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Lt. Governor



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SEP 23 2015

SCOTT E. ENRIGHT
Chairperson, Board of Agriculture

PHYLLIS SHIMABUKURO-GEISER
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

September 11, 2015

Ms. Jessica 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 Ms. Wooley:

Subject: Galbraith Lands Reservoirs Final Environmental Assessment

With this letter, the State of Hawaii Department of Agriculture (HDOA) hereby transmits the final environmental assessment and finding of no significant impact (FEA-FONSI) for the State of Hawai'i Agribusiness Development Corporation's Galbraith Lands Reservoirs project situated at (1) 6-5-002: 010, 7-1-001: 002, and 7-1-001: 005, in the Wahiawa and Waialua districts on the island of O'ahu for publication in the next available edition of the Environmental Notice.

The HDOA has included copies of comments and responses that were received during the 30-day public comment period on the draft environmental assessment and anticipated finding of no significant impact (DEA-AFONSI).

Enclosed is a completed OEQC Publication Form, one copy of the FEA-FONSI, 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 Mr. Brian Kau, P.E., Administrator of the Agricultural Resource Management Division, at 973-9473.

Sincerely,

Scott E. Enright, Chairperson
Board of Agriculture

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

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Encs.: OEQC Publication Form
FEA
FEA (Adobe Acrobat PDF file)
E-copy of publication form (MS-Word)

C: James Nakatani, ADC



**AGENCY ACTION
SECTION 343-5(b), HRS
PUBLICATION FORM**

Project Name: Galbraith Lands Reservoirs

HRS §343-5 Trigger(s): Proposing use of state or county lands or the use of state or county funds

Island: Oahu

District: Wahiawa and Waialua

TMK: (1) 6-5-002: 010, 7-1-001: 002, and 7-1-001: 005

Permits: State of Hawaii Department of Health NPDES Permit; Department of Land and Natural Resources Commission on Water Resources Management Well Construction Permit Pump Installation Permit Water Use Permit; State Historic Preservation Division Historic Site Review; Department of Transportation Right of Access Permit to Perform Work Within a State Highway Right-of-Way

City and County of Honolulu

Department of Planning and Permitting Grubbing, Grading, and Stockpiling Permit Excavation Permit; Permit to Excavate Public Right-of-Way

Proposing/Determination Agency: Sponsor:

State of Hawai'i Agribusiness Development Corporation (ADC) Ivan Kawamoto
235 South Beretania Street, Room 205
Honolulu, Hawai'i 96813
Phone: 586-0181

Determination Agency:

State of Hawai'i Department of Agriculture Brian Kau, P.E., Administrator
Agricultural Resource Management Division 1428 South King Street
Honolulu, Hawai'i 96814
Phone: 973-9473

Accepting Authority:

(for EIS submittals only)

Consultant:

Environmental Planning Solutions LLC
945 Makaiwa Street
Honolulu, HI 96816 Colette Sakoda Phone: 748- 1529

Status (check one only):

- __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.
- __X_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 State of Hawai'i Agribusiness Development Corporation (ADC) proposes farm land preparation for construction of four reservoirs on land that was previously in pineapple cultivation. The affected properties, which in total encompass 1,207 acres, are located west of the town of Wahiawa in Central O'ahu and generally bounded by Poamoho Gulch and Poamoho Camp on the north, Whitmore Village and the North Fork of Kaukonahoa Stream on the east, Schofield Barracks Military Reservation on the south, and fallow/farmed agricultural fields on the west.

The purposes of the water storage improvements are to increase the storage capacity of the irrigation water system service area which would provide additional reserve during power outages, and help optimize pumping hours and to improve water pressure for anticipated diversified crop cultivation activities. With the expected increase and demand for fresh agricultural produce, local farmers plan to grow and distribute their produce to Hawai'i's local markets, businesses, and restaurants. Local agricultural food production should help move the State towards agricultural self-sufficiency and decrease Hawai'i's dependency on importing food from out of state.

All four reservoirs, three designed for 3 MG capacity each and one for 10 MG capacity, will be constructed below existing grade. The respective reservoir sites will be graded and excavated to below grade design elevations that can contain the desired storage volume.

No residential, agricultural, or commercial activities on the lots will be displaced by the proposed action. The improvements are proposed on vacant and fallow agricultural fields.

In the long-term, the proposed action is anticipated to attract local farmers and agribusinesses to the area. Water availability and the construction of storage and water infrastructure facilities, an existing improved transportation network, and availability of high-quality productive agricultural land coupled with long-term agricultural leases should foster diverse agricultural activities and help achieve the stated purposes of the proposed action. A Finding of No Significant Impact has been determined for this project.

FINAL ENVIRONMENTAL ASSESSMENT

GALBRAITH RESERVOIRS

Agribusiness Development Corporation
Galbraith Lands Reservoirs Project
Wahiawā, O'ahu, Hawai'i

September 2015



This document was prepared pursuant to Chapter 343 HRS

APPLICANT:

Agribusiness Development Corporation
State of Hawai'i

APPROVING AGENCY:

Department of Agriculture
State of Hawai'i

PROJECT SUMMARY INFORMATION

Proposed Action: Galbraith Reservoirs

Sponsoring Agency: Agribusiness Development Corporation (ADC)
235 South Beretania Street, Room 205
Honolulu, Hawai'i 96813

Determining Agency: State of Hawai'i Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

Location: Districts of Wahiawa and Waialua O'ahu, Hawai'i

Tax Map Key / Area and Reservoir / Area: 6-5-002: 010 / 310± acres
Reservoir No. 1 / 0.9 acres
7-1-001: 002 / 302± acres
Reservoir No. 2 / 0.4 acres
7-1-001: 005 / 236± acres
Reservoir No. 3 / 1.1 acres
Reservoir No. 4 / 2.68 acres

Land Owner: State of Hawai'i

Existing Use: Fallow agricultural land

State Land Use Designation: Agricultural
General Plan for O'ahu: Urban Fringe
Zoning: AG-1 Restricted Agriculture

Need for Assessment: Chapter 343, Hawai'i Revised Statutes
§343-5(a)(1) Propose the use of state or county land or the use of state or county funds

Anticipated Determination: Finding of No Significant Impact

Contact Person: Ivan Kawamoto, Project Manager
Agribusiness Development Corporation (ADC)
235 South Beretania Street, Room 205
Honolulu, Hawai'i 96813
Telephone: (808) 586-0186

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- A. Pre-Assessment Consultation Comments
 - Pre-Assessment Letter
 - Pre-Assessment Consultation Responses
- B. Draft Environmental Assessment
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TECHNICAL REPORTS

- A. SWCA Environmental Consultants. December 2014. *Biological Resource Assessment for Galbraith Estate Diversified Agriculture*. Prepared for Environmental Planning Solutions, LLC.
- B. Keala Pono Archaeological Consulting, LLC. May 2015. *Final Archaeological Assessment of TMK: (1) 7-1-001:002(por.) and :005 (por.), Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, Island of O‘ahu, Hawai‘i*. Prepared for Environmental Planning Solutions, LLC.
- C. Keala Pono Archaeological Consulting, LLC. December 2014. *Cultural Impact Assessment of TMK: (1) 7-1-001:002 and :005, Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010, Kamananui Ahupua‘a, Waialua District, Island of O‘ahu, Hawai‘i*. Prepared for Environmental Planning Solutions, LLC.
- D. The Traffic Management Consultant. February 2015. *Draft Traffic Impact Analysis Report for the Proposed Galbraith Estate Reservoirs, Wahiawa, Hawaii*.

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SECTION 1

DESCRIPTION OF THE PROPOSED ACTION

The State of Hawai'i Agribusiness Development Corporation ("ADC") proposes farm land preparation for construction of four reservoirs on land that was previously in pineapple cultivation. The affected properties are located west of the town of Wahiawā in Central O'ahu and generally bounded by Poamoho Gulch and Poamoho Camp on the north, Whitmore Village and the North Fork of Kaukonahoa Stream on the east, Schofield Barracks Military Reservation on the south, and fallow/farmed agricultural fields on the west. A Location Map depicting the project area is shown as Figure 1.

In 2012 the Trust of Public Land ("TPL") in collaboration with the State of Hawaii, the Office of Hawaiian Affairs, the City and County of Honolulu, the U.S. Army, and D.R. Horton/Schuler (a land developer) purchased approximately 1,700 acres of land outside the town of Wahiawa from the Estate of George Galbraith ("Galbraith Estate Lands"). TPL then transferred approximately 1,207 acres to the state Agribusiness Development Corporation and 511 acres to the Office of Hawaiian Affairs (OHA, 2015). In total the acquisition of Galbraith Estate Lands comprised 12 separate land parcels.

Improvements for this project are proposed on three parcels owned by the State of Hawai'i (referred to as the project area) and controlled by ADC (See Table 1 and Figure 2). Land owned by the Office of Hawaiian Affairs is not part of the proposed action. Information about the affected parcels is shown in Table 1.

Table 1. Property Information

Reservoir Site	Tax Map Key	Land Area	Licensee/User
1	6-5-002: 010	310± acres	Kalena Farms (230± acres)
2	7-1-001: 002	302± acres	ADC
3	7-1-001: 005 por.	236± acres	Ohana Best Farm (160± acres)
4	7-1-001: 005 por.	236± acres	ADC

Source: ADC, 2014

ADC is also responsible for leasing land under their control to farmers and agricultural ventures. Thus far, ADC has executed licenses with Kalena Farms for 230 acres on Tax Map Key 6-5-002: 010, with Ohana Best Farm LLC (dba Ohana Best Farm) for 160 acres of Tax Map Key 7-1-001: 005 por., and with Ho Family Farms for 50 acres of Tax Map Key 6-5-002: 025 por.

A. Purpose of the Action

Water storage improvements are proposed to increase the storage capacity of the irrigation water system service area – which would provide additional reserve during power outages and help optimize pumping hours and to improve water pressure for anticipated diversified crop cultivation activities. With the expected increase and demand for fresh agricultural produce, local farmers plan to grow and distribute their produce to Hawai'i's local markets,

businesses, and restaurants. Local agricultural food production should help move the State towards agricultural self-sufficiency and decrease Hawai'i's dependency on importing food from out of state.

B. Technical Characteristics

The proposed action is the construction of four water storage reservoirs. ADC proposes to construct two reservoirs and private parties two reservoirs. This environmental assessment is prepared for the four reservoirs because they are similar actions, serve similar purposes, located in the same general area, and are on State land.

ADC will construct a 3.0 MG and 10.0 MG reservoir. The private parties each will construct 3.1 MG reservoirs. The reservoirs will be constructed on land under ADC jurisdiction. As shown on Figure 1, the reservoir sites are dispersed over the project area to serve existing and future agricultural users.

Reservoir Site No. 1 is located at the western end of the project area about 1.2 miles from the intersection of Kaukonahua Road and Wilikina Drive. Kalena Farms will construct the 3.1 MG reservoir for its use.

Reservoir Site No. 2 is on the southwest side of the intersection of Kaukonahua Road and Kamananui Road. The 3.0 MG reservoir will be funded and constructed by ADC.

Reservoir Site Nos. 3 and 4 are located on the north side of Kamehameha Highway generally between Saipan Road (adjoining Whitmore Village) on the east and the triangular intersection where Kamehameha Highway splits to Hale'iwa and Waialua on the west. Reservoir No. 3 (3.1 MG) will be funded and constructed by Ohana Best Farms. Reservoir No. 4, a 10.0 MG reservoir, will be funded and constructed by ADC.

All reservoirs will be constructed below existing grade. The respective reservoir sites will be graded and excavated to below grade design elevations that can contain the desired storage volume. Typical design criteria for the reservoirs are listed below but may vary by individual reservoir.

- Impounding berm to be engineered at 2:1 slope (Horizontal:Vertical)
- Base and inner slopes to be lined with woven HDPE Polypropylene fabric pond liner
- Erect security and safety fencing
- Provide driveway of adequate width for service and maintenance vehicles

Preliminary design plans for the two private reservoirs show approximately 7-foot high above ground earth berms for impounding water around the perimeter. Above grade earth berms are not proposed for the ADC reservoirs. The Department of Agriculture has requested that the reservoir drawings be submitted to the Department of Land and Natural Resources Engineering Division for review and compliance with the Hawai i Dam and Reservoir Safety Act of 2007.

Preliminary Site Plans and Sections and Elevations for the reservoirs are shown on Figures 3 through 9. Summary information for each of the reservoirs is shown in Table 2.

The reservoir sites are at proper elevations to optimize water transport from the well sites and water distribution to crop irrigation lines. In addition to providing critical storage at an elevation where irrigation water can serve as much farm crop cultivation areas and activities as possible, the storage locations are well suited in terms of pressure. A higher elevation

Table 2. Reservoir Summary

Reservoir Site	Reservoir Area (~SF)	Basin Area (~SF)	Volume (MG)	Depth (Feet)	Invert Elevation (Above MSL)
1	71,800	40,000	3.1	15	972 feet
2	74,400	32,000	3.0	15	935 feet
3	68,400	48,000	3.1	12	990 feet
4	132,000	97,500	10.0	15	967 feet

Sources: Akinaka & Associates, 2014; AgTech Pacific, 2014

would provide pressure relief for a pipeline descending from the higher elevation before pressure becomes excessive. It would also hold adequate working pressures for future users to be served at elevations below the reservoirs. Locating the reservoirs higher or lower would not optimize both of these needs.

Two wells, located at opposite ends of the project area, will supply water for the reservoirs. A State owned well on tax parcel (TMK) 6-5-002: 026) located across Kaukonahua Road from Reservoir Site No. 1 already is developed and in use. The well, which is identified as Well No. 3-3103-0001 on Commission on Water Resource Management maps, has a pumping capacity of 2,000 gallons per minute. There is no storage reservoir associated with this well.

A second well is proposed in the vicinity of Reservoir Site No. 3. The well may be developed and funded by Ohana Best Farm to service Reservoir No. 3. Ohana Best Farm will need to apply for a Well Construction permit from the Commission on Water Resources Management, Department of Land and Natural Resources. At that time, any additional environmental evaluation documentation requirements will be determined.

A conceptual water distribution system plan from the existing State well to the reservoir lots is shown as Figure 10. Three potential water resources near the Galbraith lands were identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Waste Water Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC's goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system.

The three lots on which the reservoirs are proposed already have access from adjoining streets and roads. Access to Reservoir Site No. 1 is from an existing entry off Kaukonahua Road about 0.25–0.5 miles east of its intersection with Wilikina Drive. The entry and a road to the reservoir site were formerly used to access pineapple field in the area. The road does not directly connect to the reservoir site and Kalena Farms will construct an approximately 500 foot long driveway from the road to its reservoir.

Access to Reservoir Site No. 2 is from an existing unpaved entry off Kamananui Road. The entry is approximately 0.3 mile south (towards Schofield Barracks) from its intersection with Kaukonahua Road. A 12-foot wide, approximately 1,200 feet long driveway will be constructed from the entry to the reservoir site adjoining the eastern property line.

Reservoir Site Nos. 3 and 4 are accessed from Kamehameha Highway about 0.2 miles west of its intersection with Whitmore Avenue. The existing entry and gravel driveway (approximately 900 feet in length) connects Ohana Best's agricultural operations center with Kamehameha Highway. The driveway will be shared with ADC.

Ohana Best Farm preliminarily plans to install an off-grid hybrid PV system that would occupy approximately two acres of non-productive land within its 160 acre agricultural operation. The PV array and associated battery backup and standby generator structures would be located adjacent to the 3 MG reservoir and future well site. Some of the PV panels would be placed on the rooftops of the mobile structures that are envisioned as its operations center. The remaining PV panels would be ground-mounted structures within the farm's operations area. Should plans develop further, this PV project will require further environmental evaluation and analysis prior to permitting and implementation.

C. Economic Characteristics

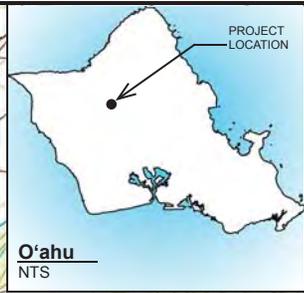
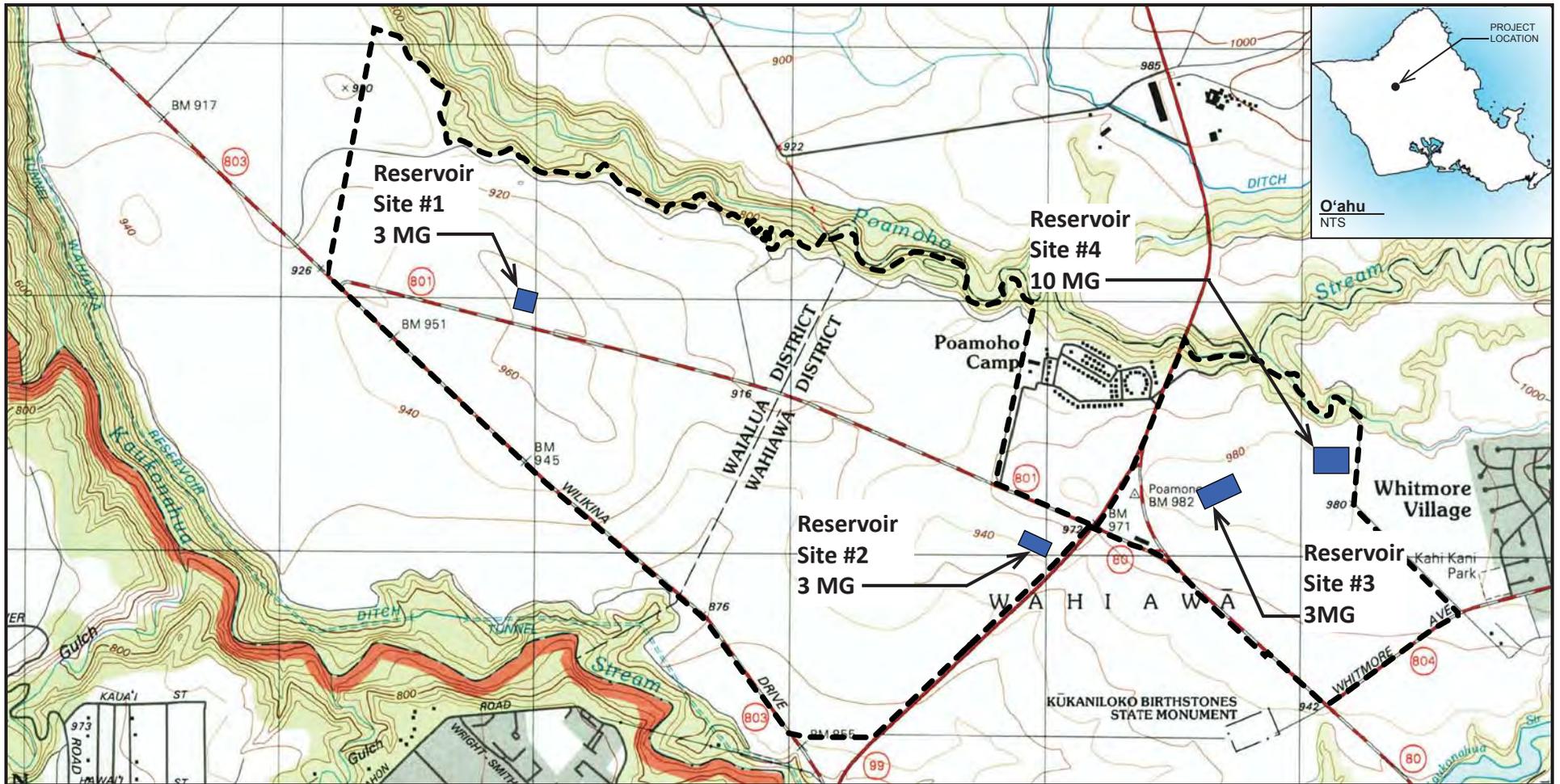
The cost for the proposed ADC reservoirs is estimated at \$1.265 million for the 3.0 MG reservoir and \$3.507 million for the 10.0 MG reservoir. The improvements will be funded by the State of Hawai'i and capital improvement program funding sought during the 2015 legislative session. If funding is approved, construction is projected to commence by November 2015. The ADC will administer and oversee construction of its reservoirs. The cost for the Kalena Farms and Ohana Best Farm 3.1 MG reservoirs is estimated at \$0.5 million each. The cost of improvements will be funded by the respective business entity.

Kalena Farms and Ohana Best Farm are prepared to commence construction after the completion of the environmental assessment process and receiving all necessary construction approvals.

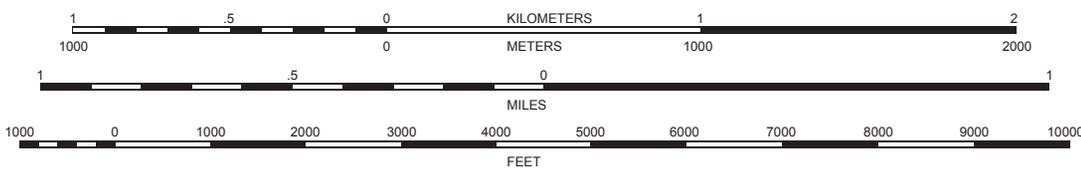
D. Social Characteristics

There are no residential, agricultural, or commercial activities on the three lots that will be displaced by the proposed action. The improvements are proposed on vacant and fallow agricultural fields.

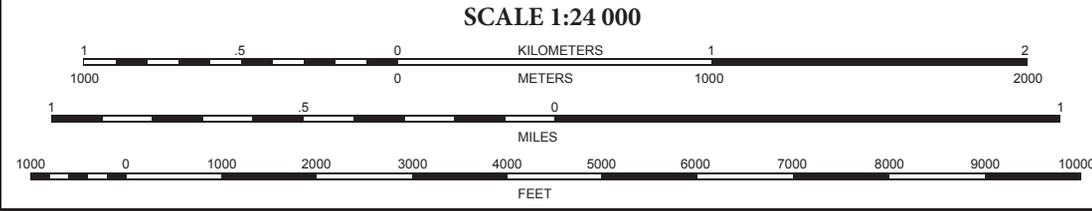
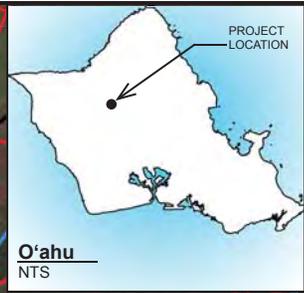
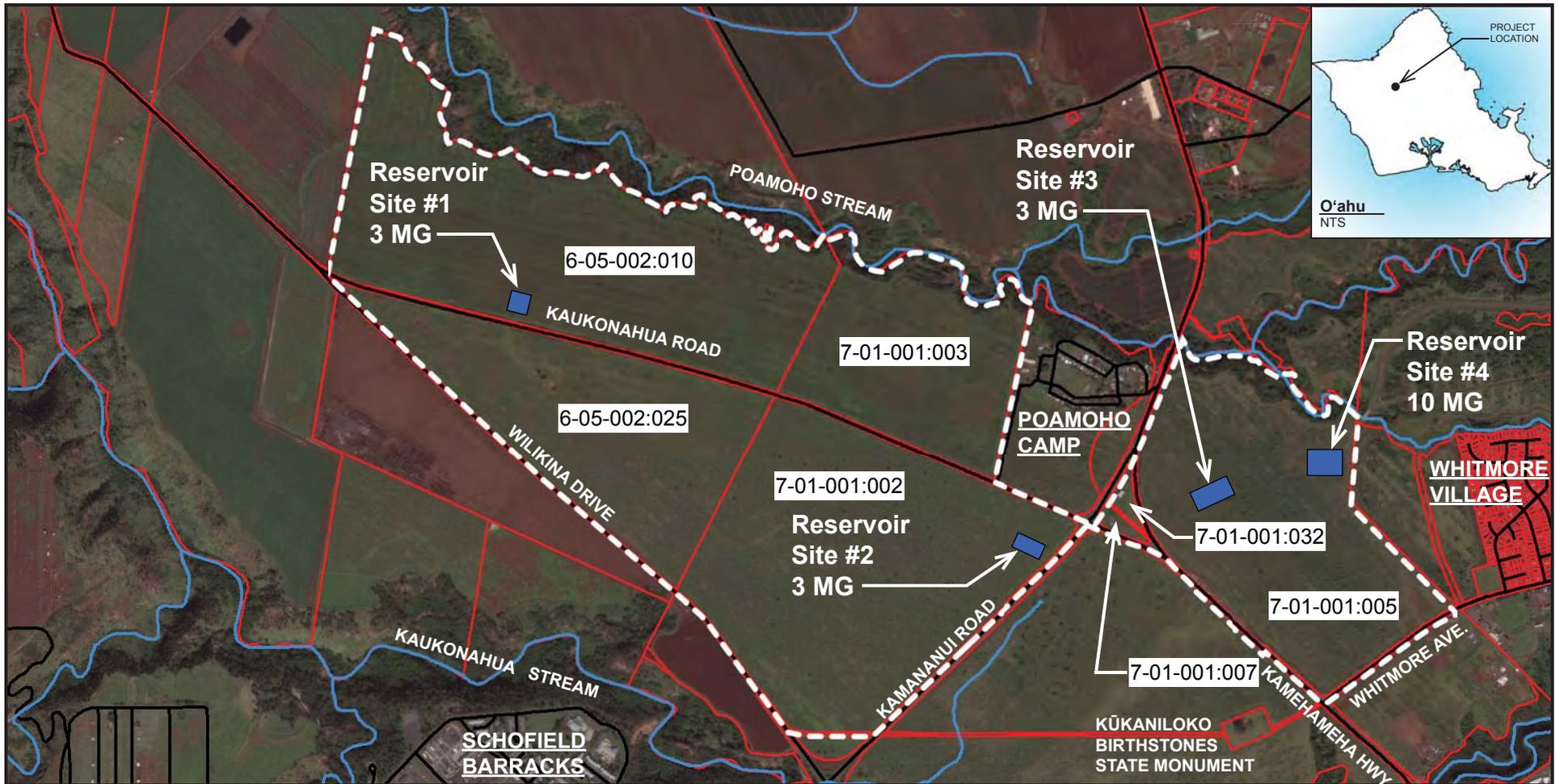
In the long-term, the proposed action is anticipated to attract local farmers and agribusinesses to the area. Water availability and the construction of storage and water infrastructure facilities, an existing improved transportation network, and availability of high-quality productive agricultural land coupled with long-term agricultural leases should foster diverse agricultural activities and help achieve the stated purposes of the proposed action.



SCALE 1:24 000



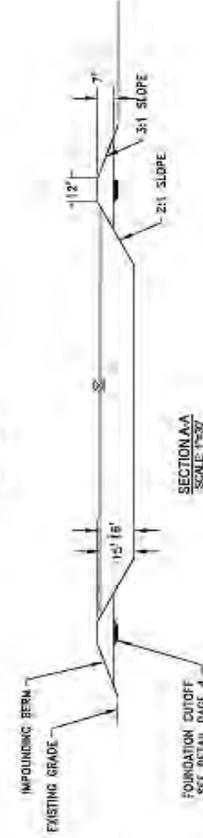
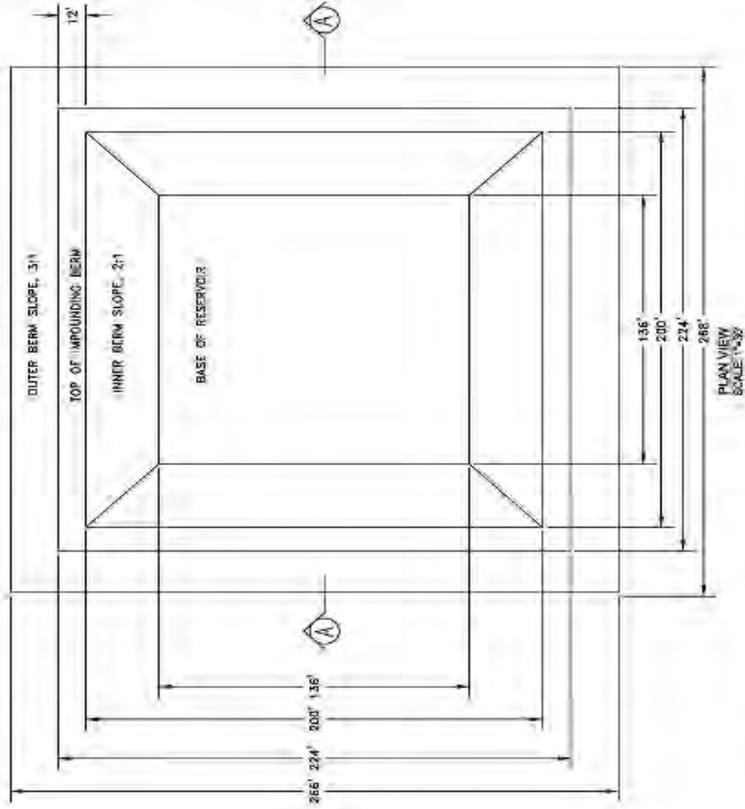
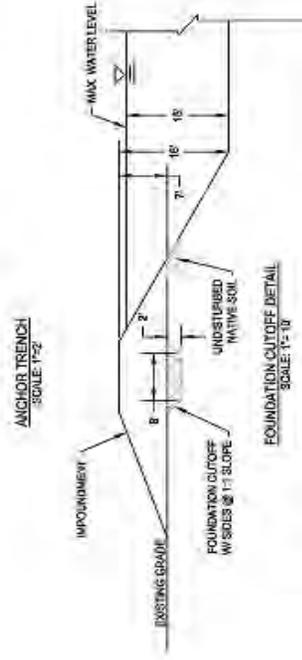
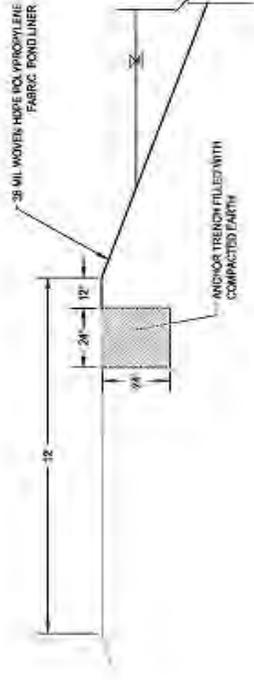
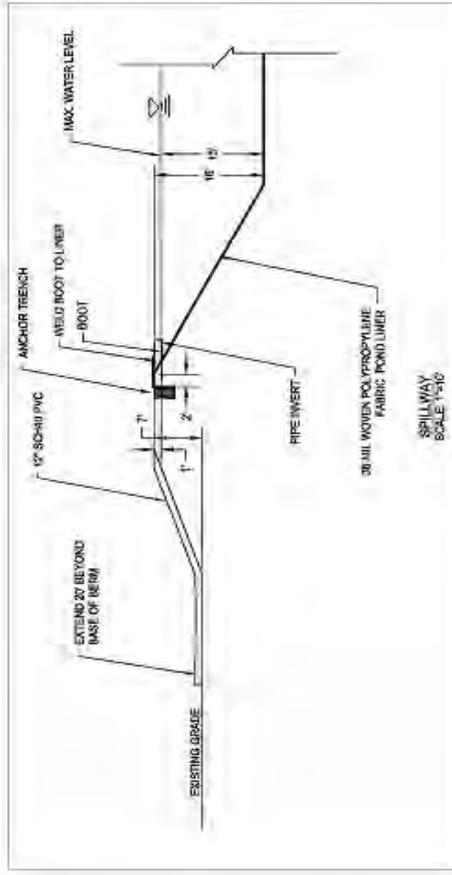
- Overall Project Limits
 - - - Tax Map Key
 - Proposed Reservoir
- Portion of 7.5-minute Series (Topographic) Maps
 United States Department of Interior
 United States Geological Survey
 Haleiwa Quadrangle, City & County of Honolulu, Hawaii*



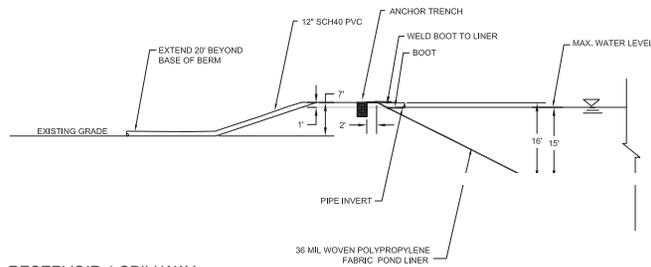
- Overall Project Limits
- Tax Map Key
- Proposed Reservoir

Sources: Esri
State of Hawai'i, Office of Planning

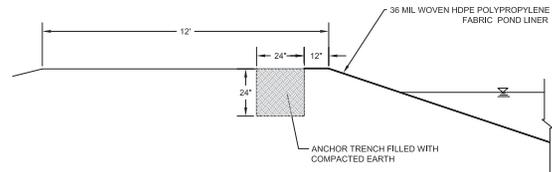
<i>Environmental Planning Solutions, LLC</i>	GALBRAITH ESTATE RESERVOIRS ENVIRONMENTAL ASSESSMENT	2
	TAX MAP WAHIAWĀ, O'AHU, HAWAI'I	



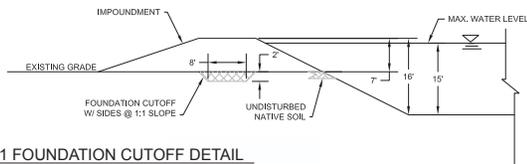
Source: AgTech Pacific



RESERVOIR 1 SPILLWAY
SCALE: 1" = 40'

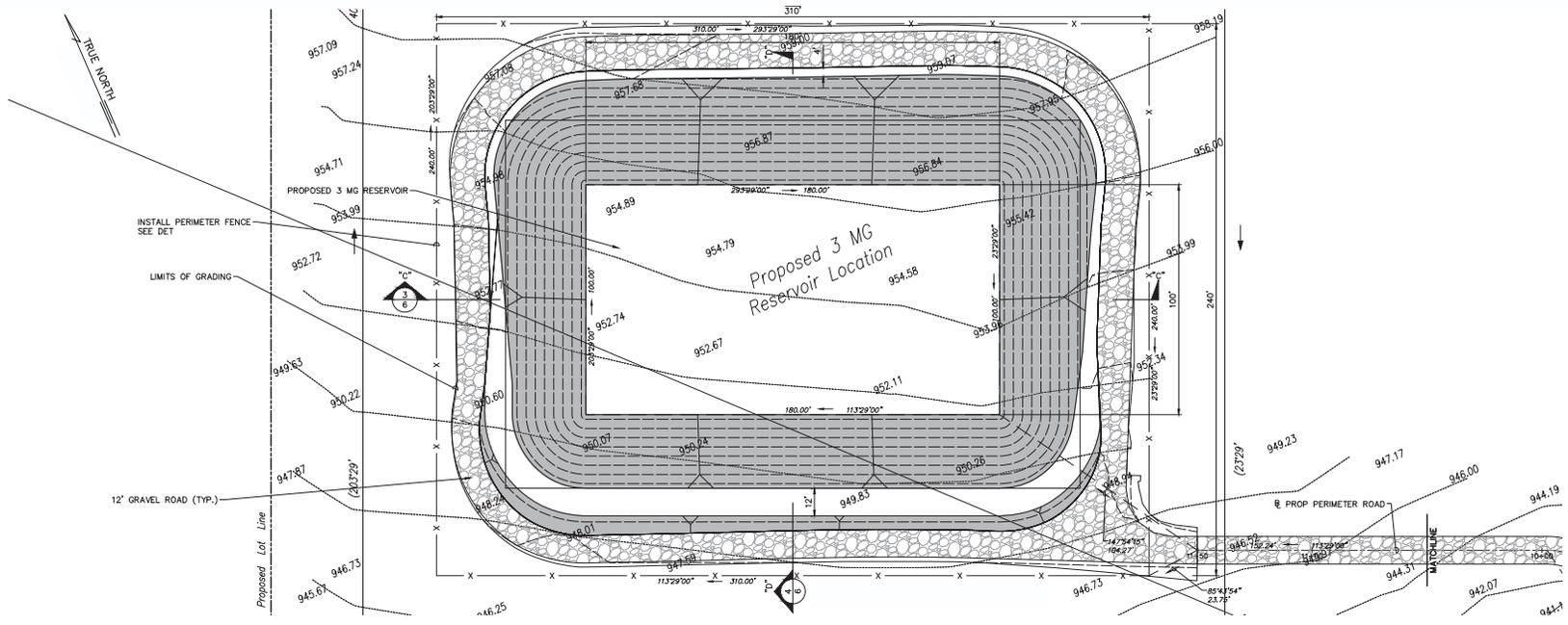


ANCHOR TRENCH
SCALE: 1" = 8'

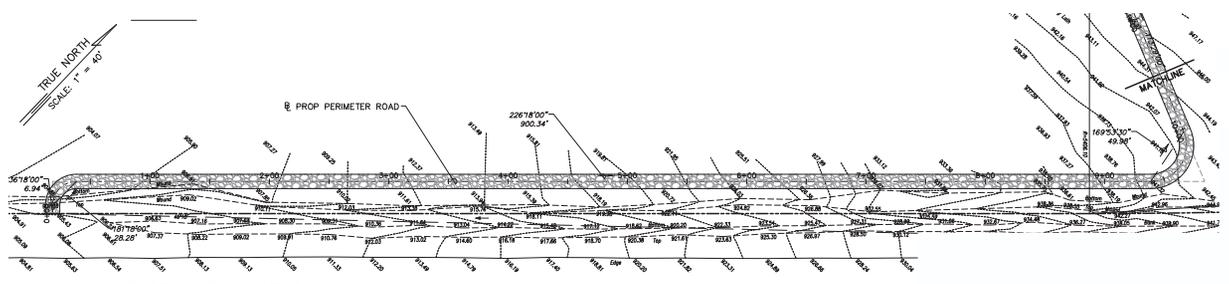


RESERVOIR 1 FOUNDATION CUTOFF DETAIL
SCALE: 1" = 40'

Source: AgTech Pacific



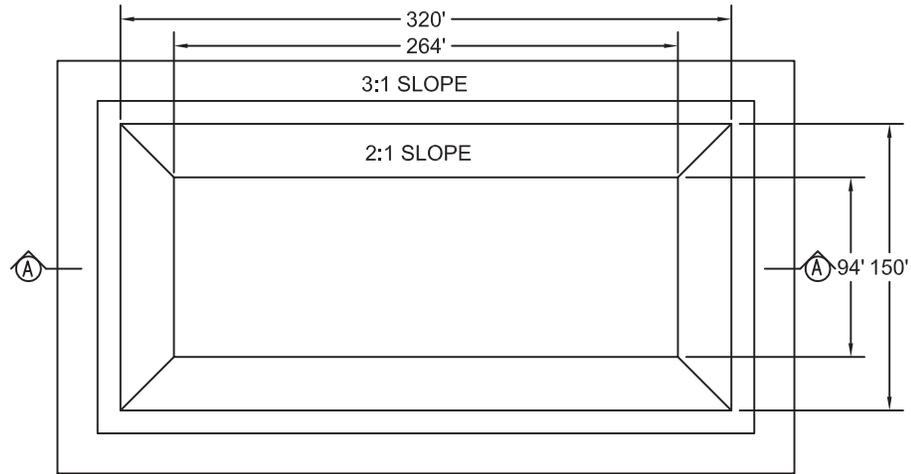
RESERVOIR 2 PLAN VIEW
SCALE: 1" = 80'



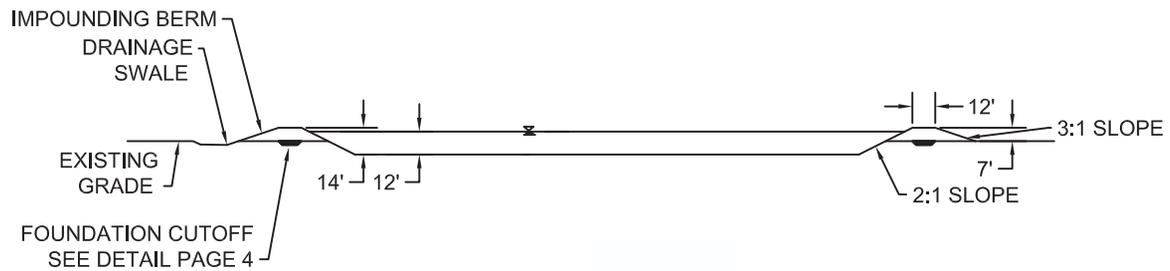
RESERVOIR 2 ACCESS RD PLAN
SCALE: 1" = 160'

KAMANANUI

Source: Akinaka & Associates, Ltd.

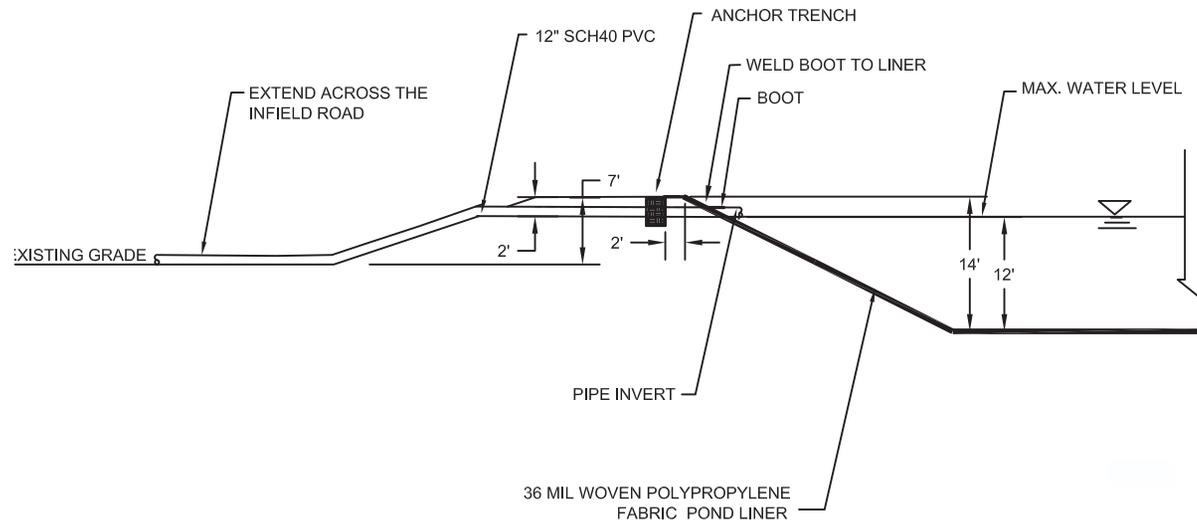


RESERVOIR 3 PLAN VIEW
SCALE: 1" = 100'

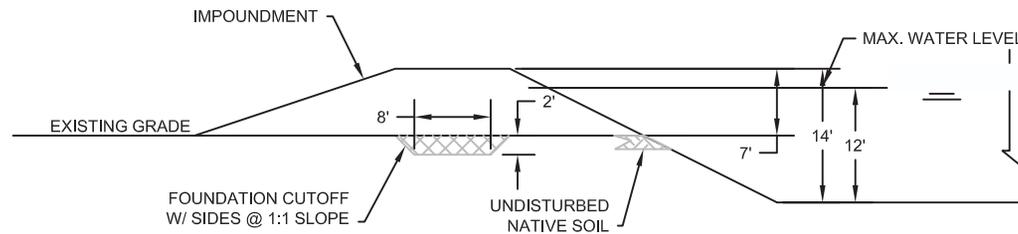


RESERVOIR 3 SECTION A-A
SCALE: 1" = 100'

Source: AgTech Pacific

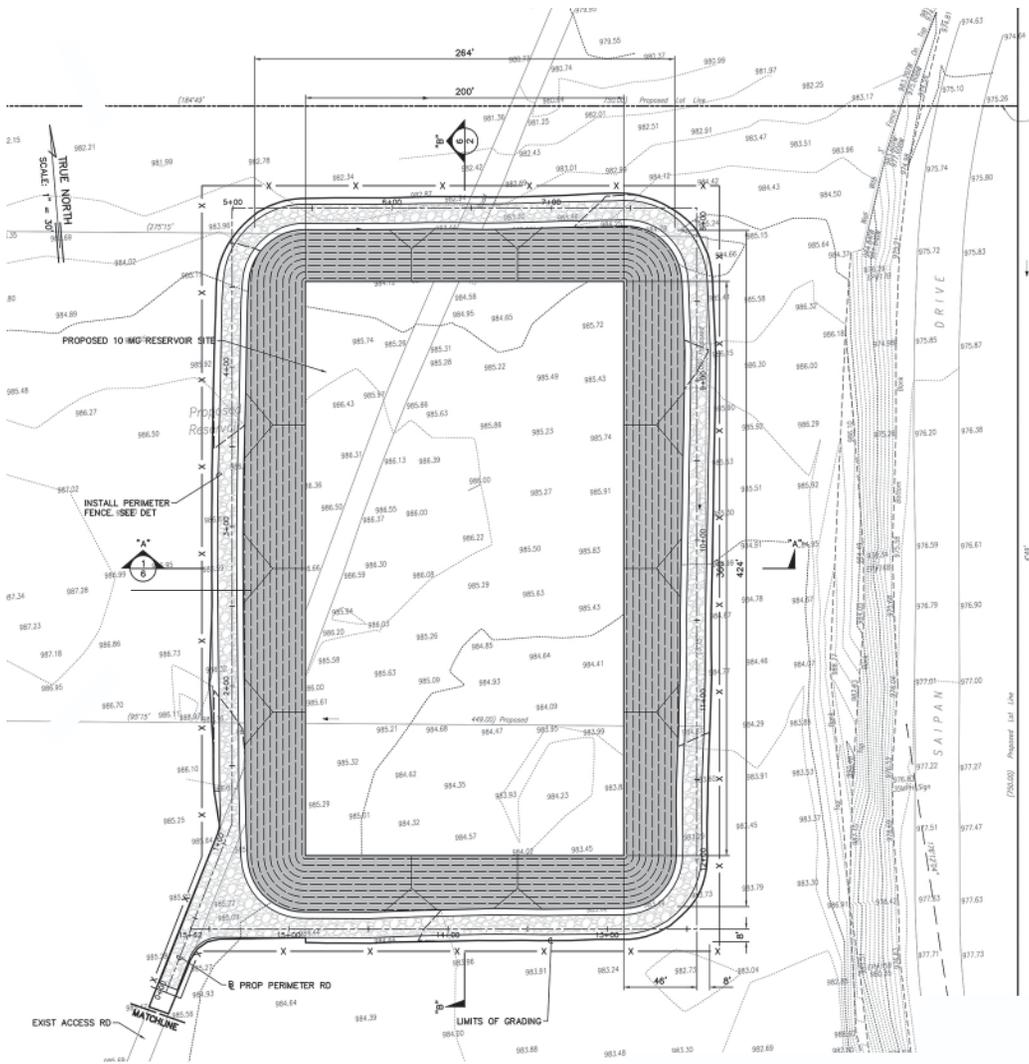


RESERVOIR 3 SPILLWAY
SCALE: 1" = 20'

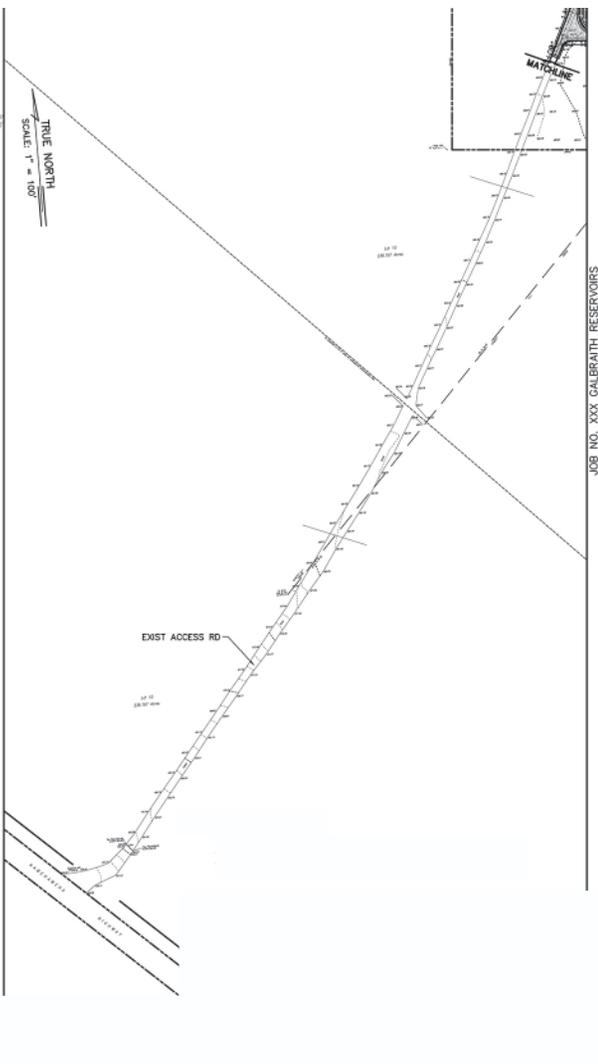


RESERVOIR 3 FOUNDATION CUTOFF DETAIL
SCALE: 1" = 20'

Source: AgTech Pacific

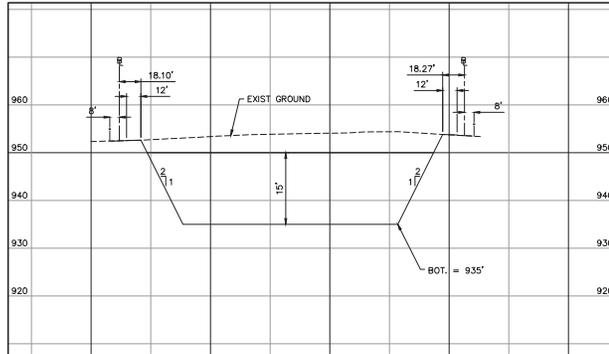


RESERVOIR 4 PLAN VIEW
SCALE: 1" = 120' HORIZONTAL

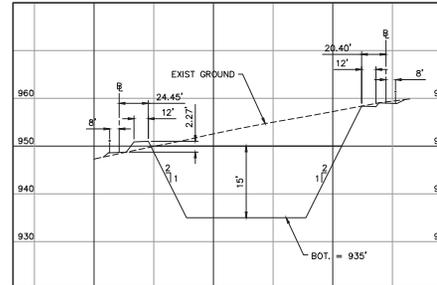


RESERVOIR 4 ACCESS RD PLAN
SCALE: 1" = 400' HORIZONTAL

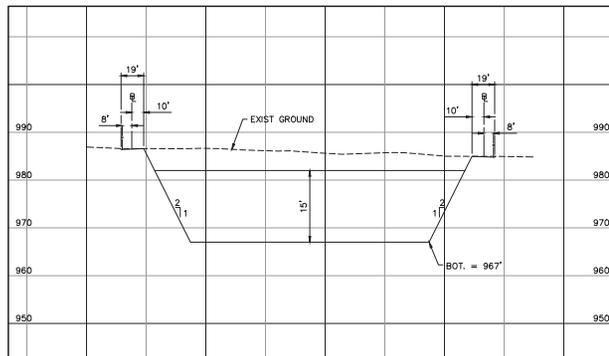
Source: Akinaka & Associates, Ltd.



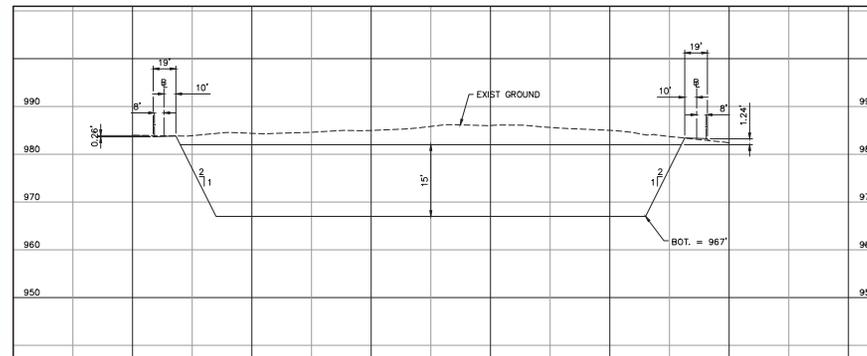
RESERVOIR 2 (3.0 MG) SECTION C-C
 SCALE: 1" = 160' HORIZONTAL
 SCALE: 1" = 40' VERTICAL



RESERVOIR 2 (3.0 MG) SECTION D-D
 SCALE: 1" = 160' HORIZONTAL
 SCALE: 1" = 40' VERTICAL

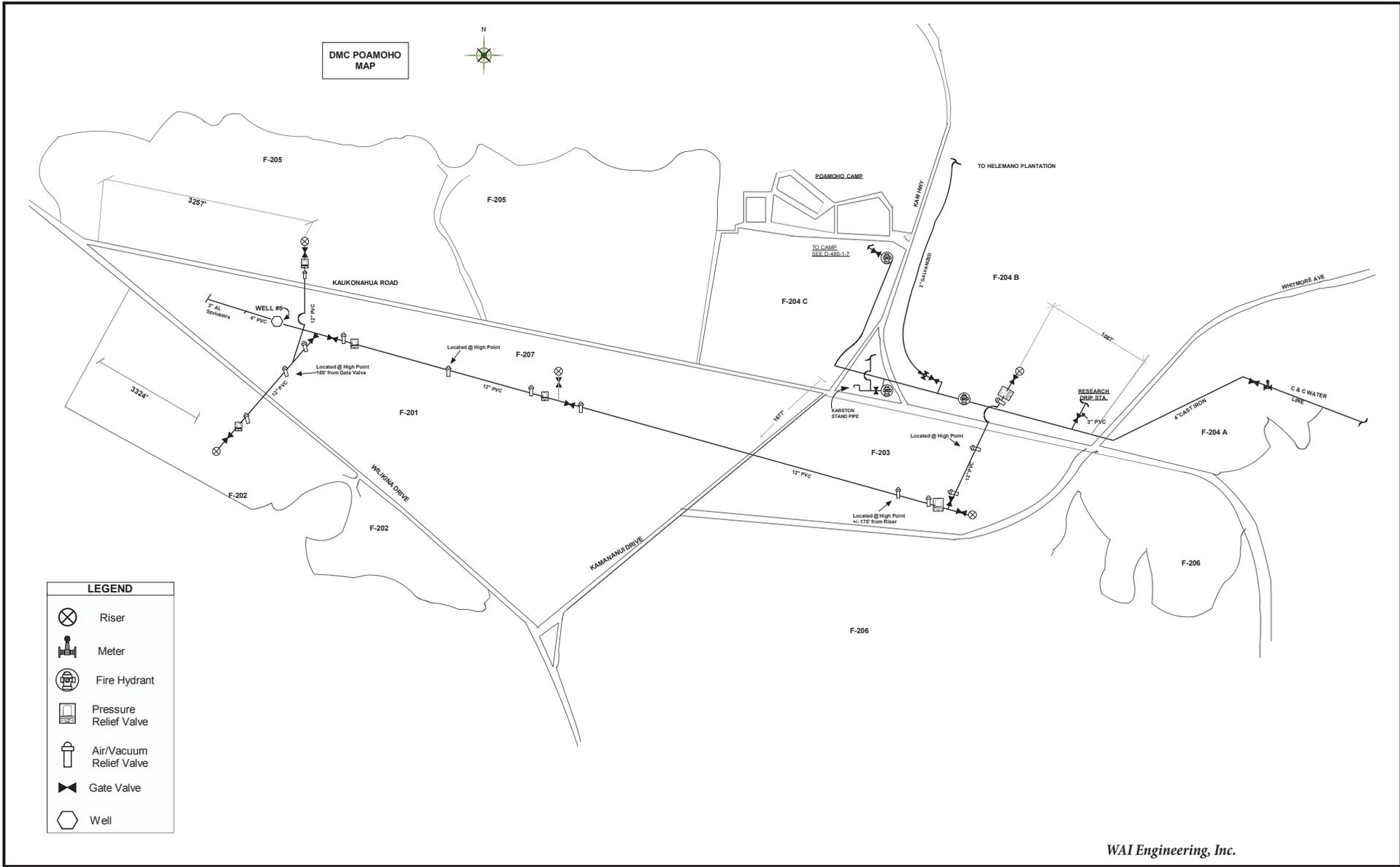


RESERVOIR 4 (10.0 MG) SECTION A-A
 SCALE: 1" = 160' HORIZONTAL
 SCALE: 1" = 40' VERTICAL



RESERVOIR 4 (10.0 MG) SECTION B-B
 SCALE: 1" = 160' HORIZONTAL
 SCALE: 1" = 40' VERTICAL

Source: Akinaka & Associates, Ltd.



