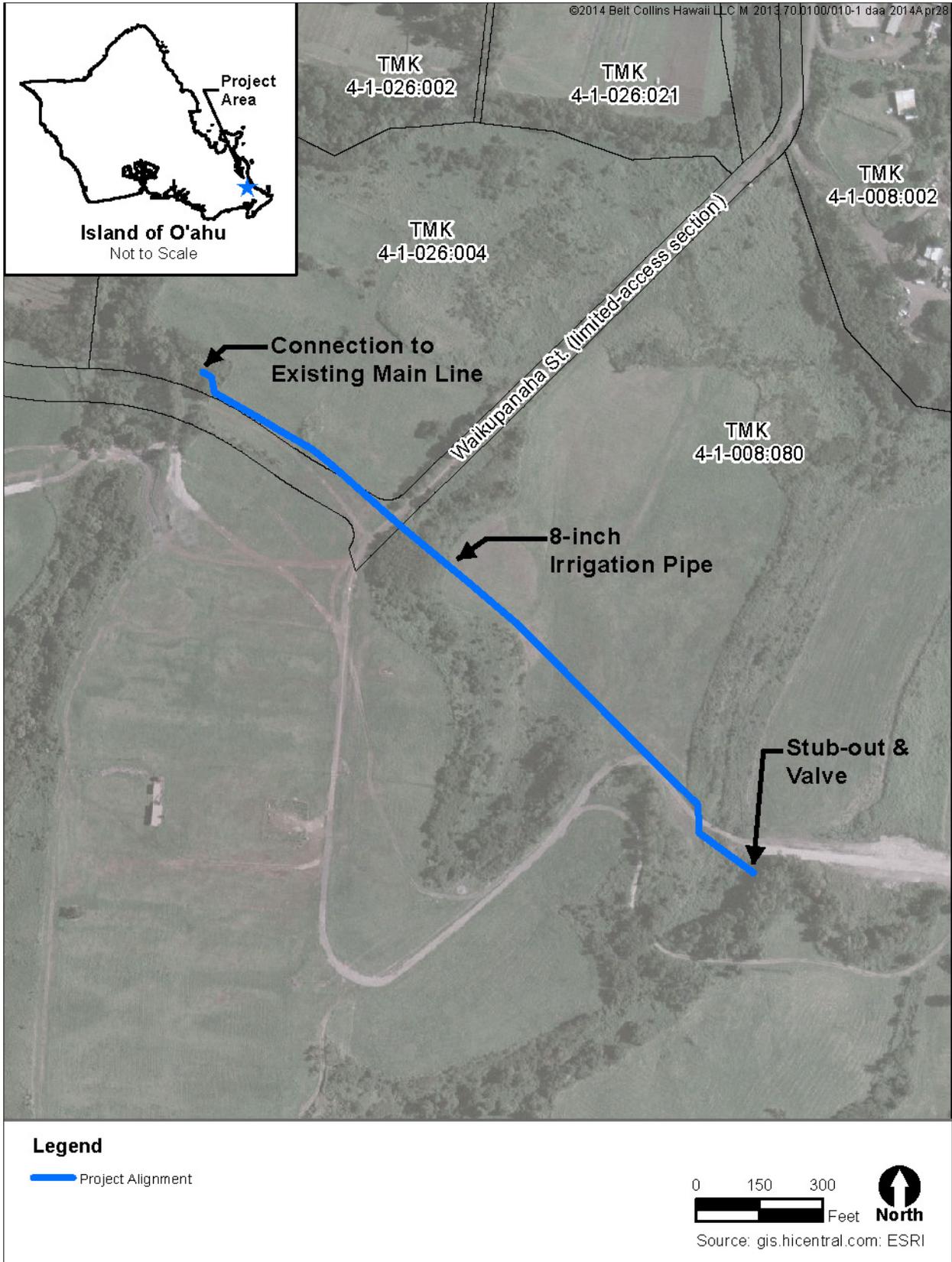
8 As shown in Figure 2-1, the proposed action would include the following:

- 9 1. Install approximately 1,800 linear feet of underground 8-inch pipe to upgrade the
10 distribution system. The pipe will be installed at depths ranging from 4 to 5 feet. In the one
11 area where the pipe alignment crosses a ditch, a series of elbow joints will be used to
12 maintain a depth of 4 to 5 feet. The installation will require excavating a trench
13 approximately 2 feet wide and 6 feet deep along the entire length of the alignment.
- 14 2. Connection of the pipe to the existing main line at the western end of the project alignment
15 will occur through the installation of couplings.
- 16 3. The irrigation pipe will stub-out and a valve will be provided at its eastern end, where a
17 connection will need to be made by users of the adjacent parcels.

18 2.2 PROJECT SCHEDULE AND ESTIMATED COST

19 The source of funding for the project would be State of Hawai'i Department of Agriculture (DOA)
20 monies. The estimated cost of the proposed action is less than \$400,000.¹ Prior to construction,
21 project design needs to be completed and permits need to be secured. Construction is anticipated to
22 begin after permits are secured and would be completed in less than a year's time.

¹ Price is from Department of Agriculture Notice to Bidders for this project plus small additional work in Maunawili.



1
2 **Figure 2-1. Site Plan**

1 2.3 ALTERNATIVES CONSIDERED

2 A No Action Alternative and an Extended Line Alternative were reviewed to meet the purpose and
3 need of this infrastructure project. These alternatives are evaluated in the following sections.

4 2.3.1 NO ACTION ALTERNATIVE

5 Under the No Action Alternative, the existing Waimānalo Irrigation System would end at the
6 western end of the project. The No-Action Alternative would result in the following:

- 7 • Continued loss of water due to evaporation and seepage;
- 8 • Maintenance cost due to having to clear debris from the ditch system; and
- 9 • Delivery of irrigation water, when available, to a site with little active agriculture.

10 2.3.2 ALTERNATIVE 1 – EXTENDED LINE

11 As an alternative to the proposed action, an extended alignment was considered. This alternative
12 would have been identical to the proposed action up to the eastern end of the proposed action, at
13 which point it would have extended the 8-inch underground pipe approximately 1,000 linear feet
14 further east.

15 The Alternative 1 would result in the following:

- 16 • Ground disturbance from trenching an additional approximately 1,000 feet, increasing
17 potential impacts from erosion and runoff;
- 18 • Potential impacts to historic sites, since the extended alignment runs parallel to a portion of
19 the historic Kailua Ditch;
- 20 • Increased cost;
- 21 • Minimal additional benefit to users in the Waimānalo Irrigation System; and
- 22 • Much the same environmental impacts as for the proposed action.

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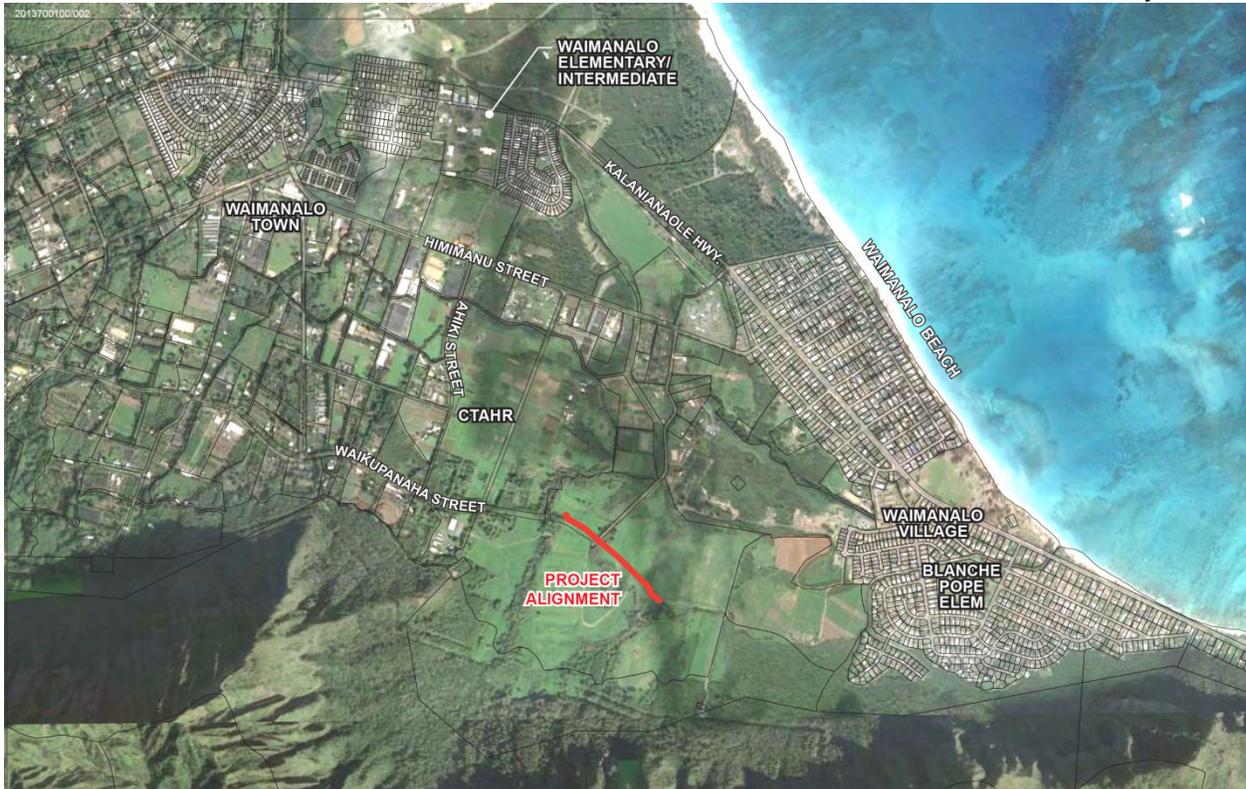
Environment/ Resource	Discussion and Determination
Circulation and Traffic	The impacts from construction traffic are expected to be minor and a traffic management plan will ensure no impacts to other users of the limited access dirt roads nearby. After construction is complete, traffic to the site would remain at current levels. No adverse impacts are anticipated.
Infrastructure	The proposed action would improve the existing irrigation system. Work will be coordinated with Board of Water Supply to ensure that any disruptions to the BWS system are avoided or minimized. No adverse impacts are anticipated.
Socioeconomic	The proposed action will increase reliability of water supply within the Waimānalo Irrigation System and will decrease water lost to seepage and evaporation. This will benefit farmers serviced by the irrigation system. The project will have a small short-term economic benefit from costs associated with construction activities. No adverse impacts are anticipated.
Public Services and Facilities	The proposed action would not affect the capacity of public services and facilities such as police and fire protection, emergency services, and parks. No adverse impacts are anticipated.
Visual and Aesthetic	The new underground irrigation pipe and accessory structures will not be visible from developed areas. No adverse impacts are anticipated.

1 3.1 LAND USE AND LAND TENURE

2 3.1.1 EXISTING CONDITIONS

3 **Regional Context:** The project is located in eastern Waimānalo Valley, approximately 0.6-miles
4 south of Kalanianaʻole Highway. The project site is located near the eastern terminus of the
5 Waimānalo Irrigation System and is surrounded by agricultural lands. The residential areas of
6 Waimānalo Town, Waimānalo Beach, and Waimānalo Village are located to the northwest, north,
7 and northeast of the project area, respectively.¹ The project site is approximately one-mile from the
8 coastline and Waimānalo Bay. To the south lie the Koʻolau Mountains. See Figure 3-1 for residential
9 areas and some of the public facilities in the surrounding area, and Figure 3-2 for the major
10 landowners in Waimānalo.

¹ These are not official names, but will be used consistently in this report. The U.S. Census identifies two Census Designated Places, Waimānalo and Waimānalo Beach. The latter includes both the Waimānalo Beach Lots subdivision and the Waimānalo Village area discussed above. The beach lots are fee-simple property. Nearly all the land to the south and east of that subdivision, to Makapuʻu Point, is Department of Hawaiian Homelands (DHHL) property.

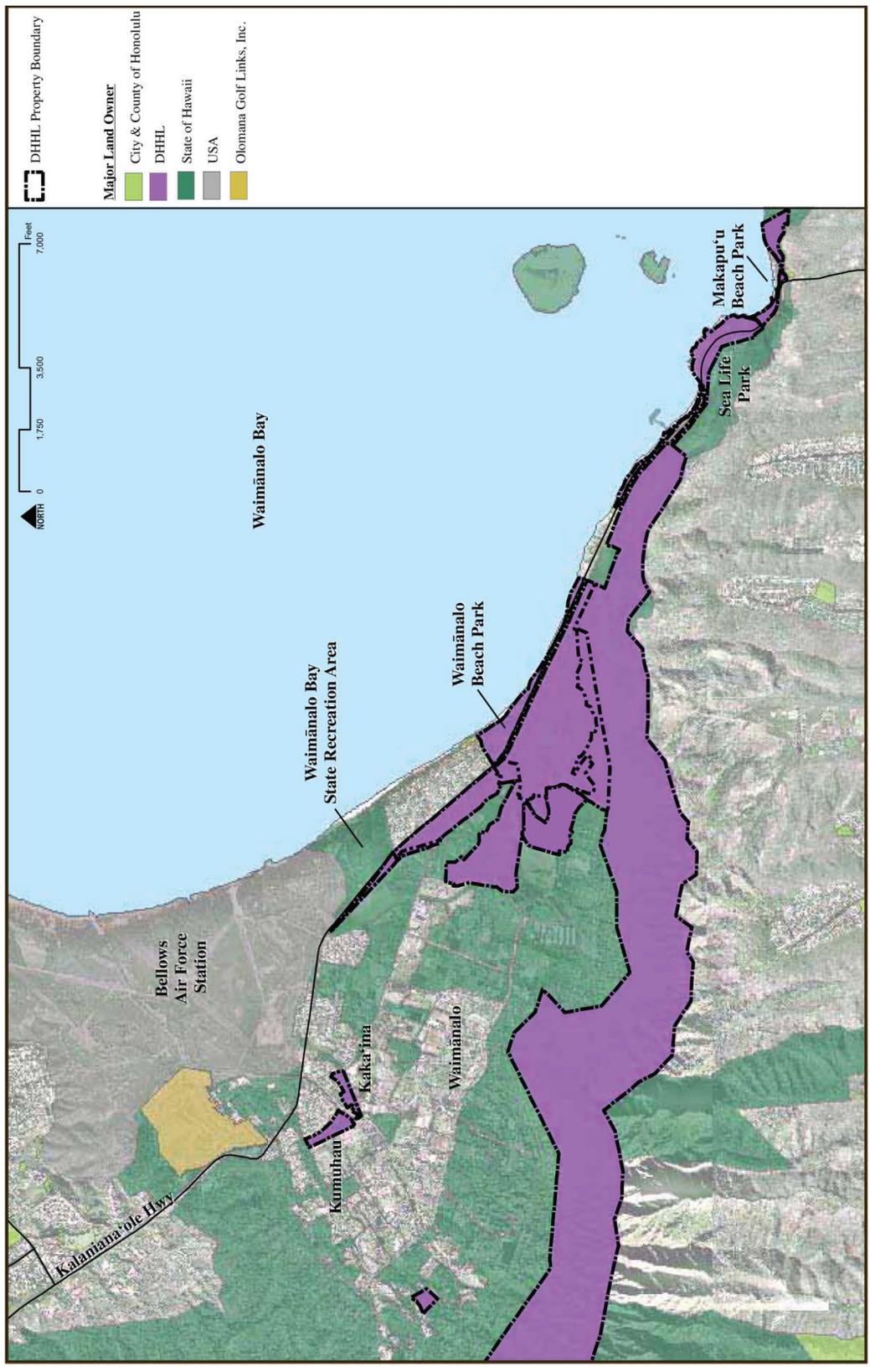


0 1000 2000 Feet North
Source: gis.hicentral.com: ESRI

1
2 **Figure 3-1. Project Location in Relation to Sections of Waimānalo**

3 **Existing Use:** The project alignment crosses through agricultural lands and runs roughly adjacent to
4 the Waimānalo Irrigation System’s existing ditch. The project alignment is within two State of
5 Hawai’i-owned (State-owned) parcels, Tax Map Key (TMK) 4-1-008:080 and TMK 4-1-026:004,
6 which are reserved for agricultural purposes and currently vacant. The State Department of
7 Agricultural (DOA) intends to lease a 53-acre portion of TMK 4-1-008:080. Wong Farm is currently
8 operating on the adjacent TMK 4-1-008:079 and will be relocated to the 53-acre portion of TMK 4-
9 1-008:080. The project crosses the Waikupanaha Street right-of-way (in TMK 4-1-008, no parcel
10 number), which is in use as a limited-access, unpaved road.

11 There are two access points for the project area: through a secured gate on Waikupanaha Street off
12 of Hihimanu Street; and off of Ahiki Street through the University of Hawai’i, College of Tropical
13 Agriculture and Human Resources’ (CTAHR’s) research station. Two secured gates separate the
14 project area from public roads along that route.



Source: Department of Hawaiian Home Lands, 2008. Waimanalo Regional Plan.

1
2 **Figure 3-2. Land Ownership in Waimānalo**

1 **Surrounding Land Use:** The project site is surrounded by agricultural lands. Just to the west of the
2 project site, CTAHR has a research station covering approximately 127 acres of agricultural lands.
3 The station includes a few support structures, including an office, laboratory, and storage
4 buildings.²

5 The lands to the north and east of the project area are owned by Department of Hawaiian
6 Homelands (DHHL). DHHL has planned a Waimānalo Homestead Village Center extending from the
7 Waimānalo Villages area.³ The DHHL's Waimānalo Regional Plan proposes new commercial,
8 residential, public services, recreation and open space, and light industrial uses. DHHL plans to
9 construct 200 residential units on the 52-acre Wong Farm parcel (TMK 4-1-008:079), which is just
10 to the east of the project area. This parcel was the eastern terminus of the Waimānalo Irrigation
11 System. With development of the parcel, water will be provided by the Board of Water Supply. The
12 farmer on the current Wong Farm will be relocated to TMK 4-1-008:080, which will be served by
13 the improved irrigation system.

14 3.1.2 POTENTIAL IMPACTS AND MITIGATION MEASURES

15 Land use and land tenure impacts are not anticipated. The proposed action is consistent with
16 existing use of the site and will support ongoing agricultural activities in the area. DOA has an
17 agreement in place to lease a 53-acre portion of TMK 4-1-008:080 for agricultural uses. The area is
18 currently vacant; while use will intensify with the return of agricultural activities to this parcel, this
19 change follows from an interagency agreement between DHHL and DOA, not the proposed action.
20 Short-term traffic impacts along the private, one-lane roads that provide access to the site would be
21 mitigated through coordination with other roadway users to ensure minimal disruption. After
22 construction is complete, activities associated with the new irrigation pipe would be limited to
23 periodic maintenance. However, the upgraded portion should require less maintenance than the
24 existing system, which will result in a reduction in access to the project area for maintenance
25 purposes.

26 3.2 GEOLOGY, SOILS, AND TOPOGRAPHY

27 3.2.1 EXISTING CONDITIONS

28 The project alignment is located in the eastern part of Waimānalo Valley near the foothills of the
29 Ko'olau Mountain *pali* (cliffs). Waimānalo Valley is the remnant of the Ko'olau shield volcano that
30 has been deeply eroded in the approximately 2 million years since eruptions ceased. Two million
31 years ago, Ko'olau volcano formed a caldera approximately eight miles long and four miles wide
32 that extended from Kāne'ohe to Waimānalo.⁴ Waimānalo Valley is bounded by the Ko'olau
33 Mountains to the south, Aniani Nui Ridge and Keolu Hills to west, and Waimānalo Bay to the north
34 and east.

2 City and County of Honolulu, Board of Water Supply. September 2012. *Ko'olau Poko Watershed Management Plan*.
Prepared by Townscape, Inc.

3 State of Hawai'i, Department of Hawaiian Homelands. 2008. *Waimānalo Regional Plan*.

4 City and County of Honolulu, Board of Water Supply. September 2012. *Ko'olau Poko Watershed Management Plan*.
Prepared by Townscape, Inc.

1 The project alignment is relatively flat. Over the alignment’s length, the elevation ranges from 127
2 feet above mean sea level (msl) at the western end to 105 feet above msl at the eastern end.

3 As seen in Figure 3-3, the project alignment crosses five different soil classifications. The U.S.
4 Department of Agriculture Soil Conservation Service’s “Soil Survey of the Islands of Kauai, Oahu,
5 Maui, Molokai, and Lanai, State of Hawaii,” dated August 1972,⁵ classifies the soil in the project area
6 as:

- 7 • Hale’iwa Silty Clay, 2-6% slopes – This soil is well-drained and has a slight erosion hazard.
8 The soil has historically been used for sugarcane and pineapple.
- 9 • Ka’ena Clay 6-12% slopes – This soil is poorly-drained and has slight to moderate erosion
10 hazard. The soil has historically been used for sugarcane and pasture.
- 11 • Kawaihapai Stony Clay 2-6% - This soil is well-drained, has a slight erosion hazard, and has
12 enough stones to hinder cultivation activities. The soil has historical been used for
13 sugarcane, pasture, and other crops.
- 14 • Pohakupu Silty Loam 0-8% slopes and 8-15% slopes – The Pohakupu series are well-
15 drained soils that have historical been used for sugarcane, pineapple, pasture, and other
16 crops. With 0-8% slopes the soil has a slight erosion hazard, with 8-15% slopes the erosion
17 hazard increases to slight to moderate.

18 The Agricultural Lands of Importance to the State of Hawai’i (ALISH) map indicates that the project
19 alignment crosses through areas classified as Prime Agricultural Land and Other Important
20 Agricultural Land.⁶ See Figure 3-4. The ALISH maps were created in 1976 and assessed soil, existing
21 land use, zoned land use, and land tenure factors to classify lands. Prime Agricultural Land is land
22 best suited for agricultural activities. Other Important Agricultural Land is land that is important for
23 agricultural activities, but has some negative attributes, such as seasonal wetness or erosive soils.

24 3.2.1 POTENTIAL IMPACTS AND MITIGATION MEASURES

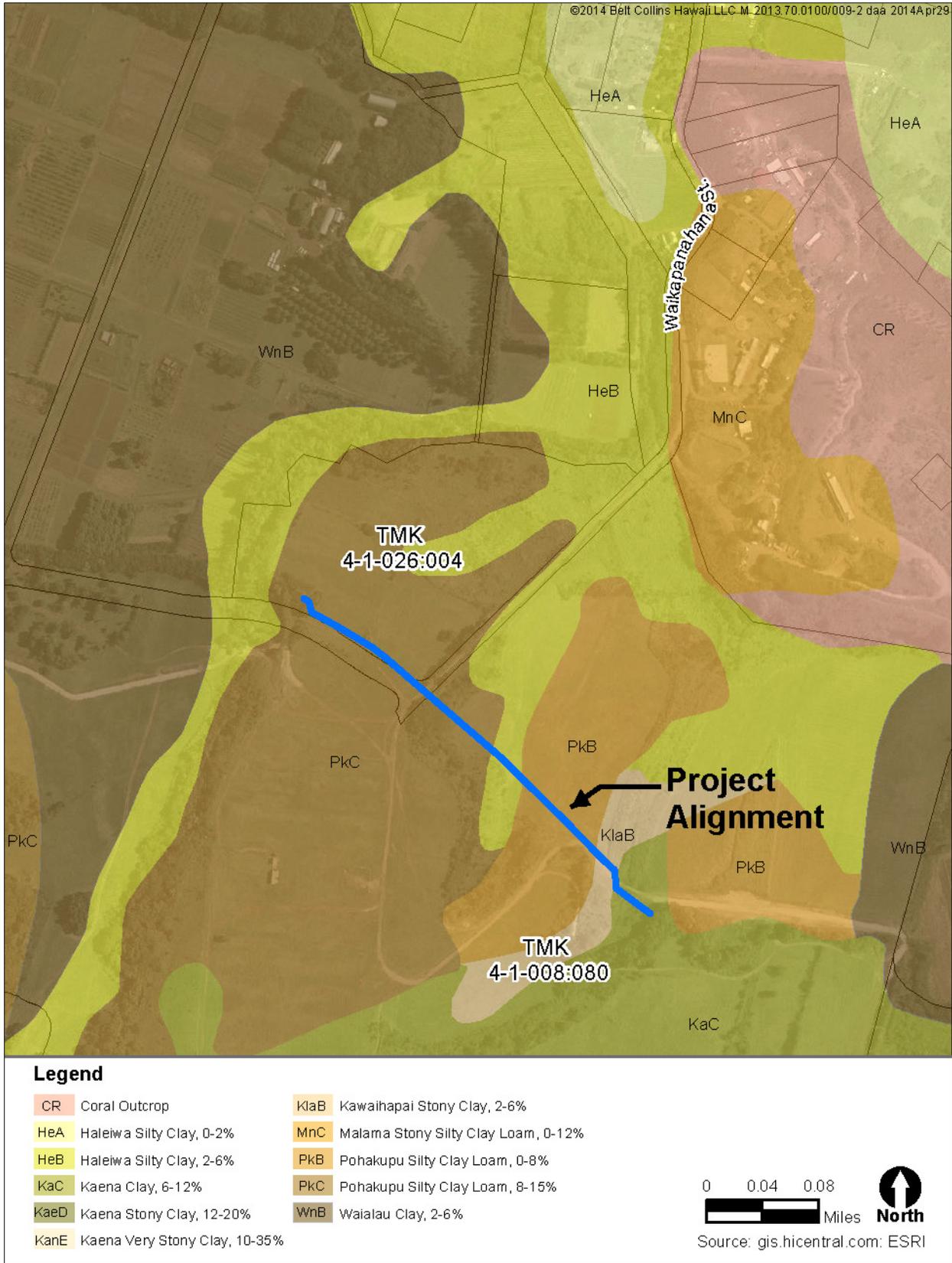
25 Installation of the irrigation pipe in the five different soils types described above is not expected to
26 be a problem. The pipe will be installed to a depth of approximately 4 feet (requiring trenching to a
27 depth of 5 feet). The evacuated soil will be stockpiled and re-used, as much as possible, to fill the
28 trenched area. The relatively flat topography minimizes runoff and erosion potential. Best
29 Management Practices (BMPs), in accordance with current City and County of Honolulu (City)
30 standards,⁷ will be implemented during construction to control soil erosion, surface runoff, and
31 dust from the proposed action. If appropriate, disturbed areas will be revegetated.

32 By providing an improved irrigation system, the proposed action will enhance the viability of
33 agricultural activities on land designated as Prime Agricultural Land and Other Important
34 Agricultural Land.

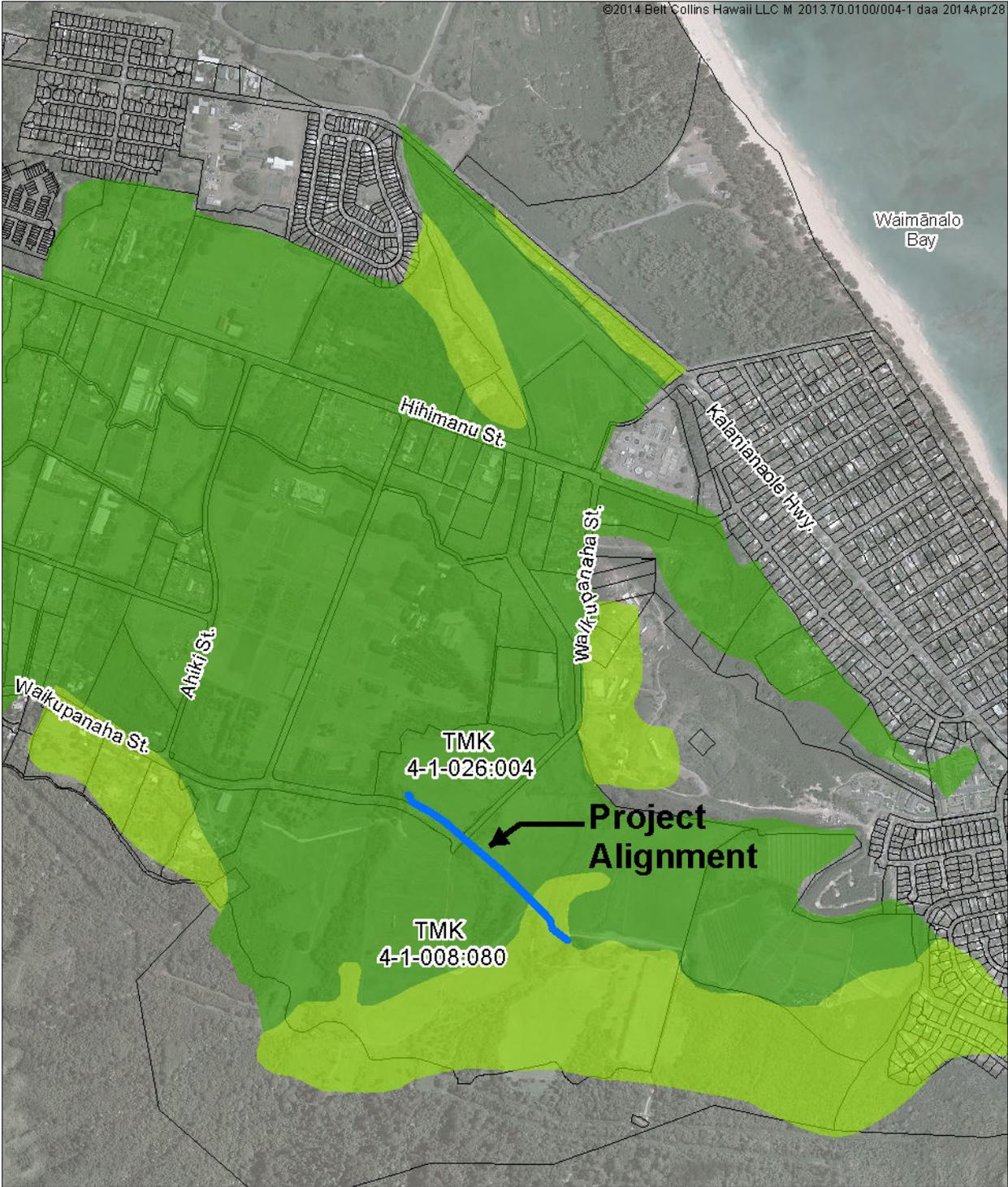
⁵ U.S. Department of Agriculture, Soil Conservation Service. 1972. *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai.*

⁶ State of Hawai’i, Department of Agriculture. 1977. *Agricultural Lands of Importance to the State of Hawai’i.*

⁷ City and County of Honolulu. 1999. *Rules Relating to Soil Erosion Standards and Guidelines.*

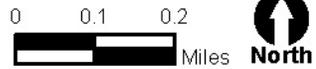


1
2 **Figure 3-3. Soils**



Legend

- Prime Important Agricultural Land
- Other Important Agricultural Land



Source: gis.hicentral.com: ESRI

1
2

Figure 3-4. Agricultural Lands of Importance to the State of Hawai'i

1 3.3 HYDROLOGY

2 3.3.1 WATER RESOURCES

3 The annual average rainfall in the project area is about 45 inches.⁸ Consistent with general weather
4 patterns on O’ahu, heavier rainfall months are November through March, and the lowest rainfall
5 months are June and July.⁹

6 3.3.2 GROUND WATER

7 According to the Hawai’i Water Resource Protection Plan, the site is located in the Waimānalo
8 hydrological unit of the Windward Aquifer Sector Area. The Waimānalo hydrological unit is
9 predominately high-level ground water sources.¹⁰

10 The underground injection control (UIC) line was established by the State Department of Health
11 (DOH) as a boundary between potable and non-potable ground water sources. In general, areas
12 upland of the UIC line are considered potable ground water sources and are subject to
13 Environmental Protection Agency (EPA) water quality standards under the Clean Water Act. The
14 areas below the UIC line are subject to EPA saltwater quality standards under the Clean Water Act.
15 The site is located upland of the UIC line.¹¹

16 3.3.3 SURFACE WATER

17 The project does not cross any streams or natural waterbodies. Inaole Stream is approximately 200
18 feet west of the western end of the project alignment. Inaole Stream is an intermittent stream¹² and
19 was assessed as having a rating of three out of 10 for biological resource conditions.¹³

20 The National Wetland Inventory (NWI) map shows two excavated ponds along the project
21 alignment. The two ponds match the location of two reservoirs that were in existence when the
22 project area was used for dairy operations. After the dairy operations ceased in 2001, the reservoirs
23 were drained and filled. As part of the Biological Resource Assessment conducted for the proposed
24 action (included in its entirety in Appendix C), the former reservoir locations were surveyed. No
25 evidence of wetlands or aquatic features was found. Survey-grade topographic maps for the project
26 area show no depression at the site on the former reservoirs. The ecological consultation examined
27 the site of the former ponds, and conducted analyses of the soil. The samples were found not to be
28 hydric, i.e., not wetlands. A request for determination of wetland status was submitted to the United
29 States Army Corps of Engineers in December 2014. The response, identifying the former ponds as
30 not waters of the United States, is included in this document as Appendix E.

31 See Figure 3-5 for a map of streams and NWI sites.

⁸ National Oceanic and Atmospheric Administration/National Weather Service. 2013. “Hydrology in Hawai’i”. Available at: <http://www.prh.noaa.gov/hnl/hydro/pages/aug13sum.php>

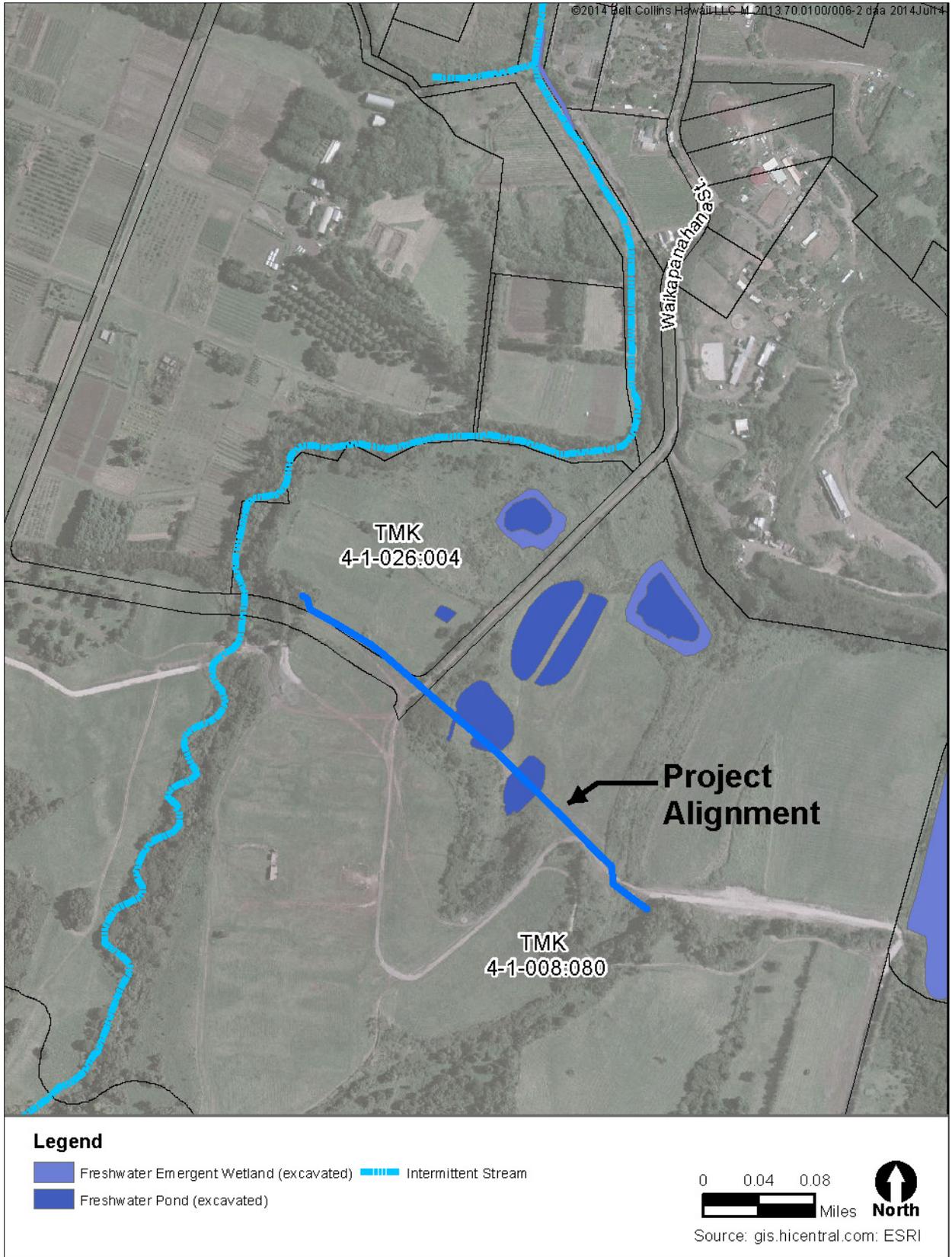
⁹ Juvik, Sonia P. and Juvik, James O. 1998. *Atlas of Hawaii*.

¹⁰ State of Hawai’i, Department of Land and Natural Resources, Commission on Water Resource Management. June 2008. *Hawai’i Water Plan: Water Resource Protection Plan*.

¹¹ State of Hawai’i, Department of Health. July 6, 1984. Underground Injection Control Program Quadrangle Maps.

¹² Department of Land and Natural Resources, Division of Aquatic Resources. 2004. *DAR Streams shapefile*. Available as of November 18, 2013 at <http://planning.hawaii.gov/gis/>

¹³ City and County of Honolulu, Board of Water Supply. 2012. *Ko’olau Poko Watershed Management Plan*. P. 2-38



1
2 **Figure 3-5. Streams and National Wetland Inventory Sites**

1 3.3.4 POTENTIAL IMPACT AND MITIGATION MEASURES

2 Due to the shallow depth of the pipe installation, the project is not anticipated to encounter
3 groundwater. Due to the absence of surface water sources near the project area, it is not anticipated
4 that the proposed work would lead to any discharges into waters of the U.S. or waters of the State.
5 As described in Section 3.2.1, BMPs will be implemented during construction to control surface
6 runoff and soil erosion. After construction is complete, no adverse impacts to water resources are
7 anticipated.

8 3.4 ARCHAEOLOGICAL AND CULTURAL RESOURCES

9 3.4.1 ARCHAEOLOGICAL RESOURCES

10 An archaeological inventory survey report was prepared by Scientific Consultant Services, Inc. for
11 the project site. The report is based on field surveys conducted during February and March 2014
12 and a review of relevant documents and databases. Four stratigraphic trenches were dug to learn
13 whether finds of archaeological interest predating the Historic period were likely. The report is
14 included as Appendix A.

15 The project crosses five exposures of the Kailua Ditch, a part of the Waimānalo Irrigation System
16 that once brought water from Kailua to the plantation cane fields. These exposures were identified
17 as part of a known Plantation Era site (50-80-15-4042). While the exposures are significant as
18 evidence of Plantation Era activities and for information content gathered in the course of the
19 survey, no further study is recommended. The trenches uncovered items (e.g., nails, PVC pipe) that
20 were of recent provenance.

21 3.4.2 CULTURAL RESOURCES

22 A Cultural Impact Assessment (CIA) was prepared by Scientific Consultant Services, Inc. for the
23 project site. The CIA is based on ethnographic research and a review of relevant cultural literature
24 research. The CIA was conducted in accordance with State Environmental Council *Guidelines for*
25 *Assessing Cultural Impacts*.¹⁴ The report is included as Appendix B.

26 The land surrounding the project has been in agricultural use for decades, and no cultural resources
27 or remains have been found. While the surrounding residential areas include a vibrant Native
28 Hawaiian community, no traditional cultural uses of the project site have been identified.

29 3.4.3 POTENTIAL IMPACTS AND MITIGATION MEASURES

30 The consultant found no evidence that the project site contained a culturally important resource or
31 that cultural practices exist in the area that could be affected by the project. While the Kailua Ditch
32 component of the Waimānalo Irrigation system is archaeologically significant, no further study is
33 warranted of the remnants along the project site.

¹⁴ State of Hawai'i. 1997. *Guidelines for Assessing Cultural Impacts*. Adopted by the Environmental Council, November 11, 1997.

1 3.5 FLORA AND FAUNA

2 This section summarizes the natural resources survey prepared by AECOS, Inc. (AECOS) for the
3 project site. The report is based on field surveys conducted during April 2014 and a review of
4 relevant documents and databases. The report is included in Appendix C.

5 3.5.1 FLORA

6 The report notes 39 plant species within the project site, only two of these species, kīpūkai
7 (*Heliotropium curraassavicum*) and naupaka kahakai (*Scaevola taccada*), are indigenous to Hawai‘i.
8 These two are common plant species. A complete list of plants is included in the natural resources
9 survey report (Appendix C). No State or federally-listed threatened, endangered, or candidate plant
10 species, or rare native Hawaiian plant species were observed on the project site.

11 The project site is dominated by non-native species, with vegetation on the site comprised of
12 grassland (pasture land) and a narrow, winding area of forest/scrub that follows the old irrigation
13 ditch. Grassland is covered by a mixture of grasses and other herbaceous plants. The forest/scrub
14 area is mostly covered by *koa haole* (*Leucaena leucocephala*), with some Java plum (*Syzygium*
15 *cuminii*) and fiddlewood (*Citharexylum*) trees.

16 3.5.2 FAUNA

17 **Avifauna:** During surveys conducted at 5 different locations and incidental sightings, 10 bird
18 species were observed or heard in the project area. No State or federally-listed threatened,
19 endangered, or candidate bird species were observed. All avian species observed are non-native,
20 with the exception of the Pacific golden plover or *kōlea* (*Pluvialis fulva*), a migratory bird that
21 winters in Hawai‘i. Birds protected under the Migratory Bird Treaty Act (MBTA) of 1918 that were
22 observed include the Pacific golden plover, Northern cardinal (*Cardinalis cardinalis*), and House
23 finch (*Carpodacus mexicanus*). The report notes that the native and endangered Hawaiian hoary
24 bat or *ōpe‘ape‘a* (*Lasiurus cinereus semotus*) may occasionally occur in the project area, although it
25 was not observed during the study.

26 In addition to the species discussed above, the United States Fish and Wildlife Service (USFWS)
27 noted that the following federally-protected species may occur in the vicinity of the project: the
28 endangered Hawaiian coot (*Fulica alai*), the endangered Hawaiian common moorhen (*Gallinula*
29 *chloropus sandvicensis*), the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*), and the
30 wedge-tailed shearwater (*Puffinus pacificus*). The last is protected under the MBTA.¹⁵

31 **Land Mammals.** The only land mammal observed during the survey was the small Asian mongoose
32 (*Herpestes*), a non-native and non-protected species.