A. Existing Uses

Land controlled by ADC is currently fallow and unused for agricultural activities. Since receiving the land, the agency has commenced and currently continues a vegetation control program for its lands. In addition sand and compost have been applied to approximately 880 acres of the 1,200 acres to increase soil *pH*.

Kalena Farms has cleared vegetation and staked the general reservoir boundaries. No other site work or improvements have been initiated.

Ohana Best Farm has commenced limited site improvements as a prelude to its agricultural activities. Overgrown vegetation has been cleared and planting fields preliminarily laid out. Lime, and/or comparable additives is being applied and tilled into the soil to raise pH levels and increase organic matter content (Ohana Best Farm, 2015). The company has located an operations center on the premises to facilitate its ground preparation activities. The center consists of a portable trailer and a covered work area also used for storing / protecting farm equipment from the elements.

The site of Reservoir 3 was partially excavated and remains that way until this environmental assessment is completed. Photograph 1 of Reservoir Site No. 2 adjoining Kamananui Road is typical of conditions at the four reservoir sites.

Areas between cleared lands remain covered with weeds, grasses, and other vegetation. Portions of the south-southeastern boundaries include heavily vegetated embankments that slope steeply down to Kaukonahua Stream Gulch and Wahiawa Reservoir (Lake Wilson). Much of the northern boundary of the project area is comprised of heavily vegetated embankment that slopes steeply down to Poamoho Stream Gulch.

B. Environmental Characteristics

1. Climate

The climate of nearby Wahiawa Town can be characterized as temperate, wet, and cool during the winter months. Annual temperatures average about 80 F with lows in the low 60s during the winter. Temperatures have also dipped into the 50s during winter. Cool conditions are attributable to the high elevation of the town (800 to 1,200 ft asl (above sea level). Rainfall averages 70 inches annually and the wettest months are December and January.

2. Geology

The Island of Oahu covers 597 square miles, and is the third largest island in the Hawaiian chain. The island was formed about 4 million years ago by two volcanoes, Waianae and Ko olau. Wai'anae, the older of the two, created the mountain range on the western side of the island, whereas the Koolau shaped the eastern side. Central Oahu is an elevated plateau bordered by the two mountain ranges with Pearl Harbor to the south. Wahiawa is



Photograph 1. View to the North at Reservoir Site No. 2

located on the Schofield Plateau in Central Oahu, sandwiched between the Waianae and Ko olau Mountain Ranges. Wahiaw District is the only moku that does not stretch from the mountain to the sea, but is landlocked by Waiialua to the north, Ko'olauloa to the east, 'Ewa to the south, and Wai'anae to the west (USGS, Keala Pono, 2014).

Lava flows from the Ko olau volcano formed Ko olau Basalt banked against the already eroded slope of the Waianae volcano to form the gently sloping surfaces of the Schofield Plateau. Lithology formed from pahoehoe and a lava, resulting in an erosional unconformity between the rocks of the two volcanoes which is visible along Kaukonahua Gulch, at the eastern foot of the Waianae Range, where Waianae lavas slope 10 degrees to 15 degrees northeastward and are overlapped by Ko olau lavas dipping 5 degrees northwestward (MacDonald et al., 1983:420).

3. Topography

The project area terrain has been substantially altered from natural conditions to conditions for sustaining former cultivated agriculture fields, roads, water storage reservoirs, and associated infrastructure.

The four reservoir sites are 900+ feet above mean sea level. Variations in elevation above this contour occur at each site. Ground elevation is shown on the Preliminary Site Plans for each reservoir.

4. Soils

According to the U.S. Department of Agriculture Soil Conservation Service (1972), the predominant soil type found throughout the project area is Wahiawa silty clay (mapping units WaA and WaB). This well drained soil is found on uplands on the island of Oahu and is derived from residium and old alluvium from basic igneous rock. In a representative profile, Wahiawa silty clay as a 12-inch thick surface layer of very dusky red and dusky red silty clay. The subsoil is approximately 48 inches thick and consists of dark reddish-brown clay with subangular blocky structure. The underlying material is weathered basic igneous rock. Permeability is moderately rapid and runoff is slow. On areas with 0 to 3 percent slopes the erosion hazard is no more than slight. On areas with 3 to 8 percent slopes the erosion hazard is slight.

Other soil types found in the project area are summarized in Table 3.

Table 3. Other Soil Types

Soil Types		Characteristics		
Name	Mapping Unit	Permeability	Runoff	Erosion Hazard
Kolekole Silty Clay Loam	KuB, KuC, KuD	Moderate	Slow	Slight
Kunia Silty Clay	Kya	Moderate	Slow	No More than Slight
Manana Silty Clay Loam	MoB	Mod. Rapid	Slow	Slight
Helemano Silty Clay	HLMG	Moderate	Med to Rapid	Severe to Very Severe
Fill Land	FL	-	-	-

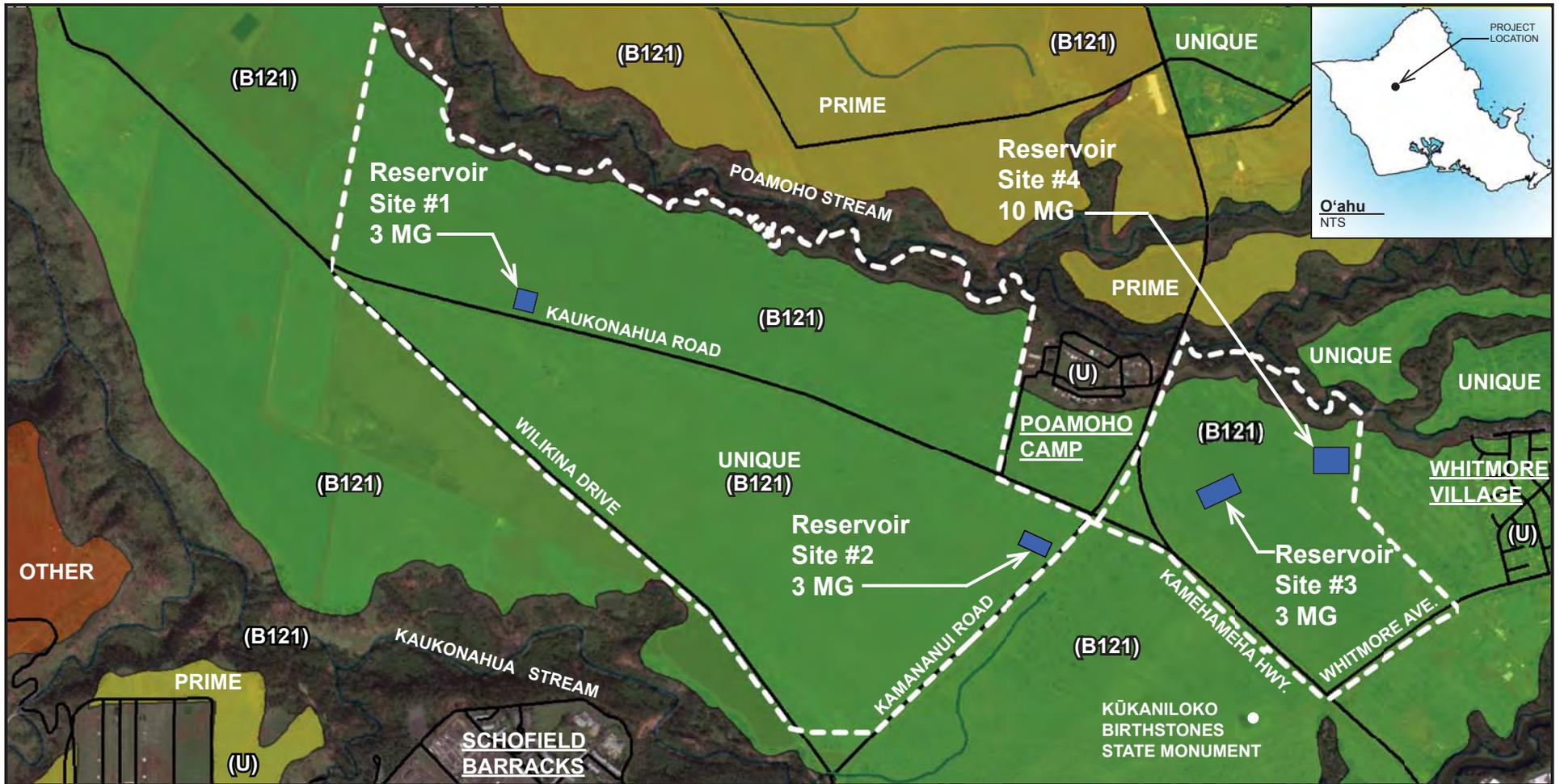
Source: Soil Conservation Service, 1972.

5. Agricultural Suitability

a. Detailed Land Classification

The Detailed Land Classification for Oahu ((Land Study Bureau, 1972) identifies several land types occurring on the subject properties. The land classification scheme assigns an alphanumeric code to all land mapped on the island. A five class productivity rating is applied using the capital letters A, B, C, D, and E to denote Master Productivity Rating with A representing land with highest productivity and E the lowest. The Master Productivity Rating is followed by numerals indicating land type and for some land types the letter “i” referring to crop productivity “under irrigated conditions”. The classification evaluates each land type according to its general productive capacity and not for a specific crop. The letter ‘U’ in the rating system denotes urban areas.

The land types identified for the subject properties include B121, C73, C90, C122, D74, D123, E107, E114, and ‘U’ (See Figure 11). Almost all the agricultural fields within the project area are identified as B121 and considered ‘Good’ productive agricultural land. The eight other land types noted above occur in the gulches bordering or part of the project area and rated fair (C), poor (D), and poorly suited (E) for agricultural uses.



SCALE 1:24 000

1 0.5 0 1 2
1000 0 1000 2000
KILOMETERS

1 0.5 0 1
1000 0 1000 2000
METERS

1 0.5 0 1
1000 0 1000 2000
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

N

Sources: Esri
State of Hawai'i,
Office of Planning

<u>ALISH Designations</u>		<u>Land Study Bureau Classifications</u>	
- - - - -	Overall Project Limits	(A)	Very Good (U) Urban
■	Prime Lands	(B)	Good
■	Unique Lands	(C)	Fair
■	Other Lands	(D)	Poor
■	Proposed Reservoir	(E)	Very Poor

b. Agricultural Lands of Importance to the State of Hawai'i

The Agricultural Lands of Importance to the State of Hawai'i ("ALISH") system consist of the mapped identification of three broad classes of agricultural land. The three classes are, in order of productivity criteria, Prime Agricultural Land, Unique Agricultural Land, and Other Important Agricultural Land. The State Department of Agriculture defines each class as follows:

Prime Agricultural Land is "Land best suited for the production of food, feed, forage, and fiber crops. This class of land has the soil quality, growing season, and moisture supply needed to economically sustain high yields of crops when treated and managed (including water management) according to modern farming methods. Prime agricultural land gives the highest yields with the lowest inputs of energy or money and with the least damage to the environment (Department of Agriculture, 1977)".

Unique Agricultural Land is "Land that has the special combination of soil quality, location, growing season, moisture supply, and is used to produce sustained high quality and or high yields of a specific crop when treated and managed according to modern farming methods".

Other Important Agricultural Land is "Land" other than Prime or Unique Agricultural Land that is also of state wide or local importance for agricultural use".

The ALISH map for this section of the island designates the ADC land "Unique Agricultural Land" (See Figure 11).

c. Important Agricultural Lands

The City and County of Honolulu completed the first of two steps in identifying Important Agricultural Lands ("IAL") for O'ahu in early 2014. The IAL study posits two important qualifications: it included privately owned and county owned land in the State Agricultural District but excluded certain agricultural lands per Chapter 205, HRS. Lands excluded from consideration met at least one of the following conditions (HHF, 2014):

- Land in the State Urban or State Conservation Land Use Districts
- Land owned by the Federal government
- Land owned by the State government (including land owned by DHHL)
- Land already designated as IAL, or
- Land designated by county land use plans or zoning for urban use

Land owned by the State of Hawai'i was thus excluded from IAL consideration by the County. The State Department of Agriculture and Department of Land and Natural Resources are charged with identifying State-owned lands that should be designated IAL and preparing maps delineating those lands (HHF, 2014). To date, the named agencies have not been able to comply with this charge.

Similar to the City and County of Honolulu IAL exclusions, the State need not consider State-owned land such as roads and land held by certain agencies to include the Agribusiness Development Corporation. In short, public land comprising the project area is statutorily excluded from IAL consideration (Chapter 171-2, HRS).

6. Drainage

Storm water runoff from the reservoir sites sheet flows from high to low elevations following the grade of the respective sites. In general, runoff from Reservoir Site No. 1 flows in the direction of Kuakonahua Road, Reservoir Site No. 2 in the direction of Kamananui Road, and Reservoir Sites No. 3 and No. 4 in the direction of Poamoho Gulch to the north and Kamehameha Highway to the south. Earth berms around each of the properties on which the reservoirs are to be located help retain surface flow to the respective property.

7. Flood Hazards

The Flood Insurance Rate Map (“FIRM”) for this section of Oahu places the subject properties in Flood Zone “D” which is defined as “unstudied areas where flood hazards are undetermined, but flooding is possible . . .” (Federal Emergency Management Agency, 2014). In its review of the Draft Environmental Assessment, the Engineering Division, Department of Land and Natural Resources, confirmed the FIRM designation of “D” for the project area (Memorandum, C. Chang, July 2, 2015).

The FIRM for the project area is shown in Figure 12.

8. Natural Hazards

a. Earthquake

Seismic hazards are those related to ground shaking. Landslides, ground cracks, rockfalls, tsunami - these are all seismic hazards. Generally, though, we think more in terms of damage to our structures and possessions. <http://hvo.wr.usgs.gov/earthquakes/hazards/>.

In Hawai‘i, earthquakes are generally linked to volcanic activity and occur thousands of times annually; the vast majority of which are at a very small magnitude. Significant earthquakes have recently originated on the Island of Hawai‘i; the most notable of which occurred at a magnitude of 4.9 on August 11, 2012 (USGS, 2013). According to the USGS map of Hawai‘i Seismic Zone Assignments established in 1997, O‘ahu lies in a seismic zone designated as Zone 2A; in which the zoning ranges from 0 (no chance of severe ground shaking) to 4 (10 percent chance of severe shaking in a 50-year interval) (USGS, 2001).

b. Volcanism

The Hawaiian Islands were created by a chain of volcanoes extending from Kauai/Niihau to the northwest to the island of Hawaii on the southeast. Although volcanoes on Ni‘ihau, Kaua‘i, O‘ahu, Maui, Moloka‘i, and L na‘i are dormant, volcanism is still an on-going event on the island of Hawai‘i (and its offshore ocean water to the southeast). Built by five volcanoes --- Mahukona, Kohala, Hualalai, Mauna Kea, and Mauna Loa --- the island continues to expand

in size as a result of lava flows from Kilauea Crater, the most active volcano on Earth, flowing into the ocean on the eastern side of the island.

There is no active volcano on the island of O'ahu.

c. Tsunami

A tsunami is a series of very long waves triggered by a disturbance at the sea floor that displaces water --- usually an earthquake (or a rise or fall of a section of the earth's crust under or near the sea floor) but sometimes a landslide or a volcanic eruption. The rise and fall in sea level is the initial formation of a tsunami wave (U.H. Hilo Department of Geography, 1998).

Tsunami generated waves also refers to a series of waves travelling across the ocean. When these waves approach shore, the speed of the wave decreases as they begin to "feel" the bottom and the height of the wave increases. When the waves strike shore, it can inundate low-lying coastal areas resulting in mass destruction and in many instances loss of life (<http://www.tsunami.org/faq.html>).

The project area is located approximately 5.3 miles from the ocean at Kaiaka and Waialua Bays between Waialua and Hale'iwa Towns on the North Shore. The subject properties are not designated a tsunami evacuation area (Department of Planning and Permitting, 2014).

d. Hurricane

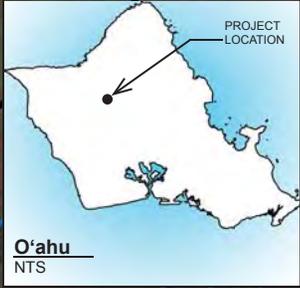
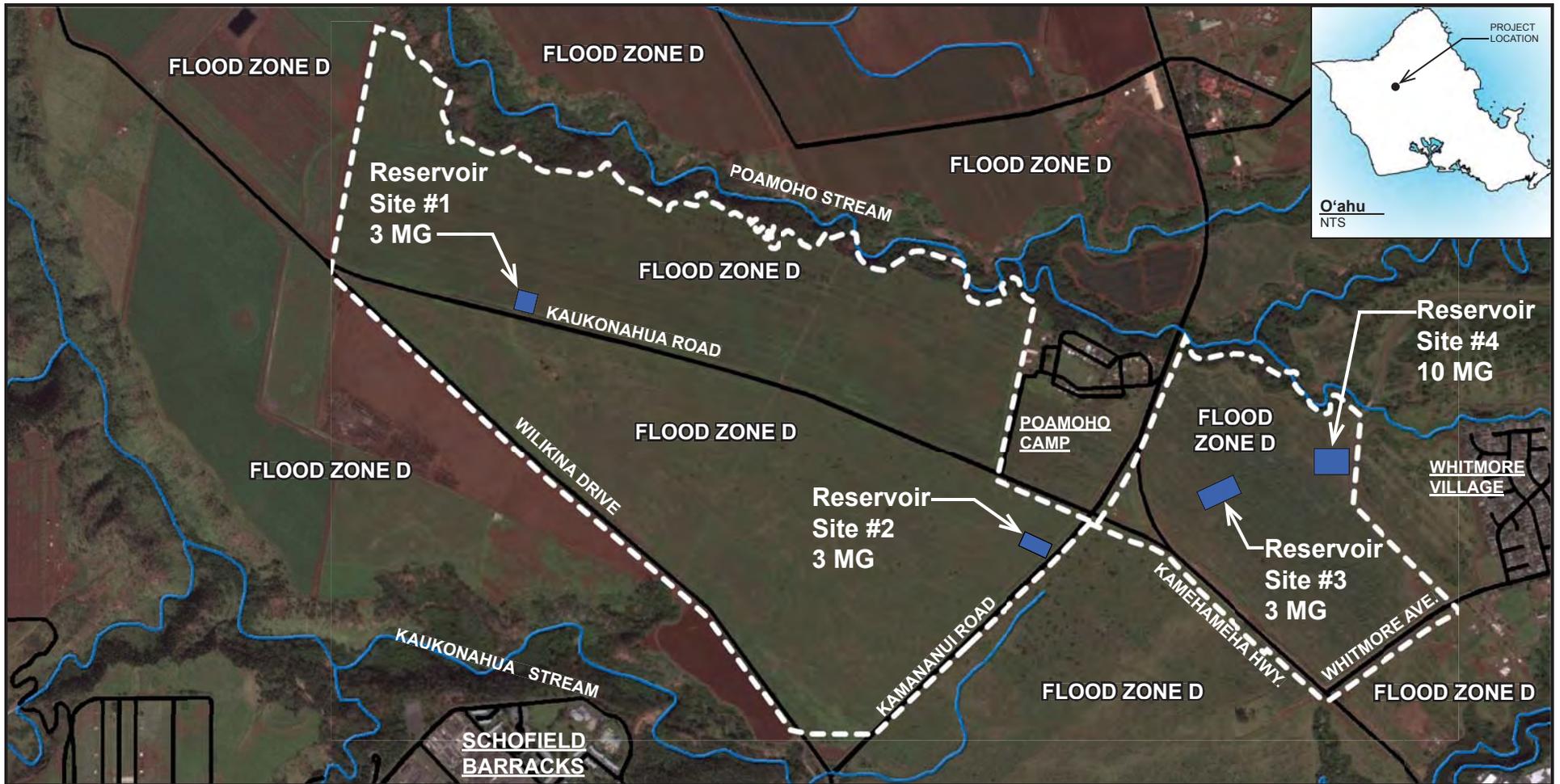
Hurricane season in Hawaii runs from June 1 through November 30 annually. Tropical storms and hurricanes historically form in the East Pacific Ocean and travel west to the Central Pacific Ocean where the Hawaiian Islands are located. In general hurricanes impact Hawaii with a combination of strong winds, torrential rains, and elevated tides and large waves on coastal and inland areas. Torrential rains can cause streams to top their banks and flood adjoining and downstream lands.

9. Water Resources

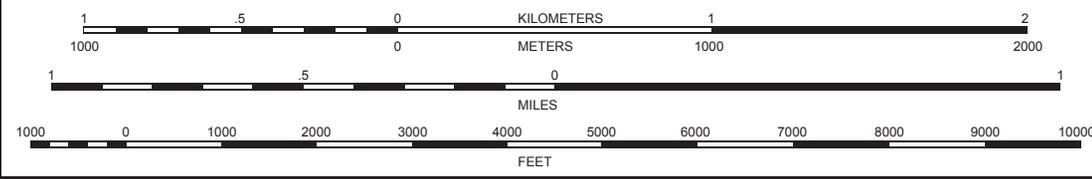
a. Surface Water

There are no surface water features on the three reservoir lots.

Poamoho Stream and Kaukonahua Stream flow in steep-sloped gulches on the north and south, respectively, beyond the property boundaries of the reservoir site lots. Reservoir Site Nos. 1, 3 and 4 are approximately 2,100 lineal feet and Reservoir Site No. 2 about 4,000 lineal feet from Poamoho Stream. Reservoir Site Nos. 1 and 2 are approximately 4,500 lineal feet to the north of Kaukonahua Stream.



SCALE 1:24 000



- Overall Project Limits
- Road
- Stream
- Proposed Reservoir

Sources: Esri
State of Hawai'i, Office of Planning

<i>Environmental Planning Solutions, LLC</i>	GALBRAITH ESTATE RESERVOIRS ENVIRONMENTAL ASSESSMENT	12
	FLOOD INSURANCE RATE MAP WAHIAWĀ, O'AHU, HAWAI'I	

A man-made water storage reservoir called Wahiawa Reservoir or Lake Wilson surrounds Wahiawa Town. The 3 billion gallon reservoir was built in 1905 by the Wahiawa Water Company for irrigation purposes and is owned by the Wahiawa Water Company and the George Galbraith Trust (Kim and Park, 1999). The reservoir is fed by the North and South Forks of Kaukonahua Stream. The North Fork is nearest to but outside the reservoir site lots.

Lake Wilson is popular for freshwater sport fishing, recreational boating, and aesthetic enjoyment. The lake is designated the Wahiaw Public Fishing Area and is the largest freshwater impoundment and freshwater sport fishery in the state (DLNR, No Date). Poamoho Stream flows in a gulch on the west side of Whitmore Village. The stream and gulch are outside the reservoir site areas.

Located on the South Fork of Kaukonahua Stream, Wahiaw Freshwater State Park provides permanent boat launching facilities, vehicle-trailer parking, a comfort station, and areas for passive recreation. Both the public fishing area and freshwater park are administered by the Department of Land and Natural Resources, State of Hawai'i.

b. Ground Water

Wahiawa Town overlies the Wahiawa aquifer of the Central Sector (Mink and Lau, 1990). The Wahiawa aquifer is characterized by a high level (fresh water not in contact with seawater) unconfined sedimentary aquifer found in dike compartments. The aquifer is currently used for drinking and rated ecologically important. Salinity is low (<250-1,000 mg/l Cl-) and the aquifer is considered irreplaceable and highly vulnerable to contamination (See Table 4).

The estimated sustainable yield of the Wahiawa aquifer is 23 million gallons per day (Wilson Okamoto Corporation, 2008, Commission on Water Resource Management, 2014). All aquifer sectors on the island of O'ahu with the exception of the Wai'anae sector are designated Ground Water Management Areas (Ibid, 2007). The ADC land is located within the Wahiawa Ground Water Management Area.

Table 4. Aquifer Classification System

Aquifer Code	30501212
Island Code	3 - Oahu
Aquifer Sector	05 - Central
Aquifer System	01 - Wahiawa
Aquifer Type, Hydrogeology	2 - High Level
Aquifer Condition	1 - Unconfined
Aquifer Type, Geology	2 - Dike
Status Code	11111
Developmental Stage	1 - Currently Used
Utility	1 - Drinking
Salinity (in mg/l Cl-)	1 - Fresh (<250)
Uniqueness	1 - Irreplaceable
Vulnerability to Contamination	1 - High

Source: Mink and Lau, 1990.

The State of Hawai'i owns a well located about 0,5 miles from the intersection of Wilikina Drive and Kaukonahua Road on the west end of the project area (formerly Del Monte Pump 5 Well). The Commission on Water Resource Management approved the transfer of Ground Water Use Permit for the well (GWUP No. 976) to ADC in April 2014 (CWRM, 2014). The approved permit is for 2.0 million gallons per day.

The Honolulu Board of Water Supply has no potable water wells in the project area.

10. Biological Resources

SWCA Environmental Consultants (2014) conducted a biological resources assessment in support of the environmental assessment prepared for this project. The assessment comprised a survey of flora, avifauna, mammals, reptiles and amphibians, and invertebrates. Excerpts from the biological resources assessment are presented in the paragraphs below. The complete report is attached as Technical Report A.

a. Flora

No state or federally listed endangered, threatened, or candidate plant species, or rare native Hawaiian plant species were observed in the project area. In all, 39 plant species were recorded in the project area during the survey. Of these, only one—'uhaloa (*Waltheria indica*)—is native to the Hawaiian Islands. This indigenous species is common in disturbed areas throughout the archipelago (Wagner et al. 1999). Appendix A provides a list of all plant species observed by SWCA biologists in the project area during the survey.

Reservoir Site #1

Reservoir Site #1 has the lowest plant diversity compared to the other sites. The predominant species is Guinea grass (*Urochloa maxima*) less than 3 feet (0.9 m) tall (Figure 3). Morning glory (*Ipomoea obscura*), castor bean (*Ricinus communis*), *Neonotonia wightii*, and Spanish needle (*Bidens alba*) are widely scattered throughout this site.

Reservoir Site #2

This reservoir site is also dominated by Guinea grass (Figure 4); however, more plant species were seen here, as compared to the other sites. K nehe (*Bidens pilosa*), sourgrass (*Digitaria insularis*), and morning glory are common throughout the site, and wild bean (*Macroptilium lathyroides*) is locally abundant within the northern portion. Other herbaceous species that are scattered sparsely throughout the area or occurring in a few small patches include Natal redtop (*Melinis repens*), Spanish needle, fuzzy rattlepod (*Crotalaria incana*), hairy horseweed (*Conyza bonariensis*), and *Neonotonia wightii*. Tree seedlings that are present but uncommon at the site include African tulip tree (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), and guava (*Psidium guajava*).

Reservoir Site #3

A lack of vegetation and presence of berms indicate this site had been recently cleared (Figure 5). Morning glory and Spanish needle are the most common species. Other scattered species include Guinea grass, sourgrass, pua nana honua (*Solanum mauritianum*), and narrow-leaved plantain (*Plantago lanceolata*).

Reservoir Site #4

This site is dominated by Guinea grass (Figure 6). Hairypod cowpea (*Vigna luteola*) and morning glory are also common. Several small shrubs and tree seedlings are scattered sparsely throughout the area including fiddlewood (*Citharexylum caudatum*), Christmas berry, pua n n honua, African tulip tree, and guava. Sourgrass and 'uhaloa are present but uncommon.

b. Avifauna

The bird species observed in the project area are those typically found in disturbed, lowland areas of Oahu. In all, 17 species were documented (Table 1). One species of migrant shorebird—the Pacific golden-plover (*Pluvialis fulva*)—was seen foraging at all sites except Site #2. All other bird species observed are introduced species common to developed areas.

No federally or state listed Hawaiian waterbirds, or suitable nesting or foraging habitat, were documented within the project area or immediate vicinity during the survey. However, the four reservoir sites could create standing water habitat for four endangered waterbird species: the Hawaiian coot or alae ke oke o (*Fulica alai*), Hawaiian gallinule or alae ula (*Gallinula sandvicensis*), Hawaiian stilt or ae o (*Himantopus mexicanus knudseni*), and Hawaiian duck or koloa maoli (*Anas wyvilliana*). See also US Fish and Wildlife Service pre-assessment comment (2014).

Habitat types used by the Hawaiian duck include natural and human-made lowland wetlands, flooded grasslands, river valleys, mountain streams, montane pools, forest swamplands, aquaculture ponds, and agricultural areas (Engilis et al. 2002; Hawaii Audubon Society 2005; USFWS 2011). The Hawaiian duck is the least likely to be attracted to the site given pure Hawaiian ducks are not considered common on O'ahu (USFWS 2011), and are more likely to use stream sites.

Hawaiian coots prefer freshwater ponds or wetlands, brackish wetlands, and human-made impoundments. They forage in water less than 12 inches (30 centimeters [cm]) deep, and nest in open water with emergent aquatic vegetation or heavy stands of grass (Brisbin et al. 2002; Schwartz and Schwartz 1949; USFWS 2011). Hawaiian coots may use the reservoirs for foraging and loafing, and grassy reservoir berms may also be used by this species (if present) for foraging and loafing. Emergent vegetation, or vegetation growing along the reservoir berms, may provide nesting habitat for Hawaiian coots.

Hawaiian gallinules favor freshwater areas with dense stands of emergent vegetation near open water, slightly emergent vegetation mats, and water depths of less than 3.3 feet (1 m). They nest on open ground, wet meadows, and on banks of waterways, and in emergent vegetation over water. Their nesting areas typically have standing water less than 24 inches (60 cm) deep (Bannor and Kiviat 2002; USFWS 2011). Hawaiian gallinules may only be attracted to reservoirs if sufficient vegetation is present.

Hawaiian stilt could also be present in any areas with shallow water. Hawaiian stilts mostly use open wetland habitats with minimal vegetative cover and water depths of less than 9.4 inches (24 cm), as well as tidal mudflats (Robinson et al. 1999). Hawaiian stilts are highly

mobile and may be attracted to the reservoirs if shallow water is present, particularly if the reservoir berms provide a gently sloping gradient.

Most Hawaiian waterbirds nest in areas in which the birds are offered some measure of protection from predators. Although predation would be an indirect effect, and the waterbirds would be exposed to the same types of predation risk at any of their current nesting sites, it may negatively affect the population if individual pairs do nest in areas where they may be exposed to higher levels of predation and, thus, lead to lower reproductive and survival rates.

The endangered Hawaiian goose or nene (*Branta sandvicensis*) could also occasionally be attracted to the reservoirs. Nene have recently been recorded traversing between the Mililani Agricultural Park and golf course and the Kahuku/North Shore area (although in small numbers). The nene is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands, with negligible dependence on freshwater habitat. Nene use various habitat types including beach strand, shrubland, grasslands to lava rock (Banko 1988; Banko et al. 1999). For nesting, they require adequate shrub cover. Although water is not necessary for nesting, it may be used if available (USFWS 2004). Hydroseeding can attract nene to feed.

Hawaiian hoary bats are known to occur on O'ahu in native, non-native, agricultural, and developed landscapes (U.S. Department of Agriculture 2009; U.S. Fish and Wildlife Service [USFWS] 1998). No large trees were observed during the survey, although small tree seedlings were seen. Given current site conditions, the chances of adversely affecting Hawaiian hoary bats as a result of the proposed project are likely small; however, the creation of water features known to be used for foraging, as well as the potential for trees to grow at the site prior to construction, will increase the potential for Hawaiian hoary bats to be present or fly through the area. If trees are to be cut as a result of the project, direct impacts to bats would occur only if a juvenile bat that is too small to fly, but too large to be carried by a parent were present in a tree that was cut down.

c. Mammals

No mammals were seen during the survey; however, dogs (*Canis familiaris*) and cats (*Felis catus*) are likely to enter the project area from nearby residences. Other mammals that can be expected on site include mice (*Mus musculus*), rats (*Rattus* spp.), and mongoose (*Herpestes javanicus*).

d, Reptiles and Amphibians

No reptiles or amphibians were seen during the survey. None of the terrestrial reptiles or amphibians in Hawai'i are native to the islands.

e. Invertebrates

Four introduced insect taxa were observed during the survey: the gulf fritillary (*Agraulis vanillae*), the honey bee (*Apis mellifera*), hoverflies (Family: Syrphidae), and ladybugs (Family: Coccinellidae). An unknown dragonfly species was also observed.

11. Archaeological Resources

Keala Pono Archaeological Consulting, LLC (2014) conducted an archaeological assessment survey of the four reservoir sites (See Technical Report B). The assessment included a literature search, pedestrian survey of the reservoir sites (~30.8 acres), and eight test excavations (2 per reservoir site). Their findings are summarized below:

- No pre-or post-contact surface architecture work was found during pedestrian survey of the project areas. All areas were found to be disturbed by pineapple cultivation. Likewise, subsurface testing did not yield any evidence of subsurface cultural features or deposits. Stratigraphy consists of the pineapple cultivation layers speckled with black plastic fragments, with a sterile layer below.
- Evidence of more recent disturbance was noted at Reservoir 3, as the entire area had been bulldozed. An assemblage of historic material was collected from the surface and in backdirt piles, in secondary context. These consisted of 85 items of ceramic and glass that may be trash from pineapple or sugarcane field workers. Items within the collection may date to as early as 1868 or as late as 1930.

The ceramics were roughly evenly split between Euro-American and Asian. Of the Asian ceramics, most were Japanese in origin. The majority of glass consisted of soda bottles, with more than half these from the Waialua Soda Works.

The report also summarized previous archaeological work in the area, pre- and post-contact settlement and land use patterns, and archaeological resources in the Wahiawa area and Town. A summary description of archaeological resources in the area is presented below.

- The most notable feature near the project area is Kukaniloko, or the Birthing Stones, one of the most sacred sites on Oahu. Kukaniloko is comprised of a number of stones associated with royal births, and a birth there legitimized a chief's high ranking right to be a leader (Yent 1999).

Identified by McAllister (1933:134-137) as Site 218, the .5 acre (2-ha) Kukaniloko site was placed on the National Register of Historic Places in 1972. In 1994, it was listed on the Hawai'i Register of Historic Places and the size of the official site was increased to 5 acres (2 ha).

A description of Kukaniloko is found in the archaeological assessment, pages 18-19,

- Ho'olonopahu, McAllister's Site 219 (1933:37) was a *kapu* place for rituals but did not necessarily have a permanent structure. The temporary structure on the sacred site, believed to have been approximately 400 meters northwest of Kukaniloko, was probably constructed of wood in of the *mākāēi*, a supernatural tree of Moloka'i. It is said that the sacred drums O'puku and Hawea were kept there (McAllister 1933:37). These sacred drums were sounded to announce an *al'ii* birth at Ku kaniloko. What remained of the site was presumed destroyed by the 1920s when the land was used for pineapple (Yent 1999:18-23).
- The Wahiawa Healing Stones, several rocks with healing properties, are reported to have been moved several times in fairly recent history. Two stones are now located in a

Japanese crypt-like shelter near a Hindu structure, worshipped by some as a manifestation of Shiva, at a suburban housing development that was built over the former cemetery at 108 California Street [Avenue]. The larger stone is Pohaku Ho'ola Kino or Keanianileihua, while the name of the smaller rock is not known (James 2010:115-116).

- Helemano Trail (connected to the Wahiawa-Pupukea Trail, later called Drum Road) was a traditional thoroughfare near the project area. Not much of the earlier history of the trail is known before the military extended and developed the road in the 1930s, which involved reconstructing old trails and creating new paths (Cultural Resources Section Staff 2012).
- The Chinese cemetery of Wahiawa, a historic-era site, was originally located at 130 California Avenue, next to Ka'ala School (south of the project area). The site was reported to have been used for the burial of Dole company employees, with the last burial done in 1947. In 1972, all marked and unmarked burials were disinterred and relocated to Mililani Memorial Park (Char and Char 1988:163-164).

a. Mahele Land Tenure

THE MAHELE is rightfully considered one of the most significant chapters in the modern history of Hawai'i. Several legislative acts during the period 1845–1855 codified a sweeping transformation from the centuries-old Hawaiian traditions of royal land tenure to the western practice of private land ownership. (Moffat and Fitzpatrick 1995).

The change in the traditional land tenure system in Hawai'i began with the appointment of the Board of Commissioners to Quiet Land Titles by Kamehameha III in 1845. The Great Mahele took place during the first few months of 1848 when Kamehameha III and more than 240 of his chiefs worked out their interests in the lands of the Kingdom. This division of land was recorded in the Mahele Book. The King retained roughly a million acres as his own as Crown Lands, while approximately a million and a half acres were designated as Government Lands. The Konohiki Awards amounted to about a million and a half acres, however title was not awarded until the *konohiki* presented the claim before the Land Commission. In the fall of 1850 legislation was passed allowing citizens to present claims before the Land Commission for lands that they were utilizing within the Crown, Government, or Konohiki lands. By 1855 the Land Commission had made visits to all of the islands and had received testimony for about 12,000 land claims. This testimony is recorded in 50 volumes that have since been rendered on microfilm. Ultimately between 9,000 and 11,000 *kuleana* land claims were awarded to *kama'aina* totaling only about 30,000 acres and recorded in ten large volumes.

During the Mahele of 1848, the land of Waialua, at that time held by Princess Victoria Kamamalu, was divided: Kamamalu retained thousands of acres in Pa'ala'a and Kawaiiloa; 134 *kuleana* was divided: Kamamalu retained thousands of acres in Pa'ala'a and Kawaiiloa; 134 *kuleana* holdings were awarded; and the western sections of Kamananui and Mokuleia, as far as Ka'ena Point, were given to the government and made available for public purchase. There were no LCA awards in the immediate vicinity of the project area. Although no Central O'ahu lands were awarded to the commoners, they undoubtedly helped farm those lands. There are documents preceding the Mahele which mention the vast cultivated *lo'i* found in this central area (Henry et al. 1992).

Two years after the enactment of the Mahele, King Kamehameha III passed another law, this one allowing foreigners to buy land. The Waihona 'Aina database shows that following the

allowance of foreigners to buy land in Hawai'i, the property around present-day Wahiawa were overwhelmingly bought out by Westerners. By 1860, approximately 290 patents were granted, with roughly one in eight sold to foreigners and naturalized citizens, including John S. Emerson and Samuel Northrup Castle (Office of State Planning 1995:1–2). In the case of the project area, those lands eventually fell into the ownership of George Galbraith. Neither the exact date of Galbraith's purchase of the property could be found, nor whether he bought his lands all at once or if he bought it piecemeal.

12. Cultural Resources

A cultural impact assessment was prepared in conjunction with the archaeological assessment. The assessment is found in Technical Report C.

In pre-contact times, before the arrival of Westerners in 1778, the Wahiawa region constituted the sacred center of O'ahu known as Lihu'e. Numerous *heiau* and the Kukaniloko *ali'i* birthing stones were located here. There were agricultural areas as well, with *kalo* and *'uala* grown in the *lo'i* and *kula* lands, respectively.

a. Place Names and Boundaries

Before the establishment of Wahiawa District in 1913, the project area was located in the traditional *moku* of Waialua. Several conflicting accounts inform on the naming of Waialua District. Thrum (in Sterling and Summers 1978:88) states that "Waialua" translates to "two waters," thus many believe that the name derived from Waialua's two streams. However, he believes that the district was named after a taro patch, and a common saying was that if you traveled to Waialua and did not see this taro patch, then you did not really see Waialua. Pukui (in Sterling and Summers 1978:88) asserts that the district was named for the cruel chief Waia, grandson of Wakea. Waia carried out his evil deeds at Waialua, and there was so much suffering there that the district was named Waialua, or "doubly disgraceful." Another source attributes the name to Waialua Pool at Kemo'o (Awai in Sterling and Summers 1978:88).

The Wahiawa District boundary has a complicated history (Sterling and Summers 1978:134). At the turn of the 20th century, Wahiaw Ahupua'a fell within the Waialua District. By 1913, the community had grown apart from Waialua District, and the new district of Wahiawa was established. Thus, in 1913, the *ahupua'a* of Wahiawa and Wai'anae Uka were moved from Waialua District to the new district of Wahiawa. In 1925 the size of Waialua District was reduced as large plots of land were transferred to Wahiawa. However, in 1932 the original 1913 land boundaries were reinstated with some small parcels added to the Schofield Barracks Military Reservation. Today the western parcel of the project area (TMK: [1] 6-5-002:010) lies within the *ahupua'a* of Kamananui, while the eastern parcels (TMK: [1] 7-1-001:002 and :005) are in Wahiawa.

Kamananui translates to "the large branch," and a grove of trees in the *ahupua'a* was named Poloa, or "the long night" (Pukui et al. 1974:80). Wahiaw on O'ahu should not be confused with Wahiawa on Kaua'i, a stream and *heiau* located in Koloa. Wahiawa can be translated as "place of noise," as rough seas were said to be heard there (Pukui et al. 1974:218). In ancient times, Hi'iaka, sister of Pele, heard the bellowing seas and composed a chant about Wahiawa and Waialua and the sound of the sea (Emerson in Handy and Handy 1991:465). Lihu'e translates to "cold chill" (Pukui et al. 1974:132). The place name Lihu'e may pre-date the formation of *ahupua'a* on O'ahu and "seems to exist independently of the *ahupua'a* in which

it falls” (Desilets et al. 2009:43). Desilets et al. help to define the boundaries of the Lihu’e region:

Judging from traditional usage, Lihu’e appears to be an ancient place-name that refers, minimally, to the entire region west of Wahiawa and east of the Wai’anae range. As a traditional place, its boundaries are necessarily imprecise, but it is clear that the region encompasses most of western Wai’anae Uka and all of Schofield Barracks. Lihu’e also appears to be used more generally to refer to the entire Central Plateau, encompassing such sacred sites as Kukaniloko. Although it is difficult to determine with any certainty, it seems probable that Lhu’e had broader boundaries prior to the institutionalization of the *moku* and *ahupua’a* land divisions we know today. Lhu’e is most often referred to as the “uplands,” although that could well mean the whole Central Plateau, which relative to coastal areas is upland. (2009:39)

b. Traditional Land Use

Traditionally, Kamananui was one of the three *ahupua’a* (along with Pa’ala’a and Kawailoa) in the fertile heartland of Waialua Moku. The *makai* areas of Waialua once contained many *lo’i*, while the *mauka* slopes were covered with *kula* of red soil, an environment very good for growing sweet potato (Handy and Handy 1991:466; Kirch and Sahlins 1992:1:20). Sterling and Summers (1978:103) note that “there were large terrace areas along the flatlands between the junction of Helemano and Poamoho Streams and the flatland west of Poamoho,” as well as small terraces in the lower flats of Poamoho and Kaukonahua Valleys. It is probable that sweet potato and bananas were grown around house sites along the ridges of the gulches. The upland areas of Kamananui/Wahiawa were one of the few places on the island where sweet potato agriculture was irrigated, with water brought in from Helemano Stream and Wahiawa Stream, both of which had many terraces along the stream banks (Handy and Handy 1991:464–5).

The population was most densely settled in the lower floodplains of the *ahupua’a*, irrigated in large part by a two mile-long waterway that at the time was the longest on the island. The *lo’i* and fishponds of the lower areas, as well as the rainfall agriculture of the *kula* supported a pre-contact community estimated at 6,000 to 8,000, which was probably the majority of the population in Waialua. In this pre-contact period (pre-Western arrival in 1778), “Kamananui was the ritual and political center of Waialua,” although the seat of power moved to the neighboring *ahupua’a* of Kawailoa by the early 1800s (Kirch and Sahlins 1992:1:20).

Lihu’e was home to the highest class of chiefs, the Lo Ali’i. The Lo Ali’i lived in the uplands of O’ahu, including Wahiawa, and were under strict *kapu* because of their sacredness:

The chiefs of Lihu’e, Wahiawa and Halemano on O’ahu were called lo ali’i. Because the chiefs at these places lived there continually and guarded their kapu, they were called loali’i [from whom a “guaranteed” chief might be obtained, loa’a]. They were like gods, unseen, resembling men. (Kamakau 1991:40)

The chiefs of Lihue, Wahiawa, and Halemano on Oahu were called Lo chiefs, Po’e Lo Ali’i [“people from whom to obtain a chief”], because they preserved their chiefly kapus. The men had kapus, and the women had kapus, and when

they joined their kapus and children were born, the children preserved their kapus. They lived in the mountains (*ikuahiwī*); and if the kingdom was without a chief, there in the mountains could be found a high chief (*ali'i nui*) for the kingdom. Or if a chief was without a wife, there one could be found—one from chiefly ancestors. Kauakahi'ailani, Ma'ilikukahi, Kalona, Piliwale, Kukaniloko, Pa'akakanilea [Pa'akanilea], Ka'akauualani, Ka'au, Lale, Paoakalani, Pakapakakuaua, Nononui, Kokoloea, and a great many others were *Lo* chiefs. (Kamakau 1964:5)

Kamananui was very much the ceremonial center of the island. The *ahupua'a* contains numerous *heiau*, including two presided over by Ku, which were also *heiau luakini* associated with human the island, K kaniloko ("the sound or resonance rises from within"), birthing stones situated near where Kamehameha Highway intersects with Whitmore Road (Yent 1999:15; Yent 1995) (also see Archaeological and Historic Sites section).

The establishment of K kaniloko as a sacred birthplace goes back to the time of the earliest chiefs of O'ahu. Nanakaoko was the chief, Kahihikalani was the chiefess, and they made Kukaniloko as a birthplace for their son, Kapawa. Kapawa's birth and the birth of later chiefs at Kukaniloko was accompanied by prescribed ceremony. The historian Samuel Kamakau describes the first royal birth there:

Kukaniloko was made by Nanakaoko and his wife Ka-hihi-o-ka-lani as a place for the birth of their child Kapawa... When the child was born, it was immediately taken into the *wai hau heiau* Ho'olono-pahu. There forty-eight chiefs ministered to the child and cut the navel cord. Ho'olono-pahu was a furlong and a half south of Kukaniloko. Two furlongs to the east of Kukaniloko was where the sacred drum Hawea was beaten; it indicated the birth of a chief. On the east of the stream on that side of Kua'ikua were the *maka'ainana* --- a great many of them --- and to the south, three furlongs distant, were the *kauwā*. (Kamakau 1991:38)

Kamakau points out that long after Kapawa, the sacredness of Kukaniloko continued and that all of the "chiefs born at Kukaniloko were the *akua* of the land and were *ali'i kapu* as well" (Kamakau 1991:53).

The historian John Papa Ii adds that besides being a sacred birthplace, Kukaniloko was also a designated place of refuge:

The Hale o Keawe was called Kaikaialealea and was a pu'u honua, or place of refuge. Similarly, Kukaniloko in Wahiawa, Oahu; and Holoholoku in Wailua, Kauai, were places which one who had killed could run swiftly and be saved. (Ii 1959:138) As a place of refuge, Kkaniloko fits in the story of the newborn twin chiefesses Laielohelohe and Laiekawai. Their mother Malaekahana feared that her newborns would be harmed, so she sent one of them to the safe haven of Kukaniloko to be raised by Kapukaihaoa (Beckwith 1970).

Even after the arrival of Westerners, Kukaniloko remained to be a place of great significance among the Hawaiian population. Ii reminds us that this important place was situated along one of the major trails that traversed O'ahu Island:

From the stream of Anahulu and from Kamani, above the houses and taro patches, a trail

stretched along in front of Kuokoa's house lot and the church. This trail went on to meet the creeks of Opaëula and Halemano, the sources of the stream of Paalaa, on down to the stream of Poo a Moho, and on to the junction where the Mokuleia trail branched off to Kamananui and Keawawahie, to Kukaniloko, the birthplace of chiefs. (li 1959:98)

c. Historic Wahiawa

In historic times (post-1778), the Wahiawa region has been used for harvesting sandalwood, sugarcane and pineapple cultivation, and for military interests.

d. Early Historic Land Use

When Kamehameha I conquered O'ahu in 1795, Waialua was given to his ally, Chief Ke'eaumoku, and for the next 70 years, the land was controlled by his descendants, primarily his daughter, Queen Ka'ahumanu. In the early 19th century, Waialua was a source of food, sandalwood for trade, and building lumber for the royalty (Office of State Planning 1995:1).

The sandalwood trade in Hawai'i began in 1791, with most of the wood shipped to China, where it was valued for its fine grain and pleasant scent. The peak trade years were 1810–1840.

As the sandalwood trade died down, whaling would become an important element in the economic, political, and social structure in Waialua. The height of the whaling period was approximately 1830–1860, which was also an era in which Waialua lost roughly half of its people to disease and emigration.

e. Agricultural Interests

In the mid-1860s, Castle & Cooke, established by Samuel Castle and Amos Starr Cooke, backed the first commercial sugar cultivation in Waialua, started by two sons of Levi Chamberlain. Early businesses managed by them and others were unsuccessful, and in 1874 the operation was sold to a partnership including Robert Halstead. Halstead was able to generate a profit, and prospects improved with the development of a railroad line. Castle & Cooke and Halstead together formed Waialua Agriculture Company in 1898. Development continued and soon the company embarked on a mammoth irrigation project to dam Kaukonahua Stream and create the Wahiawa Reservoir.

The Wahiawa Reservoir has been called the “key to Waialua's irrigation” (Wilcox 1996:109). Completed in January of 1906, it was the largest reservoir in the islands, with a capacity of 2.5 billion gallons (Wilcox 1996:109). At 136 feet (41.5 m) tall, the earthen dam is the highest in Hawai'i. The 461 foot (140.5 m)-long dam with a 580 foot (176.8)-thick base created a massive reservoir, occupying a 7 mile (11 km) length of Kaukonahua Gulch (Wilcox 1996:109). This reservoir, later dubbed Lake Wilson, delivered 90% of the surface water for the Waialua Sugar Company's fields.

Sugarcane production became less dominant with some of the land use in Waialua shifting to pineapple and military interests in later years. James Drummond Dole founded the first pineapple plantation in Wahiawa in 1900 (Hawkins 2011). He organized the Hawaiian Pineapple Company in 1901 and packed the first batch of pineapples in 1903 (Napoka 1976).

In 1922, Dole leased 12,000 acres (4,856 ha) from the Waialua Agriculture Company for pineapple production (Office of State Planning 1995).

Both sugarcane and pineapple production in the Wahiawa/Kamananui area were enabled by the train service established from Pearl City to Wahiawa, and later up through Hale'iwa. The Oahu Railway and Land Company (OR&L), founded, owned, and ran by Benjamin Franklin Dillingham, began operations in 1889 (Chiddix and Simpson 2004:19). Established portion by portion, the OR&L line originally spanned from Honolulu to Kahuku, with a branch line running from Waipahu out to Wahiawa that was constructed in 1905 to accommodate the pineapple plantation established there by Dole. Soon after construction, this line was unofficially extended to Hale'iwa—a "hush-hush track" due to the establishment of Schofield Barracks and the wartime need for back-up transportation (Kneiss 1957:13–14).

Poamoho Camp, to the north of the project area, was constructed in 1912 for workers of the Hawaiian Preserving Company, Ltd. pineapple cannery in Wahiawa. The camp consisted of 20 houses situated around a men's boarding structure. It remains as a residential neighborhood today, with approximately 300 residents (Boylan 2004), although the houses have been remodeled.

f. The U.S. Military

Adjacent to Wahiawa, in Wai'anae 'Uka, the land underwent increased military use with the establishment of Schofield Barracks. The U.S. military first occupied Schofield Barracks, originally called Castner Village, in 1909. Most major planned building projects were completed by the early 1920s. Soon after World War II began, the facilities were expanded to accommodate the Ranger Combat School created to train soldiers for "jungle" activities. The current Schofield Barracks Military Reservation's three main training areas included the Impact Zone, the South Range, and the East Range (Sullivan and Dega 2003:21).

The Helemano Military Reservation, north of Wahiawa in Pa'ala'a Ahupua'a, was established in 1943. The reservation served as a communications station for the U.S. Army, and in 1944, a signal center was constructed. The reservation became a permanent sub-installation of Schofield Barracks in 1956 (Towill Corp. 1981).

13. Hazardous Materials

Phase I Environmental Site Assessments ("ESA") were conducted in January of 2007, July of 2007, January of 2008, October of 2008, May of 2009, April of 2010, January of 2011, and September of 2011. It should be noted that 14 of the land parcels previously included in the Galbraith Estate have been sold since the May 2009 Phase I ESA was conducted, and are not included in the most recently completed (November 2012) Phase I ESA by Bureau Veritas. The ten remaining parcels that comprise the current subject property include Tax Map Key (TMK) Numbers: (1) 6-5-002: Parcels 10 and 25, and (1) 7-1-001: Parcels 2, 3, 5, 8, 12, 25, 26, and 28.

The objective of the assessment was to provide an independent, professional opinion regarding *recognized environmental conditions* (RECs) associated with the subject property as defined by ASTM International (ASTM).

One permanent structure on the subject property, the Del Monte Corporation (DMC) Well #5/Bott Well (also known as the Del Monte Pump 5 well), is located in the former pineapple

fields near the Kaukonahua Road and Wilikina Drive intersection, in the central-western portion of the subject property. The well system includes a pavilion structure that houses the well pump system, diesel engine, reservoir holding tanks with ancillary piping, a small storage shed for maintenance products, and an associated 10,000-gallon diesel AST within secondary containment. According to Wai Engineering, this AST is not currently in use.

The former DMC Turner Station facility is a cleared area located along the northeast side of Kamehameha Highway between Kamananui Road and Whitmore Avenue. The Turner Station was formerly used as a pineapple loading and staging area. According to Ms. Denise Hearn, Vice President and Real Estate Commercial Team Leader of Bank of Hawaii, the U.S. Navy has widened this portion of Kamehameha Highway as part of a requirement by the State of Hawaii.

This assessment has revealed no evidence of *RECs*, as defined by ASTM, in connection with the subject property, except for the following:

During one of Bureau Veritas' previous Phase I assessments, conducted in April of 2008, a new road for the United States Navy was under construction along the northeastern boundary, and extending through the northeast corner of the subject property. Initial construction of a bridge was underway at the nearby Poamoho Stream Gulch, and a road cutaway had been excavated for installation of the bridge. Small pieces of garbage were observed mixed in with the soil of the road cutaway along the edge of the subject property. According to personnel with the onsite construction contractor, Dick Pacific Construction Company, Ltd., a significant amount of garbage and debris were encountered during the excavation, including household-type garbage, wrecked cars, and car parts. Although the Navy roadway bridge is not part of the subject property, this discovery indicates the potential for additional garbage, cars, and car parts to be buried along the edges of the subject property immediately adjacent to the area excavated by the Navy.

This finding is considered a *REC* because there is evidence of buried cars and car parts, with a potential for releases of petroleum hydrocarbons to the subject property. Future excavation activities in the northeast portion of the subject property should be monitored for buried waste and associated releases.

The following environmental condition, which is not considered to be *REC*, as defined by ASTM, was revealed during this assessment:

The majority of the subject property was formerly used as agricultural land. Agricultural chemicals such as pesticides and herbicides used on pineapple and sugar cane crops may be an environmental concern. However, no evidence of chemical mixing or storage areas, or excessive use of pesticides and herbicides from past agricultural use was identified at the subject property.

The State of Hawaii, DOH, Solid and Hazardous Waste Branch, UST and Leaking Underground Storage Tank (LUST) databases were reviewed on September 9, 2011 to obtain information regarding environmental concerns or violations at the subject property. The subject property was not identified in the UST or LUST databases.

14. Air Quality

In Hawaii both federal and state environmental health standards pertaining to outdoor air quality are generally met due to prevalent trade winds. Aircraft operations at Wheeler Army Airfield are likely the largest source of stationary air emissions in the vicinity, yet due to the consistent winds, the regulated air pollutants in the area are within the air quality limits established by Clean Air Act.

There are no significant air emissions sources associated with the Galbraith Lands.

15. Acoustical Conditions

Noise impacts from construction-related activities are regulated under the HAR, DOH, Title 11, Chapter 46, Community Noise Control. The project site is zoned as AG-1, Restricted Agriculture and as such falls into Class C under the DOH regulations, with a maximum daytime permissible sound level of 70 decibels (dBA) (7:00 a.m. to 10:00 p.m.) and 70 dBA at night (10:00 p.m. to 7:00 a.m.) (DOH, 1996). Noise levels exceeding the maximum permissible sound levels for more than ten percent of the time within any twenty minute period will require a permit or variance issued under sections HAR Title 11, Chapter 46.

Noise generated within the project area is generally attributable to private and military vehicles, public and commercial buses and vans, cargo trucks and trailers, and agricultural trucks and trailers travelling on public roads through and surrounding the project area.

16. Views

Identification of scenic views and open space is drawn from the Central Oahu *Sustainable Communities Plan* (COSCP) and its Open Space Map.

The Plan does not specifically identify the ADC lands as significant scenic resources. However, it cites "The view of the upper Central Oahu plains toward Waialua from the end of Koa Street in Wahiawa" as a significant stationary scenic resource (Table 3.1, COSCP, 2002). Presumably this general language could include portions of the ADC land nearest Wahiawa that can be viewed from the cited location.

Although not identified as a significant scenic resource the ADC lands provide panoramic views from roads traversing the area. Panoramic views of and across the former cultivated agriculture fields as seen from both sides of Kamehameha Highway between Whitmore Avenue and Poamoho Village and Kamananui Road between Wilikina Drive and Poamoho Village (COSCP Map A1, Open Space Map).

17. Open Space

The ADC lands provide approximately 1,200+ acres of fallow agricultural land and are the principal source of open space within the project area. The large expanse of open space is seen by City and County of Honolulu planners as part of an Open Space Network for this area (DPP, 2002) with the objectives of protecting scenic views, protecting agricultural land, defining the boundaries of communities, preserving natural gulches, and providing a fire safety buffer from developed areas.

C. Socio-Economic Characteristics

This section summarizes the demographic and economic characteristics of the residents in the project area. Census data are used to describe the existing social and economic characteristics and population distribution and growth patterns.

1. Population

The decennial censuses provide the most accurate and comprehensive set of socio-economic data. The project area is located within Census Tract 91 known as Kaukonahua Road. Data summarized in Table 5 are taken from the 2010 U.S. Census. (U.S. Census Bureau 2010). The socioeconomics for the City and County of Honolulu is presented for reference.

In 2010, there were 5,332 residents in CT 91 (Kaukonahua Road). The larger district of Wahiawa had a population of 41,216. Relative to the island as a whole, less than 1 percent of Oahu's population lived in CT 91 Kaukonahua Road.

Although CT 91 has a relatively small share of the islandwide population, population growth was strong through the 2000s. Census Tract 91 experienced a net increase of 669 people or a growth rate of 14 percent. In comparison, the island of Oahu had a growth rate of 8.7 percent.

2. Employment and Income

The Wahiawa district accounts for nearly 3 percent of total population on Oahu, and only 1 percent of the island's employment. This imbalance is expected to improve into the future. The Department of Planning and Permitting prepares socio-economic projections that are reported in the Annual Report on the Status of Land Use on Oahu. The Annual Report for Fiscal Year 2009 indicates that population in the Central Oahu Sustainability Communities Plan area will grow moderately from 157,008 in 2005 to 181,423 in 2035. Over the same period, however, employment is projected to grow at a higher rate from 58,915 in 2005 to 77,373 in 2035.

Table 6 shows the occupational profile of the project area (CT 91) labor market. In comparison to the island as a whole, CT 91 residents are less likely to hold jobs in management positions. On the other hand, they are likely concentrated in the service industry and blue-collar occupations, including construction, extraction, and services, as well as production, transportation, and material moving.

In 2010, median household income was \$71,076 in CT 91 Kaukonahua Road and median family income was \$72,125. Median value for owner-occupied housing unit was \$468,800 (U.S. Census Bureau, 2010).

Table 5: Population by Census Tract, District, County, and State 2000 and 2010

Geographic	2000	2010	Net Change	Percent Change
<i>Census Tract</i>				
CT 91 Kaukonahua Road	4,663	5,332	669	14%
<i>Neighborhood</i>				
NB 26 Wahiawa	38,929	38,690	-239	-0.01%
<i>District</i>				
Wahiawa	38,370	41,216	2,846	7%
% of Oahu				
Oahu (City and County of Honolulu)	876,151	953,207	77,056	8.7%
State of Hawai i	1,213,537	1,363,731	150,194	12%

Sources: U.S. Census, 2000, 2010

Table 6: Occupational Profile for Wahiawā and Island of O‘ahu, 2010

Occupational Category	Census Tract 91		O‘ahu	
	No. of Persons	Percent	No. of Persons	Percent
Management, business, science	454	19	157,558	35
Services	682	28	93,903	21
Sales and Office	577	24	116,520	26
Agriculture, forestry, fishing	82	3	3,192	1
Construction	256	11	31,258	7
Production, transportation	356	15	37,861	8
All Occupations	2,397		447,382	

Source: U.S. Census Bureau, 2012

D. Infrastructure

1. Roads and Circulation

Kamehameha Highway is a two-way, two-lane arterial highway between Wahiawa and Central Oahu. The posted speed limit on Kamehameha Highway in the vicinity of Kamananui Road is 45 miles per hour (mph). South of Kaukonahua Road, the posted speed on Kamehameha Highway is reduced to 35 mph. The posted speed on

Kamehameha Highway is reduced again to 25 mph, north of Whitmore Avenue. Kamananui Road is a two-way, two-lane highway between Wilikina Drive and Kamehameha Highway. The posted speed limit on Kamananui Road is 45 mph. Kamananui Road is signalized at its intersections with Wilikina Drive, Kaukonahua Road, and Kamehameha Highway.

a. Highway Capacity Analysis Methodology

The Traffic Management Consultant (2014) prepared a highway capacity analysis for the project. The capacity analysis is based upon procedures presented in the Highway Capacity Manual (HCM), published by the Transportation Research Board, 2010. HCM defines the Level of Service (LOS) as a qualitative measure, which describes the operational conditions within a traffic stream. Several factors may be included in determining the LOS, such as: speed, travel time, freedom to maneuver, traffic interruptions, driver comfort, and convenience. LOS's "A", "B", and "C" are considered satisfactory Levels of Service. LOS "D" is generally considered a "desirable minimum" operating Level of Service. LOS "E" is an undesirable condition, and LOS "F" is an unacceptable condition. Intersection LOS is primarily based upon average delay (d) in terms of seconds per vehicle (sec/veh). LOS criteria are summarized in Table 7.

Table 7. Intersection Level of Service Criteria (HCM)

LOS	Signalized Intersection		Unsignalized Intersection	
	Delay d (sec/veh)	Description	Delay d (sec/veh)	Description
A	$d < 10$	Few stops, little or no delay	$d < 10$	Little or no delays
B	$10 < d < 20$	Good progression, short cycle lengths	$10 < d < 15$	Short delays
C	$20 < d < 35$	Cycle failures begin to occur, i.e., vehicles stop at more than one red phase	$15 < d < 25$	Average delays
D	$35 < d < 55$	Noticeable number of cycle failures, unfavorable progression	$25 < d < 35$	Long delays
E	$55 < d < 80$	Frequent cycle failures, poor progression, long delays	$35 < d < 50$	Very long delays
F	$d > 80$	Over saturation, many cycle failures, high delays	$d > 50$	Extreme delays

Source: The Traffic Management Consultant, 2015.

b. Existing AM Peak Hour Traffic

The AM peak hour of traffic in the study area occurred between 7:15 AM and 8:15 AM. North of Kamananui Road, Kamehameha Highway carried about 1,450 vehicles per hour (vph), total for both directions. South of Whitmore Avenue, Kamehameha Highway carried about 1,900 vph, total for both directions. The AM peak hour traffic on Kamehameha Highway was split 50/50 in the northbound and southbound directions.

Wilikina Drive carried over 1,500 vph, total for both directions, south of Kamananui Road. The AM peak hour traffic on Wilikina Drive was split 50/50 in the northbound and southbound directions. North of Wilikina Drive, Kaukonahua Road carried about 800 vph, total for both directions. The AM peak hour traffic on Kaukonahua Road was split 60/40 in the southbound direction. Kamananui Road carried about 900 vph, total for both directions, with a 60/40 split in the northeast bound direction.

During the existing AM peak hour of traffic, the intersection of Kamehameha Highway and Whitmore Avenue operated at LOS "D". The left-turn movements on westbound Whitmore Avenue and southbound Kamehameha Highway operated at LOS "F". The through movement on northbound Kamehameha Highway operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service, i.e., LOS "C", or better.

The intersection of Kamehameha Highway and Kamananui Road operated at LOS "C", during the existing AM peak hour of traffic. The left-turn movement from Kamananui Road operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The intersection of Kamananui Road and Kaukonahua Road operated at LOS "B", during the existing AM peak hour of traffic. Westbound Kaukonahua Road operated at LOS "E". The other approaches to the intersection operated at satisfactory Levels of Service. The other intersections in the study area operated at satisfactory Levels of Service during the existing AM peak hour of traffic. Figure 13 depicts the existing AM peak hour traffic.

c. Existing PM Peak Hour Traffic

The PM peak hour of traffic in the study area occurred between 3:15 PM and 4:15 PM. Kamehameha Highway carried about 1,600 vph, total for both directions, north of Kamananui Road. South of Whitmore Avenue, Kamehameha Highway carried about 2,000 vph, total for both directions. The direction of the PM peak hour traffic was split 50/50 in the northbound and southbound directions on Kamehameha Highway. Wilikina Drive carried about 1,800 vph, total for both directions, south of Kamananui Road, with a 50/50 split in the northbound and southbound directions.

North of Wilikina Drive, Kaukonahua Road carried over 900 vph, total for both directions, with a 60/40 split in the northbound direction. Kamananui Road carried over 1,000 vph, total for both directions, during the existing PM peak hour of traffic, with a 55/45 split in the southwest bound direction.

The intersection of Kamehameha Highway and Whitmore Avenue operated at LOS "D", during the existing PM peak hour of traffic. The left-turn movement on southbound Kamehameha Highway operated at LOS "F". The left-turn movement on westbound Whitmore Avenue operated at LOS "E". The through movements in both directions on Kamehameha Highway operated at LOS "D".

During the existing PM peak hour of traffic, the intersection of Kamehameha Highway and Kamananui Road operated at LOS "C". The left-turn movement from Kamananui Road operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The intersection of Kamananui Road and Kaukonahua Road operated at LOS "B", during the existing PM peak hour of traffic. Westbound Kaukonahua Road operated at LOS "E". The other approaches to the intersection operated at LOS "B".

The intersection of Wilikina Drive and Kamananui Road operated at LOS "D", during the existing PM peak hour of traffic. The left-turn movement from Kamananui Road at Wilikina Driveway operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The other intersections in the study area operated at satisfactory Levels of Service during the existing PM peak hour of traffic. The existing PM peak hour traffic is depicted on Figure 14.

2. Water System

The Honolulu Board of Water Supply has neither water wells in the project area nor transmission/distribution lines to the ADC Lands. The Board of Water Supply, however, provides potable water to Whitmore Village.

3. Wastewater System

The City and County of Honolulu does not have a wastewater system in place serving the ADC Lands and there is no private collection and treatment system serving the project area.

Wastewater from Whitmore Village is collected and pumped to the Wahiawa Wastewater Treatment Plant for treatment and disposal.

4. Solid Waste

The fallow agricultural land does not generate solid waste.

5. Power

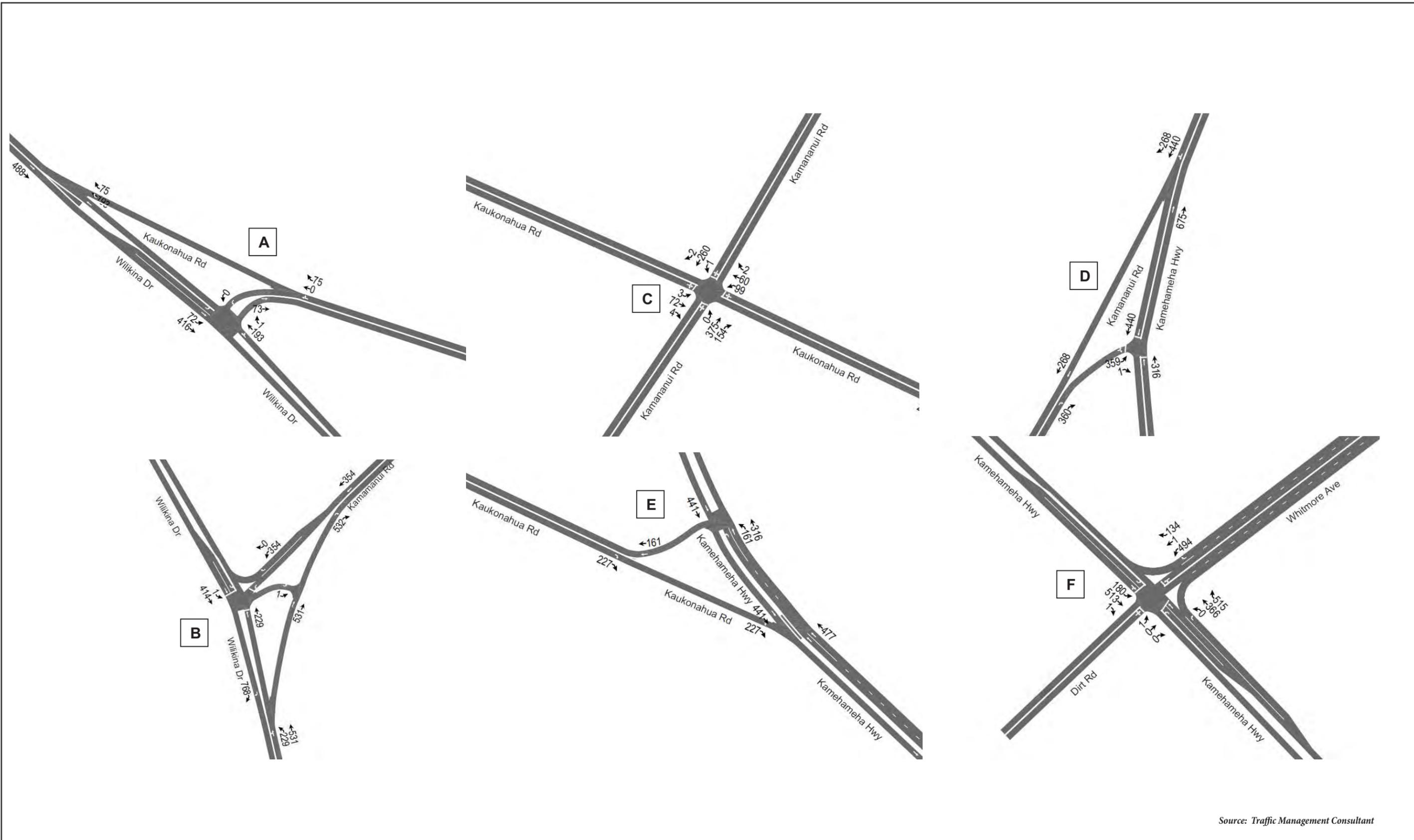
Electrical power is available from overhead systems on Kamehameha Highway, Kaukonahua Road, and Kamananui Road. The power grid is owned, operated, and maintained by Hawaiian Electric Company.

6. Telecommunications

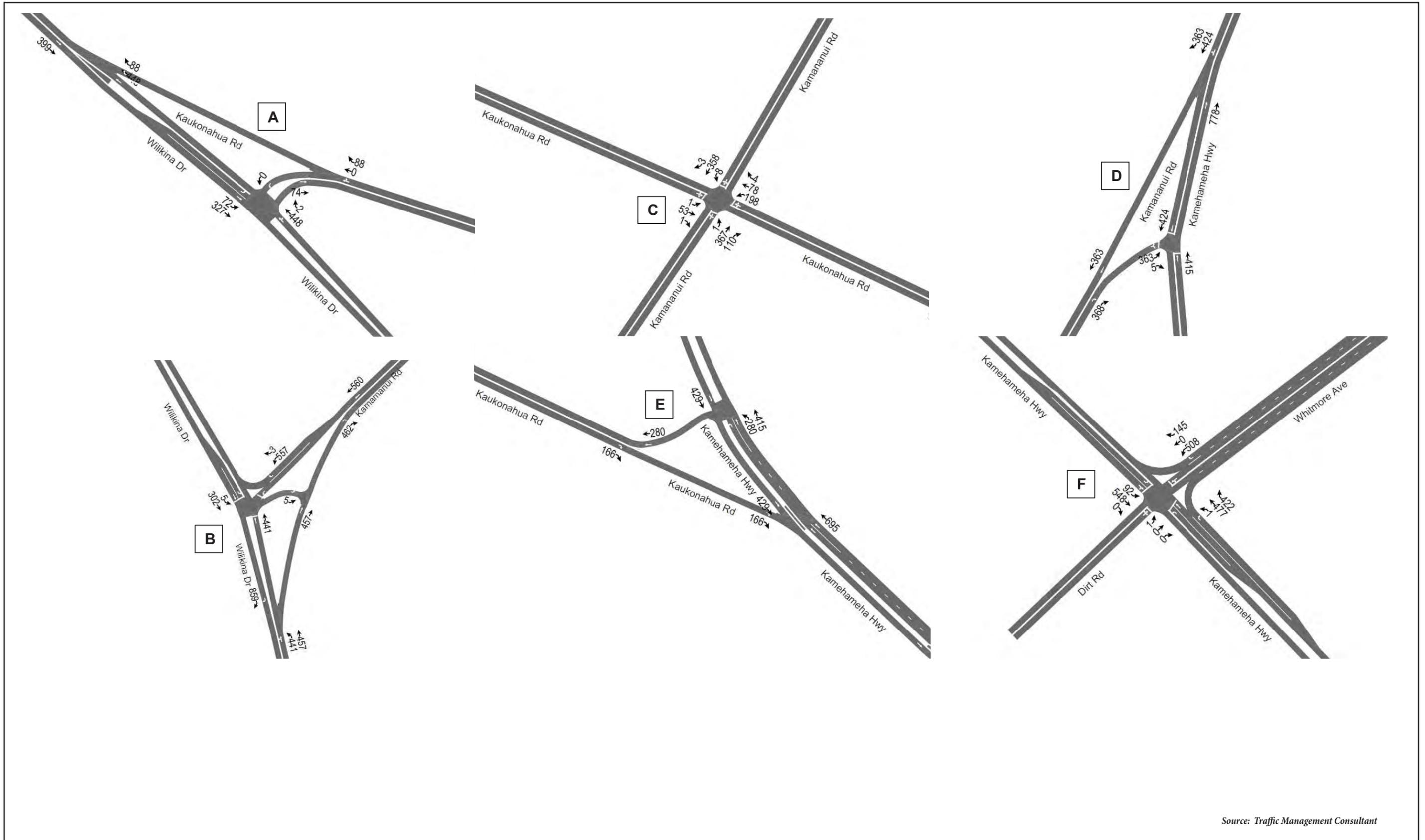
Telephone systems in the project area are either owned by Oceanic Time Warner Cable or Hawaiian Telcom. System cables are mounted on poles along the major roads traversing the project area.

Within the project area, Oceanic Time Warner Cable CATV aerial systems are located on Kamehameha Highway from Whitmore Avenue to Kaukonahua Road, Kamehameha Highway (to Hale'iwa), and Saipan Drive (OTW Comment, 2014).

No changes to existing telecommunications systems are planned.



Source: Traffic Management Consultant



Source: Traffic Management Consultant

E. Public Services and Facilities

1. Police

The project area is within the Honolulu Police Department's District 2 (Wahiawa/North Shore). Protective services originate from the Wahiaw District Station in the town of Wahiawa. Located at the northern end of North Cane Street the Station is approximately 1.9 miles from the intersection of Kamehameha Highway and Wilikina Drive.

2. Fire

Fire protection originates from the Wahiaw Fire Station (Station 16) in the town of Wahiaw . Located on California Avenue, the Station is about 1.6 miles from the intersection of Kamehameha Highway and Wilikina Drive. The Fire Station was dedicated in 2002 to replace the old Wahiaw Fire Station that previously occupied the same site.

Emergency medical service (ambulance) originates from an Emergency Medical Services facility at the Wahiawa Fire Station.

3. Recreation

See No. 9, Water Resources, a. Surface Water of this section for a description of Wahiawa Freshwater Park.

4. Medical Facilities

Wahiawa General Hospital is located in the center of Wahiaw and bounded by Center Street, Lehua Street, and Kilani Avenue. The non-profit community based hospital is the most comprehensive health care facility serving communities of Central O'ahu and North Shore. The Hospital provides emergency room services, a medical specialty clinic, and surgery, and a woman's mammography center. The 53-bed acute facility is equipped for all levels of patient care (<http://www.wahiawageneral.org/View/History.html>).

Located on the grounds of Wahiaw Hospital, the Wahiawa Nursing and Rehab Center provides physical therapy services and 107 beds for long-term care patients.

5. Solid Waste Disposal

The Wahiawa Convenience Center located on Wilikina Drive is one of six "convenience" centers operated by the City and County of Honolulu. Residents can dispose of household solid waste (combustible and non-combustible refuse) and green waste at the centers. Some types of refuse are prohibited / restricted from disposal. White goods, Freon-type appliances, tires, batteries, and propane tanks are also accepted for disposal.

6. Public Schools

The State Department of Education organizes all public schools by island and geographic area into "complexes areas". O'ahu schools are organized into nine complex areas. A

complex consists of a high school and all the intermediate and elementary schools that “feed” students into it. A complex area consists of two or more complexes.

Central O’ahu forms the Leilehua-Mililani-Waialua Complex Area of which the project area is located within the Leilehua Complex. The Leilehua Complex is comprised of Leilehua High School, Wahiawa and Wheeler Middle Schools, and Hale Kula, Helemano, Iliahi, Kaala, Solomon, Wahiawa, and Wheeler Elementary Schools.

During school year 2013-2014, the Leilehua Complex had an enrollment of 17,581 students excluding students enrolled in Pre-Kindergarten.

A. Hawaii State Plan

The Hawai'i State Plan, Chapter 226 of HRS, adopted in 1978 and amended in 1988, 1991, and 1996, establishes the overall theme, goals, objectives, and priority guidelines to guide the future long-range development of the State (Department of Planning and Economic Development 1978). Given its policy-based framework it is not a land use plan or land use control.

The proposed action is for the construction of four water storage reservoirs on the former Galbraith Estate lands north of Wahiawa. The reservoirs will provide irrigation water necessary to establish diversified agriculture on high quality agriculture land that was previously in pineapple cultivation. State Plan objectives and policies applicable to the project scope are recited below relative to the project scope.

The proposed action is consistent with State Plan objectives and policies for agriculture as a component of the state's economic base, growing the economic base through diversified agriculture, and development of water facilities that support and sustain agriculture. Appropriate objectives and policies include:

Section 226-7: Objectives and policies for the economy-- agriculture.

- (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:
 - (2) Growth and development of diversified agriculture throughout the State.
 - (3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.
- (b) To achieve the agriculture objectives, it shall be the policy of this State to:
 - (1) Establish a clear direction for Hawaii's agriculture through stakeholder commitment and advocacy.
 - (2) Encourage agriculture by making best use of natural resources.
 - (5) Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawaii's economy.
 - (6) Seek the enactment and retention of federal and state legislation that benefits Hawaii's agricultural industries.
 - (10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.
 - (12) Expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.
 - (13) Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency.

- (16) Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses. [L 1978, c 100, pt of §2; am L 1986, c 276, §6; am L 1993, c 25, §2]

Section 226-10: Objective and policies for the economy – potential growth activities.

- (a) Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawaii's economic base.
- (b) To achieve the potential growth activity objective, it shall be the policy of the State to:
 - (1) Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production, and energy and marine-related industries.

Section 226-14: Objectives and policies for facility systems – in general.

- (a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.
- (b) To achieve the general facility systems objective, it shall be the policy of this State to:
 - (2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
 - (3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.

Section 226-16: Objective and policies for facility systems--water.

- (a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.
- (b) To achieve the facility systems water objective, it shall be the policy of this State to:
 - (1) Coordinate development of land use activities with existing and potential water supply.
 - (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.
 - (6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs. [L 1978, c 100, pt of §2; am L 1986, c 276, §15]

B. State Functional Plans

The State Functional Plans implement the broader goals, objectives, and policies of the State Plan through specific actions identified as Implementing Actions (IA). While the proposed project is not specifically identified as an IA, the project maintains consistency with the Agriculture Functional Plan (DBEDT 1991).

C. State Land Use Districts

The State Land Use Commission under the authority of Chapter 205, Hawai'i Revised Statutes classifies all land in the State of Hawaii as Agricultural, Conservation, Rural, and Urban. Uses in the Agricultural District are regulated by the Land Use Commission; uses in the Conservation District by the Board of Land and Natural Resources, uses in the Rural District by the Land Use Commission, and uses in the Urban District by the respective county government. The zoning powers of the respective counties also govern uses in other than the Conservation District.

All of the ADC land is located within the State Land Use Agricultural district (See Figure 15) and subject to permissible agricultural uses as stipulated on land classified by the Land Study Bureau's Detailed Land Classification as overall productivity rating Class A or B (§205-4.5).

Land use is also under the jurisdiction of the City and County of Honolulu and its land use policies, controls, standards, and codes for agriculture land.

D. General Plan for O'ahu

Although classified Agricultural, land use in the project area is under the authority of the City and County of Honolulu and its applicable plans, ordinances, and regulations. City land use policies and controls for O'ahu are vertically aligned or tiered for managing growth and land uses beginning with the General Plan for the City and County of Honolulu ("General Plan"), community development plans and sustainable community plans, and zoning. Special districts and special management area rules provide supplementary controls for defined areas where man-made features and natural resources should be protected and managed.

The General Plan for the City and County of Honolulu ("General Plan") is the first tier. It sets forth broad objectives and policies in eleven functional areas such as Economic Activity, Natural Environment, Energy, Physical Development and Urban Design, and Public Safety. The Population component and its objectives and policies are key to managing growth. The component establishes a population distribution pattern for eight geographic regions comprising the county. Each region has an upper and lower limit (percentage) of the island wide population for a targeted year (currently 2025). The general plan also includes General Plan Development Pattern map depicting the eight districts and the desired development pattern for and within the respective district.

- Wahiawa is part of the Central O'ahu region of the island and the development pattern is to maintain developed areas within the district as "Urban Fringe".

Economic Activity, Objective C: To maintain the viability of agriculture on Oahu.

- Policy 1: Assist the agricultural industry to ensure the continuation of agriculture as an important source of income and employment.
- Policy 2: Support agricultural diversification in all agricultural areas on Oahu.
- Policy 3: Support the development of markets for local products, particularly those with the potential for economic growth.
- Policy 6: Encourage the more intensive use of productive agriculture land.
- Policy 7: Encourage the use of more efficient production practices by agriculture, including the efficient use of water.

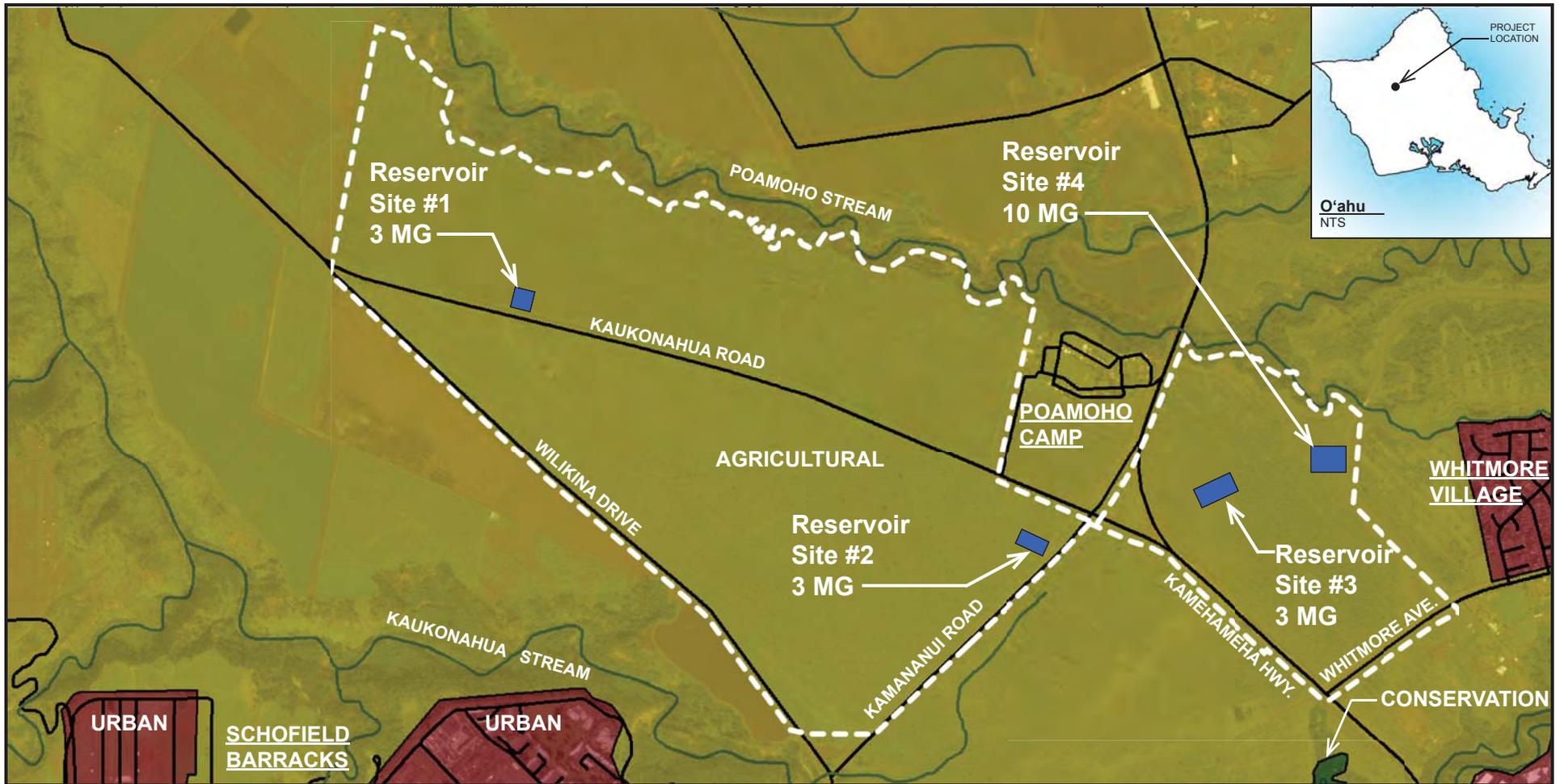
General plan objectives and policies and ADC reservoir / infrastructure construction are mutually supportive. Long-range goals for Oahu stated in the General Plan directed toward agriculture activity on Oahu support the ADC action to increase agriculturally productive uses in certain regions on Oahu and the ADC action to build reservoirs as a means of promoting agriculture sustainability are consistent with the general plan objectives and policies for agriculture.

Agriculture is also cited in the Transportation and Utilities functional area with an objective and policy for agriculture water. The objective states: "To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal" and the supporting policy reads "Develop and maintain an adequate supply of water for agricultural and industrial needs (Policy 2)".

Existing state well No. 3-3103-0001 (Commission on Water Resource Management) and development of a well near Reservoir 4 will supply agriculture growers in the project area with an adequate and reliable water source.

E. Central O'ahu Sustainable Communities Plan

Development Plans or Sustainable Communities Plans prepared for the eight geographic regions in the County comprise the second tier. Although encompassing eight regions where each area's values, vision, and policies for accommodating growth are different, the plans collectively support the General Plan.



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Sources: Esri
State of Hawai'i,
Office of Planning

State Land Use Designations

- Overall Project Limits
- Urban
- Agricultural
- Conservation
- Proposed Reservoir

ADC lands north of Wahiawa generally are in the Central Oahu *Sustainable Communities Plan* (2002) Area. However, Reservoir Site No. 1 is within the North Shore Sustainable Communities Plan Area. While acknowledging the site is in a different community plan area, it is treated as part of the Central O'ahu *Sustainable Communities Plan* (COSCP or Plan) for this environmental assessment.

The COSCP comprises four key components. It 1) describes the role of Central Oahu in Oahu's development pattern, 2) articulates a vision for Central Oahu's future, 3) prescribes policies, planning principles, and guidelines for land use and infrastructure, and 4) identifies measures for implementing the plan.

The Central O'ahu *Sustainable Communities Plan* (COSCP) reaffirms the role of Central O'ahu and the directed growth policies of the General Plan. With regards to agriculture, the COSCP:

“Promotes diversified agriculture and pineapple on 10,350 acres of prime and unique agricultural lands along Kunia Road, north of Wahiawa, surrounding Mililani, and on the Waipio Peninsula in accordance with the **General Plan** policies to support agricultural diversification in all agricultural areas and to encourage continuation of a viable pineapple industry (COSCP, Section 1, Central O'ahu's Role in O'ahu's Development Pattern)”.

The vision for Central O'ahu and the role of agriculture is prescribed as part of an Open Space Network and Retention of Agricultural Lands. Vision statements for each are as follows:

“Urban growth will be contained within a boundary which will protect prime agricultural lands along Kunia Road, north of Wahiawa, surrounding Mililani, and on the Waipio Peninsula for diversified agriculture and pineapple will help retain open space and views, in addition to supporting economic diversification (COSCP Section 2.1, Vision Statement)”.

Agricultural lands are to be retained in the geographic locations cited above. These lands are rated unique agricultural land by the Agricultural Lands of Importance to the State of Hawaii mapping system and are rated “Good” or “B” soils by the Detailed Land Classification – Island of Oahu. Based on these ratings the land is among the most productive lands in the State for diversified agriculture (DPP, 2002).

“By protecting agricultural lands from urban development, an opportunity is created for long-term retention and development of diversified agriculture on small farms, corporate lands, and agricultural parks. Public-private partnerships will be needed to solve problems of lease terms and tenure, access to capital, research, and marketing if this vision is to be realized (COSCP Section 2.2.2, Retention of Agricultural Lands).”

The Plan acknowledges that growth will take place and establishes a Community Growth Boundary embracing the entire district. The boundary identifies areas where growth and infill can occur (inside the boundary) and areas where agriculture, open space, and natural resources should be maintained and preserved (areas outside the boundary). It is one of the

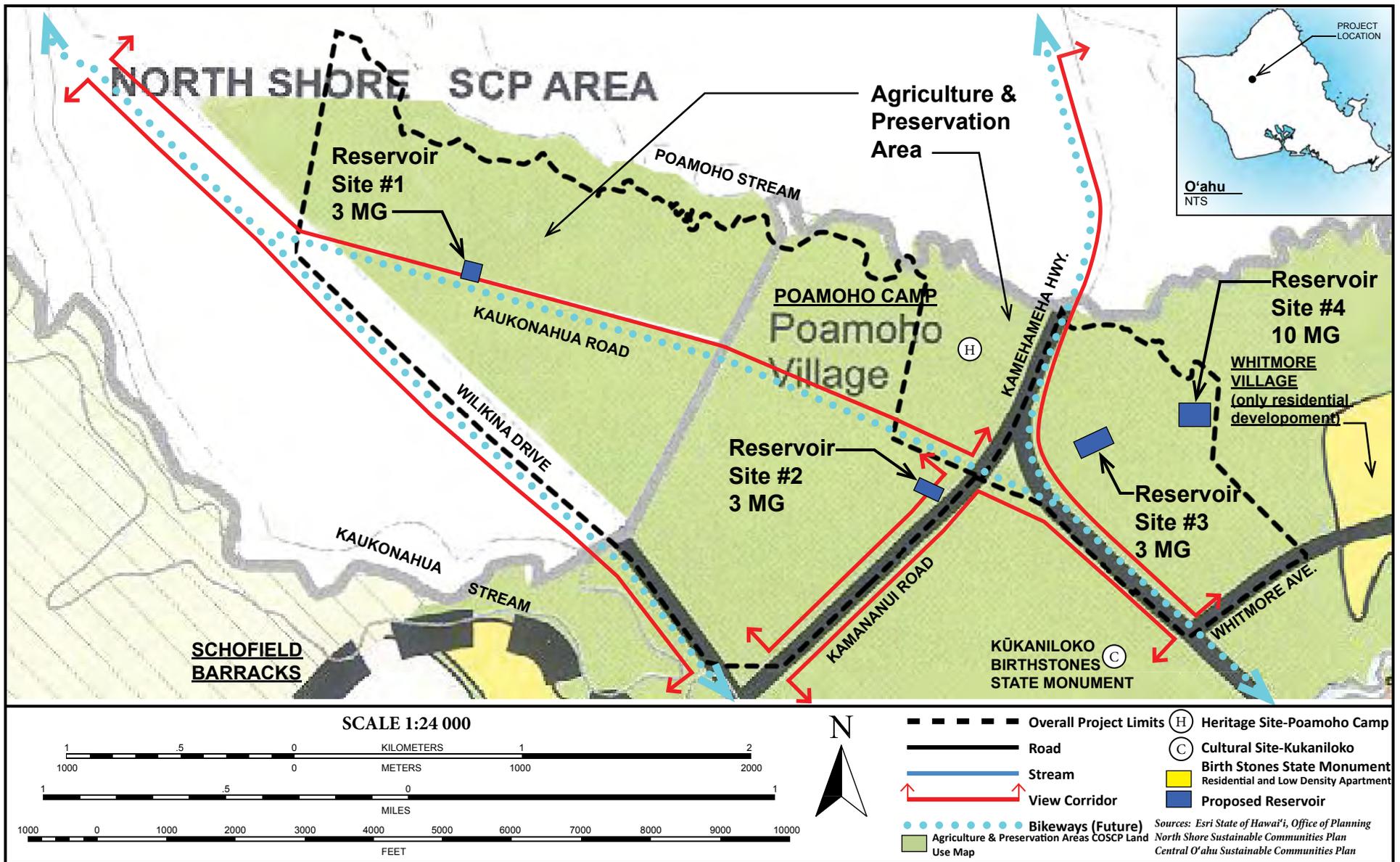
key elements for protecting valuable agricultural land from development, preserving open space, allowing for urban growth.

The Urban Community Growth Boundary essentially is a line drawn to identify existing urban areas where growth will be allowed and to separate urban areas from agricultural areas that should be protected from future development. Conversely, the boundary “Give[s] long-range protection from urbanization of an estimated 10,350 acres of prime and unique agricultural lands and for preservation of open space while providing adequate land for residential, commercial and industrial uses needed in Central Oahu for the foreseeable future. It is the intent that urban zoning not be approved beyond this Boundary (underscoring added).”

- The Central Oahu SCP Urban Land Use Map (Map A2) designates the ADC land Agricultural and Preservation Areas (See Figure 16).
- The project area is outside the Community Growth Boundary.

The Plan also recognizes that identifying agricultural lands that should be retained and protected looks good for land planning purposes but supporting facilities and accessory uses are necessary for the land to be put into agricultural use. By example such facilities are needed for worker staging, equipment and material storage, warehousing, processing, distributing, farm equipment repair, and office use for conducting all aspects of the agriculture operation. Towards that end, the Plan posits the following guidelines (Section 3.1.4.4):

- Facilities necessary to support intensive cultivation of arable agricultural lands should be permitted.
- Residential uses should be permitted only to the extent that it is accessory to the agricultural use. Where several dwelling are planned as part of an agricultural use, they should be sited and clustered to avoid the use of more productive agricultural lands and to reduce infrastructure costs.
- Buildings and other facilities that are accessory to an agricultural operation should be designed and located to minimize impact on nearby urban areas and roadways.



F. Zoning

Zoning comprises the third tier of the City's land use management system. As shown on zoning maps for the county, land is zoned by use and density (for example AG-1 Restricted Agriculture with a minimum lot size of 5 acres). The Land Use Ordinance (Chapter 21, Revised Ordinances of Honolulu), which incorporates the zoning maps for the County, prescribes the types of uses permitted in zoning districts and associated development standards. The LUO also establishes requirements for parking, specific use standards, signs, development in flood districts and special districts, and administration and enforcement procedures.

- The ADC Lands are zoned AG-1 Restricted Agriculture (See Figure 17). Permissible uses for agriculture zoned land are identified in Article 3, Table 21.3 Master Use Table of the Land Use Ordinance, City and County of Honolulu.

G. Other Controls

A **Special Area Plan**, the Wahiawa Urban Design Plan, was prepared for Wahiawa and transmitted to the City Council in 1998. The Wahiawa Urban Design Plan (1998) is a "how to" manual for implementing urban design recommendations for the town. The recommendations address four functional areas: directing more visitor traffic through Wahiawa by modifying highway signs on various highways, modifying highway signage to Wahiawa, establishing a "sense of arrival" at Wilson and Karsten Thot Bridges the two gateways to Wahiawa, enhancing streetscape aesthetics along the town's major streets, and re-establishing/preserving Wahiawa's plantation heritage through architectural design, building character/redevelopment potential. The Honolulu City Council accepted the Wahiawa Urban Design Plan as Resolution 98-262 in 1998.

The Plan makes no design recommendations for the ADC Lands.

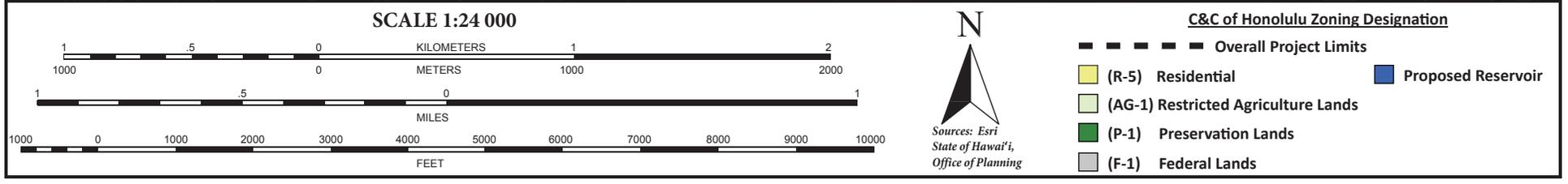
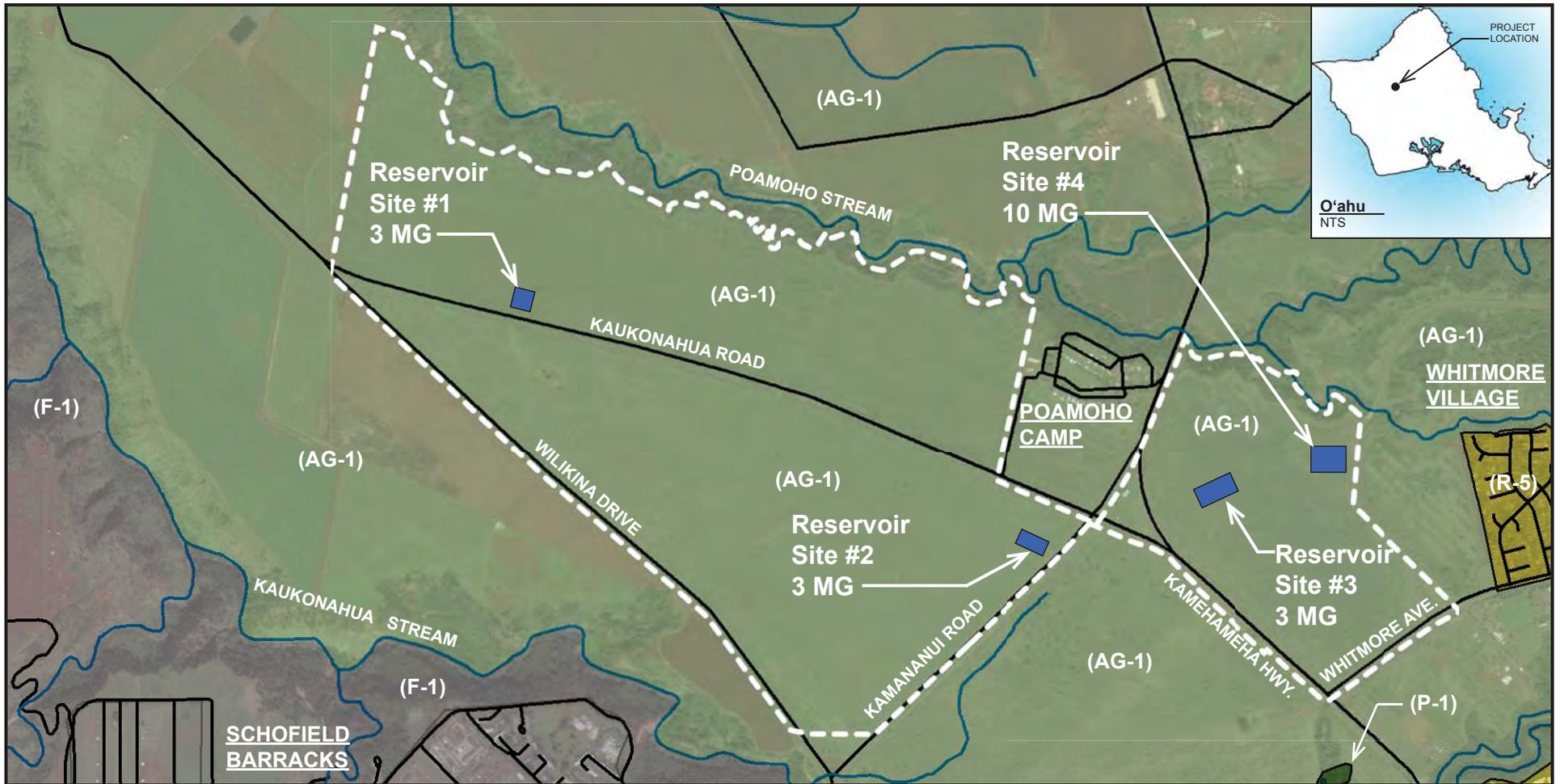
A Special District provide a means by which certain areas in the community in need of restoration, preservation, redevelopment or rejuvenation may be designated as special district to guide development to protect and/or enhance the physical and visual aspects of an area for the benefit of the community as a whole (LUO, Sec. 21-4.90).

Wahiawa Town is not one of the seven Special Districts in the City and County of Honolulu.

The project area is not located in the County delineated Special Management Area. The nearest coastal area is at Kaiaka Bay about 5.3 miles to the north at Waialua Town.

H. Hawai'i Coastal Zone Management Program

Chapter 205A, Hawai'i Revised Statutes stipulates objectives and policies "to guide and regulate public and private uses in the coastal zone management area (§205A-1)". Hawai'i's coastal zone 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 (Ibid)"



The relationship between the proposed active and the coastal zone management objectives are listed below followed by a statement disclosing the consistency of the proposed action to the respective objective. Policies for the objectives are not cited.

(1) Recreational resources

Provide coastal recreational opportunities accessible to the public.

Statement. The project area is not located on or along a shoreline thus there are no coastal recreational opportunities accessible to the public.

The north fork of Kaukonahua Stream flows to the north of the ADC land. There is no “formal” access to the reservoir from the Whitmore side, however, many well-worn walking paths lead to the reservoir.

Freshwater fishing is open to the public and Wahiawa Freshwater State Park, located on the south fork of Kaukonahua Stream, provides permanent boat launching facilities, vehicle-trailer parking, a comfort station, and areas for passive recreation. Both the public fishing area and freshwater park are administered by the Department of Land and Natural Resources, State of Hawai'i.

(2) Historic resources

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

Statement. Archaeological inventory surveys (Keala Pono, 2014) of the four reservoir sites did not reveal the presence of surface historical features. Limited excavations at each site also did not uncover remains of pre-historic features. Ceramics and glass of historic vintage were unearthed at one of the reservoir sites.

(3) Scenic and open space resources

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

Statement. Coastal scenic and open space resources are not present in the project area.

(4) Coastal ecosystems

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

Statement. Valuable coastal ecosystems have not been identified in the project area.

(5) Economic uses

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

Statement. The proposed project is not a coastal dependent development. However, construction of water storage reservoirs and the re-establishment of agricultural activities at this location and on fallow agriculture land are important to the State's economy.

(6) Coastal hazards

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

Statement. The proposed action is not planned for an area exposed to tsunami, storm waves, stream flooding, and known subsidence.

Flood Insurance Rate Maps place the project area in Other Flood Areas Zone "D" which is defined as "[U]nstudied areas where flood hazards are undetermined but flooding is possible" (National Flood Insurance Program, 2014).

(7) Managing development

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

(8) Public participation

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

Statement. The Agribusiness Development Corporation has commissioned the preparation of an environmental assessment pursuant to Chapter 343, Hawaii Revised Statutes. The purpose of the assessment is to disclose potential environmental impacts associated with the project. To date, the pre-assessment consultation phase has been completed and a Draft Environmental Assessment prepared. The Draft Environmental Assessment was circulated to government agencies, elected officials, community organizations, individuals, and others requesting to be a consulted party. The Wahiawa Neighborhood Board was briefed about the project on March 16, 2015.

(9) Beach protection

Protect beaches for public use and recreation.

Statement. The proposed action is not proposed on a beach or along the shoreline.

(10) Marine Resources

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

Statement. The proposed action will not affect marine resources.

A. Assessment Process

The scope of the project was discussed with staff of the Agribusiness Development Corporation, existing lessees, the consulting engineers, and consultants preparing technical reports for the environmental assessment. State and County agencies were contacted for information relative to their areas of expertise. Agencies, organizations, and persons with an interest in the proposed action were requested to provide comments during the pre-assessment consultation periods. Consultants were retained to investigate potential impacts on biological, archaeological, and cultural resources. Informant interviews also were conducted with cultural practitioners with knowledge of the area. Potential impacts on the road system with the project also were evaluated.

Time was spent in the field noting conditions at the reservoir sites and general conditions of the ADC lands. The sum total of the consultations and field investigations helped to identify existing conditions and features that could affect or be affected by the proposed action. These conditions include:

- ADC land is fallow, generally unimproved and devoid of permanent structures;
- Rare, threatened, or endangered flora or fauna are not found on the reservoir sites;
- There are no surface archaeological resources at the reservoir sites;
- Cultural practices have not been associated with the reservoir sites;
- The reservoir sites are located in areas where the flood hazard is undetermined;
- There are no streams, ponds, or wetlands on the reservoir sites;
- The reservoir sites are not located adjacent to residential areas;

The four proposed water storage reservoirs are not water storage tanks or above ground structures. The reservoirs will be constructed at or below grade by excavating the ground to design depth and impoundment dimension, lining the excavated area, and in two instances surrounding the reservoir perimeter with earthen berms for impounding water. Reservoir dimensions vary and affect the extent of cut and fill quantities for each. Associated improvements include constructing access driveways, spillway piping, and fencing.

B. Short-term Impacts

Construction will temporarily affect ambient air quality. Site work activities will raise fugitive dust that can settle in adjoining areas. Site work will be limited to the reservoir sites and associated driveways. The limited area to be disturbed should aid in mitigating dust generation and erosion. The general contractor will employ dust control measures to prevent work site and construction equipment and activities from becoming significant dust generators. Control measures will comply with Chapter 60.1, Air Pollution Control, Title 11, State Department of Health (and revisions thereto).