33 **Invertebrates.** The survey did not observe any protected invertebrate species. Scarlet skimmer
34 dragonflies (*Crocothemis servilla*), an alien species, were observed in abundance.

¹⁵ United States Fish and Wildlife Service. July 1, 2014. “Technical assistance regarding preparation of a draft environmental assessment to address the Department of Agriculture’s proposed Waimānalo Irrigation System project, O‘ahu”. Letter included in Appendix D of this EA.

3.5.3 PROBABLE IMPACTS AND MITIGATION MEASURES

While the plant and wildlife habitats on the project site have been highly modified by humans and are now largely occupied by alien flora and fauna, several species of concern exist in the area. No State or federally-listed threatened, endangered, or candidate plant or animal species were observed on the project site. The species of concern are: the endangered Hawaiian coot, the endangered Hawaiian common moorhen, the endangered Hawaiian stilt, and the endangered Hawaiian hoary bat.

The proposed action will include the following management measures to address potential impacts to the species of concern:

- **Tree cutting restriction:** Woody plants greater than 15 feet tall will not be removed or trimmed during the bat birthing and pup rearing season (June 1 through September 15).
- **Hawaiian waterbird nest survey and avoidance:** Immediately prior to construction, a biologist will conduct a survey of the project site, including any staging area, to identify any Hawaiian coot, Hawaiian common moorhen, or Hawaiian stilt nests that may be present. If a nest is present, a 100-foot buffer will be established and maintained until the chicks have fledged.

An additional concern of the USFWS involved nighttime lighting and Hawaiian seabirds, particularly the wedge-tailed shearwater. The proposed action will not involve the installation of any permanent lighting. Nor will nighttime construction occur that would require the use of lights.

Based on natural resource surveys and management measures, any flora and fauna impacts from the proposed action are anticipated to be minor and the project should not result in any taking of protected species.

3.6 HEALTH AND SAFETY

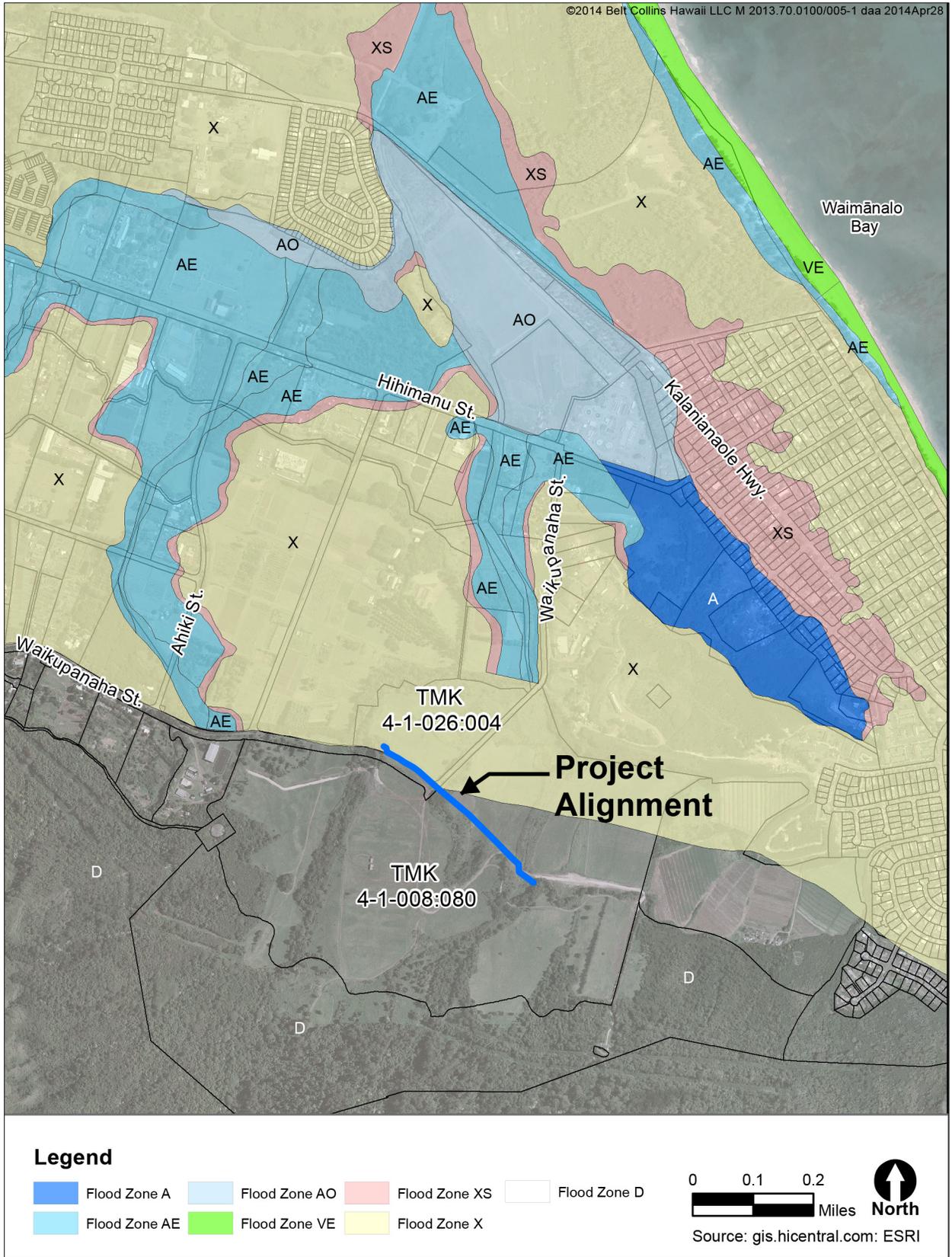
3.6.1 FLOOD HAZARD

The natural characteristics of Ko'olaupoko, which include relatively low infiltration capacity of soils due to saturation from frequent rainfall, make the area susceptible to flood hazards. Waimānalo experienced more than ten flood events between 1941 and 1983.¹⁶

The Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency do not show any floodways crossing the project site.¹⁷ The FIRMs indicate that the project runs from an area where flood hazards are minimal (X) to one where flood hazards are undetermined (D). See Figure 3-6.

¹⁶ City and County of Honolulu, Board of Water Supply. September 2012. *Ko'olau Poko Watershed Management Plan*.

¹⁷ Federal Emergency Management Agency. 2011. *Flood Hazard Areas shapefile and metadata*. Obtained from <http://planning.hawaii.gov/gis/download-gis-data/>



1
2

Figure 3-6. Flood Insurance Rate Map

1 3.6.2 TSUNAMI EVACUATION ZONE

2 The Tsunami Evacuation Zone Maps were prepared by the City’s Department of Emergency
3 Management and other agencies in 2010. The maps were based upon updated scientific techniques
4 and technology that were not available when the previous maps were prepared. The project is
5 located nearly 0.5 miles inland from the tsunami evacuation zone.

6 3.6.3 EARTHQUAKE

7 Most earthquakes in Hawai’i are directly linked to volcanic activities and the islands’ volcanic
8 structure. The movement of magma from active volcanoes on the island of Hawai’i causes many
9 small earthquakes every year. Larger tectonic quakes are caused by structural weakness at the
10 volcano’s base or movement deep within the earth’s crust.¹⁸

11 In 2006, the State experienced the strongest recorded earthquake in 23 years. The 6.7-magnitude
12 earthquake from west of the island of Hawai’i caused island-wide blackouts on Oahu and Maui. On
13 O’ahu, the earthquake caused automatic switches and operators to shut down the Kahe and Waiiau
14 power plants to protect the equipment.¹⁹

15 3.6.4 HURRICANE

16 Hurricane season in Hawai’i begins in July and lasts through November. Hurricanes in the Central
17 Pacific generally originate in the areas off the coasts of southern Mexico and Central America. Few
18 of these hurricanes make it near the Hawaiian Islands region, as most die off as they move
19 northeasterly over cooler waters and less favorable atmospheric conditions. In the past 50 years,
20 three hurricanes have made landfall in Hawai’i, all on the island of Kaua’i. Hurricane Iniki in 1992
21 was the most destructive of these storms, the Category 4 hurricane (recorded wind speeds of 145
22 mph) directly hit Kaua’i causing 6 deaths and \$2.2 billion in damages. Other hurricanes and tropical
23 storms have caused damage through flooding, high winds, and high waves.²⁰

24 3.6.5 PROBABLE IMPACTS AND MITIGATION MEASURES

25 Flooding is expected to have minimal or no adverse impact due to the project area’s location away
26 from flood hazard areas. Similarly, the project location is well outside the tsunami evacuation zone.
27 Due to its underground construction, the irrigation pipe should have minimal risk from
28 earthquakes. The underground location should also limit any possible damages from extreme
29 weather. In the event the irrigation line is broken or damaged, multiple valves will be available to
30 shut off the system.

¹⁸ U.S. Geological Survey. No date. *Earthquake Hazards*. Obtained from
<http://pubs.usgs.gov/gip/hazards/earthquakes.html>.

¹⁹ Hawaiian Electric Company. December 28, 2006. *Investigation of 2006 Oahu Island-Wide Power Outage, PUC Docket
Number 2006-0431*.

²⁰ City and County of Honolulu, Department of Emergency Management. No date. *Hurricanes in Hawaii*. Available at
<http://www1.honolulu.gov/dem/hurr1.htm> as of November 6, 2013.

1 3.7 AIR QUALITY

2 3.7.1 EXISTING CONDITIONS

3 The Clean Air Branch of the DOH, as part of its statewide pollution control responsibilities,
4 monitors ambient levels of Carbon Monoxide (CO), Sulfur Dioxide (SO₂), and Particulate Matter
5 (PM₁₀ and 2.5). The nearest monitoring station to the project site is located approximately 10
6 miles away in Honolulu where from 2007 to 2011 readings did not exceed Federal and State
7 standards for CO, SO₂, PM₁₀, and PM 2.5.²¹

8 At a local level, air quality at the project site should be limited to dust generated from agricultural
9 activities and emissions from motor vehicles that occasionally pass through the site.

10 3.7.2 PROBABLE IMPACTS AND MITIGATION MEASURES

11 During construction, an increase in emissions would occur as a result of construction vehicles and
12 equipment accessing and working on the site. Short-term impact associated with installation of the
13 underground irrigation pipe would include dust created by the excavation, stockpiling, and hauling
14 of soil. BMPs will be employed during construction to minimize air quality impacts. These measures
15 would likely include periodically wetting down of excavated material and unpaved construction
16 areas, use of dust screens, and managing the amount of areas uncovered.

17 No adverse air quality impacts are anticipated from the proposed action after construction.

18 3.8 NOISE

19 3.8.1 EXISTING CONDITIONS

20 The project parcels are currently vacant, so ambient noise at the project site is limited. Noise can
21 occasionally be heard from farm or maintenance vehicles, and natural sounds from wildlife and
22 weather. Faint sounds would be audible from CTAHR and other nearby farming operations. The
23 nearest noise-sensitive receptors to the project site are residences located approximately 0.5 miles
24 away on Lupe Street.

25 3.8.2 PROBABLE IMPACTS AND MITIGATION MEASURES

26 During construction, short-term, temporary noise is expected to occur. Some of the noisy
27 equipment that may be used includes backhoes, compaction equipment, flatbed trucks, and diesel
28 power generators. Noise suppressant devices, such as mufflers, would to be used to help reduce
29 objectionable noise levels. Construction activities would comply with the State DOH, Chapter 11-46,
30 Community Noise Control regulations. Compliance with these regulations would be part of the
31 project’s construction contract and responsibility of the selected contractor.

32 No adverse noise impacts are anticipated from the proposed action.

²¹ State of Hawai’i, Department of Health. 2012. *Annual Summary 2011 Air Quality*.

1 3.9 CIRCULATION AND TRAFFIC

2 3.9.1 EXISTING CONDITIONS

3 The two-lane Kalaniana'ole Highway enters Waimānalo from both and east and west. It is the only
4 road access to the ahupua'a. From Kalaniana'ole Highway, Hihimanu Street connects to the two
5 access points for the project area: through a secured gate on Waikupanaha Street; and off of Ahiki
6 Street through the University of Hawai'i, CTAHR's research station and through two secured gates.
7 Traffic within the gated roadways is limited to those accessing the agricultural lands in the
8 immediate vicinity.

9 3.9.2 PROBABLE IMPACTS AND MITIGATION MEASURES

10 The proposed action is expected to generate minimal short-term impacts during construction
11 associated with vehicles traveling to and from the project site. Access to the site will likely occur via
12 Waikupanaha Street, in order to avoid CTAHR. Before construction activities begin, DOA will
13 coordinate access with CTAHR and farmers who use the limited-access roads in order to ensure
14 that any impacts are minor. After construction is complete, activities associated with the new
15 irrigation pipe would be limited to periodic maintenance.

16 3.10 INFRASTRUCTURE

17 3.10.1 SEWER, WATER, AND IRRIGATION

18 The project site does not have a wastewater system. There are no known wastewater pipes or toilet
19 facilities within the site.

20 The project alignment crosses a Board of Water Supply (BWS) water transmission line that
21 connects the Waimānalo Well III production facility with the Waimānalo treated water distribution
22 system. The project site does not have a connection for drinking water.

23 The project is located at the eastern end of the Waimānalo Irrigation System. The system collects
24 water from Maunawili Stream, Ainoni Stream, and Makawao Stream within the Maunawili
25 Watershed, transports it via a tunnel under Aniani Nui Ridge, and then distributes the water to over
26 160 farmers in Waimānalo.²² Within the project area, the main irrigation system consists of a
27 section of unpressurized pipe and a section of open ditch. The system is described in greater detail
28 in Section 1.1.2. A map of the system is provided in Figure 1.2.

29 3.10.2 SOLID WASTE

30 During construction, workers will use portable toilets. The project will not bring any population to
31 the project site, and will not create any new solid waste demand.

32 3.10.3 ELECTRICITY, TELEPHONE, AND CABLE

33 While electric, telephone and cable lines extend to the urban areas north and east of the project site,
34 the site and the terminus of the line after improvements do not have service.

²² State of Hawai'i. 2004. *Agriculture Water Use and Development Plan*.

1 3.10.4 FUEL AND GAS LINES

2 No fuel or gas lines serve the project site and the fields at the terminus of the improved irrigation
3 line.

4 3.10.5 DRAINAGE

5 Storm water runoff follows the natural contours of the region. The developed drainage system on
6 the project site is limited to culverts that cross under the unnamed dirt road. The historical ditch
7 system can direct upland runoff onto agricultural lands during times of heavy rain. Due to the heavy
8 vegetation found throughout the parcels where the project is located (see more detail in Section
9 3.5.1), most rain is absorbed by the ground in the lower slopes and flat areas.

10 3.10.6 PROBABLE IMPACTS AND MITIGATION MEASURES

11 The proposed action does not involve the construction of a drinking water or sewer system.
12 Drinking water and wastewater needs during construction would be handled by the contractor and
13 would likely involve the provision of bottled water and portable toilets. The project will be
14 coordinated with BWS to minimize any impacts to the BWS transmission line. The proposed action
15 will not modify any developed drainage structures. BMPs will be implemented during construction
16 to control surface runoff and soil erosion. After construction is complete, the proposed action will
17 not increase and modify storm water runoff on the project site.

18 No impact on electric, telephone, cable, fuel or gas transmission lines is anticipated.

19 3.11 SOCIO-ECONOMIC SETTING

20 3.11.1 EXISTING AND ANTICIPATED CONDITIONS

21 Waimānalo is a rural area within the Ko‘olau Poko Sustainable Community Plan area. That area is
22 identified by the City as an “urban-fringe” area in which little further growth in housing or
23 population is anticipated in the next few decades.²³

24 Waimānalo extends from the Ko‘olau mountains to the ocean. The area can be identified as a
25 Neighborhood Board Area (No. 32) or as Zip Code Tabulation Area (ZCTA) 96795. In 2000, the
26 Neighborhood Board Area resident population was 11,234. By 2010, the population had declined to
27 11,141.²⁴ Recent resident population characteristics are available for the Waimānalo ZCTA from the
28 American Community Survey (ACS) for the years 2008 through 2012, as shown in Table 3-2 and
29 Table 3-3. The Waimānalo population is young, in contrast to the island median. Native Hawaiians
30 and Pacific Islanders account for most of the population. Mixed-race identifications are more
31 common than for the island as a whole.

²³ City and County of Honolulu, *General Plan*. Last amended 2002. Available as of 7/21/14 at <http://www.honolulu.gov/Portals/0/pdfs/planning/generalplan/GPReport.pdf>.

²⁴ State of Hawai‘i, Department of Business, Economic Development and Tourism. *2012 State of Hawai‘i Data Book*, Table 1.15. Available at <http://dbedt.hawaii.gov/economic/databook/db2012/> as of July 21, 2014. This historical comparison is used for lack of evidence that ZCTA boundaries did not change from 2000 to 2010.

1 **Table 3-2. Demographic Characteristics, Waimānalo and City and County of Honolulu**

	City and County of Honolulu	Waimānalo 96795
Total population	955,215	10,037
Median Age	37.7	32.9
Race (alone or in combination)		
White	37.3%	44.3%
Black or African American	3.6%	2.5%
American Indian and Alaska Native	2.1%	2.3%
Asian	61.6%	50.2%
Native Hawaiian and Other Pacific Islander	23.6%	71.5%
Some other race	2.3%	2.7%
Average Number of Race Identifications/Person	1.31	1.73
Households	308,490	2,448
Average Household Size	2.98	3.97
Owner-occupied	56.4%	66.4%
Renter-occupied	43.6%	33.6%

2

3 SOURCE: U.S. Census, American Community Survey, 2008-2012, available via American FactFinder
 4 (<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>).

5 Waimānalo has a higher unemployment rate than the County as a whole, and a lower median
 6 household income. The distribution of resident workers by industry is similar to the island-wide
 7 distribution. While Waimānalo has extensive farm land, the share of the population actually
 8 involved with agriculture is small. In 2012, some 96 business establishments were based in
 9 Waimānalo, but only five were in agriculture. Some 1,132 persons worked for establishments in
 10 Waimānalo, of which 25 or fewer were in agriculture.²⁵

11 The ACS data show that the percentage of the population in poverty in Waimānalo is higher than
 12 island-wide. Children in the area are more likely to be living in poverty than children in other areas.
 13 On the other hand, the incidence of poverty among the elderly is low.

²⁵ U.S. Census. *ZIP Code Business Patterns*, 2012, for 96795. Available at <http://censtats.census.gov/cgi-bin/zbpnaic/zbpsect.pl> as of July 21, 2014. This source may undercount the number of persons actually employed in the area, since workers for firms with multiple sites are typically counted at the firm's headquarters.

1

Table 3-3. Economic Characteristics, Waimānalo and City and County of Honolulu

	City and County of Honolulu	Waimānalo 96795
Employment Status		
Population 16 years and over	768,597	7,663
Civilian labor force	475,089	4,731
Percent Unemployed	5.8%	8.9%
Average commute time (minutes)	27.0	33.3
Industry of civilian workers		
Agriculture, forestry, fishing and hunting, and mining	0.7%	2.1%
Construction	7.0%	9.7%
Manufacturing	3.5%	3.7%
Wholesale trade	2.5%	2.6%
Retail trade	11.4%	11.3%
Transportation and warehousing, and utilities	5.9%	6.5%
Information	1.8%	0.8%
Finance and insurance, and real estate and rental and leasing	6.9%	5.0%
Professional, scientific, and management, and administrative and waste management	10.2%	9.2%
Educational services, and health care and social assistance	21.6%	22.4%
Arts, entertainment, and recreation, and accommodation and food services	14.2%	13.5%
Other services, except public administration	4.4%	5.1%
Public administration	9.8%	8.3%
Median Household Income	\$72,292	\$56,441
Persons below the Poverty Threshold		
Share of all persons	9.6%	12.7%
Share of persons under 18	12.7%	17.0%
Share of persons 65 or older	7.2%	2.5%

2

3 SOURCE: U.S. Census, American Community Survey, 2008-2012. Available via American FactFinder
4 (<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>).

5 3.11.2 PROBABLE IMPACTS AND MITIGATION MEASURES

6 The project will support agriculture in Waimānalo. No further social impact is anticipated. No
7 mitigation is necessary.

8 Construction will support a few jobs, for less than a year's time. Operation of the new irrigation
9 system will deliver more water and will deliver it closer to active farming than under No Action
10 conditions, and so will support farming as an economic activity.

1 3.12 PUBLIC SERVICES AND FACILITIES

2 3.12.1 POLICE, FIRE, AND EMERGENCY SERVICES

3 The Honolulu Police Department’s Patrol District No.4 provides police services to the Windward
4 Coast from Waimānalo to Kahuku. The district is divided into Sector 1 (Waimānalo), Sector 2
5 (Kailua), Sector 3 (Kāne’ohe, Kahalu’u), and Sector 4 (Ka’a’awa, Kuhuku, Kawela Bay). The district
6 station is Kāne’ohe and the nearest sub-station to the project site is located in Kailua.²⁶ DLNR
7 Division of Conservation and Resource Enforcement provides police services within Conservation
8 districts, which includes the areas approximately 0.5-miles inland from the project.²⁷

9 Fire service to the project area is provided by Honolulu Fire Department (HFD). The HFD Battalion
10 No. 3 serves the Windward Coast from Waimānalo to Kahuku. The nearest fire station to the project
11 site is Waimānalo Fire Station No. 27 on Kalaniana’ole Highway.²⁸

12 The City Department of Emergency Services provides ambulance services throughout O’ahu
13 through its Emergency Medical Services Division (EMS). The project site is within the EMS
14 Waimānalo Emergency Services Response Area. HFD also co-responds with first responder
15 emergency services.²⁹

16 3.12.2 EDUCATION

17 Waimānalo Elementary and Intermediate School, located on Kalaniana’ole Highway, is north of the
18 project site. Pope Elementary School is in Waimānalo Beach, to the east. Both are about a mile from
19 the site. A Kamehameha Schools preschool is located on Ilauhole Street, near Pope Elementary.

20 3.12.3 PARKS AND RECREATION AREAS

21 The nearest park is Waimānalo District Park, located on Hihīmanu Street, inland from the
22 Waimānalo Elementary and Intermediate School. It is about a half-mile north and west of the
23 project site. Beach parks are located along the coast. These include Bellows Field Beach Park (with
24 sections open to the public on weekends), Waimānalo Bay State Recreation Area and Waimānalo
25 Beach Park.

26 3.12.4 PROBABLE IMPACTS AND MITIGATION MEASURES

27 The project will not bring or move any people to the project area. No impacts on public services and
28 facilities are anticipated. No mitigation is required.

26 City and County of Honolulu, Police Department. No date. *Patrol Districts*. Available as 1/23/14 at http://www.honoluluupd.org/departments/index.php?page=patrol_districts

27 State of Hawai’i, Department of Land and Natural Resources. No date. *Division of Conservation and Resource Enforcement, Strategic Plan 2009-2014*.

28 City and County of Honolulu, Fire Department. 2003. *Honolulu Fire Department*. Available as of 1/23/14 at <http://www1.honolulu.gov/budget/execbgt/fy03hfd.pdf>

29 City and County of Honolulu, Department of Emergency Services. 2013. *Honolulu Emergency Services Department Unit Locations and Response Areas*. Available as of 12/26/13 at <http://www1.honolulu.gov/esd/ems/redicustomerservicenumber.pdf>

1 3.13 VISUAL AND AESTHETIC RESOURCES

2 3.13.1 EXISTING CONDITIONS

3 The project area is overgrown farm land. With relocation of farmers to the area, the appearance of
4 the fields will change, but will remain rural.

5 3.13.2 PROBABLE IMPACTS AND MITIGATION MEASURES

6 Construction of the project will involve heavy equipment on site for a short time. Trenches will be
7 dug to lay the new pipe, and then filled. After construction, the irrigation line will be buried. No
8 lasting aesthetic impact is anticipated.

9 3.14 CUMULATIVE IMPACTS

10 The project reduces loss of water from the Waimānalo Irrigation System and extends the main
11 irrigation line to reach the site where farming activity is being relocated. As such, it contributes to
12 the impact of the Waimānalo Irrigation System, as set forth in the Waimānalo Watershed Plan and
13 EIS. No separate cumulative impact of the proposed action is anticipated.

1 4 LAWS, PLANS, POLICIES, AND CONTROLS

2 4.1 FEDERAL LAWS

3 The project does not involve the use of federal lands or funds. Regardless, an analysis of the
4 project’s consistency with federal environmental policies has been performed.

5 4.1.1 COASTAL ZONE MANAGEMENT ACT OF 1972

6 The federal Coastal Zone Management Act of 1972 (CZMA) establishes a program for management,
7 development, and protection of the nation’s coastal zone. The states are authorized to develop and
8 implement their own Coastal Zone Management (CZM) program, hence the Hawai’i CZM Program.
9 Hawai’i Revised Statutes (HRS) 205A-1 establishes that all lands within the State are within the
10 CZM area. The Office of Planning under the State Department of Business, Economic Development
11 and Tourism is designated as the lead agency to administer this program in Hawai’i. The individual
12 counties of the State are responsible for identifying and establishing the Special Management Areas
13 (SMA) and shoreline setback areas of their jurisdiction.

14 Discussions of the project’s relationship to the Hawai’i CZM Program and City and County of
15 Honolulu’s (City’s) SMA are provided respectively, in Sections 4.2.5 and 4.3.6 of this chapter.

16 4.1.2 RIVERS AND HARBORS ACT OF 1899

17 The Rivers and Harbors Act makes it illegal to discharge refuse matter of any kind into the
18 navigable waters of the U.S. without a permit. The Rivers and Harbors Act also makes it illegal to
19 excavate, fill, or alter the course, condition, or capacity of any port, harbor, channel, or other
20 navigable waters and their tributaries without a permit. Although many activities covered by the
21 Rivers and Harbor Act are regulated under the Clean Water Act, the Rivers and Harbors Act retains
22 independent vitality. The Act is administered by the U.S. Army Corps of Engineers.

23 The proposed action does not involve activities near any streams, water bodies or other waters of
24 the U.S. The project alignment crosses the location of two former reservoirs (shown in Figure 3-5)
25 which have subsequently been drained and filled. Section 3.3 describes the water resources in the
26 project area and Section 3.10 describes drainage.

27 4.1.3 ENDANGERED SPECIES ACT OF 1973

28 The purpose of the Endangered Species Act (ESA) is to protect critically imperiled species and to
29 conserve the ecosystems upon which they depend. ESA’s provisions encompass plants and
30 invertebrates as well as vertebrates. The U.S. Fish and Wildlife Service (USFWS) and National
31 Oceanic and Atmospheric Administration, which includes the National Marine Fisheries Service,
32 administer the Act.

33 Section 7 of the ESA requires that federally-funded projects not jeopardize species listed as
34 threatened or endangered or adversely modify designated critical habitats. The project is not
35 receiving any federal funds. A natural resources survey conducted for this environmental
36 assessment (EA) (described in Section 3.5) observed no endangered species in the project area. Due
37 to the possibility that four endangered species—the Hawaiian coot, the Hawaiian common
38 moorhen, the Hawaiian stilt, and the Hawaiian hoary bat—may occasionally occur in the vicinity of

1 the project area appropriate measures will be implemented, as described in Section 3.5.3. The
2 precautionary management measures were developed, in part, through consultation with USFWS.
3 Based on the proposed action and management measures the project is unlikely to have any
4 adverse impacts on listed species.

5 4.1.4 MIGRATORY BIRD TREATY ACT OF 1918

6 The purpose of the Migratory Bird Treaty Act is to protect migratory birds and birds native to the
7 U.S. The Act prohibits the unregulated “taking” of covered species, which is defined as “hunting,
8 pursuing, killing, possessing or transporting any migratory bird, nest, egg or part thereof.” The Act
9 extends to all bird species native to the U.S., even those that are not migratory. The Act is
10 administered by the USFWS.

11 The biological assessment survey conducted for this EA identified three species in the surrounding
12 area that are covered under the Migratory Bird Treaty Act (described in Section 3.5). The project is
13 unlikely to have any adverse impact on the covered species.

14 4.1.5 NATIONAL HISTORIC PRESERVATION ACT OF 1966

15 The National Historic Preservation Act of 1966 is legislation intended to preserve historical and
16 archaeological sites in the U.S. The Act created the National Register of Historic Places (NRHP), the
17 list of National Historic Landmarks, and in Hawai‘i, the State Historic Preservation Division (SHPD).
18 The Act requires actions that are federally funded, authorized, or implemented take into account
19 the effect a proposed project will have on any district, site, building, structure, or object that is
20 included in or eligible for inclusion on the NRHP. Section 106 of the Act sets up a process involving
21 coordination and consultation with the local SHPD. Since the project is receiving no federal funds,
22 the project is not subject to Section 106 requirements. Chapter 6E-8 of the HRS establishes similar
23 responsibilities for State projects to be reviewed by SHPD (described in Section 4.2.4).

24 Section 3.4 of this document, entitled “Archaeological and Cultural Resources,” summarizes the
25 archaeological and cultural studies prepared for the project site.

26 4.1.6 ENVIRONMENTAL JUSTICE

27 Executive Order 12898 regarding Environmental Justice requires each federal agency and federal
28 aid recipients to take appropriate steps to identify and address “disproportionately high and
29 adverse human health or environmental effects” of federal projects on minority or low income
30 populations. Similar non-discrimination protection is provided by Title VI of the Civil Rights Act of
31 1964, as amended.

32 The proposed action does not have an adverse impact on any particular group. The proposed action
33 will benefit farmers served by the Waimānalo Irrigation System through increasing the reliability of
34 the system.

35 4.1.7 PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH AND SAFETY 36 RISKS

37 Executive Order 13045 calls on federal agencies to ensure that their policies, programs, activities,
38 and standards address disproportionate risks to children that result from environmental health
39 risks or safety risks. The proposed project is located on secured agricultural lands, away from

1 where children would normally be present. The proposed action is not anticipated to pose any
2 disproportionate risks to children.

3 4.2 STATE POLICIES AND STATUTES

4 4.2.1 HAWAI'I STATE PLAN

5 The Legislature in 1978 adopted the Hawai'i State Planning Act (State Plan), HRS, to establish
6 direction and provide long-range planning for the State. The State Plan consists of a series of broad
7 goals, objectives, and policies that serve as guidelines for future long-term growth and
8 development. It further (1) provides a basis for determining priorities and allocating limited
9 resources; (2) seeks to improve coordination of federal, State, and county plans, policies, programs,
10 projects, and regulatory activities; and, (3) establishes a system for plan formulation and program
11 coordination to provide for an integration of all major State and county activities.

12 The proposed action supports and is consistent with the following State Plan objectives and
13 policies:

14 **226-7 Objective and Policies for the Economy – Agriculture.**

15 *(a)(2) Growth and development of diversified agriculture throughout the State.*

16 *(b)(10) Assure the availability of agriculturally suitable lands with adequate water to*
17 *accommodate present and future needs.*

18 The project will upgrade a section of the Waimānalo Irrigation System distribution system. The
19 project will decrease water loss and provide pressurized water, which will improve the reliability of
20 the system. The improved irrigation system will contribute to achieving the above goal.

21 **226-13 Objectives and policies for the physical environment--land, air, and water** 22 **quality.**

23 *(b)(2) Promote the proper management of Hawai'i's land and water resources.*

24 Through reducing water loss in the Waimānalo Irrigation System, the project will improve efficient
25 management of water within the system. The State's *Agriculture Water Use and Development Plan*
26 (AWUDP) and the 1981 *Waimānalo Watershed Plan and EIS* planned for increasingly efficient
27 management in Waimānalo Irrigation System through upgrading the system.

28 **226-16 Objectives and Policies for Facility Systems – Water**

29 *(b)(1) Assist in improving the quality, efficiency, service, and storage capabilities of*
30 *water systems for domestic and agricultural use.*

31 The project reduces water loss in the Waimānalo Irrigation System, resulting in a more efficient
32 agricultural water system. Additionally, through providing water under pressure, reliability of
33 irrigation water will be improved.

1 4.2.2 STATE LAND USE LAW

2 The Hawai'i State Legislature adopted the State Land Use Law in 1961 to protect Hawai'i's valuable
3 lands from development that resulted in short-term gains for a few and long-term losses to the
4 income and growth potential of the State's economy. To achieve this end, the Legislature
5 established an overall framework of land use management. HRS Chapter 205 placed all lands within
6 the State in one of four land use districts: Urban, Agricultural, Conservation, or Rural (the Rural
7 District was added in 1963), and established the State Land Use Commission to administer the
8 designated land use districts.

9 The project site is located in the Agriculture District. See Figure 4-1. This district encompasses
10 lands with capacity for cultivation; lands within the district are exclusively for agricultural uses.
11 The proposed action supports agricultural activities on land designated as part of the Agriculture
12 District.

13 HRS Chapter 46-4 provides counties with the responsibility for enacting zoning regulations within
14 the Agriculture District, provided that regulations are consistent with State Land Use Law. See
15 Section 4.3.5 for discussion of City zoning.

16 4.2.3 STATE ENVIRONMENTAL POLICY

17 HRS Chapter 344 establishes an environmental policy that (1) encourages productive and enjoyable
18 harmony between people and their environment; (2) promotes efforts that will prevent or
19 eliminate damage to the environment and biosphere; (3) stimulates the health and welfare of
20 humanity; and (4) enriches the understanding of the ecological systems and natural resources
21 important to the people of Hawai'i.

22 The proposed action is consistent with following sections of the State Environmental Policy:

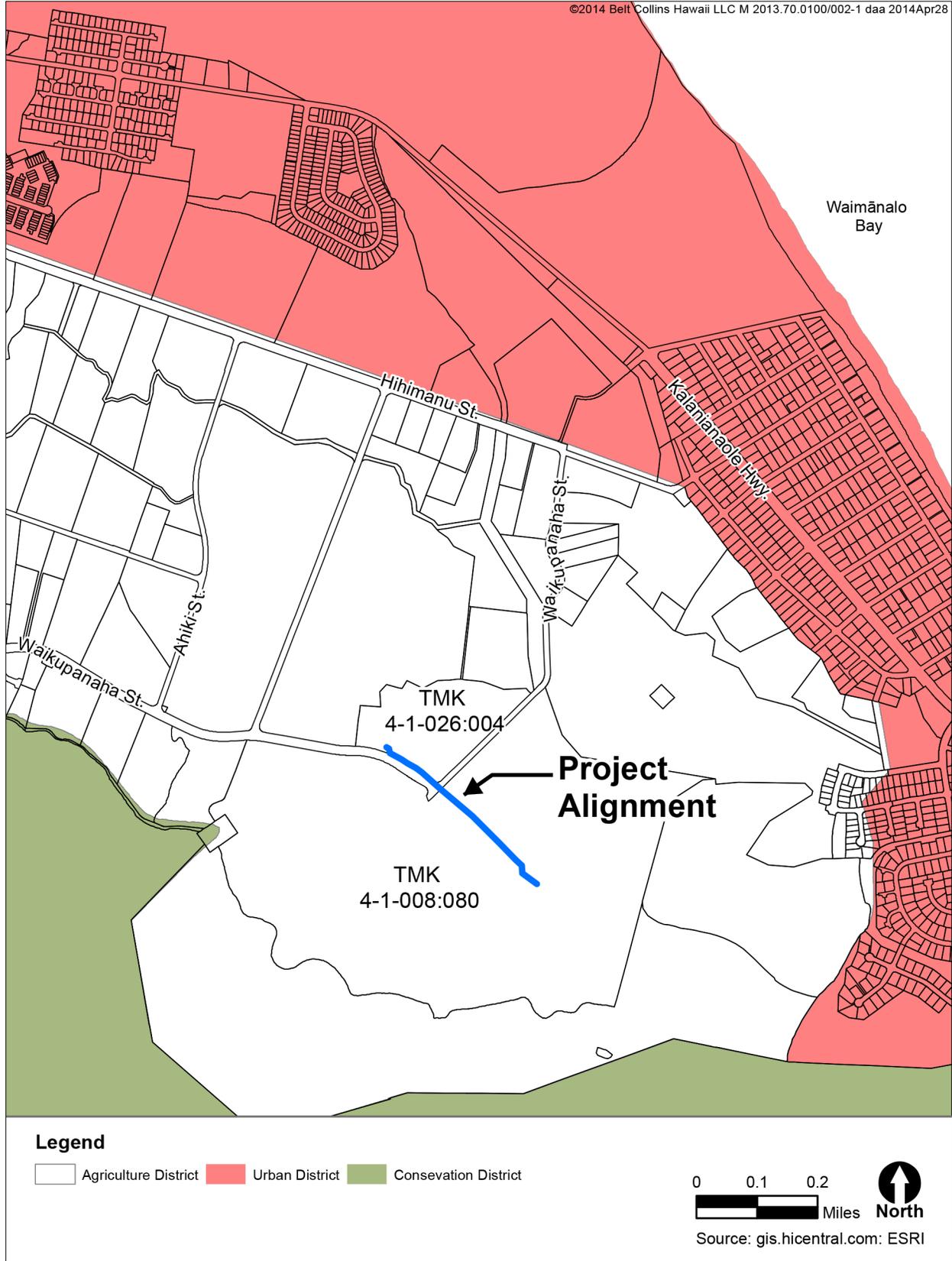
23 *HRS 344-3(1) Conserve the natural resources, so that land, water, mineral, visual, air*
24 *and other natural resources are protected by controlling pollution, by preserving or*
25 *augmenting natural resources, and by safeguarding the State's unique natural*
26 *environmental characteristics in a manner which will foster and promote the general*
27 *welfare, create and maintain conditions under which humanity and nature can exist in*
28 *productive harmony, and fulfill the social, economic, and other requirements of the*
29 *people of Hawaii.*

30 *HRS 344-3(2)(B) Creating opportunities for the residents of Hawai'i to improve their*
31 *quality of life through diverse economic activities which are stable and in balance with*
32 *physical and social environments.*

33 *HRS 344-4(2)(B) Promote irrigation and waste water management practices which*
34 *conserve and fully utilize vital water resources.*

35 *HRS 344-4(5)(B) Promote and foster the agricultural industry of the State and*
36 *preserve and conserve productive agricultural lands.*

37 The project will upgrade a section of the Waimānalo Irrigation System, resulting in a more efficient
38 use of irrigation water resources. The project directly supports the agricultural industry.



1
2 **Figure 4-1. State Land Use Districts**

1 4.2.4 STATE HISTORIC PRESERVATION PROGRAM

2 The State Historic Preservation Program, HRS 6E, is intended to conserve and develop the historic
3 and cultural property within the State for the public good. The legislation declares that it shall be
4 the public policy of the State to provide leadership in preserving, restoring, and maintaining
5 historic and cultural property, and to conduct activities, plans, and programs in a manner
6 consistent with the preservation and enhancement of historic and cultural property. Chapter 6E-8
7 requires that a proposed State project which may affect historic property or a burial site must
8 conduct consultation with the SHPD and that the project shall not commence until the SHPD has
9 given written concurrence.

10 In 1981, SHPD listed the Waimānalo Ditch System as eligible for NRHP (Site Number 50-80-15-
11 4042).¹

12 Section 3.4 of this document, entitled “Archaeological and Cultural Resources,” describes the
13 archaeological and cultural studies that have been conducted for the project site. These studies
14 have found no evidence of cultural resources or practices that might be affected by the project, and
15 have documented five remnants of the Historic Kailua Ditch. In the opinion of the archaeologist, no
16 further study is warranted. Consultation with SHPD will be conducted in accordance with Chapter
17 6E-8.

18 4.2.5 HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM

19 The Hawai'i CZM Program was promulgated in 1977 in response to the federal CZMA. Per HRS
20 205A-1, the areas encompassed by the CZM are all the lands and waters of the State. The next
21 sections assess the project in relation to the objectives and policies of the CZM Program.

22 4.2.5.1 Recreational Resources

23 The proposed project will not interfere with, nor obstruct public efforts to meet the CZM objective
24 and policies relating to providing coastal recreational opportunities accessible to the public.

25 4.2.5.2 Historic Resources

26 Studies have been conducted to investigate and identify archaeological and cultural resources that
27 might be impacted by the proposed project. See Section 3.4.3 of this document and Appendices A
28 and B. No adverse impacts on archaeological or cultural resources are anticipated.

29 4.2.5.3 Scenic and Open Space Resources

30 The project will not interfere with nor obstruct public efforts to meet the CZM objective and policies
31 relating to the protection, preservation, and restoration or improvement of the quality of coastal
32 scenic and open space resources. The proposed action involves the installation of underground
33 irrigation pipe and appurtenances, which will not impact any views or open space resources.

34 4.2.5.4 Coastal Ecosystems

35 The proposed project is located approximately a mile inland from the shoreline and would not
36 adversely impact valuable coastal ecosystems, including offshore reefs.

¹ T.S. Dye & Colleagues, Archaeologists, Inc. 2008. *Historic Properties Assessment for the Proposed T-Mobile West Waimānalo Cell Site*.

1 4.2.5.5 Economic Uses

2 The CZM objective and policies pertaining to economic uses are to provide for public or private
3 facilities and improvements important to the State's economy in suitable locations. The proposed
4 action involves installation of underground irrigation pipe on agricultural land, and is in line with
5 the CZM economic objective.

6 4.2.5.6 Coastal Hazards

7 Due to the proposed project's inland location, there is no risk to the proposed project from coastal
8 hazards.

9 4.2.5.7 Managing Development

10 The proposed project will not interfere with public efforts to improve the development review
11 process, communication, and public participation in the management of coastal resources and
12 hazards.

13 4.2.5.8 Public Participation

14 The proposed project is open to public participation by virtue of this EA preparation and public
15 comment/response process. Through this State environmental review process, information and
16 public awareness are generated on the project and its affected environment.

17 4.2.5.9 Beach Protection

18 Due to the proposed project's inland location, there is no risk of adverse impacts to beaches for
19 public use and recreation.

20 4.2.5.10 Marine Resources

21 The proposed project is located approximately one mile from the ocean. Best Management
22 Practices would be employed during construction to control runoff and erosion.

23 The proposed project would not obstruct public efforts to implement the State's ocean resources
24 management plan.

25 4.2.6 STATE WATER CODE AND HAWAI'I WATER PLAN

26 The State Water Code, HRS 174C, is intended to protect, control, and regulate use of the State's
27 water resources for the benefit of the people. HRS 174C incorporated the Public Trust Doctrine
28 from the State Constitution into the Water Code.