Most construction equipment and vehicles are diesel powered and emit exhaust emissions typically high in nitrogen dioxide and low in carbon monoxide. The Federal and State nitrogen dioxide standard ---100mg/m³ per annum---which is an annual standard, is not likely to be exceeded during construction. Carbon dioxide emissions should be less than that generated by automobile traffic on adjoining streets. Fumes from diesel equipment may be detected but should be dispersed by the prevailing winds.

Like fugitive dust, construction noise cannot be avoided. Exposure to noise will vary by construction phase, the duration of each phase, and the type of equipment used during the different phases. Maximum sound levels in the range of 82-96 db(A) measured at 50 feet from the source would be generated by heavy machinery during site work. After site work is completed, reductions in sound levels, frequency, and duration can be expected.

Community Noise Control regulations (State Department of Health, Title 11, Chapter 46 Noise Control for Oahu) establish maximum permissible sound levels for construction activities occurring within “acoustical” zoning districts. Based on the agricultural zoning for the property, the project is classified as a Class C zoning district for noise control purposes. The maximum permissible daytime (7 a.m. to 10 p.m.) sound level in the district is 70 dBA during daytime and nighttime for stationary noise sources and equipment related to construction (§11-46-4). Any noise source that emits noise levels in excess of the maximum permissible sound levels cannot be operated without first obtaining a noise permit from the State Department of Health. Although the permit does not attenuate noise per se it regulates the hours during which excessive noise is allowed. The contractor will be responsible for obtaining and complying with conditions attached to the permit.

Although limited in area, site work will expose soil thus creating opportunities for erosion (fugitive dust and suspended sediment in construction related runoff) at each reservoir site. Estimated earthwork for the below grade reservoirs are shown on Table 8.

Table 8. Earthwork Quantities

Reservoir Site	Graded Area (SF)	Excavation (CY)	Embankment (CY)
1	NA	7,945	5,740
2	NA	NA	None
3	85,000	8,150	9,260
4	NA	NA	None

Sources: AgTech Pacific, 2014, 2015

Trenching and stockpiling excavated or imported material will be performed in accordance with Chapter 14, Article 14 of the Revised Ordinances of Honolulu, 1990, as amended. Furthermore, work will be done in accordance with the Rules Relating to Soil Erosion Standards and Guidelines.

Best Management Practices (BMPS) for erosion and drainage control during construction will be incorporated into grading plans. BMPS will include erecting silt fences around the project limits, grassing all exposed areas after grading work is completed, placing absorbent socks around drain inlets to minimize sediment from entering the drainage system, and constructing stabilized construction access pads at road entrances to minimize tracking mud and debris

onto public roads. The contractor may implement other BMPS based on field conditions and their experience in working with similar work sites.

BMPS also will be implemented pursuant to City and County of Honolulu Rules Relating to Storm Drainage Standards, Section II, Storm Water Quality.

Site work at all the reservoirs will exceed one acre thus a NPDES General Permit Authorizing Discharges of Storm Water Associated with Construction Activity will be required from the State Department of Health.

The majority of the project area was formerly used as agricultural land and agricultural chemicals such as pesticides and herbicides used on pineapple and sugar cane crops may be an environmental concern. However, no evidence of chemical mixing or storage areas or excessive use of pesticides and herbicides from past agricultural use was identified at the subject property (project area) during several Phase I ESA. Prior to earthmoving activities, workers should be apprised that herbicide and pesticide were applied to the land and the site work contractor should take appropriate precautions.

Threatened or endangered flora were not found during the reconnaissance survey. Nearly all of the plant species seen during the survey are not native to Hawaii, and the one native species present is common throughout the Hawaiian Islands. Therefore, the proposed project is not expected to have a significant, adverse impact on botanical resources.

SWCA recommends that native Hawaiian plants be employed for landscaping around the project area to the maximum extent possible. Potential native species that may be appropriate for landscaping at the proposed project area include 'a'ali'i (*Dodonaea viscosa*), alahē'e (*Psydrax odorata*), and O'ahu sedge (*Carex wahuensis*).

Hawaiian hoary bats are known to occur on O'ahu in native, non-native, agricultural, and developed landscapes (U.S. Department of Agriculture 2009; U.S. Fish and Wildlife Service [USFWS] 1998). No large trees were observed during the survey although small tree seedlings were seen. If trees are to be cut as a result of the project, direct impacts to bats would occur only if a juvenile bat that is too small to fly but too large to be carried by a parent were present in a tree that was cut down.

Although the chances of adversely affecting Hawaiian hoary bats as a result of the proposed project are likely small, the following measures are recommended as a conservative impact avoidance measure:

- Any fences that are erected as part of the project should have barbless top-strand wire to prevent entanglements of the Hawaiian hoary bat on barbed wire. No fences in the project area were observed with barbed wire during the survey; however, if fences are present, the top strand of barbed wire should be removed or replaced with barbless wire.
- No trees taller than 15 feet (4.6 m) should be trimmed or removed as a result of this project between June 1 and September 15, when juvenile bats that are not yet capable of flying may be roosting in the trees.

Implementation of these guidelines, which have been promulgated by the USFWS (1998), is expected to result in the avoidance of all direct impacts to Hawaiian hoary bats.

SWCA observed five bird species federally protected under the Migratory Bird Treaty Act during this survey. Only the Pacific golden-plover is considered a native migratory bird species in Hawai'i. It is one of the most common wintering migrants throughout the Pacific Basin (Pyle and Pyle 2009). Construction at the site may temporarily displace some of these bird species, but long-term impacts are not expected. These birds (likely limited to a few individuals) are expected to find suitable foraging habitat at nearby areas. The temporary displacement of these individuals in the project area is not expected to affect an individual's survival or the overall species' populations

No pre- or post-contact surface architecture was found during pedestrian survey of the project areas. All areas were found to be disturbed by pineapple cultivation. Likewise, subsurface testing did not yield any evidence of subsurface cultural features or deposits. Stratigraphy consists of the pineapple cultivation layer speckled with black plastic fragments, with a sterile layer below. Evidence of more recent disturbance was noted at Reservoir 3, as the entire area had been bulldozed. An assemblage of historic material was collected from the surface and in backdirt piles, in secondary context. These consisted of 85 items of ceramic and glass that may be trash from pineapple or sugarcane field laborers. Items within the collection may date to as early as 1868 or as late as 1930. The ceramics were roughly evenly split between Euro-American and Asian. Of the Asian ceramics, most were Japanese in origin. The majority of glass consisted of soda bottles, with more than half of these from the Waialua Soda Works. The Waialua Soda Works bottles could be dated to within a few years, between ca. 1910 and 1912.

In sum, archaeological survey was conducted on TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiaw and TMK: (1) 6-5-002:010 (por.) in Kamananui. No archaeological sites were found, and the only remains were glass and ceramics collected from a disturbed context. Construction of the four reservoirs will have no effect on historic properties because no historic properties occur there.

Archaeological and/or cultural monitoring is recommended, however, because of community concerns that there may be subsurface archaeological remains. It should be noted that isolated human burial remains may be discovered during construction activities, even though no evidence of human burials was found during the survey. Should human burial remains be discovered during construction activities, work in the vicinity of the remains should cease and the SHPD should be contacted.

The project lands played an important role in Hawai'i in both the traditional and historic past. A rich corpus of background information was found for the region, including place names and their meanings, *ōlelo no'eau*, *mo'olelo*, information on land use in traditional and historic times, and data from archaeological work. Adding significantly to this is the information shared during the oral history interviews and within the consultants' written statements. The consultants for this project all have strong ties to the region, and offered important insight into the history of the area.

Research and ethnographic survey compiled for the current study revealed that the project area was a culturally significant region as the birthplace and home of the great chiefly line known as the Lo Ali'i. Therefore, all of Central O'ahu was a sacred area peopled by high-ranking chiefs. At the

center of these chiefly lands were the hallowed grounds called Kukaniloko. As the birthplace and residence of the high chiefs, Central O'ahu remained a revered place throughout the centuries.

Community members who are knowledgeable of the cultural resources of the study area provided their *'ike* which identified significant cultural practices that continue to today. One consultant noted the importance of preserving areas "not just to gather [plants], but to protect things we need for our ceremonies." It was asserted that the Kukaniloko site is much more extensive than generally recognized today, and that buried cultural resources might lie beneath the surface. Traditional religious practices are still carried out in the project lands. One consultant reaffirmed this with the following statement:

...These practices and traditions never stopped despite all of the influx of foreigners, despite the banning of the language, despite the overflow of the religions and the governments and all of that, these practices have never stopped. These traditions are still here. We have to make sure that we keep these intact. This is our religion, if you want to call it that, for lack of a better English word.

Consultants expressed concern over several resources that may be affected by construction of the proposed reservoirs. Resources that might be affected include Kukaniloko, other known and previously undocumented cultural sites, as well as the *wai and 'āina* (water and land).

Vehicles carrying workers and material will contribute to traffic on Kamehameha Highway, Kaukonahua Road, and Kamananui Road the major streets accessing this part of Central O'ahu. Construction related trip generation is anticipated to be minimal because reservoir construction will be confined primarily to earthmoving activities hence a large, skilled workforce is not required. Material deliveries will be scheduled during non-peak traffic hours to minimize impact on local traffic.

Temporary construction field offices and base yards may be set up at each reservoir site. Material will be unloaded and stockpiled in the base yard. Construction equipment will be stored in the base yard and the yard secured after working hours.

According to public safety service and natural resource agencies consulted during the assessment period, existing services and resources are not expected to be adversely affected by the project. The Fire Department indicated, "that there will be no significant impact to fire department service due to the construction of the four reservoirs (Bratakos, Fire Dept., June 23, 2015). The Honolulu Police Department stated it anticipates, "No significant impact on the services or operations of the HPD (Tsuyemura, HPD, June 16, 2015). The State Division of Aquatic Resources of DLNR stated it has, "no objection to the proposed project. (DAR) "would like to see Best Management Practices toward preventing contaminants from possibly entering the aquatic environment during project activities (Miyasaka, DAR DLNR, June 19, 2015)."

C. Long-term Impacts

The purpose of the project is to provide reservoirs for storing irrigation water to be drawn as needed by users. Irrigation water will be supplied by an existing and proposed state wells in the project area. Without water large scale agriculture initiatives for the area are limited or non-existent. Indirectly, irrigation water will be applied to agricultural fields for growing an

array of vegetable, fruit, tropical foliage, and tree crops. Individual licensees and their respective farming and business objectives will determine what is to be grown.

ADC is permitted to withdraw up to 2.0 MGD from an existing state well near the western end of the project limits. At this time it is unknown when the maximum withdrawal will be achieved and how withdrawal would affect the Wahiawa aquifer. The Commission on Water Resource Management would not have approved a groundwater use permit if studies and analysis of the aquifer system concluded that withdrawing 2.0 MGD could impair the resource. It is anticipated that the Commission will monitor water usage and the condition of the aquifer. Sustaining the aquifer is of paramount importance and it is further anticipated that Commission actions in the future will be guided by protecting this potable drinking water source.

Reservoir construction will be staggered with construction of the private reservoirs preceding the ADC reservoirs. One of the licensees proposes to commence construction after the environmental assessment process is completed and state and county approvals received. A building schedule for the second private reservoir and the two ADC reservoirs has not been determined. The ADC reservoirs require legislative appropriation for construction and are subject to state procurement regulations. Because of the staggered construction schedule, short-term impacts discussed earlier are expected to be repeated on a site by site basis until the four reservoirs are completed.

The reservoirs *per se* are not anticipated to result in long-term adverse environmental impacts. The reservoirs do not take up large tracts of land compared to the size of the lots on which they are proposed and they are spaced out over the 1,200 acre project area.

Below grade construction should not threaten public safety. The reservoirs are sited away from populated locations and in open fields (that eventually will be planted). Inflow and outflow can be controlled either at the water source or reservoir. Should the reservoirs need to be drained water discharge can be controlled without posing drainage or flood hazards. For this purpose, the two private reservoirs will be constructed with spillways.

The below grade reservoirs are set back well distant from roads and should not be clearly visible from roads or nearby locations. Reservoir No. 2 is the exception because of its location and elevation below the grade of Kamananui and Kaukonahua Roads. Its appearance will be no different from other open reservoirs and water infrastructure (diches, flumes) already existent on agricultural lands between Wahiaw and Hale'iwa/Waialua. Over time, the reservoirs will become part of the agricultural landscape and obscured from view by cultivated material.

The water reservoirs are small but vital infrastructure inputs for agriculture production. The three factors of production --- land, labor, and capital --- should include water and transportation when it comes to agriculture. ADC is setting aside land and committing public funds for building the water infrastructure. The state owns and operates a well in the area (with a second well planned) thus water is available. A system of state and county roads is already in place providing access to Honolulu and all parts of O'ahu. Labor and capital will be provided by farmers and businesses. The State has the land, water, and soon water infrastructure --- agriculture activities will follow.

It is postulated that reservoir construction will not result in significant adverse environmental impacts. The action, however, is viewed for this environmental assessment as a component

of a long-range commitment that has a bearing on the project area, agriculture on O‘ahu, and agricultural development in the state in general. In this context a recent newspaper article talked about a state initiative called the “Whitmore Project” (Honolulu Star Advertiser, 2014). The acquisition of the Galbraith Estate Land was the first major step of the initiative with the land now under ADC control. A second step is the provision of water storage facilities as proposed by this action. With land availability and water, it is anticipated that fallow land will be put into productive use. Such uses may not be limited only to growing food crops but can spawn ancillary activities such as processing and manufacturing what is grown in the area for market.

It is anticipated that current and future ADC objectives and actions in conjunction with the Whitmore Project should:

- Re-establish Wahiawa and adjoining communities as a hub for agriculture [At one time Wahiawa was called the “Pineapple Capital of the World”]
- Strengthen the role of agriculture as a viable economic sector of the local economy
- Provide economic and employment opportunities with trickle down effects to other economic sectors
- Help reduce importation of food stuffs
- Promote agricultural self-sufficiency
- Provide opportunities for “incubating” new crops
- Promote agricultural tourism
- Facilitate construction of manufacturing/processing facilities for crops grown in the area
- Provide research facilities and educational opportunities in agriculture

Long-term economic benefits from reservoir construction are difficult to identify and quantify with certainty. The availability of water and land should stimulate and create opportunities for expanding agriculture in the area. Growth in agriculture will create employment opportunities that should increase payroll taxes to federal and state governments. State and county excise taxes should increase as products are bought and sold. Real estate taxes could be affected as fallow land is put into productive use. Changes in real estate taxes will depend on the assessed land value and the corresponding tax rate at the time of assessment.

Agricultural development supports state and county plans for the area through the time horizon articulated for the respective plans. As discussed in Section 3 of this environmental assessment, agricultural uses are consistent, supportive, and implement the:

- Hawaii State Plan objectives and policies for agriculture as an economic activity, diversified agriculture as a growth industry, and the provision of water infrastructure for agriculture.
- General Plan for O‘ahu objectives and policies associated with Economic Activity and Transportation and Utilities
- Central Oahu and North Shore Sustainable Community Plan policies and guidelines for protecting agricultural land from development and preserving open space

- Agricultural uses for AG-1 zoned land per the City and County of Honolulu’s Land Use Ordinance
- Consistent with the Hawai’i Coastal Zone Management Program objectives and policies

The U.S. Fish and Wildlife Service (2014 Comment Letter) pointed out that endangered waterbirds fly over the area and may be attracted to the open, uncovered reservoirs. Should this occur, ADC, state and federal wildlife officials, and the reservoir owners will discuss measures for allowing waterbirds to frequent the reservoirs or measures to prevent waterbirds from doing so.

The significance of the archaeological site ---Kukailimoku --- was described in written reports prepared for this assessment (Keala Pono, 2014). The site is located on land under jurisdiction of the Office of Hawaiian Affairs (“OHA”) and will not be directly impacted by this undertaking. However, as agricultural activities materialize and the area transitions again to wide spread agricultural uses the feature should be integrated into a plan for the OHA lands. It would be in the public interest for a “community of stakeholders” to collaboratively strive to determine its future status and how that that future is to be attained.

Future traffic conditions were projected for “With” and “Without” project scenarios for the six parcels under ADC control. For this project, an annual increase of 1.1% growth in traffic was applied to the existing year (2014) peak hour traffic to estimate year 2017 peak hour traffic demands. The results are indicative of traffic conditions in 2017 without the project.

Future traffic with the project was calculated by applying trip generation rates and assigning worker traffic to the AM and PM peak hours for the six sites controlled by ADC. Trip generation rates for agricultural workers, however, are not available in the published reference Trip Generation (Institute of Traffic Engineers). Thus, a 0.4 worker/acre ratio was used for estimating the agricultural workers by site. The resulting projection of workers and trip assignment by site is shown in Table 9. The trip generation methodology is explained in the Traffic Impact Analysis (2015).

Table 9. Trip Generation Characteristics

Site	Acreage	Employees	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
1	311	124	83	7	90	6	78	84
2	302	121	81	7	88	6	76	82
3&4	236	94	63	5	68	4	59	63
5	145	58	39	3	42	3	37	40
6	192	77	51	4	55	4	49	53
Totals	1186	474	317	26	343	23	299	322

Source: The Traffic Management Consultant, 2015.

The Traffic Impact Analysis posited the following conclusions for morning (AM) and afternoon (PM) peak hour conditions and ADC reservoir development to the year 2017.

AM Peak Hour Traffic Impact Analysis With Project

- The intersection of Kamehameha Highway and Whitmore Avenue is expected to operate at an overall LOS "D". However, the individual traffic movements are expected to operate at the same Levels of Service as under the AM peak hour of traffic without the proposed project.
- The other intersections in the study area operated at satisfactory Levels of Service, or at the same Levels of Service as during the AM peak hour of traffic without the proposed project.
- All the Site Access Driveways are expected to operate at satisfactory Levels of Service, during the AM peak hour of traffic with the proposed project.

The AM peak hour traffic with the proposed project is depicted on Figure 18.

PM Peak Hour Traffic Impact Analysis With Project

- The left-turn movement from Kaukonahua Road at Wilikina Driveway is expected to operate at LOS "D", during the PM peak hour of traffic with the proposed project. The other traffic movements at the intersection are expected to operate at the same Levels of Service as under the PM peak hour of traffic without the proposed project.
- The other intersections in the study area operated at satisfactory Levels of Service, or at the same Levels of Service as during the PM peak hour of traffic without the proposed project.
- The Sites #3 & #4 Access Driveway is expected to operate at LOS "E" at Kamehameha Highway, during the PM peak hour of traffic with the proposed project.
- The other Site Access Driveways are expected to operate at satisfactory Levels of Service.

Figure 19 depicts the PM peak hour traffic with the proposed project.

The proposed State of Hawaii Agribusiness Development Corporation reservoirs and agricultural activities on the former Galbraith Estates land in Wahiawa, Hawaii is expected to have minimal impacts to traffic at the major intersections in the study area.

A. No Action

The No Action alternative would preclude the occurrence of all environmental impacts --- short and long-term and beneficial and adverse---disclosed in this Assessment. Without water storage improvements the capability of the area's irrigation water system to provide additional reserve during power outages, help optimize pumping hours, and improve water pressure for anticipated diversified crop cultivation would be foregone. The State of Hawaii would not be fulfilling its mission to provide critical infrastructure improvements on appropriately zoned agricultural land to facilitate the increased demand for locally grown vegetables and fruits. Opportunities to expand local production of food crops would be hindered and a State goal of achieving agricultural self-sufficiency prolonged. The No Action alternative would therefore mean the purpose of the project will not be attained, and desired long-term objectives for agriculture in the project area and agriculture in general delayed until some future time.

Construction permits and approvals required for the proposed improvements and approving authorities are identified below. Additional permits and approvals may be required depending on agricultural uses/operations and improvement/construction plans of individual tenants.

Federal

None Required

State of Hawai'i

Department of Health

NPDES Permit

Department of Land and Natural Resources

Commission on Water Resources Management

Well Construction Permit

Pump Installation Permit

Water Use Permit

State Historic Preservation Division

Historic Site Review

Department of Transportation

Right of Access

Permit to Perform Work Within a State Highway Right-of-Way

City and County of Honolulu

Department of Planning and Permitting

Grubbing, Grading, and Stockpiling Permit

Excavation Permit

Permit to Excavate Public Right-of-Way

SECTION 7

AGENCIES, ORGANIZATIONS, INDIVIDUALS CONSULTED IN THE ASSESSMENT PROCESS

Pre-assessment consultation letters to gather comments for the preparation of this Draft Environmental Assessment were distributed to forty-two (42) federal, state, and county agencies, utilities, community organizations and leaders listed below. Consultation commenced a 30-day response period ending November 22, 2014. Fourteen (14) response letters were received (Appendix A) and were addressed as part of the EA analysis.

The availability of the Draft Environmental Assessment was announced in the State of Hawai'i Office of Environmental Quality Control (OEQC) June 8, 2015 issue of the Environmental Notice publication for a required 30-day public review period. Consulted parties listed below were sent copies of the DEA in CD format via US Postal Service. Fourteen (14) comment letters and email communications were received and response letters were sent to commenting parties. Comments letters, responses and a tabular summary of comments and responses are included in Appendix B.

Federal

U.S. Environmental Protection Agency
Pacific Island Contact Office
P.O. Box 50003
Honolulu, Hawaii 96850

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd, Rm 3-122, Box 50088
Honolulu, Hawaii 96850

U.S. Army Corps of Engineers Honolulu Dist.
Pacific Ocean Division
Building 525, Suite 300
Fort Shafter, Hawaii 96858

Department of the Interior
Geological Survey
Pacific Islands Water Science Center
677 Ala Moana Blvd., Ste. 415
Honolulu, Hawaii 96813

Department of Agriculture
U.S. NRCS
Pacific Islands Area Office
PO Box 50004
Hon., HI 96850

State of Hawai'i

Environmental Health Administration
Department of Health
State of Hawai'i
P.O. Box 3378
Honolulu, Hawaii 96801

Ford Fuchigami, Director/Alvin Takeshita
State of Hawai'i Department of Transportation- Highways
Aliiaimoku Bldg., 869 Punchbowl Street
Honolulu, Hawaii 96813

Scott Enright, Chairperson
State of Hawaii Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Administrator
State of Hawai'i Department of Land and Natural Resources
Historic Preservation Division
601 Kamokila Blvd., Suite 555
Kapolei, Hawaii 96707

University of Hawaii
Environmental Center
2500 Dole Street
Krauss Annex 19
Honolulu, HI 96822

Russell Tsuji, Administrator
Land Division
State of Hawaii DLNR
P.O. Box 621
Honolulu, Hawai'i 96809

Dr. Kamana'opono Crabbe, Chief Operating Officer
Office of Hawaiian Affairs
Attn: OHA Compliance Enforcement
560 N. Nimitz Highway, Ste 200
Honolulu, HI 96817

Jessica Wooley, Director
State of Hawaii OEQC
235 South Beretania St., Suite 702
Honolulu, Hawaii 96813

City and County of Honolulu

George Y. Atta, Director
Department of Planning & Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Department of Design & Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Department of Environmental Services
City and County of Honolulu
1000 Uluohia St., Ste 308
Kapolei, HI 96707

Fire Chief
City and County of Honolulu
636 South Street
Honolulu, HI 96813-5007

Chief of Police
City and County of Honolulu
801 S. Beretania Street
Honolulu, Hawaii 96813

Department of Facilities Maintenance
1000 Uluohia St., Ste. 215
Kapolei, Hawaii 96707

Board of Water Supply
City and County of Honolulu
630 S. Beretania Street
Honolulu, Hawaii 96813

Utilities

Oceanic Time Warner Cable
200 Akamainui St.
Mililani, HI 96789

Hawaiian Telcom
1177 Bishop Street
Honolulu, HI 96813

Hawaiian Electric Company
P.O. Box 2750
Honolulu, HI 96840

Elected Officials

State Senator Donovan Dela Cruz
Senate District 22
State Capitol, Rm. 202
Honolulu, HI 96813

State Representative Marcus Oshiro
House District 46
State Capitol, Rm. 424
Honolulu, HI 96813

Ernest Y. Martin, Council Chair, District 2
530 So. King St., Rm. 202
Honolulu, HI 96813

Organizations, Neighbors and Individuals

Wahiawa-Whitmore Village NB #26
Jeanne Ishikawa, Chair
jeannenb26@yahoo.com

Sierra Club, Hawaii Chapter
Anthony Aalto, Chair
abaalto@gmail.com

Larry Jefts
94-877 Kunia Road
Kunia, HI 96759

Ohana Best Farm LLC
c/o Joseph Blanco
PO Box 30045
Hon., HI 96820

Alii Turf
700 Whitmore Ave.
Wahiawa, HI 96786

Green World Coffee Farm
71-101 N. Kamehameha Hwy
Wahiawa, HI 96786

Dole Plantation
64-1550 Kamehameha Hwy

Wahiawa, HI 96786

Helemano Plantation
64-1510 Kamehameha Hwy
Wahiawa, HI 96786

Helemano Farms LLC
1750 Whitmore Ave.
Wahiawa, HI 96786

SECTION 8

DETERMINATION OF SIGNIFICANCE

Chapter 200 (Environmental Impact Statement Rules) of Title 11, Administrative Rules of the State Department of Health, establishes criteria for determining whether an action may have significant effects on the environment (§11-200-12). The relationship of the proposed project to these criteria is discussed below.

1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

Natural and cultural resources will not be “lost” since none are present on the four reservoir sites.

2) Curtails the range of beneficial uses of the environment;

The project does not curtail the beneficial uses of the environment. Land in the project area has been fallow for approximately a dozen years.

3) Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, Hawaii Revised Statutes, and any revisions thereof and amendments thereto, court decisions or executive orders;

The project does not conflict with long-term environmental policies, goals, and guidelines of the State of Hawaii.

4) Substantially affects the economic or social welfare of the community or State;

The project will not substantially affect the economic or social welfare of the State in the short-term. In the long-term it is anticipated that the ADC lands and water availability will stimulate agriculture development in the area. In turn, agriculture development should help bolster one of the State's economic sectors, provide employment opportunities, foster agricultural self-sufficiency, reduce food imports, and spin-off agriculture related activities. Such activities could include processing and packing plants, on-site distribution centers, and agricultural tourism.

5) Substantially affects public health;

Public health will not be adversely affected during construction. Short-term environmental impacts in the form of fugitive dust, noise from construction equipment, and minor erosion (dust and construction related runoff) can be expected. These impacts can and will be mitigated by measures described in this Assessment and measures, such as BMPs for erosion control to be submitted with grading plans and construction notes on construction drawings.

The areas on which the reservoirs are to be built are distant from the residential communities of Whitmore Village and Poamoho Camp. Thus air quality in these settled communities should not be affected and noise should not be clearly audible. In addition,

dust and noise from reservoir construction should be no different from dust and noise resulting from limited agricultural activities taking place near the project area.

6) Involves substantial secondary impacts, such as population changes or effects on public facilities;

Population changes and effects on public facilities are not anticipated as a result of the project.

7) Involves a substantial degradation of environmental quality;

The reservoir sites already have been substantially altered by previous pineapple cultivation.

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

The proposed action is limited to the construction of four water storage reservoirs. This environmental assessment disclosed that the action will not result in significant short-term impacts and anticipated impacts are construction related and will be limited generally to the location of the respective reservoirs.

Based on available information the four reservoirs are the key development activity on the respective sites and in the project area into the reasonably foreseeable future. As the fallow but fertile lands are transformed into productive agricultural use, cumulative impacts can be anticipated as the ADC and those with an interest in agricultural development strive to improve the economic and social welfare of the State (See Criterion 4 above).

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

Rare, threatened or endangered flora and fauna are not found on the reservoir sites.

10) Detrimentially affects air or water quality or ambient noise levels;

Ambient air quality will be affected by fugitive dust and combustion emissions during site work but can be controlled by measures stipulated in this Assessment. Construction noise may be pronounced during site preparation work but should diminish once the reservoirs are completed. All site work activities will comply with air, water quality, and noise pollution regulations of the State Department of Health.

Erosion control measures will be prescribed in grading plans and BMP prepared for the project.

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

The reservoirs are neither located in a flood hazard area nor environmentally sensitive area. Reservoir development and use are not anticipated to affect Poamoho Stream,

Kaukonahua Stream, and Lake Wilson as the reservoir lots are several thousand feet from these resources.

12) Substantially affects scenic vistas and view planes identified in county or state plans or studies, or,

The below grade reservoirs will not affect scenic vistas or view planes. The ADC land is neither identified specifically as a visual resource to be seen (such as a natural landmark) nor located within scenic vistas or view planes identified in county or state plans. The Central Oahu *Sustainable* Communities Plan, however, indicates that panoramic views across the agricultural fields are provided from adjacent the adjacent road network.

13) Requires substantial energy consumption.

Substantial energy consumption is not anticipated. Emergency generators will provide power for sustaining pumping capacity at the respective reservoirs should a power shortage or outage occur.

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Keala Pono Archaeological Consulting, LLC. December 2014. *Cultural Impact Assessment of TMK: (1) 7-1-001:002 and :005, Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010, Kamananui Ahupua‘a, Waialua District, Island of O‘ahu, Hawai‘i*. Prepared for Environmental Planning Solutions, LLC.

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Plans and Drawings

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Correspondence

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Glossary of Acronyms and Hawaiian Terms

ADC	Agribusiness Development Corporation
ALISH	Agricultural Lands of Importance to the State of Hawai'i
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
COSCP	Central Oahu Sustainable Communities Plan
CT	Census Tract
dB	decibel
DOA	Department of Agriculture
EA	Environmental Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ha	hectare
HCM	Highway Capacity Manual
HRS	Hawai i Revised Statutes
LOS	level of service
LSB	Land Study Bureau, University of Hawai i
LUO	Land Use Ordinance
<i>makai</i>	toward the ocean (seaward)
<i>mauka</i>	toward the mountain (landward)
MSL	mean sea level
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
rec	recognized environmental conditions
SCP	Sustainable Communities Plan
SHPD	State Historic Preservation Division
SMA	Special Management Area
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
vph	vehicles per hour

Preparers

Contributors to the preparation of the Environmental Assessment are listed below:

Ivan Kawamoto, Project Coordinator/Manager
State of Hawai i Agribusiness Development Corporation

Colette Sakoda, Environmental Planner and Project Manager
Environmental Planning Solutions, LLC

Gerald Park, Urban Planner, Senior Author, QA/QC
Gerald Park Urban Planner

InForm Design, Inc.
Graphics

Akinaka & Associates, Inc.
Prime Engineering Design Consultant

AgTech Pacific
Engineering Design Consultant

Keala Pono
Archaeologists, Cultural Resources Assessor

SWCA
Biological scientists

Randall Okaneku, P.E.
Traffic Engineering and Impacts Assessor
The Traffic Management Consultant

PRE-ASSESSMENT CONSULTATION

PRE-ASSESSMENT LETTER

October 22, 2014

Board of Water Supply
City & County of Honolulu
630 S. Beretania St.
Hon., HI 96813

Dear Consulted Party:

Subject: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project, Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road - Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

The State of Hawai'i Agribusiness Development Corporation (ADC) is proposing farm land preparation and construction of four reservoirs: three (3) 3 MG reservoirs, and a 10 MG reservoir on the former pineapple fields known as the former Galbraith Estate property in Wahiawa, Central Oahu. A Project Location Map is enclosed for your reference. ADC's agricultural land preparation is to support diversified crop production to supply fresh produce to local markets and businesses serving Hawai'i's residents. The need for an HRS Chapter 343 Environmental Assessment (EA) is triggered by the use of State of Hawai'i owned land. Technical studies to include an Archaeological Inventory Survey (AIS), Cultural Impact Assessment (CIA), Traffic Impact Analysis Report (TIAR), and Biological Resource Impact Assessment will be prepared in conjunction with the environmental assessment. The State of Hawai'i Department of Agriculture (HDOA) is the accepting authority for this environmental assessment.

As part of the Environmental Assessment process, we are seeking your input in identifying potential environmental impacts and regulatory compliance requirements within your jurisdiction associated with the proposed action.

We are requesting any written comments and/or information with respect to your area(s) of concern. Please send your written comments to the following by November 22, 2014:

Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawai'i 96816

Please send a copy of your comments to:

Mr. Scott Enright, Chair
Department of Agriculture
State of Hawai'i
1428 So. King Street
Honolulu, Hawai'i 96814

October 22, 2014

Page 2

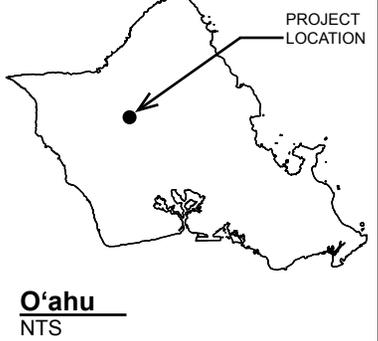
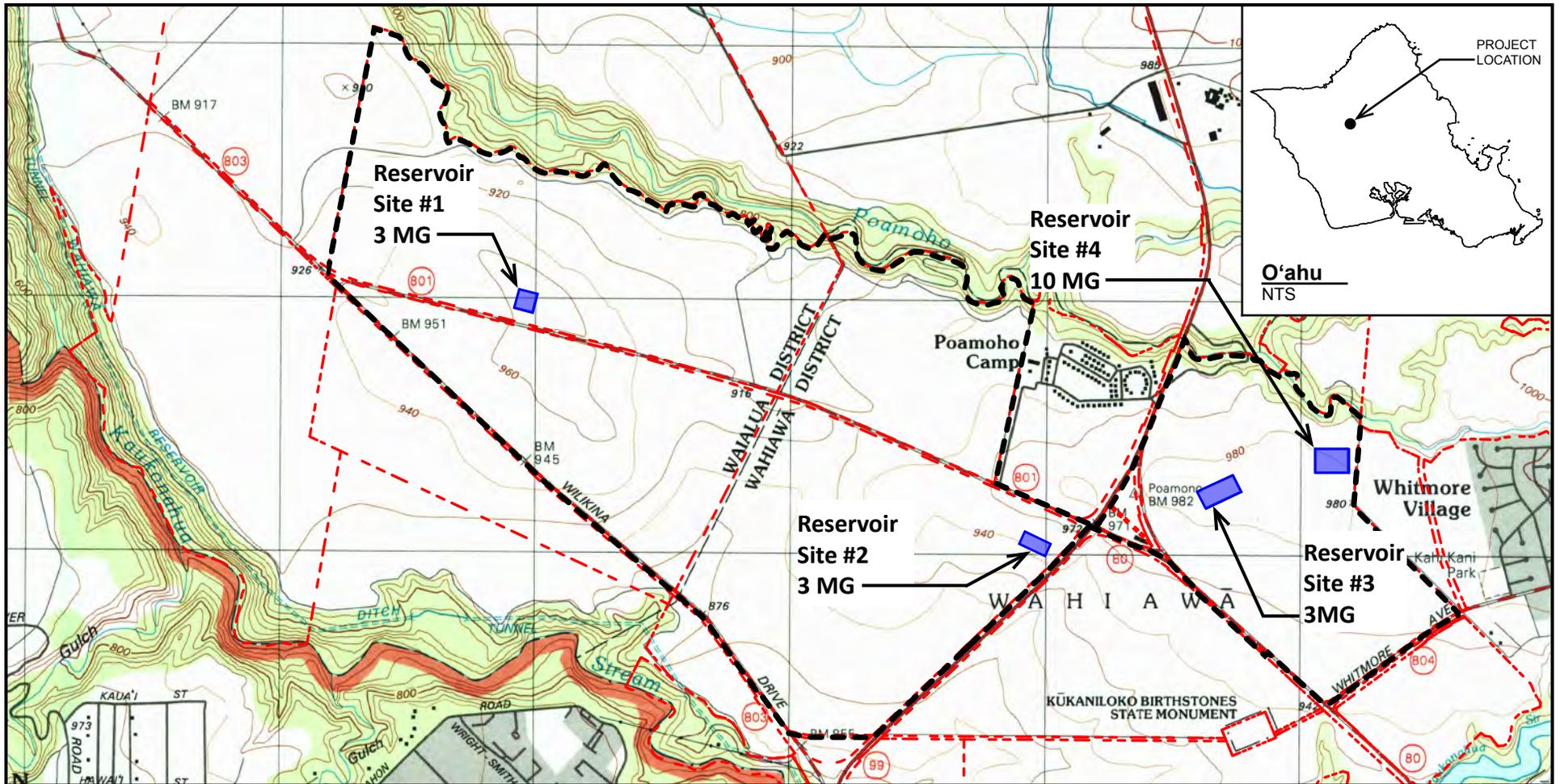
Thank you for participating in the planning stages of this important project. If you have any questions or need clarification, please contact me at (808) 748-1529.

Sincerely,

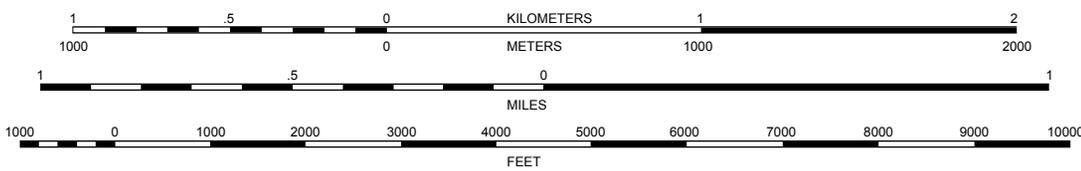
A handwritten signature in black ink, appearing to read "Colette Sakoda". The signature is fluid and cursive, written in a professional style.

Colette Sakoda
Environmental Planning Solutions, LLC

Enclosure: Location Map



SCALE 1:24 000



- Overall Project Limits**
 - Tax Map Key**
 - Proposed Reservoir**
- Portion of 7.5-minute Series (Topographic) Maps
United States Department of Interior
United States Geological Survey
Haleiwa Quadrangle, City & County of Honolulu, Hawaii*

Environmental Planning Solutions, LLC
 Courtesy of: In+Form Design, Inc.

GALBRAITH ESTATE RESERVOIRS ENVIRONMENTAL ASSESSMENT

LOCATION MAP
 WAHIAWĀ, O'AHU, HAWAII



United States Department of the Interior



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

In Reply Refer To:
2015-TA-0031

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawai'i 96816

NOV 20 2014

Subject: Technical Assistance for the Galbraith Estate Diversified Agriculture Reservoirs Project, Wahiawā, O'ahu

Dear Ms. Sakoda:

The U.S. Fish and Wildlife Service (Service) received your letter on October 23, 2014, requesting our comments on the proposed Galbraith Estate Diversified Agriculture Reservoirs Project in Wahiawā, O'ahu [TMKs: (1) 6-5-002:010, 7-1-001:002, and 7-1-001:005]. The State of Hawai'i's Agribusiness Development Corporation (ADC) is proposing farm land preparation and construction of four reservoirs: three 3 MG reservoirs, and a 10 MG reservoir on the former pineapple fields known as the former Galbraith Estate property. ADC's agricultural land preparation is to support Hawai'i's residents. We understand the State of Hawai'i Department of Agriculture is preparing a Hawai'i Revised Statutes Environmental Assessment (EA) for the proposed project. We offer the following comments to assist you in your EA.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program as it pertains to listed species and designated critical habitat. Our records indicate there is a high probability that Hawaiian waterbirds, including the Hawaiian coot (*Fulica alai*), Hawaiian gallinule (*Gallinula chloropus sandvicensis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), and Hawaiian duck (*Anas wyvilliana*), may be affected by components of your proposed project. Hawaiian geese (*Branta sandvicensis*) recently have arrived on O'ahu. A pair was first observed in early January 2014 at the First Wind Kawaihoa wind farm facility. They have successfully nested, fledging two goslings at the James Campbell National Wildlife Refuge (NWR) near the town of Kahuku. The pair, originally from Kaua'i, was translocated to Hilo, Hawai'i on February 15, 2012, by the State of Hawaii Division of Fish and Wildlife and were apparently attempting to return to Kaua'i when they arrived on O'ahu. As of November 2014 the four birds have been seen regularly traversing between the Mililani at the Agriculture Park and at a local golf course and to the North shore of O'ahu at James Campbell NWR and Turtle Bay Resort.

Based on the project details provided, your project will result in standing water or creation of open water, which has a high likelihood of attracting Hawaiian waterbirds and Hawaiian geese to

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the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g., any ponding water) if water is present. Hawaiian waterbirds and Hawaiian geese attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

We appreciate your efforts to conserve endangered species. If you have questions regarding these comments, please contact Jiny Kim, Fish and Wildlife Biologist (phone: 808-792-9400, email: jiny_kim@fws.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Aaron Nadig', with a long horizontal flourish extending to the right.

Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, North Western Hawaiian Islands,
and American Samoa



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Pacific Islands Water Science Center
677 Ala Moana Blvd., Suite 415
Honolulu, Hawaii 96813
Phone: (808) 587-2400/Fax: (808) 587-2401

November 13, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawai'i 96816

Dear Ms. Sakoda:

Subject: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project, Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonahua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

Thank you for forwarding the subject Pre-Assessment Consultation notice for review and comment by the staff of the U.S. Geological Survey Pacific Islands Water Science Center. We have reviewed this document and have no comments to offer at this time.

We appreciate the opportunity to participate in the review process.

Sincerely,

Stephen S. Anthony
Center Director

Mr. Scott Enright, Chair
Department of Agriculture
State of Hawaii
1428 So. King Street
Honolulu, Hawai'i 96814

NEIL ABERCROMBIE
Governor



SCOTT E. ENRIGHT
Chairperson, Board of Agriculture

KEN H. KAKESAKO
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512
Phone: (808) 973-9600 FAX: (808) 973-9613

October 24, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, HI 96816

Dear Ms. Sakoda:

RE: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project, Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonahua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/ Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

Thank you for your letter dated October 22, 2014 and the opportunity to participate in your pre-assessment consultation regarding the Galbraith Estate diversified agriculture reservoirs project. The Agricultural Resource Management Division has no comments at this time. We would appreciate future updates to this project so we may continue to assess any impact to the program.

Sincerely,

Brian Kau, P.E.
Administrator and Chief Engineer
Agricultural Resource Management





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

ROSS M. HIGASHI
INTERIM DIRECTOR

Deputy Directors
RANDY GRUNE
AUDREY HIDANO
JADINE URASAKI
IN REPLY REFER TO:

HWY 1986
HWY-PS 2.8404

November 10, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Environmental Assessment (EA) Pre-Consultation for Reservoirs Project, Provide the trigger for the EA Galbraith Estate Diversified Agriculture, Wahiawa, Oahu
TMK: (1) 6-5-002:010, 7-1-001:002 & 7-1-001:005

Thank you for consulting with us regarding the proposed construction of four (4) new farm land reservoirs on the former pineapple fields known as the former Gailbraith Estate. The proposed project is bound by Kamananui Road (State Route #99) and Kamehameha Highway (State Route #80). Our department is concerned with the possible impacts of the proposed project towards the operations of the State Highway.

We have the following comments:

1. The EA should discuss and evaluate project impacts to the State highway facilities, specifically Kamananui Road, Kamehameha Highway, and Whitmore Avenue.
2. The discussion should assess the impacts to the State highway facilities both during construction and operation of the reservoirs.
3. The discussion of impacts should include the following items:
 - modes of transportation, such as vehicle/equipment types;
 - frequency;
 - hours of operations and peak hours;
 - inconvenience to the motorists, bicyclists, pedestrians, community;
 - construction duration and hours;
 - pollution due to dust and noise;
 - applicable grading and drainage studies.
4. Further coordination with our department will be required for any new or modifications of access regarding acceptable access requirements.
5. The EA should also consider possible impacts on proposed projects in the area such as the:

Ms. Colette Sakoda
November 10, 2014
Page 2

HWY-PS 2.8404

- Phycal Algae Production Project on TMK: (1) 7-1-007:011 por. 030 and 031;
 - Military Training Road for the Schofield Barracks Stryker Brigade Convoy Training.
6. Transportation impacts due to the construction and operations of the proposed project to the State Highway shall be mitigated by the applicant at their cost.

If you have any questions, please contact Ken Tatsuguchi, Engineering Program Manager, Highways Planning Branch, at 587-1830. Please reference file review number 2014-228 in all contacts and correspondence regarding these comments.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ross M. Higashi". The signature is stylized with a large, looped initial "R" and "H".

ROSS M. HIGASHI
Interim Director of Transportation

c: Mr. Scott Enright, Department of Agriculture



OFFICE OF PLANNING STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: <http://planning.hawaii.gov/>

Ref. No. P-14575

November 20, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoir Project, Wahiawa, Oahu; TMK No: (1) 6-5-002:010, 7-1-001:002, and 7-1-001:005

Thank you for the opportunity to provide early consultation comments on the Galbraith Estate Diversified Agriculture project. According to the documents provided to our office by letter dated October 23, 2014, this project calls for the preparation of farm land and the construction of four reservoirs on former pineapple fields in Wahiawa.

The Office of Planning (OP) has reviewed the documents provided to us and has the following comments and concerns to offer:

1. OP fully supports the proposed preparation of farmlands and construction of four reservoirs on the former Galbraith Estate lands in Wahiawa, which furthers the State's goals of food security and agricultural self-sufficiency.
2. OP provides technical assistance to state and county agencies in administering the statewide planning system in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Planning Act provides goals, objectives, priorities, and priority guidelines for growth, development, and the allocation of resources throughout the State. The Hawaii State Plan includes diverse policies and objectives of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, and sustainability.

The Draft Environmental Assessment (Draft EA) should include an analysis on the Hawaii State Plan, HRS Chapter 226, in a section that addresses how the project conforms or is in conflict with state and county plans, policies, and controls the analysis should include a discussion of the projects ability to meet all of the objectives and policies of HRS Chapter 226.

Ms. Colette Sakoda
November 20, 2014
Page 2

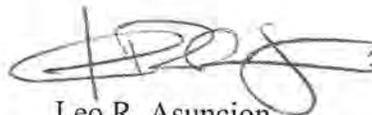
3. OP is the lead agency for the Hawaii Coastal Zone Management (CZM) Program. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

The Draft EA shall include a statement in a section that addresses how the project conforms or is in conflict with state and county plans, policies, and controls. The statement should include a discussion of the proposed project's ability to meet all of the objectives and policies set forth in HRS § 205A-2. Where a conflict or inconsistency exists, the statement must describe the extent to which the applicant has reconciled its proposed action with this statute. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

Because of the wet flashy nature of weather patterns in central Oahu and the close proximity of nearby streambeds (north of the parcel), this project may have nonpoint pollution impacts on coastal waters. 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 75 (management measure for erosion and sediment control for Agricultural areas). 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 Hekekoa of our office at 587-2845.

Sincerely,



Leo R. Asuncion
Acting Director

c: Mr. Scott Enright, Chair

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 20, 2014

Environmental Planning Solutions, LLC
Attn: Ms. Colette Sakoda
945 Makaiwa Street
Honolulu, Hawai'i 96816

email: sakodacolette@aol.com

Dear Ms. Sakoda,

SUBJECT: Pre-Assessment Consultation Regarding Galbraith Estate Diversified
Agriculture Reservoirs Project

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

At this time, enclosed are comments from (1) Land Division – Oahu District; (2) Office of Conservation & Coastal Lands; (3) Division of State Parks; (4) Engineering Division; and (5) Commission on Water Resource Management. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

A handwritten signature in blue ink, appearing to read "Russell Y. Tsuji".

Russell Y. Tsuji
Land Administrator

Enclosure(s)

c: Department of Agriculture
Attn: Scott Enright via email to: Scott.Enright@hawaii.gov



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2014

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

FROM:

R Russell Y. Tsuji, Land Administrator *VT*

SUBJECT:

Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project

LOCATION:

Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonuhua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

APPLICANT:

State of Hawai'i Agribusiness Development Corporation (ADC) by its consultant, Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by **November 19, 2014**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *T. Chee*
 Print Name: *Troy Chee*
 Date: *10/29/14*

bc

OA-15-66



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

2014 OCT 28 P 2:42

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

NOV 5 2014
STATE OF HAWAII

October 27, 2014

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

RECEIVED
LAND DIVISION
2014 NOV -5 PM 2:52
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

FROM:

Russell Y. Tsuji, Land Administrator *VEN*

SUBJECT:

Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project

LOCATION:

Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

APPLICANT:

State of Hawai'i Agribusiness Development Corporation (ADC) by its consultant, Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by **November 19, 2014**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments. *+NOT in conservation district*
- Comments are attached.

Signed: *Lauren Yasaka*
Print Name: Lauren Yasaka
Date: 11/3/2014

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

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



RECEIVED
STATE PARKS DIV



14 OCT 28 AIO:44

DEPT OF LAND &
NATURAL RESOURCES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2014

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

RECEIVED
LAND DIVISION
2014 NOV -6 PM 3:08
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

FROM:

Russell Y. Tsuji, Land Administrator *VEN*

SUBJECT:

Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project

LOCATION:

Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonuhua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai`i

APPLICANT:

State of Hawai`i Agribusiness Development Corporation (ADC) by its consultant, Environmental Planning Solutions, LLC

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Please submit any comments by **November 19, 2014**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *Daniel S. Quinn*
Print Name: Daniel S. Quinn
Date: 11/3/14



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2014

MEMORANDUM

TO: *JRC*

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division**
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII
RECEIVED
LAND DIVISION
2014 NOV 17 PM 2:58
14 OCT 28 PM 9:39 ENGINEERING

FROM: *TO: [initials]*

Russell Y. Tsuji, Land Administrator *VEN*
SUBJECT: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project

LOCATION: Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai`i

APPLICANT: State of Hawai`i Agribusiness Development Corporation (ADC) by its consultant, Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by **November 19, 2014**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *Chris S. Chang*
Print Name: Chris S. Chang, Chief Engineer
Date: 10/17/14

**DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION**

LD/Russell Y. Tsuji

**REF: Pre-Assessment Consultation for EA for Galbraith Estate Diversified Agriculture Reservoirs
Project, Wahiawa
Oahu 072**

COMMENTS

- () We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ____.
- (X) **Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone D, an area where flood hazards are undetermined.**
- () Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ____.
- () Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- () Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.
 - () Mr. Frank DeMarco at (808) 961-8042 of the County of Hawaii, Department of Public Works.
 - () Mr. Carolyn Cortez at (808) 270-7253 of the County of Maui, Department of Planning.
 - () Mr. Stanford Iwamoto at (808) 241-4896 of the County of Kauai, Department of Public Works.
-
- () The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.
 - () The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.
 - () Additional Comments: _____

 - () Other: _____

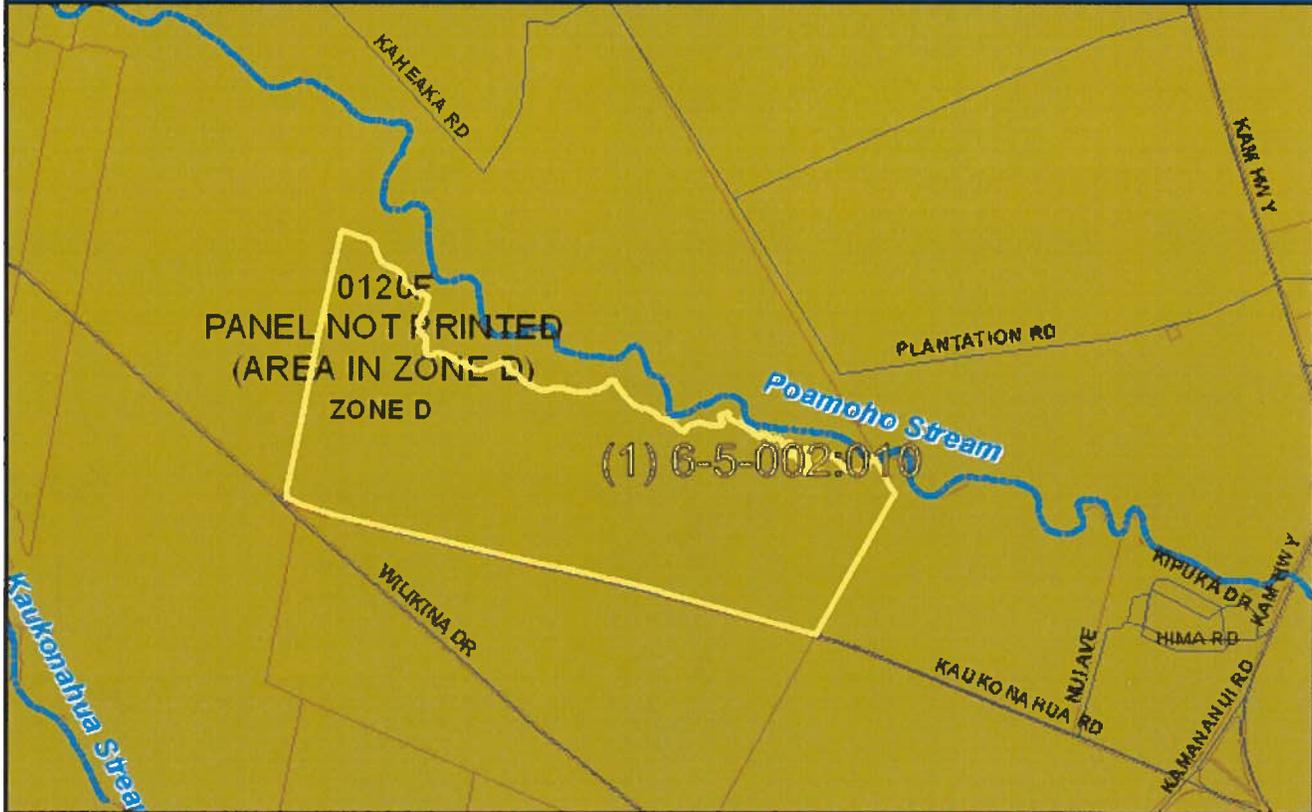
Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: _____



State of Hawaii FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- Zone A:** No BFE determined.
- Zone AE:** BFE determined.
- Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	HONOLULU
TMK NO:	(1) 6-5-002-010
PARCEL ADDRESS:	
FIRM INDEX DATE:	NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	15003C0120F
PANEL EFFECTIVE DATE:	PANEL NOT PRINTED

PARCEL DATA FROM:	APRIL 2014
IMAGERY DATA FROM:	MAY 2006

IMPORTANT PHONE NUMBERS

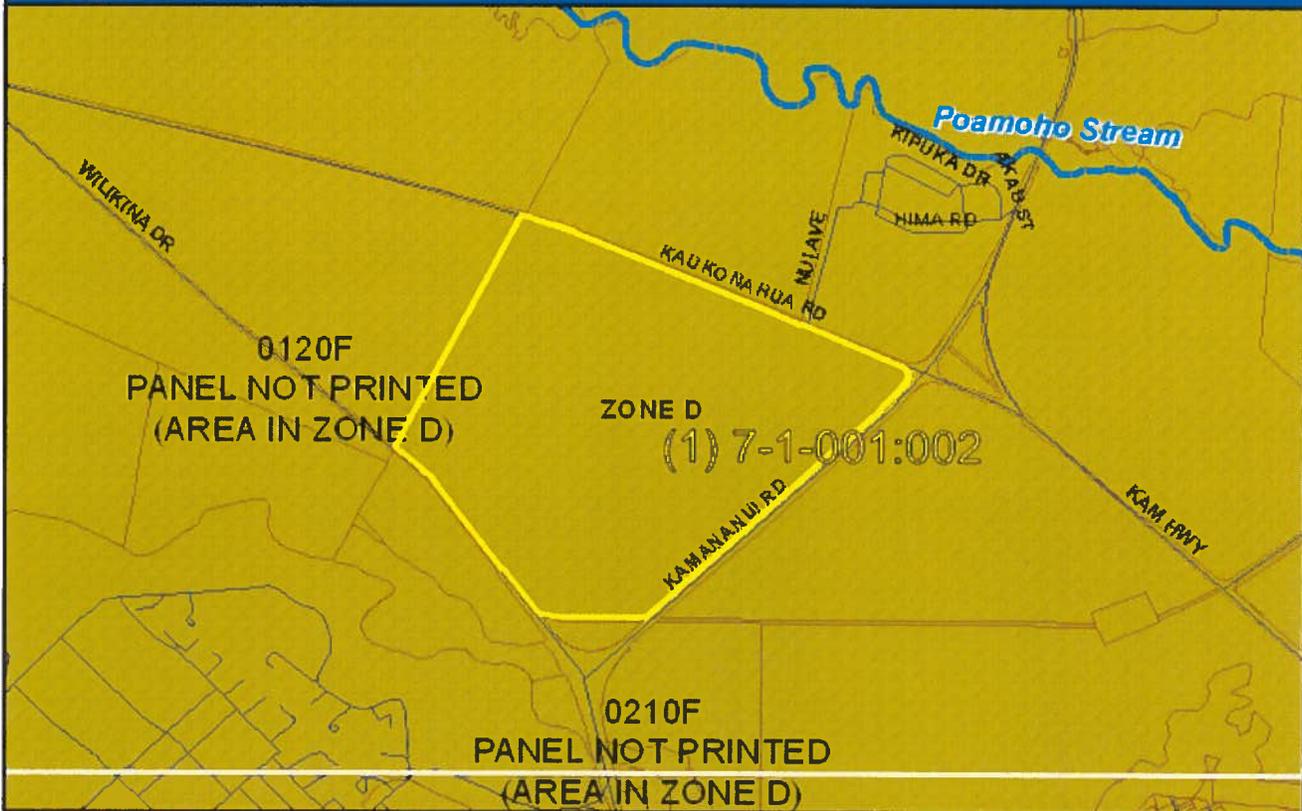
<u>County NFIP Coordinator</u>	
City and County of Honolulu	
Mario Siu-Li, CFM	(808) 768-8098
<u>State NFIP Coordinator</u>	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

Disclaimer: The Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use of the information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR from any liability, which may arise from its use.

If this map has been identified as 'PRELIMINARY' or 'UNOFFICIAL', please note that it is being provided for informational purposes and is not to be used for official/legal decisions, regulatory compliance, or flood insurance rating. Contact your county NFIP coordinator for flood zone determinations to be used for compliance with local floodplain management regulations.



FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- Zone A:** No BFE determined.
- Zone AE:** BFE determined.
- Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
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NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY: HONOLULU
TMK NO: (1) 7-1-001-002
PARCEL ADDRESS:
FIRM INDEX DATE: NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S): NONE
FEMA FIRM PANEL(S): 15003C0120F
PANEL EFFECTIVE DATE: PANEL NOT PRINTED

PARCEL DATA FROM: APRIL 2014
IMAGERY DATA FROM: MAY 2006

IMPORTANT PHONE NUMBERS

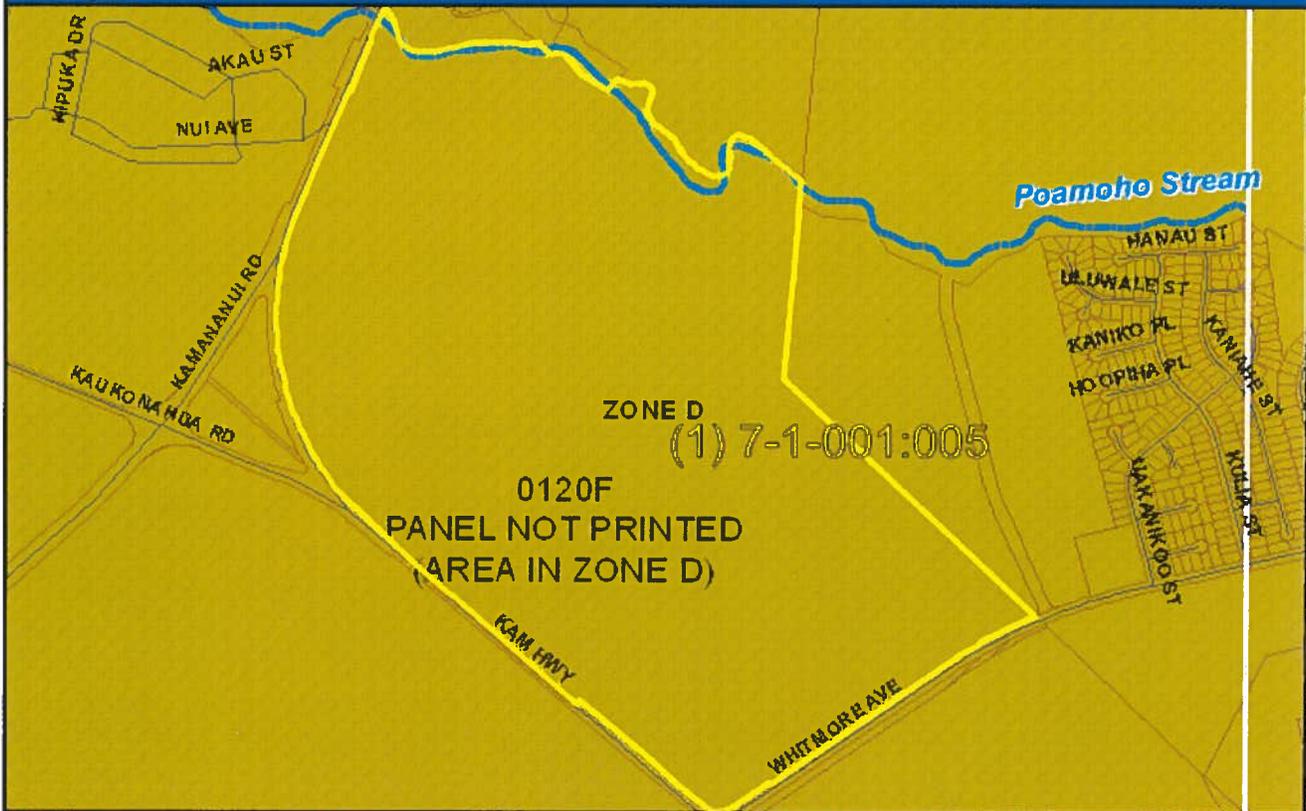
County NFIP Coordinator
 City and County of Honolulu
 Mario Siu-Li, CFM (808) 768-8098
State NFIP Coordinator
 Carol Tyau-Beam, P.E., CFM (808) 587-0267

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FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

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- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY: HONOLULU
TMK NO: (1) 7-1-001-005
PARCEL ADDRESS: 71-190 KAM HWY WAHIAWA, HI 96786
FIRM INDEX DATE: NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S): NONE
FEMA FIRM PANEL(S): 15003C0120F
PANEL EFFECTIVE DATE: PANEL NOT PRINTED

PARCEL DATA FROM: APRIL 2014
IMAGERY DATA FROM: MAY 2006

IMPORTANT PHONE NUMBERS

County NFIP Coordinator
 City and County of Honolulu
 Mario Siu-Li, CFM (808) 768-8098
State NFIP Coordinator
 Carol Tyau-Beam, P.E., CFM (808) 587-0267

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2014

MEMORANDUM

RECEIVED
LAND DIVISION
2014 NOV 19 AM 10:19
2014 NOV 19 PM 3:14
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

~~TO:~~

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

~~FROM:~~

Russell Y. Tsuji, Land Administrator *VEN*

~~SUBJECT:~~

Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoirs Project

~~LOCATION:~~

Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonuhua Road – Larry Jefts); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai'i

~~APPLICANT:~~

State of Hawai'i Agribusiness Development Corporation (ADC) by its consultant, Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by November 19, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

RFI 40813
118561

Signed: *William M. Tam*
Print Name: WILLIAM M. TAM, Deputy Director
Date: November 18, 2014



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

November 18, 2014

REF: RFD.4081.3

TO: Russell Tsuji, Administrator
Land Division

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

SUBJECT: Pre-Assessment Consultation Galbraith Estate Diversified Agriculture Reservoir Project, Wahiawa

FILE NO.:

TMK NO.: 6-5-002:010; 7-1-001:002; 7-1-001:005

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

Our comments related to water resources are checked off below.

1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at <http://www.usgbc.org/leed>. A listing of fixtures certified by the EPA as having high water efficiency can be found at <http://www.epa.gov/watersense/>.
5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at <http://hawaii.gov/dbedt/czm/initiative/lid.php>.
6. We recommend the use of alternative water sources, wherever practicable.
7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at <http://energy.hawaii.gov/green-business-program>

- 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf
- 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:

Additional information and forms are available at http://hawaii.gov/dlnr/cwrn/info_permits.htm.

- 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- 11. A Well Construction Permit(s) is (are) required before any well construction work begins.
- 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 14. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.
- 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.
- 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- OTHER:
These lands are included in a Central Oahu non-potable water study that is being conducted by the Commission. A final report is anticipated to be released in the next few months.

If there are any questions, please contact Lenore Ohye of the Planning Branch at 587-0216 or Dean Uyeno of the Stream Protection and Management Branch at 587-0234.

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) 768-4567
Web site: www.honolulu.gov



KIRK CALDWELL
MAYOR

ROBERT J. KRÖNING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

November 18, 2014

Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Attn: Colette Sakoda

Dear Ms. Sakoda:

Subject: Pre-Assessment Consultation
Regarding Galbraith Estate Diversified Agriculture Reservoirs Project
Tax Map Key No. 6-5-002:010 proposed 3 MG (Kaukonahua Road -
Larry Jeffs); 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/
Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed
3 MG and 10 MG, Wahiawa, Oahu, Hawaii

The Department of Design and Construction has the following comments to offer on the pre-assessment consultation:

Wilikina Drive and Kaukonahua Road has been identified for repaving and the project is currently in design. We anticipate the project being advertised for bids in Spring 2015 and construction to follow.

Thank you for the opportunity to review and comment. Should there be any questions, please contact me at 768-8480.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Kröning".

Robert J. Kröning, P.E.
Director

RJK: cf (585520)

cc: State of Hawaii, Department of Agriculture
Mr. Scott Enright

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR



MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

November 18, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Preassessment Consultation
Galbraith Estate Diversified Agriculture Reservoirs Project
Wahiawa, Oahu, Hawaii
Tax Map Keys: 6-5-002: 010
7-1-001: 002 and 005

In response to your letter dated October 22, 2014, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) requires that the following be complied with:

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1, Uniform Fire Code [UFC]TM, 2006 Edition, Section 18.2.3.2.2.)

A fire department access road shall extend to within 50 ft of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1, UFCTM, 2006 Edition, Section 18.2.3.2.1.)

2. A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter

Ms. Colette Sakoda
Page 2
November 18, 2014

constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1, UFC™, 2006 Edition, Section 18.3.1, as amended.)

3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1, UFC™, 2006 Edition, Section 18.2.3.4.1.1, as amended.)
4. Submit civil drawings to the HFD for review and approval.

Should you have questions, please contact Battalion Chief Terry Seelig of our Fire Prevention Bureau at 723-7151 or tseelig@honolulu.gov.

Sincerely,



SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

cc: Scott Enright
Department of Agriculture

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



MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP10/14-585780R

November 18, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

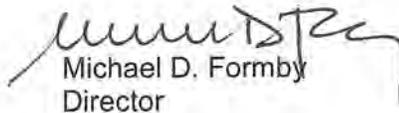
SUBJECT: Pre-Assessment Consultation for Environmental Assessment (EA)
Galbraith Estate Diversified Agriculture Reservoirs Project
Wahiawa, Oahu, Hawaii

In response to your letter dated October 22, 2014, we have the following comments:

1. The EA should discuss any traffic impacts the project may have on any surrounding City roadways, including short-term impacts during construction, and measures to mitigate these impacts applying complete streets principles.
2. The area Neighborhood Board, as well as the area residents, businesses, emergency personnel, Oahu Transit Services, Inc. (TheBus), etc., should be kept apprised of the details of the proposed project and the impacts, particularly during construction, the project may have on the adjoining local street area network.
3. Any construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

Thank you for the opportunity to review this matter. Should you have any questions, please contact Renee Yamasaki of my staff at 768-8383.

Very truly yours,


Michael D. Formby
Director

cc: Mr. Scott Enright, Chair
Department of Agriculture

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulu-pd.org

KIRK CAEDWELL
MAYOR



LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. MCCAULEY
DEPUTY CHIEFS

OUR REFERENCE MT-DK

October 29, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

This is in response to your letter of October 22, 2014, requesting comments on a Pre-Assessment Consultation for the Galbraith Estate Diversified Agriculture Reservoirs Project in Wahiawa.

The Honolulu Police Department has reviewed this project and has concerns regarding construction debris and the flow of vehicular traffic in the area.

Construction site debris (e.g., dust, soil, rocks, etc.) may potentially reach the roadways and cause a hindrance for motorists. Any thoroughfare impediment may cause traffic back ups. A traffic gridlock will delay the response time for police and emergency services traveling through this sector.

We recommend that the developer implement debris and traffic controls to move vehicles safely through the area.

If there are any questions, please call Acting Major Larry Lawson of District 2 (Wahiawa) at 723-8703.

Thank you for the opportunity to review this project.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By


MARK TSUYEMURA
Management Analyst VI
Office of the Chief

cc: Mr. Scott Enright, Chair
Department of Agriculture

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843



November 26, 2014

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
MAHEALANI CYPHER
THERESIA C. McMURDO
DAVID C. HULIHEE

ROSS S. SASAMURA, Ex-Officio
ROSS M. HIGASHI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer 

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Your Letter Dated October 22, 2014 Requesting Comments
on the Environmental Assessment Pre-Assessment
Consultation for the Galbraith Estate Agriculture Reservoirs
Project - Tax Map Key: 6-5-002: 010; 7-1-001: 002; 7-1-001: 005

Thank you for the opportunity to comment on the proposed agricultural reservoirs project.

We do not have objections to the proposed reservoirs.

We do not have water facilities in the vicinity of the proposed reservoirs.

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

cc: S. Enright, Department of Agricultural

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) 768-6041
DEPT. WEB SITE: www.honolulu.gov • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR



GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2014/ELOG-2217 (rns4)

December 4, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

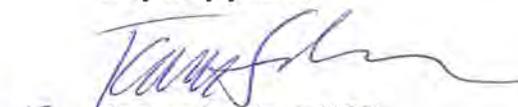
Thank you for your letter dated October 22, 2014, regarding a request for pre-assessment comments on the proposed Galbraith Estate Diversified Agriculture Reservoir Project (TMK: 6-5-002:010, 7-1-001:002, and 7-1-001:005).

We have the following comments:

1. The Draft Environmental Assessment (DEA) should include a discussion of the consistency of the project with the Oahu General Plan and the Central Oahu Sustainable Communities Plan (CO SCP).
2. The project is consistent with the existing CO SCP (2002) vision and policies supporting preservation of agricultural lands north of Wahiawa for use in diversified agriculture, permitting facilities necessary to support intensive cultivation of arable agricultural lands, and calling for developing an adequate supply of nonpotable water for irrigation.
3. The DEA should discuss the source of the water to be stored in the reservoirs, and address the possibility of using water recovered from wastewater effluent.
4. The DEA should disclose all permits and approvals for the project that will be required from the City and County of Honolulu.

Should you have any questions, please contact Bob Stanfield of our staff at 768-8051.

Very truly yours,


George I. Atta, FAICP
Director

GIA:bkg
1196735

From: Liu, Rouen <rouen.liu@hawaiianelectric.com>

To: 'sakodacolette@aol.com' <sakodacolette@aol.com>

Cc: 'hdoa.info@hawaii.gov' <hdoa.info@hawaii.gov>

Subject: FW: Pre-Assessment consultation for Galbraith Estate Diversified Agriculture Reservoirs Project

Date: Fri, Nov 21, 2014 5:02 pm

Dear Ms. Sakoda,

Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has no objection to the project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities.

We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Diversified Agriculture Reservoirs project come to fruition, please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.

If you have any questions, please call me at 543-7245.

Sincerely,

Rouen Q. W. Liu

Permits Engineer

Cc: Mr. Scott Enright (HDOA)

CONFIDENTIALITY NOTICE: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and/or privileged information. Any unauthorized review, use, copying, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender immediately by reply e-mail and destroy the original message and all copies.

Transmittal

 **TIME WARNER**
CABLE
200 Akamainui Street • Mililani HI 96789
(808) 625 - 2100

Date: October 28, 2014

RE: PROJECT LOCATION/WORK ORDER

To: Environmental Planning Solutions
945 Makaiwa St
Honolulu, HI 96816

Galbraith Estate Diversified Agriculture
Reservoirs Project

E-21146

Attention: Colette Sakoda

GENTLEMEN: We are sending you the following:

- | | |
|---|---|
| <input type="checkbox"/> Pole / Conduit Application | <input type="checkbox"/> Preliminary / Final Drawings |
| <input type="checkbox"/> Permit Applications | <input type="checkbox"/> Return Prints |
| <input type="checkbox"/> Copy of Letter | <input checked="" type="checkbox"/> Other |

Copies	Sht / Appl. #	Description
1		Location map with CATV comments

The Above is transmitted:

- | | |
|---|--|
| <input type="checkbox"/> For Your Approval | <input checked="" type="checkbox"/> As Requested |
| <input type="checkbox"/> For Review and Comment | <input type="checkbox"/> As Approved |
| <input type="checkbox"/> For Your Use / Records | <input type="checkbox"/> Other _____ |

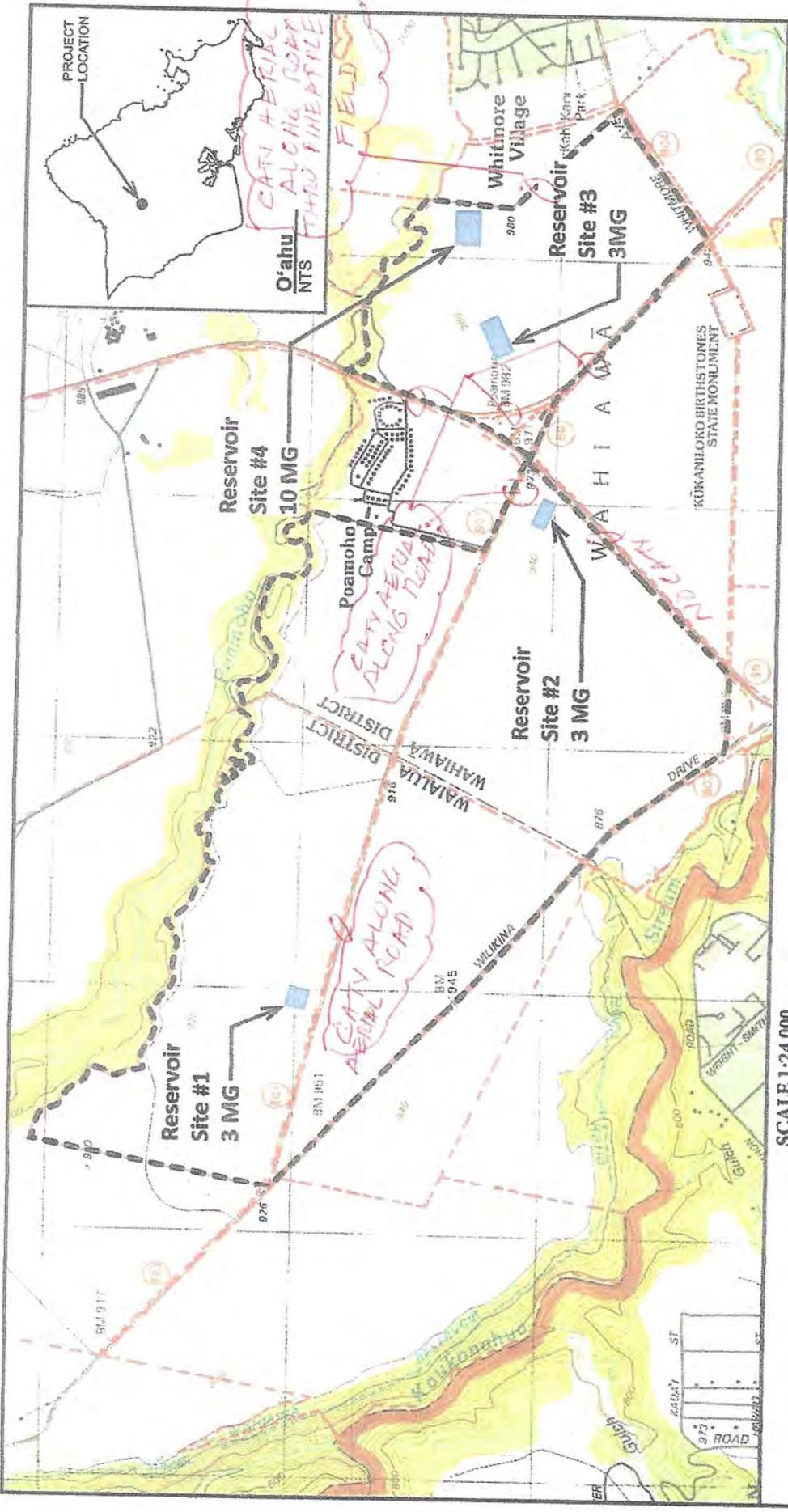
Comments / Remarks: Pls see the enclosed "Location Map" with Oceanic's notes indicating aerial CATV along the road ways. Oceanic TWC does not have system within the project site of the (4) planned reservoirs.

Pls call me at 625-8456 should you have any questions.

Thank-you,

CC: Mr. Scott Enright
Xmit

Signed: Dean Yonezawa
Title: OSP Engineer (Dean Yonezawa)

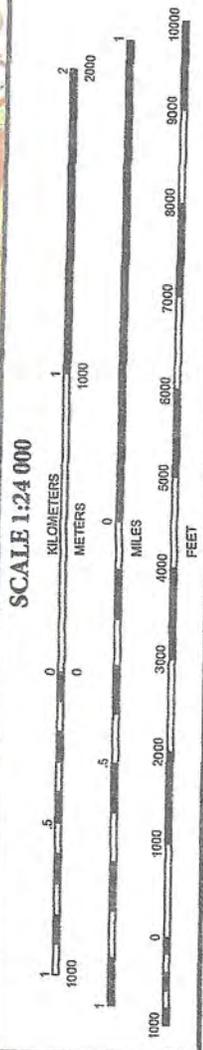


Overall Project Limits

Tax Map Key

Proposed Reservoir

Regions of 7.5-minute Series (Topographic) Maps
 United States Department of Interior
 United States Geological Survey
 Taitewa Quadrangle, City & County of Honolulu, Hawaii



Environmental Planning Solutions, LLC
 Courtesy of: In-Form Design, Inc.

GALBRAITH ESTATE RESERVOIRS ENVIRONMENTAL ASSESSMENT

LOCATION MAP
 WAHIAWĀ, O'AHU, HAWAII



OFFICE OF PLANNING STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: <http://planning.hawaii.gov/>

Ref. No. P-14575

November 20, 2014

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Pre-Assessment Consultation Regarding Galbraith Estate Diversified Agriculture Reservoir Project, Wahiawa, Oahu; TMK No: (1) 6-5-002:010, 7-1-001:002, and 7-1-001:005

Thank you for the opportunity to provide early consultation comments on the Galbraith Estate Diversified Agriculture project. According to the documents provided to our office by letter dated October 23, 2014, this project calls for the preparation of farm land and the construction of four reservoirs on former pineapple fields in Wahiawa.

The Office of Planning (OP) has reviewed the documents provided to us and has the following comments and concerns to offer:

1. OP fully supports the proposed preparation of farmlands and construction of four reservoirs on the former Galbraith Estate lands in Wahiawa, which furthers the State's goals of food security and agricultural self-sufficiency.
2. OP provides technical assistance to state and county agencies in administering the statewide planning system in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Planning Act provides goals, objectives, priorities, and priority guidelines for growth, development, and the allocation of resources throughout the State. The Hawaii State Plan includes diverse policies and objectives of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, and sustainability.

The Draft Environmental Assessment (Draft EA) should include an analysis on the Hawaii State Plan, HRS Chapter 226, in a section that addresses how the project conforms or is in conflict with state and county plans, policies, and controls the analysis should include a discussion of the projects ability to meet all of the objectives and policies of HRS Chapter 226.

Ms. Colette Sakoda
November 20, 2014
Page 2

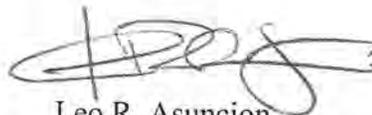
3. OP is the lead agency for the Hawaii Coastal Zone Management (CZM) Program. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

The Draft EA shall include a statement in a section that addresses how the project conforms or is in conflict with state and county plans, policies, and controls. The statement should include a discussion of the proposed project's ability to meet all of the objectives and policies set forth in HRS § 205A-2. Where a conflict or inconsistency exists, the statement must describe the extent to which the applicant has reconciled its proposed action with this statute. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

Because of the wet flashy nature of weather patterns in central Oahu and the close proximity of nearby streambeds (north of the parcel), this project may have nonpoint pollution impacts on coastal waters. 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 75 (management measure for erosion and sediment control for Agricultural areas). 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%20Watershed%20Guidance%20Final.pdf)

If you have any questions regarding this comment letter, please contact Josh Hekekoa of our office at 587-2845.

Sincerely,



Leo R. Asuncion
Acting Director

c: Mr. Scott Enright, Chair



November 20, 2014

Sent via Electronic and USPS Mail

Colette Sakoda
Environmental Planning Solutions, LLC
SAKODACOLETTE@AOL.COM
945 Makaiwa Street
Honolulu, HI 96816

Subject: Pre-Assessment Consultation
Former Galbraith Estate Diversified Agriculture Irrigation Infrastructure Project
Comments on Planned Improvements on TMK Key No. 7-1-001 Parcel 5

Dear Ms. Sakoda:

Thank you for your letter dated October 22, 2014 regarding pre-assessment consultation. Ohana Best Farm strongly believes the planned irrigation infrastructure is critical to restarting farming activities on the former Galbraith lands that lay fallow for well over a decade. We call to your attention that the installation of the two reservoirs and the respective timing of their completion dates may trigger adverse impacts to farms operating on Parcel 5. These impacts, however can be readily mitigated through carefully and thorough preplanning and pre-coordination of the installation and operation of the reservoirs. As the first tenant to start its operations on Parcel 5, we discussed our comments below with senior ADC officials. We conclude our letter to you with suggested pathways to mitigate potential impacts that may arise.

Comment #1 – Review of Proposed Parcel 5 Irrigation Infrastructure

Since taking possession of our site, Ohana Best Farm invested significant resources. With ADC guidance and suggestion, we master planned our farmland, prepared and filed a soils conservation plan, cleared and grubbed our 160-acre farmland, and adjusted the pH levels of its field soils. Given our level of investment, placing our fields into production is now our highest priority. We are currently preparing and processing construction drawing so once the assessment process successfully concludes, we will be prepared to mobilize and quickly being installing selected irrigation infrastructure on Parcel 5. These improvements, which we understand are part of this EA submittal and review, includes the 3 MG reservoir, the development of other water sources that will supplement irrigation water feeding the 3 MG reservoir, a pipeline distribution system that distributes water stored in the 3 MG reservoir to all parts of our farm, and other customary ancillary irrigation infrastructure.

Comment #2 - Ramifications of Staggered Reservoir Completion Dates

Of the two planned reservoirs on Parcel 5, ADC's 10 MG reservoir will likely be the placed into service well after Ohana Best Farm places its 3 MG reservoir into service. Anticipated delays bringing the ADC reservoir online are due to required state funding and procurement processes. Ohana Best Farm foresees the staggered completion schedules of the reservoirs will have logistical and operational ramifications. Water and electrical infrastructure that serves the 10 MG reservoir must cross over portions of Ohana Best Farm production fields. To mitigate the impact of such crossings, we suggest Ohana Best Farm and ADC promptly coordinate the design and installation of common mechanical and

Colette Sakoda
November 20, 2014
Page 2 of 2

electrical components that serve both reservoirs. Through advanced planning and coordination, one can avoid the need in the future to disturb planted fields and adversely affect the farm's scheduled harvest yields.

Comment #3 – Proposed Entry and Exit Point for the 10 MG Reservoir

Based on a preliminary drawing received from ADC, ingress and egress for the 10 MG reservoir appears to be through a roadway that bisects the Ohana Best farm site. To avoid security and operational conflicts arising from the installation and use of such a roadway, and to preserve and maintain Ohana Best Farm's quiet enjoyment of its farmland, the primary access point for the 10 MG reservoir should be via Saipan Road. The access point should not be dependent on installing or using a roadway on the Ohana Best Farm site. The current siting and layout of the 10 MG reservoir readily lends itself to using Saipan Road as the reservoir's primary access point. The use of a dedicated Saipan Road access point rather than the use of the route currently planned greatly mitigates the disruptions to farmers operating on Parcel 5.

Suggested Planning Pathways

Ohana Best suggests the assessment process incorporate the following planning pathways to help identify and mitigate possible adverse project impacts triggered by the planned irrigation improvements on Parcel 5.

- Each of the two reservoirs shall be designed, constructed, and operated in a manner that minimizes adverse impacts to any ongoing farm operations on Parcel 5
- To minimize said adverse impacts, Ohana Best Farm and ADC should be strongly encouraged to begin coordinating the design and installation of common mechanical and electrical components that serve both reservoirs
- Common components that serve both reservoirs shall be timely installed, and the associated costs equitably shared and promptly paid by Ohana Best Farm and ADC
- Since the 3 MG reservoir will exclusively serve Ohana Best Farm, Ohana Best shall be responsible for the siting, design, construction, operation, and maintenance of said reservoir

Ohana Best Farm offers these comments in the spirit of identifying and mitigating issues that the proposed project may trigger and welcome the opportunity to discuss our comments with you in further detail. We look forward to the successful conclusion of the assessment process so that the installation of critically needed irrigation infrastructure can promptly begin and completed expeditiously.

With warmest and best regards,
Ohana Best LLC, dba Ohana Best Farm



Hwa (Jun) Young Chung
Managing Member

cc: Scott Enright

**DRAFT ENVIRONMENTAL ASSESSMENT
COMMENTS AND RESPONSES**

Galbraith Lands Reservoirs Project
Draft EA Comments
As of July 31, 2015

Respondent	Document	Comments	Draft Responses
State of Hawaii Agencies			
Alec Wong, Chief, Clean Water Branch, Dept of Health	Letter dated June 29, 2015	<ol style="list-style-type: none"> 1. Project and its potential impacts to State waters must meet anti-degradation policy (HAR sect. 11-54-1.1); 2. Project owner may be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater into State surface waters, including storm water (HAR Chapt. 11-55) 3. Recommend consultation with ACOE Regulatory Branch regarding permitting requirements. Sec. 401 Water Quality Certification is required for any Federal permit to conduct activity that may result in discharge into navigable waters. 4. All discharges related to project construction must comply with State's Water Quality standards. 5. Pursuant to State's position that all projects must reduce, reuse and recycle to protect, restore, and sustain water quality and beneficial uses of State waters by: a) Treating storm water as a resource by integrating it into project planning and permitting; b) including how implementation of methods to conserve natural resources and improve 	<p>The construction contractor will be responsible for adhering to State regulations implementing the Clean Water Act as well as acquiring applicable NPDES permits prior to the start of construction.</p> <p>ADC will encourage its reservoir construction contractor and its agricultural licensees to implement plans that incorporate practices that are environmentally sustainable.</p>

Respondent	Document	Comments	Draft Responses
		<p>water quality will be included; c) Site-specific construction BMPs to be designed, implemented, operated, and maintained by the project owner; d) consider use of green building practices; e) identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function.</p>	
<p>Jessica Wooley, Director, OEQC</p>	<p>June 19, 2015</p>	<ol style="list-style-type: none"> 1. Clarify whether all 4 reservoirs will be constructed below existing grade (cited inconsistency between Table 2 and Table 8). 2. Seeking quantities of material to be excavated and embankment information for all 4 reservoirs as information as Table 8 missing information. 3. Seeking consistency of information regarding slope of berms. Also, requesting confirmation if 7-ft high earth berms will be designed for all 4. 4. Plan for specific water sources to be drawn from needed – what if any wells besides the existing 2.0 MGD well will be used? Will only ground water and not surface water, be used? What impact will the project have on the Wahiawa aquifer? 5. Clarify how the outflow will occur from below grade reservoirs. How will the spillways on Reservoirs 1 & 3 function and why aren't the other 2 showing spillways? 	<ol style="list-style-type: none"> 1. The four reservoirs will be constructed below existing grade. Excavation and embankment quantities were not provided for Reservoirs 2 and 4 hence the “blank cells” in Table 8 for both reservoirs. Table 8 will be revised to include said quantities if available or noted in the table as “Not Available”. <p>Suitable excavated material may be used for the reservoir embankment per recommendation of the consulting engineer. Unused material will be disbursed or stockpiled around the reservoir or elsewhere on property.</p> <p>Soil handling will be performed per Hawaii Administrative Rules for Air Pollution Control (Chapter 60.1) and NPDES Permit General Permit Authorizing Discharges of Stormwater Associated with Construction Activity. In addition, site work will be performed in accordance with Chapter 14, Article 14, Revised Ordinances of Honolulu, Rules Relating to Soil Erosion Standards and Guidelines, approved</p>

Respondent	Document	Comments	Draft Responses
		<p>6. Include assurance that discussion with USFWS regarding avoiding impact to endangered waterbirds will occur before construction.</p> <p>7. Alternatives discussion in Sect. 5 should be expanded to include alternative siting and sizing schemes.</p> <p>8. Future use of agricultural chemicals relative to effects on public health should be included in the Secondary Impacts section.</p>	<p>Best Management Plans, and approved plans/permits for grubbing, grading, and stockpiling.</p> <p>2. The 3:1 inner berm slope shown on the General Area Map for Reservoir No. 1 will be revised per the 2:1 slope depicted on the Section View.</p> <p>3. As disclosed in the Draft EA, the Commission of Water Resource Management (CWRM) approved the transfer of Ground Water Use Permit No. 976 to ADC for withdrawal of up to 2.0 MGD for irrigating the Galbraith Estate Lands. The water source is a state owned well on the western end of the project area (formerly Del Monte Pump 5 Well).</p> <p>4. The 2.0 MGD withdrawal rate was previously approved for Del Monte Pump 5 Well. It is presumed that this volume was derived from the sum total of hydro-geological studies, geo-technical data, capacity of the aquifer, and public discussion when the Ground Water Use Permit was approved for Del Monte. Thus water withdrawal will not exceed the allowable withdrawal rate; only the end users have changed.</p> <p>Disclosing potential environmental impacts upon the Wahiawa aquifer is beyond the scope of work for</p>

Respondent	Document	Comments	Draft Responses
			<p>constructing storage facilities. It is anticipated, however, that the development of a second state well near Reservoir No. 4 would be subject to rigorous investigation, analysis, evaluation, and public discussion of potential impacts on the Wahiawā aquifer.</p> <p>It is also anticipated recharge of the Wahiawa aquifer will occur from agricultural use as irrigation water percolates into the ground. An estimate of water recharge was outside the scope of this Draft Environmental Assessment.</p> <p>The ADC has indicated that the 2.0 MGD is sufficient to irrigate approximately 1,000 acres. Should the ADC (or State of Hawai‘i) acquire adjoining property thus increasing the agricultural acreage in the area, then the use of surface water will have to be explored.</p> <p>5. The reservoirs were designed by different engineering consultants. The consultant for the two private reservoirs (Nos. 1 and 3) designed both with berms and spillways. The engineering consultant for the State reservoirs (Nos. 2 and 4) did not. Inclusion of a spillway (or not) was determined by the</p>

Respondent	Document	Comments	Draft Responses
			<p>respective engineering consultant.</p> <p>Overflow from the reservoirs (and spillways) will discharge onto the surrounding agricultural fields and percolate into the ground.</p> <p>6. The U.S. Fish and Wildlife Service talked about “four birds (Hawaiian geese) have been seen regularly traversing from Mililani at the Agricultural Park and at a local golf course and to the North shore of O’ahu at James Campbell NWR and Turtle Bay Resort.” The Service does not state clearly that the birds (and other Hawaiian waterbirds) fly over the Galbraith Estate Lands.</p> <p>It is acknowledged that standing water or open water may attract waterbirds. Users will be apprised of the attractive nuisance created by the reservoir and advised to consult with the Service. Scheduling consultation with the Service will be left to the user.</p> <p>7. Alternative siting schemes for the reservoirs focused on locational and elevational criteria based on ADC’s requirements within its Galbraith property. Storage quantities were determined by the ADC for the state</p>

Respondent	Document	Comments	Draft Responses
			<p>reservoirs and requested by the other two entities for their reservoirs. The final dimensions and design of each were provided by the respective consulting engineers. As disclosed in the Draft EA the selected sites “are at optimum elevations to optimize water transport from the well sites and water distribution to crop irrigation lines” (Section 1, B. Technical Characteristics, 9th paragraph, page 2).</p> <p>Recommendations by community members consulted in conjunction with the project’s Cultural Impact Assessment were appropriately summarized in Section 4.B. Summary of Potential Environmental Impacts and Measures to Mitigate Adverse Effects, Short-term Impacts.</p> <p>8. The Galbraith Estate Lands remain fallow and unused. Future agricultural activities and vegetable crops (for example) to be grown are left up to the respective grower. Fertilizers and chemicals applied to stimulate plant growth, control insects, and eliminate weeds will vary by what is to be grown, what is approved for use by the USDA and US EPA, and Hawai’i State</p>

Respondent	Document	Comments	Draft Responses
			Department of Agriculture, and the grower's product preference. Without knowledge of these factors and others, it is too early to talk about effects on public health from agricultural activities and measures for mitigating this concern.
Land Division-Oahu District, Dept of Land and Natural Resources	Memo dated July 7, 2015	No comments.	
Aquatic Resources Division	Memo dated July 7, 2015	No objections to the project. Would like to see Best Management Practices toward preventing contaminants from possibly entering the aquatic environment during project activities.	<p>The "no objection to the proposed project" statement will be inserted into the Final Environmental Assessment and appropriately referenced.</p> <p>Best Management Practices will be prepared by the respective proponent to minimize impacts during construction and ensuing reservoir operation. Accidental discharge of sediments and pollutants should be contained in the vicinity of the respective reservoir or on agricultural land surrounding the reservoir. Each reservoir is located distant from the North Fork of Kaukonahua Stream and Kaukonahua Stream below the Wahiawā dam thus this spatial separation should help prevent pollutants from entering the aquatic environment.</p>
Engineering Division	Memo dated July 7, 2015	Confirmed that per the FIRM the project site is located in Zone D, an area where flood hazards are undetermined.	The confirmation will be noted and referenced in the Final Environmental Assessment.

Respondent	Document	Comments	Draft Responses
			Plans for the four proposed reservoirs will be submitted to Engineering Division, Dam Safety Program for compliance review with applicable dam safety rules and legislation.
Commission on Water Resource Management		<p>3. Water Resources: Agricultural Use and Water Development Plan</p> <p>6. Alternate Water Sources</p> <p>Permits Requested by CWRM</p> <p>10. Water Use Permit</p> <p>11. Well Construction Permit</p> <p>Other</p> <p>Modification to existing water use permit possible.</p>	<p>The Hawai'i Department of Agriculture will be consulted.</p> <p>Three potential water resources near the Galbraith lands identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Waste Water Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC's goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system. The Final EA will include a discussion on these potential alternative water sources.</p> <p>Ground Water Use Permit (GWUP 976) for well No. 3-3103-001 was transferred to the Agricultural Development Corporation on April 9, 2015. The new permit supersedes GWUP No. 717.</p> <p>ADC proposes to construct a second well as part of the proposed project. The agency will apply for a Ground Water Use Permit and Well Construction Permit from CWRM prior to construction.</p> <p>Other:</p>

Respondent	Document	Comments	Draft Responses
			This information will be passed on to ADC for consideration in planning for future infrastructure.
Dr. Susan Lebo, State Historic Preservation Division, Dept of Land and Natural Resources	June 31, 2015	Determined no historic properties affected with implementation of archaeological monitoring.	<p>SHPD’s determination that “no historic properties affected with implementation of archaeological monitoring” will be included in the Final Environmental Assessment.</p> <p>An Archaeological Monitoring Plan will be prepared and submitted to your office for review and acceptance before the start of construction.</p> <p>Archaeological monitoring will be conducted during construction.</p>
Office of Hawaiian Affairs		<ul style="list-style-type: none"> • Suitability of Well No. 3-3103-0001 requesting discussion about irrigation water source. • Capacity of the existing Galbraith Irrigation System – requesting discussion • Upgrades to Galbraith Irrigation System on OHA Property – requesting close coordination with OHA 	<p>At the time the Draft Environmental Assessment was prepared and to the present, State Well No. 3-3103-0001 is the only underground water source available to supply the four reservoirs. A second well proposed near Reservoir No. 4 would supplement the existing well.</p> <p>The State Agricultural Development Corporation (ADC) believes that in the short term (3 to 5 years) State Well No. 3-3103-0001 can supply 2.0 MGD of water to irrigate approximately 1,000 acres of the Galbraith Estate Lands. Water delivery to the four proposed reservoirs will be from the existing Galbraith Irrigation System (GIS) much of which crosses through land owned by</p>

Respondent	Document	Comments	Draft Responses
			<p>OHA. What upgrades are needed and/or proposed to deliver 2.0 MGD to the reservoirs using the GIS were not known when this environmental assessment was prepared.</p> <p>A Conceptual Plan shown as Figure 10 shows a system crossing through OHA property as the primary distribution system is preliminary.</p> <p>When OHA and ADC approve an irrigation system plan, it is anticipated that an environmental assessment will be required. The assessment should discuss the existing GIS, proposed upgrades (such as pump stations, new transmission lines, pressure relief valves), integration with existing and proposed water wells, and integration with the reservoirs proposed by this project.</p> <p>ADC interest in seeking a long-term source of water is under investigation as noted by your comment (Kennedy Jenks Consultants, Technical Study Wahiawa/North Shore Irrigation Study). It is assumed that selection of an alternative water source (or more than one source) will drive technical studies for designing a comprehensive irrigation system including the GIS and</p>

Respondent	Document	Comments	Draft Responses
			<p>a supplementary system as needed.</p> <p>Landscaping the reservoirs with native plants will be considered wherever feasible and practicable.</p> <p>Archaeological monitoring will be conducted during reservoir construction.</p>
City and County of Honolulu Agencies			
Robert J. Kroning, Director, Dept of Design and Construction	Letter dated June 24, 2015	No comments.	The agency’s “no comments to offer on the draft environmental assessment” will be included in the Final Environmental Assessment. In addition, the Department’s comment and our response will be appended in the document.
		No comments.	
George I. Atta, Director, Dept of Planning and Permitting	Letter dated July 7, 2015	FEA needs to include a short discussion of the possible use of non-potable water sources, including recycled water.	Three potential water resources near the Galbraith lands were identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Waste Water Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC’s goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system.
Socrates Bratakos, Assistant	Letter dated June 23, 2015	Department determined that there will	Honolulu Fire Department’s

Respondent	Document	Comments	Draft Responses
Fire Chief, Honolulu Fire Dept		be no significant impact to fire dept services.	determination “that there will be no significant impact to fire department service due to the construction of the four reservoirs” will be included in the Final Environmental Assessment.
Mark Tsuyemura, Office of the Chief, Police Dept	Letter dated June 16, 2015	No significant impact on the services or operations of the HPD.	HPD’s comment will be included in the Final Environmental Assessment.
Utility Companies			
Les Loo, Network Engineer— Outside Plant Engineer, Network Engineering & Planning, Hawaiian Telcom	Letter dated July 8, 2015	No specific issue that need to be addressed.	
Rouen Liu, Permits Engineer, HECO	Email response dated July 7, 2015	HECO has no objection to the project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. As the proposed project comes to fruition, please continue to keep us informed.	Statement that HECO has no objection to the project will be included in the Final Environmental Assessment. The ADC and lessees will be notified to keep HECO informed of their respective plans.
Community Organizations and Individuals			
Ohana Best		<ul style="list-style-type: none"> • Minimize Adverse Impacts on Farm Operations Caused by Reservoir #4 • Information on OBF Planned Reservoir #3 	Although the Agricultural Development Corporation (ADC) has set the location of Reservoir #4 and engineering design parameters established, there has been no further design work on the reservoir. ADC will seek funding for design and construction of the reservoir from the State Legislature in the near future. It is anticipated that design engineering for water infrastructure from the reservoir will proceed hand in hand with reservoir design. During the design

Respondent	Document	Comments	Draft Responses
			<p>phases OBF input will be sought and with ADC collectively develop short and long-term measures for minimizing impacts on its farming operations.</p> <p>Ohana Best LLC's proposed 3 MG reservoir and accessory improvements, including a photovoltaic facility and well development, were disclosed as part of the project's proposed action in Section 1 (pages 1 through 4) of the Draft Environmental Assessment for the Galbraith Reservoirs (DEA). Ohana Best Farm (OBF) furnished information about its Reservoir #3 and engineering information and drawings for the reservoir were included in the DEA. Technical information about the planned photovoltaic facility was provided but not included in the DEA. It was not in the scope of the Draft EA to describe OBF facilities and planned farming operations and impact of reservoir construction on said operations.</p> <p>Disclosing OBF improvements in the environmental assessment may not preclude OBF entirely from the environmental requirements of permitting agencies. Permitting authorities may require additional information or supplemental environmental review for specific OBF proposals. For example, should OBF</p>

Respondent	Document	Comments	Draft Responses
			<p>opt to drill a well on its property, OBF would have to procure a Ground Water Use Permit and Well Use Permit. As the approving authority for both permits, the Commission on Water Resource Management could require an environmental assessment (or a supplemental assessment) for water withdrawal from a ground water management area. Potential impacts resulting from ground water withdrawal and well drilling on the Galbraith Estate lands are not disclosed in the Environmental Assessment for the Galbraith Reservoirs.</p>

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM



DAR #5123
2015 JUN 25 PM 2:42
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII
RECEIVED
LAND DIVISION
G11 ✓
BK ✓
ATV ✓

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

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Galbraith Lands Reservoirs Project

LOCATION: Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10MG, Wahiawa, Oahu, Hawai'i

APPLICANT: State of Hawaii, Agribusiness Development Corporation by its consultant Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

1. Go to: <https://sp01.ld.dlnr.hawaii.gov/LD>
2. Login: Username: LD\Visitor Password: 0pa\$\$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Galbraith Lands Reservoirs Project", then click on "Files" and "Download a copy". (Any issues accessing the document should be directed to Linda Kawakami at (808) 587-0371 or Linda.Kawakami@hawaii.gov)

Please submit any comments by **July 6, 2015**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

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

Signed: Alton Miyasaka
 Print Name: Alton Miyasaka
 Date: 6-19-15

DAVID Y. IGE
GOVERNOR OF HAWAII



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

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY
ACTING DEPUTY DIRECTOR - WATER

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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

June 19, 2015

Date: 6/19/15
DAR # 5123

MEMORANDUM

TO: Alton Miyasaka, Acting Administrator *AM*
DATE: 6/0/15
FROM: Glenn Higashi, Aquatic Biologist *GRH*
Annette Tagawa, Aquatic Biologist *AT*

SUBJECT: Request for Comments: Draft Environmental Assessment: Galbraith Lands Reservoirs Project, Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawai 'i

Comment	Date Request	Receipt	Referral	Due Date
	6/08/15	6/08/15	6/08/15	7/06/15

Requested by: State of Hawaii, Agribusiness Development Corporation by its consultant Environmental Planning Solutions, LLC

Summary of Proposed Project

Brief Description:

Request review and comment on the Draft Environmental Assessment for the Galbraith Lands Reservoirs Project. The State of Hawai'i Agribusiness Development Corporation (ADC) proposes farm land preparation for construction of four reservoirs on land that was previously in pineapple cultivation. The affected properties, which in total encompass 1,207 acres, are located west of the town of Wahiawa in Central O'ahu and generally bounded by Poamoho Gulch and Poamoho Camp on the north, Whitmore Village and the North Fork of Kaukonahua Stream on the east, Schofield Barracks Military Reservation on the south, and fallow/farmed agricultural fields on the west.

The purposes of the water storage improvements are to increase the storage capacity of the irrigation water system service area which would provide additional reserve during power outages, and help optimize pumping hours and to improve water pressure for anticipated diversified crop cultivation activities. With the expected increase and demand for fresh agricultural produce, local farmers plan to grow and distribute their produce to Hawai' i's local markets, businesses, and restaurants. Local agricultural food production should help move the State towards agricultural self-sufficiency and decrease Hawai' i's dependency on importing food from out of state.

All four reservoirs, three designed for 3 MG capacity each and one for 10 MG capacity, will be constructed below existing grade. The respective reservoir sites will be graded and excavated to below grade design elevations that can contain the desired storage volume. Two wells, located at opposite ends of the project area, will supply water for the reservoirs.

Comments:

The Division has no objections to the proposed project. However, as part of the Environmental Assessment, the Division would like see Best Management Practices addressed toward mitigation measures that include preventing any contaminants such as sediments, pollutants, petroleum products and other debris from possibly entering the aquatic environment during project activities.

Thank you for providing DAR the opportunity to review and comment on the proposed project. Should there be any changes to the project plans, DAR requests the opportunity to review and comment on those changes.

September 10, 2015

Alton Miyasaka, Acting Administrator
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 330
Honolulu, HI 96813

Subject: Draft Environmental Assessment: Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010 (por.); 7-1-001: 002 (por.), 005 (por.)
DAR # 5123

Dear Mr. Miyasaka:

Thank you for reviewing the subject environmental assessment. The following are offered in response to your comments.

The “no objection to the proposed project” statement will be inserted into the Final Environmental Assessment and appropriately referenced.

Best Management Practices will be prepared by the respective proponent to minimize impacts during construction and ensuing reservoir operation. Accidental discharge of sediments and pollutants should be contained in the vicinity of the respective reservoir or on agricultural land surrounding the reservoir. Each reservoir is located distant from the North Fork of Kaukonahua Stream and Kaukonahua Stream below the Wahiawā dam thus this spatial separation should help prevent pollutants from entering the aquatic environment.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 20, 2015

Environmental Planning Solutions, LLC
Attn: Ms. Colette Sakoda
945 Makaiwa Street
Honolulu, Hawai'i 96816

via email: sakodacolette@aol.com

Scott Enright, Chair
State Department of Agriculture
1428 So. King Street
Honolulu, Hawai'i 96814

via email: scott.enright@hawaii.gov

Dear Ms. Sakoda and Mr. Enright,

SUBJECT: Galbraith Lands Reservoirs Project

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments sent to you dated July 7 and 8, 2015, enclosed are additional comments from the Commission on Water Resource Management on the subject matter. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Sincerely,

A handwritten signature in blue ink, appearing to read "Russell Y. Tsuji".

Russell Y. Tsuji
Land Administrator

Enclosure(s)



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

REC'D
LAND DIVISION
2015 JUN 16 PM 2:58
DEPT OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

~~TO:~~

FR

TO:

FROM:

SUBJECT:

LOCATION:

APPLICANT:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

Russell Y. Tsuji, Land Administrator

Galbraith Lands Reservoirs Project

Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10MG, Wahiawa, Oahu, Hawai'i

State of Hawaii, Agribusiness Development Corporation by its consultant Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

1. Go to: <https://sp01.ld.dlnr.hawaii.gov/LD>
2. Login: Username: LD\Visitor Password: 0pa\$\$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Galbraith Lands Reservoirs Project", then click on "Files" and "Download a copy". (Any issues accessing the document should be directed to Linda Kawakami at (808) 587-0371 or Linda.Kawakami@hawaii.gov)

Please submit any comments by July 6, 2015. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- () We have no objections.
- () We have no comments.
- (x) Comments are attached.

Signed: /s/ W. Roy Hardy
Print Name: Acting Deputy Director
Date: July 15, 2015

FILE ID: RFD.46813
DOC ID: 13336v



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

July 15, 2015

REF: RFD.4081.3

TO: Russell Tsuji, Administrator
Land Division

FROM: W. Roy Hardy, Acting Deputy Director 
Commission on Water Resource Management

SUBJECT: Pre-Assessment Consultation Galbraith Estate Diversified Agriculture Reservoir Project, Wahiawa

FILE NO.:

TMK NO.: 6-5-002:010, 7-1-001:002, 7-1-001:005

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

Our comments related to water resources are checked off below.

1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at <http://www.usgbc.org/leed>. A listing of fixtures certified by the EPA as having high water efficiency can be found at <http://www.epa.gov/watersense/>.
5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at <http://hawaii.gov/dbedt/czm/initiative/lid.php>.
6. We recommend the use of alternative water sources, wherever practicable.
7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at <http://energy.hawaii.gov/green-business-program>

- 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf
- 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:

Additional information and forms are available at http://hawaii.gov/dlnr/cwrn/info_permits.htm.

- 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- 11. A Well Construction Permit(s) is (are) required before any well construction work begins.
- 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 14. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.
- 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.
- 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- OTHER:
State Well No. 3103-001 has an allocation of 2 mgd. There is currently 0.022 mgd available from the Wahiawa Aquifer System Area. If all of the reservoirs can be accommodated with the existing 2 mgd allocation, then the applicant can request a modification to the existing water use permit to combine the wells into a battery. If separate water use permits are preferred, a new water use permit must be obtained prior to putting the proposed well into use.