29 *It is recognized that the waters of the State are held for the benefit of the citizens of*
30 *the State. It is declared that the people of the State are beneficiaries and have a right*
31 *to have the waters protected for their use. (HRS 174C-2)*

32 The Water Code established the Hawai'i Water Plan (HWP) to comprehensively address rules and
33 policy regarding water resources. HRS 174C established the Commission on Water Resource
34 Management (CWRM) to have overall responsibility for the HWP and the authority to prepare,
35 update, and implement the HWP. The HWP is comprised of eight documents, with responsibility for
36 preparation of the documents assigned to different State agencies and county governments:

- 37 • Water Resource Protection Plan prepared by the CWRM
- 38 • Water Quality Plan prepared by the Department of Health

- 1 • State Water Projects Plan prepared by the Department of Land and Natural Resources
- 2 (DLNR)
- 3 • Agricultural Water Use and Development Plan prepared by the DOA
- 4 • Water Use and Development Plans, one plan for each of the four counties, prepared by the
- 5 respective counties

6 The Water Resource Protection Plan, Agricultural Water Use and Development Plan, and O‘ahu
7 Water Use and Development Plan are relevant to the project and are described in the following
8 sections; the O‘ahu Water Management Plan is described in the City section of this chapter in
9 Section 4.3.3.

10 4.2.6.1 Water Resource Protection Plan

11 The objective of the Water Resource Protection Plan (WRPP) is to protect and sustain ground and
12 surface water resources, watersheds, and natural stream environments. The WRPP contains
13 general water management principles and policies; resource inventories and assessments;
14 monitoring plans; existing demand reporting and future demand forecasting; program directives
15 and policies addressing conservation, augmentation, watershed protection, water quality, use, and
16 drought planning; and, priority recommendations and an implementation plan.

17 The project was originally included in the 1981 Waimānalo Watershed Plan and EIS recommended
18 actions. It was designed to conserve water within the Waimānalo Irrigation System and thus to
19 augment the supply of water available for farmers. By reducing water loss within the irrigation
20 system, the project is consistent with the WRPP’s goals and objectives.

21 4.2.6.2 Agriculture Water Use and Development Plan

22 The intention of the Agriculture Water Use and Development Plan (AWUDP) is to provide a plan to
23 rehabilitate and maintain the irrigation systems constructed during the plantation-era for future
24 agricultural use. With the AWUDP, the State Department of Agriculture was to: inventory the State’s
25 irrigation systems; identify maintenance and rehabilitation needs for the irrigation systems and
26 costs for the work; develop criteria to prioritize the needed work; develop a 5-year program to
27 repair the systems; and, develop a long-range plan to manage the systems.

28 The Waimānalo Irrigation System is one of ten public irrigation systems included in the AWUDP.
29 The AWUDP proposes maintenance and capital improvement projects for the Waimānalo Irrigation
30 System, establishes project prioritization criteria, and includes a five-year program. In 2003, when
31 the AWUDP was finalized, the Waimānalo Irrigation System had benefited from the implementation
32 of significant improvements as proposed in the 1981 Waimānalo Watershed Plan and EIS and the
33 1984 Maunawili Ditch Improvements EIS. The work completed included the replacement of the
34 majority of the originally open, unlined ditch distribution system with ductile iron pipes. The
35 AWUDP intends to improve water management in Waimānalo Irrigation System through replacing
36 remaining portions of open, unlined ditches of the collection and distribution systems; constructing
37 a system to treat sewage effluent and distribute it for irrigation use; enhancing environmental
38 quality through retaining farmland in agriculture uses; preserving the historic ditch system; and,
39 providing a solid waste collection site. Most of the Waimānalo Irrigation System recommendations

1 in the AWUDP are carried forward from the Waimānalo Watershed Plan and EIS and the Maunawili
2 Ditch Improvements EIS.

3 The project is included in the AWUDP. It will upgrade a section of the distribution system.

4 4.2.7 DEPARTMENT OF HAWAIIAN HOME LANDS – WAIMĀNALO REGIONAL
5 PLAN

6 The Department of Hawaiian Home Lands (DHHL) created the Waimānalo Regional Plan to guide
7 development and use of the agency’s nearly 2,000 acres in Waimānalo. A central component of the
8 plan is the establishment of the Waimānalo Homestead Village Center, which builds on existing
9 DHHL residential and institutional uses by providing new residential, recreational, commercial,
10 light industrial, and agricultural in the surrounding areas.

11 The DHHL plan proposes homestead and recreational/open space development in the
12 approximately 52-acre Wong Farm parcel (TMK 4-1-008:079) near the project site. The Wong Farm
13 parcel was transferred from DLNR to DHHL as part of the settlement under Act 14, Special Session
14 Laws of Hawai’i, 1995. The parcel is currently served by the Waimānalo Irrigation System at the
15 eastern terminus of the system. Once DHHL has received the necessary subdivision approvals,
16 irrigation service will be discontinued to the parcel and the farmer using the land will be relocated
17 to the currently vacant TMK 4-1-008:080.

18 4.3 CITY AND COUNTY OF HONOLULU

19 4.3.1 GENERAL PLAN

20 The City’s General Plan (last amended in 2002) is comprised of 11 sections: Population; Economic
21 Activity; Natural Environment; Housing; Transportation and Utilities; Energy; Physical
22 Development and Urban Design; Public Safety; Health and Education; Culture and Recreation; and
23 Government Operations and Fiscal Management. The section on Economic Activity, Physical
24 Development and Urban Design, and Culture and Resources are relevant to this EA and are
25 presented and discussed in Table 4-1.

Table 4-1. Key Sections of the General Plan

Economic Activity
OBJECTIVE A: To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living.
Policy 1: Encourage the growth and diversification of Oahu's economic base.
COMMENT: By improving the Waimānalo Irrigation System, the project supports agricultural activities, which are identified as an important part of O’ahu’s diversified economic base.

Table 4-1. Key Sections of the General Plan

<p>OBJECTIVE C: To maintain the viability of agriculture on Oahu</p>
<p>Policy 1: Assist the agriculture industry to ensure the continuation of agriculture as an important source of income and employment.</p>
<p>Policy 5: Maintain agricultural land along the Windward, North Shore, and Waianae coasts for truck farming, flower growing, aquaculture, livestock production, and other types of diversified agriculture</p>
<p>Policy 7: Encourage the use of more efficient production practices by agriculture, including the efficient use of water.</p>
<p>COMMENT: The proposed action will improve the Waimānalo Irrigation System by decreasing water loss and enhancing reliability, which will result in more efficient use of water resources to support agricultural activities in Waimānalo.</p>
<p>Physical Development and Urban Design</p>
<p>OBJECTIVE D: To maintain those development characteristics in the urban-fringe and rural areas which make them desirable places to live.</p>
<p>Policy 4: Maintain rural areas as areas which are intended to provide environments supportive of lifestyle choices which are dependent on the availability of land suitable for small to moderate size agricultural pursuits, a relatively open and scenic setting, and/or a small town, country atmosphere consisting of communities which are small in size, very low density and low rise in character, and may contain a mixture of uses.</p>
<p>COMMENT: The proposed action supports agricultural activities and rural lifestyle in Waimānalo.</p>
<p>Culture and Resources</p>
<p>OBJECTIVE B: To protect Oahu's cultural, historic, architectural, and archaeological resources.</p>
<p>Policy 2: Identify, and to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.</p>
<p>COMMENT: Cultural and archaeological studies that were conducted for this EA, as described in Section 3.4 of this document, show that the project will not affect cultural, historic, architectural or archaeological resources.</p>

- 1 4.3.2 KO'OLAU POKO SUSTAINABLE COMMUNITIES PLAN
- 2 The City Charter requires the establishment of development plans with conceptual schemes for
- 3 accomplishing the objectives and policies of the City's General Plan. The City has created eight
- 4 development plans that include land use maps, statements establishing land use standards and
- 5 principles, statements establishing urban design principles and controls, and statements
- 6 establishing priorities necessary to guide major development activities. Based on the City's policy to

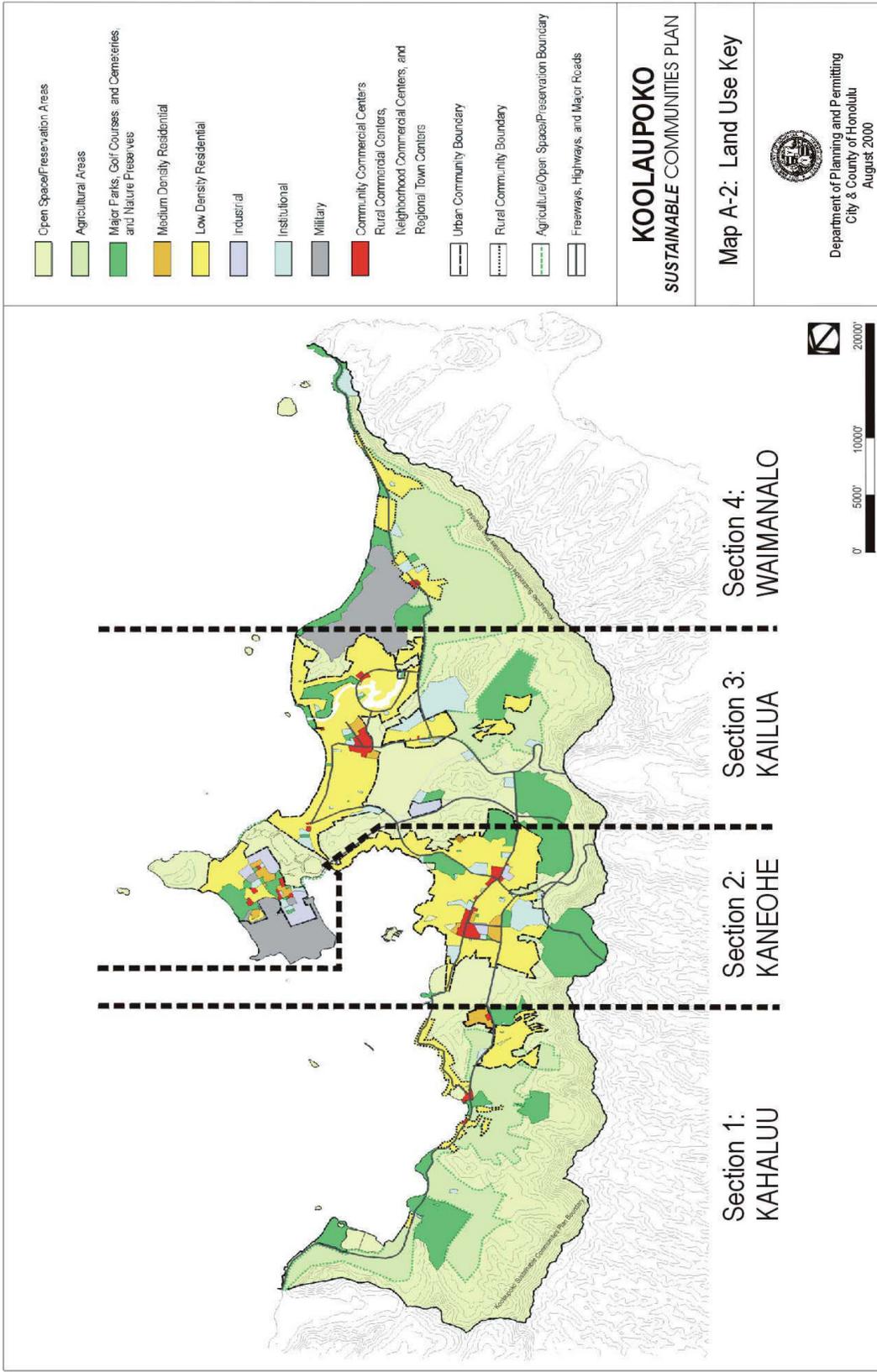
1 guide development to specific regions, the plans for ‘Ewa and the Primary Urban Center, to which
 2 most development is to be directed, are titled “Development Plans,” and the plans for the remaining
 3 six communities, where growth is to remain relatively stable, are titled “Sustainable Communities
 4 Plans.”

5 The Ko’olau Poko Sustainable Communities Plan (SCP) provides a conceptual, long-range vision,
 6 and policies for land use and infrastructure development in the Ko’olaupoko area (see Figure 4-2).²
 7 The Ko’olau Poko SCP identifies a vision guided by ten key elements, including to “preserve and
 8 promote agriculture uses and open space in rural areas.” The plan notes that Waimānalo has the
 9 largest concentration of high-quality agricultural land in the Ko’olau Poko area. The plan’s
 10 provisions related to the Open Space Preservation, Historic and Cultural Resources, and
 11 Agricultural Use are relevant to the proposed project and are presented and discussed in Table 4-2.

Table 4-2. Key Sections of the Ko’olau Poko Sustainable Communities Plan

Open Space Preservation
Policy: Design and locate building and other facilities that are accessory to an agricultural operation in a way that minimizes visual impacts within the view corridors identified (as important). (Section 3.1.3.5 of Ko’olau Poko SCP)
COMMENT: The project involves the installation of underground irrigation pipe and appurtenances, which will not impact any views.
Historic and Cultural Resources
Policy: Preserve significant historic features from earlier periods. (Section 3.4.2 of Ko’olau Poko SCP)
COMMENT: The project will avoid any adverse impacts to the historic Waimānalo Ditch System. See Section 3.4 for more discussion.
Agricultural Use
Policy: Provide support infrastructure, services, and facilities to foster and sustain agricultural operations (Section 3.5.2 of Ko’olau Poko SCP)
COMMENT: The project upgrades the Waimānalo Irrigation System, which is essential infrastructure for supporting agricultural operations in Waimānalo.

² The current version of the Sustainable Communities Plan was passed in 2000. An update is in progress, and a new draft is now being circulated. The City now uses “Ko’olau Poko,” in two words, for the region, and this usage is followed for all references to the City’s plans herein. Proposed changes to the text of the plan involve no substantive changes to the policies mentioned in Table 4-2. For the draft and a summary of major changes, see <http://www.honoluluodpp.org/Planning/DevelopmentSustainableCommunitiesPlans/KoolaupokoPlan.aspx> (viewed on November 24, 2014).



Source: City and County of Honolulu. 2012. Ko'olau Poko Sustainable Communities Plan.

1
2

Figure 4-2. Ko'olau Poko Sustainable Communities Plan Land Use Map

4.3.3 O'AHU WATER MANAGEMENT PLAN

The State Water Code (described in Section 4.2.6 of this chapter) places the responsibility for preparing water use and development plans at the county level. In response to State Water Code, the City established the O'ahu Water Management Plan (OWMP), Revised Ordinances of Honolulu (ROH) 30, in 1990. The OWMP includes policies and strategies to regulate water management and guide decisions regarding water on O'ahu by the State CWRM (described in Section 4.2.6 of this chapter).

A Hawai'i Supreme Court 2000 ruling changed the way water laws were interpreted in Hawai'i by identifying four public trust uses that have priority over other water uses: (1) maintenance of waters in their natural state; (2) domestic water use; (3) waters necessary for the exercise of Native Hawaiian and traditional and customary rights; and, 4) water for Hawaiian Home Lands. At the time of the ruling, the Board of Water Supply (BWS) had begun making preparation for an update of the OWMP. Based on the ruling and public feedback, BWS decided to have plans developed at the regional level, utilizing a holistic watershed-based approach and integrating the four priority uses identified in the ruling into the plans' objectives. The planning framework developed by BWS integrated the principles of the Hawaiian concept of the *ahupua'a*, considering environmental, economic, and cultural values, to guide the creation of regional watershed management plans for the City's eight development plan areas.

The relevant regional plan for the project area, the Ko'olau Poko Watershed Management Plan, is described in the following section.

4.3.4 KO'OLAU POKO WATERSHED MANAGEMENT PLAN

Following the OWMP established framework for regional watershed management plans, the Ko'olau Poko Watershed Management Plan (KWMP) was adopted in 2012. The planning framework included the following five major objectives:

1. Promote sustainable watersheds
2. Protect and enhance water quality and quantity
3. Protect Native Hawaiian's traditional and customary rights
4. Facilitate public participation, education, and project implementation
5. Meet future water demands at reasonable cost

The KWMP identifies a number of sub-objectives within the five major objectives; those relevant to the project are identified with discussion in Table 4-3.

The KWMP focuses additional attention on five "critical watersheds," where "catalyst projects" are identified as high-priority projects or focus areas that have immense potential to accomplish the plan's objectives in the watershed. The adjoining Waimānalo and Kahawai watersheds, which cover all the agricultural lands serviced by the Waimānalo Irrigation System, are included as critical watersheds. The catalyst project for the watersheds is to "increase water supplies for Waimānalo farmers;" under which four specific actions are proposed, including the implementation of ditch improvements to the Waimānalo Irrigation System.

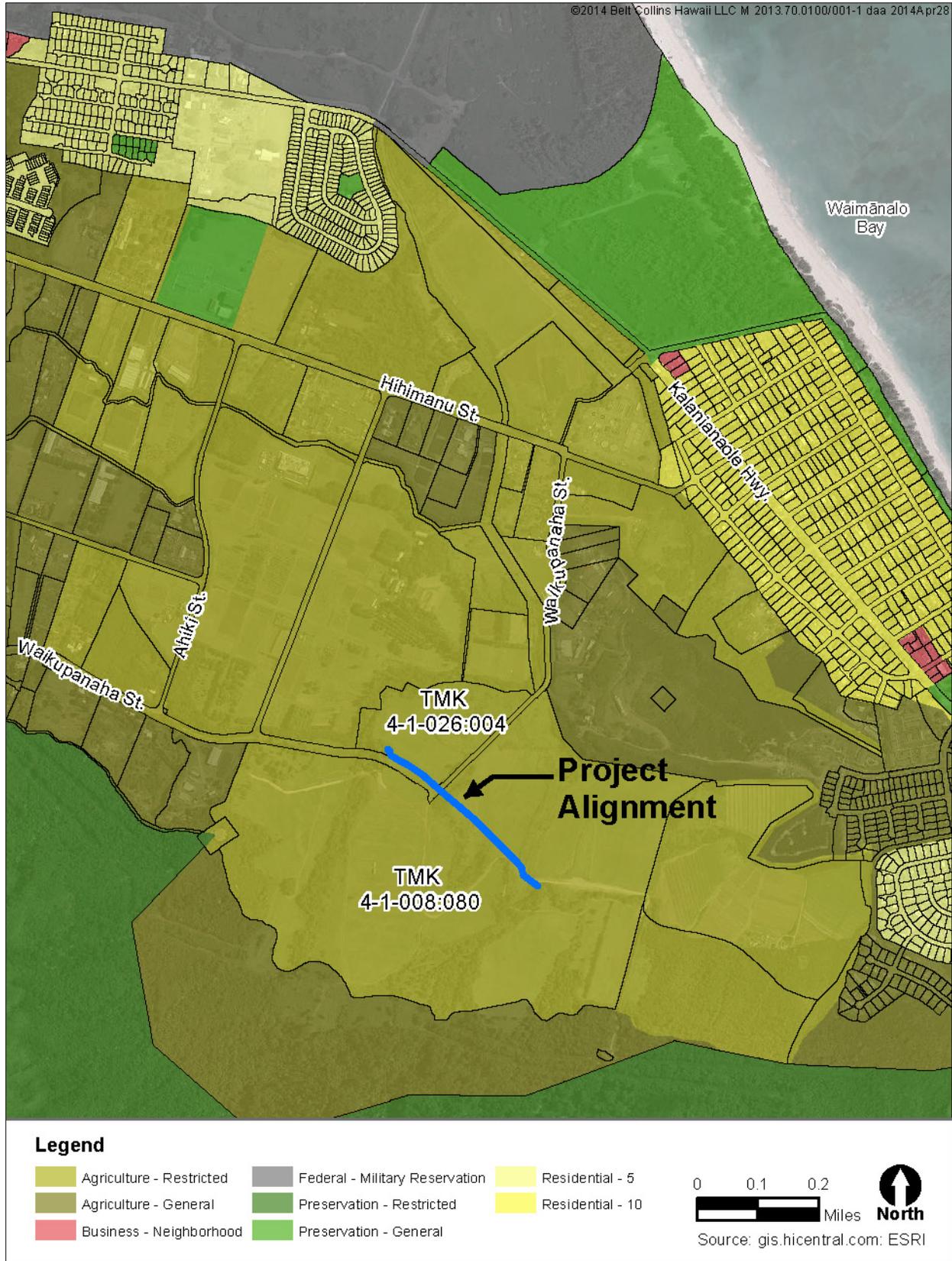
Table 4-3. Key Objectives and Sub-objectives from Ko’olau Poko Watershed Management Plan

Objective 1: Promote sustainable watersheds
Sub-objective 1.1: Promote the cultivation of more locally grown food and the concept of “food security”
COMMENT: Through improving the Waimānalo Irrigation System, the project supports agricultural activities in the KWMP area.
Objective 4: Facilitate public participation, education, and project implementation
Sub-objective 4.1: Promote public participation in planning and implementation of watershed management projects and programs.
COMMENT: By virtue of this EA preparation and public comment/response process, the project is engaging public participation in the planning process for changes to the agriculture water system.
Objective 5: Meet future water demands at a reasonable cost
Sub-objective 5.2: Develop alternative water sources for agriculture
COMMENT: Through upgrading a section of the distribution system the project will decrease water loss within the Waimānalo Irrigation System, which will result in increased availability of water within the system for distribution by DOA.

1 The KWMP focuses additional attention on five “critical watersheds,” where “catalyst projects” are
 2 identified as high-priority projects or focus areas that have immense potential to accomplish the
 3 plan’s objectives in the watershed. The adjoining Waimānalo and Kahawai watersheds, which cover
 4 all the agricultural lands serviced by the Waimānalo Irrigation System, are included as critical
 5 watersheds. The catalyst project for the watersheds is to “increase water supplies for Waimānalo
 6 farmers;” under which four specific actions are proposed, including the implementation of ditch
 7 improvements to the Waimānalo Irrigation System.

8 4.3.5 CITY LAND USE ORDINANCE

9 The project site is within the State Conservation District, which is administered by the State Board
 10 of Land and Natural Resources, as described in Section 4.2.2. The City’s Land Use Ordinance (LUO)
 11 map shows that the project site is AG-1, Restricted Agriculture District. See Figure 4-3. The purpose
 12 of the AG-1 District is to conserve important agricultural lands for the agricultural uses. The LUO
 13 allows for accessory uses within the AG-1 District as long as the uses perpetuate the use of the lands
 14 for production of food, feed, forage, fiber crops, or horticultural plants.



1
2 **Figure 4-3. Zoning According to City Land Use Ordinance**

- 1 The project involves the installation of pipe to upgrade a distribution section of the Waimānalo
 2 Irrigation System. The system provides water for agricultural uses and is therefore consistent with
 3 the LUO zoning district. As confirmed by the City Department of Planning and Permitting (DPP), the
 4 project is categorized as a Utility Installation Type A, which is a permitted use in the AG-1 District.
- 5 Table 4-4 describes LUO development standards for the AG-1 District and project compliance.

Table 4-4. Land Use Ordinance AG-1 Development Standards and Project Compliance

Development Standard	AG-1 District	Project Compliance
Minimum lot area	5 acres	Both project parcels exceed standard.
Minimum lot width and depth	150 feet	Both project parcels exceed standard.
Front yard setback	15 feet	Water lines and appurtenances less than 30 inches in height are permitted, per LUO Section 21-4.30.
Rear and side yard setback	10 feet	Water lines and appurtenances less than 30 inches in height are permitted, per LUO Section 21-4.30.
Maximum height	15-25 feet	Surface structures installed will be limited to irrigation appurtenances.

6 4.3.6 SPECIAL MANAGEMENT AREA

7 The Special Management Area (SMA) on O’ahu is administered by the City. The SMA map shows the
 8 project site is located over 0.5 miles inland from the SMA and, therefore, would not be subject to
 9 Chapter 25, ROH, governing SMAs. See Figure 4-4.

10 4.3.7 SUMMARY OF REQUIRED PERMITS AND APPROVALS

11 The necessary permits and approvals, as summarized in Table 4-5, will be obtained before
 12 construction commences.

Table 4-5. Summary of Required Permits and Approvals

Construction Activity	Required Permit/ Approvals	Approving Agency
Earthwork and installation of water lines.	Grading, grubbing, and stockpiling permits	DPP
General construction	HRS Chapter 6E-8 consultation and determination of no adverse effect	SHPD



Legend

 Special Management Area

0 0.1 0.2
 Miles  North

Source: gis.hicentral.com: ESRI

1
2

Figure 4-4. Special Management Area

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1 5 ANTICIPATED DETERMINATION

2 This Draft Environmental Assessment demonstrates that the proposed action will have no
3 significant adverse impact on the environment and that an Environmental Impact Statement is not
4 warranted. A Finding of No Significant Impact (FONSI) is, therefore, anticipated for this proposed
5 action.

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6 FINDINGS AND REASONS SUPPORTING ANTICIPATED DETERMINATION

The following findings and reasons indicate that the proposed action will have no significant adverse impact on the environment based on the 13 significance criteria provided in the Hawai‘i Administrative Rules 11-200-12, and as a result supports the Anticipated Finding of No Significant Impact (AFONSI) determination.

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

Response. The flora, fauna, archaeological, and cultural impact studies conducted for this proposed action indicate that with the implementation of identified management measures there will be no significant adverse impacts on natural or cultural resources.

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

Response. The project will support agricultural use of farm lands, and does not curtail any beneficial use of the environment.

- *Conflicts with the state’s long-term environmental policies or goals and guidelines as expressed in Chapter 344, Hawai‘i Revised Statutes (HRS).*

Response. As demonstrated in this document, the proposed action is consistent with the State of Hawai‘i’s long-term environmental policies and guidelines as expressed in Chapter 344, HRS.

- *Substantially affects the economic or social welfare of the community or state.*

Response. The project is not anticipated to have an impact on the economic and social welfare of the community and State beyond improving the efficiency of the Waimānalo Irrigation System and providing irrigation water at its terminus.

- *Substantially affects public health.*

Response. No impact on public health is anticipated.

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

Response. No substantial secondary impacts are anticipated.

- *Involves a substantial degradation of environmental quality.*

Response. The project will not degrade environmental quality.

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

Response. The project follows on a DOA decision to relocate farm operations to the parcel surrounding the end of the irrigation line. That decision and the project will not have further cumulative impacts.

- 1 • *Substantially affects a rare, threatened, or endangered species, or its habitat.*
2 **Response.** The project is not expected to affect rare, threatened or endangered species. A
3 proposed management action will provide assurance that construction will not affect such
4 species. After construction, impacts on such species and their habitat will be minimal or
5 absent.
- 6 • *Detrimentially affects air or water quality or ambient noise levels.*
7 **Response.** No impact on air or water quality is anticipated. Construction will involve some
8 noise, but at considerable distance from sensitive receivers.
- 9 • *Affects or is likely to suffer damage by being located in an environmentally sensitive area such*
10 *as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land,*
11 *estuary, fresh water, or coastal waters.*
12 **Response.** The project is located in farm lands which are not environmentally sensitive.
- 13 • *Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.*
14 **Response.** The project does not affect any vistas or viewplanes identified in plans and
15 studies.
- 16 • *Requires substantial energy consumption.*
17 **Response.** The project will involve limited energy consumption.

7 COMMENTS

The agencies and interested parties contacted for the early consultation process are indicated. Those who responded are indicated to the right. Copies of the comment and the response letters are included in Appendix D of this document.

Table 7-1. Agencies and Parties in the Early Consultation Process

Agency	Responded to early-consultation letter
FEDERAL AGENCIES	
Environmental Protection Agency, Region IX, Pacific Islands Office	
U.S. Army Corps of Engineers, Pacific Ocean Division	
U.S. Department of Agriculture, Natural Resource Conservation Services	
U.S. Department of Commerce, National Marine Fisheries Service, Pacific Islands Regional Office	
U.S. Department of the Interior, U.S. Fish and Wildlife Service	x
STATE OF HAWAII	
Senator Laura Thielen, State Senate District 25	
Representative Chris Lee, State House District 51	
Department of Accounting and General Services	x
Department of Agriculture	
Department of Business, Economic Development, and Tourism	x (Office of Planning)
Department of Hawaiian Home Lands	
Department of Health	x (two responses)
Department of Land and Natural Resources (DLNR)	
Office of Conservation and Coastal Lands, DLNR	x
Office of Hawaiian Affairs	x
State Historic Preservation Division, DLNR	
CITY AND COUNTY OF HONOLULU	
Councilmember Ikaika Anderson, Council District 3	
Board of Water Supply	x
Department of Design and Construction	x
Department of Environmental Services	
Department of Facility Maintenance	
Department of Parks and Recreation	x
Department of Planning and Permitting	x
Department of Transportation Services	x

Table 7-1. Agencies and Parties in the Early Consultation Process

Agency	Responded to early-consultation letter
OTHER STAKEHOLDERS	
Hawai'i Farm Bureau Federation	
Historic Hawai'i Foundation	
The Nature Conservancy of Hawai'i	
University of Hawai'i at Mānoa, College of Tropical Agriculture and Human Resources, Waimānalo Research Station	x
Waimānalo Agriculture Association	
Waimānalo Hawaiian Homes Association	
Waimānalo Neighborhood Board	

1 8 REFERENCES

2 City and County of Honolulu, *General Plan*. Last amended 2002. Available as of January 21, 2014 at
3 www.honolulu.gov/Portals/0/pdfs/planning/generalplan/GPReport.pdf.

4 City and County of Honolulu. 2000. *Ko'olau Poko Sustainable Communities Plan*.

5 City and County of Honolulu. 1999. *Rules Relating to Soil Erosion Standards and Guidelines*.

6 City and County of Honolulu. 1990. *O'ahu Water Management Plan*.

7 City and County of Honolulu Board of Water Supply. 2012. *Ko'olau Poko Watershed Management*
8 *Plan*. Prepared by Townscape, Inc.

9 City and County of Honolulu, Department of Emergency Management. No date. *Hurricanes in*
10 *Hawaii*. Available at www1.honolulu.gov/dem/hurr1.htm as of November 6, 2013.

11 City and County of Honolulu, Department of Emergency Services. 2013. *Honolulu Emergency*
12 *Services Department Unit Locations and Response Areas*. Available as of December 26, 2013
13 at www1.honolulu.gov/esd/ems/redicustomerservicenumber.pdf.

14 City and County of Honolulu Fire Department. 2003. *Honolulu Fire Department*. Available as of
15 January 23, 2014 at www1.honolulu.gov/budget/execbgt/fy03hfd.pdf.

16 City and County of Honolulu Police Department. No date. *Patrol Districts*. Available as December 26,
17 2013 at www.honolulu.gov/departments/index.php?page=patrol_districts.

18 Juvik, S. P. and Juvik, J.O, 1998. *Atlas of Hawai'i*. 3rd edition.

19 Hawaiian Electric Company. December 28, 2006. *Investigation of 2006 Oahu Island-Wide Power*
20 *Outage, PUC Docket Number 2006-0431*.

21 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 6E. State Historic Preservation Program*.

22 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 174C. State Water Code*.

23 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 205, Land Use Commission*.

24 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 205A. Coastal Zone Management*.

25 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 341, Environmental Quality Control*.

26 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 343, Environmental Impact Statement*.

27 State of Hawai'i. *Hawai'i Revised Statutes, Chapter 344. Environmental Policy Act*.

28 State of Hawai'i. 1997. *Guidelines for Assessing Cultural Impacts*. Adopted by the Environmental
29 Council, November 11, 1997.

- 1 State of Hawai'i, Department of Agriculture. 2004. *Agriculture Water Use and Development Plan*.
- 2 State of Hawai'i, Department of Agriculture. 1977. *Agricultural Lands of Importance to the State of*
3 *Hawai'i*.
- 4 State of Hawai'i, Department of Agriculture, Agriculture Resource Management Division. No date.
5 *Irrigation Systems*. Available as of April 9, 2014 at hdoa.hawaii.gov/arm/irrigation-systems/
- 6 State of Hawai'i, Department of Business, Economic Development and Tourism. 2013. *2012 State of*
7 *Hawaii Data Book*.
- 8 State of Hawai'i, Department of Hawaiian Homelands. 2008. *Waimānalo Regional Plan*.
- 9 State of Hawai'i Department of Health. 2012. *Annual Summary 2011 Air Quality*.
- 10 State of Hawai'i, Department of Health. 1992a. *Hawai'i Administrative Rules, Title 11, Chapter 23,*
11 *Underground Injection Control*.
- 12 State of Hawai'i, Department of Health. 2003. *Hawai'i Administrative Rules, Title 11, Chapter 60.1, Air*
13 *Pollution Control*.
- 14 State of Hawai'i, Department of Health. 1996a. *Hawai'i Administrative Rules, Title 11, Chapter 200.*
15 *Environmental Impact Statement Rules*.
- 16 State of Hawai'i, Department of Health. 1996b. *Hawai'i Administrative Rules, Title 46, Community*
17 *Noise Control*.
- 18 State of Hawai'i, Department of Land and Natural Resources. 2011. *Hawai'i Administrative Rules*
19 *13-5*.
- 20 State of Hawai'i. Department of Land and Natural Resources. No date. Division of Conservation and
21 Resource Enforcement, Strategic Plan 2009–2014.
- 22 State of Hawai'i, Department of Land and Natural Resources. Commission on Water Resource
23 Management. 2003. *State Water Projects Plan: Hawai'i Water Plan*. Prepared by Fukunaga
24 and Associates, Inc.
- 25 State of Hawai'i, Department of Land and Natural Resources, Commission on Water Resource
26 Management. June 2008. *Hawai'i Water Plan: Water Resource Protection Plan*.
- 27 State of Hawai'i, Department of Land and Natural Resources, Division of Forestry and Wildlife. No
28 date. *Fire Response Maps*. Available as of November 20, 2013 at
29 dlnr.hawaii.gov/forestry/fire/response-maps/.
- 30 State of Hawai'i, Office of Planning. 2012. *Increased Food Security and Food Self-Sufficiency Strategy,*
31 *Volume III: Assessment of Irrigation Systems in Hawai'i*.
- 32 T.S. Dye & Colleagues, Archaeologists, Inc. 2008. *Historic Properties Assessment for the Proposed*
33 *T-Mobile West Waimānalo Cell Site*.

- 1 U.S. Bureau of the Census, American Community Survey, 2008–2012, available via American
2 FactFinder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>
- 3 U.S. Bureau of the Census. *ZIP Code Business Patterns*, 2012, for 96795. Available at
4 <http://censtats.census.gov/cgi-bin/zbpnaic/zbpsect.pl> as of July 21, 2014.
- 5 U.S. Department of Agriculture, Soil Conservation Service. 1981. *Waimānalo Watershed*
6 *Management Plan and Environmental Impact Statement*. Available as of November 26, 2014
7 at www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_036790.pdf.
- 8 U.S. Department of Agriculture, Soil Conservation Service. August 1972. *Soil Survey of the Islands of*
9 *Kauai, O’ahu, Maui, Molokai, and Lanai, State of Hawai’i*.
- 10 U.S. Federal Emergency Management Agency. 2011. *Flood Hazard Areas shapefile and metadata*.
11 Obtained from planning.hawaii.gov/gis/download-gis-data/
- 12 U.S. Geological Survey. No date. *Earthquake Hazards*. Obtained from
13 pubs.usgs.gov/gip/hazards/earthquakes.html
- 14 U.S., National Oceanic and Atmospheric Administration/National Weather Service. 2013.
15 “Hydrology in Hawai’i”. Available at: www.prh.noaa.gov/hnl/hydro/pages/aug13sum.php

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Appendix A

Archaeological Assessment

**ARCHAEOLOGICAL INVENTORY SURVEY REPORT
FOR THE MAIN LINE EXTENSION WAIMĀNALO
IRRIGATION SYSTEM PROJECT
WAIMĀNALO AHUPUA`A, KO`OLAUPOKO DISTRICT
O`AHU ISLAND, HAWAII
[TMK: (1) 4-1-008:080]**

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ABSTRACT

At the request of Joanne Hiramatsu, of Belt Collins Hawaii, LLC, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey for the proposed Main Line Extension Waimānalo Irrigation System Project, Waimānalo, Ko`olaupoko District O`ahu Island, Hawaii`i [TMK: (1) 4-1-008:080]. The project area corridor extends approximately 1,800 feet (548.6 m) in length by 46 to 66 feet wide (118,800 sq. ft./36210.24 sq. m) and consists of approximately 2.8 acres. The project area is owned by the State of Hawaii`i.

Archaeological Inventory Survey was performed in order to identify potential historic properties (non-burial and burial), to assess the significance of any newly identified historic properties, to make a project effect determination, and to propose mitigation measures to address the project effect on historic properties, pursuant to Hawaii Administrative Rules (HAR) § 13-284 and HAR § 13-276.

During the survey five exposures of the Historic Kailua Ditch (State Site 50-80-15-4042) were identified. The Historic Kailua Ditch is "...one of the three constituent subdivisions of the [over] 114-year old Waimanalo Irrigation System..." (Drolet and Sinoto 2001:19). Based on feature type, location, and archival research, all features were interpreted as associated with the Historic Plantation-Era (1890 to 1971).

The five exposures of State Site 50-80-15-4042 have been evaluated in accordance with criteria established for the Hawaii`i State Register of Historic Places (HAR§13-276 and HAR§13-284) and was found to be significant under the following criteria: Criterion "a", associated with events [e.g., Plantation-Era] (that have made an important contribution to the broad pattern of Hawaiian history) and Criterion "d" (for information content). No additional architectural features were identified on the ground surface or in subsurface contexts

The Archaeological Inventory Survey has been completed with sufficient information collected from State Site 50-80-15-4042. Based on the findings of the current Archaeological Inventory Survey, no further archaeological work is recommended for the proposed undertaking.

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INTRODUCTION

At the request of Joanne Hiramatsu, of Belt Collins Hawaii, LLC, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey (AIS) for the proposed Main Line Extension Waimānalo Irrigation System Project, Waimānalo, Ko'olaupoko District O'ahu Island, Hawai'i [TMK: (1) 4-1-008:080]. The project area corridor extends approximately 1,800 feet (548.6 m) in length by 46 to 66 feet wide (118,800 sq. ft./36210.24 sq. m) and consists of approximately 2.8 acres (Figures 1 through 3). The project area is owned by the State of Hawai'i.

The AIS follows an Archaeological Field Inspection which was conducted February 13, 2014 by SCS archaeologist Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator. The field inspection was conducted in order to determine the presence/absence of historic properties. The site visit consisted of a cursory walk-through of the property and the photo-documentation of any encountered historic properties.

The Archaeological Inventory Survey fieldwork was conducted from March 19 through March 21, 2014 by SCS archaeologists Elizabeth Pestana, B.A., and Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator. The AIS was performed 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) § 13-284 and HAR § 13-276.

During the survey five exposures of the Historic Kailua Ditch (State Site 50-80-15-4042) were identified. The Historic Kailua Ditch is "...one of the three constituent subdivisions of the [over] 114-year old Waimanalo Irrigation System..." (Drolet and Sinoto 2001:19). Based on feature type, location, and archival research, the exposed portions of the Historic Kailua Ditch (State Site 50-80-15-4042) were interpreted as associated with the Plantation-Era (1890 to 1971).

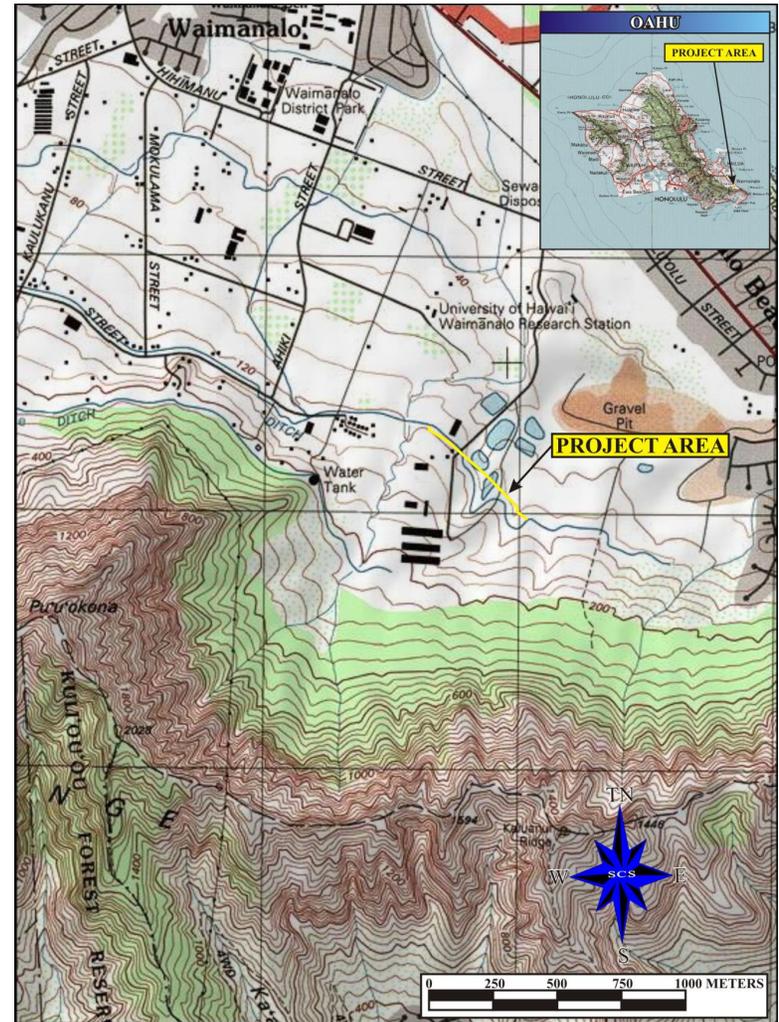


Figure 1: USGS Quadrangle (Koko Head 1999) Showing Project Area Location.