If there are any questions, please contact Ryan Imata of the Regulation Branch at 587-0225.

September 10, 2015

W. Roy Hardy, Acting Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
State of Hawaii
PO Box 621
Honolulu, HI 96809

Subject: Draft Environmental Assessment: Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010 (por.); 7-1-001: 002 (por.), 005 (por.)
REF: RFD.4081.3

Dear Mr. Hardy:

Thank you for reviewing the subject environmental assessment. Our responses are offered in the order your comments were presented.

Water Resources

3. Agricultural Use and Water Development Plan

ADC will continue to closely coordinate its plans with the Hawai'i Department of Agriculture to ensure appropriate incorporation of its Galbraith agricultural lands and water resources into the Agricultural Use and Water Development Plan.

6. Alternate Water Sources

Three potential water resources near the Galbraith lands identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Waste Water Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC's goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system. The Final EA will include a discussion on these potential alternative water sources.

Permits Requested by CWRM

10. Water Use Permit

Ground Water Use Permit (GWUP 976) for well No. 3-3103-001 was transferred to the Agricultural Development Corporation on April 9, 2015. The new permit supersedes GWUP No. 717.

11. Well Construction Permit

ADC proposes to construct a second well as part of the proposed project. The agency will apply for a Ground Water Use Permit and Well Construction Permit from CWRM prior to construction.

W. Roy Hardy
Sept. 10, 2015
Page 2

Other

This information will be passed on to ADC for consideration in planning for future infrastructure.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC

A handwritten signature in black ink, appearing to read "Colette Sakoda".

Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2015

MEMORANDUM

TO: *FR*

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division**
- Div. of Forestry & Wildlife
- Div. of State Parks
- Commission on Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division – Oahu District
- Historic Preservation

FROM: *LD*
SUBJECT:
LOCATION:

Russell Y. Tsuji, Land Administrator
Galbraith Lands Reservoirs Project
Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed 3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-001:005 proposed 3 MG and 10MG, Wahiawa, Oahu, Hawai'i

APPLICANT: State of Hawaii, Agribusiness Development Corporation by its consultant Environmental Planning Solutions, LLC

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document which can be found here:

1. Go to: <https://sp01.ld.dlnr.hawaii.gov/LD>
2. Login: Username: LD\Visitor Password: 0pa\$\$word0 (first and last characters are zeros)
3. Click on: Requests for Comments
4. Click on the subject file "Galbraith Lands Reservoirs Project", then click on "Files" and "Download a copy". (Any issues accessing the document should be directed to Linda Kawakami at (808) 587-0371 or Linda.Kawakami@hawaii.gov)

Please submit any comments by **July 6, 2015**. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: _____
 Print Name: Cory S. Chang, Chief Engineer
 Date: 7/2/15

15 JUN 8 PM 10:26 ENGINEERING
 RECEIVED
 LAND DIVISION
 2015 JUL -6 PM 2:27
 DEPT. OF LAND &
 NATURAL RESOURCES
 STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji

REF: DEA for Galbraith Lands Reservoirs Project, Wahiawa
Oahu.039

COMMENTS

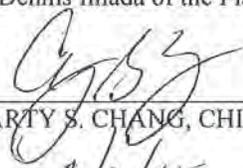
- (X) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone D, an area where flood hazards are undetermined.
- () Please take note that the project site according to the Flood Insurance Rate Map (FIRM), is located in Zone ____.
- () Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ____.
- () Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- () Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.
- () Mr. Carter Romero (Acting) at (808) 961-8943 of the County of Hawaii, Department of Public Works.
- () Mr. Carolyn Cortez at (808) 270-7253 of the County of Maui, Department of Planning.
- () Mr. Stanford Iwamoto at (808) 241-4896 of the County of Kauai, Department of Public Works.
- () The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.
- () The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

- ☒ Additional Comments Compliance with Hawaii Revised Statutes 179 D and Hawaii Administrative Rules 13-190.1 is required if any of the proposed facilities fall within the definition of a dam regulated under the Hawaii Dam and Reservoir Safety Act of 2007.
- () ~~Other:~~ _____

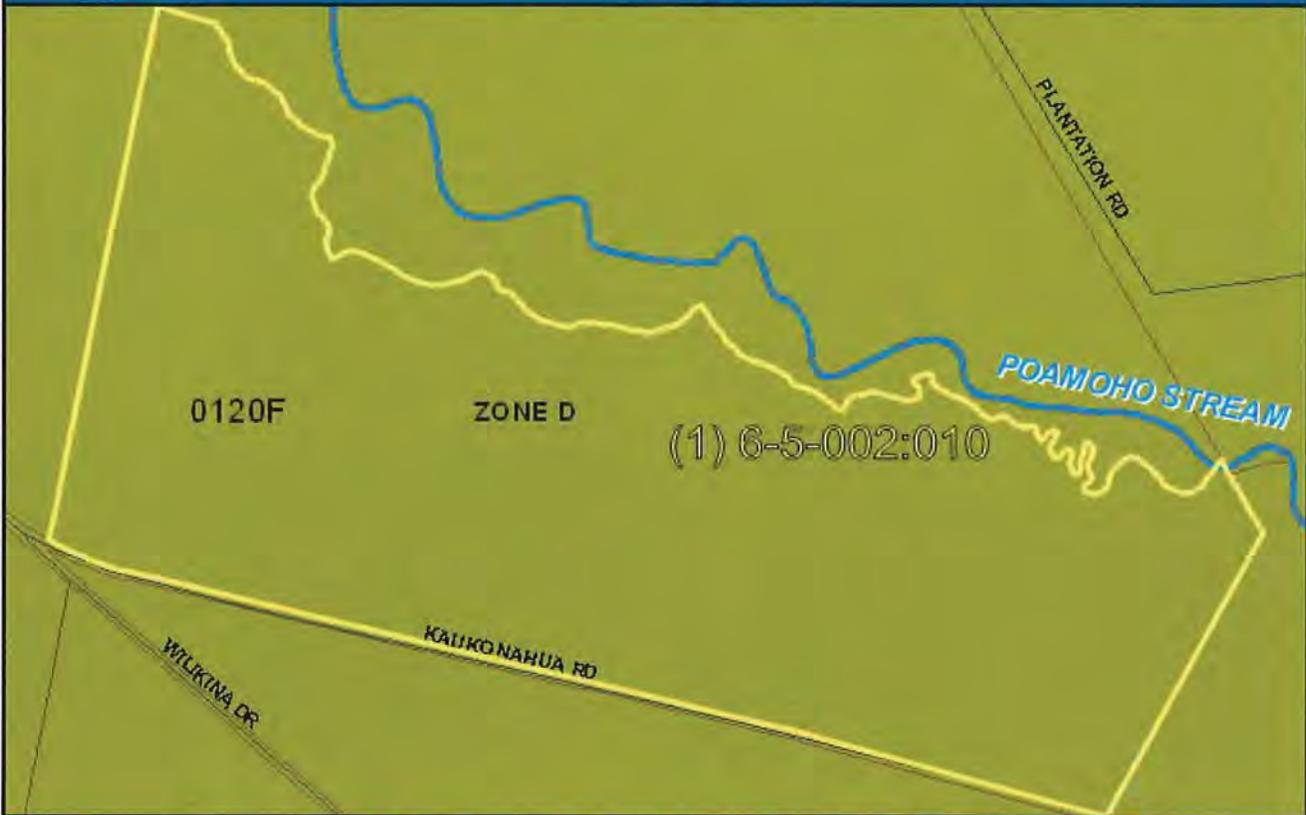
Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed:  _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 1/2/15



State of Hawaii FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- Zone A:** No BFE determined.
- Zone AE:** BFE determined.
- Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY: HONOLULU
TMK NO: (1) 6-5-002-010
PARCEL ADDRESS:
FIRM INDEX DATE: NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S): NONE
FEMA FIRM PANEL(S): 15003C0120F
PANEL EFFECTIVE DATE: SEPTEMBER 09, 9999

PARCEL DATA FROM: APRIL 2014
IMAGERY DATA FROM: MAY 2006

IMPORTANT PHONE NUMBERS

County NFIP Coordinator
 City and County of Honolulu
 Mario Siu-Li, CFM (808) 768-8098
State NFIP Coordinator
 Carol Tyau-Beam, P.E., CFM (808) 587-0267

Disclaimer: The Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use of the information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR from any liability, which may arise from its use.

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State of Hawaii FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- Zone A:** No BFE determined.
- Zone AE:** BFE determined.
- Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY: HONOLULU
TMK NO: (1) 7-1-001-002
PARCEL ADDRESS:
FIRM INDEX DATE: NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S): NONE
FEMA FIRM PANEL(S): 15003C0120F
PANEL EFFECTIVE DATE: SEPTEMBER 09, 9999

PARCEL DATA FROM: APRIL 2014
IMAGERY DATA FROM: MAY 2006

IMPORTANT PHONE NUMBERS

County NFIP Coordinator
 City and County of Honolulu
 Mario Siu-Li, CFM (808) 768-8098
State NFIP Coordinator
 Carol Tyau-Beam, P.E., CFM (808) 587-0267

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State of Hawaii FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- Zone A:** No BFE determined.
- Zone AE:** BFE determined.
- Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

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- Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY: HONOLULU
TMK NO: (1) 7-1-001-005
PARCEL ADDRESS: 71-190 KAM HWY WAHIAWA, HI 96786
FIRM INDEX DATE: NOVEMBER 05, 2014
LETTER OF MAP CHANGE(S): NONE
FEMA FIRM PANEL(S): 15003C0120F
PANEL EFFECTIVE DATE: SEPTEMBER 09, 9999

PARCEL DATA FROM: APRIL 2014
IMAGERY DATA FROM: MAY 2006

IMPORTANT PHONE NUMBERS

County NFIP Coordinator
 City and County of Honolulu
 Mario Siu-Li, CFM (808) 768-8098
State NFIP Coordinator
 Carol Tyau-Beam, P.E., CFM (808) 587-0267

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September 10, 2015

Carty S. Chang, Chief Engineer
Division of Engineering
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 221
Honolulu, HI 96813

Subject: Draft Environmental Assessment: Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010 (por.); 7-1-001: 002 (por.), 005 (por.)

Dear Mr. Chang:

Thank you for reviewing the subject environmental assessment. The following are offered in response to your comments.

Thank you for confirming that the project site according to the Flood Insurance Rate map for the area is located in Zone D. The confirmation will be noted and referenced in the Final Environmental Assessment.

ADC is asking that plans for the four proposed reservoirs be submitted to the Engineering Division, Dam Safety Program for compliance review with applicable dam safety rules and legislation.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

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

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY
ACTING DEPUTY DIRECTOR - WATER

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

June 31, 2015

Russell Y. Tsujii, Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Scott Enright, Chair
State Department of Agriculture
1428 So. King Street
Honolulu, HI 96814

Dear Sirs:

**SUBJECT: Chapter 6E-8 Historic Preservation Review
Draft Environmental Assessment (DEA) – Galbraith Lands Reservoirs Project
State of Hawaii Agribusiness Development Corporation (ADC)
Kamananui and Wahiawā Ahupua‘a, Waialua and Wahiawā District, Island of O‘ahu
TMK: (1) 6-5-002:010 (por.), 7-1-001:002 (por.), 005 (por.)**

LOG NO: 2015.02230
DOC NO: 1506GC10

Architecture
Review Complete
Archaeology
**Follow Up Required*
History & Culture
Review Complete

Thank you for the opportunity to review and comment on the DEA for the Galbraith Lands Reservoirs Project. The ADC proposes to construct four reservoirs (Reservoirs 1-4) on former Galbraith Estate Lands now owned by the State of Hawaii. The proposed project is a collaboration between the ADC, Kalena Farms and Ohana Best Farms. Reservoir 1 will be constructed by Kalena Farms and will consist of a 3.1 MG Reservoir within a 3.31-acre portion of a 310-acre parcel identified as TMK: (1) 6-5-002:010. Reservoir 2 will be constructed by ADC and will consist of a 3.0 MG Reservoir within a 10.13-acre portion of the 302-acre parcel identified as TMK: (1) 7-5-002:002. The 3.0 MG Reservoir 3 will be constructed by Ohana Best Farms within a 2.71-acre portion of the 236-acre parcel identified as TMK: (1) 7-1-001:002. The 10.0 MG Reservoir 4 will be constructed by ADC within a 14.68-acre portion of the 236-acre parcel identified as TMK: (1) 7-1-001:002.

Our records indicate that an archaeological inventory survey (AIS) was conducted within the subject TMK parcels above. Due to negative findings, the AIS results were reported as an archaeological assessment (AA). The AA report was reviewed and accepted by SHPD on May 2, 2015 (Log No. 2015.00362, Doc. No. D1505GC01). The AA recommended that archaeological monitoring be conducted for the proposed project due to the potential of encountering subsurface archaeological remains and due to community concerns (McElroy et al. 2015:53).

Based on the above, SHPD's determination is "no historic properties affected with implementation of archaeological monitoring."

***SHPD requests the following actions to be completed before permit issuance:**

ARCHAEOLOGY

Archaeological Monitoring Plan

Russell Tsujii
June 31, 2015
Page 2 of 2

SHPD looks forward to receiving an Archaeological Monitoring Plan meeting the requirements of Hawaii Administrative Rules (HAR) §13-279-4. SHPD will notify you when the requested plan has been accepted, and the permit may be issued.

Please contact me at (808) 692-8019 or at (Susan.A.Lebo@hawaii.gov) for any archaeological concerns or this letter.

Aloha,

A handwritten signature in black ink that reads "Susan A. Lebo". The signature is written in a cursive, flowing style.

Susan A. Lebo, PhD
Archaeology Branch Chief

cc: Steve Molmen, Land Agent, DLNR-Land Div (Steve.Molmen@hawaii.gov)
Colette Sakoda, Environmental Planning Solutions, LLC (sakodacolette@aol.com)

September 10, 2015

Susan J. Lebo, PhD
Archaeology Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building
601 Kamokila Boulevard, Suite 555
Kapolei, HI 96707

Dear Ms. Lebo:

Subject: Chapter 6E-8 Historic Preservation Review
Draft Environmental Assessment - Galbraith Lands Reservoirs Project
State of Hawaii Agribusiness Development Corporation (ADC)
Kamanananui and Wahiawā Ahupua‘a, Waialua and Wahiawā District, O‘ahu
Tax Map Keys: 6-5-002: 010 (por.); 7-1-001: 002 (por.), 005 (por.)

Thank you for reviewing the subject environmental assessment. The agency’s determination that “no historic properties affected with implementation of archaeological monitoring” will be included in the Final Environmental Assessment. In addition, the Department’s comment and our response will be appended in the document.

An Archaeological Monitoring Plan will be prepared and submitted to your office for review and acceptance before the start of construction. Archaeological monitoring will be conducted during construction

We appreciate State Historic Preservation Division’s participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

DAVID Y. IGE
GOVERNOR OF HAWAII



VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD/CWB

06045PNN.15

June 29, 2015

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

**SUBJECT: Comments on the Draft Environmental Assessment (DEA) for the Galbraith Lands Reservoirs Project
Wahiawa and Waialua, Island of Oahu, Hawaii**

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your DEA, dated May 21, 2015, 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/Clean-Water-Branch-Std-Comments.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).

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 an 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 (\$1,000 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/>. 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: 835-4303) 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.
5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:
 - a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like

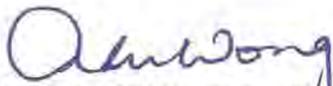
community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

- b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g., minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.
- c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.
- d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.
- e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

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

NN:ay

- c: Mr. Ivan Kawamoto, State of Hawaii Agribusiness Development Corporation
Mr. Brian Kau, State of Hawaii Department of Agriculture
DOH-EPO #15-130 [via e-mail only]

September 10, 2015

Alec Wong, Chief,
Clean Water Branch
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawai'i 96801-3378

Re: Draft Environmental Assessment: Galbraith Lands Reservoir Project
Kamananui Ahapua'a, Waialua Moku, O'ahu Mokupuni
TMKs (1) 6-5-002: 010; (1) 7-1-001: 002, 005
06045PNN.15

Dear Mr. Wong:

Thank you for reviewing and commenting on the referenced environmental assessment. Our responses to your comments are offered below.

Comments 1 through 4: Compliance with HAR sections 11-54 (anti-degradation policy), 11-55 (NPDES permit requirements, Section 401 (Water Quality Standards and Certification).

Response: The construction contractor will be responsible for adhering to State regulations implementing the Clean Water Act as well as acquiring applicable NPDES permits prior to the start of construction.

Comment 5: Consistency with State's position on the need for projects to reduce, reuse and recycle to protect, restore, and sustain water quality and beneficial uses of State waters.

Response: ADC will encourage its reservoir construction contractor and its agricultural licensees to implement plans that incorporate practices that are environmentally sustainable.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813
Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqchawaii@doh.hawaii.gov

File No

OEQC 15-069
DEAGalbraith

June 19, 2015

Mr. Scott Enright, Chair
Department of Agriculture
State of Hawaii
1428 S. King Street
Honolulu, HI 96814

Dear Mr. Enright,

SUBJECT: Draft Environmental Assessment (EA) for the Galbraith Lands Reservoirs Project, Wahiawa, O'ahu

The Office of Environmental Quality reviewed the Draft EA prepared for the subject project, and offers the following comments for your consideration.

Clarification of some technical aspects of the project could help readers better understand the potential benefits of the proposal, including:

1) Consistency between Table 2 (Reservoir Summary) and Table 8 (Earthwork Quantities)

The Draft EA repeats the statement that all four reservoirs will be constructed below existing grade, yet the narrative above Table 8 along with the data in this table indicate that only reservoirs 1 and 3 will be excavated below grade and embanked.

Also, complete information about the significant amount of material to be excavated and embanked should be provided for each reservoir, along with a discussion of how much and where excess excavated and/or necessary imported material will be handled.

2) Consistency of information regarding slope of berms

The General Area Map for Reservoir No. 1 provides conflicting information regarding the inner berm slope, with the Plan View indicating it will be a 3:1 slope and the Section View indicating it will be a 2:1 slope. Given the assertion that all reservoirs will be constructed below grade, a discussion should be included to support the design of 7-foot high above grade earth berms around the 2 private reservoirs (Nos. 1 and 3).

3) Water Source and Outflow

With a total capacity of almost 20 million gallons, and an acknowledged goal of increasing the amount of water that will become available for agricultural operations in the area, a more robust discussion of the project's impact upon the Wahiawa aquifer is warranted than the brief statements on page 62 alluding to proposed state wells and the unknown time when the maximum withdrawal from the existing 2.0 MGD well will be achieved. Also, please confirm the impression that only ground water, and not surface water, will be the source for all the reservoirs.

Regarding outflow from the reservoirs, some clarification would be helpful regarding how discharge will occur from these below grade reservoirs, how the spillways on the bermed Reservoirs 1 & 3 will function and why the other two reservoirs won't have spillways.

4) Endangered Waterbirds

The US Fish and Wildlife Service (USFWS) commented that endangered waterbirds fly over the area and quite likely will be attracted to the open, uncovered reservoirs. They suggest that the project proponents work with USFWS staff during project planning to develop measures to avoid impacts to listed species. The language in the Draft EA states that such discussion will take place only after the occurrence of impacts to listed species. Please provide concrete assurance that substantive discussions with USFWS will occur prior to the construction of the reservoirs, as requested by the USFWS.

Further, the Biological Resource Assessment for the project included a valuable discussion and recommendations pertaining to both flora and fauna, and these measures should be affirmatively integrated into the project's design.

5) Alternatives

Section 5 of the Draft EA only provides a dismissal of the No Action alternative. Other potential alternative siting and sizing schemes should be considered to allow a richer discussion of the desired goal of improving the capacity of the region's irrigation system. We note the project's Cultural Impact Assessment includes a variety of recommendations to modify the proposal, which could serve as the basis for alternatives to analyze and incorporate into the project's design.

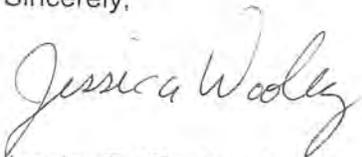
6) Secondary Impacts

We appreciate your acknowledgement that the project will have secondary impacts, namely in the form of increased agricultural production and related activity in the context of the Whitmore Project. As it was noted that agricultural chemicals already used on the project lands may be an environmental concern, we believe a discussion is warranted to clarify how effects on public health and the environment may be exacerbated by future agricultural activity on the lands, and what mitigation measures can be taken to alleviate this concern.

Mr. Scott Enright, Chair
DEA Galbraith Project
June 19, 2015
Page 3

Thank you for the opportunity to comment on the Draft EA. We look forward to the response that also will be included within the project's Final EA. If you have any questions about these comments, please consult myself or Tom Eisen in our office at (808) 586-4185.

Sincerely,

A handwritten signature in cursive script that reads "Jessica Wooley".

Jessica E. Wooley, Director
Office of Environmental Quality Control

c: Collette Sakoda (Consultant)

September 10, 2015

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

Dear Ms. Wooley:

Subject: Draft Environmental Assessment for the Galbraith Lands Reservoirs
Project, Wahiawā, O'ahu
File No. OEQC 15-069

Thank you for reviewing the subject Draft Environmental Assessment. We offer the following responses in the order your comments were presented.

1. Consistency between Table 2 and Table 8

The four reservoirs will be constructed below existing grade. Excavation and embankment quantities were not provided for Reservoirs 2 and 4 hence the "blank cells" in Table 8 for both reservoirs. Table 8 will be revised to include said quantities if available or noted in the table as "Not Available".

Suitable excavated material may be used for the reservoir embankment as recommended by the consulting engineer. Unused material will be spread around the reservoir or elsewhere on property.

Soil handling will be performed per Hawaii Administrative Rules for Air Pollution Control (Chapter 60.1) and NPDES Permit General Permit Authorizing Discharges of Stormwater Associated with Construction Activity. In addition, site work will be performed in accordance with Chapter 14, Article 14, Revised Ordinances of Honolulu, Rules Relating to Soil Erosion Standards and Guidelines, approved Best Management Plans, and approved plans/permits for grubbing, grading, and stockpiling.

2. Consistency of information regarding slope of berms

The 3:1 inner berm slope shown on the General Area Map for Reservoir No. 1 will be revised per the 2:1 slope depicted on the Section View.

3. Water Source and Outflow

As disclosed in the Draft EA, the Commission of Water Resource Management (CWRM) approved the transfer of Ground Water Use Permit No. 976 to ADC for withdrawal of up to 2.0 MGD for irrigating the Galbraith Estate Lands. The water source is a state owned well on the western end of the project area (formerly Del Monte Pump 5 Well).

The 2.0 MGD withdrawal rate was previously approved for Del Monte Pump 5 Well. It is presumed that this volume was derived from the sum total of hydro-geological studies, geo-technical data, capacity of the aquifer, and public discussion when the Ground Water Use Permit was approved for Del Monte. Thus water withdrawal will not exceed the allowable withdrawal rate; only the end users have changed.

Disclosing potential environmental impacts upon the Wahiawa aquifer is beyond the scope of work for constructing storage facilities. It is anticipated, however, that the development of a second state well near Reservoir No. 4 would be subject to rigorous investigation, analysis, evaluation, and public discussion of potential impacts on the Wahiawā aquifer.

It is also anticipated recharge of the Wahiawa aquifer will occur from agricultural use as irrigation water percolates into the ground. An estimate of water recharge was outside the scope of this Draft Environmental Assessment.

The ADC has indicated that the 2.0 MGD is sufficient to irrigate approximately 1,000 acres. Should the ADC (or State of Hawai‘i) acquire adjoining property thus increasing the agricultural acreage in the area, alternate water sources will have to be explored. Three potential water resources near the Galbraith lands were identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Waste Water Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC’s goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system. The Final EA will include a discussion of these potential alternative water sources.

The reservoirs were designed by different engineering consultants. The consultant for the two private reservoirs (Nos. 1 and 3) designed both with berms and spillways. The engineering consultant for the State reservoirs (Nos. 2 and 4) did not. Inclusion of a spillway (or not) was determined by the respective engineering consultant.

Overflow from the reservoirs (and spillways) will discharge onto the surrounding agricultural fields and percolate into the ground.

4. Endangered Waterbirds

The U.S. Fish and Wildlife Service talked about “four birds (Hawaiian geese) have been seen regularly traversing from Mililani at the Agricultural Park and at a local golf course and to the North shore of O‘ahu at James Campbell NWR and Turtle Bay Resort.” The Service does not state clearly that the birds (and other Hawaiian waterbirds) fly over the Galbraith Estate Lands.

It is acknowledged that standing water or open water may attract waterbirds. Users will be apprised of the attractive nuisance created by the reservoir and advised to consult with the Service. Scheduling consultation with the Service will be left to the user.

5. Alternatives

Alternative siting schemes for the reservoirs focused on locational and elevational criteria based on ADC’s requirements within its Galbraith property. Storage quantities were determined by the ADC for the state reservoirs and requested by the other two entities for their reservoirs. The final dimensions and design of each were provided by the respective consulting engineers. As disclosed in the Draft EA the selected sites “are at optimum elevations to optimize water transport from the well sites and water distribution to crop irrigation lines” (Section 1, B. Technical Characteristics, 9th paragraph, page 2).

Recommendations by community members consulted in conjunction with the project’s Cultural Impact Assessment were appropriately summarized in Section 4.B. Summary of Potential Environmental Impacts and Measures to Mitigate Adverse Effects, Short-term Impacts.

6. Secondary Impacts

The Galbraith Estate Lands remain fallow and unused. Future agricultural activities and vegetable crops (for example) to be grown are left up to the respective grower. Fertilizers and chemicals applied to stimulate plant growth, control insects, and eliminate weeds will vary by what is to be grown, what is approved for use by the U.S. Department of Agriculture, U.S. Environmental Protection Agency, Hawai‘i State Department of Agriculture, and the grower’s product preference. Without knowledge of

Jessica Wooley
September 10, 2015
Page 3

these factors and others, it is too early to talk about effects on public health from agricultural activities and measures for mitigating this concern.

We appreciate the Office of Environmental Quality Control's participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC

A handwritten signature in black ink, appearing to read "Colette Sakoda".

Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC



STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
560 N. NIMITZ HWY., SUITE 200
HONOLULU, HAWAII 96817

HRD15/7294B

July 7, 2015

Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa St.
Honolulu, HI 96816

Scott Enright, Chair
State Department of Agriculture
1428 S. King St.
Honolulu, HI 96814

Re: Draft Environmental Assessment: Galbraith Lands Reservoirs Project
Kamananui Ahupua'a, Wailua Moku, O'ahu Moku
TMKs (1) 6-5-002:010; (1) 7-1-001:002; (1) 7-1-001:005

Aloha Ms. Sakoda:

The Office of Hawaiian Affairs (OHA) received your letters dated June 4, 2015 and June 10, 2015, requesting comments on a draft environmental assessment (DEA) for the Galbraith Lands Reservoirs Project (the "GLR Project"). The applicant, the State of Hawai'i Agribusiness Development Corporation (ADC), proposes the construction of four reservoirs on former pineapple plantation lands in Wahiawā, O'ahu to increase irrigation water storage capacity for agricultural activities in the area.

As you are aware, OHA has a property interest in approximately 511 acres¹ adjacent to the reservoir parcels, acquired through the Galbraith Estate Lands purchase. Although the proposed reservoirs will not be located on OHA land, the existing Galbraith Irrigation System (GIS) crosses through OHA parcels and it appears that the GIS will still serve as the primary distribution system under the proposed GLR Project. See DEA Figure 10. In addition to our landowner interests, OHA has statutory responsibilities "[t]o assess the policies and practices of other agencies impacting on native Hawaiians and Hawaiians, and conducting advocacy efforts for native Hawaiians and Hawaiians[.]" Hawai'i Revised Statutes (HRS) §10-3.

¹ We note an incorrect acreage of 495 acres for OHA lands on page 1 of the DEA, citing to the HHF Planners study.

The four reservoirs will be constructed below grade on three parcels, all owned by the State of Hawai'i and managed by ADC. Kalena Farms, a current licensee, will fund and construct a 3.1 million gallon (MG) reservoir at Reservoir Site No. 1 for its use. Ohana Best Farms, another current licensee, will fund and construct a 3.1 MG reservoir at Reservoir Site No. 3. The other reservoirs, a 3 MG reservoir (Reservoir Site No. 2) and a 10 MG reservoir (Reservoir Site No. 4), will be funded and constructed by ADC. All reservoirs will be lined by a polypropylene fabric pond liner and be built below grade. The two privately funded and constructed reservoirs will also integrate 7-foot, above grade earth berms for impounding water as part of their reservoir design.

According to the DEA, the reservoirs will be supplied with water from two wells, one existing and one proposed. The existing well, Well No. 3-3103-0001 (fka Del Monte Pump 5 Well and the Del Monte Corporation Well #5/Bott Well), has a 2,000 gallon per minute capacity and is located on state land near to the proposed Reservoir Site No. 1. The ground water use permit for the well is for 2.0 million gallons per day. DEA p. 23. A second well is proposed nearby to Reservoir Site No. 3, with Ohana Best Farm as the entity responsible for funding, construction, and permitting, including a well construction permit from the Commission on Water Resource Management and associated "environmental evaluation documentation requirements[.]" DEA p. 3. The proposed well "may be developed and funded by Ohana Best Farm to service Reservoir No. 3." Id.

Based on our review, we note that the DEA included limited discussion of water sources and the means of water transmission from well sites to the proposed reservoirs. In other words, the DEA discusses the reservoir sites in isolation, without describing and analyzing the impacts of the overall irrigation system, of which these reservoirs will be a primary component. Areas for further discussion and analysis should include:

- The suitability of Well No. 3-3103-0001 to serve as the water source for all four proposed reservoirs, given the uncertain and unsecured status of a new well near the Reservoir Site No. 3;
- The capacity of the existing GIS to transmit water between reservoirs, or any necessary upgrades to facilitate this use; and
- The relative locations of the proposed reservoirs, the existing GIS, and additional transmission lines that will be needed to connect reservoir sites to the GIS. Figure 10 in the DEA, which provides the only depiction of the existing and proposed distribution systems, does not include the locations of the proposed reservoirs. Moreover, system upgrades contemplate the installation of an additional pressure relief valve and four air/vacuum relief valves on OHA property. We ask that any proposed upgrades to the system be done in close coordination with our agency, given ongoing planning efforts, which may include relocating irrigation transmission lines on OHA parcels.

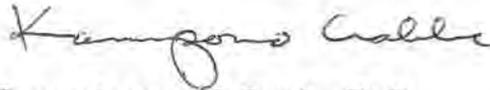
OHA staff were recently invited to a presentation by the U.S. Army Corps of Engineers and their consultant, Kennedy/Jenks Consultants, on the ongoing "Hawaii Water Systems

Technical Study Wahiawa/North Shore Irrigation Study” (“Technical Study”). The Technical Study is being conducted in support of ADC interests in exploring alternative water sources beyond continued use of Well No. 3-3103-0001. An alternative water source configuration from the Technical Study could provide a viable water option besides, or in addition to, potable water from Well No. 3-3103-0001 and could serve as one of the alternatives considered in the final EA.

Finally, OHA supports specific recommendations contained in the DEA: (1) that native plants be used in landscaping for the project and (2) that archaeological and cultural monitoring be utilized for the project. DEA pp. 60-61. With respect to indigenous and Polynesian introduced plants, we note that HRS §103D-408 already requires the use of such plants in new state-funded landscaping projects wherever and whenever feasible, and that this requirement has been further clarified by HB 206, included in OHA’s 2015 legislative package and recently passed by the Hawai’i State Legislature. With respect to monitoring, given the proximity to Kūkaniloko and potential for impacts to unidentified subsurface Native Hawaiian sites, we also support archaeological and cultural monitoring for all reservoir excavation activities, despite the past plantation agriculture use.

Thank you for the opportunity to comment. Should you have questions regarding this letter, please contact Everett Ohta, OHA Lead Compliance Specialist, at 594-0231 or by email at everetto@oha.org.

‘O wau iho nō me ka ‘oia ‘i‘o,



Kamana‘opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC:eo

C: Peter Apo, OHA O‘ahu Trustee
Jonathan Ching, OHA Land and Property Manager

**Please address replies and similar, future correspondence to our agency:*

*Dr. Kamana'opono Crabbe
Attn: OHA Compliance Enforcement
560 N. Nimitz Hwy., Ste. 200
Honolulu, Hawai'i 96817*

September 10, 2015

Dr. Kamana‘opono Crabbe
Attn: OHA Compliance Enforcement
560 N. Nimitz Highway, Ste 200
Honolulu, HI 96817

Re: Draft Environmental Assessment: Galbraith Lands Reservoir Project
Kamananui Ahapua‘a, Waialua Moku, O‘ahu Mokupuni
TMKs (1) 6-5-002: 010; (1) 7-1-001: 002, 005
HRD15//7294B

Dear Dr. Crabbe:

Thank you for reviewing and commenting on the referenced environmental assessment. Responses to your comments are offered in the order they were presented.

Suitability of Well No. 3-3103-0001
Capacity of the existing Galbraith Irrigation System
Upgrades to Galbraith Irrigation System on OHA Property

At the time the Draft Environmental Assessment was prepared and to the present, State Well No. 3-3103-0001 is the only underground water source available to supply the four reservoirs. A second well proposed near Reservoir No. 4 would supplement the existing well.

The State Agricultural Development Corporation (ADC) believes that in the short term (3 to 5 years) State Well No. 3-3103-0001 can supply 2.0 MGD of water to irrigate approximately 1,000 acres of the Galbraith Estate Lands. Water delivery to the four proposed reservoirs will be from the existing Galbraith Irrigation System (GIS) much of which crosses through owned by OHA. What upgrades are needed and/or proposed to deliver 2.0 MGD to the reservoirs using the GIS were not known when this environmental assessment was prepared.

According to the Conceptual Water Plan, Figure 10, proposed improvements crossing OHA and ADC property have been prepared but not approved. The Conceptual Plan shows a system crossing through OHA property may serve as the primary distribution system.

When OHA and ADC approve an irrigation system plan, it is anticipated that an environmental assessment will be required. The assessment should discuss the existing GIS, proposed upgrades (such as pump stations, new transmission lines, pressure relief valves), integration with existing and proposed water wells, and integration with the reservoirs proposed by this project.

ADC interest in seeking a long-term source of water is under investigation as noted by your comment (Kennedy Jenks Consultants, Technical Study Wahiawa/North Shore Irrigation Study). It is assumed that selection of an alternative water source (or more than one source) will drive technical studies for designing a comprehensive irrigation system including the GIS and a supplementary system as needed.

Dr. Kamana'opono Crabbe

Sept. 10, 2015

Page 2

Landscaping the reservoirs with native plants will be considered wherever feasible and practicable.

Archaeological monitoring will be conducted during reservoir construction.

The participation of the Office of Hawaiian Affairs in the environmental assessment review process is appreciated.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC

A handwritten signature in black ink, appearing to read "Colette Sakoda". The signature is fluid and cursive, with the first name being more prominent.

Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

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) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR



ROBERT J. KRÖNING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

June 24, 2015

Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Attn: Colette Sakoda

Dear Ms. Sakoda:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed
3 MG (corner of Kaukonahua Road/Kamehameha Highway and Kamananui
Road); 7-1-001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawaii

The Department of Design and Construction does not have comments to offer on the draft environmental assessment.

Thank you for the opportunity to review and comment. Should there be any questions, please contact me at 768-8480.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Kroning".

Robert J. Kroning, P.E.
Director

RJK: cf (612417)

September 10, 2015

Robert J. Kroning, P.E., Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, HI 96813

Dear Director Kroning:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010; 7-1-001: 002, 005

Thank you for reviewing and commenting on the subject environmental assessment. The agency's "no comments to offer on the draft environmental assessment" will be included in the Final Environmental Assessment. In addition, the Department's comment and our response will be appended in the document.

Department of Design and Construction participation in the environmental assessment review process is appreciated.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

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) 768-6041
DEPT. WEB SITE: www.honoluluudpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR



GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2015/ELOG-1145 (mw)

July 7, 2015

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Thank you for your letter dated June 4, 2015 requesting comments on the Draft Environmental Assessment (EA) for the Galbraith Lands Reservoirs Project. The Final EA needs to include a short discussion of the possible use of non-potable water sources, including recycled water.

Should you have any questions, please contact Mike Watkins of our staff at 768-8044.

Very truly yours,

A handwritten signature in blue ink, appearing to read "George I. Atta".

George I. Atta, FAICP
Director

GIA:js

cc: Scott Enright, Chair
State Department of Agriculture

September 10, 2015

George I. Atta, FAICP, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Re: Draft Environmental Assessment: Galbraith Lands Reservoir Project
Kamananui Ahapua'a, Waialua Moku, O'ahu Moku
TMKs (1) 6-5-002: 010; (1) 7-1-001: 002, 005
2015/ELOG-1145 (mw)

Dear Director Atta:

Thank you for reviewing and commenting on the referenced environmental assessment. Our response to your comment is offered below.

Three potential water resources near the Galbraith lands were identified in a recently commissioned study for the ADC: 1) Wahiawa Ditch Irrigation System (surface water); 2) Wahiawa Wastewater Treatment Plant (recycled water); and 3) Lake Wilson (surface water). ADC's goal is to capture the recycled and surface water and integrate it into the existing Galbraith Irrigation System to develop a long-range irrigation system. The Final EA will include a discussion of these as potential alternative water sources.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR



MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

June 23, 2015

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010
7-1-001: 002 and 005

In response to your letter dated June 4, 2015, regarding the above mentioned subject, the Honolulu Fire Department determined that there will be no significant impact to fire department services due to the construction of the four reservoirs.

Should you have questions, please contact Acting Battalion Chief Terio Bumanglag Jr. of our Fire Prevention Bureau at 723-7151 or tbumanglag@honolulu.gov.

Sincerely,

A handwritten signature in cursive script that reads "Socrates D. Bratakos".

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

cc: Scott Enright, Chair
State Department of Agriculture

September 10, 2015

Socrates D. Bratakos
Assistant Chief
Honolulu Fire Department
636 South Street
Honolulu, HI 96813-5007

Dear Assistant Chief Bratakos:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010; 7-1-001: 002, 005

Thank you for reviewing and commenting on the subject environmental assessment. The Honolulu Fire Department's determination "that there will be no significant impact to fire department service due to the construction of the four reservoirs" will be included in the Final Environmental Assessment. In addition, the Department's comment and our response will be appended in the document.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 • INTERNET: www.honolulu-pd.org

KIRK CALDWELL
MAYOR



LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. McCAULEY
DEPUTY CHIEFS

OUR REFERENCE MT-DK

June 16, 2015

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Ms. Sakoda:

This is in response to your letter of June 4, 2015, requesting comments on a Draft Environmental Assessment for the Galbraith Lands Reservoirs Project in Wahiawa.

Based on the information provided, this project should have no significant impact on the services or operations of the Honolulu Police Department.

If there are any questions, please call Acting Major Gregory Osbun of District 2 (Wahiawa) at 723-8703.

Thank you for the opportunity to review this project.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By 
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

cc: Mr. Scott Enright, Chair
Hawaii Department of Agriculture

September 10, 2015

Louis M. Kealoha
Chief
Honolulu Police Department
801 South Beretania Street
Honolulu, HI 96813

Dear Chief Kealoha:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010; 7-1-001: 002, 005

Thank you for reviewing and commenting on the subject environmental assessment. Your determination that “the project should have no significant impact on the services or operations of the Honolulu Police Department,” will be included in the Final Environmental Assessment. In addition, the Department’s comment and our response will be appended in the document.

We appreciate your participation in the environmental assessment review phase of this important project.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC

From: Kuwaye, Kristen <kristen.kuwaye@hawaiianelectric.com>

To: 'sakodacolette@aol.com' <sakodacolette@aol.com>

Cc: Liu, Rouen <rouen.liu@hawaiianelectric.com>; '1.11.159255@ecollab.heco.com' <1.11.159255@ecollab.heco.com>

Subject: Galbraith Lands Reservoirs Project

Date: Tue, Jul 7, 2015 2:55 pm

Kristen Kuwaye on behalf of Rouen Liu

Dear Ms. Colette Sakoda,

Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has no objection to the project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Galbraith Lands Reservoirs Project comes to fruition, please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.

If you have any questions, please call me at 543-7245.

Sincerely,

Rouen Q. W. Liu

Permits Engineer

Tel: (808) 543-7245

Email: Rouen.liu@hawaiianelectric.com

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September 10 2015

Rouen Q.W. Liu,
Permits Engineer
Engineering Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, HI 96840-0001

Dear Mr. Liu:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project

Thank you for reviewing the subject Draft Environmental Assessment. Your statement that Hawaiian Electric Company has no objection to the project will be inserted into the Final Environmental Assessment. The ADC and lessees will be notified to keep HECO informed of their respective plans.

HECO's participation in the environmental assessment review process is appreciated.

Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC



Colette Sakoda, Principal

c: Scott Enright, HDOA
James Nakatani, ADC



July 8, 2015

Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816
Attention: Ms. Colette Sakoda

Dear Ms. Sakoda:

Subject: **Draft Environmental Assessment: Galbraith Lands Reservoirs Project
Tax Map Key No. 6-5-002:010 proposed 3 MG; 7-1-001:002 proposed 3 MG
(corner of Kaukonahua Road/Kamehameha Highway and Kamananui Road); 7-1-
001:005 proposed 3 MG and 10 MG, Wahiawa, Oahu, Hawaii**

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the subject project.

Hawaiian Telcom does not have any specific issues that need to be addressed in preparation of the Draft Environmental Assessment. Please continue to include us during the design stages of the project.

If you have any questions or require assistance in the future on this project, please call me at 546-7761.

Sincerely,



Les Loo
Network Engineer
Network Engineering & Planning

cc: File [Wahiawa]



OHANA BEST LLC
2829B Mokumoa Street
Honolulu, HI 96819
OHANABESTFARMS@GMAIL.COM

Hwa Jun Chung
Managing Member

July 8, 2015

Sent via Electronic Mail and USPS

Scott Enright, Chair
Department of Agriculture
State of Hawaii
SCOTT.ENRIGHT@HAWAII.GOV
1428 South King Street
Honolulu, HI 96814

Colette Sakoda
Environmental Planning Solutions, LLC
SOKADACOLETTE@AOL.COM
945 Makaiwa Street
Honolulu, HI 96816

Dear Mr. Enright and Ms. Sakoda:

Re: Comment on Draft Environmental Assessment - Galbraith Lands Reservoirs Project

Having reviewed the above-referenced Draft Environmental Assessment report, I submit the following comments:

- **Need to minimize adverse impacts on ongoing farm operations caused by the installation and operation of Reservoir #4**

On page 161 of the report, a letter, dated November 20, 2014 (addressed to Ms. Sakoda and copied to Mr. Enright), outlines various concerns Ohana Best Farms (OBF) has regarding proposed improvements on Parcel 5 that OBF and the Agribusiness Development Corporation (ADC) will both be using. The letter includes suggested pathways to minimize such impacts.

Shortly after ADC set the final location of its Reservoir #4 on Parcel 5, these concerns were brought to the attention of ADC. Ten months have since lapsed and OFB is still awaiting an opportunity to review and provide comment on ADC's mitigation efforts that addresses the concerns raised. As part of the environmental assessment process, OBF believes the draft report should set forth specific details on ADC's efforts to mitigate any potential adverse impacts to OFB's ongoing farming operations caused by the installation and operation of Reservoir #4.

Mr. Scott Enright
Ms. Colette Sakoda
July 8, 2015
Page 2 of 2

- **Submitting additional information on OFB planned Reservoir #3 and other ancillary improvements**

At the request of ADC, since mid-June 2014, OBF has been working with Ms. Sakoda and her colleagues in their task to complete a draft environmental assessment report for the OFB Reservoir #3, one of four reservoirs that will service ADC lands in the area, and which collectively encompass the ADC Reservoirs Project covered under this EA. Based on guidance provided by OEQC¹, the documentation OBF provided to Ms. Sakoda incorporate descriptions of all improvements that are an integral part of OBF planned irrigation infrastructure.

OBF's goal is to streamline and integrate the various government compliance processes. The timely completion of those processes allows promptly placing the farmland into production and lessens the timeline and the expenditure of resources to complete such processes. A packet of supplemental documentation previously submitted by OBF to Ms. Sakoda (parts of which is referenced in the Draft EA report but not covered in detail) is enclosed with this communication. Should ADC elect to approve OBF's proposal to construct Reservoir #3 and the other ancillary improvements associated with OBF reservoir project, salient information regarding those improvements are already part of the EA record. My hope is that such documentation minimizes the necessity of submitting supplemental assessments.

If you have any questions or comments regarding this communication, please feel free to contact me. In closing, I look forward to working with ADC towards reaching an amiable conclusion to the items noted herein and the reservoir project receiving a FONSI notice.

With warmest and best regards,



Hwa (Jun) Young Chung
Managing Member
Ohana Best LLC

Enclosure: Supplemental Documentation Packet

¹ OEQC strongly advised OBF to disclose all planned improvement, and that such disclosures be incorporated into ADC's EA report covering Reservoir #3



**Supplemental Documentation
Reservoir #3 and Ancillary Improvements**

**Farm Irrigation Improvement #1
Three Million Gallon Reservoir (Reservoir #3)**

<p align="center"><i>Background and description of Improvement</i></p>	<p>Don McDonald, a licensed Hawaii civil engineer and the principal of Agtech Pacific, prepared and finalized the design of the reservoir and the farm’s irrigation system. The three million gallon reservoir is located at one of the highest elevation points on the farm. As part of the design process, Mr. McDonald sought, and incorporated into his final design¹, input from the West Oahu Soil and Water Conservation District (WOSWCD)², the Natural Resources Conservation Service (NRCS), and ITC Water Management, Inc. (ITC). ITC provided additional value-engineering input and submitted proposals to construct the reservoir. The reservoir and irrigation system meets applicable NRCS design standards, an eligibility precondition requirement when seeking USDA financing.</p>
<p align="center"><i>Justification and Impact Assessment</i></p>	<p>OBF acknowledges ADC’s plans to construct Reservoir #4, a ten million gallon reservoir that could serve OBF and other ADC-owned parcels. However, because of circumstances beyond ADC’s control, the completion date of the reservoir is not certain. OBF desires to commence farming operations as soon as possible. Given the uncertainty on a specific completion date, OBF elected to move forward with planning and installing Reservoir #3.</p> <p>OEQC guidance strongly recommends OBF follow the spirit and intent of Chapter HRS 343 by disclosing all planned improvements irrespective of the funding source or ownership of the improvements. Incorporating the disclosures now is in the spirit and intent of Chapter 343, and minimizes future delays or future cost in order to satisfy compliance requirements of Chapter 343.</p>

¹ See Attachment I – Final Reservoir Plan

² See Attachment II – Ohana Best Farms Soils Conservation Plan

**Farm Improvement #2
NEW IRRIGATION WELL**

<p style="text-align: center;"><i>Background and description of Improvement</i></p>	<p>OBF acknowledges ADC is working to place into service a portion of the existing 12” water transmission line that traverses non-ADC owned lands. That portion of the transmission line serves as the primary pipeline that delivers water to Reservoirs #3 and #4. Collectively the two reservoirs will hold 69% the total planned water storage for ADC lands in the area. Given the delays encountered to date regarding this matter, and as a proactive planning measure, OBF explored other irrigation water sources to supply OBF Reservoirs #3 & potentially #4. Because of the crops OBF grows, R-1 water was not considered.</p> <p>Tapping the neighboring Alli Turf well proved more regulatory intensive than first anticipated. Surprisingly, for deep water well conditions (like those in the Whitmore area), preliminary studies show the net amortized cost (per thousand gallons) of drilling a new well and powering the submersible pump using solar power can be less than the direct and indirect costs to extract the water from an existing well using a diesel-powered generator. Based on these studies, OBF is pursuing installing a new well with solar power generation. We understand CWRM may be able to process³ the well permit administratively if ADC acknowledges that water drawn from the new well counts as part of the overall water allocation ADC holds for its lands in the area. It takes 60-90 days after submittal to process a permit administratively.</p>
<p style="text-align: center;"><i>Justification and Impact Assessment</i></p>	<p>The installation of a new well with solar power generation brings certainty in the delivery timetable, water quality that OBF needs, and a lower the life cycle cost of irrigation water. It is important to note that the addition of a new well does not change ADC’s existing water allocation for the area. Rather, the availability of a second well for the area provides additional water source redundancy, significantly reduces the dependence on the need to use portions of existing pipeline that crosses non-ADC lands, and offers ADC alternative pathways and options to supply, interconnect, and distribute water throughout the area.</p> <p>OEQC guidance strongly recommends OBF follow the spirit and intent of Chapter 343 HRS by disclosing all planned improvements irrespective of the funding source or ownership of the improvements. Incorporating the disclosures now is in the spirit and intent of Chapter 343 HRS, and minimizes future delays or future cost in order to satisfy compliance requirements of Chapter 343 HRS.</p>

³ Process takes approximately 60-90 days to process after CWRM’s receipt of a complete permit application

Farm Improvement #3
Photovoltaic (PV) Array Systems

<p>Background and description of Improvement</p>	<p>With the expected continued rise in the cost of energy produced using fossil-fueled powered generators, and after factoring the initial cost and time to install traditional electrical service to the farm⁴, OBF incorporated into its capital improvement plans two photovoltaic (PV) array systems designed to allow the farm to be 100% off the utility grid. There current are federal and state financial incentives⁵ readily available that promotes and make financially feasible the installation of these renewable energy systems. A description of the planned PV systems is attached⁶.</p>
<p><i>Justification and Impact Assessment</i></p>	<p>Financial incentives offered by state and federal governments strongly underscore the heightened priority of state and national policies to deploy renewable energy systems that lessen the dependence and use of fossil fuels to generate electricity. In addition to federal and state tax credits, USDA is offering grants for up to 25 percent of total project costs and loan guarantees for up to 75 percent of total project costs for renewable energy systems and energy efficiency improvements. Electricity generation with PV array systems will stabilize and likely reduced farm utility costs. This especially applies to fossil fuel-electricity cost⁷ used to operate submersible and surface pumps used for irrigation purposes.</p> <p>OEQC guidance strongly recommends OBF follow the spirit and intent of Chapter 343 HRS by disclosing all planned improvements irrespective of the funding source or ownership of the improvements. Incorporating the disclosures now is in the spirit and intent of Chapter 343 HRS, and minimizes future delays or future cost in order to satisfy compliance requirements of Chapter 343 HRS.</p>

⁴ With no existing electrical service to the farm, the nearest HECO power pole tap is approximately 2,500 feet away and will required the installation of multiple power poles and the creation and issuance of a dedicated power and transformer easement in favor of HECO

⁵ USDA loans, USDA grants, and state and federal tax credits

⁶ See Attachment III – Ohana Best Farm Renewable Energy Plan

⁷ Ongoing fuel, and equipment maintenance costs associated with power generated via diesel generators

Farm Improvement #4
Base Yard Improvements

<p>Background and description of Improvement</p>	<p>As part of its farm base yard operations, OFB plans to install nominal base yard structures typically found on similar farms of its size. The improvements are a small field office with secured storage, and covered shed areas⁸. The shed areas will be used for equipment maintenance, repairs, and conducting other ancillary farm activities. All roof areas of these base yard structures would serve as mounting platforms for the solar panels arrays.</p>
<p><i>Justification and Impact Assessment</i></p>	<p>The roof of these planned improvements will serve as mounting platform for the farms PV arrays. The improvements are nominal in size, occupying less than 1.25% of the total farm acreage. These base yard improvements are typical found in similar farms of its size and are necessary for maintaining efficient farm operations.</p> <p>OEQC guidance strongly recommends OBF follow the spirit and intent of Chapter 343 HRS by disclosing all planned improvements irrespective of the funding source or ownership of the improvements. Incorporating the disclosures now is in the spirit and intent of Chapter 343 HRS, and minimizes future delays or future cost in order to satisfy compliance requirements of Chapter 343 HRS.</p>

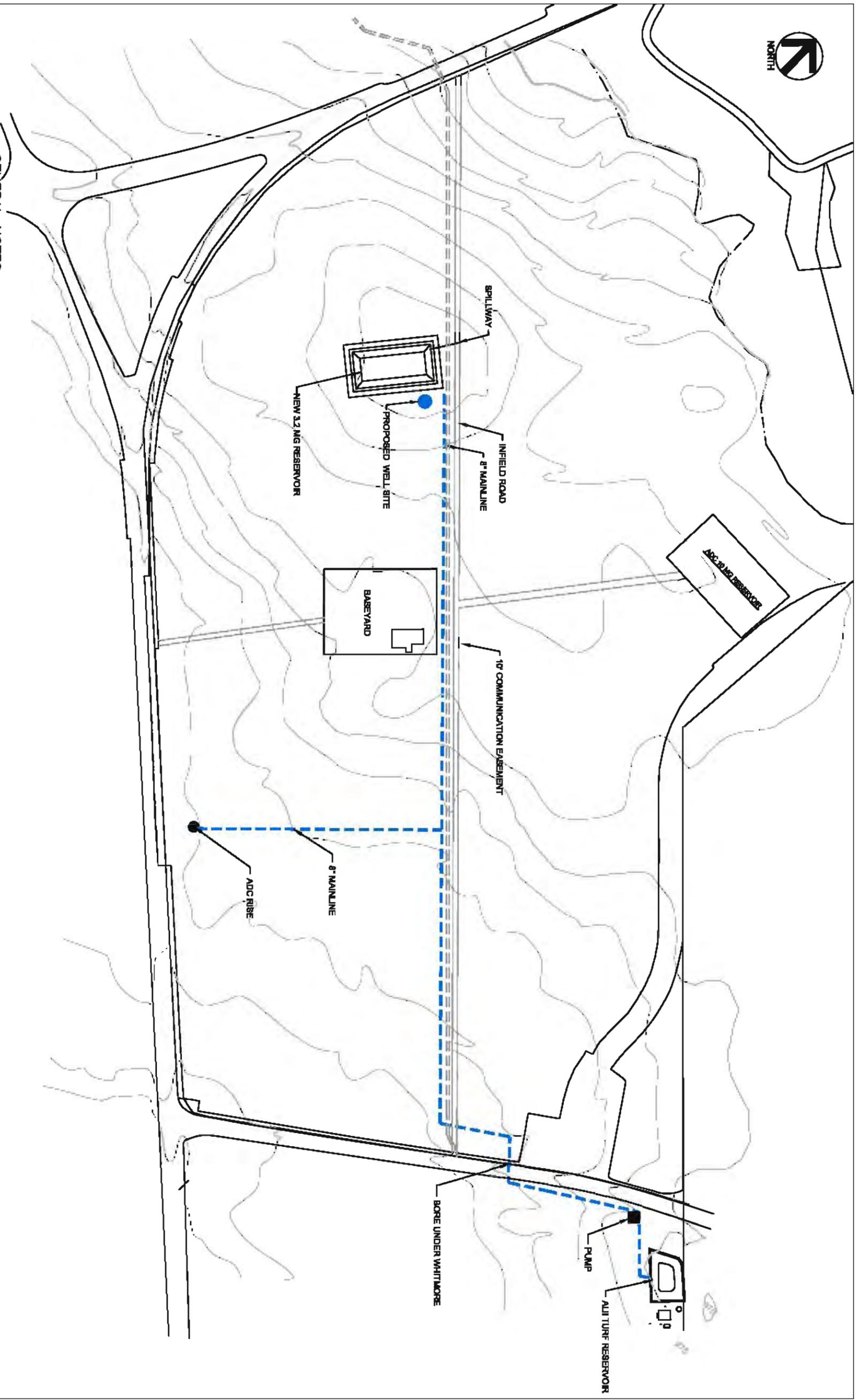
⁸ See Attachment IV – Base Yard Site Plan

LIST OF ATTACHMENTS

<u>No.</u>	<u>Attachment Description</u>
I	Final Reservoir Plan
II	Ohana Best Farms Soils Conservation Plan
III	Ohana Best Farm Renewable Energy Plan
IV	Ohana Best Farm Site and Base Yard Plans

Attachment I

FINAL RESERVOIR PLAN



GENERAL NOTES:

1. OHANA BEST LIQUID RESERVOIR TO BE 3.2 MILLION GALLONS.
2. LOCATION OF THE RESERVOIR SHOWN IS APPROXIMATE AND CAN BE ADJUSTED IN FIELD.
3. UPON COMPLETION ALL BERMS WILL BE PLANTED WITH A SUITABLE GRASSCOVER.
4. INLET AND DISCHARGE FROM THE RESERVOIR WILL BE PAVED OVER IMPROVING BERM.
5. SOIL TYPE IS WAIA, WAIANA SILTY CLAY AND REASONABLY SUITABLE FOR AN EROSION.