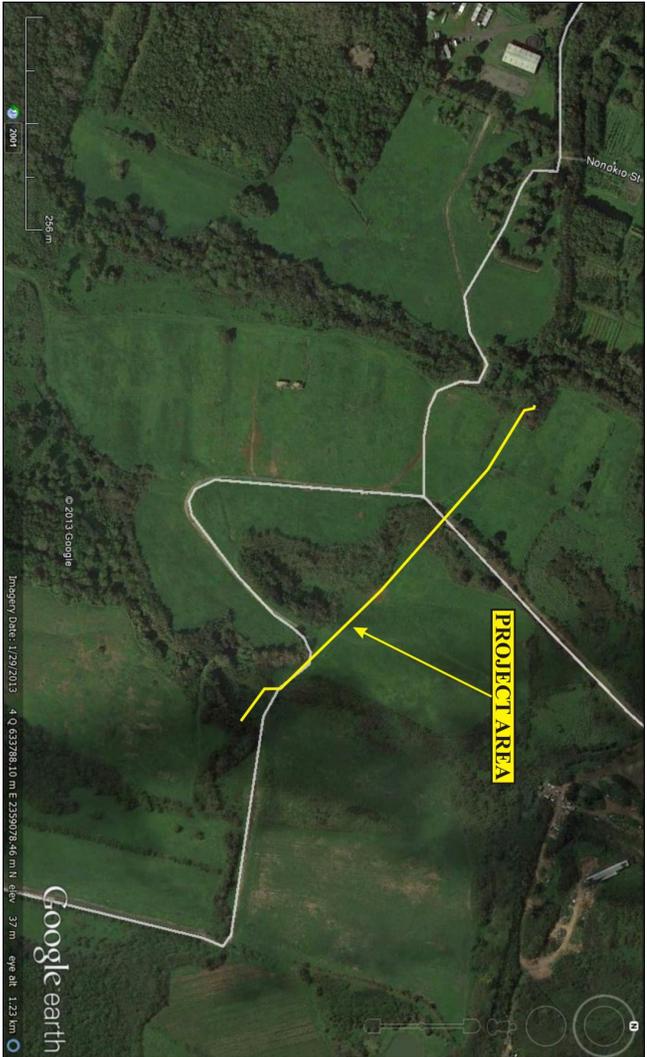


Figure 3: Google Earth Image (Aerial Imagery from Google, Digital Globe dated 1/29/2013) Showing Project Area Location.

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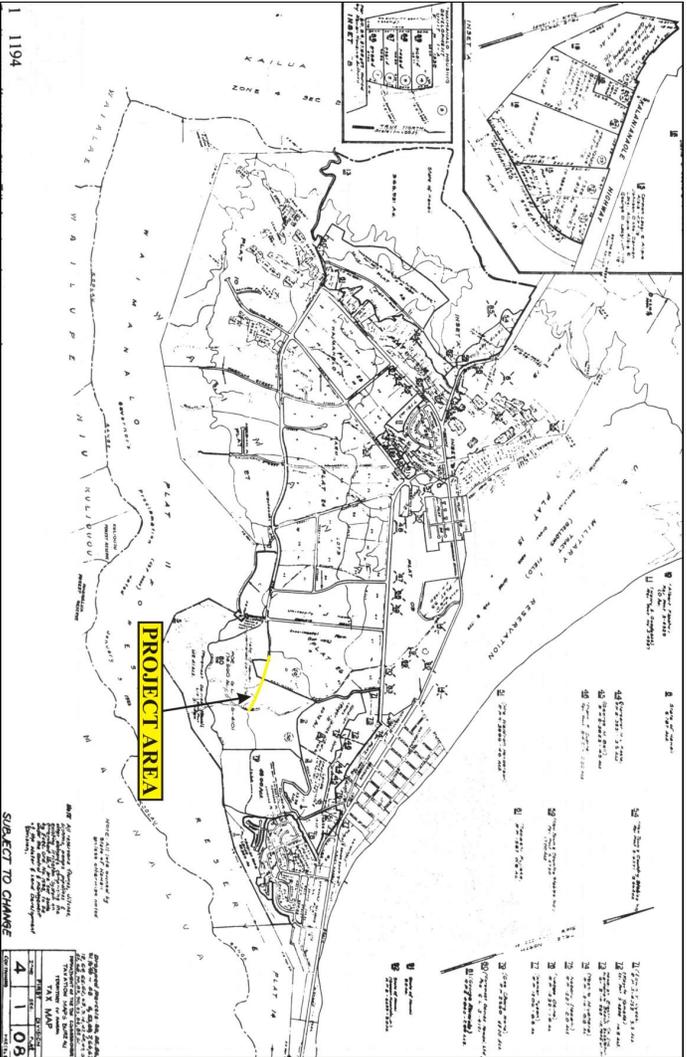


Figure 2: Tax Map Key [TMK (D) 4-1-008] Showing Project Area Location.

3

ENVIRONMENTAL SETTING

PROJECT AREA LOCATION

The Main Line Extension Waimānalo Irrigation System project area is situated in the southeastern portion of the island of Oʻahu and on the windward side of the Koʻolaupoko Mountain Range. The project area is located an estimated 1.5 miles (1,812.2 m) southwest of the coastline at an elevation of approximately 120 feet (6.0 to 9.8 m) above mean sea level (amsl). The project area corridor extends approximately 1,800 feet (548.6 m) in length by 46 to 66 feet wide (118,800 sq. ft./36210.24 sq. m) and consists of approximately 2.8 acres (see Figures 1 through 3). The project area is owned by the State of Hawaiʻi.

CLIMATE

Temperatures within the *ahupuaʻa* of Waimānalo range from the high 50s to the high 80s (degrees Fahrenheit), during the winter months. Winter rainfall ranges from 5 to 15 inches (Armstrong 1983:62, 64). During the summer months, temperatures in Waimānalo Ahupuaʻa range from the high 60s to the low 90s (degrees Fahrenheit). Rainfall during the summer months can range from 2 to 7 inches (*ibid*).

SOILS

According to Foote *et al.* (1972: 34, 63- 64, 49-50, 113; Sheet Map 66 and 67), the project area extends across five Soil Series and is specifically situated within Haleiwa silty clay (HeB) soils, Kaena clay (KaC) deposits, Kawaihapai stony clay loam (KlaB), and Pohakupu silty clay loam (PkB and PkC) soils (Figure 4).

Haleiwa Soil Series

Soils of the Haleiwa Series can be found on Oʻahu and Molokaʻi Islands on alluvial fans and drainages located in coastal areas (Foote *et al.* 1972: 33-34). The soils of the Haleiwa Series developed in alluvium derived from volcanic rock, occur at elevations ranging from sea level to 250 feet amsl in areas with rainfall ranging from 30 to 60 inches annually (*ibid*: 33). The HeB soils are present on 2 to 6 percent slopes, exhibit slow runoff and a slight erosion hazard. Soils of the HeB type are used for the cultivation of sugarcane, pineapple, and vegetables (*ibid*: 34).

Kaena Soil Series

Typically, soils of the Kaena Series consist of soils originating in alluvium and colluvium derived from volcanic rock occurring on the islands of Oʻahu and Kauaʻi Islands. Soils of the Kaena Series can be found in areas with elevations ranging from 50 to 150 feet amsl and

receiving between 30 to 45 inches of rainfall annually (Foote *et al* 1972: 49). The KaC soils occur on 6 to 12 percent slopes and exhibit slow runoff and a slight erosion hazard. The KaC soils are likely to be used for sugarcane cultivation and as ranchlands (*ibid*: 50).

Kawaihapai Soil Series

In general, soils of the Kawaihapai Series are comprised of alluvial deposits that "originated from basic igneous rock" in the humid upland regions of Oʻahu and Molokaʻi. These well-drained soils can be found in drainage ways and on alluvial fans, in coastal areas elevations extending from sea level to 300 feet amsl (Foote *et al.* 1972:63). The KlaB soils occur on 2 to 6 percent slopes in areas receiving 30 to 50 inches of annual rainfall. Soils of the KlaB soil type contain "enough stones to hinder, but not prevent, cultivation" (*ibid*: 64). Soils of the KlaB soil type exhibit slow runoff and a slight erosion hazard (*ibid*). Typically, the KlaB soils are agricultural soils used in the cultivation of sugarcane, vegetables, and as ranchlands (*ibid*).

Pohakupu Soil Series

Soils of the Pahakupu Series typically originate in alluvium eroded from volcanic rock and are well-drained soils occurring on terraces and alluvial fans on Oʻahu and Kauaʻi Islands (Foote *et al.* 1972:113). Soils of the Pahakupu Series can be found at elevations ranging from 50 to 250 feet amsl in areas receiving 40 to 60 inches of rainfall annually. The PkB soil occurs on 0 to 8 percent slopes and exhibit moderately rapid permeability, slow runoff, and a slight erosion hazard. On Oʻahu, PkC soils are used as ranchlands, the cultivation of vegetables, and residential areas (*ibid*: 113).

In contrast, the PkC soils occur on steeper (8 to 15 percent) slopes and exhibit slow to medium runoff and a slight to moderate erosion hazard (*ibid*). Soils of the PkC type are used as ranchlands (*ibid*).

VEGETATION

The vegetation within the project area represents historic events and does not reflect the vegetation pattern prior to contact. The project area was heavily impacted during the Plantation Era and exhibits a landscape covered in secondary growth species. Vegetation in the project area includes Koa Haole (*Leucaena leucocephala*), Chinese Violet (*Asystasia gangetica*), White Clover (*Trifolium repens*), Java Plum (*Syzygium cumini*), Mountain Naupaka (*Naupaka Kuahiwī*), Taro (*kalo*; *Colocasia esculenta*), Castor bean (*Ricinus Communis*), medium to tall grasses, various medium to tall trees, and vines.

Figure 4: USDA Soil Survey Map (Foot et al. 1972; Sheet Map 67) Showing Project Area Location.



TRADITIONAL SETTLEMENT PATTERNS

Archaeological settlement pattern data suggests that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas of the main islands between A. D. 850 and 1100, with populations eventually settling in drier leeward areas during later periods (Kirch 2011). Although coastal settlement was dominant, Native Hawaiians began cultivating and living in the upland *kula* (plains) zones. Greater population expansion to inland areas began around the 14th century and continued through the 16th century. Large scale or intensive agriculture was implemented in association with habitation, religious, and ceremonial activities.

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock, and wild plant and bird collecting. During the pre-Contact Period, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens such as *kō* (sugar cane, *Saccharum officinarum*) and *mai'a* (bananas, *Musa* sp.) were also grown and, where appropriate, the production of such crops as *'uala* (sweet potato, *Ipomoea batatas*) occurred. This was a typical agricultural pattern seen during the pre-Contact Period on all the Hawaiian Islands (Kirch and Sahlins Vol. 1, 1992:5, 119; Kirch 1985).

A district (*moku*) contained smaller land divisions (*ahupua'a*), which customarily stretched inland from the coast upland into the interior. Extended household groups living within the *ahupua'a* were therefore able to harvest resources from both the land and the sea. Ideally, this situation allowed each *ahupua'a* some degree of self-sufficiency by supplying requisite resources from different environmental zones (Lyons 1875:111). The *'ili āina* or *'ili* were smaller land divisions within an *ahupua'a*. The *mo'o āina* were narrow strips of land within an *'ili*. The land holding of a tenant or *hoa āina* was called a *kuleana* (Lucas 1995:40, 77, 61).

Land was considered the property of the king or *ali'i ai moku*. The *ali'i ai moku* was ensured rights and responsibilities to the land, but this did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka āinana* (literally "people that attended the land) worked the individual plots of land (Pukui and Elbert 1986:224).

In Hawai`i, much of the economically valuable coastal lands were preferred for chiefly residence, as these areas were easily accessible resources such as offshore and onshore fish ponds, the sea. In addition, some of the most extensive wet taro lands were located in the coastal regions of the Hawaiian Islands (Kirch and Sahlins Vol. 1, 1992:19). Inland resources necessary for subsistence could easily be brought to the *ali`i* residence. The majority of farming was situated in the lower portions of stream valleys where there were broader alluvial flat lands or on bends in the streams where alluvial terraces could be modified to take advantage of the stream flow. Dry land cultivation occurred in colluvial areas at the base of gulch walls or on flat slopes (Kirch and Sahlins Vol. 2, 1992:59, Kirch 1985).

TRADITIONAL AND HISTORICAL SETTING

On the southeast end of Kailua is the *ahupua`a* of Waimānalo, a steep sided valley containing one central perennial drainage, Puha Stream that extends to the shallow bay (Tuggle 1994). It is thought that a second drainage, known as Inoa`ole Stream was created around the 1900s by the Waimanalo Sugar Company. The earliest evidence for occupation in Waimānalo appears within the lowlands around A.D. 1000 to 1300 (*ibid.*).

Waimānalo was also ideal for irrigated taro terraces, providing agricultural resources for the support of *ali`i* and their entourage across the Anianinui Ridge in Kailua. Kahekili, the chief of Maui in the late 1700s, stated that Waimānalo was not a good place for battle but only for food and fish (Kamakau 1991). Waimānalo was watered by numerous springs. According to Charles Alona, a life-long resident of Waimānalo, at least nine of the *lo`i* (wetland taro) sections were watered by springs (Handy and Handy 1972:457).

A spring named Kupunakane (Grandfather) was located in the mountains above Waimānalo and on the flat land, was a spring named Kupunawahine (Grandmother). Mary Kawena Pukui (in Handy and Handy 1972:458) recounts a legend associated with these two springs:

The strange, strange thing about these ponds was that on calm, sunny days they begin to cry to each other. Their voices are soft and sounded very much like a woman mourning for her husband. On days that were overcast with clouds in the sky, then the water of the mountain spring changed. The water of the mountain spring became warm and when you drank water in the lowland spring it was cool...

Apparently taro was not the only food source produced in Waimānalo, as in the 19th century it was known for *ulu* (breadfruit), *ōhi`a`ai* (mountain apple), *kukui*, *niu* (coconut) as well as *uala* (sweet potatoes) and *kō* in the dryer sections (Tuggle 1994).

PRE-CONTACT PERIOD

According to oral accounts, the Waimānalo Ahupua`a was settled during the pre-Contact (pre-1778) Period with small villages, springs, *lo`i* (irrigated taro terraces), religious shrines, and other common site types (Handy and Handy 1972:458; Sterling and Summers 1978:243-255). Oral histories suggest that Kailua and Kāne`ohe Bay were economic and political centers during the later centuries of the pre-Contact period and that Waimānalo played a more minor role (Handy and Handy 1972:457; Dega *et al.* 1998).

According to Handy and Handy (1972:458):

Levi Chamberlain is quoted as reporting in 1828, the location of a small and quite poor fishing village near the beach, toward Makapu`u Point from the present Waimanalo town, just beyond which is there was a pool named Ka-wai-kupanaha where the people got their fresh water. This place has since been covered by the roadway.

Another description of the pool named Ka-waikupanaha was provided by an informant and life-long resident of Waimānalo, Charles Alona (September 22, 1939 in Sterling and Summers 1978: 246):

A spring called Wai-kupanaha was pointed out to us, (in valley mauka of Mill), surrounded by tall taro plants, banana trees and fragrant white gingers. According to Mr. Alona, the Wa i-kupanaha on the west side of Mr. Castle's place was a lele, or a part of this kuleana, so both were given the same name. The upland piece was for taro growing and the piece near the sea was for fishing. The former owners of Wai-kupanaha went inland to raise taro and then to their land by the shore to fish. Both places had water but today only the up land Wai-kupanaha has water,

This Wai-kupanaha could not be tampered with but left as nature made it. A Japanese used a pipe to draw water from here to his house and the water ceased to flow. The Alona's asked him to remove his pipe and as soon as he did so, the water flowed once

again in abundance. It still feeds some taro patches below as it did in former times.

Charles Alona, an informant, spoke of another village in Waimānalo (Handy and Handy 1972:458) which was:

...situated on a low hill across from Waimanalo Beach Park. This was settled by folk from Molokai, hence the name: Pu'u o Molokai. These people held themselves apart from the people of Waimanalo. If a girl born there married a Waimanalo man, she had to leave Pu'u o Molokai. But gradually the Molokai people were absorbed by Waimanalo.

Although the *ahupua`a* of Waimānalo, which literally means potable or drinkable water, only had one stream, much of the valley once was planted in taro (Sterling and Summers 1978:243), as this area had numerous springs from which water was obtained. Handy and Handy (1972:457) note that in 1935 there was evidence of "old *lo`i*" located inland. Edward Niaupio, (a local resident) knew of nine named "...terrace sections whose water came from small streams and springs flowing out of the high mountain range (Handy 1940:100). According to Mr. Niaupio, the terraces extended for 1.5 miles "from below Puu Loa well toward Puu o Kona" and were positioned in a semi-circle at the base of the Ko'olaupoko Mountain Range (*ibid*).

According to legend, there were two named springs in Waimānalo Ahupua`a. One account printed in the *Hoku o Hawaii*, March 11, 1930 (in Handy and Handy 1972:458) states that:

The [spring] called Kupunakane [Grandfather] is way up in the mountains. The spring called Kupunawahine [Grandmother] is a spring way down on the level land. The strange, strange thing about these ponds was that on calm, sunny days they began to cry out to each other. Their voices are soft and very much like a woman mourning her husband. On days that were overcast with clouds in the sky, then the water of the mountain spring changed. The water of the mountain spring became warm and when you drank the water in the lowland spring it was cool, according to their legend.

Charles Alona, an informant, told Handy and Handy (1972:458) of two additional springs which were well-known in Waimānalo Ahupua`a:

...Wai-kupunaha was the name of a spring (*mauka* of the plantation mill) surrounded by tall taro plants, banana trees, and fragrant white gingers.

This was a *lele* (section of land) which had its counterparts on the seashore, where the owner of the *kuleana* [property] that included the upland and shore-side areas lived. There was fresh water also on the piece by the sea. And at Olomana above the sugar mill there was a fine old spring. This area was then thickly populated. There was another spring across the road from what is now Bellows Air Force Base. Near this is Maha'ilua, another thickly populated place.

McAllister (1933:192) noted Pahonu Pond (McAllister Site 383-A; State Site 50-80-15-1037) which was located adjacent to the E.O. [Wall] property in Waimānalo (Sterling and Summers 1978:249), near the present-day Sea Life Park. The pond was described as a "sea pond" (Handy and Handy 1972:458) measuring 500 feet in length by 50 feet wide. McAllister (1933:192) stated that "[a] line of stones, submerged at high tide, but visible at low tide, indicates its former extent. Turtles are said to have been kept in the pond for the use of the alii." This "enclosure for turtles" was described by Charles Alona, an informant, (in Sterling and Summers 1978:249) as:

Pa-honu, an enclosure for turtles that was once located back of Mrs. Wall's present home.

There was once a chief who was so fond of turtle meat that he ordered a sea wall built to keep captured turtles from escaping. Every turtle caught by a fisherman was put into this enclosure. No one else was allowed to partake of turtle meat under penalty of death. No one dared to eat turtle as long as the old chief lived.

Several *heiau* are known to have been located in Waimānalo Ahupua`a (McAllister 1933:190-195), which typically suggests a relatively substantial, resident population during the pre-Contact Period. A large structure (ca. 130 x 110 ft.) located south (*mauka*) of the current project area (Figure 5) was said to have been a *heiau* (Site 24). The possible *heiau* was reported by Mr. Murdoch, an informant on February 21, 1958 (Sterling and Summers 1978:247). According to Sterling and Summers (*ibid*):

Heavy underbrush prevented detailed inspection. Northwest wall appears to be in fairly good state of preservation. "Makai wall is badly damaged." This is the area which is on the accessible side.

McAllister's Site 382, located north of the current project area (see Figure 5), was a small *heiau* (ca. 50 x 90 ft.) situated in an area known as Pohakunui. According to McAllister (1933: 191), the *heiau* "...was built on the crown of a little hill, at the foot of the palis (sic) on the mountainward edge of the cane field just back of the Waimanalo mill. The site is in fairly good preservation, and the low walls which follow the contours are practically intact..."

Local resident, E.P. Kaniaupio reported a large (ca. 250 x 130 ft.) unnamed *heiau* (McAllister's Site 381) situated on the "...Waimanalo side of Olomana, on the edge of the Waimanalo cane field facing Koolau Range" (McAllister 1933: 191; see Figure 5).

Another indication of the significance of Waimānalo Ahupua`a during the pre-Contact Period was known as Haununaniho (McAllister's Site 383), a *pu`uhouua* or place of refuge, located "near the seaside of the mill" in Waimānalo (McAllister 1933:191). According to McAllister (*ibid*):

A small hill said to have been famous in older days a place of refuge (*puuhouua*). It is said that as soon as one side knew there was no hope for victory in the battle being fought, the wisest course was to flee as rapidly as possible to Haununaniho, for all the chiefs recognized the sacredness of this hill and the lives of those who reached this elevation were spared.

Several *ko`a*, or fish shrines, (Site 22) are located along the coast and on the larger adjoining islands of Waimānalo (Sterling and Summers 1978:251, 252, 255; Drolet and Sinoto 2001).

Traditional Hawaiian burials have been documented near the shore in sandy deposits at Bellows Air Force Station and at Waimānalo Bay State Recreation Park. Oral tradition also alludes to burials in caves in the Ko`olau cliffs (Sterling and Summers 1978: 250).

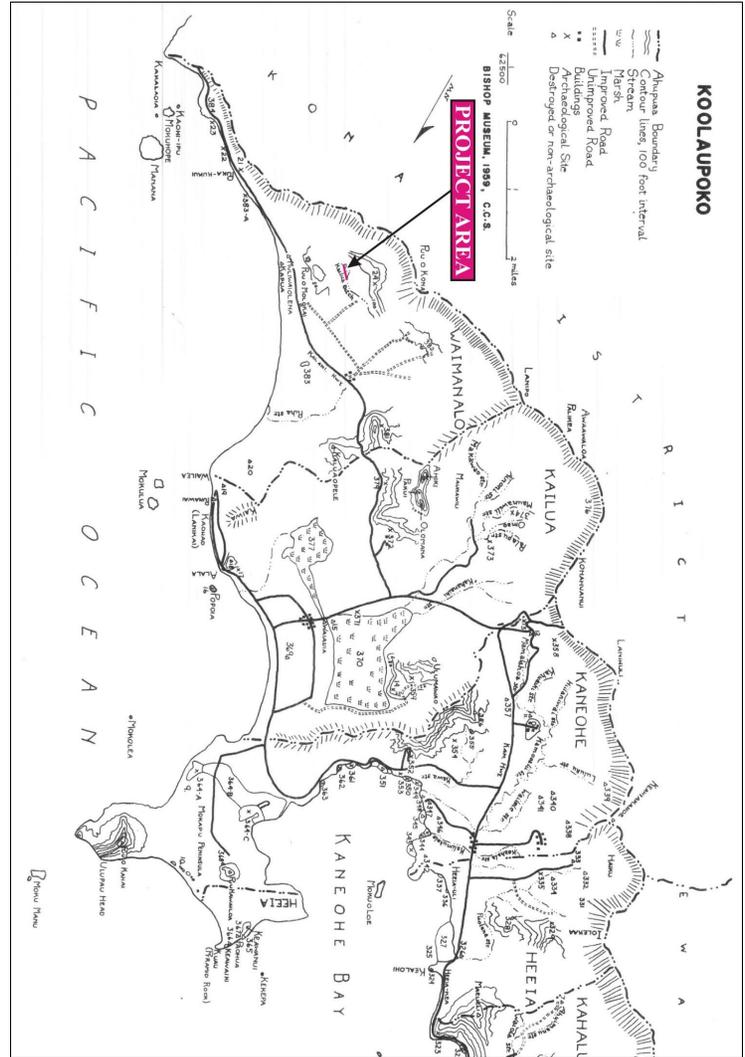


Figure 5: Ko`olaupoko District Map (Sterling and Summers 1978) Showing Project Area Location.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame'elehiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1968:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living.

These claims did not include any previously cultivated land, `okipū, stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame'elehiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

At the time of the Māhele in 1848, 147 *kuleana* were claimed in the *ahupua`a* of Waimānalo (Waihona `Aina Database 2014). Land Commission Awards (LCAs) refer to the lands used for the cultivation of bananas, possibly sweet potato, the presence of taro fields and fish in the *lo`i* ponds. Tuggle's (1994:4) map of the *ahupua`a* of Waimānalo places the taro-growing LCAs along the upper tributaries originating from Pu`u Lanipu, extending down towards the coast and ending where they join to form a single Puha Stream. Sweet potato was grown near Pu`u o Moloka`i (*ibid.*).

A search of the Waihona `Aina Database (2014), and the REDI Realty Tax Map Key indicated no Land Commission Awards (LCA) were located within the project area. However, based on the location and the availability of fresh water, there is a good chance that the project area may have been under cultivation during the pre-Contact Period. The general Waimānalo Plain area was known to be a place of wet-land taro farming, and terraces and water diversion features were reported in oral history accounts (Handy 1940), especially further up the slope in

higher land south and southwest of the project area. Archaeologists have confirmed the presence of such agricultural features in the Waimānalo Ahupua`a.

HISTORIC PERIOD

An Englishman by the name of Thomas Cummins had arrived in the islands around 1828. He married a High Chiefess, Kaumakaokane, and received an estate of Crown lands in Waimānalo (Hammatt and Shideler 2004). Twenty-two years later, Kauikeaouli (Kamehameha III) leased the entire *ahupua`a* of Waimānalo to him for a period of 50 years (*ibid.*). Cummins, and his son John, developed a cattle and horse ranch named the Mauna Loke (Mt. Rosa) where Hawaiian royalty was often entertained (*ibid.*). The introduction of ranching activities brought an end to traditional agriculture in the valley, as indicated by a description of Waimānalo Ahupua`a in the year 1847 (published in the Ka Hoonanea o Ka Manawa, Kuokoa, October 26, 1906, in Sterling and Summers 1978:244) paints a vivid picture of the valley:

....filled with breadfruit, mountain apples, kukui and coconut trees. There were taro patches, with banks covered with ti and wauke plants. Grass houses occupied the dry lands, a hundred of them there and sweet potatoes and sugar cane were much grown....The whole ahupua`a of Waimanalo was leased to white men except the native kuleanas and because the cattle wandered over them... [t]he taro patches that were neatly built at the time when the chiefs ruled over the people and the land, were broken up. The sugar cane, ti, and wauke plants were destroyed. The big trees that grew in those days, died because the roots could not get moisture. The valley became a place for animals.

As the natives left the land, the Cummins Estate bought their *kuleana* in Waimānalo, gaining some 200 additional acres of land (Hammatt and Shideler 2004). Cummins allowed Chinese rice farmers use of the terraces previously growing taro. They grew not only rice, but also sugar cane which, by 1876 with the Reciprocity Treaty, had become the way of the future. John Cummins built a sugar mill and landing pier in the 1880s and sublet his land to the Waimanalo Sugar Company, the majority shares of which he owned.

William Jarrett purchased 670 acres in the upper reaches of the `ili of Maunawili from the government in 1849, which in turn, was sold to Henry Sawyer in 1855 along with all the *kuleana* lands, to which Sawyer continued to add, eventually forming the Maunawili Ranch (Brennan 2009). The ranch was sold in 1869 to Maria Hio Adams Boyd, the granddaughter of a close advisor to Liholiho (Kamehameha II) (*ibid.*). The ranch stayed in the Boyd family until the Boyd's sold their ranch in 1893 to William Irwin, who became a partner of Claus Spreckels, the

so-called “Sugar King” (Adler 1966 in 1880 Brennan 2009). With the addition of the Boyd’s ranch, Irwin and Spreckels controlled the processing of the majority of the sugar yield in Hawai‘i, including Waimanalo Sugar Company (WSC) (*ibid.*). Once Irwin gained control of WSC, he developed a ditch system to divert water from Maunawili to Waimānalo for its sugar needs.

The early 1900s saw the development of a railroad for transporting cane to the pier in Waimānalo, and general expansion of the successful sugar cane venture. John Cummins sold his shares in the W.S.C. in 1894 and with his death in 1913; his estate sold the remaining lands and leases to W.S.C. (Brennan 2009).

More recently, most of the Waimānalo Plain was under commercial sugar cane production, and this would have had a dramatic effect on any traditional sites or features located on or under the ground surface. The Waimanalo Sugar Company, one of the smallest and least successful in Hawai‘i, was established in 1878 and closed in 1947 (Wilcox 1996; Dorrance and Morgan 2000). Historical photographs and maps (Figure 6) indicate vast areas of inland Waimānalo under cane cultivation.

Ranching activities occurred throughout Waimānalo after sugarcane (Cowan-Smith and Stone 1988). Horse ranching continues to be popular in Waimānalo, although its effects on the landscape and on historic properties are less significant than sugar cane.

PREVIOUS ARCHAEOLOGY

Numerous archaeological projects have been conducted along the Waimānalo shoreline, the great majority of which took place within Bellows Air Force Station/ Marine Corps Training Area Bellows (see Dega 2003). The military installation is situated about a mile to the east of the subject project area. The geomorphology and sediments of Bellows are different from the subject property, but the range and density of traditional sites are impressive. A minimum of 23 sites have been designated state site numbers at Bellows, ten of which are pre-Contact to late 19th century sites. These include habitations, burials, *heiau*, workshop areas, midden, and possible agricultural features. Another nexus of investigations has Waimānalo Bay State Recreation Park,

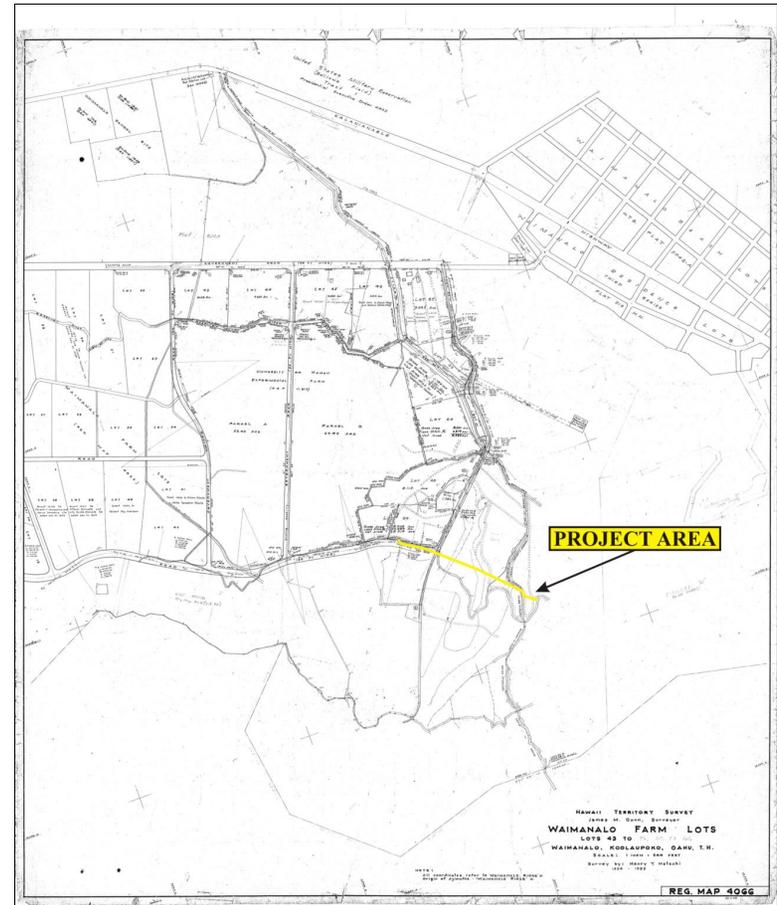


Figure 6: Hawaii Territory Survey Map of Waimanalo Farm Lots, Waimanalo, Koolaulupoko, O‘ahu, T. H. (Dunn 1954-1955: Reg. Map 4066) Showing Project Area Location.

located south of Bellows; findings included a buried traditional cultural layer (Davis 1976) and human burials (Pearson 1971). The locations of selected previously conducted archaeological projects located in the vicinity of the current project are shown in Figure 7.

A handful of studies have been conducted in Waimānalo town itself. In 1993 an archaeological assessment was made for the Job Corps Center site on Hīhīmanu Street; no cultural resources were identified (Sinoto 1993). In 1994 Archaeological Monitoring on the same parcel yielded negative findings for historic properties (Pantaleo 1994).

In 2001, Aki Sinoto Consulting, Inc. conducted an Archaeological Inventory Survey at Board of Water Supply Well III, Waimanalo, Ko`olaupoko, O`ahu [TMK: (1) 4-1-08:05, 79, & 80] (Drolet and Sinoto 2001). During the survey, two archaeological sites were identified: State Site 50-80-15-4042, which consisted of portions of the Historic Kailua Ditch, a component of the well-known Waimanalo Irrigation System; and State Site 50-80-15-5876, a possible remnant of a railroad berm and two stacked-stone structures.

In 2002, Cultural Surveys Hawai`i conducted an Archaeological Inventory Survey on a 6-acre parcel on Ahiki Street as part of improvements to the USDA Hawai`i Fruit Fly Production Facility; one historic site (the Tai-Lee Ditch, State Site 50-80-15-6427) was identified (Hammatt *et al.* 2002). In 2003, Cultural Surveys Hawai`i conducted an Archaeological Inventory Survey on a 9-acre parcel adjacent to the Hammatt *et al.* (2002) project area, no archaeological resources were identified (Hammatt *et al.* 2003).

In 2004, Cultural Surveys Hawai`i conducted a lot feasibility study on two parcels discussed in the included the above-mentioned Hammatt *et al.* (2002) and Hammatt *et al.* (2003) project areas (Monahan 2004). The Monahan (2004) feasibility study concluded that archaeological sites, if present, would be most likely to exist near water sources such as the tributary stream at the western end of the current project area. In 2006, SCS Tome *et al.* 2006) conducted an Archaeological Assessment of the parcels discussed in Hammatt *et al.* (2002), Hammatt *et al.* (2003), and Monahan (2004). The Tome *et al.* (2006) study consisted of a surface survey and subsurface testing; no cultural resources were reported.

In 2010, Cultural Surveys Hawai`i conducted Archaeological Monitoring was conducted at Waimanalo Elementary and Intermediate School during excavations for wastewater improvements; no historic sites were identified (Hunkin *et al.* 2010). In 2010, McElroy (2010) conducted archaeological monitoring for fiber optic installation along portions of Hīhīmanu

Street, Kaka`ina Street, Waikupunaha Street, and Mekia Street; no cultural resources were reported. In 2013, Scientific Consultant Services, Inc. conducted Archaeological Monitoring of the mechanical excavation of six trenches in the northeast end of the Department of Hawaiian Home Lands Kakaina Residential Subdivision, located in Waimānalo, Waimānalo Ahupua`a, Ko`olaupoko District, O`ahu Island (TMK: 4-1-08:010, 081, 091); no historic properties were identified (Hazlett and Spear 2013).

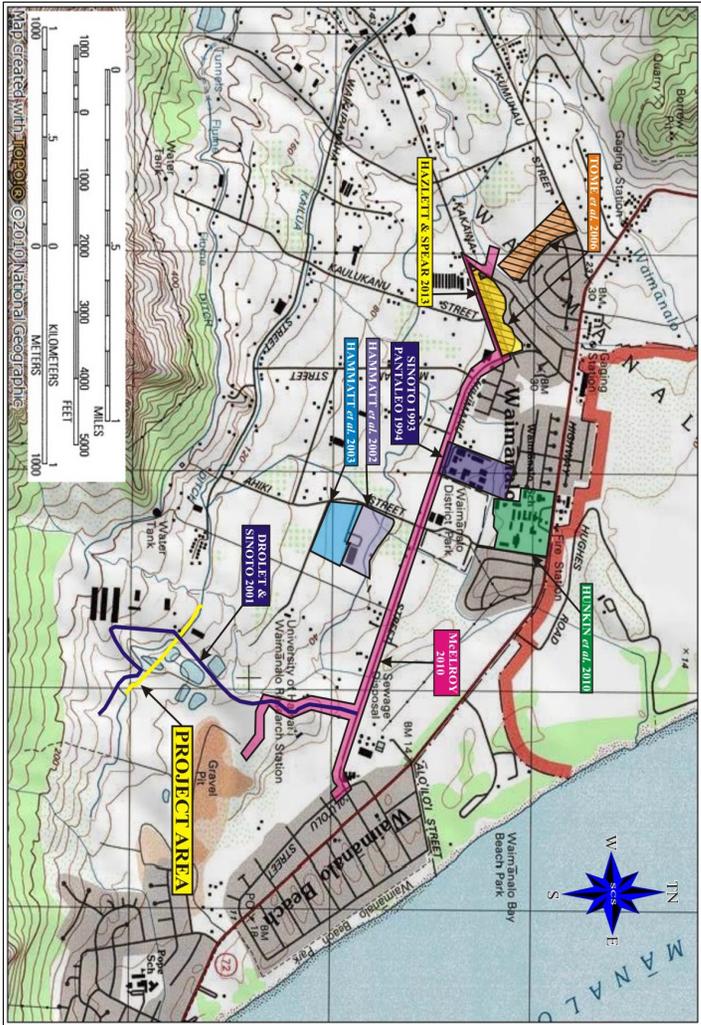


Figure 7: USGS Quadrangle (Koko Head 1999) Showing Locations of Previously Conducted Archaeological Projects in the Vicinity of the Current Project Area.

FIELDWORK EXPECTATIONS

Based on the location of the project area and the findings of previous archaeological work in the general area, expected findings included portions of the Historic Kailua Ditch, which is a component of the well-known Waimanalo Irrigation System (State Inventory of Historic Places [SIHP] No. 50-80-15-4042) (Neller 1980), as well as historic sites and artifacts associated with the Historic Plantation -Era.

Additional potential site types that were expected to be encountered within the current project area included pre-Contact and early Historic Period habitation sites, artifacts, and (possibly) burials. Almost every additional archaeological study through the years has added new, previously unrecorded, agricultural features to the growing list of valley sites.

METHODOLOGY

FIELD METHODOLOGY

The AIS follows an Archaeological Field Inspection which conducted February 13, 2014 by SCS archaeologist Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator. The field inspection was conducted in order to determine the presence/absence of historic properties. The AIS was performed 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) § 13-284 and HAR § 13-276.

The AIS fieldwork was conducted from March 19 through March 21, 2014, by SCS Archaeologists Elizabeth Pestana, B.A., and Guerin Tome, B.A., under the direction of Robert L. Spear, Ph.D., Principal Investigator.

Multiple field tasks were completed during the current Archaeological Inventory Survey. First, pedestrian survey was conducted in order to identify archaeological sites and assess the proposed project area geographical/physiographical features. Fieldwork was comprised of a

systematic pedestrian survey covering 100 percent of the project area. Transect spacing of 7 to 10 meters (23 and 33 feet) intervals, on each side of the proposed 1,800 foot long ditch line, was employed, as ground visibility was moderate. Once archaeological features were located, they were marked with biodegradable flagging tape. During the pedestrian survey, results were compiled on standard graphing paper as well as with digital photography. Each feature was given an SCS temporary feature designation (*e.g.*, T-1) and plotted on a United States Geological Survey (USGS) map with a handheld Garmin GPS Map 60 CSx global positioning system (GPS) unit. The datum and coordinate system used for the GPS unit was NAD83 and UTM (Universal Transverse Mercator). True north compass orientation was also employed. All measurements were recorded in metric. The individual exposures of the Historic Kailua Ditch were also documented in plan-view. The site boundary was primarily determined by feature architecture boundaries. Visible exploration on the exterior of the features did not produce cultural materials and thus, each feature recorded herein was defined by their exterior architecture.

Representative plan view sketches showing the location and morphology of identified features were compiled and illustrated. Photographs were taken of all subsurface features and are presented with the associated feature in the Archaeological Inventory Survey Results section.

EXCAVATION METHODOLOGY

To supplement the surface pedestrian survey, limited excavation was conducted during the current Archaeological Inventory Survey. Excavation efforts were not focused on surface architecture, as the surface architecture was interpreted as associated with Historic Period agriculture and excavation of the features would not have provided additional information. Excavation focused on identifying subsurface archaeological cultural materials, subsurface features, and human influence to strata. A total of four stratigraphic trenches (ST-1 through ST-4) were manually excavated at State Site 50-80-15-4042 (Figure 8). Standard excavation and recording procedures were used during the project. All excavated material was screened through 1/4" and 1/8" inch wire mesh and visually inspected for the presence of cultural material. Equipment utilized to perform these excavations included shovels, trowels, whisk brooms, and metric tape measures.

Soil stratigraphy encountered during excavation was documented utilizing metric graph paper and United States Department of Agriculture (USDA) Munsell (2000) soil color charts.

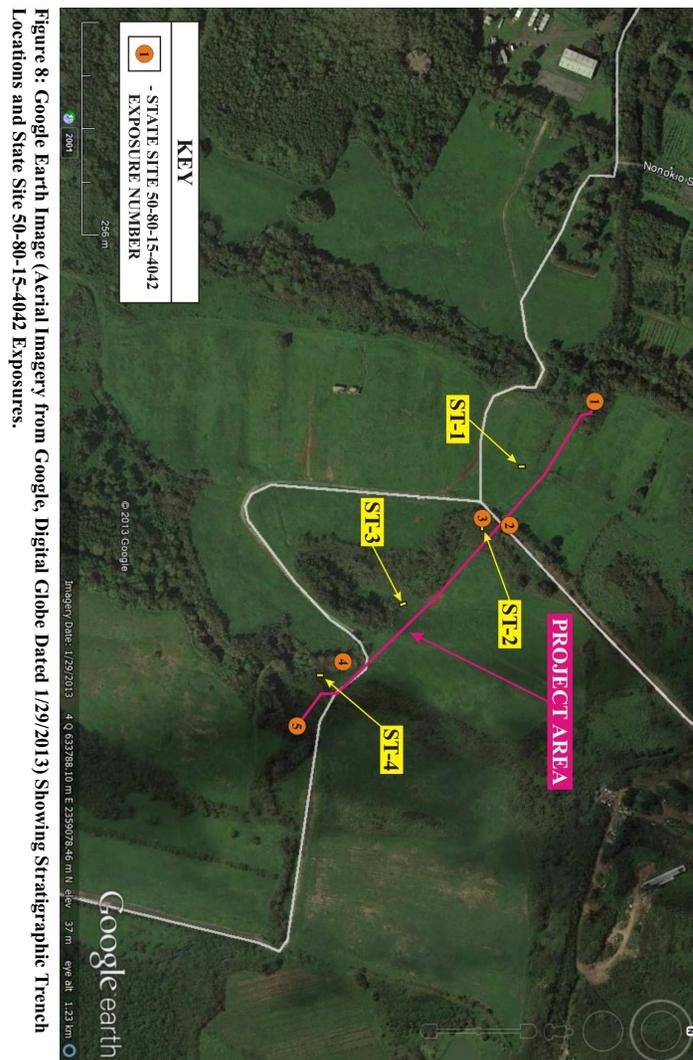


Figure 8: Google Earth Image (Aerial Imagery from Google, Digital Globe Dated 1/29/2013) Showing Stratigraphic Trench Locations and State Site 50-80-15-4042 Exposures.

Stratigraphic profiles were completed for ST-1 through ST-4. All stratigraphic profiles were drafted for presentation in the AIS report. The stratigraphic profiles of the four excavated stratigraphic trenches are presented in the Stratigraphic Trench Excavations section.

Identified, portable archaeological materials were collected and recorded with applicable provenience and placed in plastic and paper bags for laboratory analysis (Appendix A). It should be noted that all plastic material (*i.e.*, bags, sheets, pvc pipes, etc.) were interpreted as Modern and were not collected. Additional cultural materials were interpreted as Modern based on context, manufacturer stamps, method of construction, material, etc., and these materials were not collected.

CURATION

Scientific Consultant Services, Inc. will curate all collected materials until the AIS work has been completed, reviewed, and accepted by the SHPD. All materials gathered during this project (including documentation) are ultimately the property of the client, who may request their transfer subsequent to the acceptance of the final AIS report.

INVENTORY SURVEY RESULTS

During the survey five exposures comprising one discontinuous segment of the Historic Kailua Ditch (State Site 50-80-15-4042) were identified. The Historic Kailua Ditch is "...one of the three constituent subdivisions of the [over] 114-year old Waimanalo Irrigation System (Drolet and Sinoto 2001:19). Based on feature type, location, and archival research, the exposed portions of the Historic Kailua Ditch (State Site 50-80-15-4042) were interpreted as associated with the Plantation-Era (1890 to 1971).

The Historic Kailua Ditch is located roughly perpendicular to the southwest (*mauka*)/northeast (*makai*) trending slope partially crossing the slope at the southwest end of the project area corridor. The ditch has been breached in several surface locations and the exposed concrete construction is cracked and dislocated at the road-side flume. In general, the five ditch exposures can be evaluated as in fair to poor physical condition. The five exposures of the Historic Kailua Ditch (State Site 50-80-15-4042) are individually described below.

HISTORIC KAILUA DITCH (STATE SITE 50-80-15-4042), EXPOSURE 1 (E1)

GPS Coordinates: 633632 E/2359337 N **Integrity:** Altered
Condition: Fair **Age:** Historic
Form: Subsurface Intake with Sluice Gate **Function:** Historic Agriculture

Historic Kailua Ditch, Exposure 1 (E1) consists of a rectangular, concrete-lined segment of the Historic Kailua Ditch. Exposure 1 consists of measures 2.6 by 2.0 by 0.60-0.82 m deep and is oriented along a northwest/southeast axis at a bearing of 100/280 degrees, Magnetic. Exposure 1 was constructed below existing surface/grade and includes a diamond plating cover. The surface portion of the E1 construction is partially buried. The exposed construction, which extends below grade, exhibits metal framing on the top edge. This structure was form-constructed in place with mortared mason slabs (Figures 9 and 10).

HISTORIC KAILUA DITCH (STATE SITE 50-80-15-4042), EXPOSURE 2 (E2)

GPS Coordinates: 633775 E/2359249 N **Integrity:** Altered
Condition: Fair **Age:** Historic
Form: Concreted Flume Intersection **Function:** Historic Agriculture

Historic Kailua Ditch, Exposure 2 (E2) was constructed of mason-pour forms and brick. The walls were formed against *in situ* soils. A horizontal seam bisects the wall across the center, possibly indicating two separate pours for finished wall heights (Figures 11 and 12). Exposure 2 is oriented along a northwest/southeast axis at a bearing of 138/318 degrees, Magnetic. The exterior of E2 measures 13.0 by 1.55, with a wall thickness of 15 to 25 cm. The interior of E2 measures 3.40 by 1.0 m. This section of the Historic Kailua Ditch has been impacted by modifications including an intersecting concrete ditch. This section, also, appears to have been poorly constructed as exemplified in the exterior form of the walls and the cracks in/on the wall interior. This exposure of the ditch extends below a southeast/northwest trending paved road and continues to the south as an excavated earthen ditch. Historic materials consisting of limestone coral road bedding used in the construction of the ditch and the surrounding infrastructure were observed on the ground surface and on the interior bottom surface of the ditch. Another suggested rationale for the presence of limestone in the project area is that limestone was utilized in commercial sugarcane production to lower the pH of the soils and decrease the acidity of the soils.



Figure 10: Photograph of State Site 50-80-15-4042, Exposure 1 Interior Showing Grating and Sluice Notch in the North Wall. View to East.

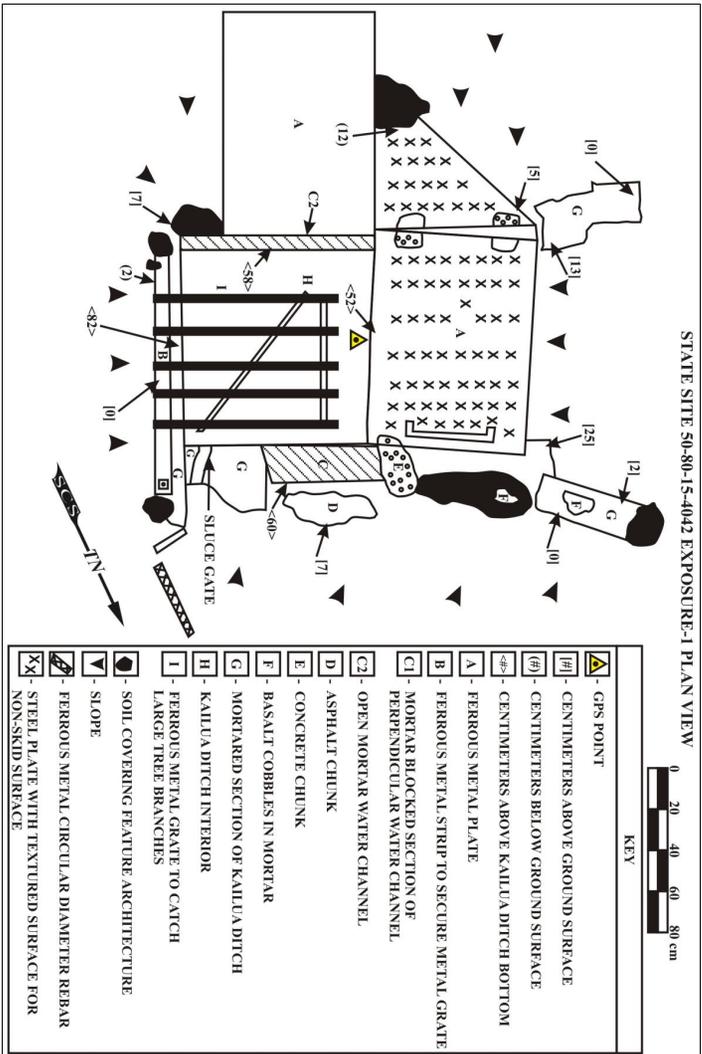


Figure 9 : Plan View Drawing of State Site 50-80-15-4042, Exposure 1.

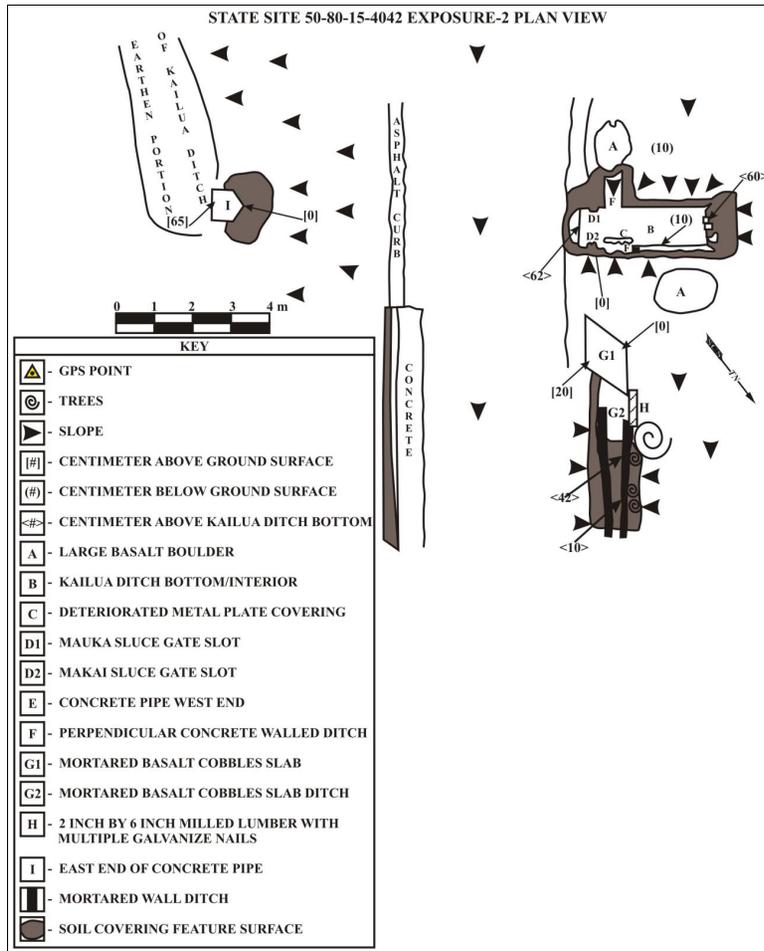


Figure 11: Plan View Drawing of State Site 50-80-15-4042, Exposure 2.



Figure 12: Photographic Overview of State Site 50-80-15-4042, Exposure 2, West End Showing Subsurface Section of Historic Kailua Ditch and Drainage Pipe. View to East.

HISTORIC KAILUA DITCH (STATE SITE 50-80-15-4042), EXPOSURE 3 (E3)

GPS Coordinates: 633773 E/2359213 N **Integrity:** Altered
Condition: Fair **Age:** Historic
Form: Earthen Ditch Channel **Function:** Historic Agriculture

Historic Kailua Ditch, Exposure 3 (E3) consists of a north/south (355/175 degrees, Magnetic) trending, linear, excavated earthen depression (4.0 x 3.0 x by 0.50 m deep) located at the base of a steep east facing embankment below the main road. A pvc pipe (10-inch diameter) was visible in a portion of this segment of the ditch (Figures 13 and 14). Scattered modern trash on the surface of the feature included aluminum cans, plastic beverage cups, glass sherds, metal fragments, and a section of corrugated metal sheeting.

HISTORIC KAILUA DITCH (STATE SITE 50-80-15-4042), EXPOSURE 4 (E4)

GPS Coordinates: 633956 E/2359033 N **Integrity:** Altered
Condition: Fair to Poor **Age:** Historic
Form: Earthen Ditch Channel **Function:** Historic Agriculture

Historic Kailua Ditch, Exposure 4 (E4) consists of a northwest/southeast trending (174/354 degrees, Magnetic) excavated earthen section of the ditch located at the base of a shallow embankment (Figures 15 and 16). Exposure 4 measures 4.0 by 4.0 m with a maximum depth of 0.40 m on the east side. A pvc pipe (10-inch diameter) was visible in a portion of this segment of the ditch and breaches the ditch at multiple locations.

HISTORIC KAILUA DITCH (STATE SITE 50-80-15-4042), EXPOSURE 5 (E5)

GPS Coordinates: 634031 E/2358981 N **Integrity:** Altered
Condition: Poor **Age:** Historic
Form: Earthen Ditch Channel **Function:** Historic Agriculture

Historic Kailua Ditch, Exposure 5 (E5) consists of a southwest/northeast trending excavated earthen section of the ditch. Exposure 5 was not well-defined and the area is overgrown with tall grasses, vines, and variety of shrubs forming the ground cover (Figures 17 and 18). This section of the ditch is partially level where the west bank/berm would be. In addition, a barbed wire fence extends along the interior of the east bank of the ditch.

STRATIGRAPHIC TRENCH EXCAVATIONS

During the inventory survey four stratigraphic trenches were manually excavated utilizing pick axes, shovels, and trowels. Stratigraphic testing was not conducted of the identified features. All of the features identified during the survey were interpreted as Historic features associated with the Historic Kailua Ditch. Thus, excavation of these features would not provide

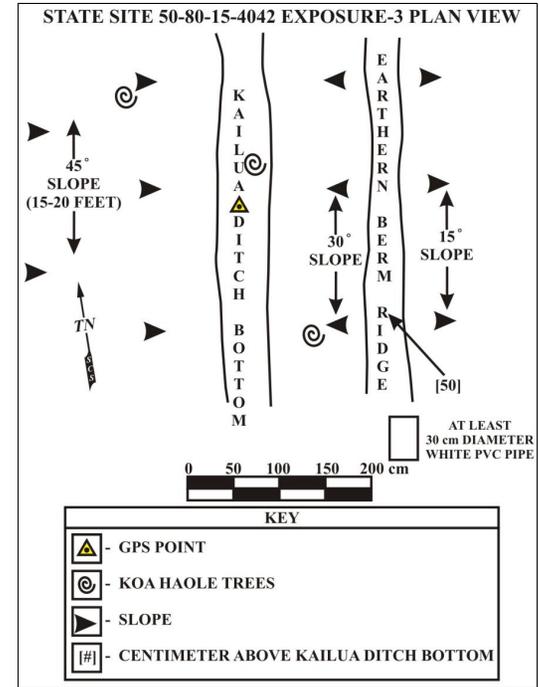


Figure 13: Plan View Drawing of State Site 50-80-15-4042, Exposure 3.



Figure 14: Photographic Overview of State Site 50-80-15-4042, Exposure 3 with Modern Trash. View to North/Northeast.

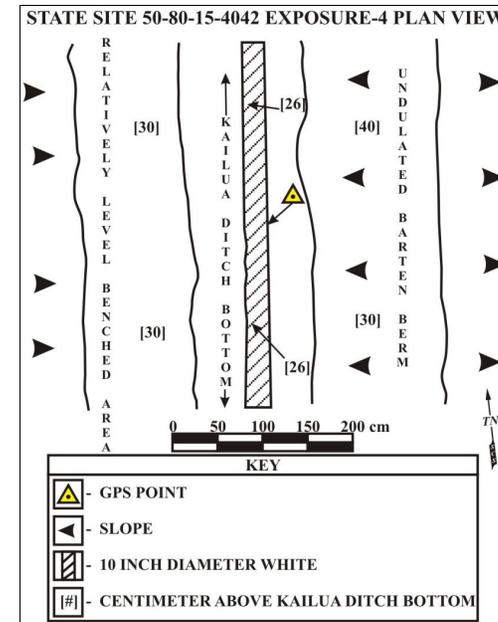


Figure 15: Plan View Drawing of State Site 50-80-15-4042, Exposure 4.



Figure 16: Photographic Overview of State Site 50-80-15-4042, Exposure 4. View to South.

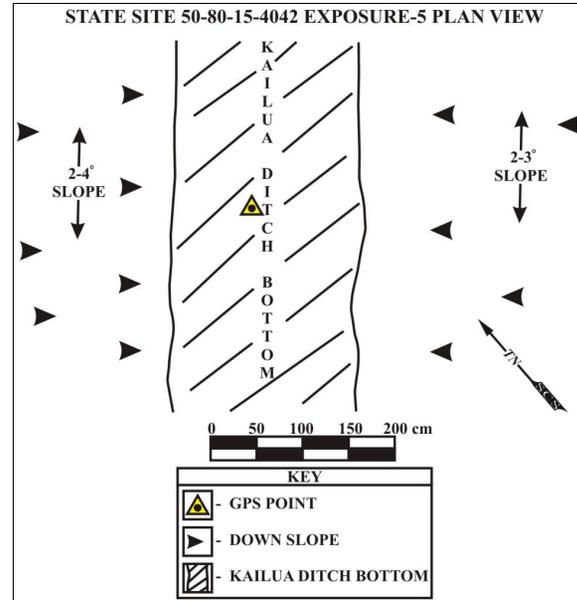


Figure 17: Plan View Drawing of State Site 50-80-15-4042, Exposure 5.



Figure 18: Photographic Overview of State Site 50-80-15-4042, Exposure 4. View to North.

additional information. Tested areas consisted of areas where human activity was thought to have occurred (see Figure 8). Stratigraphic Trench 1 was placed on a modified earthen bench that suggested the presence of *lo'i* soils. Stratigraphic Trench 2 was placed in an area thought to contain historic cultural materials associated with the construction of the Historic Kailua Ditch. Stratigraphic Trench 3 was placed in a swale which suggested the presence of *lo'i* soils or habitation deposits. Stratigraphic Trench 4 was placed in a level ground surface which suggested the presence of habitation deposits.

No traditional or historic cultural materials, deposits, artifacts, or midden were identified during excavation. The identified cultural materials, which were collected from the stratigraphic trench excavations, consisted of the following non-diagnostic materials: one piece of plastic pvc pipe fragment, one sawn tree branch fragment, three pieces of basalt construction gravel, 4 pieces of limestone pebbles, charcoal flecking, six ferrous metal nails, two possible ferrous nails, 1 non-ferrous metal washer, one non-diagnostic black, hard, plastic fragment, one whiteware tile fragment, and one whiteware sherd. One diagnostic marine invertebrate, which laboratory analysis identified as *Gastropoda: Trochus intexus*, was collected (see Appendix A).

STRATIGRAPHIC TRENCH 1 (ST-1)

Stratigraphic Trench 1 was placed on a modified earthen bench that suggested the presence of *lo'i* soils. Stratigraphic Trench 1 (ST-1) measured 1.0 m long by 0.5 m wide with a minimum depth of 25 centimeters below surface (cmbs) and a maximum depth of 34 cmbs. Stratigraphic Trench 1 was placed on level ground within a slightly undulating agricultural field and oriented along a north/south axis (186/6 degrees, Magnetic). Cultural materials consisting of coral/sandstone, basalt gravel, white plastic pvc pipe were observed within ST-1 at 8 to 10 cm bs. The white pvc pipe was collected as it was initially thought to be a possible ceramic sherd. During lab analysis the material was identified as pvc pipe (see Appendix A). No traditional or definitive historic artifacts were encountered in ST-1. Two stratigraphic layers were identified in ST-1 (Figures 19 and 20). The stratigraphic layers are described below.

Layer I (0-11/13 cmbs) consisted of dark brown (7.5YR 3/3, moist semi-compact clay loam with micro roots and rootlets and an approximately 15 percent basalt cobble and limestone gravel content. Layer I was interpreted as an agricultural deposit as the lower boundary was fairly uniform and gradual. The following non-diagnostic cultural materials identified in Layer I: plastic pvc pipe, sawn tree branch fragment, basalt construction gravel, and limestone pebbles. No traditional or definitive historic artifacts were encountered in Layer I.

Layer II (11/13-25/34 cmbs) consisted of dark brown (7.5YR 3/3, moist) semi-compact loamy clay. Layer II was culturally sterile.

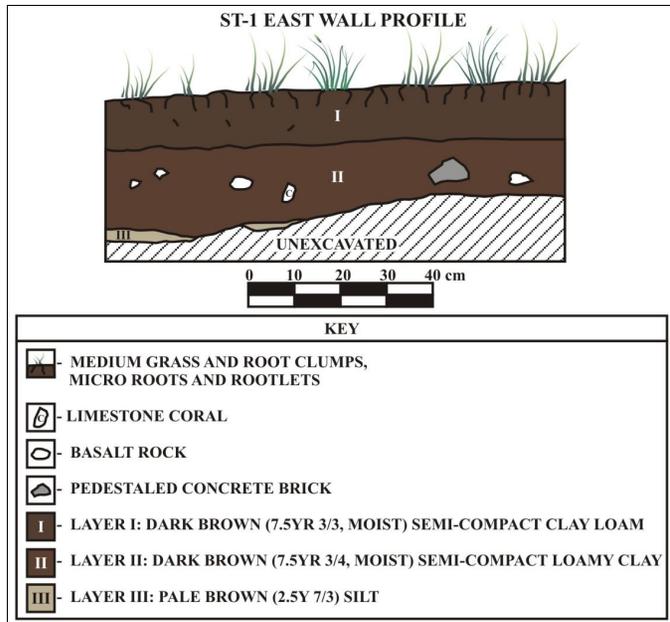


Figure 19: Stratigraphic Trench 1, East Wall Profile.



Figure 20: Photograph of Stratigraphic Trench 1, East Wall Profile. View to East.

STRATIGRAPHIC TRENCH 2 (ST-2)

Stratigraphic Trench 2 (ST-2) was placed on an approximately 15 to 20 degree, west to east trending downslope in close proximity of State Site 50-80-15-4042, Exposure 2, in an effort to identify historic cultural materials associated with the construction of the ditch in subsurface contexts. The northwest corner of ST-2 is located approximately 3.8 m, at a compass bearing of 260 degrees, Magnetic from State Site 50-80-15-4042, Exposure 2. Stratigraphic Trench 2 measured 1.0 m long by 0.5 m wide with a minimum depth of 60 centimeters below surface (cmbs) and a maximum depth of 70 cmbs and was oriented along a north/south axis (90/270 degrees, Magnetic). Cultural materials consisting of limestone pebbles were present in ST-2 (see Appendix A). No traditional or definitive historic artifacts were encountered in ST-2 (see Appendix A). Three stratigraphic layers were identified in ST-2 (Figures 21 and 22). The stratigraphic layers are described below.

Layer I (0-10 cmbs) consisted of semi-loose black (10 YR 2/1, moist) loam with grass roots. As the lower boundary no Layer I was diffuse, Layer I was interpreted as a natural stratum containing limestone pebbles that rolled downslope. Limestone pebbles associated with roads were observed in the project area. No traditional.

Layer II (10-40 cmbs) consisted of semi-compact, dark brown (7.5YR 3/3, moist) clayey loam containing grass and tree roots. Layer II contained limited charcoal flecking. An *in situ* sample of the charcoal flecking was collected at 42 cmbs. Due to the presence of a diffuse lower boundary, Layer II was interpreted as a natural stratum and the charcoal was interpreted as originating upslope and washing downslope. Layer II was culturally sterile.

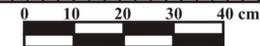
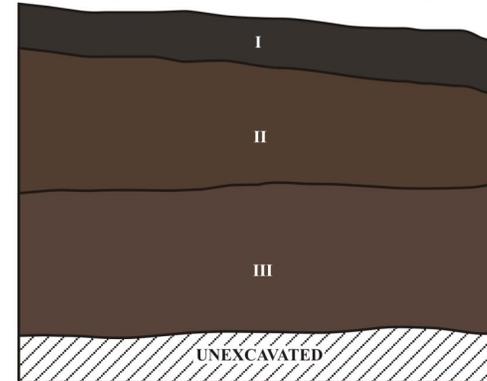
Layer III (40-70 cmbs) consisted of compact, dark reddish (5YR 3/3, moist) clayey silt with few tree roots. Layer III was culturally sterile. Layer III was interpreted as a natural stratum, as Layers I and II were natural strata. Layer III was culturally sterile.

STRATIGRAPHIC TRENCH 3 (ST-3)

Stratigraphic Trench 3 (ST-3) was placed at the base of a swale which was thought may yield *lo'i* soils or evidence of habitation. Stratigraphic Trench 3 (1.0 m long by 0.5 m wide with a maximum depth of 20 cmbs. Stratigraphic Trench 1 was placed at the north edge of a fallow agricultural field and oriented along a north/south axis (8/188 degrees, Magnetic). No cultural materials were present in ST-3. Two stratigraphic layers were identified in ST-3 (Figures 23 and 24). The stratigraphic layers are described below.

Layer I (0-7cmbs) consisted of dark brown (7/5YR 3/3, moist) semi-compact clay loam with micro roots and rootlets Layer I was interpreted as an agricultural deposit as the lower boundary was fairly uniform and gradual. Layer I was culturally sterile.

ST-2 NORTH WALL STRATIGRAPHIC PROFILE



KEY

- I - LAYER I: BLACK (10YR 2/1, MOIST) LOAM WITH GRASS ROOTS
- II - LAYER II: DARK BROWN (7.5YR 3/3, MOIST) CLAYEY LOAM WITH GRASS
- III - LAYER III: DARK REDDISH BROWN (5YR 3/3, MOIST) CLAYEY SILT

Figure 21: Stratigraphic Trench 2, North Wall Profile.

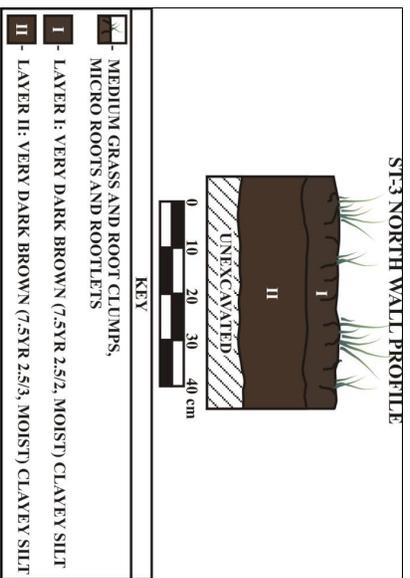


Figure 23: Stratigraphic Trench 3, North Wall Profile.



Figure 22: Photograph of Stratigraphic Trench 2, North Wall Profile. View to Northeast.

Figure 24: Photograph of Stratigraphic Trench 3, North Wall Profile. View to North.



Layer II (10-20 cmbs) consisted of dark brown (7.5YR 3/3, moist) semi-compact loamy clay. Layer II was culturally sterile.

STRATIGRAPHIC TRENCH 4 (ST-4)

Stratigraphic Trench 4 (ST-4) was placed on a level, slightly raised area (80 cm diameter) which was thought may yield evidence of habitation. Stratigraphic Trench 4 measured 1.0 m long by 0.5 m wide with a minimum depth of 37 centimeters below surface (cmbs) and a maximum depth of 40 cmbs and was oriented along a west/east axis (000/180 degrees, Magnetic). Cultural materials consisting of ferrous metal nails, possible ferrous metal nails, non-ferrous metal washer, whiteware tile fragment, whiteware plate base sherd, and one diagnostic marine invertebrate, which laboratory analysis identified as Gastropoda: *Trochus intextus*, was collected (see Appendix A). No traditional or definitive historic artifacts were encountered in ST-4 (see Appendix A). Four stratigraphic layers were identified in ST-4 (Figures 25 and 26). The stratigraphic layers are described below.

Layer I (0-16 cmbs) consisted of semi-loose dark brown (7.5YR 3/3, dry) sandy loam with grass roots. The lower boundary was solid. The following non-diagnostic cultural materials were observed, not collected: basalt gravel and limestone chunks. The following non-diagnostic cultural materials were collected: ferrous metal corroded, flat, circular-head nails, and a white pvc fragment. No traditional or definitive historic artifacts were encountered in Layer I.

Layer II (16-26 cmbs) consisted of semi-compact, very dark grayish brown (7.5YR 3/2, dry) loamy clay containing few grass roots. The lower boundary was solid. The following non-diagnostic cultural materials were collected from Layer II: corroded, ferrous metal flat head circular diameter nails, a whiteware tile sherd, a whiteware plate base sherd, and a small diameter metal washer (see Appendix A). One diagnostic marine invertebrate, which laboratory analysis identified as Gastropoda: *Trochus intextus*, was collected (see Appendix A). Layer II is likely an imported material as it is located just above the arbitrarily labeled Layer III, which is also comprised of imported material.

Layer III (26-36 cmbs) consisted of semi-loose, very pale brown (10YR 7/4, dry) silty sand containing angular basalt cobbles. The lower boundary was solid. Limestone chunks were observed not collected. Layer III was culturally sterile.

Layer IV (36- 46 cmbs) consisted of compact, dark brown (20YR 3/3, dry) loamy clay mottled with pockets of semi-loose dark, yellowish brown (10YR 3/6, dry) silty sand. Limestone pebbles

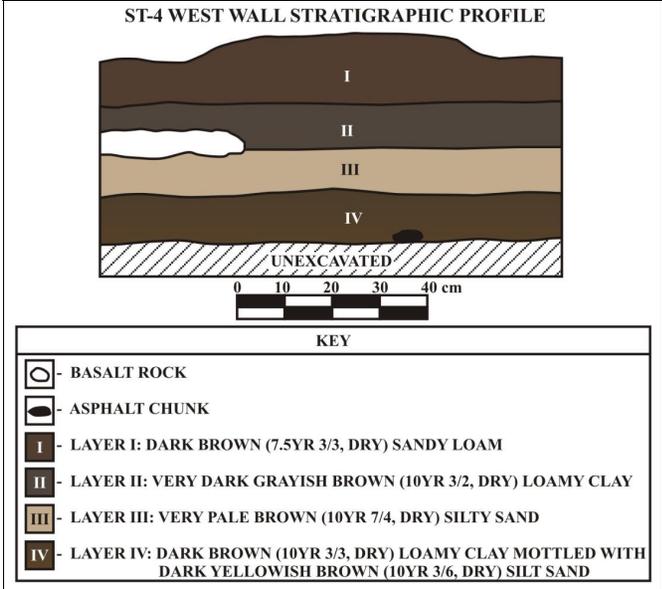


Figure 25: Stratigraphic Trench 4, West Wall Profile.



Figure 26: Photograph of Stratigraphic Trench 4, West Wall Profile, View to West.

and cobbles and asphalt chunks and dried blue paint were observed, not collected. The mottling of different matrices suggests Layer IV is imported fill material.

DISCUSSION AND SUMMARY

Archaeological Inventory Survey of the Main Line Extension Waimānalo Irrigation System led to the identification of five previously undocumented segments of the previously identified Historic Kailua Ditch (State Site 50-80-15-4042). No additional architectural features were identified on the ground surface or in subsurface contexts. A total of 25 artifacts were collected from the stratigraphic trench excavations. The collected non-diagnostic materials consisted of: one piece of plastic pvc pipe fragment, one sawn tree branch fragment, three pieces of basalt construction gravel, 4 pieces of limestone pebbles, charcoal flecking, six ferrous metal nails, two possible ferrous nails, 1 non-ferrous metal washer, one non-diagnostic black, hard, plastic fragment, one whiteware tile fragment, and one whiteware sherd. One diagnostic marine invertebrate, which laboratory analysis identified as Gastropoda: *Trochus intextus*, was collected (see Appendix A). As none of the collected artifacts exhibited diagnostic traits, chronological context could not be established for the collected cultural material

SIGNIFICANCE ASSESSEMENTS

Archaeological Inventory Survey of the Main Line Extension Waimānalo Irrigation System led to the identification of five previously unidentified exposures, which comprise one discontinuous segment, of the Historic Kailua Ditch (State Site 50-80-15-4042). The Historic Kailua Ditch is "...one of the three constituent subdivisions of the [over] 114-year old Waimanalo Irrigation System (Drolet and Sinoto 2001:19). Based on feature type, location, and archival research, all features were interpreted as associated with the Historic Plantation-Era (1890 to 1971).

The five previously unidentified exposures comprising one discontinuous segment of the Historic Kailua Ditch (State Site 50-80-15-4042) were evaluated for significance pursuant to HAR §13-284-6 regarding the evaluation of historic properties for projects requiring a permit on privately owned land. The administrative rules state that a historic property, to be considered significant, must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following criteria:

Criterion a: Be associated with events that have made an important contribution to the broad patterns of our history;

Criterion b: Be associated with the lives of persons important in our past ;

Criterion c: Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

Criterion d: Have yielded, or is likely to yield, information important for research on prehistory or history; or

Criterion e: Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts – these associations being important to the group’s history and cultural identity.

The five newly identified exposures of State Site 50-80-15-4042 have been evaluated in accordance with criteria established for the Hawai’i State Register of Historic Places (HAR§13-276 and HAR§13-284) and found to be significant under the following criteria: Criterion “a”, associated with events [e.g., Plantation-Era] (that have made an important contribution to the broad pattern of Hawaiian history) and Criterion "d" (for information content). Based on the current findings, no further archaeological work is recommended.

CONCLUSION AND RECOMMENDATIONS

Archaeological Inventory Survey of the Main Line Extension Waimānalo Irrigation System led to the identification of five previously unidentified exposures, which comprise one discontinuous segment, of the Historic Kailua Ditch (State Site 50-80-15-4042). No additional architectural features were identified on the ground surface or in subsurface contexts. The Archaeological Inventory Survey has been completed with sufficient information collected from State Site 50-80-15-4042. Based on the findings of the current Archaeological Inventory Survey, no further archaeological work is recommended for the proposed undertaking.

REFERENCES

- Allen, Jane, Mary Riford, Paul Brennan, David Chaffee, Linda Scott Cummings, Carol Kawachi, Lori Liu, and Gail Murakami
2002 *Kula and Kajawai: Geoarchaeological and Historical Investigations in Middle Maunawili Valley, Kailua, Ko`olau Poko, O`ahu*. Prepared for HRT, LTD. On file at the State Historic Preservation Division, Kapolei.
- Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. The University of Hawaii Press, Honolulu.
- Brennan, Paul
2009 "Maunawili Ranch". *Kailua*. Kailua Historical Society.
- Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.
- Cowan-Smith, V., and B.D. Stone
1988 *Aloha Cowboy*. University of Hawaii Press, Honolulu, Hawai`i.
- Davis, B.
1976 *Archaeological Survey and Testing at the Waimanalo Bay State Recreational Area, Ko`olau-Poko, Waimanalo, O`ahu Island*. On file at the State Historic Preservation Division, Kapolei.
- Daws, G.
1968 *Shoal of Time: History of the Hawaiian Islands*. University of Hawai`i Press, Honolulu.
- Dega, M.
2003 *Archaeological Monitoring and Sampling During Removal of Two Underground Storage Tanks at Sherwood Forest County Park, Waimanalo, Ko`olaupoko District, O`ahu Island, Hawai`i, for DERP/FUDS*. Prepared for U.S. Army Corps of Engineers. Scientific Consultant Services, Inc., Honolulu.
- Dega, M.F., K. Latinis, and R. Ogg
1998 *Archaeological Monitoring and Sampling During Excavations for the Removal of Excess Land Underground Storage Tanks at Site ST-11 at Bellows Air Force Station Hawai`i, Waimanalo, Ko`olaupoko District, O`ahu Island, Hawai`i*. Scientific Consultant Services, Inc., Honolulu.
- Dixon, B.
1993 *An Archaeological Reconnaissance of Five Board of Water Supply Wells on O`ahu, Hawaii*. On file at the State Historic Preservation Division, Kapolei.

- Dorrance, W.H., and F.S. Morgan
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawai`i*. Mutual Publishing, Honolulu.
- Drolet, P., and A. Sinoto
2001 *Archaeological Inventory Survey, BWS Waimanalo Well III, Waimanalo, Ko`olaupoko, O`ahu (TMK: 4-1-08:05, 79, & 80)*. Aki Sinoto Consulting, Inc., Honolulu. On file at the State Historic Preservation Division, Kapolei.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of Island of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station, Washington, D.C.
- Hammatt, H.H., and D. Borthwick
1988 *Archaeological Reconnaissance of Mauka Portion of Phase II: Waimanalo Agricultural Park, Waimanalo, O`ahu*. On file at the State Historic Preservation Division, Kapolei.
- Hammatt, H.H. and D.W. Shideler
2004 *Archaeological Monitoring Plan for the Proposed Wastewater System and Utilities Upgrades Kaiona Beach Park, Waimanalo Ahupua`a, Ko`olaupoko, O`ahu*. Prepared for Hawai`i Waters Technology, LTD. Cultural Surveys Hawai`i, Inc., Kailua.
- Hammatt, H.H., D. W. Shideler, and S. D. M. Freeman
2002 *Archaeological Inventory Survey in Support of Modifications of the USDA Fruit Fly Production Facility at Waimanalo, Ko`olaupoko, O`ahu (TMK 4-1-26:Por. 1)*. Cultural Surveys Hawai`i, Kailua.
- Hammatt, H.H., D. W. Shideler, and S. D. M. Freeman
2003 *Archaeological Inventory Survey in Support of Expansion of the USDA Fruit Fly Production Facility, Addendum to Archaeological Inventory Survey in Support of Modifications of the USDA Fruit Fly Production Facility at Waimanalo, Ko`olaupoko, O`ahu (TMK 4-1-26:Por 1)*. Cultural Surveys Hawai`i, Kailua.
- Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bernice Pauahi Museum Press, Honolulu.
- Handy, E.S. Craighill and Elizabeth Handy
1972 *Native Planters in Old Hawaii*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Hazlett and Spear

- 2013 *Archaeological Monitoring Report for the Department of Hawaiian Home Lands(DHHL) Kakaina Subdivision in Waimanalo, Waimanalo Ahupua`a, Ko`olaupoko District, Island of O`ahu, Hawai`i [TMK (1) 4-1-08:010, 081, and 091]*. Scientific Consultant Services, Inc., Honolulu.

Hunkin, N., D. Borthwick, and H. H. Hammatt

- 2010 *Final Archaeological Monitoring Report for the Reconstruction of Wastewater Systems at Waimanalo Elementary and Intermediate School, Waimānalo Ahupua`a, Ko`olaupoko District, O`ahu Island TMK: [1] 4-1-09:12*. Prepared for CH2M Hill and the Department of Education, state of Hawaii. Cultural Surveys Hawai`i, Kailua.

Kamakau, Samuel

- 1991 *Tales and traditions of the People of Old*. Bishop Museum Press, Honolulu.

Kame`eleihiwa, Lilikalā

- 1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press, Honolulu.

Kelly, Marion

- 1983 *Na Māla o Kona: Gardens of Kona*. Report 83-2, Department of Anthropology, Bishop Museum. Bishop Museum Press, Honolulu.

- 1998 *A Gunboat Diplomacy, Sandalwood Lust and National Debt*. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.

Kirch, Patrick

- 1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

- 2011 "When Did the Polynesians Settle Hawai`i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer," in *Hawaiian Archaeology*. 12 (2011) pp. 3-26.

Kirch, Patrick V. and Marshall Sahlins

- 1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.

Kuykendall, R.S.

- 1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai`i Press, Honolulu.

Lucas, Paul F. Naho

- 1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai`i Committee for the Preservation and Study of Hawaiian Language, Art and Culture. University of Hawai`i Press, Honolulu.

Lyons, C. J.

- 1875 "Land Matters in Hawaii 2," *The Islander*, June 9, 1875. Honolulu, Hawai`i.

McAllister, J. Gilbert

- 1933 *Archaeology of O`ahu*. Bernice Pauahi Bishop Museum, Honolulu.

McElroy, W. K.

- 2010 *Final: Archaeological Monitoring Report for the Sandwich Isles Communications Fiber Optic Duct Line Project, `Olu`olu to Mekia St., Waimanalo Ahupua`a, Ko`olaupoko District, Island of O`ahu, Hawai`i, Portions of TMKs: (1) 4-1-08, 09, 21, 23, 24, 26, and 32*. Garcia and Associates, Kailua.

Monahan, C.M.

- 2004 *Feasibility Study of a 9.60-Acre Lot in Waimanalo for the Department of Hawaiian Homelands, Waimanalo Ahupua`a, Ko`olaupoko District, Island of O`ahu, Hawai`i [TMK: 4-1-08:11]*. Prepared for Austin, Tsutsumi & Associates. Scientific Consultant Services, Inc., Honolulu, Hawai`i.

Munsell Soil Color Chart.

- 2000 *Munsell Soil Color Charts* (revised). GretagMacbeth, New Windsor, New York.

Neller, E.

- 1980 *Waimanalo Ditch System: Photo Survey*. On file at the State Historic Preservation Division, Kapolei.

Pantaleo, J.

- 1994 *Letter Report to Tom Dye RE. Monitoring at the Hawaii Job Corps Center in Waimanalo, O`ahu*. Prepared for the Hawai`i State Historic Preservation Division by Aki Sinoto Consulting, Honolulu, Hawai`i.

Pearson, R.

- 1971 *Archaeological Reconnaissance Survey: Waimanalo Bay State Recreation Area, Waimanalo, Oahu*. On file at the State Historic Preservation Division, Kapolei.

Pestana Elizabeth and Robert L. Spear

- 2014 *Archaeological Inventory Survey of the Waimanalo Irrigation Line Project Waimānalo Ahupua`a, Ko`olaupoko District, O`ahu Island, Hawai`i [TMK: (1) 4-1-008:080]* (in preparation). Scientific Consultant Services Inc., Honolulu.

Pukui, Mary Kawena, Samuel Elbert, Esther Mookini

- 1974 *Place Names of Hawaii*. University of Hawai`i Press, Honolulu.

Sinoto, Aki
 1993 *Letter report to Tom Dye RE. Hawaii Job Corps Center, Waimanalo, O`ahu TMK 4-1-09:1 Lot A.* Prepared for the Hawai`i State Historic Preservation Division by Aki Sinoto Consulting, Honolulu.

State Historic Preservation Division
 1998 *Hawai`i Revised Statutes: Chapter 6-E Historic Preservation in Hawai`i.*

2002a *Hawaii Administrative Rules Title 13 DLNR, Subtitle 13 SHPD Rules Chapter 284 Rules Governing Procedures for Historic Preservation Review to Comment on Section 6-42, HRS Projects.*

2002b *Hawaii Administrative Rules Title 13 DLNR, Subtitle 13 SHPD Rules Chapter 276 Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports.*

Sterling E. and C. Summers
 1978 *Sites of O`ahu.* Bishop Museum Press, Honolulu.

Tome, G., L. Morawski, L., and R.L. Spear
 2006 *Archaeological Assessment of Two Parcels Totaling 20 Acres in Waimanalo, Waimanalo Ahupua`a, Ko`olaupoko District, Island of O`ahu, Hawai`i [TMK (1) 4-1-08:011 AND (1) 4-1-23:065] and [TMK (1) 4-1-08:91, 92, 10, 81].* Scientific Consultant Services, Inc., Honolulu.

Tuggle, David
 1994 *Archaeological Research of Areas Proposed for Development of Military Family Housing and Expansion of Military Training at Bellow Air Force Station, Oahu.* International Archaeological Research Institute, Inc., Honolulu.

United States Geological Survey
 1999 *Koko Head Quadrangle, Hawaii. 1:24,000. 7.5 Minute Series.* Washington, D.C.

Waihona `Aina Database
 2014 <https://www.waihona.com>. Accessed April 2014.

Wilcox, C.
 1996 *Sugar Water: Hawaii's Plantation Ditches.* University of Hawai`i Press, Honolulu.