REVISIONS

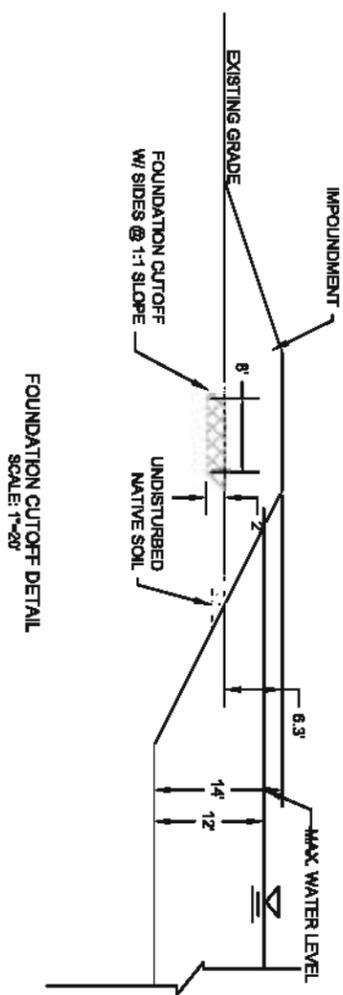
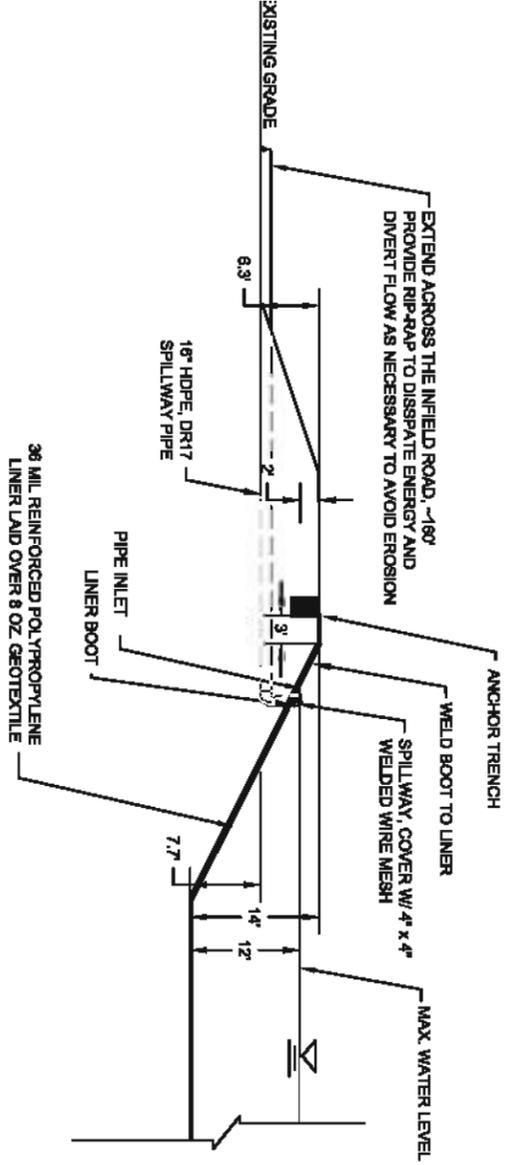
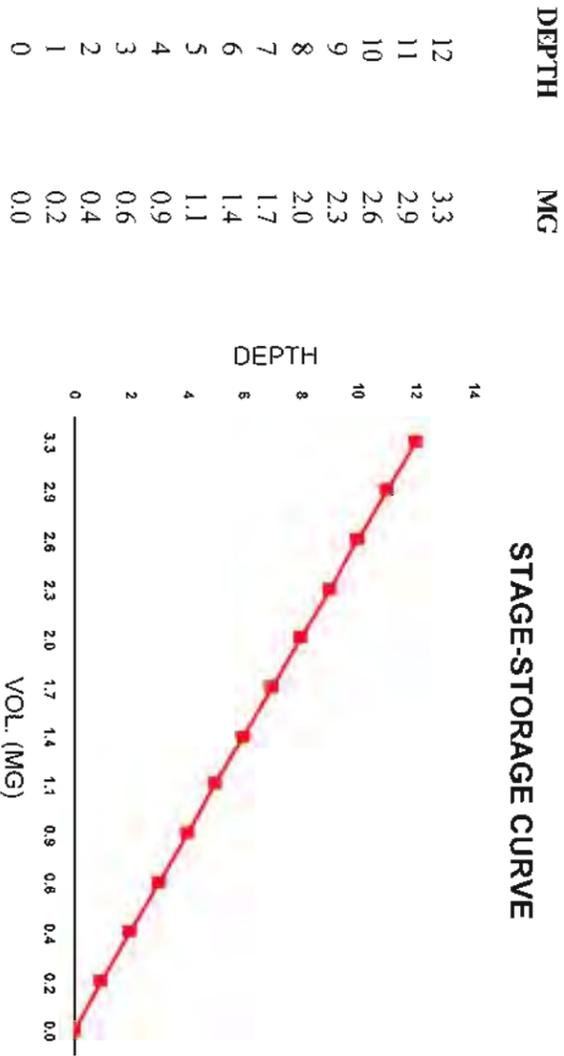
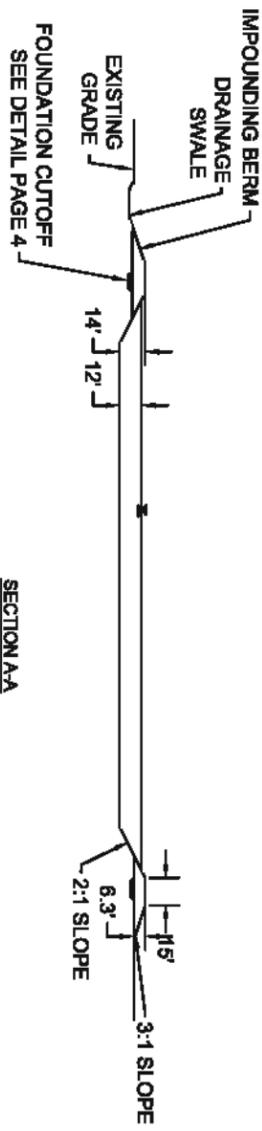
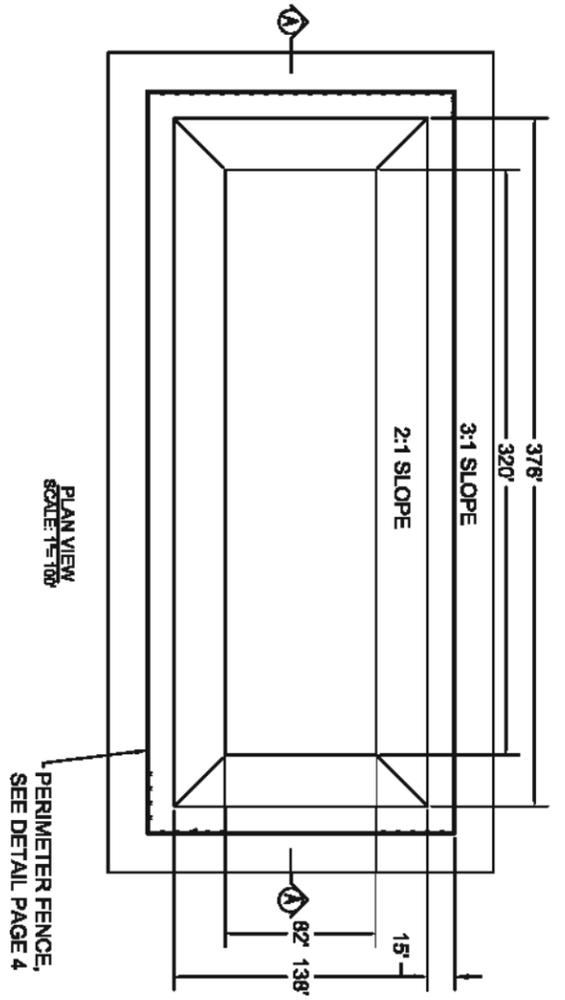
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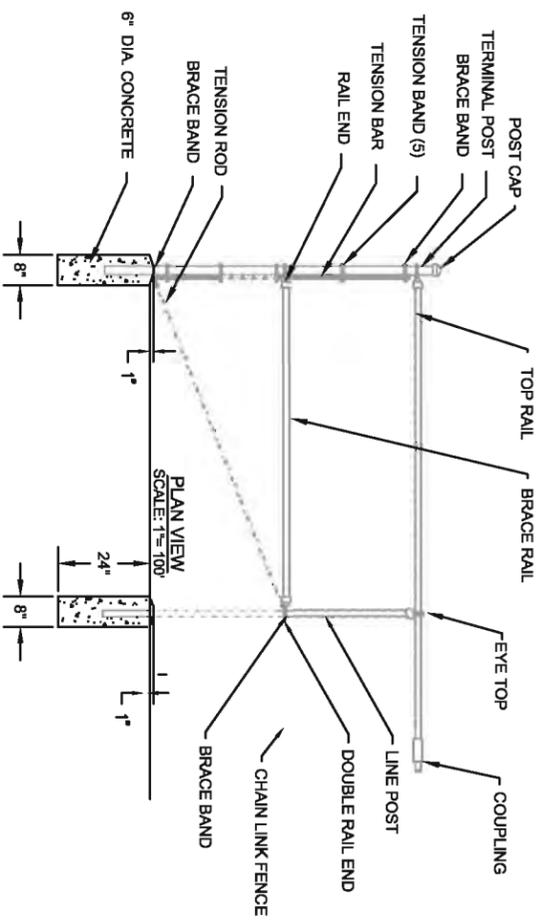
PHONE: (808) 636-2020
E-MAIL: agtech@hawaii.rr.com

AGTECH PACIFIC
P. O BOX 1246
HALEIWA, HI 96712

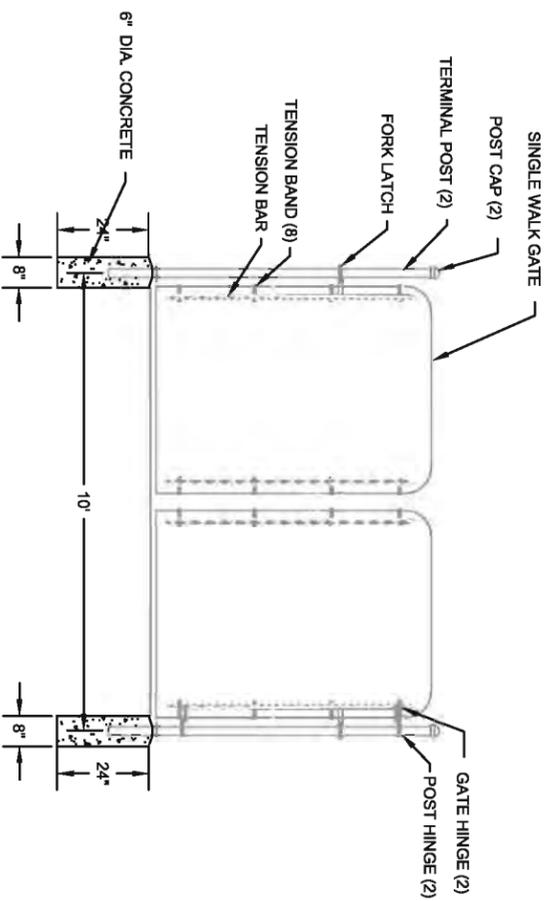
OHANA BEST FARM
PROPOSED RESERVOIR
GENERAL AREA MAP

DATE	1/10/2018
SCALE	1"=50'
DRAWN BY	
CHECKED BY	
APP	
SHEET	P2

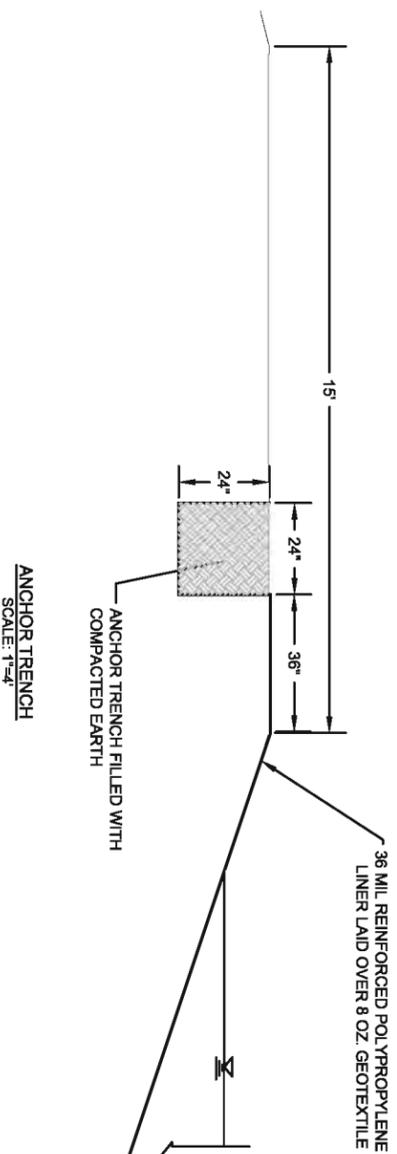




6' CHAIN LINK FENCE DETAIL
NO SCALE



6' CHAIN LINK 6' DOUBLE GATE DETAIL
NO SCALE



ANCHOR TRENCH
SCALE: 1"=4'

CONSTRUCTION NOTES:

1. THE CONTRACTOR IS FREE TO MAKE NECESSARY FIELD ADJUSTMENTS TO THE RESERVOIR SHAPE TO ACCOMMODATE EQUIPMENT CONSTRAINTS PROVIDED THAT THE OVERALL VOLUME IS NOT CHANGED AND THE SPECIFIED SIDE SLOPES ARE MAINTAINED.
2. IN DEVELOPING THE EMBANKMENT THE CONTRACTOR SHALL BUILD IN NO MORE THAN ~9" LIFTS UTILIZING A COMPACTOR OR OR SHEEPFOOT ROLLER TO COMPACT EACH LIFT OF SOIL. COMPACTION TO BE DONE AT PROPER SOIL MOISTURE CONTENT SUFFICIENT TO ACHIEVE 90 - 95% COMPACTION.
3. THE CONTRACTOR SHALL INCREASE THE HEIGHT OF THE EMBANKMENT 5 TO 10% TO ALLOW FOR SETTLING.
4. INTERIOR SIDE SLOPE SHALL BE 2 HORIZONTAL TO 1 VERTICAL (2:1) WHILE EXTERIOR SLOPES SHALL BE 3:1 MIN.
5. ALL PIPES IN AND OUT OF THE RESERVOIR ARE TO BE HDPE DR17 WITH SEEPAGE CONTROL IN ACCORDANCE WITH LINING MANUFACTURER'S SPECIFICATIONS.
6. CUT VOLUME IS ESTIMATED TO BE ~250,000 CUBIC FEET AND FILL TO BE ~195,000 CUBIC FEET.
7. EXCESS SPOIL FROM EXCAVATION IS TO BE DEPOSITED ON THE EXTERIOR SLOPES OF THE RESERVOIR.
8. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS PRIOR TO EXCAVATION. ANY DISCREPANCIES ARE TO BE REPORTED PRIOR TO COMMENCEMENT OF THE PROJECT.
9. THE LINER IS TO BE INSTALLED IN ACCORDANCE WITH ALL MANUFACTURER'S RECOMMENDATIONS.
10. ALL LINER MATERIAL IS TO BE 36 MIL REINFORCED POLYPROPYLENE LAID OVER AN 8 OZ. GEOTEXTILE FABRIC.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING AND TESTING OF ALL SEAMS AND PIPE PENETRATIONS.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING A STABLE GROUND COVER ON ALL IMPOUNDING BERMS IMMEDIATELY UPON COMPLETION.

Attachment II

OHANA BEST FARMS SOILS CONSERVATION PLAN



Ohana Best LLC

January 21, 2015

Sent Via Email

West Oahu SWCD
Attention: Makena Mason
WESTOAHUSWCD@GMAIL.COM

Re: Conservation Plan #3 Update
Portion of TMK I-1-7-001 Parcel 5 (160 acres)

Dear Makena:

Ohana Best Farms (OBF) is transmitting the attached revisions to its Conservation Plan. ADC recently sited their proposed 10 million gallon reservoir on a portion of OBF's farm, necessitating changing a portion of the original farm boundary. While the size of the farm remains unchanged, the boundary change now includes lands that were not previously included in OBF's conservation plan. There are adjustments to conservation practices based on the physical attributes of the new area.

Incorporated into Plan Revision #3 is the preliminary drawings of Ohana Best's proposed 3 mg reservoir (one of four planned on ADC lands).

Ohana Best would very much appreciate if Conservation Plan #3 Update can be placed on the January 27, 2015 meeting agenda of the West Oahu SWCD. Please feel free to contact Robert Maglasang at 808-253-9185 who is assisting OBF if you have any questions or comments.

With warmest and best regards,

A handwritten signature in black ink, appearing to read "Hwa (Jun) Young Chung".

Ohana Best LLC
dba Ohana Best Farms
Hwa (Jun) Young Chung
Managing Member

Enclosures
cc: Robert Maglasang
J. F. Blanco



Note: This Conservation Plan Update was accepted by the West Oahu SWCD at their January 27, 2015 meeting.

Conservation Plan Update

Ohana Best LLC
2928-A Mokumoa Street
Honolulu, HI 96819

Ohana Best Farms will grow diversified crops on 160 acres in Central Oahu while integrating appropriate NRCS practices that protect soil, water, plants, wildlife, and human resources. The company endeavours to: 1) reduce the amount of imported fresh produce by optimizing operating efficiencies and economies of scale, 2) export surplus produce to other regions during their non-growing seasons, and 3) earn the reputation and respect as a well-managed, environmentally responsible, and civic-minded operation.

Access Roads (560)

Existing egress and Ingress roadways and aprons, as well as internal circulation roadways, will be established and/or renewed by laying recycled asphalt (RAP), gravel, coral, or other comparable material. During the start-up phase of the farm, construction and roadway materials will be stored onsite to facilitate the build out of the farm roadways and farm appurtenances.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	5,800 ft	3	2014	main roads installed	Sep-14
2	3,200 ft	3	2014	main roads installed	Sep-14
3	1,800 ft	4	2014	main roads installed	Nov-14
4	2,600 ft	4	2014	main roads installed	Nov-14
Total	13,400 ft				

Ohana Best Farm LLC Conservation Plan

Agrichemical Handling Facility (309)

A facility with an impervious surface to provide an environmentally safe area for handling agrichemicals will be built.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
Base Yard	1 ea	2	2015		
Total	1				

Cover Crop (340)

Grasses, legumes, or forbs will be established during fallow periods to reduce erosion, increase soil organic matter, reduce soil compaction and suppress weeds.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	30 ac	1	2015		
2	39 ac	1	2015		
3	33 ac	2	2015		
4	53 ac	2	2015		
Total	155 ac				

Deep Tillage (324)

Lime, and/or comparable additives will be applied and tilled into the soil to raise pH levels and increase organic matter content. Simultaneously, compacted soil layers will be broken to facilitate infiltration and root growth.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	30 ac	4	2014	applied 13 tons per acre	Dec-14
2	39 ac	1	2015		
3	33 ac	2	2015		
4	53 ac	2	2015		
Total	155 ac				

Ohana Best Farm LLC Conservation Plan

Heavy Use Area Protection (561)

Frequently used areas will be stabilized by surfacing with suitable materials (gravel, RAP, geotextiles, etc.) to reduce erosion, improve water quality, and improve aesthetics. These areas may include, but are not limited to entrances, shelters, processing areas, and equipment washing areas.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	3 ac	2	2015		
2	1 ac	2	2015		
3	1 ac	2	2015		
4	1 ac	2	2015		
Base Yard	1 ac	3	2014	completed	Aug-14
Reservoir	2 ac	3	2015		
Total	9 ac				

Integrated Pest Management (595)

A pest management strategy which combines prevention, avoidance, monitoring, and suppression will be implemented.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	30 ac	2	2015		
2	39 ac	2	2015		
3	33 ac	3	2015		
4	53 ac	3	2015		
Total	155 ac				

Irrigation Pipeline (430)

Irrigation pipelines will be installed to convey irrigation water. Mains and submains will be sized according to irrigation needs. The amounts below are mainline estimates in linear feet.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	2,000 ft	4	2014	pipeline roughed-in	Nov-14
2	2,300 ft	4	2014	pipeline roughed-in	Nov-14
3	1,700 ft	1	2015		
4	1,500 ft	1	2015		
Reservoir	1,000 ft	2	2015		
Total	8,500 ft				

Ohana Best Farm LLC Conservation Plan

Irrigation Water Reservoir (436)

One 6-million lined reservoir will be installed.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
3	1 ea	2	2015	EA application in process	Jan-15
Total	1				

Irrigation Water Management (449)

The volume, frequency, and allocation of irrigation water will be managed to optimize its use.

Zone	Planned Amount	Timetable		Notes	Date
		Quarter	Year		
1	30 ac	3	2015		
2	39 ac	3	2015		
3	33 ac	4	2015		
4	53 ac	4	2015		
Base Yard	4 ac	1	2015		
Total	159 ac				

Land Clearing (460)

Guinea grass, small trees, and other volunteer vegetation will be removed by light grading for farming operations and to install conservation measures. Debris from land clearing will be used to construct exclusion berms, chipped for compost, or burned, if permitted by State Department of Health.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	30 ac	2	2014	area cleared	Jun-14
2	39 ac	2	2014	area cleared	Jun-14
3	33 ac	4	2014	area cleared	Nov-14
4	53 ac	4	2014	area cleared	Nov-14
Base Yard	4 ac	2	2014	area cleared	Jun-14
Reservoir	2 ac	4	2014	area cleared	Oct-14
Total	161 ac				

Nutrient Management (590)

The amount, source, placement, form and timing of plant nutrients and soil amendments will be managed.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	30 ac	3	2015		
2	39 ac	3	2015		
3	33 ac	4	2015		
4	53 ac	4	2015		
Total	155 ac				

Ohana Best Farm LLC Conservation Plan

Pumping Plant (533)

A facility will be installed to deliver water at a desired pressure and flow rate. It includes a pump, associated power units, plumbing and appurtenances, a fuel or energy source, and protective structures, as needed.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
3	1 ea	2	2015		
Total	1				

Seasonal High Tunnel System (798)

A polyethylene covered structures without electrical ventilation and at least 6 feet in height will be built to create a favourable growing climate for crops.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
4	5 ac	1	2016		
Total	5 ac				

Spoil Spreading (572)

Excavated material from the construction of farm structures, e.g., roads, waterways, retention basins, reservoir, etc., may be stockpiled and distributed throughout the farm in a manner that minimizes soil erosion and protects water quality.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	2 ac	4	2014	ongoing practice	
2	2 ac	4	2014	ongoing practice	
3	2 ac	1	2015	ongoing practice	
4	2 ac	1	2015	ongoing practice	
Base Yard	2 ac	3	2014	completed	Oct-14
Total	10 ac				

Use Exclusion (470)

Use exclusion berms will be constructed on zone borders to deter access by unauthorized people, vehicles, and equipment.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	30 ac	2	2014	berms installed	
2	39 ac	2	2014	berms installed	
3	33 ac	4	2014	berms installed	
4	53 ac	3	2014	berms installed	
Base Yard	4 ac	3	2014	berms installed	
Reservoir	2 ac	2	2015		
Total	161 ac				

Ohana Best Farm LLC Conservation Plan

Water and Sediment Control Basins (638)

Basins will be constructed to retain water and capture sediment from surface runoff.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	1 ea	1	2015	80% completed	
Total	1				

Water Well (642)

A well will be drilled into the underlying aquifer to provide water for irrigation and farming operations.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
3	1 ea	1	2016		
Total	1				

This plan consists of general guidelines which were developed from Natural Resources Conservation Service conservation planning directives, standards, and specifications. These can be accessed at: <http://efotg.sc.egov.usda.gov>.

OWNER / OPERATOR

- I. By my signature below, I, the decision-maker for Ohana Best, LLC., confirm that I have been involved in the planning process and agree to the practices listed in this plan.

- II I intend to implement the practices listed in the plan and accept the responsibilities of:
 - a) ensuring the practices meet or exceed current NRCS specifications,
 - b) complying with applicable federal, state, or county regulations and policies, and
 - c) acquiring any permit that may be required before implementing a practice.

OHANA BEST FARMS



January 22, 2015
Date

Hwa Young Chung
Managing Director

WEST OAHU SWCD

Larry Jefts
Chairman

Date

Ohana Best Farm LLC Conservation Plan

Water and Sediment Control Basins (638)

Basins will be constructed to retain water and capture sediment from surface runoff.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
1	1 ea	1	2015	80% completed	
Total	1				

Water Well (642)

A well will be drilled into the underlying aquifer to provide water for irrigation and farming operations.

Zone	Planned Amount	Timetable		Applied Amount	Date
		Quarter	Year		
3	1 ea	1	2016		
Total	1				

This plan consists of general guidelines which were developed from Natural Resources Conservation Service conservation planning directives, standards, and specifications. These can be accessed at: <http://efotg.sc.egov.usda.gov>.

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 - c) acquiring any permit that may be required before implementing a practice.

OHANA BEST FARMS



January 22, 2015
Date

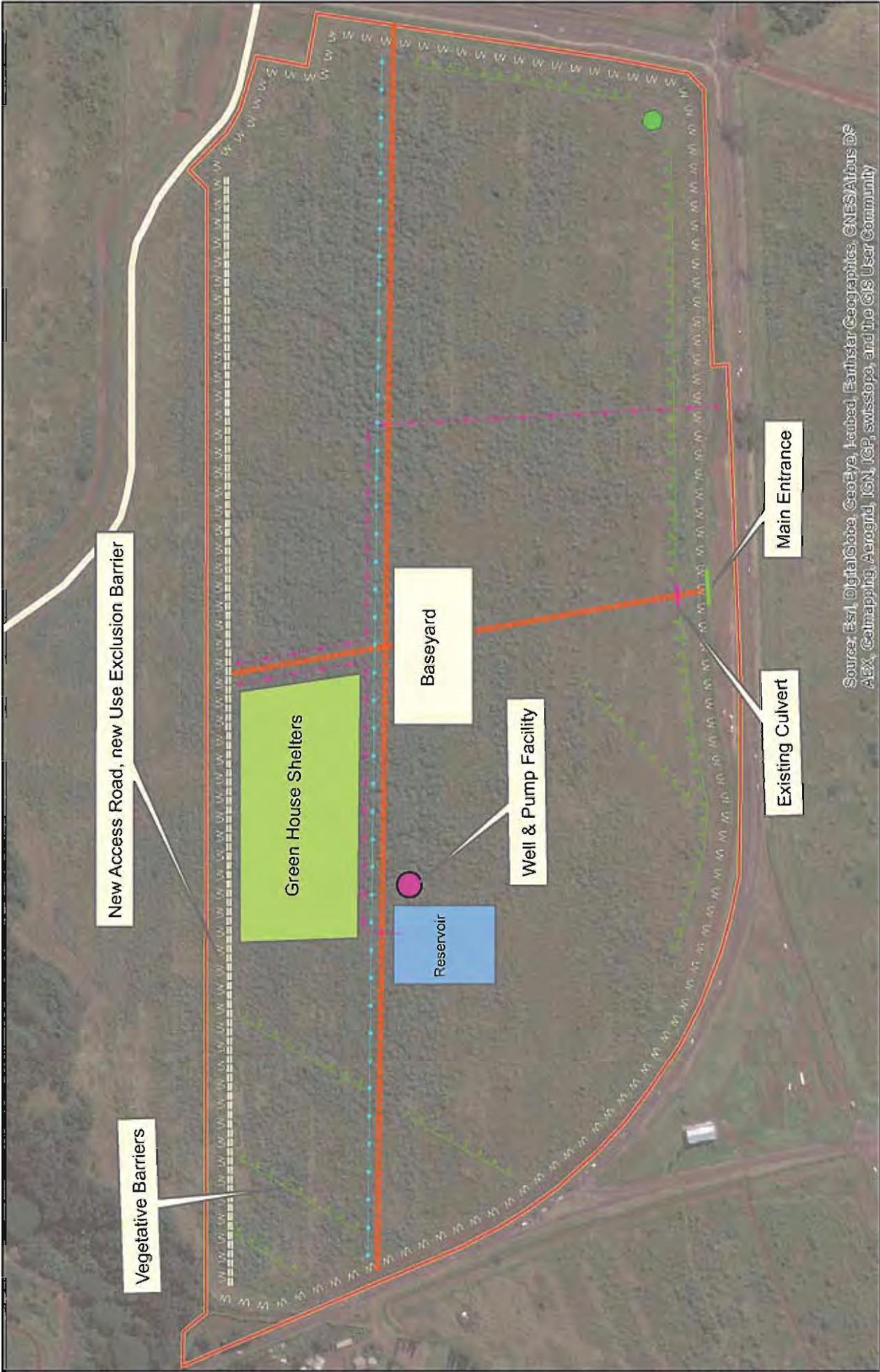
Hwa Young Chung
Managing Director

WEST OAHU SWCD

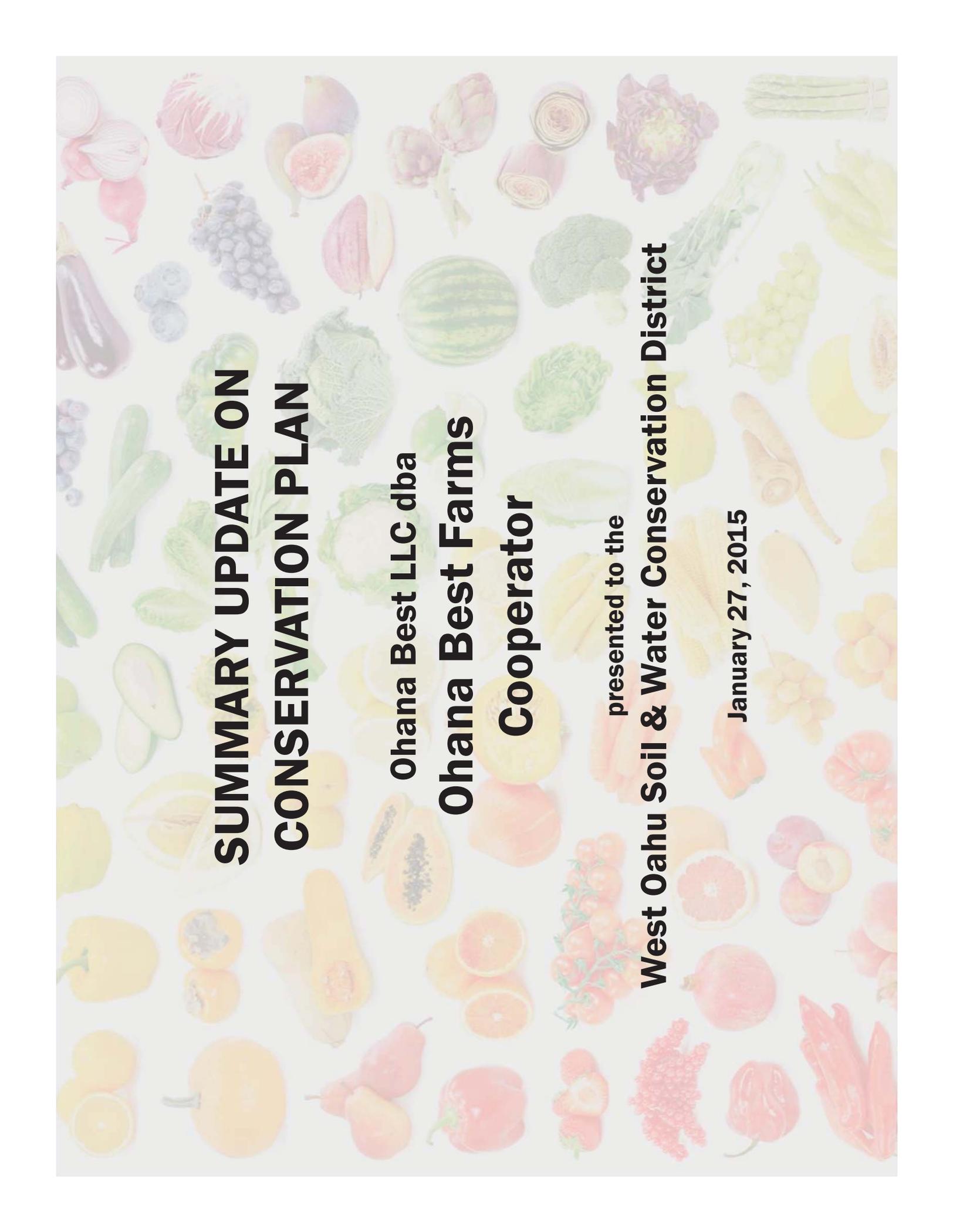


Date

Larry Jeffs
Chairman



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, AEX, Geomatics, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community



**SUMMARY UPDATE ON
CONSERVATION PLAN**

Ohana Best LLC dba

**Ohana Best Farms
Cooperator**

presented to the

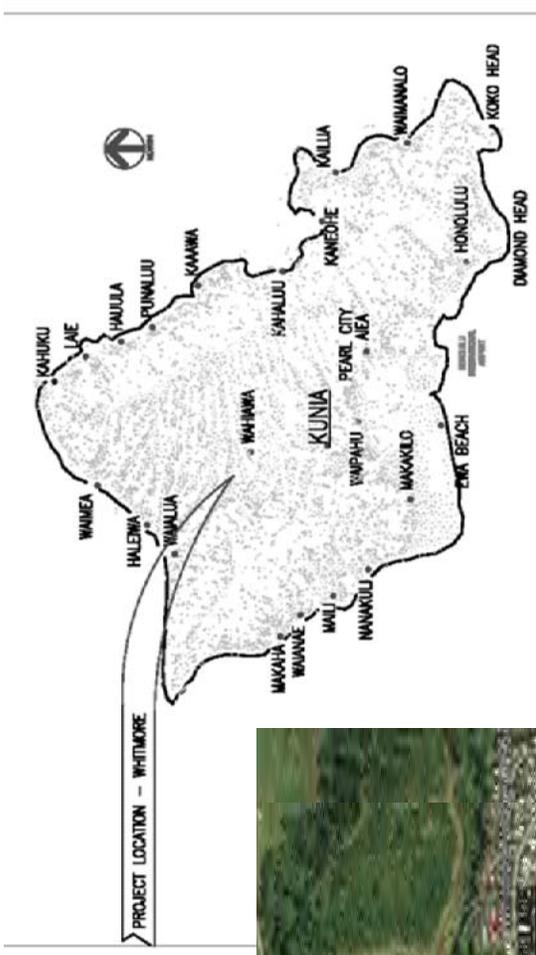
West Oahu Soil & Water Conservation District

January 27, 2015

OHANA BEST FARMS PROPERTY LOCATION



VACINITY MAP
SCALE: 1"=2000'



Farm is located on the corner of
Whitmore Ave. and Kamehameha Hwy.
160 acres

TMK 7-1-001-005 (portion of)
160 acres

Ohana Best Farms
January 2015

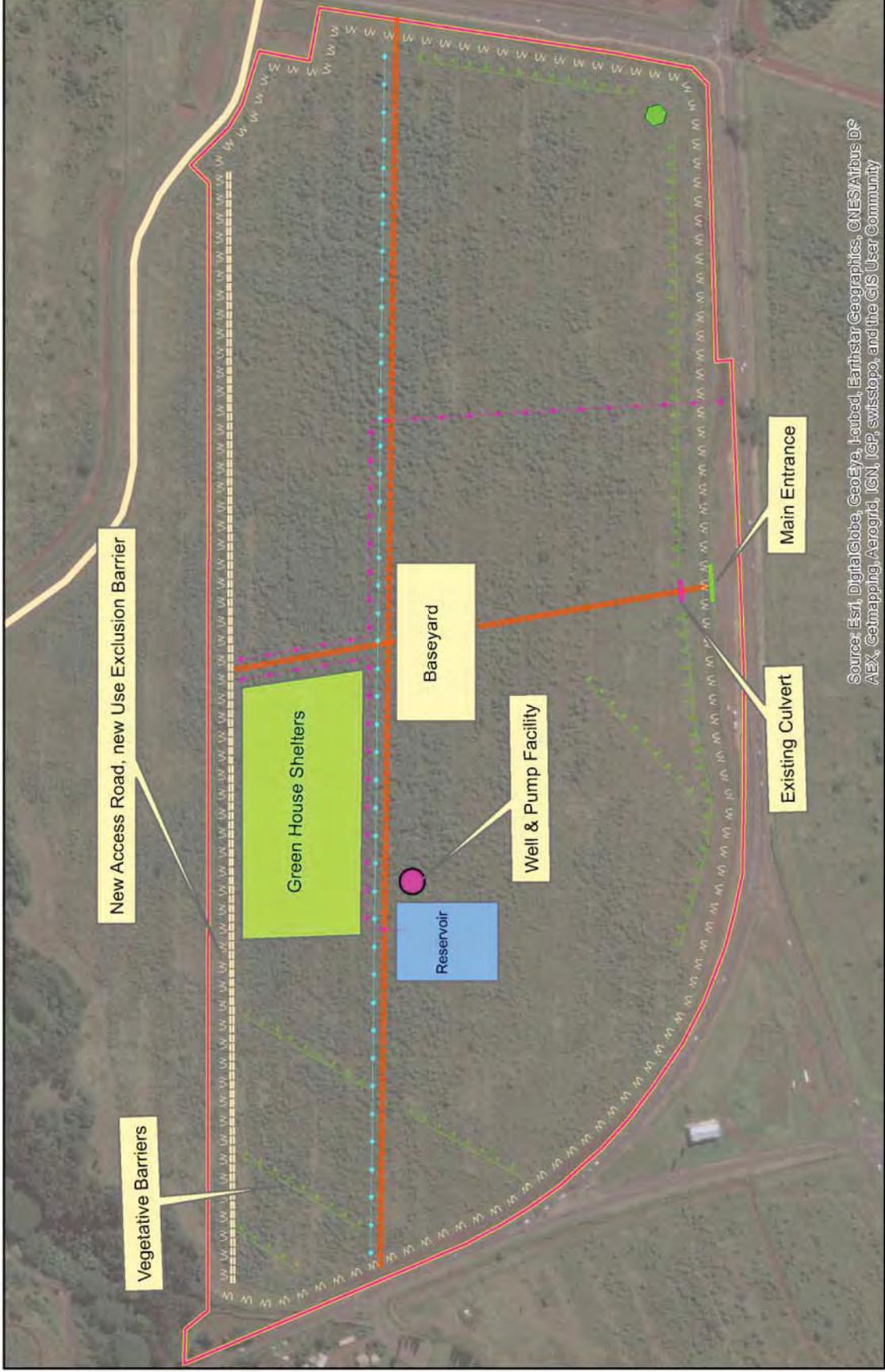
OHANA BEST FARMS CONSERVATION PLAN MAP - REVISION #2



Oahu RCD
July 2014

TMK 7-1-001-005 (portion of)
160 acres

OHANA BEST FARMS CONSERVATION PLAN MAP - REVISION #3

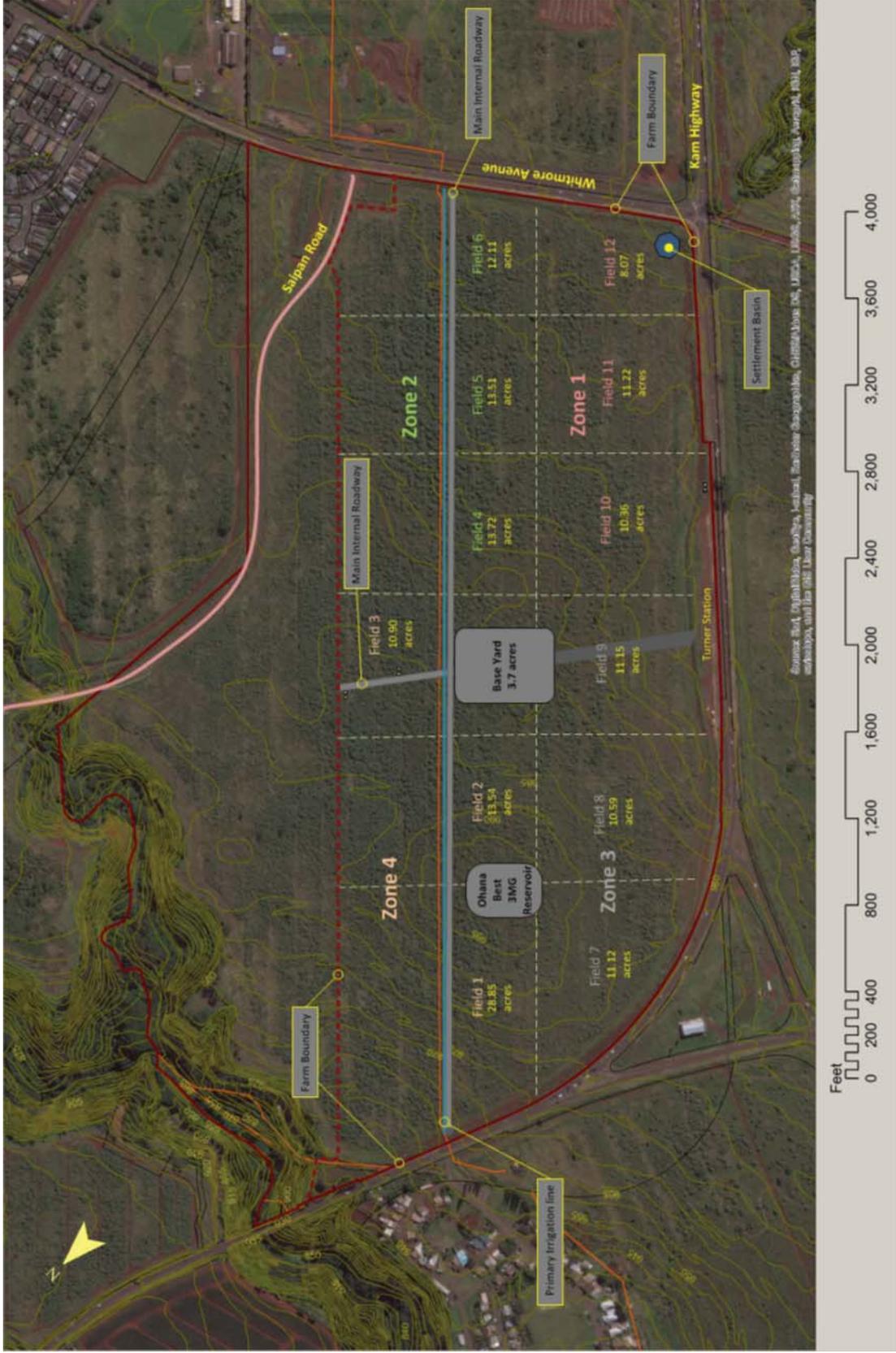


TMK 7-1-001-005 (portion of)

160 acres

Ohana Best Farms
January 2015

OHANA BEST FARMS CONSERVATION PLAN MAP - REVISION #3

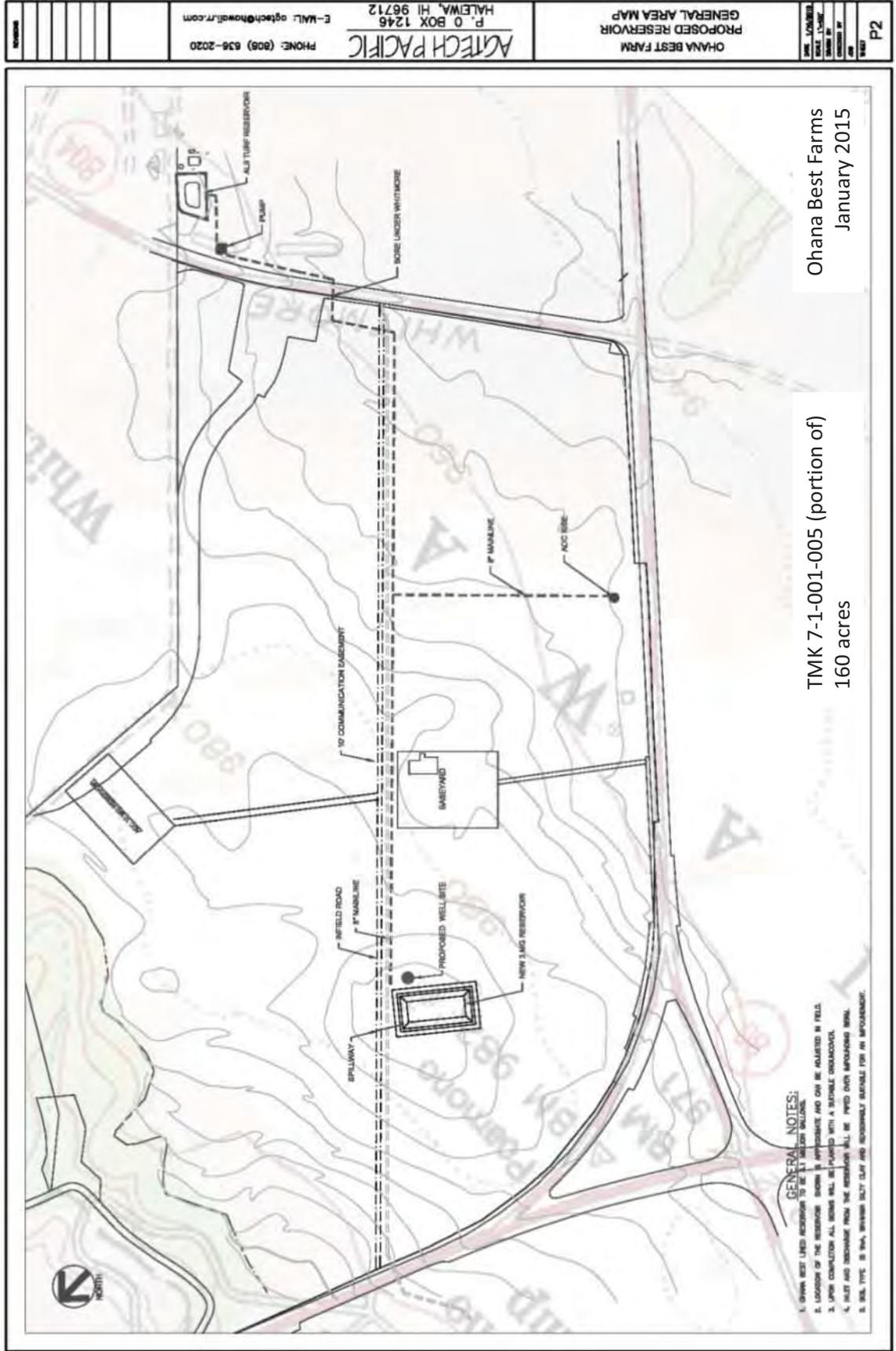


TMK 7-1-001-005 (portion of)

160 acres

Ohana Best Farms
January 2015

OHANA BEST FARMS Irrigation Plans



GENERAL NOTES:

1. OHANA BEST FARMS RESERVOIR TO BE SITUATED AS SHOWN.
2. LOCATION OF THE RESERVOIR SHOWN IS APPROXIMATE AND CAN BE ADJUSTED IN FIELD.
3. UPON COMPLETION ALL WORK SHALL BE FINISHED WITH A SEPARATE DRAINAGE.
4. FILL AND DISCHARGE FROM THE RESERVOIR SHALL BE PERMITTED THROUGH THE MAIN.
5. SOIL TYPE IS 39A, BRUNNABLE SILTY CLAY AND OCCASIONALLY SUITABLE FOR AN IRRIGATION.

TMK 7-1-001-005 (portion of)
160 acres

Ohana Best Farms
January 2015

Attachment III

OHANA BEST FARM RENEWABLE ENERGY PLAN

Attachment III

RENEWABLE ENERGY PLAN OHANA BEST FARM

An integral part of Ohana Best Farms operating vision and mission is to use where feasible and applicable farm equipment that is energy efficient and powered with renewable energy systems. A solar water heater will generate hot water required to meet basic farm food safety and OSHA requirements.

Electricity will power the following:

- irrigation pumps and control systems
- refrigeration systems that cool and store harvested produce
- greenhouse ventilation, irrigation and lighting systems
- security and building lighting
- administrative offices and office equipment
- miscellaneous farm equipment and machinery

The total planned electrical load is 150KV with primary power being 3-phase, 4-wire (277/480 volts).

Electrical Power Sources

The following power sources are available to provide farm power.

HECO Power

HECO power is the most stable 24/7 power supply with nominal ongoing equipment maintenance. This source of power is the most costly. There is currently no utility service at the farm and the nearest HECO utility power pole is located on Whitmore Avenue, approximately 2,500 feet away from the farm's base yard, and approximately 3,000 feet away from the farm's proposed water well and water reservoir. These distances add significantly to HECO's initial installation charges and the time to secure pre-installation requirements, including but not limited to a dedicated power pole and transformer easement in favor of HECO. Additionally, since the bulk of HECO's power is generated using fossil-fuel generators, reductions in HECO's power cost within the next 5-7 years is not likely to occur.

Private On-Site Generators

A common local practice for farms with no or limited utility service is to deploy multiple fuel-powered generators to provide farm power. While the initial deployment costs are low, fuel and ongoing maintenance costs of the generators significantly increase the operating costs of multiple generator deployment.

Private Photovoltaic (PV) Systems

While the initial outlay to install PV systems are high, PV systems have the lowest ongoing maintenance cost. USDA currently offers generous loan and grant programs that can fund substantial portion of the PV system. When coupled with existing state and federal tax credits, the net life cycle costs make a very strong and compelling case to install PV. The PV system will also include a battery backup component in the event of sustained days of inclement weather. Since available solar radiation drives the system's electrical generation, the system's typical peak operating window is 5-8 hours per day. PV systems require electrical equipment to be appropriately upsized to address PV's limited operating window, as well as integrating supplemental power sources to provide power when no solar radiation is available.

Hybrid System

Deploying a combination of a PV system with battery backup coupled with onsite generator as the farm's third-backup power source, allows substantial on demand capacity to and having power on a 24/7 when necessary.

PV System Description and Site Location

Two off-grid hybrid PV systems are envisioned to be deployed.

PV System Array #1

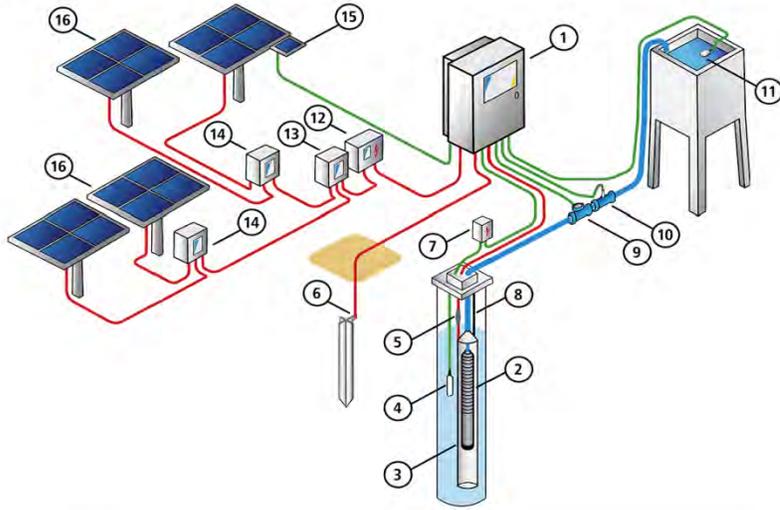
PV System Array #1 will be used primarily to power the irrigation system (submergible well pump and reservoir distribution pump and pump system controls, monitors). The array will have a capability to generate up to 247kWp (peak) using up to 836 solar panels that will be primarily ground mounted at a 20-degree tilt angle. The array will be installed in a fenced area of approximately 50,000 square feet, and be located adjacent to the farm's three-million gallon reservoir and water well. The array will be configured as a hybrid system incorporating battery backup and a standby generator.

PV System Array #2

PV System Array #2 will be used primarily to power all other electrical equipment the irrigation system (submergible well pump and reservoir distribution pump and pump system controls, monitors). The array will have a capability to generate up to 190kWp (peak) using up to 644 solar panels. Ground-mounted and/or roof-mounted panels will be oriented at a 20-degree tilt angle. Array #2 will cover an area of approximately 38,500 square feet. The location of the array will be on the roofs of the structures planned for the farm's base yard where the bulk of the other electrical equipment will be concentrated.