APPENDIX A: CULTURAL MATERIAL INVENTORY

SCS PROJECT 1532 WAIMANALO IRRIGATION LINE CULTURAL MATERIAL INVENTORY						
Lab Bag	Excavation Unit	Layer/ Level	Depth	Collected Item	Measurements	Count ¹ Remarks
1	ST-1	I	0-10 cmbs	Plastic PVC Pipe Fragment	-	1 White
1	ST-1	I	0-10 cmbs	Sawn Tree Branch Fragment	-	1 -
1	ST-1	I	0-10 cmbs	Basalt Construction Gravel	-	3 -
1	ST-1	I	0-10 cmbs	Limestone Pebbles	-	4 -
2	ST-2	I	0-10 cmbs	Limestone Pebbles	-	3 -
3	ST-2	II	42 cmbs	Charcoal with Matrix	6.1 g	- -
4	ST-4	I	0-16 cmbs	Ferrous Metal Nails	-	4 Bent and severely corroded
5	ST-4	II	16-26 cmbs	Ferrous Metal Nails	-	2 Bent and severely corroded
5	ST-4	II	16-26 cmbs	Possible Ferrous Metal Nails	-	2 Bent and severely corroded
5	ST-4	II	16-26 cmbs	Non-Ferrous Metal Washer	Diameter: 1.0 cm Thickness: 0.1 cm Weight: 0.4 g	1 -
5	ST-4	II	16-26 cmbs	Hard Plastic Fragment	-	1 Black
5	ST-4	II	16-26 cmbs	Whiteware Tile Fragment	-	1 Dorsal glazed white, ventral side not glazed, profile displays upper glazed half and lower unglazed half
5	ST-4	II	16-26 cmbs	Whiteware Plate Base Sherd	-	1 Exterior and interior glazed
5	ST-4	II	16-26 cmbs	Marine Invertebrate	0.4 g	1 Gastropoda: <i>Trachus inextus</i>

Note 1: If invertebrate or vertebrate, count is Minimum Number of Individuals. If artifact, then count is amount of artifacts.

Appendix B

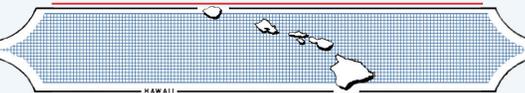
Cultural Impact Assessment

**A CULTURAL IMPACT ASSESSMENT
FOR THE MAIN LINE EXTENSION WAIMĀNALO IRRIGATION
SYSTEM PROJECT
WAIMĀNALO AHUPUA`A, KO`OLAUPOKO DISTRICT
O`AHU ISLAND, HAWAII
[TMK: (1) 4-1-008:080]**

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INTRODUCTION

At the request of Joanne Hiramatsu, of Belt Collins Hawaii, LLC, Scientific Consultant Services, Inc. (SCS) has prepared a Cultural Impact Assessment (CIA) for the proposed Main Line Extension Waimānalo Irrigation System Project, Waimānalo, Ko’olaupoko District O’ahu Island, Hawai’i [TMK: (1) 4-1-008:080]. The project area extends approximately 1,800 feet (548.6 m) in length by 2 feet wide (0.0096 m) and consists of approximately 0.08264 acres (Figures 1 through 3). The project area is owned by the State of Hawai’i.

The Constitution of the State of Hawai’i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of Native Hawaiians. Article XII, Section 7 (2000) requires the State to “protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778.” In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to Native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai’i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, “native Hawaiian rights...may extend beyond the *ahupua`a* in which a Native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner” (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawai’i (2000) with House Bill (HB) 2895, relating to Environmental Impact Statements, proposes that:

...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii’s culture, and traditional and customary rights... [H.B. NO. 2895].

Articles IX and XII of the State constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of Native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies

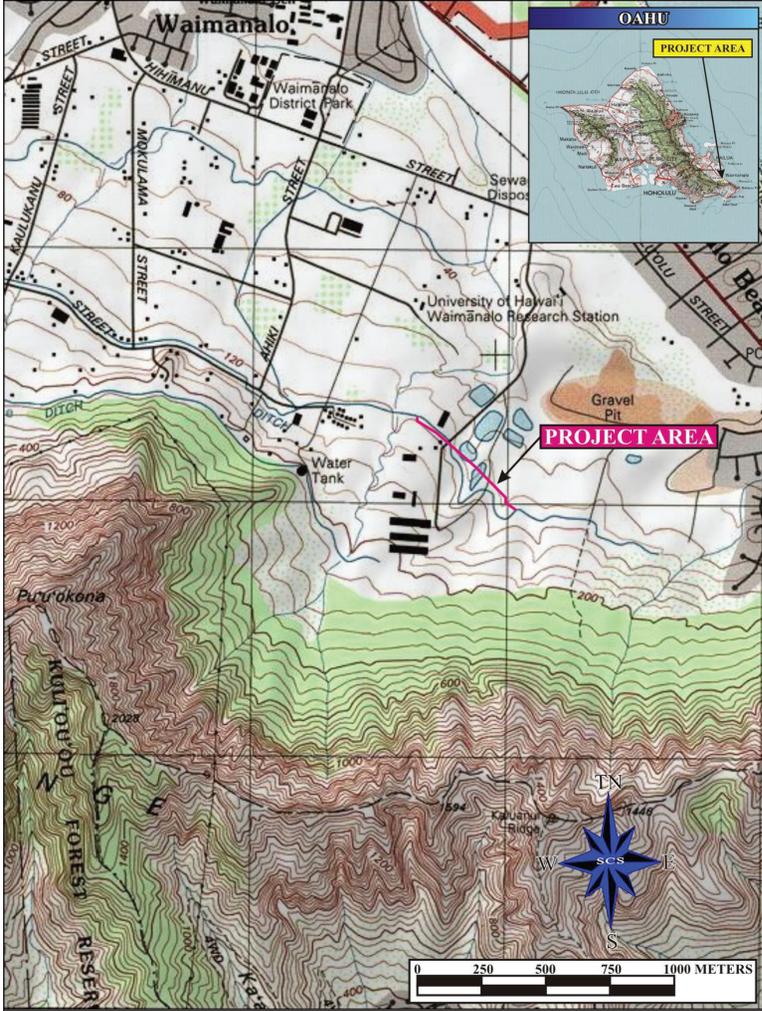


Figure 1: USGS Quadrangle (Koko Head 1999) Showing Project Area Location.



Figure 2: Tax Map Key (TMK) (1) 4-1-008) Showing Project Area Location.



Figure 3: Google Earth Image (Aerial Imagery from Google, Digital Globe dated 1/29/2013) Showing Project Area Location.

and other developers to assess the effects of proposed land use or shoreline developments on the “cultural practices of the community and State” as part of the HRS Chapter 343 (2001) environmental review process.

It also redefined the definition of “significant effect” to include “...the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies . . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State” (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 50, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. As defined by the Hawaii State Office of Environmental Quality Control (OEQC), the concept of geographical expansion is recognized by using, as an example, “the broad geographical area, e.g. district or *ahupua`a*” (OEQC 2012:12). It was decided that the process should identify ‘anthropological’ cultural practices, rather than ‘social’ cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a CIA is to identify the possibility of ongoing cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in-depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 2012:12):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of “traditional” was explained in *National Register Bulletin*:

“Traditional” in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property then is significance derived from the role the property plays in a community’s historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]

METHODOLOGY

This CIA was prepared as much as possible in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 2012:11-13). In outlining the “Cultural Impact Assessment Methodology,” the OEQC (2012:11) states that:

“ . . . information may be obtained through scoping, community meetings, ethnographic interviews and oral histories . . . ”

This report contains archival and documentary research, as well as communications with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. An example of the letters of inquiry is presented in Appendix A. Copies of the posted legal notice, and affidavit are presented in Appendix B. An example of the follow-up letter of inquiry is presented in Appendix C. The signed information release form is presented in Appendix D. This CIA was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 2012:13), whenever possible. The assessment concerning cultural impacts may include, but not be limited to:

- A. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.
- B. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.
- C. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

- D. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.
- E. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.
- F. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.
- G. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area affected directly or indirectly by the proposed project.
- H. An explanation of confidential information that has been withheld from public disclosure in the assessment.
- I. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.
- J. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.
- K. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

If ongoing cultural activities and/or resources are identified within the project area, assessments of the potential effects on the cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These sources included legendary accounts of native and early foreign

writers; early historical journals and narratives; historic maps; land records, such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws and guidelines when knowledgeable individuals are able to identify cultural practices in, or in close proximity to, the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed again that this process does not include formal or in-depth ethnographic interviews or oral histories as described in the OEQC's *Guidelines for Assessing Cultural Impacts* (2012). The assessments are intended to identify potential impacts to ongoing cultural practices, or resources, within a project area or in its close vicinity.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the interview available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

ENVIRONMENTAL SETTING

PROJECT AREA LOCATION

The Main Line Extension Waimānalo Irrigation System is situated in the southeastern portion of the island of O`ahu and on the windward side of the Ko`olaupoko Mountain Range. The project area is located an estimated 1.5 miles (1,812.2 m) southwest of the coastline at an elevation of approximately 120 feet (6.0 to 9.8 m) above mean sea level (amsl). The project area extends approximately 1,800 feet (548.6 m) in length by 2 feet wide (0.0096 m) and consists of approximately 0.08264 acres. The project area is owned by the State of Hawai`i.

CLIMATE

Temperatures within the *ahupua`a* of Waimānalo range from the high 50s to the high 80s (degrees Fahrenheit) during the winter months. Winter rainfall ranges from 5 to 15 inches (Armstrong 1983:62, 64). During the summer months, temperatures in Wamānalo Ahupua`a range from the high 60s to the low 90s (degrees Fahrenheit). Rainfall during the summer months can range from 2 to 7 inches (*ibid*).

SOILS

According to Foote *et al.* (1972: 34, 63- 64, 49-50, 113; Sheet Map 66 and 67), the project area extends across five Soil Series and is specifically situated within Haleiwa silty clay (HeB) soils, Kaena clay (KaC) deposits, Kawaihapai stony clay loam (KlaB), and Pohakupu silty clay loam (PkB and PkC) soils (Figure 4).

Haleiwa Soil Series

Soils of the Haleiwa Series can be found on O`ahu and Moloka`i Islands on alluvial fans and drainages located in coastal areas Foote *et al.* 1972: 33-34). The soils of the Haleiwa Series developed in alluvium derived from volcanic rock, occur at elevations ranging from sea level to 250 feet amsl in areas with rainfall ranging from 30 to 60 inches annually (*ibid*: 33). The HeB soils are present on 2 to 6 percent slopes, exhibit slow runoff and a slight erosion hazard. Soils of the HeB type are used for the cultivation of sugarcane, pineapple, and vegetables (*ibid*: 34).

Kaena Soil Series

Typically, soils of the Kaena Series consist of soils originating in alluvium and colluvium derived from volcanic rock occurring on the islands of O`ahu and Kaua`i Islands. Soils of the Kaena Series can be found in areas with elevations ranging from 50 to 150 feet amsl and

TRADITIONAL SETTLEMENT PATTERNS

Archaeological settlement pattern data suggests that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas of the main islands between A. D. 850 and 1100, with populations eventually settling in drier leeward areas during later periods (Kirch 2011). Although coastal settlement was dominant, Native Hawaiians began cultivating and living in the upland *kula* (plains) zones. Greater population expansion to inland areas began around the 14th century and continued through the 16th century. Large scale or intensive agriculture was implemented in association with habitation, religious, and ceremonial activities.

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock, and wild plant and bird collecting. During the pre-Contact Period, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens such as *kō* (sugar cane, *Saccharum officinarum*) and *mai'a* (bananas, *Musa* sp.) were also grown and, where appropriate, the production of such crops as *'uala* (sweet potato, *Ipomoea batatas*) occurred. This was a typical agricultural pattern seen during the pre-Contact Period on all the Hawaiian Islands (Kirch and Sahlins Vol. 1, 1992:5, 119; Kirch 1985).

A district (*moku*) contained smaller land divisions (*ahupua'a*), which customarily stretched inland from the coast upland into the interior. Extended household groups living within the *ahupua'a* were therefore able to harvest resources from both the land and the sea. Ideally, this situation allowed each *ahupua'a* some degree of self-sufficiency by supplying requisite resources from different environmental zones (Lyons 1875:111). The *'ili 'āina* or *'ili* were smaller land divisions within an *ahupua'a*. The *mo'o 'āina* were narrow strips of land within an *'ili*. The land holding of a tenant or *hoa 'āina* was called a *kuleana* (Lucas 1995:40, 77, 61).

Land was considered the property of the king or *ali'i 'ai moku*. The *ali'i 'ai moku* was ensured rights and responsibilities to the land, but this did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka 'āinana* (literally "people that attended the land) worked the individual plots of land (Pukui and Elbert 1986:224).

In Hawai'i, much of the economically valuable coastal lands were preferred for chiefly residence, as these areas were easily accessible resources such as offshore and onshore fish ponds, the sea. In addition, some of the most extensive wet taro lands were located in the coastal regions of the Hawaiian Islands (Kirch and Sahlins Vol. 1, 1992:19). Inland resources necessary for subsistence could easily be brought to the *ali'i* residence. The majority of farming was situated in the lower portions of stream valleys where there were broader alluvial flat lands or on bends in the streams where alluvial terraces could be modified to take advantage of the stream flow. Dry land cultivation occurred in colluvial areas at the base of gulch walls or on flat slopes (Kirch and Sahlins Vol. 2, 1992:59, Kirch 1985).

TRADITIONAL AND HISTORICAL SETTING

On the southeast end of Kailua is the *ahupua'a* of Waimānalo, a steep sided valley containing one central perennial drainage, Puha Stream that extends to the shallow bay (Tuggle 1994). It is thought that a second drainage, known as Inoa'ole Stream was created around the 1900s by the Waimanalo Sugar Company. The earliest evidence for occupation in Waimānalo appears within the lowlands around A.D. 1000 to 1300 (*ibid.*).

Waimānalo was also ideal for irrigated taro terraces, providing agricultural resources for the support of *ali'i* and their entourage across the Anianinui Ridge in Kailua. Kahekili, the chief of Maui in the late 1700s, stated that Waimānalo was not a good place for battle but only for food and fish (Kamakau 1991). Waimānalo was watered by numerous springs. According to Charles Alona (in Handy and Handy 1972:457), a life-long resident of Waimānalo, at least nine of the *lo'i* (wetland taro) sections were watered by springs.

A spring named Kupunakane (Grandfather) was located in the mountains above Waimānalo and on the flat land, was a spring named Kupunawahine (Grandmother). Mary Kawena Pukui (in Handy and Handy 1972:458) recounts a legend associated with these two springs:

The strange, strange thing about these ponds was that on calm, sunny days they begin to cry to each other. Their voices are soft and sounded very much like a woman mourning for her husband. On days that were overcast with clouds in the sky, then the water of the mountain spring changed. The water of the mountain spring became warm and when you drank water in the lowland spring it was cool...

Apparently taro was not the only food source produced in Waimānalo, as in the 19th century it was known for 'ulu (breadfruit), 'ōhi'a 'ai (mountain apple), kukui, niu (coconut) as well as 'uala (sweet potatoes) and kō in the dryer sections (Tuggle 1994).

PRE-CONTACT PERIOD

According to oral accounts, the Waimānalo Ahupua'a was settled during the pre-Contact (pre-1778) Period with small villages, springs, lo'i (irrigated taro terraces), religious shrines, and other common site types (Handy and Handy 1972:458; Sterling and Summers 1978:243-255). Oral histories suggest that Kailua and Kāne'ohe Bay were economic and political centers during the later centuries of the pre-Contact period and that Waimānalo played a more minor role (Handy and Handy 1972:457; Dega *et al.* 1998).

According to Handy and Handy (1972:458):

Levi Chamberlain is quoted as reporting in 1828, the location of a small and quite poor fishing village near the beach, toward Makapu'u Point from the present Waimanalo town, just beyond which is there was a pool named Ka-wai-kupanaha where the people got their fresh water. This place has since been covered by the roadway.

Another description of the pool named Ka-waikupanaha was provided by an informant and life-long resident of Waimānalo, Charles Alona (September 22, 1939 in Sterling and Summers 1978: 246):

A spring called Wai-kupanaha was pointed out to us, (in valley mauka of Mill), surrounded by tall taro plants, banana trees and fragrant white gingers, According to Mr. Alona, the Wa i-kupanaha on the west side of Mr. Castle's place was a lele, or a part of this kuleana, so both were given the same name. The upland piece was for taro growing and the piece near the sea was for fishing. The former owners of Wai-kupanaha went inland to raise taro and then to their land by the shore to fish. Both places had water but today only the up land Wai-kupanaha has water,

This Wai-kupanaha could not be tampered with but left as nature made it. A Japanese used a pipe to draw water from here to his house and the water ceased to flow. The Alona's asked him to remove his pipe and as soon as he did so, the water flowed once

again in abundance. It still feeds some taro patches below as it did in former times.

Charles Alona, an informant, spoke of another village in Waimānalo (Handy and Handy 1972:458) which was:

...situated on a low hill across from Waimanalo Beach Park. This was settled by folk from Molokai, hence the name: Pu'u o Molokai. These people held themselves apart from the people of Waimanalo. If a girl born there married a Waimanalo man, she had to leave Pu'u o Molokai. But gradually the Molokai people were absorbed by Waimanalo.

Although the *ahupua'a* of Waimānalo, which literally means potable or drinkable water, only had one stream, much of the valley once was planted in taro (Sterling and Summers 1978:243), as this area had numerous springs from which water was obtained. Handy and Handy (1972:457) note that in 1935 there was evidence of "old lo'i" located inland. Edward Niaupio, (a local resident) knew of nine named "...terrace sections whose water came from small streams and springs flowing out of the high mountain range (Handy 1940:100). According to Mr. Niaupio, the terraces extended for 1.5 miles "from below Puu Loa well toward Puu o Kona" and were positioned in a semi-circle at the base of the Ko'olaupoko Mountain Range (*ibid*).

According to legend, there were two named springs were in Waimānalo Ahupua'a. One account printed in the *Hoku o Hawaii*, March 11, 1930 (in Handy and Handy 1972:458) states that:

The [spring] called Kupunakane [Grandfather] is way up in the mountains. The spring called Kupunawahine [Grandmother] is a spring way down on the level land. The strange, strange thing about these ponds was that on calm, sunny days they began to cry out to each other. Their voices are soft and very much like a woman mourning her husband. On days that were overcast with clouds in the sky, then the water of the mountain spring changed. The water of the mountain spring became warm and when you drank the water in the lowland spring it was cool, according to their legend.

Charles Alona, an informant, told Handy and Handy (1972:458) of two additional springs which were well-known in Waimānalo Ahupua'a:

...Wai-kupanaha was the name of a spring (*mauka* of the plantation mill) surrounded by tall taro plants, banana trees, and fragrant white gingers.

This was a *lele* (section of land) which had its counterparts on the seashore, where the owner of the *kuleana* [property] that included the upland and shore-side areas lived. There was fresh water also on the piece by the sea. And at Olomana above the sugar mill there was a fine old spring. This area was then thickly populated. There was another spring across the road from what is now Bellows Air Force Base. Near this is Maha'ilua, another thickly populated place.

McAllister (1933:192) noted Pahonu Pond (McAllister Site 383-A; State Site 50-80-15-1037) which was located adjacent to the E.O. [Wall] property in Waimānalo (Sterling and Summers 1978:249), near the present-day Sea Life Park. The pond was described as a "sea pond" (Handy and Handy 1972:458) measuring 500 feet in length by 50 feet wide. McAllister (1933:192) stated that "[a] line of stones, submerged at high tide, but visible at low tide, indicates its former extent. Turtles are said to have been kept in the pond for the use of the alii." This "enclosure for turtles" was described by Charles Alona, an informant, (in Sterling and Summers 1978:249) as:

Pa-honu, an enclosure for turtles that was once located back of Mrs. Wall's present home.

There was once a chief who was so fond of turtle meat that he ordered a sea wall built to keep captured turtles from escaping. Every turtle caught by a fisherman was put into this enclosure. No one else was allowed to partake of turtle meat under penalty of death. No one dared to eat turtle as long as the old chief lived.

Several *heiau* are known to have been located in Waimānalo Ahupua'a (McAllister 1933:190-195), which typically suggests a relatively substantial, resident population during the pre-Contact Period. A large structure (ca. 130 x 110 ft.) located south (*mauka*) of the current project area (Figure 5) was said to have been a *heiau* (Site 24). The possible *heiau* was reported by Mr. Murdoch, an informant on February 21, 1958 (Sterling and Summers 1978:247). According to Sterling and Summers (*ibid*):

Heavy underbrush prevented detailed inspection. Northwest wall appears to be in fairly good state of preservation. "Makai wall is badly damaged." This is the area which is on the accessible side.

McAllister's Site 382, located north of the current project area (see Figure 5), was a small *heiau* (ca. 50 x 90 ft.) situated in an area known as Pohakunui. According to McAllister (1933: 191), the *heiau* "...was built on the crown of a little hill, at the foot of the palis (sic) on the mountainward edge of the cane field just back of the Waimanalo mill. The site is in fairly good preservation, and the low walls which follow the contours are practically intact..."

Local resident, E.P. Kaniaupio reported a large (ca. 250 x 130 ft.) unnamed *heiau* (McAllister's Site 381) situated on the "...Waimanalo side of Olomana, on the edge of the Waimanalo cane field facing Koolau Range" (McAllister 1933: 191; see Figure 5).

Another indication of the significance of Waimānalo Ahupua'a during the pre-Contact Period was known as Haununaniho (McAllister's Site 383), a *pu'uhonua* or place of refuge, located "near the seaside of the mill" in Waimānalo (McAllister 1933:191). According to McAllister (*ibid*):

A small hill said to have been famous in older days a place of refuge (*puuhonua*). It is said that as soon as one side knew there was no hope for victory in the battle being fought, the wisest course was to flee as rapidly as possible to Haununaniho, for all the chiefs recognized the sacredness of this hill and the lives of those who reached this elevation were spared.

Several *ko'a*, or fish shrines, (Site 22) are located along the coast and on the larger adjoining islands of Waimānalo (Sterling and Summers 1978:251, 252, 255; Drolet and Sinoto 2000).

Traditional Hawaiian burials have been documented near the shore in sandy deposits at Bellows Air Force Station and at Waimānalo Bay State Recreation Park. Oral tradition also alludes to burials in caves in the Ko'olau cliffs (Sterling and Summers 1978: 250).

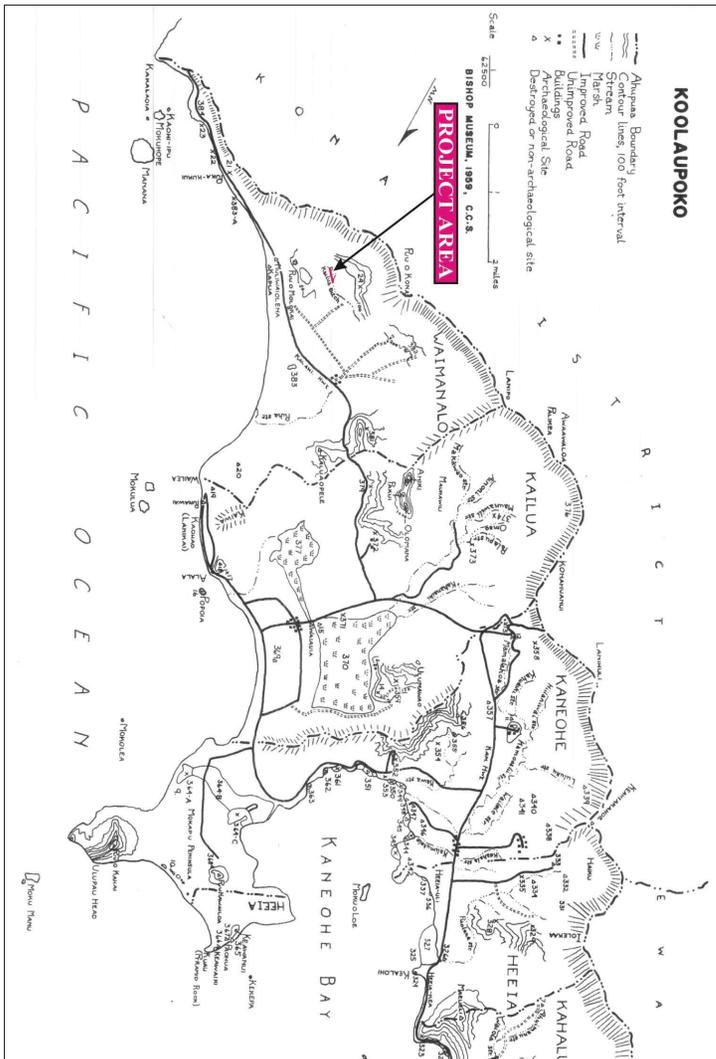


Figure 5: Ko'olaupoko District Map (Sterling and Summers 1978) Showing Project Area Location

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame'eleihewa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1968:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living.

These claims did not include any previously cultivated land, `okipū, stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame'eleihewa 1992:295; Kirch and Sahllins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

At the time of the Māhele in 1848, 147 *kuleana* were claimed in the *ahupua`a* of Waimānalo (Waihona `Aina Database 2014). Land Commission Awards (LCAs) refer to the lands used for the cultivation of bananas, possibly sweet potato, the presence of taro fields and fish in the *lo`i* ponds. Tuggle's (1994:4) map of the *ahupua`a* of Waimānalo places the taro LCAs along the upper tributaries originating from Pu`u Lanipu, extending down towards the coast and ending where they join to form a single Puha Stream. Sweet potato was grown near Pu`u o Moloka`i (*ibid.*).

A search of the Waihona `Aina Database (2014), and the REDI Realty Tax Map Key indicated no Land Commission Awards (LCA) were located within the project area. However, based on the location and the availability of fresh water, there is a good chance that the project area may have been under cultivation during the pre-Contact Period. The general Waimānalo Plain area was known to be a place of wet-land taro farming, and terraces and water diversion features were reported in oral history accounts (Handy 1940), especially further up the slope in higher land south and southwest of the project area. Archaeologists have confirmed the presence of such agricultural features in the Waimānalo Ahupua`a.

HISTORIC PERIOD

An Englishman by the name of Thomas Cummins had arrived in the islands around 1828. He married a High Chiefess, Kaumakaokane, and received an estate of Crown lands in Waimānalo (Hammatt and Shideler 2004). Twenty-two years later, Kauhikaouli (Kamehameha III) leased the entire *ahupua`a* of Waimānalo to him for a period of 50 years (*ibid.*). Cummins, and his son John, developed a cattle and horse ranch named the Mauna Loke (Mt. Rosa) where Hawaiian royalty was often entertained (*ibid.*). The introduction of ranching activities brought an end to traditional agriculture in the valley, as indicated by a description of Waimānalo Ahupua`a in the year 1847 (published in the *Ka Hoonanea o Ka Manawa, Kuokoa*, October 26, 1906, in Sterling and Summers 1978:244) paints a vivid picture of the valley:

...filled with breadfruit, mountain apples, kukui and coconut trees. There were taro patches, with banks covered with ti and wauke plants. Grass houses occupied the dry lands, a hundred of them there and sweet potatoes and sugar cane were much grown...The whole ahupua`a of Waimanalo was leased to white men except the native kuleanas and because the cattle wandered over them... [t]he taro patches that were neatly built at the time when the chiefs ruled over the people and the land, were broken up. The sugar cane, ti, and wauke plants were destroyed. The big trees that grew in those days, died because the roots could not get moisture. The valley became a place for animals.

As the natives left the land, the Cummins Estate bought their *kuleana* in Waimānalo, gaining some 200 additional acres of land (Hammatt and Shideler 2004). Cummins allowed Chinese rice farmers use of the terraces previously growing taro. They grew not only rice, but also sugar cane which, by 1876 with the Reciprocity Treaty, had become the way of the future. John Cummins built a sugar mill and landing pier in the 1880s and sublet his land to the Waimanalo Sugar Company, the majority shares of which he owned.

William Jarrett purchased 670 acres in the upper reaches of the `ili of Maunawili from the government in 1849, which in turn, was sold to Henry Sawyer in 1855 along with all the *kuleana* lands, to which Sawyer continued to add, eventually forming the Maunawili Ranch (Brennan 2009). The ranch was sold in 1869 to Maria Hio Adams Boyd, the granddaughter of a close advisor to Liholiho (Kamehameha II) (*ibid.*). The ranch stayed in the Boyd family until the Boyd's sold their ranch in 1893 to William Irwin, who became a partner of Claus Spreckels, the so-called "Sugar King" (Adler 1966 in 1880 Brennan 2009). With the addition of the Boyd's

ranch, Irwin and Spreckels controlled the processing of the majority of the sugar yield in Hawai`i, including Waimanalo Sugar Company (WSC) (*ibid.*). Once Irwin gained control of WSC, he developed a ditch system to divert water from Maunawili to Waimānalo for its sugar needs.

The early 1900s saw the development of a railroad for transporting cane to the pier in Waimānalo, and general expansion of the successful sugar cane venture. John Cummins sold his shares in the W.S.C. in 1894 and with his death in 1913; his estate sold the remaining lands and leases to W.S.C. (Brennan 2009).

More recently, most of the Waimānalo Plain was under commercial sugar cane production, and this would have had a dramatic effect on any traditional sites or features located on or under the ground surface. The Waimanalo Sugar Company, one of the smallest and least successful in Hawai`i, was established in 1878 and closed in 1947 (Wilcox 1996; Dorrance and Morgan 2000). Historical photographs and maps (Figure 6) indicate vast areas of inland Waimānalo under cane cultivation.

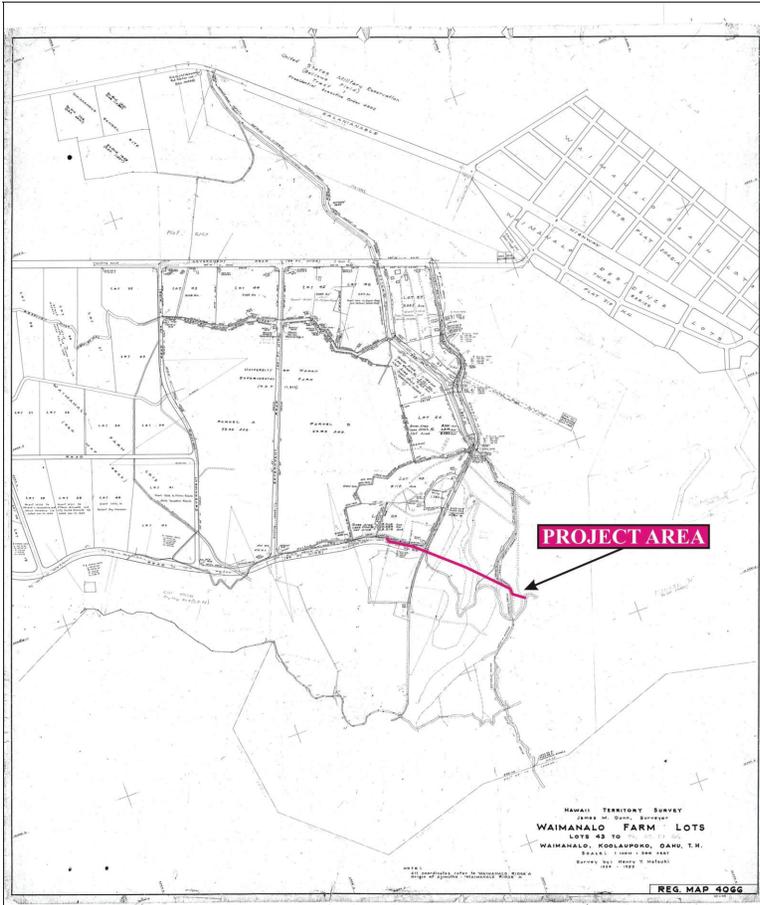


Figure 6: Hawaii Territory Survey Map of Waimanalo Farm Lots, Waimanalo, Koolaupoko, O'ahu, T. H. (Dunn 1954-1955: Reg. Map 4066) Showing Project Area Location.

Ranching activities occurred throughout Waimānalo after sugarcane (Cowan-Smith and Stone 1988). Horse ranching continues to be popular in Waimānalo, although its effects on the landscape and on historic properties are less significant than sugar cane.

ARCHAEOLOGY

Numerous archaeological projects have been conducted along the Waimānalo shoreline, the great majority of which took place within Bellows Air Force Station/ Marine Corps Training Area Bellows (see Dega 2003). The military installation is situated about a mile to the east of the subject project area. The geomorphology and sediments of Bellows are different from the subject property, but the range and density of traditional sites are impressive. A minimum of 23 sites have been designated state site numbers at Bellows, ten of which are pre-Contact to late 19th century sites. These include habitations, burials, *heiau*, workshop areas, midden, and possible agricultural features. Another nexus of investigations has Waimānalo Bay State Recreation Park, located south of Bellows; findings included include Davis (1976) that reported a buried traditional cultural layer (Davis 1976) and human burials (Pearson 1971). The locations of selected previously conducted archaeological projects located in the vicinity of the current project are shown in Figure 7.

A handful of studies have been conducted in Waimānalo town itself. In 1993 an archaeological assessment was made for the Job Corps Center site on Hihīmanu Street; no cultural resources were identified (Sinoto 1993). In 1994 Archaeological Monitoring on the same parcel yielded negative findings for historic properties (Pantaleo 1994).

In 2001, Aki Sinoto Consulting, Inc. conducted an Archaeological Inventory Survey at Board of Water Supply Well III, Waimanalo, Ko'olaupoko, O'ahu [TMK: (1) 4-1-08:05, 79, & 80] (Drolet and Sinoto 2001). During the survey, two archaeological sites were identified: State Site 50-80-15-4042, which consisted of portions of the Historic Kailua Ditch, a component of the well-known Waimanalo Irrigation System; and State Site 50-80-15-5876, a possible remnant of a railroad berm and two stacked-stone structures.

In 2002, Cultural Surveys Hawai'i conducted an Archaeological Inventory Survey on a 6-acre parcel on Ahiki Street as part of improvements to the USDA Hawai'i Fruit Fly Production Facility; one historic site (the Tai-Lee Ditch, State Site 50-80-15-6427) was identified (Hammatt *et al.* 2002). In 2003, Cultural Surveys Hawai'i conducted an Archaeological Inventory Survey

on a 9-acre parcel adjacent to the Hammatt *et al.* (2002) project area, no archaeological resources were identified (Hammatt *et al.* 2003).

In 2004, Cultural Surveys Hawai'i conducted a lot feasibility study on two parcels discussed in the included the above-mentioned Hammatt *et al.* (2002) and Hammatt *et al.* (2003) project areas (Monahan 2004). The Monahan (2004) feasibility study concluded that archaeological sites, if present, would be most likely to exist near water sources such as the tributary stream at the western end of the current project area. In 2006, SCS Tome *et al.* (2006) conducted an Archaeological Assessment of the parcels discussed in Hammatt *et al.* (2002), Hammatt *et al.* (2003), and Monahan (2004). The Tome *et al.* (2006) study consisted of a surface survey and subsurface testing; no cultural resources were reported.

In 2010, Cultural Surveys Hawai'i conducted Archaeological Monitoring was conducted at Waimanalo Elementary and Intermediate School during excavations for wastewater improvements; no historic sites were identified (Hunke *et al.* 2010). In 2010, McElroy (2010) conducted archaeological monitoring for fiber optic installation along portions of Hihimanu Street, Kaka'ina Street, Waikupunaha Street, and Mekia Street; no cultural resources were reported. In 2013, Scientific Consultant Services, Inc. conducted Archaeological Monitoring of the mechanical excavation of six trenches in the northeast end of the Department of Hawaiian Home Lands Kakaina Residential Subdivision, located in Waimānalo, Waimānalo Ahupua'a, Ko'olaupoko District, O'ahu Island (TMK: 4-1-08:010, 081, 091); no historic properties were identified (Hazlett and Spear 2013).

Scientific Consultant Services, Inc. conducted an Archaeological Inventory Survey of the subject property in March 2014 (Dagher and Spear 2014, in preparation). During the survey five exposures of the Historic Kailua Ditch were identified. The Historic Kailua Ditch is "...one of the three constituent subdivisions of the [over] 114-year old Waimanalo Irrigation System (State Site 50-80-15-4042) (Drolet and Sinoto 2001:19).

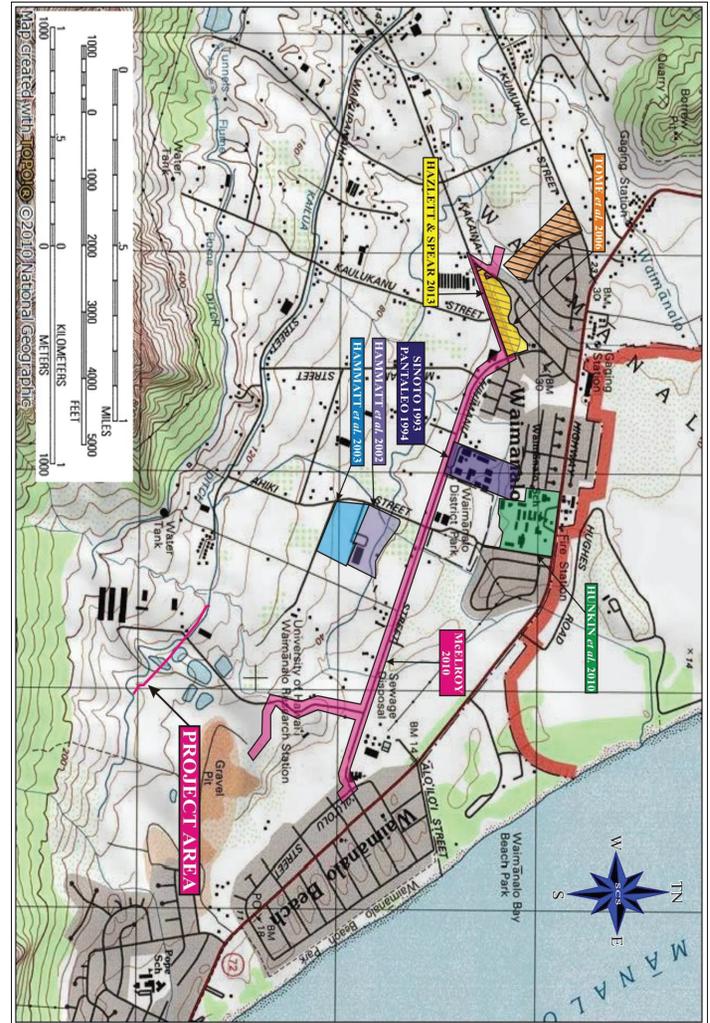


Figure 7: USGS Quadrangle (Koko Head 1999) Showing Locations of Previously Conducted Archaeological Projects in the Vicinity of the Current Project Area.

CONSULTATION

Consultation was conducted via telephone, e-mail, personal interviews, and the U.S. Postal Service. Consultation was sought from Dr. Kamana'opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs; Hinano Rodrigues, State Historic Preservation Division, Maui; Kailua Hawaiian Civic Club; Ko'olaupoko Hawaiian Civic Club; Aaron Mahi, former O'ahu Island Burial Council Ko'olaupoko District Representative; Ms. Nanette Napoleon, cemetery historian; Leimomi Dierks, Lanikai Canoe Club; and Mr. William Ho'ohuli, community member.

In addition, a Cultural Impact Assessment Notice was published on March 5, 6, and 9, 2014, in *The Honolulu Star-Advertiser* and the April 2014 issue of the OHA newspaper, *Ka Wai Ola* (see Appendix B). These notices requested information of cultural resources or activities in the area of the proposed project, stated the Tax Map Key (TMK) number, and where to respond with pertinent information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

CULTURAL IMPACT ASSESSMENT INQUIRY RESPONSES

Analysis of the potential effect of the project on cultural resources, practices or beliefs, the potential to isolate cultural resources, maintain practices or beliefs in their original setting, and the potential of the project to introduce elements that may alter the setting in which cultural practices take place is a requirement of the OEQC (2012:13). As stated earlier, this includes the cultural resources of the different groups comprising the multiethnic community of Hawai'i.

During the consultation process, SCS received one response to the inquiries pertaining to any information that individuals or organizations may have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the proposed Waimanalo Irrigation Line. Nanette Napoleon, responded via e-mail (dated March 5, 2014) to the inquiry of SCS, stating that:

In my 30 years as a cemetery historian, I have never come across any reference, written or oral, to any historic or pre-historic burials in this location.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 2012) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, researching sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort." However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the current undertaking, letters of inquiry were sent to individuals and organizations that may have knowledge or information pertaining to the collection of cultural resources and/or practices currently, or previously, conducted in close proximity to the proposed 1,800 feet (548.6 m) long by 2 feet wide (0.0096 m) Main Line Extension Waimānalo Irrigation System Project, Waimānalo, Ko'olaupoko District O'ahu Island, Hawai'i [TMK: (1) 4-1-008:080].

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of this report. Such scholars as Samuel Kamakau, Martha Beckwith, Jon J. Chinen, Lilikalā Kame'eleihiwa, R. S. Kuykendall, Marion Kelly, E. S. C. Handy and E.G. Handy, Elspeth P. Sterling, and Mary Kawena Puku'i and Samuel H. Elbert continue to contribute to our knowledge and understanding of Hawai'i, past and present. The works of these and other authors were consulted and incorporated in this report where appropriate. Land use document research was supplied by the Waihona `Aina Database (2014).

CULTURAL ASSESSMENT AND RECOMMENDATIONS

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a suggested guideline of the OEQC (2012). Based on the response from those organizations and individuals contacted, the proposed project area has not been used for

traditional cultural purposes within recent times. Based on historical research and the response from those organizations and individuals contacted, it is reasonable to conclude that Hawaiian rights related to gathering, access or other customary activities within the project area will not be affected and there will be no adverse effect upon cultural practices or beliefs.

REFERENCES

- Allen, Jane, Mary Riford, Paul Brennan, David Chaffee, Linda Scott Cummings, Carol Kawachi, Lori Liu, and Gail Murakami
2002 *ʻKula and Kajawai: Geoarchaeological and Historical Investigations in Middle Maunawili Valley, Kailua, Koʻolau Poko, Oʻahu*. Prepared for HRT, LTD. On file at the State Historic Preservation Division, Kapolei.
- Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. The University of Hawaii Press, Honolulu.
- Brennan, Paul
2009 "Maunawili Ranch". *Kailua*. Kailua Historical Society.
- Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.
- Cowan-Smith, V., and B.D. Stone
1988 *Aloha Cowboy*. University of Hawaii Press, Honolulu, Hawaiʻi.
- Davis, B.
1976 *Archaeological Survey and Testing at the Waimanalo Bay State Recreational Area, Koʻolau-Poko, Waimanalo, Oʻahu Island*. On file at the State Historic Preservation Division, Kapolei, Hawaiʻi.
- Daws, G.
1968 *Shoal of Time: History of the Hawaiian Islands*. University of Hawaiʻi Press, Honolulu.
- Dega, M.
2003 *Archaeological Monitoring and Sampling During Removal of Two Underground Storage Tanks at Sherwood Forest County Park, Waimanalo, Koʻolaupoko District, Oʻahu Island, Hawaiʻi, for DERP/FUDS*. Prepared for U.S. Army Corps of Engineers. Scientific Consultant Services, Inc., Honolulu.
- Dega, M.F., K. Latinis, and R. Ogg
1998 *Archaeological Monitoring and Sampling During Excavations for the Removal of Excess Land Underground Storage Tanks at Site ST-11 at Bellows Air Force Station Hawaiʻi, Waimanalo, Koʻolaupoko District, Oʻahu Island, Hawaiʻi*. Scientific Consultant Services, Inc., Honolulu.

- Dixon, B.
1993 *An Archaeological Reconnaissance of Five Board of Water Supply Wells on O`ahu, Hawaii*. On file at the State Historic Preservation Division, Kapolei.
- Dorrance, W.H., and F.S. Morgan
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawai`i*. Mutual Publishing, Honolulu.
- Drolet, P., and A. Sinoto
2000 *Archaeological Inventory Survey, BWS Waimanalo Well III, Waimanalo, Ko`olaupoko, O`ahu (TMK: 4-1-0805, 79, & 80)*. On file at the State Historic Preservation Division, Kapolei.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of Island of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station, Washington, D.C.
- Hammatt, H.H., and D. Borthwick
1988 *Archaeological Reconnaissance of Mauka Portion of Phase II: Waimanalo Agricultural Park, Waimanalo, O`ahu*. On file at the State Historic Preservation Division, Kapolei.
- Hammatt, H.H. and D.W. Shideler
2004 *Archaeological Monitoring Plan for the Proposed Wastewater System and Utilities Upgrades Kaiona Beach Park, Waimānalo Ahupua`a, Ko`olaupoko, O`ahu*. Prepared for Hawai`i Waters Technology, LTD. Cultural Surveys Hawai`i, Inc., Kailua.
- Hammatt, H.H., D. W. Shideler, and S. D. M. Freeman
2002 *Archaeological Inventory Survey in Support of Modifications of the USDA Fruit Fly Production Facility at Waimānalo, Ko`olaupoko, O`ahu (TMK 4-1-26: Por. 1)*. Cultural Surveys Hawai`i, Kailua.
- Hammatt, H.H., D. W. Shideler, and S. D. M. Freeman
2003 *Archaeological Inventory Survey in Support of Expansion of the USDA Fruit Fly Production Facility, Addendum to Archaeological Inventory Survey in Support of Modifications of the USDA Fruit Fly Production Facility at Waimānalo, Ko`olaupoko, O`ahu (TMK 4-1-26: Por 1)*. Cultural Surveys Hawai`i, Kailua.
- Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bernice Pauahi Museum Press, Honolulu.

- Handy, E.S. Craighill and Elizabeth Handy
1972 *Native Planters in Old Hawaii*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.
- Hazlett and Spear
2013 *Archaeological Monitoring Report for the Department of Hawaiian Home Lands (DHHL) Kakaina Subdivision in Waimanalo, Waimanalo Ahupua`a, Ko`olaupoko District, Island of O`ahu, Hawai`i [TMK (1) 4-1-08:010, 081, and 091]*. Scientific Consultant Services, Inc., Honolulu.
- Hunkin, N., D. Borthwick, and H. H. Hammatt
2010 *Final Archaeological Monitoring Report for the Reconstruction of Wastewater Systems at Waimanalo Elementary and Intermediate School, Waimānalo Ahupua`a, Ko`olaupoko District, O`ahu Island TMK: [1] 4-1-09:12*. Prepared for CH2M Hill and the Department of Education, state of Hawaii. Cultural Surveys Hawai`i, Kailua.
- Kamakau, Samuel
1991 *Tales and traditions of the People of Old*. Bishop Museum Press, Honolulu.
- Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press, Honolulu.
- Kelly, Marion
1983 *Na Māla o Kona: Gardens of Kona*. Report 83-2, Department of Anthropology. Bishop Museum. Bishop Museum Press, Honolulu.
- 1998 *A Gunboat Diplomacy, Sandalwood Lust and National Debt*. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.
- Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
- 2011 "When Did the Polynesians Settle Hawai`i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer," in *Hawaiian Archaeology*. 12 (2011) pp. 3-26.
- Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.

- Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai'i Press, Honolulu.
- Lucas, Paul F. Nahoa
1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai'i Committee for the Preservation and Study of Hawaiian Language, Art and Culture. University of Hawai'i Press, Honolulu.
- Lyons, C. J.
1875 "Land Matters in Hawaii 2," *The Islander*, June 9, 1875. Honolulu, Hawai'i.
- McAllister, J. Gilbert
1933 *Archaeology of O'ahu*. Bernice Pauahi Bishop Museum, Honolulu.
- McElroy, W. K.
2010 *Final: Archaeological Monitoring Report for the Sandwich Isles Communications Fiber Optic Duct Line Project, 'Olu'olu to Mekia St., Waimanalo Ahupua'a, Ko'olaupoko District, Island of O'ahu, Hawai'i, Portions of TMKs: (1) 4-1-08, 09, 21, 23, 24, 26, and 32*. Garcia and Associates, Kailua.
- Monahan, C.M.
2004 *Feasibility Study of a 9.60-Acre Lot in Waimanalo for the Department of Hawaiian Homelands, Waimanalo Ahupua'a, Ko'olaupoko District, Island of O'ahu, Hawai'i [TMK: 4-1-08:11]*. Prepared for Austin, Tsutsumi & Associates. Scientific Consultant Services, Inc., Honolulu, Hawai'i.
- Neller, E.
1980 *Waimanalo Ditch System: Photo Survey*. On file at the State Historic Preservation Division, Kapolei.
- Pantaleo, J.
1994 *Letter Report to Tom Dye RE. Monitoring at the Hawaii Job Corps Center in Waimanalo, O'ahu*. Prepared for the Hawai'i State Historic Preservation Division by Aki Sinoto Consulting, Honolulu, Hawai'i.
- Parker, Patricia L., and Thomas F. King
1990 *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Register Bulletin 38. Washington, D.C.: National Park Service.

- Pearson, R.
1971 *Archaeological Reconnaissance Survey: Waimanalo Bay State Recreation Area, Waimanalo, Oahu*. On file at the State Historic Preservation Division, Kapolei.
- Pestana Elizabeth and Robert L. Spear
2014 *Archaeological Inventory Survey of the Waimanalo Irrigation Line Project Waimānalo Ahupua'a, Ko'olaupoko District, O'ahu Island, Hawai'i [TMK: (1) 4-1-008:080]* (in preparation). Scientific Consultant Services Inc., Honolulu.
- Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai'i Press, Honolulu.
- Sinoto, A.
1993 *Letter report to Tom Dye RE. Hawaii Job Corps Center, Waimanalo, O'ahu TMK 4-1-09:1 Lot A*. Prepared for the Hawai'i State Historic Preservation Division by Aki Sinoto Consulting, Honolulu.
- Sterling E. and C. Summers
1976 *Sites of O'ahu*. Bishop Museum Press, Honolulu.
- Tome, G., L. Morawski, and Spear, R.L.
2006 *Archaeological Assessment of Two Parcels Totaling 20 Acres in Waimanalo, Waimanalo Ahupua'a, Ko'olaupoko District, Island of O'ahu, Hawai'i [TMK (1) 4-1-08:011 AND (1) 4-1-23:065] and [TMK (1)4-1-08:91, 92, 10, 81]*. Scientific Consultant Services, Inc., Honolulu.
- Tuggle, David
1994 *Archaeological Research of Areas Proposed for Development of Military Family Housing and Expansion of Military Training at Bellow Air Force Station, Oahu*. International Archaeological Research Institute, Inc., Honolulu.
- United States Geological Survey
1999 Koko Head Quadrangle, Hawaii. 1:24,000. 7.5 Minute Series. Washington, D.
- Waihona 'Aina Database
2014 <https://www.waihona.com>. Accessed April 2014.
- Wilcox, C.
1996 *Sugar Water: Hawaii's Plantation Ditches*. University of Hawai'i Press, Honolulu.

APPENDIX A: EXAMPLE LETTER OF INQUIRY

A

Dear:

In compliance with the State of Hawai'i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai'i Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai'i on November 19, 1997, Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) pertaining to the proposed Waimanalo Irrigation Line to be located on land owned by the State of Hawai'i within Waimānalo Ahupua'a, Ko'olaupoko District, O'ahu Island [TMK: (1) 4-1-008:080] (Figures 1 through 3).

According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs... The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs...

We are asking you for any information that you or other individuals have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the project area. We are also asking for any information pertaining to traditional cultural activities or traditional rights which may be impacted by the proposed irrigation line. The results of the cultural impact assessment are dependent on the response and contributions made by individuals and organizations, such as XXXX.

Enclosed are maps showing the proposed project areas. Please contact me at the Scientific Consultant Services, Honolulu, office at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely,

Cathleen Dagher
Senior Archaeologist
Enclosures (3)

Cc: Dr. Kamana'opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs; Hinano Rodrigues, State Historic Preservation Division, Maui; Kailua Hawaiian Civic Club; Ko'olaupoko Hawaiian Civic Club; Aaron Mahi, former O'ahu Island Burial Council Ko'olaupoko District Representative; Ms. Nanette Napoleon, community member; Leimomi Dierks, Lanikai Canoe Club; William Ho'ohuli, community member

A1

APPENDIX B: LEGAL NOTICE AND AFFIDAVIT

B

1533

AFFIDAVIT OF PUBLICATION
IN THE MATTER OF
SCS Proj 1533 Waimanalo Irrigation Line CIA

STATE OF HAWAII }
City and County of Honolulu } SS.

Doc. Date: MAR 10 2014 **# Pages:** 1
Notary Name: Patricia K. Reese **First Judicial Circuit**
Doc. Description: Affidavit of Publication
Notary Signature: *Patricia K. Reese* **Date:** MAR 10 2014



Lisa Kaukani being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc. publisher of The Honolulu Star-Advertiser and MidWeek, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the aforementioned newspapers as follows:

Honolulu Star-Advertiser 3 times on:
03/05, 03/06, 03/09/2014
Midweek Wed. 0 times on:
_____ times on:

And that Plaintiff is not a party to or in any way interested in the above entitled matter.

Lisa Kaukani
Lisa Kaukani
Subscribed to and sworn before me this 10th day
of March A.D. 2014
Patricia K. Reese
Patricia K. Reese, Notary Public of the First Judicial Circuit, State of Hawaii
My commission expires: Dec 07 2014



Ad # 0000607373

Information requested by Scientific Consultant Services, Inc. (SCS) on cultural resources or on-going cultural activities on or near the proposed Waimanalo Irrigation Line to be located on land owned by the State of Hawai'i within Waimanalo Ahupua'a, Ko'olaupoko District, O'ahu Island [TMK: (1) 4-1-008:080]. Please respond within 30 days to Cathleen Dagher at (808) 597-1182. (54607373 3/5, 3/6, 3/9/14)

LN: _____

Information requested by Scientific Consultant Services, Inc. (SCS) on cultural resources or on-going cultural activities on or near the proposed Waimanalo Irrigation Line to be located on land owned by the State of Hawai'i within Waimanalo Ahupua'a, Ko'olaupoko District, O'ahu Island [TMK: (1) 4-1-008:080]. Please respond within 30 days to Cathleen Dagher at (808) 597-1182.

B1

APPENDIX C: EXAMPLE FOLLOW-UP LETTER

C

Dear:

This is our follow-up letter to our February 28, 2014 letter, which was in compliance with the statutory requirements of the State of Hawai'i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai'i Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai'i, on November 19, 1997.

Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) pertaining to the proposed Waimanalo Irrigation Line to be located on land owned by the State of Hawai'i within Waimānalo Ahupua'a, Ko'olaupoko District, O'ahu Island [TMK: (1) 4-1-008:080].

We are seeking any information that you, or other individuals, may have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the project area. We are also asking for any information pertaining to traditional cultural activities or traditional rights which may be impacted by the proposed irrigation line. The results of the cultural impact assessment are dependent on the response and contributions made by individuals and organizations, such as XXXX.

Please contact me at the Scientific Consultant Services, Honolulu, office at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely,

Cathleen Dagher
Senior Archaeologist

Cc: Dr. Kamana'opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs; Hinano Rodrigues, State Historic Preservation Division, Maui; Kailua Hawaiian Civic Club; Ko'olaupoko Hawaiian Civic Club; Aaron Mahi, former O'ahu Island Burial Council Ko'olaupoko District Representative; Leimomi Dierks, Lanikai Canoe Club; William Ho'ohuli, community member

C1

Appendix C

Biological Resources Assessment

Methods

Flora and faunal surveys were conducted by Eric Guinther and Susan Burr on April 23, 2014. The surveys entailed traversing the general route of the proposed water line on foot. A handheld GNSS unit (Trimble GeoXH 6000 Series) was used to record progress of the survey (survey path) as well as any feature locations (Figure 3). Susan Burr returned to the site on November 24, 2014 to determine if hydric soils are present in former agriculture ponds in the vicinity of the proposed water line. The results of that investigation are included as Attachment A.

Botanical Survey

Plants were identified in the field and those not immediately identifiable were photographed and/or a piece "collected" for identification in the laboratory. Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1999) for native and naturalized flowering plants and *A Tropical Garden Flora* (Staples & Herbst, 2005) for crop and ornamental plants. Revised plant names from various more recently published papers are as summarized in Imada (2012).

Fauna Survey

Timed bird counts were conducted at five point count stations (Fig. 3). All birds observed during a 5 or 10 minute viewing period were recorded within a visible radius of the observer and by listening for vocalizations. Time not spent counting at point count stations was used to search the rest of the site for species and habitats not detected during the point counts. Incidental sightings were noted when encountered. Point counts and incidental observations were conducted in the morning on April 23rd between 10:00 and 12:00. Weather conditions during the survey period were ideal, with no rain and excellent visibility. Species identifications were verified with *A Photographic Guide to the Birds of Hawaii: the Main Islands and Offshore Waters* (Denny, 2010). Taxonomy follows the Checklist of North and Middle American Birds by American Ornithologists' Union (AUO, 2013).

Results

Botanical Resources

A list of all plant species encountered (flora) in the April 2014 survey is included in Table 1. A total of 39 plant taxa from 16 families was observed.

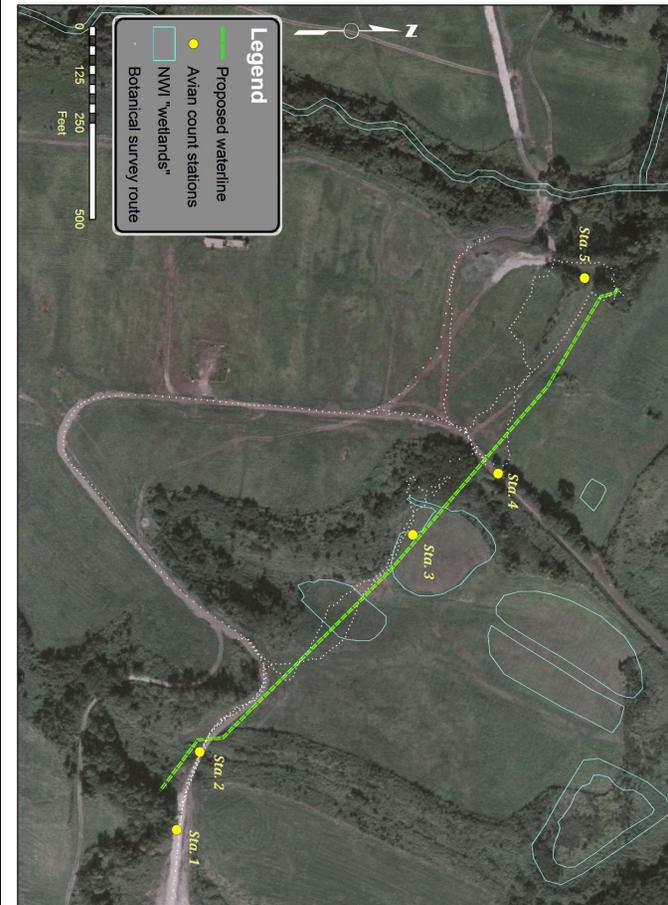


Figure 3. Botanical survey path and bird count stations at CTAHR fields in Waimanalo on April 23, 2014.

Table 1. Flora observed for a new water line at CTAHR in Waimānalo, O'ahu.

Family Species	Common name	Status	Abund.	Notes
<i>FLOWERING PLANTS</i>				
<i>DICOTYLEDONS</i>				
ACANTHACEAE				
<i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	Nat	O	
AMARANTHACEAE				
<i>Alternanthera pungens</i> Kunth	khaki weed	Nat	U	
ASTERACEAE (COMPOSITAE)				
<i>Ageratum conyzoides</i> L.	<i>maile hohono</i>	Nat	U1	
<i>Calyptocarpus vialis</i> Less.	---	Nat	U	
<i>Bidens alba</i> (L.) DC.	beggartick	Nat	A	
<i>Emilia fosbergii</i> Nicolson	Flora's paintbrush	Nat	U	
<i>Sphagneticola trilobata</i> (L.) Pruski	wedelia	Nat	U	<1>
<i>Synedrella nodiflora</i> (L.) Gaertn.	node weed	Nat	U	<1>
BORAGINACEAE				
<i>Heliotropium currasavicum</i> L.	<i>kīpūkai</i>	Ind	U	<1>
BRASSICACEAE				
<i>Lepidium virginicum</i> L.	---	Nat	U3	<1>
CONVOLVULACEAE				
<i>Ipomoea obscura</i> (L.) Ker-Gawl.	---	Nat	U	
CUCURBITACEAE				
<i>Coccinia grandis</i> (L.) Voigt	scarlet-fruited gourd	Nat	R	
EUPHORBIACEAE				
<i>Euphorbia hirta</i> L.	garden spurge	Nat	R	
<i>Ricinus communis</i> L.	castor bean	Nat	U	
<i>Phyllanthus debilis</i> Klein ex Willd.	<i>niruri</i>	Nat	R	
FABACEAE				
<i>Canavalia cathartica</i> Thours	<i>maunaloa</i>	Nat	R	
<i>Leucaena leucocephala</i> (Lam.) deWit	<i>koa haole</i>	Nat	A	
<i>Macroptilium atropurpureum</i> (DC.) Urb.	---	Nat	U	
<i>Mimosa pudica</i> L.	sensitive plant	Nat	U	
<i>Neonotonia wightii</i> (Wight & Arnott) Lackey	glycine vine	Nat	AA	
GOODINACEAE				
<i>Scaevola sericea</i> Vahl	<i>naupaka kahakai</i>	Nat	R	<1>
MALVACEAE				
<i>Malvastrum coromandelianum</i> (L.) Garcke	false mallow	Nat	C	

Table 1 (continued).

MALVACEAE				
<i>Sida ciliaris</i> L.	---	Nat	O3	
<i>Sida rhombifolia</i> L.	---	Nat	O	
<i>Sida spinosa</i> L.	prickly sida	Nat	O	<1>
MYRTACEAE				
<i>Syzygium cuminii</i> (L.) Skeels	Java plum	Nat	O1	
PHYTOLACCACEAE				
<i>Rivina humilis</i> L.	coral berry	Nat	R	
SOLANACEAE				
<i>Solanum torvum</i> Mill.	---	Nat	R	
VERBENACEAE				
<i>Citharexylum spinosum</i> L.	fiddlewood	Nat	U	
<i>Verbena litoralis</i> Kunth	<i>ōwi</i>	Nat	R	
<i>FLOWERING PLANTS</i>				
<i>MONOCOTYLEDONS</i>				
POACEAE (GRAMINEAE)				
<i>Cenchrus purpureus</i> (Schumach.) Marrone	elephant grass	Nat	R3	
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	Nat	C	
<i>Chloris virgata</i> Sw.	feather fingergrass	Nat	U	
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Nat	U	
<i>Eleusine indica</i> (L.) Gaertn.	wiregrass	Nat	O	
<i>Paspalum fimbriatum</i> Kunth	Panama grass	Nat	R	<1>
<i>Urochloa maxima</i> (Jacq.) R. D. Webster	Guinea grass	Nat	AA	
<i>Urochloa maxima</i> var. <i>trichoglume</i> (Robyns) R. D. Webster	green panic grass	Nat	AA	
<i>Urochloa mutica</i> (Forsk.) Nguyen	California grass	Nat	R2	

Legend to Table 1:

Status = distributional status

- Ind** - indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
- Nat** - naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778 and well-established outside of cultivation.

Abundance = occurrence ratings for plants in survey area in April 2014.

- R** - Rare - only one or two plants seen.
- U** - Uncommon - several to a dozen plants observed.
- O** - Occasional - found regularly, but not abundant anywhere.
- C** - Common - considered an important part of the vegetation and observed numerous times.
- A** - Abundant - found in large numbers; may be locally dominant.
- AA** - Abundant - very abundant and dominant; defining vegetation type.

Table 1 (continued).

Numbers (as in R3) offset occurrence ratings (1 – several plants; 2 – many plants; 3 – abundant in a limited area) in cases where distribution across the survey area may be limited, but individuals seen are more than indicated by the occurrence rating alone.

Notes = <1> - not reported by David and Guinther (2012); see text.

We note that this area was previously surveyed for plants by David and Guinther (2012). Plant species marked with note <1> in Table 1 were not reported in the 2012 survey. All are rare or uncommon plants in the present survey that were either missed in 2012, or have appeared here since. Neither explanation is unusual. In the previous survey, a total of 6 species that are considered native or early Polynesian introductions were recorded in the field and scrub vegetation types in a survey that covered a large proportion of the CTAHR lands in Waimānalo. In the present survey, only one native—*kīpūkai* (*Heliotropium curassavicum*), a small herbaceous plant—was observed for a percentage native species of 2.6%; in the broad survey of CTAHR lands, seven species (6%) of 114 species recorded were native/Polynesian introduced. However, only one indigenous species and 6 Polynesian introduced species were recorded (David & Guinther, 2012).

The vegetation on the site comprises grassland (pasture land) and narrow, winding areas of forest/scrub that follow an old irrigation ditch. Pasture land is a mixture of grasses and other herbaceous plants, and here, grasses (Family Poaceae) are the most represented family by number of species as well as areal coverage (Figs. 4 and 5) in our survey. Non-grasses abundant here are glycine vine (*Neonotonia wightii*) and a common beggartick (*Bidens alba*). The forest/forest scrub is mostly *koa haole* (*Leucaena leucocephala*), with some Java plum (*Syzygium cuminii*) and fiddlewood (*Citharexylum spinosum*), and is confined to areas bordering the pastures.

Avifaunal Resources

A total of 25 individual birds representing eight different species were recorded during station counts (Table 2). Between 0 and 3 birds were observed at Stas. 1 through 3, while 10 and 12 birds were observed at Stas. 4 and 5, respectively. An additional 17 birds, including two additional species, were recorded as incidental sightings. All birds observed are commonly found in disturbed areas such as the area surveyed.



Figure 4. Vegetation in area of count-station Sta. 3 looking northwest. A field of Guinea grass surrounded to the north and beyond by *koa haole* scrub forest.



Figure 5. Vegetation looking west towards count-station Sta. 5, with a field of Guinea grass in foreground and mixed forest beyond.

Table 2. Avifauna observed during survey of April 23, 2014 or reported by David and Guinther (2012) from CTAHR lands in Waimānalo.

Family Common Name	Scientific Name	Status	Sta./ count	Notes
GALLIFORMES				
PHASIANIDAE – Pheasants & Partridges				
Phasianinae – Pheasants & Allies				
Gray Francolin	<i>Francolinus pondicerianus</i>	A	1/4	
Domestic Chicken	<i>Gallus gallus</i>	D	--	
Ring-necked Pheasant	<i>Phasianus colchicus</i>	A	--	
Common Peafowl	<i>Pavo cristatus</i>	A	--	
NUMIDIDAE - Guineafowl				
Helmeted Guineafowl	<i>Numida meleagris</i>	D	--	
PELECANIFORMES				
ARDEIDAE – Herons, Bitterns, & Allies				
Cattle Egret	<i>Bubulcus ibis</i>	A	--	
CHARADRIIFORMES				
CHARADRIIDAE - Lapwings & Plovers				
Pacific Golden Plover	<i>Pluvialis fulva</i>	MI	5/1	
COLUMBRIFORMES				
COLUMBIDAE – Pigeons & Doves				
Rock Pigeon	<i>Columba livia</i>	A	--	
Spotted Dove	<i>Streptopelia chinensis</i>	A	--	
Zebra Dove	<i>Geopelia striata</i>	A	3/2	
PASSERIFORMES				
ALAUDIDAE				
Sky Lark	<i>Alauda arvensis</i>	A	--	
PYCNONOTIDAE - Bulbuls				
Red-vented Bulbul	<i>Pycnonotus cafer</i>	A	--	
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	A	5/1, 1/3	
CETTIDAE – Cettia Warblers & Allies				
Japanese Bush-warbler	<i>Cettia diphone</i>	A	--	
ZOSTEROPIDAE – White-eyes				
Japanese White-eye	<i>Zosterops japonicus</i>	A	1/1, 4/2, 1/1	

Table 2 (continued).

Family Common Name	Scientific Name	Status	Sta./ count	Notes
TIMALIIDAE – Babblers				
Red-billed Leiothrix	<i>Leiothrix lutea</i>	A	--	
TURDIDAE – Thrushes				
White-rumped Shama	<i>Copsychus malabaricus</i>	A	--	
STURNIDAE – Starlings				
Common Myna	<i>Acridotheres tristis</i>	A	4/1, 1/3	
EMBERIZIDAE - Emberizids				
Red-crested Cardinal	<i>Paroaraia coronata</i>	A	--	
CARDINALIDAE – Cardinals, Saltators & Allies				
Northern Cardinal	<i>Cardinal cardinalis</i>	A	1/4	
FRINGILLIDAE - Fringilline and Carduline Finches & Allies				
Carduelinae – Carduline Finches				
House Finch	<i>Carpodacus mexicanus</i>	A	4/1	
ESTRILDIDAE – Estrilid Finches				
Estrilidinae – Estrilidine Finches				
Common Waxbill	<i>Estrilda astrild</i>	A	1/5	
Java Sparrow	<i>Padda oryzivora</i>	A	--	
Lonchurinae – Mannikins and Munias				
Chestnut Munia	<i>Lonchura atricapilla</i>	A	5/10	<1>

Legend to Table 2:

Status = distributional status
 A – Alien - introduced to the Hawaiian Islands by humans
 D – Domesticated- species not considered to be established in the wild on the Island of O'ahu
 MI – Migrant - migratory bird occurring in Hawai'i for a portion of the year
 Station = brief description of location where birds were observed
 1 - Sta. 1 - *koa haole* forest at ditch
 2 - Sta. 2 - ditch under road with Guinea grass and elephant grass
 3 - Sta. 3 - California grass field near end of water line
 4 - Sta. 4 - *koa haole* forest adjacent to Waikupunaha Road
 5 - Sta. 5 - *koa haole* forest at start of water line
 I - Incidental - observed but not at a designated count-station
 -- - not observed during April 23, 2014 survey
 Count = number of birds detected per 10-minute viewing period
 Note = <1> Not reported from CTAHR survey by David and Guinther (2012).

Few native animal species find useful habitat in the non-native vegetation in the survey area. All avian species observed are considered alien to the Hawaiian Islands, except the Pacific golden plover or *kōlea* (*Pluvialis fulva*), a migratory species that winters in the Hawaiian Islands. This species is protected under the Migratory Bird Treaty Act (MBTA). Under the Act, taking, killing or possessing migratory birds is unlawful.

Other Fauna

Other fauna observed include two dragonflies and the small Asian mongoose (*Herpestes javanicus*). The small Asian mongoose is native to south and southeast Asia and was purposefully introduced into Hawai'i to aid in reduction of rat population at sugarcane plantations.

The scarlet skimmer dragonfly (*Crocothemis servilia*) was regularly observed during the survey, especially around Sta. 5. The common green darner dragonfly (*Anax junius*) was observed once or twice. The scarlet skimmer is a species of dragonfly of the Family Libellulidae native to east and southeast Asia and accidentally introduced to Hawai'i. The common green darner dragonfly is one of two native species of dragonfly in the Hawaiian Islands. All dragonfly species are aquatic for part of their lifecycle, but are far-ranging as adults and not always associated with a body of water; that is, seeing a dragonfly is not an indication that a body of water is close by.

Discussion

Botanical Resources

The status column in Table 1 indicates native and non-native species. Only native plants (indigenous or endemic species) would have any resource value in this location. Only one indigenous species was observed, *Heliotropium curassavicum*, a small herbaceous plant that is common. The plant species present are introduced, naturalized species. A floristic composition of 3% natives is somewhat less than is typical for lowland O'ahu, but not unusual given that the project location is in agricultural use.

Protected Species

No plant or animal species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawai'i endangered species programs (DLNR, 1998; USFWS, 2005, 2011) were recorded. However,

auku'u (a protected species under state statutes) may inhabit trees along the ditches and Pacific Golden plover are protected by the MBTA. No exceptional trees occur along the pipeline route (C&C, 2012).

Critical Habitat

No federally-declared critical habitat occurs in the project area. There is no equivalent statute or rule under State of Hawai'i laws or regulations.

Wetlands

Figure 3 (above) shows, outlined in light blue, areas of presumed streams and wetlands from the National Wetlands Inventory (NWI; USFWS, 1984). The two ponds in the immediate vicinity of the proposed pipeline are classified in the NWI as "PUBHx": excavated (man-made), permanently-flooded palustrine wetland (freshwater marsh) with an unconsolidated (mud) bottom. Features indicated on NWI maps are not necessarily jurisdictional (that is, do not necessarily come under U.S. Army Corps of Engineers authority) and, indeed, do not necessarily exist. Not all areas mapped by USFWS were field validated by the agency. However, these ponds can be seen to be open-water ponds in a 2001 U.S. Geological Survey image available through Google Earth. The ponds were related to prior use of this area as a dairy, where some or all the ponds served as receivers of runoff from dairy operations. Today, no evidence of these wetlands or aquatic features or berms surrounding them exists on the ground in the area we surveyed. Fig. 4 (above) is looking across the area of these two ponds. The ponds, berms, and dairy were no longer evident in a 2004 satellite image provided by Google Earth.

Wetland determination data forms (Attachment A) were completed in apparent low spots of the two NWI "wetlands" (see Figure 6) following guidelines issued by the U.S. Army Corps of Engineers (USACE, 1987, 2012). Hydrophytic vegetation is present at all four sampling points. Hydric soils are present at SP-1, but the sampling point does not meet any indicators of wetland hydrology and, therefore, would not be considered a jurisdictional wetland. SP-2 appears to be at a lower elevation than SP-1 and the flora is more indicative of a wetland here than at SP-1 (*Urochloa mutica* vs. *Megathyrsus maximus* at SP-1), but the soil is not hydric and the sampling point also does not meet any indicators of wetland hydrology. Two additional determination forms were completed in a low area (potentially a formerly excavated ditch or a natural swale) within the vicinity of the NWI "wetlands" and the water line. Neither of these points exhibited characteristics of hydric soils or wetland hydrology. We conclude that

the two former pond areas in the vicinity of the proposed pipeline are not wetlands.



Figure 6. Location of soil test pits in relation to the proposed water line and the NWI map of "wetlands".

References

- American Ornithologists' Union (AUO). 2013. Checklist of North and Middle American Birds. 58 pp. Available online at URL: <http://checklist.aou.org/taxa/>; last accessed on May 15, 2014.
- City and County of Honolulu (C&C). 2012. Exceptional Tree Program (website). Available online at URL: <http://www1.honolulu.gov/parks/exceptionaltrees.htm>; last visited on February 9, 2012.

_____. - Department of Planning and Permitting (C&C-DPP). 2014. Honolulu Land Information System (website). Available online at URL: <http://gis.hicentral.com/FastMaps/ParcelZoning/>; last accessed May 14, 2014.

David, R. E. and E. B. Guinther. 2012. Biological surveys conducted for the University of Hawai'i, College of Tropical Agriculture and Human Resources, Waimānalo Research Station Master Plan MGD Site, Ko'olau Poko District, Island of O'ahu. Prep. for Kimura International, Inc. 23 pp.

Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered and Threatened Wildlife and Plants, and Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

Denny, J. 2010. *A Photographic Guide to the Birds of Hawai'i*. University of Hawai'i Press. Honolulu HI. 210 pp.

Group 70 International, Inc. (Group 70 Intl.). 2011. Waimānalo Regional Plan Draft October 2011. Prep. for Department of Hawaiian Home Lands. Available online at URL: <http://dhlh.hawaii.gov/2011/10/10/final-draft-waimanalo-regional-plan-2011/>; last accessed May 12, 2014. 40 pp.

Imada, Clyde T. 2012. Hawaiian Native and Naturalized Vascular Plants Checklist (December 2012 update). Bishop Museum Tech. Rept. 60. 380 pp.

Palmer, D. D. 2003. *Hawai'i's ferns and fern allies*. University of Hawaii Press, Honolulu. 324 pp.

Tomich, P. Q. 1986. *Mammals in Hawaii*. Bishop Museum Press. Honolulu, Hawaii. 37 pp.

U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetlands Delineation Manual*. Tech. Rept. Y-87-1. Environmental Laboratory, Dept. of the Army, Waterways Experiment Station, Vicksburg.

_____. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Hawai'i and Pacific Islands Region Version 2.0*, ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, C. V. Noble, and. ERDC/EL TR-12-5. U.S. Army Engineer Research and Development Center. Vicksburg, MS. 130 pp incl. appendices.

U.S. Fish and Wildlife Service (USFWS). 1984. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Available online at URL: <http://www.fws.gov/wetlands/Data/Mapper.html>.

U.S. Fish and Wildlife Service (USFWS). 2005. 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. *Federal Register*, 70 (No. 90; Wednesday, May 11, 2005): 24870-24934.

_____. 2014. USFWS Threatened and Endangered Species System (TESS; website). Available online at URL: http://ecos.fws.gov/tess_public/pub/stateListingIndividual.jsp?state=HI&status=listed.

Wagner, W. L., D. R Herbst, and S. H. Sohmer. 1990. *Manual of the Flowering Plants of Hawai'i*. University of Hawaii Press, Honolulu, Hawaii. 2 vols. 1854 pp.

_____ and _____. 1999. *Supplement to the Manual of the flowering plants of Hawai'i*, pp. 1855-1918. In: Wagner, W. L., D.R. Herbst, and S.H. Sohmer, *Manual of the flowering plants of Hawai'i. Revised edition*. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

Attachment A

Wetland Data Determination Forms

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1015
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-1
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026-004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 46.32276 sec N Long: 157 deg 42 min 33.60106 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (PUBHx on NWI map)

Are climatic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and surrounding berms do not exist today.

VEGETATION—Use scientific names of plants.

Tree Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
 Total Number of Dominant Species Across All Strata: 1 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Sapling/Shrub Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None (see herb stratum)			
2.			
3.			
4.			
5.			
0 =Total Cover			

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by: _____
 OBL species x1= _____
 FACW species x2= _____
 FAC species x3= _____
 FACU species x4= _____
 UPL species x5= _____
 Column Totals: _____(A) _____(B)
 Prevalence Index = B/A= _____

Herb Stratum (Plot size: 5 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Megathyrsus maximus	88	Yes	FAC
2. Ipomoea triloba	2	No	FAC
3. Desmanthus pernanbucanus	5	No	FACU
4. Ipomoea obscura	5	No	FAC
5. Leucaena leucocephala (shrub)	2	No	UPL
6.			
7.			
8.			
102 =Total Cover			

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 3 - Prevalence Index is <3.0¹
 1Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Woody Vine Stratum (Plot size: 5 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
0 =Total Cover			

Hydrophytic Vegetation Present? Yes No

Remarks: Leucaena leucocephala trees are located upslope of SP 1.

SOIL

Sampling Point: SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix			Redox Features			Type ¹	Loc ²	Texture	Remarks
	Color	(moist)	%	Color (moist)	%					
0-7	2.5YR 4/4		78	10R 4/8	5	C		M	clay	prominent redox features
				Gley 1 4/1	3	D		M		prominent redox features
				black	1	C		M		prominent redox features
				10YR 5/8	3	C		M		prominent redox features
7-17	Gley 1 4/1		95	10YR 5/8	3	C		M	stony clay	prominent redox features
				5YR 5/8	2	C		M		prominent redox features

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:
 Histisols (A1) _____ Sandy Redox (S5) _____
 Histic Epipedon (A2) _____ Dark-Surface (S7) _____
 Black Histic (A3) _____ Loamy Gleyed Matrix (F2) _____
 Hydrogen Sulfide (A4) _____ Depleted Matrix (F3) _____
 Muck Presence (A8) _____ Redox Dark Surface (F6) _____
 Depleted Below Dark Surface (A11) _____ Depleted Dark Surface (F7) _____
 Thick Dark Surface (A12) _____ Redox Depressions (F8) _____
 Sandy Gleyed Matrix (S4) _____

Indicators for Problematic Hydric Soils ³:
 Stratified Layers (A5) _____
 Sandy Mucky Mineral (S1) _____
 Red Parent Material (TF2) _____
 Very Shallow Dark Surface (TF12) _____
 Other (Explain in Remarks) _____

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____
Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)
Primary Indicators (minimum of one required: check all that apply)
 Surface Water (A1) _____ Aquatic Fauna (B13) _____
 High Water Table (A2) _____ Tilapia Nests (B17) _____
 Saturation (A3) _____ Hydrogen Sulfide Odor (C1) _____
 Water Marks (B1) _____ Oxidized Rhizospheres on Living Roots (C3) _____
 Sediment Deposits (B2) _____ Presence of Reduced Iron (C4) _____
 Drift Deposits (B3) _____ Recent Iron Reduction in Tiled Soils (C6) _____
 Algal Mat or Crust (B4) _____ Thin Muck Surface (C7) _____
 Iron Deposits (B5) _____ Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa) _____
 Inundation Visible on Aerial Imagery (B7) _____ and American Samoa) _____
 Water Stained Leaves (B9) _____ Other (Explain in Remarks) _____

Secondary Indicators (minimum of two required)
 Surface Soil Cracks (B6) _____
 Sparsely Vegetated Concave Surface (B8) _____
 Drainage Patterns (B10) _____
 Dry-Season Water Table (C2) _____
 Salt Deposits (C5) _____
 Stunted or Stressed Plants (D1) _____
 Geomorphic Position (D2) _____
 Shallow Aquitard (D3) _____
 FAC-Neutral Test (D5) _____

Field Observations:
 Surface Water Present? Yes No Depth (inches): _____
 Water Table Present? Yes No Depth (inches): >17 _____
 Saturation Present? Yes No Depth (inches): >17 _____
Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Negative alpha, alpha dipyrldyl reaction throughout soil profile. Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1115
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-2
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 44.917195 sec N Long: 157 deg 42 min 32.56070 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (PUBHx on NWI map)

Are climatic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.		

VEGETATION—Use scientific names of plants.

Tree Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			
Sapling/Shrub Stratum (Plot size: 15 m radius)			
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			
Herb Stratum (Plot size: 5 m radius)			
1. Megathyrsus maximus	5	No	FAC
2. Urochloa mutica	95	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
100 =Total Cover			
Woody Vine Stratum (Plot size: 5 m radius)			
1. None			
2.			
0 =Total Cover			
Remarks Leucaena leucocephala trees are located upslope of SP 2.			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
 Total Number of Dominant Species Across All Strata: _____ (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species _____ x1= _____
 FACW species _____ x2= _____
 FAC species _____ x3= _____
 FACU species _____ x4= _____
 UPL species _____ x5= _____

Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 3 - Prevalence Index is <3.0¹
 Problematic Hydrophytic Vegetation ¹ (Explain in Remarks or in the delineation report)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix			Redox Features			Type ¹	Loc ²	Texture	Remarks
	Color	(moist)	%	Color (moist)	%					
0 - 16	2.5YR 4/4		85	10YR 5/6	7	C	M		stony clay	prominent redox features
				2.5YR 3/1	5	D	M			distinct redox features
				10YR 5/6	3	C	M			prominent redox features
										less stony than stony clay at SP-1

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

<input type="checkbox"/> Histisols (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Stratified Layers (A5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark-Surface (S7)	<input type="checkbox"/> Sandy Mucky Mineral (S1)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Muck Presence (A8)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required; check all that apply)

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Tilapia Nests (B17)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Water Stained Leaves (B9)		

Field Observations:

Surface Water Present? Yes No Depth (inches): _____
 Water Table Present? Yes No Depth (inches): >16 _____
 Saturation Present? Yes No Depth (inches): >16 _____

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
 Negative alpha, alpha' dipyrldyl reaction throughout soil profile. Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1200
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-3
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 46.08317 sec N Long: 157 deg 42 min 32.22764 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (near PUBHx on NWI map)

Are climatic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		

Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.

VEGETATION—Use scientific names of plants.

Tree Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			

Sapling/Shrub Stratum (Plot size: 15 m radius)

1. None	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			

Herb Stratum (Plot size: 5 m radius)

1. Megathyrsus maximus	Absolute % Cover	Dominant Species?	Indicator Status
1. Megathyrsus maximus	40	Yes	FAC
2. Urochloa mutica	40	Yes	FACW
3. Macroptilium atropurpureum	20	Yes	FAC
4.			
5.			
6.			
7.			
8.			
100 =Total Cover			

Woody Vine Stratum (Plot size: 5 m radius)

1. None	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
=Total Cover			

Remarks

SOIL

Sampling Point: SP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix			Redox Features			Type ¹	Loc ²	Texture	Remarks
	Color	(moist)	%	Color (moist)	%					
0 - 18	2.5YR 3/3		85	10YR 5/6	5	C	M	clay	prominent redox features	
				2.5YR 5/6	5	C	M		distinct redox features	
				10YR 4/1	5	D	M		prominent redox features	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histisols (A1)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark-Surface (S7)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Muck Presence (A8)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Tilapia Nests (B17)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Water Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): >18

Saturation Present? Yes No Depth (inches): >18

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1221
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-4
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 47.09430 sec N Long: 157 deg 42 min 32.17599 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (near PUBHx on NWI map)

Are climatic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.		

VEGETATION—Use scientific names of plants.

Tree Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			

Sapling/Shrub Stratum (Plot size: 15 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			

Herb Stratum (Plot size: 5 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Megathyrsus maximus	90	Yes	FAC
2. Ipomoea cf. indica	5	Yes	FACU
3. Leucaena leucocephala (less than 1 m tall)	5	No	UPL
4.			
5.			
6.			
7.			
8.			
100 =Total Cover			

Woody Vine Stratum (Plot size: 5 m radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
0 =Total Cover			

Remarks

SOIL

Sampling Point: SP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix			Redox Features			Type ¹	Loc ²	Texture	Remarks
	Color	(moist)	%	Color (moist)	%					
0-18	2.5YR 3/3		85	10YR 5/6	5	C	M	clay		prominent redox features
				2.5YR 5/6	5	C	M			distinct redox features
				10YR 4/1	5	D	M			prominent redox features

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histisols (A1)	<input type="checkbox"/> Sandy Redox (S5)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark-Surface (S7)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Muck Presence (A8)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Tilapia Nests (B17)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Water Stained Leaves (B9)	

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): >18

Saturation Present? Yes No Depth (inches): >18

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Field observations were made more than 15 min after hole was dug.

Appendix D

Early Consultation Letters



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

RECEIVED

2014 JUL -2 PM 12:43



JUL 0 1 2014

In Reply Refer To:
2014-TA-0292

Ms. Joanne Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Subject: Technical assistance regarding the preparation of a draft environmental assessment to address the Department of Agriculture's proposed Waimānalo Irrigation System project, O'ahu.

Dear Ms. Hiramatsu:

The U.S. Fish and Wildlife Service (Service) received your letter, dated May 27, 2014, in which you requested our comments on the preparation of a draft environmental assessment (DEA) for the proposed Waimānalo Irrigation System project, on the island of O'ahu. These comments are provided in accordance with the National Environmental Policy Act of 1969 [42 U.S.C. 4321 et seq.; 83 Stat. 852] (NEPA); and other authorities mandating Federal oversight of environmental resources including the Fish and Wildlife Coordination Act of 1934 [16 U.S.C. 661 et seq.; 48 Stat. 401], as amended (FWCA); the Federal Clean Water Act [33 U.S.C. 1251 et seq.; 62 Stat. 1155], as amended (CWA); and the Endangered Species Act of 1973 [16 U.S.C. 1531 et seq.; 87 Stat. 884], as amended (ESA). This response is in accordance with sect 7 of the Endangered Species Act (ESA) of 1973, as amended [16 U.S.C. 1531 et seq.] and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as amended (MBTA).

The proposed project involves the installation of approximately 1,800 feet of irrigation pipe to upgrade a section of the distribution system. The proposed project will extend the irrigation system to replace one section of the old irrigation system. The purpose of the proposed project is to improve the reliability of the irrigation system and reduce the water loss currently occurring in this portion of the system. Additional information on the proposed project, such as staging areas, was not provided.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity Mapping Program. There is no designated or proposed critical habitat under the ESA, or National Wildlife Refuges, wilderness areas, or wildlife preserves in the vicinity of the proposed project. However, our records indicate the



Ms. Hiramatsu

federally endangered Hawaiian hoary bat (Lasiurus cinereus semotus) may be present in the vicinity. Additionally, the wedge-tailed shearwater (Puffinus pacificus) protected under the MBTA, may fly over the project area when traversing between the ocean and mountainous breeding colonies. Our records also indicate that three federally endangered waterbirds may occur in the project area: the Hawaiian common moorhen (Gallinula chloropus sandvicensis), the Hawaiian stilt (Himantopus mexicanus knudseni), and the Hawaiian coot (Fulica alai). Further, there may be native stream fauna and native plants in the proposed project area and we recommend to the extent practical, you avoid and minimize impacts to all native habitats in the project vicinity. We offer the following recommendations to assist you in the preparation of the environmental analysis:

Hawaiian Hoary Bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15-ft tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Seabirds

Seabirds, including the wedge-tailed shearwater fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. To reduce potential impacts to seabirds, we recommend the following minimization measures be incorporated into your final EA:

- Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.
If housing development lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

Waterbirds

The endangered Hawaiian stilt, Hawaiian gallinule, Hawaiian coot, and Hawaiian duck (collectively referred to as Hawaiian waterbirds) are known to occur within the project areas. We recommend you incorporate the following measures into your project description to avoid and minimize impacts to Hawaiian waterbirds:

A biological monitor should conduct Hawaiian waterbird and nest surveys at the proposed project site prior to project initiation. A 100-ft buffer should be established and maintained around all active nests and broods until the chicks/ducklings have fledged. No potentially

Ms. Hiramatsu

3

disruptive activities or habitat alteration should occur within this buffer. A biological monitor should be present on the project site during all construction or earth moving activities to ensure that Hawaiian waterbirds and nests are not adversely impacted.

If a listed Hawaiian waterbird is observed within the project site, or flies into the site while activities are occurring (within 100-ft), all potentially disruptive activities (including human activity, mechanical or construction disturbance) will be stopped until the animal(s) voluntarily leave the area.

Your letter reported that a flora and fauna survey of the area was conducted for incorporation into your DEA, and that no endangered plants or animals were found in the project area; and that no ponds or wetlands were observed along the pipeline alignment. To better assist you, we suggest attaching relevant surveys and other project related documents to future requests for guidance. For example, it would be helpful to know the time of day and time of year in which the survey took place since this may impact the species observed. We suggest incorporating the species mentioned above, and all related avoidance and mitigation measures pertaining to each species, into your DEA.

In accordance with the Clean Water Act, we recommend that the proposed project be altered to avoid passing through the excavated ponds. Even though it was reported in your May 27, 2014 letter that these two ponds contained no water, they may fill with water during the rainy season and attract Hawaiian waterbirds. Your letter did not include what time of year, or how frequently, the ponds were evaluated. Because there are other potential water resources within the proposed project vicinity or nearby adjacent areas, and the proposed activities may cause soil erosion and sedimentation into these adjacent aquatic environments, we are attaching the Service's recommended Best Management Practices regarding sedimentation and erosion in aquatic environments. We encourage you to incorporate the relevant practices into your project design.

We appreciate your efforts to conserve endangered species. If you have any questions concerning these recommendations please contact Carrie Harrington, Fish and Wildlife Biologist (phone: 808-792-9400; fax: 808-792-9581).

Sincerely,



Vickie Caraway
Acting Assistant Field Supervisor:
Oahu, Kauai, NWHI, Am. Samoa

Enclosure

U.S. Fish and Wildlife Service Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.
2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.
3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see <http://www.haccp-nrm.org/Wizard/default.asp>) can help to prevent attraction and introduction of non-native species.
5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.





April 7, 2015
2013.70.0100/15P-017

Ms. Vickie Caraway, Acting Assistant Field Supervisor
Pacific Islands Fish and Wildlife Office
Fish and Wildlife Service
United States Department of Interior
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Dear Ms. Caraway:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your July 1, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension (reference number 2014-TA-0292). Your response indicates a range of concerns. Your comment letter will be included in the Draft Environmental Assessment (DEA) for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

The federally-listed endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian common moorhen (*Gallinula chloropus sandvicensis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), and Hawaiian coot (*Fulica alai*) will be included in the DEA as species that may occur in the project area. Additionally, the wedge-tailed shearwater protected under the Migratory Bird Treaty Act will be discussed in the DEA. The investigation of the project area for the Biological Resource Assessment did not observe any of the aforementioned species.

Per your recommendation, the proposed action will not disturb, remove, or trim woody plants greater than 15 feet tall during the Hawaiian hoary bat birthing and pup rearing season (June 1 through September 15).

Regarding nighttime light impacts to seabirds, the proposed action will not involve the installation of any outdoor lighting or any night-time construction.

For the Hawaiian waterbirds, the proposed action will implement mitigation measures as agreed to with your staff via telephone conversation on July 15, 2014. Immediately prior to construction, a biologist will conduct a survey of project area to identify any Hawaiian waterbird nests that may be present. If a nest is present, a 100-foot buffer will be established and maintained until the chicks have fledged.

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
Belt Collins Hawaii is an Equal Opportunity Employer

Ms. Vickie Caraway
March 11, 2015 / 15P-017
Page 2

The two National Wetland Inventory-identified excavated ponds in the project area are former reservoirs that were drained and filled after dairy operations ceased on the land in 2001. As part of the Biological Resource Assessment, the location of the former reservoirs was surveyed and no evidence of wetlands or aquatic features was found. A soils analysis has confirmed that these sites are not wetlands. Survey-grade topographic maps for the project area show the site of the former reservoirs has no depression from the surrounding ground level. A request for determination was sent to the United States (U.S.) Army Corps of Engineers, to confirm that the former reservoirs are not waters of the U.S. The determination is included in the DEA as Appendix E.

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,
BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

RECEIVED

2014 JUL -3 PM 4:00

BELT COLLINS HAWAII



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

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
EMDC/CWB

06040PGH.14

June 30, 2014

Ms. Joanne Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

**SUBJECT: Comments on Environmental Assessment Early Consultation
Main Line Extension, Waimanalo Irrigation System
TMKs: (4) 1-008-080 and (4) 1-026:004
Koolaupoko District, Oahu, Hawaii**

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated May 27, 2014, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program.

We recommend that you also read our standard comments on our website at:
<http://health.hawaii.gov/epo/files/2013/05/CWB-standardcomment.pdf>.

1. Any project and its potential impacts to State waters must meet the following criteria:
 - a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.
 - b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.
 - c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).
2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

Ms. Joanne Hiramatsu
June 30, 2014
Page 2

06040PGH.14

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee (\$1000 for an individual NPDES permit or \$500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: <https://eha-cloud.doh.hawaii.gov/epermit/View/home.aspx>. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 438-9258) regarding their permitting requirements.

Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (Emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and HAR, Chapter 11-54.

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

If you have any questions, please visit our website at: <http://health.hawaii.gov/cwb/>, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,


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

GH:np



April 7, 2015
2013.70.0100/15P-009

Mr. Alec Wong, Chief
Clean Water Branch
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, HI 96801

Dear Mr. Wong:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your response dated June 30, 2014 with comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension.

With regard to the waters of the State of Hawaii (State) or the United States (U.S.), the proposed action does not involve work in, over, or under waters of either the State or the U.S. The Draft Environmental Assessment (DEA) will discuss surface water resources in the project area. Please refer to the U.S. Army Corps of Engineers letter addressing this issue in Appendix E.

Your reference of permits and compliance with State Water Quality Standards is noted. We recognize the National Pollutant Discharge Elimination System (NPDES) issues, but the proposed action is not anticipated to create discharges that would be subject to a NPDES permit.

We appreciate your comments. Your letter will be included in the DEA for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. Alec Wong
March 11, 2015 / 15P-009
Page 2

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,
BELT COLLINS HAWAII LLC


John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

NEIL ABERCROMBIE
GOVERNOR



RECEIVED

2014 JUN -2 PM 1:08

Dean H. Seki
Comptroller
Maria E. Zielinski
Deputy Comptroller

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

MAY 30 2014

(P)1184.4

Ms. Joanne E. Hiramatsu, Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

Subject: Environmental Assessment Early Consultation
Main Line Extension, Waimanalo Irrigation System
Koolaupoko District, Oahu, Hawaii
TMK: (4) 1-008:080, (4) 1-026:004

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

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

Sincerely,

DEAN H. SEKI
Comptroller

c: Mr. Gordon W. Chong, Department of Agriculture



April 7, 2015
2013.70.0100 / 15P-007

Mr. Dean H. Seki, Comptroller
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, HI 96822

Dear Mr. Seki:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your May 30, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that there no Department of Accounting and General Services facilities in the vicinity of the project which may be impacted and that you have no additional comments to offer at this time.

We appreciate your comments. If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,
BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:ajk

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
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NEIL ABERCROMBIE
GOVERNOR OF HAWAII



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

RECEIVED

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

2014 JUN 23 PM 3:04

BELT COLLINS HAWAII

In reply, please refer to:
File:
EPO 14-110

June 19, 2014

Ms. Joanne E. Hiramatsu
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

**SUBJECT: Environmental Assessment Early Consultation
Main Line Extension, Waimanalo Irrigation System
TMK: (4) 1-088-080, (4) 1-026: 004, Koolaupoko, Oahu, Hawaii**

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter dated May 27, 2014. Thank you for allowing us to review and comment on the subject document. The document was routed to the relevant Environmental Health divisions, branches, and offices. They will provide specific comments to you if necessary. EPO recommends that you review the standard comments at: <http://health.hawaii.gov/epo/home/landuse-planning-review-program/>. You are required to adhere to all applicable standard comments, including any that apply to obtaining a National Pollutant Discharge Elimination System (NPDES) permit from DOH's Clean Water Branch.

You may also wish to review the recently revised Water Quality Standards Maps that have been updated for all islands. The new Water Quality Standards Maps (2013) can be found at: <http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/water-quality-standards/>.

The EPO suggests that you examine the many sources available on strategies to support the sustainable and healthy design of communities and buildings, including the:

State of Hawaii, Office of Planning: www.planning.hawaii.gov and the 2013 ORMP;

U.H., School of Ocean and Earth Science and Technology: www.soest.hawaii.edu;

2014 National Climate Change Report – Highlights for Hawaii:

http://ipcc-wg2.gov/AR5/images/uploads/WGIAR5-Chap29_FGDall.pdf;

U.S. Health and Human Services: www.hhs.gov/about/sustainability;

U.S. Environmental Protection Agency's sustainability programs: www.epa.gov/sustainability; and

Intergovernmental Panel on Climate Change (IPCC):

http://ipcc-wg2.gov/AR5/images/uploads/WGIAR5-Chap29_FGDall.pdf

The DOH encourages everyone to apply these sustainability strategies and principles early in the planning and review of projects. We also request that for future projects you consider conducting a Health Impact Assessment (HIA). More information is available at: www.cdc.gov/healthyplaces/hia.htm and www.epa.gov/research/healthscience/health-impact-assessment.htm.

We request you share all of this information with others to increase community awareness on sustainable, innovative, inspirational, and healthy community design.

Mahalo,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

c. Alec Wong, Clean Water Branch



April 7, 2015
2013.70.0100/15P-010

Ms. Laura Leialoha Phillips McIntyre, Program Manager
Environmental Planning Office
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, HI 96801

Dear Ms. McIntyre:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 19, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your comment letter will be included in the Draft Environmental Assessment (DEA) for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

With regard to the Standard Comments, these will be reviewed and integrated into the Draft Environmental Assessment (DEA) where appropriate.

The Water Quality Standards Maps will be reviewed and integrated in the DEA where appropriate. The DEA will discuss water resources and appropriate mitigation measures, if any are needed.

In response to sustainability strategies and Health Impact Assessment, these will be reviewed and integrated into the DEA where appropriate. The DEA will discuss public health and appropriate mitigation measures, if any are needed.

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Ms. Laura Leialoha Phillips McIntyre
March 11, 2015/ 15P-010
Page 2

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,
BELT COLLINS HAWAII LLC


John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



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

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

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

REF:OCCL:LY

Correspondence: OA 14-211

MAY 3 0 2014

Ms. Joanne E. Hiramatsu, Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

SUBJECT: Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Ko'olaupoko, O'ahu, Hawai'i
Tax Map Keys (TMKs): (1) 4-1-8: 080 and (1) 4-1-026:004

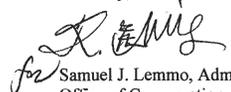
Dear Ms. Hiramatsu:

The Office of Conservation and Coastal Lands (OCCL) is in receipt of your inquiry regarding the subject matter. According to your information, the Department of Agriculture (DOA) is proposing to extend the main irrigation line of the Waimānalo Irrigation System. The project involves the installation of approximately 1,800 square feet of irrigation pipe to upgrade a section of the distribution system.

The OCCL notes that the subject parcels appear to lie outside of the Conservation District and is, therefore, not in our jurisdiction.

Should you have any questions regarding this correspondence, contact Lauren Yasaka of our Office at (808) 587-0386.

Sincerely,


for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

C: ODLO
City & County of Honolulu, DPP



April 7, 2015
2013.70.0100/15P-015

Mr. Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Land
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Lemmo:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your May 30, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that the project area lies outside of the State Conservation District and is therefore not in your jurisdiction.

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
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PHONE (808) 594-1888



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FAX (808) 594-1865

2014 AUG 11 PM 12:00

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
737 IWILEI ROAD, SUITE 200
HONOLULU, HAWAII 96817

BELT COLLINS HAWAII

HRD 14-7078 B

July 31, 2014

Joanne E. Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 N. King St., Suite 200
Honolulu, HI 96819

Re: Environmental Assessment Early Consultation Main Line Extension, Waimānalo Irrigation System Tax Map Key: (4) 1-008-080, (4) 1-026:004 Ko'olaupoko District, O'ahu, Hawai'i

Dear Mrs. Hiramatsu:

The Office of Hawaiian Affairs (OHA) is in receipt of your May 27, 2014 letter informing OHA that the Department of Agriculture wishes to extend the main irrigation line of the Waimānalo Irrigation System and reduce the water loss currently experienced by the system.

OHA does not have any preliminary comments as to the Environmental Assessment (EA) preparation. We look forward to participating in the consultation process for the Cultural Impact Assessment and the Archeological Inventory Survey, as well as an opportunity to review the completed draft EA.

As always, we request assurances that should iwi kūpuna or Native Hawaiian cultural deposits be identified during any other ground altering activities, all work will immediately cease and the appropriate agencies, including OHA, will be contacted pursuant to applicable law.

Should you have any questions, please contact Jeannin Jeremiah at 594-1790 or by email at jeanninj@oha.org.

'O wau iho nō,

Kamana'opo'ono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KMC:jj



April 7, 2015
2013.70.0100/15P-016

Dr. Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer
Office of Hawaiian Affairs
State of Hawai'i
737 Iwilei Road, Suite 200
Honolulu, HI 96817

Dear Dr. Crabbe:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 26, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that you have no comments at this time.

You request assurances that, should iwi kūpuna or Native Hawaiian cultural deposits be identified in the course of ground-altering activities, work will cease and the appropriate agencies will be contacted pursuant to applicable law. The Department of Agriculture will follow the applicable law.

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
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**OFFICE OF PLANNING
STATE OF HAWAII**

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

RECEIVED

2014 JUN 25 PM 2:57

NEIL ABERCROMBIE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

BELT COLLINS HAWAII

Ref. No. P-14429

June 24, 2014

Ms. Joanne E. Hiramatsu
Belt Collins Hawaii, LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

Subject: Environmental Assessment Early Consultation Main Line Extension, Waimanalo Irrigation System; TMK: (1) 4-1-008:080, (1) 4-1-026:004, Koolauopoko District, Oahu, Hawaii

Thank you for the opportunity to provide comments on the proposed extension of the main irrigation line at the Waimanalo Irrigation System. We have reviewed the documents submitted by letter dated May 27, 2014, and have the following comments to offer:

1. OP is the lead agency for the Hawaii Coastal Zone Management (CZM) Program. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area"). The Draft EA should include a discussion of the proposed project's ability to meet all of the objectives and policies set forth in HRS § 205A-2. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, and marine resources. The Draft EA should include the Coastal Zone Management Act, HRS Chapter 205A, in a list of "relationships to land use plans, policies, and controls."
2. In the Draft EA, please provide a list of any federal, state, or county permits required for this project. A listing of required permits will allow OP to better evaluate this project and determine such things as whether a Coastal Zone Management Federal Consistency evaluation is necessary.
3. Because of the frequent rainy weather patterns for Windward, Oahu, and the close proximity of the project site to Waimanalo Bay, this project may have nonpoint pollution implications on coastal waters. Any trenching work or ground disturbance due to the extension or improvement to the irrigation line and/or grading and clearing

Ms. Joanne E. Hiramatsu
June 24, 2014
Page 2

work for may result in erosion and sediment loss and have a negative environmental impact. Please review the Hawaii Watershed Guidance, which provides a summary and links to management measures that may be implemented to minimize coastal nonpoint pollution impact. Specifically, please examine page 122 (Site Development Management Measure for urban runoff). The Watershed Guidance can be viewed or downloaded from the Office of Planning website at [http://files.hawaii.gov/dbedt/op/czm/initiative/nonpoint/HI Watershed Guidance Final.pdf](http://files.hawaii.gov/dbedt/op/czm/initiative/nonpoint/HI_Watershed_Guidance_Final.pdf)

If you have any questions regarding this comment letter, please contact Josh Hekeikia of our Hawaii CZM Program at 587-2845.

Sincerely,



Leo R. Asuncion
Acting Director



April 7, 2015
2013.70.0100/15P-014

Mr. Leo R. Asuncion, Acting Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, HI 96813

Dear Mr. Asuncion:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 24, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your comments will be included in the Draft Environmental Assessment (DEA) for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

The Hawaii Coastal Zone Management Program and the project's ability to meet the objectives and policies as set forth by Hawaii Revised Statutes Chapter 205A will be discussed in the DEA

With regard to any required federal, state, and county permits, a list of the required permits and approvals will be included in the DEA.

The Hawaii Watershed Guidance will be reviewed and integrated into the DEA where appropriate. The DEA will discuss hydrology, geology, and appropriate mitigation measures, if any are needed.

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
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Mr. Leo Asuncion
March 11, 2015 / 15P-014
Page 2

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC



John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Joanne Hiramatsu

From: Lim, Thomas [LimT@ctahr.hawaii.edu]
Sent: Monday, June 23, 2014 11:31 AM
To: Joanne Hiramatsu
Cc: ADSC; Corrales, R; Lynn Nakamasu; Gallo, Maria; Gordon.W.Chong@hawaii.gov; Barry.W.Cheung@hawaii.gov; Grace, K; Evensen, Carl; Kinoshita, Charles; Lepczyk, Christopher
Subject: FW: belt collins letter March 27, 2014 - EA Waimanalo (MDG) site - Irrigation water line extension
Attachments: [Untitled].pdf

Joanne, Planner, Belt Collins

E.A. Waimanalo – DOA Irrigation system - water line extension TMK: (4)1-008-080 (MGD site)

Please note the subject parcel is still pending formal transfer to the university (UH/CTAHR) as the former Meadow Gold Dairy parcel as a long term lease agreement with DLNR. CTAHR has interest to add land to its existing Waimanalo experiment research station TMK: (4)-001-026:01, 02, 21.

Official response: CTAHR has no comments to the early consultation of the Environmental Assessment (E.A.) at this time.

Mahalo Nui Loa!

Thomas Lim
Director Planning & Management Systems
College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa
3050 Maile Way
Gilmore 214B
Honolulu, HI 96822
808-956-7429
808-956-9105 (fax)
limt@ctahr.hawaii.edu

From: Gilmore 214 Scanner [<mailto:no-reply-214@ctahr.hawaii.edu>]
Sent: Monday, June 23, 2014 11:02 AM
To: Lim, Thomas
Subject: belt collins



April 7, 2015
2013.70.0100 / 15P-006

Mr. Thomas Lim, Director
Director of Planning and Management Systems
College of Tropical Agriculture and Human Resources
University of Hawaii at Mānoa
3050 Maile Way, Gilmore 214B
Honolulu, HI 96822

Dear Mr. Lim:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 23, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your comment letter will be included in the Draft Environmental Assessment for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

Thank you for the details on the planned transfer of Tax Map Key: 4-1-008-080 to College of Tropical Agriculture and Human Resources from the former Meadow Gold Dairy. Your response also indicates that CTAHR is interested in additional parcels in the vicinity of the project area. Please contact the appropriate person at the State Department of Agriculture, Department of Land and Natural Resources, or Department of Hawaiian Home Lands to initiate these discussions.

We appreciate your comments. If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:ajk

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
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CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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Deputy Manager and Chief Engineer

Ms. Joanne E. Hiramatsu, Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

Subject: Your Letter Dated May 27, 2014 Requesting Comments on the Environmental Assessment Early Consultation for the Main Line Extension, Waimanalo Irrigation System – Tax Map Key: 4-1-008:080, 4-1-026:004

Thank you for the opportunity to comment on the proposed irrigation main extension project.

The construction drawings should be submitted for our review.

The construction schedule should be coordinated to minimize impact to the water system.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

for ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Water for Life . . . Ka Wai Ola



April 7, 2015
2013.70.0100 / 15P-005

Mr. Ernest Y. W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Lau:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 19, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your comment letter will be included in the Draft Environmental Assessment for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

Regarding your request to submit construction drawings of the proposed project for your review, we will submit construction drawings for your review prior to construction.

We will coordinate the construction schedule with you to minimize any impacts to the water system.

We appreciate your comments. If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,
BELT COLLINS HAWAII LLC


John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:ajk
cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
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DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4667
Web site: www.honolulu.gov

RECEIVED

2014 JUN 11 PM 12:41

BELT COLLINS HAWAII

MARK YONAMINE, P.E.
ACTING DIRECTOR
GERALD HAMADA, P.E.
ACTING DEPUTY DIRECTOR



KIRK CALDWELL
MAYOR

June 10, 2014

Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Attn: Joanne Hiramatsu

Dear Ms. Hiramatsu:

Subject: Environmental Assessment Early Consultation Main Line Extension,
Waimanalo Irrigation System Tax Map Key: (4) 1-008-080, (4) 1-026:004
Koolaupoko District, Oahu, Hawaii

The Department of Design and Construction does not have comments to offer on the environmental assessment early consultation.

Thank you for the opportunity to review and comment. Should there be any questions, please contact me at 768-8480.

Sincerely,



Mark Yonamine, P.E.
Acting Director

CTT: cf (564504)



April 7, 2015
2013.70.0100/15P-008

Mr. Mark Yonamine, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, HI 96813

Dear Mr. Yonamine:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 10, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that you have no comments at this time.

We appreciate your comments. If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
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DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-8041
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2014 JUL -7 PM 3:44

KIRK CALDWELL
MAYOR



BELT COLLINS HAWAII LLC
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

June 27, 2014

2014/ELOG-962 (mh)

Ms. Joanne E. Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

This is in response to your letter of May 27, 2014, regarding an Environmental Assessment Early Consultation for the proposed Main Line Extension of the Waimanalo Irrigation System. We offer the following comments:

1. The Draft Environmental Assessment (DEA) should include a discussion of how the proposed project is consistent with Objective B Policy 2 of Section V Transportation and Utilities in the City and County of Honolulu's General Plan to develop and maintain an adequate supply of water for agricultural needs.
2. New or maintenance of agricultural infrastructure is supported under the current Koolau Poko Sustainable Communities Plan.
3. The proposed Main Line Extension is under the category of Utility Installations, Type A, which is a permitted use within the AG-1 Restricted Agricultural District.
4. The DEA should include a site plan (drawn to scale) showing the property lines, and identifying the existing and proposed structures. The site plan should also identify the required yard setbacks, easements, landscaping, and site access.
5. Provide information on the Flood Insurance Rate Map (FIRM) flood districts and base flood elevations. On a map of the site, show the floodway boundaries and actual heights above mean sea level.
6. Provide information on grading, describing the area and volume of excavation or fill.

Ms. Joanne E. Hiramatsu
June 27, 2014
Page 2

7. The DEA should include a complete listing of required permits and approvals.
8. Please show the entire Waimānalo Irrigation System, its source, and service area.

Should you have any questions, please call Matt Higashida of our staff at 768-8045.

Very truly yours,

George I. Atta, FAICP
Director

GIA:bkg
1156458



April 7, 2015
2013.70.0100/15P-011

Mr. George I. Atta, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

Dear Mr. Atta:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 27, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates a range of comments. Your comment letter will be included in the Draft Environmental Assessment (DEA) for the project, to be published in the Office of Environmental and Quality Control, *The Environmental Notice*.

Thank you for the confirmation that the project is categorized as a Utility Installation Type A, which is a permitted use in the AG-1 Restricted Agricultural District.

The City and County of Honolulu's General Plan and the Ko'olau Poko Sustainable Communities Plan will be addressed in the DEA to include consistency with both plans.

With regard to the site plans, the DEA will include a detailed site plan with property lines, existing and proposed structures, setbacks, easements, and site access, as appropriate.

Flood hazards will be described in the DEA and will include information on the Flood Insurance Rate Map.

The DEA will provide an account of grading necessary for the proposed action and the project will get a grading permit prior to construction.

Required permits and approvals will be included in the DEA.

Regarding the Waimānalo Irrigation system, the DEA will describe and include a map for the existing system.

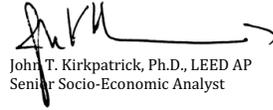
Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
Belt Collins Hawaii is an Equal Opportunity Employer

Mr. George Atta
March 11, 2015 / 15P-011
Page 2

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC



John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

DEPARTMENT OF PARKS & RECREATION
CITY AND COUNTY OF HONOLULU RECEIVED

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

2014 JUN 18 PM 2:12

KIRK CALDWELL
MAYOR



June 16, 2014

BELT COLLINS HAWAII

MICHELE K. NEKOTA
DIRECTOR

JEANNE C. ISHIKAWA
DEPUTY DIRECTOR

Ms. Joanne E. Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

SUBJECT: Environmental Assessment Early Consultation
Main Line Extension, Waimanalo Irrigation System
Tax Map Kay: (4) 1-008-080, (4) 1-026-004
Koolaupoko District, Oahu, Hawaii

Thank you for the opportunity to review and comment at the early consultation stage of the Environmental Assessment to extend the main irrigation line of the Waimanalo Irrigation System.

The Department of Parks and Recreation has no comment. As the proposed project will have no impact on any program or facility of the Department, you may remove us as a consulted party to the balance of the EIS process.

Should you have any questions, please contact Mr. John Reid, Planner at 768-3017.

Sincerely,



Michele K. Nekota
Director

MKN:jr
(564591)



April 7, 2015
2013.70.0100/15P-012

Ms. Michele K. Nekota, Director
Department of Parks and Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, HI 96707

Dear Ms. Nekota:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 16, 2014 comments on the Environmental Assessment (EA) early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that you have no comment and that the proposed action will not impact any Department of Parks and Recreation facilities or programs. Per your request, we will remove you from future EA consultation for this project.

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.beltcollins.com | honolulu@bchdesign.com
Belt Collins Hawaii is an Equal Opportunity Employer

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov



KIRK CALDWELL
MAYOR

2014 JUN 30 PM 12:28
COLLINS HAWAII

MICHAEL D. FORMBY
DIRECTOR
MARK N. GARRITY, AICP
DEPUTY DIRECTOR

June 26, 2014

TP5/14-564582R

Ms. Joanne E. Hiramatsu
Director of Planning
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

SUBJECT: Pre-Consultation for Draft Environmental Assessment (DEA) Main Line Extension-Waimanalo Irrigation System; Tax Map Key: (4) 1-008-080, (4) 1-026:004; Koolaupoko, Oahu, Hawaii

In response to your letter dated May 27, 2014, we have no comments to offer at this time, but we reserve further comment pending the submission of the DEA.

Thank you for the opportunity to review this matter. Should you have any further questions, please contact Michael Murphy of my staff at 768-8359.

Very truly yours,

Michael D. Formby
Director

cc: Mr. Gordon W. Chong
State of Hawaii, Department of Agriculture



April 7, 2015
2013.70.0100/15P-013

Mr. Michael D. Formby, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, HI 96813

Dear Mr. Formby:

**Response to Comments
Environmental Assessment Early Consultation
Main Line Extension, Waimānalo Irrigation System
Tax Map Key: 4-1-008:080, 4-1-026:004
Ko'olaupoko District, O'ahu, Hawai'i**

Thank you for your June 26, 2014 comments on the Environmental Assessment early consultation for the proposed Waimānalo Irrigation System Main Line Extension. Your response indicates that you have no comments at this time.

If you have any questions, please feel free to call me at 521-5361, ext. 268, or you can email me at jkirkpatrick@bchdesign.com.

Very truly yours,

BELT COLLINS HAWAII LLC

John T. Kirkpatrick, Ph.D., LEED AP
Senior Socio-Economic Analyst

JTK:hp

cc: Mr. Gordon W. Chong, Department of Agriculture

Appendix E

Wetland Determination Correspondence

Attachment A

Wetland Data Determination Forms

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1015
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-1
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 46.32276 sec N Long: 157 deg 42 min 33.60106 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (PUBHx on NWI map)

Are climactic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
---	--

Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom.
 USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and surrounding berms do not exist today.

VEGETATION—Use scientific names of plants.

Stratum (Plot size: <u>15 m radius</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
5.			
	0	=Total Cover	
Sapling/Shrub Stratum (Plot size: <u>15 m radius</u>)			
1. None (see herb stratum)			
2.			
3.			
4.			
5.			
	0	=Total Cover	
Herb Stratum (Plot size: <u>5 m radius</u>)			
1. <u>Megathyrsus maximus</u>	88	Yes	FAC
2. <u>Ipomoea triloba</u>	2	No	FAC
3. <u>Desmanthus pernambucanus</u>	5	No	FACU
4. <u>Ipomoea obscura</u>	5	No	FAC
5. <u>Leucaena leucocephala (shrub)</u>	2	No	UPL
6.			
7.			
8.			
	102	=Total Cover	
Woody Vine Stratum (Plot size: <u>5 m radius</u>)			
1. None			
2.			
	0	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species _____ x1= _____

FACW species _____ x2= _____

FAC species _____ x3= _____

FACU species _____ x4= _____

UPL species _____ x5= _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

Problematic Hydrophytic Vegetation ¹ (Explain in Remarks or in the delineation report)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

Remarks: Leucaena leucocephala trees are located upslope of SP 1.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color	(moist) %	Color (moist)	%				
0 - 7	2.5YR 4/4	78	10R 4/8	5	C	M	clay	prominent redox features
			Gley 1 4/1	3	D	M		prominent redox features
			black	1	C	M		prominent redox features
			10YR 5/8	3	C	M		prominent redox features
7 - 17	Gley 1 4/1	95	10YR 5/8	3	C	M	stony clay	prominent redox features
			5YR 5/8	2	C	M		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains

²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Muck Presence (A8)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Dark-Surface (S7)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

- Stratified Layers (A5)
- Sandy Mucky Mineral (S1)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Innundation Visible on Aerial Imagery (B7)
- Water Stained Leaves (B9)
- Aquatic Fauna (B13)
- Tilapia Nests (B17)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tiled Soils (C6)
- Thin Muck Surface (C7)
- Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Salt Deposits (C5)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____
 Water Table Present? Yes No Depth (inches): >17
 Saturation Present? (includes capillary fringe) Yes No Depth (inches): >17

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Negative alpha, alpha dipyriddy reaction throughout soil profile. Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1115

Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-2

Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004

Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None

Lat: 21 deg 19 min 44.917195 sec N Long: 157 deg 42 min 32.56070 sec W Datum: WGS 1984 Slope (%): 0

Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (PUBHx on NWI map)

Are climactic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
---	--

Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.

VEGETATION—Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: <u>15 m radius</u>)			
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			
Sapling/Shrub Stratum (Plot size: <u>15 m radius</u>)			
1. None			
2.			
3.			
4.			
5.			
0 =Total Cover			
Herb Stratum (Plot size: <u>5 m radius</u>)			
1. <u>Megathyrsus maximus</u>	5	No	FAC
2. <u>Urochloa mutica</u>	95	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
100 =Total Cover			
Woody Vine Stratum (Plot size: <u>5 m radius</u>)			
1. None			
2.			
0 =Total Cover			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species _____ x1= _____

FACW species _____ x2= _____

FAC species _____ x3= _____

FACU species _____ x4= _____

UPL species _____ x5= _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

Problematic Hydrophytic Vegetation ¹ (Explain in Remarks or in the delineation report)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

Remarks: Leucaena leucocephala trees are located upslope of SP 2.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color	(moist) %	Color (moist)	%				
0 - 16	2.5YR 4/4	85	10YR 5/8	7	C	M	stony clay	prominent redox features
			2.5YR 3/1	5	D	M		distinct redox features
			10YR 5/6	3	C	M		prominent redox features less stony than stony clay at SP-1

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histisols (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Muck Presence (A8) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Dark-Surface (S7) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Innundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Tilapia Nests (B17) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): >16

Saturation Present? (includes capillary fringe) Yes No Depth (inches): >16

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Negative alpha, alpha' dipyriddy reaction throughout soil profile. Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1200
 Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-3
 Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004
 Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None
 Lat: 21 deg 19 min 46.08317 sec N Long: 157 deg 42 min 32.22764 sec W Datum: WGS 1984 Slope (%): 0
 Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (near PUBHx on NWI map)

Are climactic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
---	---

Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.

VEGETATION—Use scientific names of plants.

Tree Stratum (Plot size: <u>15 m radius</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>None</u>			
2. _____			
3. _____			
4. _____			
5. _____			
0 =Total Cover			
Sapling/Shrub Stratum (Plot size: <u>15 m radius</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>None</u>			
2. _____			
3. _____			
4. _____			
5. _____			
0 =Total Cover			
Herb Stratum (Plot size: <u>5 m radius</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Megathyrsus maximus</u>	40	Yes	FAC
2. <u>Urochloa mutica</u>	40	Yes	FACW
3. <u>Macroptilium atropurpureum</u>	20	Yes	FAC
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
100 =Total Cover			
Woody Vine Stratum (Plot size: <u>5 m radius</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>None</u>			
2. _____			
_____ =Total Cover			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species _____ x1= _____

FACW species _____ x2= _____

FAC species _____ x3= _____

FACU species _____ x4= _____

UPL species _____ x5= _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0¹

___ Problematic Hydrophytic Vegetation ¹ (Explain in Remarks or in the delineation report)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

Remarks

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color	(moist) %	Color (moist)	%				
0 - 18	2.5YR 3/3	85	10YR 5/8	5	C	M	clay	prominent redox features
			2.5YR 5/6	5	C	M		distinct redox features
			10YR 4/1	5	D	M		prominent redox features

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histisols (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Muck Presence (A8) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Dark-Surface (S7) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Innundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Tilapia Nests (B17) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): >18

Saturation Present? (includes capillary fringe) Yes No Depth (inches): >18

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Field observations were made more than 15 min after hole was dug.

WETLAND DETERMINATION DATA FORM—Hawai'i and Pacific Islands

Project/Site: Waimanalo Irrigation Line City: Waimanalo Sampling Date: Nov 24, 2014 Time: 1221

Applicant/Owner: Hawaii Department of Agriculture State/Terr./Comm.: HI Island: Oahu Sampling Point: SP-4

Investigator(s): Susan Burr, Daniel Mench TMK/Parcel: 4-1-026:004

Landform (hillslope, coastal plain, etc.): Coastal plain Local relief (concave, convex, none): None

Lat: 21 deg 19 min 47.09430 sec N Long: 157 deg 42 min 32.17599 sec W Datum: WGS 1984 Slope (%): 0

Soil Map Unit Name: Pohakupu silty clay loam, 8 to 15% slopes NWI classification: upland (near PUBHx on NWI map)

Are climactic/hydrologic conditions on the site typical for this time of year: Yes No (If no, explain in Remarks)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes No

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS—Attach a site map showing sampling point locations transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: PUBHx=permanently flooded, excavated palustrine wetland with an unconsolidated bottom. USGS image viewed on Google earth shows two ponds existed in the vicinity on 3/19/2001, but by 8/30/2004, the ponds were filled and surrounding land was graded. The former depressions and berms do not exist today.

VEGETATION—Use scientific names of plants.

Stratum	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: <u>15 m radius</u>)			
1. None			
2.			
3.			
4.			
5.			
			0 =Total Cover
Sapling/Shrub Stratum (Plot size: <u>15 m radius</u>)			
1. None			
2.			
3.			
4.			
5.			
			0 =Total Cover
Herb Stratum (Plot size: <u>5 m radius</u>)			
1. <u>Megathyrsus maximus</u>	90	Yes	FAC
2. <u>Ipomoea cf. indica</u>	5	Yes	FACU
3. <u>Leucaena leucocephala (less than 1 m tall)</u>	5	No	UPL
4.			
5.			
6.			
7.			
8.			
			100 =Total Cover
Woody Vine Stratum (Plot size: <u>5 m radius</u>)			
1. None			
2.			
			0 =Total Cover

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by: _____

OBL species _____ x1= _____

FACW species _____ x2= _____

FAC species _____ x3= _____

FACU species _____ x4= _____

UPL species _____ x5= _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

Problematic Hydrophytic Vegetation ¹ (Explain in Remarks or in the delineation report)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No

Remarks

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color	(moist) %	Color (moist)	%				
0 - 18	2.5YR 3/3	85	10YR 5/8	5	C	M	clay	prominent redox features
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¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present: Yes No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: (Explain observations in Remarks, if needed.)

Primary Indicators (minimum of one required: check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Innundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Tilapia Nests (B17) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tiled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Fiddler Crab Burrows (C10) (Guam, CNMI, and American Samoa) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes No Depth (inches): _____

Water Table Present? Yes No Depth (inches): >18

Saturation Present? (includes capillary fringe) Yes No Depth (inches): >18

Wetland Hydrology Present? Yes No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Field observations were made more than 15 min after hole was dug.



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

March 4, 2015

SUBJECT: Approved Jurisdictional Determination for the Waimanalo Irrigation System, Waimanalo, Island of Oahu, Hawaii, Department of the Army File No. POH-2015-00014

Belt Collins Hawaii, LLC
Attention: Joanne Hiramatsu
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Ms. Hiramatsu:

This is in response to your letter dated December 10, 2014 requesting a determination of permitting requirements for the Water Main Line Extension of the Waimanalo Irrigation System in Waimanalo, Island of Oahu, Hawaii. We have completed review of your submitted documents and assigned your project Department of the Army file number **POH-2015-00014**. Please reference this number in all future correspondence with this office concerning this project.

Based on your submitted documents and available resources, the U.S. Army Corps of Engineers (Corps) concurs with the conclusions of your wetland data sheets that the wetlands identified on the NWI map do not meet the Corps definition of a 'wetland' per the 1987 Wetland Delineation Manual, and the 2012 Hawaii and Pacific Island Regional Supplement. This office has determined that there are no waterways, wetlands or other areas considered "waters of the United States" under Corps jurisdiction within the review area provided in your submittal. Therefore, a Department of the Army permit under Section 404 of the Clean Water Act (Section 404) is not required for the proposed waterline extension.

This determination covers only your project as described above within the review area provided in Figure 3 and evaluated in Attachment A of your submittal. Be advised, although this determination identifies waters not under federal jurisdiction, this determination does not extend to waters within the subject parcel and outside of the review area that may be subject to Corps jurisdiction. In accordance with Section 404, you must obtain prior approval from this office for the discharge or placement of excavated or fill material into waters of the U.S., including jurisdictional wetlands. This determination does not obviate the need to obtain any and all other federal, state or local approvals prior to commencing with the proposed work.

This determination is valid for a period of five (5) years from the date of the letter, unless new information warrants revision of the determination before the expiration date or a District Commander has identified, after public notice and comment, that specific

geographic areas with rapidly changing environmental conditions merit re-verification on a more frequent basis.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions related to this determination, please contact Ms. Jessie Paahana at 808-835-4107 or via e-mail at jessie.k.paahana@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Office by accessing our web-based customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Sincerely,

PAAHANA.JES

SIE.A

K.1367868755

Jessie K. Paahana

Biologist, Regulatory Branch

Digitally signed by PAAHANA.JES SIE.A K.1367868755
DN: cn=SIE.A, o=Government, ou=HQ, ou=PR, ou=USA,
ou=PAAHANA.JES SIE.A K.1367868755
Date: 2016.03.04 12:25:01 -1000