The following system layout illustrates the components being installed.

System Layout



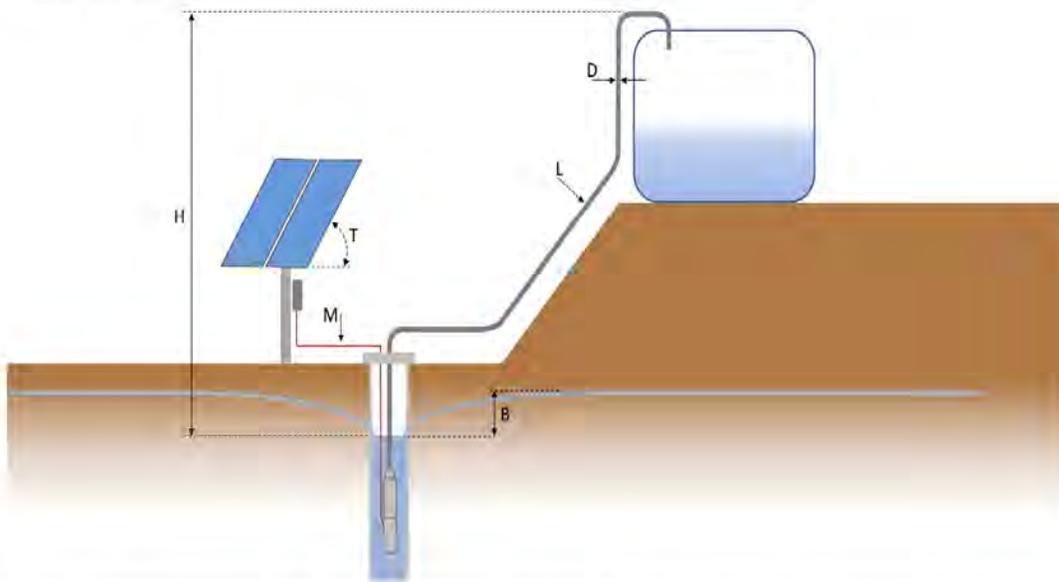
1: PSK2 Controller	11: Float Switch
2: Submersible Pump	12: PV Protect
3: Stilling Tube	13: PV Combiner
4: Well Probe	14: PV Disconnect
5: Cable Splice Kit	15: PV Module for Sun Switch
6: Grounding Rod	16: PV Generator
7: Surge Protector*	
8: Safety Rope	
9: Water Meter	
10: Pressure Sensor	

*It is recommended to install a Surge Protector at each controller sensor input.

PV System Sizing Factors

Static head pressure, pump output capacity, and the anticipated PV operating window (estimated to be approximately 6 hours daily) are key variables factored into the selection of system irrigation pumps. The size of the PV system is a function of the power usage of the pumps.

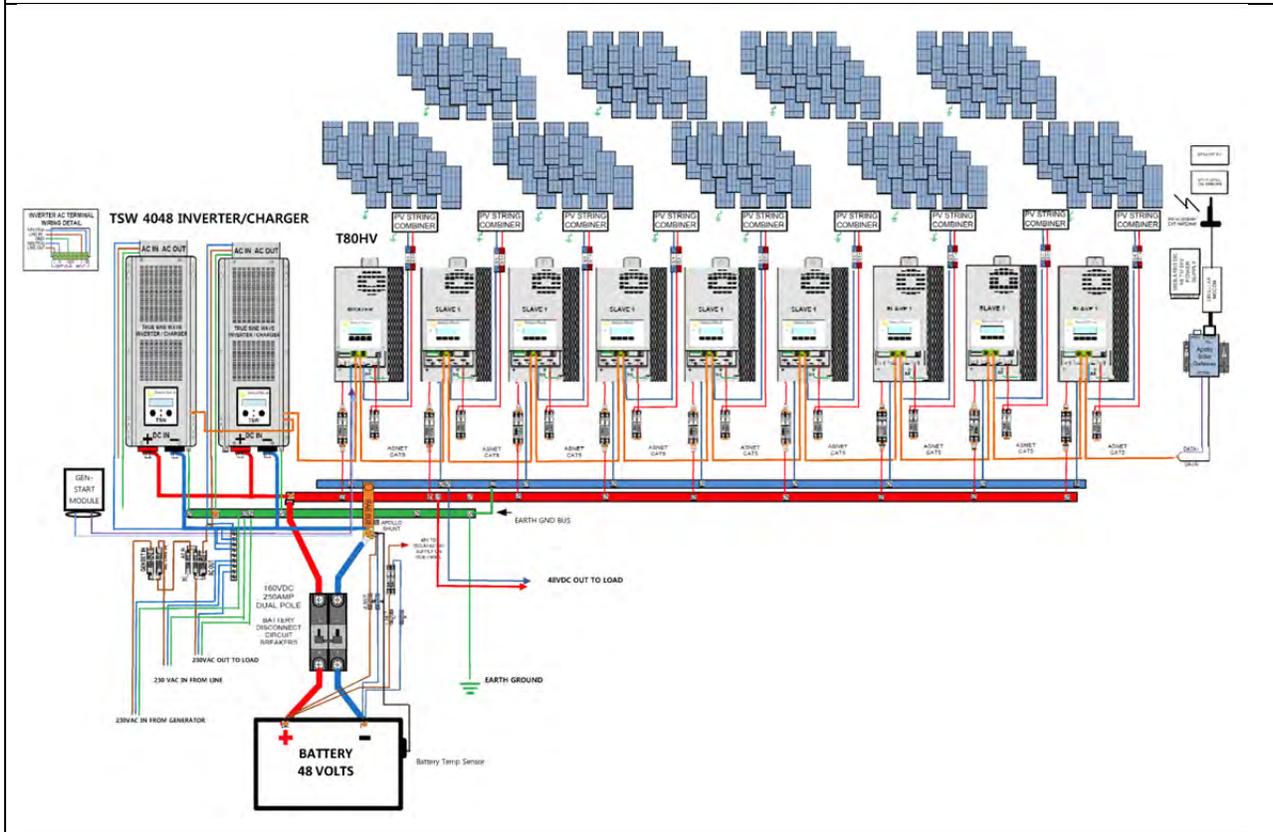
Sizing Layout



H (Static head):	Vertical height from the dynamic water level to the highest point of delivery.
B (Drawdown):	Lowering of water level depending on flow rate and recovery rate of the well.
D (Pipeline inner diameter)	
L (Pipe length):	Entire pipeline from the pump outlet to the point of delivery. Elbows and armatures must be added as an equivalent length of pipeline.
M (Motor cable):	The cable between controller and pump unit.
T (Tilt angle):	Angle of the PV generator surface from the horizontal plane.

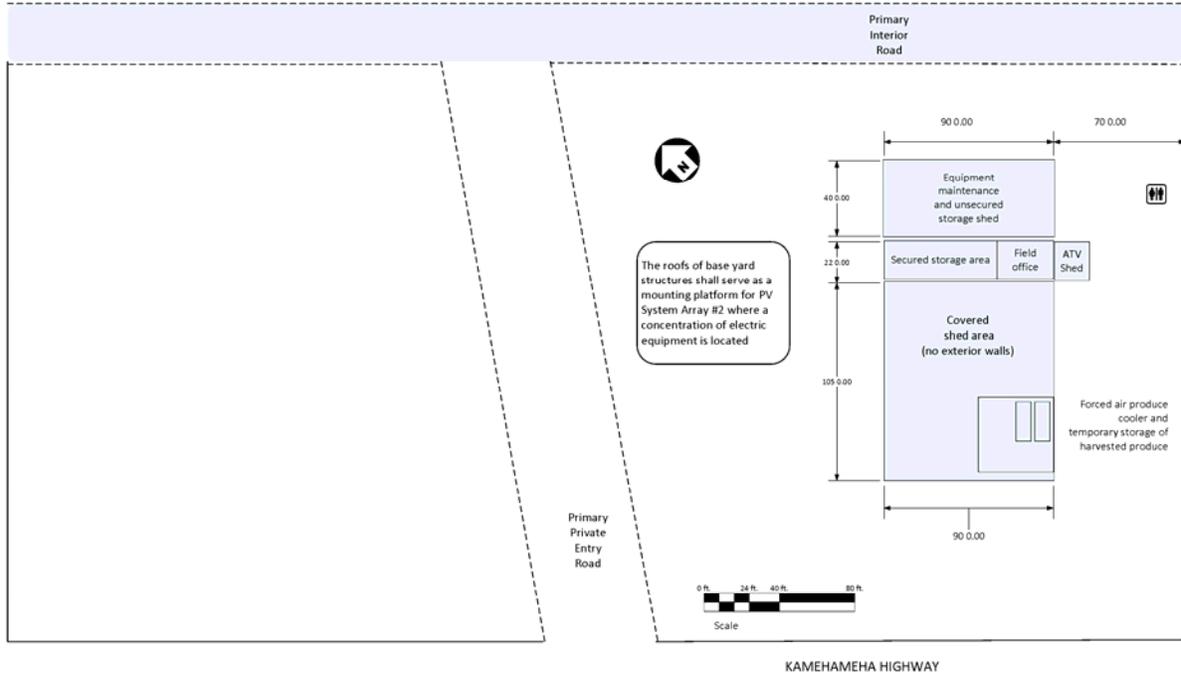
Hybrid Solar System

The diagram below illustrates a planned hybrid solar system that incorporates both battery and standby generator power sources.



Alternative Location of Solar Array#2

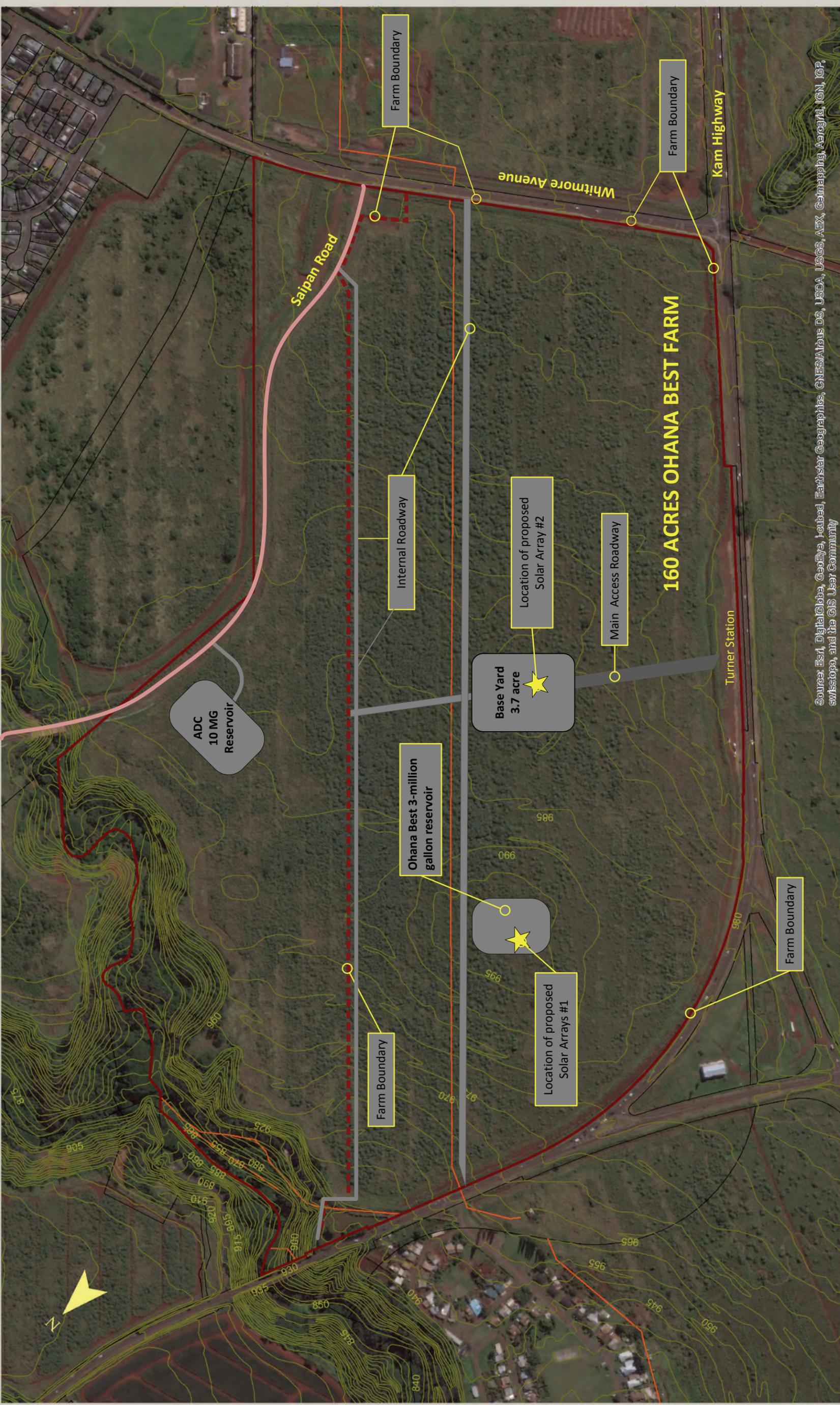
ALTERNATIVE
 QUANTITIES TABLE
 BASE PROPER PLAN



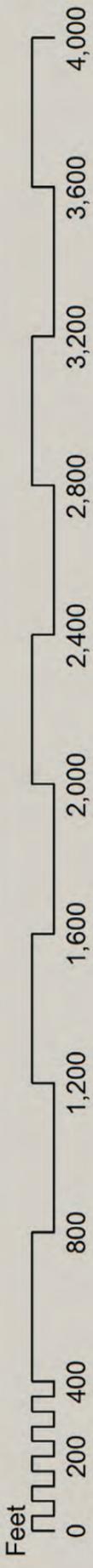
Attachment IV

OHANA BEST FARM SITE AND BASE YARD PLANS

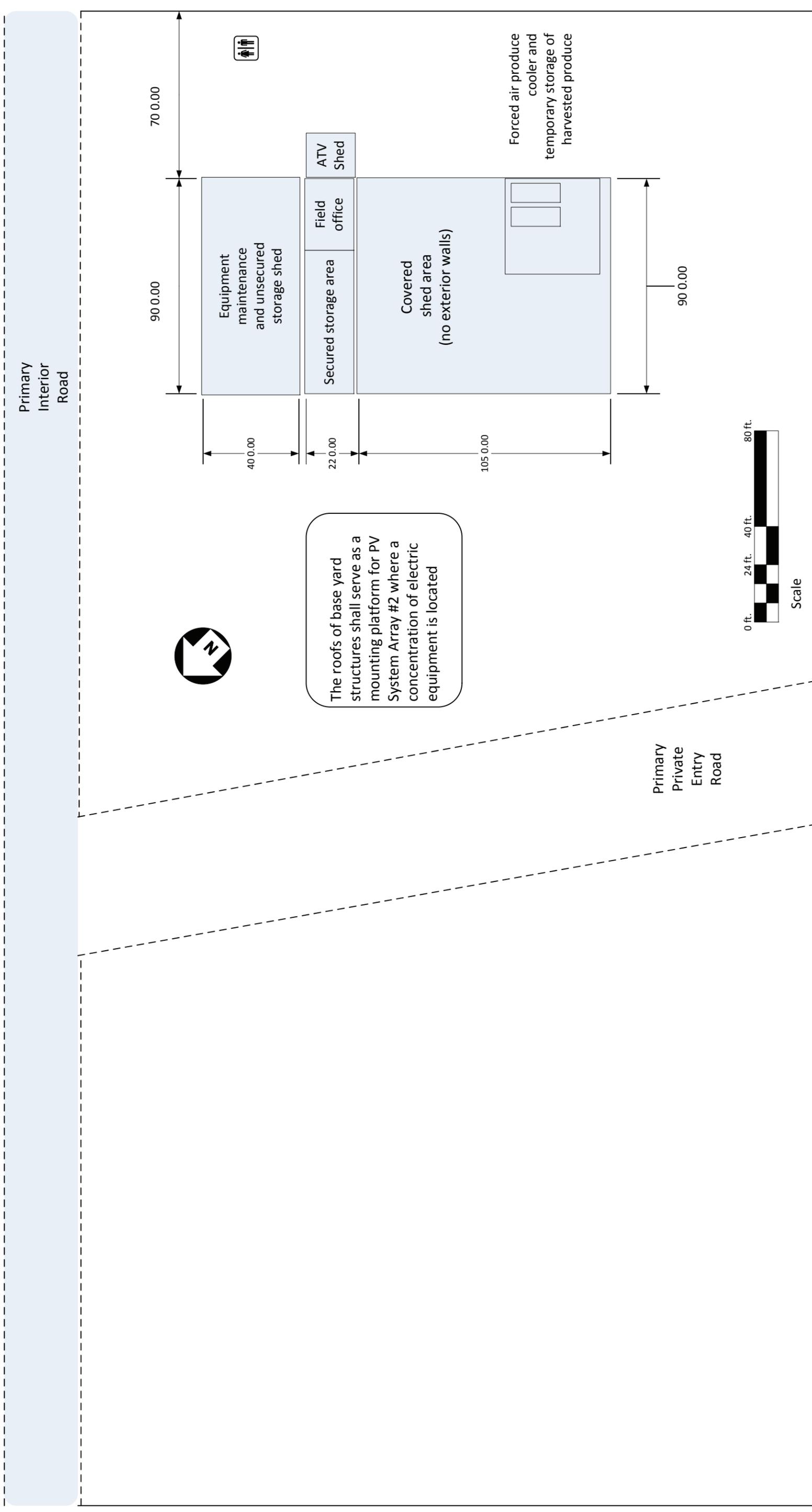
OHANA BEST FARMS
SITE PLAN PARCEL 5



Source: Esri, DigitalGlobe, GeoEye, iSat, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, Aergrid, IGN, IGP, swisstopo, and the GIS User Community



ATTACHMENT IV
OHANA BEST FARMS
BASE YARD PLAN



September 10, 2015

Hwa Jun Chung
Managing Member
Ohana Best LLC
2829B Mokumoa Street
Honolulu, HI 96819

Dear Ms. Chung:

Subject: Draft Environmental Assessment
Galbraith Lands Reservoirs Project
Tax Map Keys: 6-5-002: 010; 7-1-001: 002, 005

Thank you for reviewing and commenting on the subject environmental assessment. We have received your November 20, 2014 and July 8, 2015 letters. The following responses are offered to your comments in the order they were presented.

Minimize Adverse Impacts on Farm Operations Caused by Reservoir #4

Although the Agricultural Development Corporation (ADC) has set the location of Reservoir #4 and engineering design parameters established, there has been no further design work on the reservoir. ADC will seek funding for design and construction of the reservoir from the State Legislature in the near future. It is anticipated that design engineering for water infrastructure from the reservoir will proceed hand in hand with reservoir design. During the design phases OBF input will be sought and with ADC collectively develop short and long-term measures for minimizing impacts on its farming operations.

Information on OBF Planned Reservoir #3

Ohana Best LLC's proposed 3 MG reservoir and accessory improvements, including a photovoltaic facility and well development, were disclosed as part of the project's proposed action in Section 1 (pages 1 through 4) of the Draft Environmental Assessment for the Galbraith Reservoirs (DEA). Ohana Best Farm (OBF) furnished information about its Reservoir #3 and engineering information and drawings for the reservoir were included in the DEA. Technical information about the planned photovoltaic facility was provided but not included in the DEA. It was not in the scope of the Draft EA to describe OBF facilities and planned farming operations and impact of reservoir construction on said operations.

Disclosing OBF improvements in the environmental assessment may not preclude OBF entirely from the environmental requirements of permitting agencies. Permitting authorities may require additional information or supplemental environmental review for specific OBF proposals. For example, should OBF opt to drill a well on its property, OBF would have to procure a Ground Water Use Permit and Well Use Permit. As the approving authority for both permits, the Commission on Water Resource Management could require an environmental assessment (or a supplemental assessment) for water withdrawal from a ground water management area. Potential impacts resulting from ground water withdrawal and well drilling on the Galbraith Estate lands are not disclosed in the Environmental Assessment for the Galbraith Reservoirs.

Hwa Jun Chung
Sept. 10, 2015
Page 2

Ohana Best's two comment letters and our response will be appended in the document.

Thank you for participating in the environmental assessment review process.

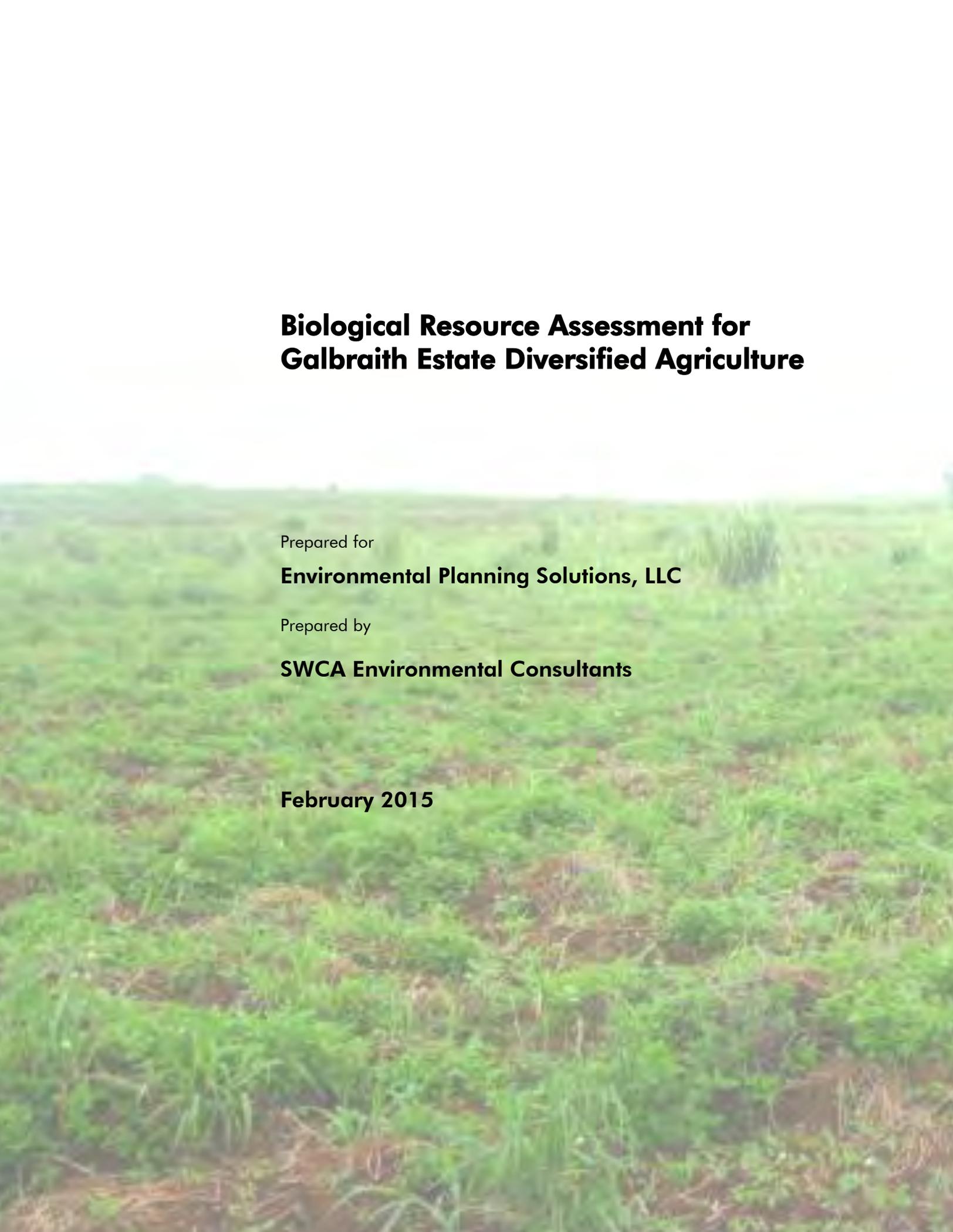
Sincerely,

ENVIRONMENTAL PLANNING SOLUTIONS LLC

A handwritten signature in black ink, appearing to read "Colette Sakoda".

Colette Sakoda, Principal

c: Joseph Blanco, Ohana Best LLC
Scott Enright, HDOA
James Nakatani, ADC



Biological Resource Assessment for Galbraith Estate Diversified Agriculture

Prepared for

Environmental Planning Solutions, LLC

Prepared by

SWCA Environmental Consultants

February 2015

**BIOLOGICAL RESOURCE ASSESSMENT
FOR GALBRAITH ESTATE DIVERSIFIED AGRICULTURE**

Prepared for

ENVIRONMENTAL PLANNING SOLUTIONS, LLC

Makaiwa Street
Honolulu, Hawai'i 96816
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Prepared by

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SWCA Project No. 28346

February 2, 2015

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1. INTRODUCTION

Environmental Planning Solutions, LLC tasked SWCA Environmental Consultants (SWCA) to conduct a biological resource assessment to support the environmental assessment (EA) for the proposed Galbraith Estate Diversified Agriculture project. Environmental Planning Solutions, LLC has been selected by Akinaka & Associates to prepare the EA for the State's Agribusiness Development Corporation's agricultural operation plan according to Hawai'i Revised Statutes (HRS), Chapter 195D, as amended. This plan includes construction of four reservoirs (three 3-million gallon [MG] reservoirs and one 10-MG reservoir) and associated infrastructure improvements (e.g., pipes and pumps) to support the anticipated diversified agricultural crop production in Wahiawā, Island of O'ahu. This report summarizes the findings of the survey conducted by SWCA botanists and biologists on October 17, 2014. The objectives of the terrestrial survey were as follows:

1. Conduct a 2-day survey to identify the dominant vascular plant species and vegetation communities observed in the project area. Areas most likely to harbor native plants (e.g., gulches, steep slopes, pits, and rocky outcrops) were more intensively surveyed.
2. Conduct a 1-day survey to document terrestrial fauna (birds, mammals, reptiles, amphibians, and large insects) in the project area.
3. Prepare a report describing the terrestrial flora and fauna in the project area based on available literature and SWCA's surveys. The report includes an assessment of potential impacts to these resources as a result of the project and recommendations regarding measures to minimize or avoid impacts to these resources.

2. DESCRIPTION OF THE PROJECT AREA

2.1. Location and Vicinity

The project area is located in the former pineapple fields known as the Galbraith Estate property in Wahiawā on the central portion of O'ahu Island (Figure 1). The project area encompasses four non-contiguous reservoir sites, ranging from 1.52 to 8.73 acres (0.61 to 3.53 hectares [ha]) in size. Elevations in the project area range from 935 feet to 985 feet (285–300 meters [m]) above sea level. The terrain is mostly flat.

One of the proposed 3-MG reservoirs (Reservoir Site #1) is located at Tax Map Key (TMK) 6-5-002:010 north of Kaukonahua Road (Figure 2). Another 3-MG reservoir (Reservoir Site #2) is located at TMK 7-1-001:002 just southwest of the corner of Kaukonahua Road and Kamehameha Highway (Highway 99 or Kamananui Road). The third 3-MG reservoir (Reservoir Site #3) and the 10-MG reservoir (Reservoir Site #4) are within TMK 7-1-001:005; these sites are north of Kamehameha Highway (Highway 80) and southeast of Saipan Drive (see Figure 2). All reservoirs will be constructed below existing grade to approximately 15 feet (4.6 m) in depth and uncovered. The bases and inner slopes will be lined with woven HDPE Polypropylene fabric pond liner and the impounding berm engineered at 2:1 slope. The project area does not include the associated infrastructure improvements because the engineering and irrigation designs for these features have not been finalized.

Agricultural operations in the project area were discontinued in 2007. All four reservoir sites were cleared roughly 1 year prior to this biological survey. Notable land uses in the vicinity include Whitmore Village, Wahiawā town, Poamoho Camp, Schofield Barracks Military Reservation, and Dole Plantation.

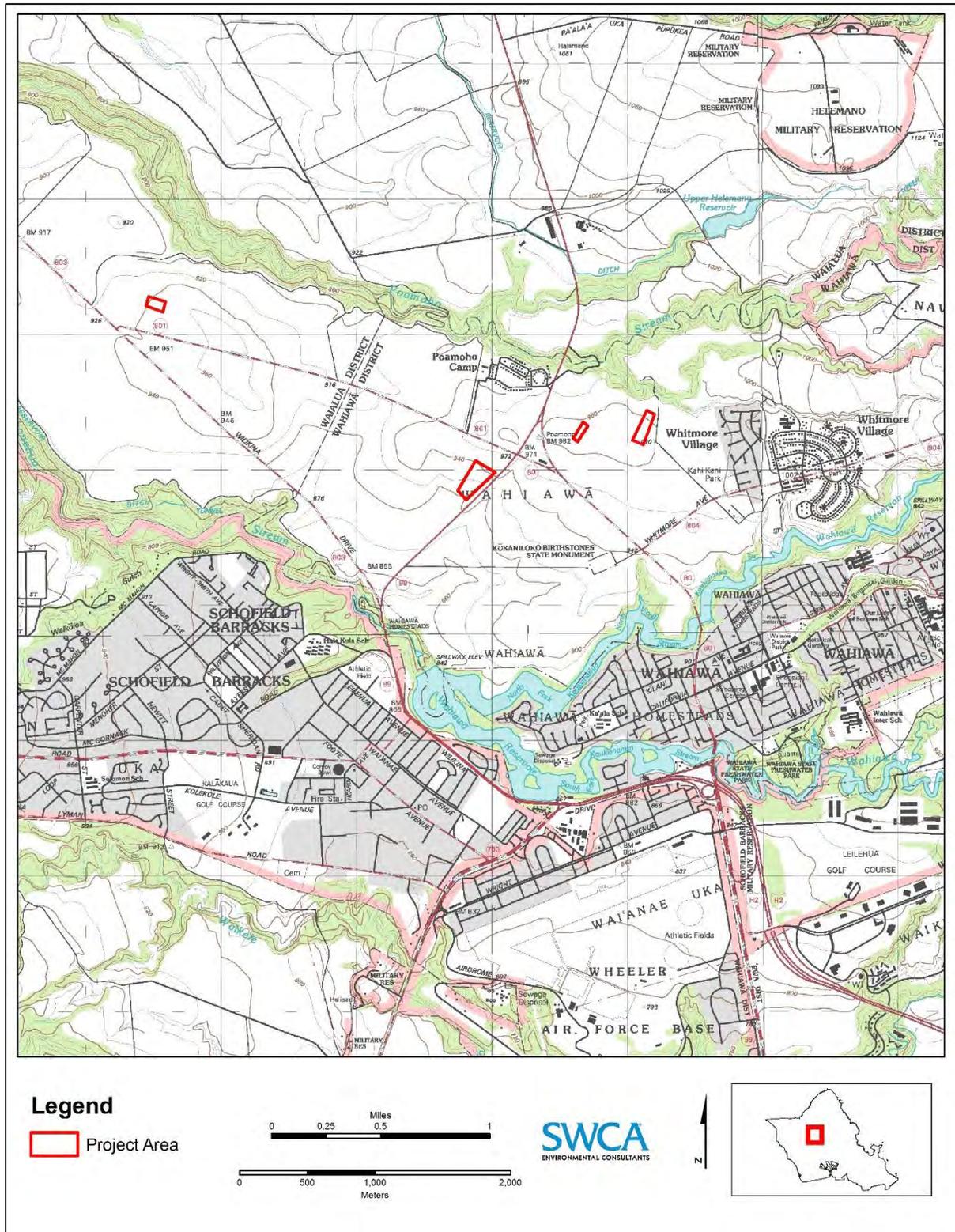


Figure 1. Project area location.

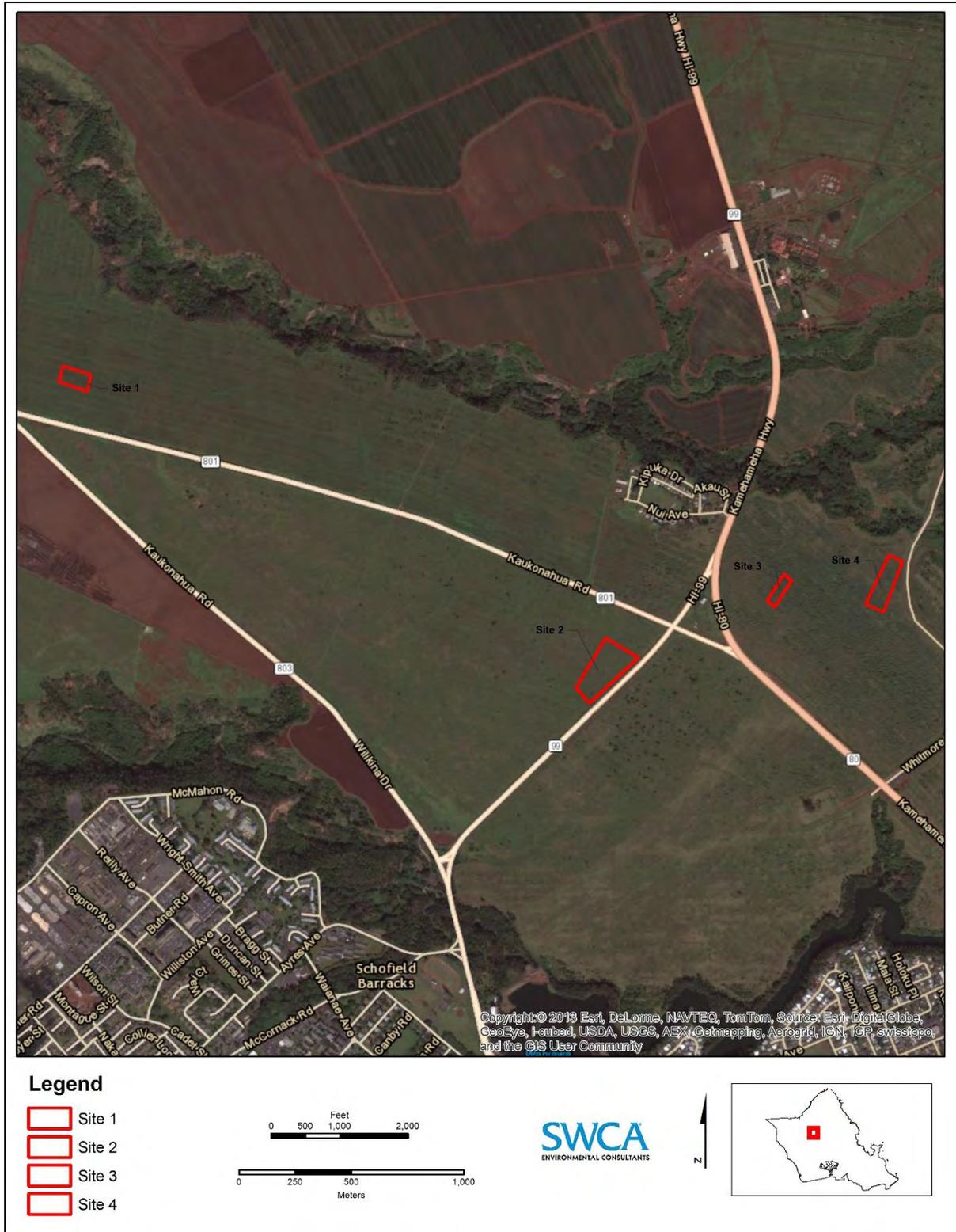


Figure 2. Four reservoir sites.

2.2. Hydrology

Mean annual rainfall for this area is approximately 40.5 inches (1,030 millimeters [mm]). Rainfall is typically highest in December–January and lowest in June–August (Giambelluca et al. 2013). The closest rainfall gages to the site indicated above-average rainfall for 2014 through the end of October (National Oceanic and Atmospheric Administration/National Weather Service, Weather Forecast Office Honolulu 2014).

3. METHODS

SWCA conducted a review of available scientific and technical literature regarding natural resources in and near the project area. This literature review encompassed a thorough search of refereed scientific journals, technical journals, and reports; EAs and environmental impact statements; relevant government documents; and unpublished data that provide insight into the natural history and ecology of the area. SWCA also reviewed available geospatial data, aerial photographs, and topographic maps of the project area.

A field reconnaissance of the project area was conducted by one SWCA botanist and one SWCA wildlife biologist on October 17, 2014.

3.1. Flora

A pedestrian botanical survey was conducted in the project area to document all vascular plant species and vegetation communities. Areas more likely to support native plants (e.g., rocky outcrops and shady areas) were more intensively examined.

Plants recorded during the survey are indicative of the season (“rainy” versus “dry”) and the environmental conditions at the time of the survey. It is likely that additional surveys conducted at a different time of the year would result in minor variations in the species and abundances of plants observed.

3.2. Fauna

Fauna surveys consisted of a pedestrian survey in the morning hours (before 11:00 am), when wildlife was most likely to be active. All birds, mammals, reptiles, amphibians, and insect species seen or heard were noted. Visual and auditory observations were included in the survey.

Due to the lack of trees in the project area, field surveys for the endangered Hawaiian hoary bat or ‘ōpe‘ape‘a (*Lasiurus cinereus semotus*) were not conducted, and no bat detectors were deployed; however, areas of suitable habitat for foraging and roosting were noted when present.

4. RESULTS

No state or federally listed threatened, endangered, or candidate plant species were observed in the project area during the survey. The project area does not contain critical habitat for threatened or endangered species.

4.1. Flora

No state or federally listed endangered, threatened, or candidate plant species, or rare native Hawaiian plant species were observed in the project area. In all, 39 plant species were recorded in the project area during the survey. Of these, only one—‘uhaloa (*Waltheria indica*)—is native to the Hawaiian Islands. This indigenous species is common in disturbed areas throughout the archipelago (Wagner et al. 1999). Appendix A provides a list of all plant species observed by SWCA biologists in the project area during the survey.

4.1.1. Reservoir Site #1

Reservoir Site #1 has the lowest plant diversity compared to the other sites. The predominant species is Guinea grass (*Urochloa maxima*) less than 3 feet (0.9 m) tall (Figure 3). Morning glory (*Ipomoea obscura*), castor bean (*Ricinus communis*), *Neonotonia wightii*, and Spanish needle (*Bidens alba*) are widely scattered throughout this site.

4.1.2. Reservoir Site #2

This reservoir site is also dominated by Guinea grass (Figure 4); however, more plant species were seen here, as compared to the other sites. Kī nehe (*Bidens pilosa*), sourgrass (*Digitaria insularis*), and morning glory are common throughout the site, and wild bean (*Macroptilium lathyroides*) is locally abundant within the northern portion. Other herbaceous species that are scattered sparsely throughout the area or occurring in a few small patches include Natal redbud (*Melinis repens*), Spanish needle, fuzzy rattlepod (*Crotalaria incana*), hairy horseweed (*Conyza bonariensis*), and *Neonotonia wightii*. Tree seedlings that are present but uncommon at the site include African tulip tree (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), and guava (*Psidium guajava*).

4.1.3. Reservoir Site #3

A lack of vegetation and presence of berms indicate this site had been recently cleared (Figure 5). Morning glory and Spanish needle are the most common species. Other scattered species include Guinea grass, sourgrass, pua nānā honua (*Solanum mauritianum*), and narrow-leaved plantain (*Plantago lanceolata*).

4.1.4. Reservoir Site #4

This site is dominated by Guinea grass (Figure 6). Hairypod cowpea (*Vigna luteola*) and morning glory are also common. Several small shrubs and tree seedlings are scattered sparsely throughout the area including fiddlewood (*Citharexylum caudatum*), Christmas berry, pua nānā honua, African tulip tree, and guava. Sourgrass and ‘uhaloa are present but uncommon.



Figure 3. Reservoir Site #1.



Figure 4. Reservoir Site #2.



Figure 5. Reservoir Site #3.



Figure 6. Reservoir Site #4.

4.2. Fauna

4.2.1. Avifauna

The bird species observed in the project area are those typically found in disturbed, lowland areas of O‘ahu. In all, 17 species were documented (Table 1). One species of migrant shorebird—the Pacific golden-plover (*Pluvialis fulva*)—was seen foraging at all sites except Site #2. All other bird species observed are introduced species common to developed areas.

Table 1. Birds Observed by SWCA in the Project Area and Vicinity

Common Name	Scientific Name	Status	MBTA
Cattle egret	<i>Bubulcus ibis</i>	NN	X
Chestnut mannikin	<i>Lonchura atricapilla</i>	NN	
Common myna	<i>Acridotheres tristis</i>	NN	
Common waxbill	<i>Estrilda astrild</i>	NN	
Eurasian skylark	<i>Alauda arvensis</i>	NN	X
Gray francolin	<i>Francolinus pondicerianus</i>	NN	
House finch	<i>Haemorhous mexicanus</i>	NN	X
Japanese white-eye	<i>Zosterops japonicus</i>	NN	
Northern cardinal	<i>Cardinalis cardinalis</i>	NN	X
Pacific golden-plover	<i>Pluvialis fulva</i>	M	X
Red avadavat	<i>Padda oryzivora</i>	NN	
Red-vented bulbul	<i>Pycnonotus cafer</i>	NN	
Red-whiskered bulbul	<i>Pycnonotus jocosus</i>	NN	
Ring-necked pheasant	<i>Phasianus colchius</i>	NN	
Rose-ringed parakeet	<i>Psittacula krameri</i>	NN	
Spotted dove	<i>Streptopelia chinensis</i>	NN	
Zebra dove	<i>Geopelia striata</i>	NN	
Total species		17	

Status: NN = non-native permanent resident; M = migrant.

MBTA = Migratory Bird Treaty Act

4.2.2. Hawaiian Hoary Bat

Surveys for Hawaiian hoary bats were not conducted, but any areas of suitable habitat for roosting and foraging were noted during the survey. Hawaiian hoary bats forage in open, wooded, and linear habitats with a wide range of vegetation types. These animals are insectivores and are regularly observed foraging over streams, reservoirs, and wetlands up to 300 feet (100 m) offshore (U.S. Department of Agriculture 2009). It is possible that the Hawaiian hoary bat could occasionally fly through or forage in the open habitat prevalent within the project sites.

Hawaiian hoary bats typically roost in dense canopy foliage or in subcanopy (when canopy is sparse) with open access for launching into flight (personal communication, Frank Bonaccorso, U.S. Geological

Survey). No large tree species were observed in the project area during the survey, likely as a result of recent disturbance. Therefore, Hawaiian hoary bats are not expected to currently roost on site.

4.2.3. Other Mammals

No mammals were seen during the survey; however, dogs (*Canis familiaris*) and cats (*Felis catus*) are likely to enter the project area from nearby residences. Other mammals that can be expected on site include mice (*Mus musculus*), rats (*Rattus* spp.), and mongoose (*Herpestes javanicus*).

4.2.4. Reptiles and Amphibians

No reptiles or amphibians were seen during the survey. None of the terrestrial reptiles or amphibians in Hawai'i are native to the islands.

4.2.5. Invertebrates

Four introduced insect taxa were observed during the survey: the gulf fritillary (*Agraulis vanillae*), the honey bee (*Apis mellifera*), hoverflies (Family: Syrphidae), and ladybugs (Family: Coccinellidae). An unknown dragonfly species was also observed.

5. DISCUSSION AND RECOMMENDATIONS

5.1. Flora

No threatened or endangered plants were found during the reconnaissance survey. Nearly all of the plant species seen during the survey are not native to Hawai'i, and the one native species present is common throughout the Hawaiian Islands. Therefore, the proposed project is not expected to have a significant, adverse impact on botanical resources.

SWCA recommends that native Hawaiian plants be employed for landscaping around the project area to the maximum extent possible. Potential native species that may be appropriate for landscaping at the proposed project area include 'a'ali'i (*Dodonaea viscosa*), alahe'e (*Psydrax odorata*), and O'ahu sedge (*Carex wahuensis*).

Additional information on selecting appropriate (non-invasive) plants for landscaping or revegetation can be obtained from the following websites:

- <http://www.nativeplants.Hawaii.edu/>
- <http://www.plantpono.org/non-invasive-plants.php>
- http://www.hear.org/alternativestoinvasives/pdfs/mcaac_hpwra_a2i_list.pdf
- <http://www.hear.org/oisc/oahuearlydetectionproject/pdfs/oedposterwhatnottoplant.pdf>

5.2. Fauna

5.2.1. Federally Listed Species

Waterbirds

No federally or state listed Hawaiian waterbirds, or suitable nesting or foraging habitat, were documented within the project area or immediate vicinity during the survey. However, the four reservoir sites could create standing water habitat for four endangered waterbird species: the Hawaiian coot or 'alae ke'oke'o

(*Fulica alai*), Hawaiian gallinule or 'alaie 'ula (*Gallinula galeata sandvicensis*), Hawaiian stilt or ae'ō (*Himantopus mexicanus knudseni*), and Hawaiian duck or koloa maoli (*Anas wyvilliana*).

Habitat types used by the Hawaiian duck include natural and human-made lowland wetlands, flooded grasslands, river valleys, mountain streams, montane pools, forest swamplands, aquaculture ponds, and agricultural areas (Engilis et al. 2002; Hawaii Audubon Society 2005; USFWS 2011). The Hawaiian duck is the least likely to be attracted to the site given pure Hawaiian ducks are not considered common on O'ahu (USFWS 2011), and are more likely to use stream sites.

Hawaiian coots prefer freshwater ponds or wetlands, brackish wetlands, and human-made impoundments. They forage in water less than 12 inches (30 centimeters [cm]) deep, and nest in open water with emergent aquatic vegetation or heavy stands of grass (Brisbin et al. 2002; Schwartz and Schwartz 1949; USFWS 2011). Hawaiian coots may use the reservoirs for foraging and loafing, and grassy reservoir berms may also be used by this species (if present) for foraging and loafing. Emergent vegetation, or vegetation growing along the reservoir berms, may provide nesting habitat for Hawaiian coots.

Hawaiian gallinules favor freshwater areas with dense stands of emergent vegetation near open water, slightly emergent vegetation mats, and water depths of less than 3.3 feet (1 m). They nest on open ground, wet meadows, and on banks of waterways, and in emergent vegetation over water. Their nesting areas typically have standing water less than 24 inches (60 cm) deep (Bannor and Kiviat 2002; USFWS 2011). Hawaiian gallinules may only be attracted to reservoirs if sufficient vegetation is present.

Hawaiian stilt could also be present in any areas with shallow water. Hawaiian stilts mostly use open wetland habitats with minimal vegetative cover and water depths of less than 9.4 inches (24 cm), as well as tidal mudflats (Robinson et al. 1999). Hawaiian stilts are highly mobile and may be attracted to the reservoirs if shallow water is present, particularly if the reservoir berms provide a gently sloping gradient.

Most Hawaiian waterbirds nest in areas in which the birds are offered some measure of protection from predators. Although predation would be an indirect effect, and the waterbirds would be exposed to the same types of predation risk at any of their current nesting sites, it may negatively affect the population if individual pairs do nest in areas where they may be exposed to higher levels of predation and, thus, lead to lower reproductive and survival rates.

The following measures are recommended in order to avoid and minimize impacts to listed waterbirds as a result of the project:

- If a nest is discovered, work should cease within 100 feet (30.5 m), and U.S. Fish and Wildlife Service should be contacted as soon as possible. Work should begin only after chicks/ducklings have fledged or left the area.
- If an endangered Hawaiian waterbird is found in the area during on-going activities, then all activities within 100 feet (30.5 m) of the bird should cease, and the bird should also not be approached. Work may continue after the bird leaves the area of its own accord.
- The reservoirs should be enclosed by, at least, a 4-foot (1.2 m) chain-link fence. This will keep out trespassers and dogs.
- The reservoirs should be kept free of emergent vegetation, which could be an important attractant for waterbirds. Vegetation along the berms and adjacent areas should be kept as low as possible, which will discourage waterbirds from nesting. None of these species are likely to nest in open areas lacking some taller vegetation.

Waterbirds are most vulnerable to predation when nesting, thus, vegetation management aimed to keep vegetation low will negate most or all risk associated with predation. Implementing the measures related to construction will result in avoidance of impacts during construction.

Nēnē

The endangered Hawaiian goose or nēnē (*Branta sandvicensis*) could also occasionally be attracted to the reservoirs. Nēnē have recently been recorded traversing between the Mililani Agricultural Park and golf course and the Kahuku/North Shore area (although in small numbers). The nēnē is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands, with negligible dependence on freshwater habitat. Nēnē use various habitat types including beach strand, shrubland, grasslands to lava rock (Banko 1988; Banko et al. 1999). For nesting, they require adequate shrub cover. Although water is not necessary for nesting, it may be used if available (USFWS 2004). Hydroseeding can attract nēnē to feed.

The following measures are recommended to avoid and minimize impacts to nēnē:

- If an endangered nēnē is found in the area during on-going activities, then all activities within 100 feet (30.5 m) of the bird should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord.
- The reservoirs should be enclosed by, at least, a 4-foot chain-link fence. This will keep out trespassers and dogs.
- Vegetation along the berms and adjacent areas should be kept as low as possible, which will discourage nēnē from nesting. Nēnē require sufficient shrub cover for nesting, and vegetation control measures will preclude nesting of this species.

Nēnē are most vulnerable to predation when nesting, thus, vegetation management aimed to keep vegetation low will negate most or all risk associated with predation. Implementing the measures related to construction will result in avoidance of impacts during construction.

Hawaiian hoary bats

Hawaiian hoary bats are known to occur on O‘ahu in native, non-native, agricultural, and developed landscapes (U.S. Department of Agriculture 2009; U.S. Fish and Wildlife Service [USFWS] 1998). No large trees were observed during the survey, although small tree seedlings were seen. Given current site conditions, the chances of adversely affecting Hawaiian hoary bats as a result of the proposed project are likely small; however, the creation of water features known to be used for foraging, as well as the potential for trees to grow at the site prior to construction, will increase the potential for Hawaiian hoary bats to be present or fly through the area. If trees are to be cut as a result of the project, direct impacts to bats would occur only if a juvenile bat that is too small to fly, but too large to be carried by a parent were present in a tree that was cut down.

The following measures are recommended as conservative impact avoidance measures:

- Any fences that are erected as part of the project should have barbless top-strand wire to prevent entanglements of the Hawaiian hoary bat on barbed wire. No fences in the project area were observed with barbed wire during the survey; however, if fences are constructed around any of the reservoirs (as currently proposed), the top strand of barbed wire should be removed or replaced with barbless wire.
- No trees taller than 15 feet (4.6 m) should be trimmed or removed as a result of this project between June 1 and September 15, when juvenile bats that are not yet capable of flying may be roosting in the trees.

Implementation of these guidelines, which have been promulgated by the USFWS (1998), is expected to result in the avoidance of all direct impacts to Hawaiian hoary bats.

5.2.2. Migratory Bird Treaty Act

SWCA observed five bird species federally protected under the Migratory Bird Treaty Act during this survey. Only the Pacific golden-plover is considered a native migratory bird species in Hawai'i. It is one of the most common wintering migrants throughout the Pacific Basin (Pyle and Pyle 2009). Construction at the site may temporarily displace some of these bird species, but long-term impacts are not expected. These birds (likely limited to a few individuals) are expected to find suitable foraging habitat at nearby areas. The temporary displacement of these individuals in the project area is not expected to affect an individual's survival or the overall species' populations.

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Appendix A

Checklist of Plants Observed at the Proposed Galbraith Estate Diversified Agricultural Project Area on October 17, 2014

Appendix A: Checklist of Plants Observed at the Proposed Galbraith Estate Diversified Agricultural Project Area on October 17, 2014

The following checklist is an inventory of plant species observed by SWCA botanists on October 17, 2014, during the survey of the proposed Galbraith Estate Diversified Agriculture project area. The plant names are arranged alphabetically by family and then by species into two groups: Monocots and Dicots. The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012).

Status:

- E: Endemic = Native only to the Hawaiian Islands
- I: Indigenous = Native to the Hawaiian Islands and elsewhere
- P: Polynesian = Introduced by Polynesians
- X: Introduced/alien = Brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (i.e., James Cook's arrival in the islands in 1778)

Scientific Name	Common and Hawaiian Name(s)	Status
MONOCOTS		
<u>POACEAE</u>		
<i>Cenchrus echinatus</i> L.	common sandbur	X
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	X
<i>Digitaria insularis</i> (L.) Mez ex Ekman	sourgrass	X
<i>Eleusine indica</i> (L.) Gaertn.	wiregrass	X
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop, Natal grass	X
<i>Paspalum dilatatum</i> Poir.	Dallis grass	X
<i>Urochloa maxima</i> (Jacq.) R. D. Webster	Guinea grass	X
DICOTS		
<u>ACANTHACEAE</u>		
<i>Justicia betonica</i> L.	white shrimp plant, squirrel's-tail	X
<u>ANACARDIACEAE</u>		
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	X
<u>ARALIACEAE</u>		
<i>Schefflera actinophylla</i> (Endl.) Harms	octopus tree	X
<u>ASTERACEAE</u>		
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	Maui pāmakani	X
<i>Bidens alba</i> (L.) DC. var. <i>radiata</i> (Sch.Bip.) Ballard ex Melchert	Spanish needle, beggartick	X

Scientific Name	Common and Hawaiian Name(s)	Status
<i>Bidens pilosa</i> L.	kī, kī nehe	X
<i>Calyptocarpus vialis</i> Less.	----	
<i>Conyza bonariensis</i> (L.) Cronq.	hairy horseweed	X
<i>Emilia fosbergii</i> Nicolson	pualele	X
<i>Tridax procumbens</i> L.	coat buttons	X
<u>BIGNONIACEAE</u>		
<i>Spathodea campanulata</i> P.Beauv.	African tulip tree	X
<u>CONVOLVULACEAE</u>		
<i>Ipomoea obscura</i> (L.) Ker Gawl.	morning glory	X
<u>CUCURBITACEAE</u>		
<i>Momordica charantia</i> L.	balsam pear, bitter melon	X
<u>EUPHORBIACEAE</u>		
<i>Ricinus communis</i> L.	castor bean	X
<u>FABACEAE</u>		
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	X
<i>Crotalaria incana</i> L.	fuzzy rattlepod	X
<i>Falcataria moluccana</i> (Miq.) Barneby & J.W.Grimes	albizia	X
<i>Indigofera spicata</i> Forssk.	creeping indigo	X
<i>Indigofera suffruticosa</i> Mill.	indigo, 'inikō	X
<i>Macroptilium lathyroides</i> (L.) Urb.	wild bean, cow pea	X
<i>Mimosa pudica</i> L.	sensitive plant	X
<i>Neonotonia wightii</i> (Wight & Arn.) Lackey	----	X
<i>Vigna luteola</i> (Jacq.) Benth.	hairypod cowpea	X
<u>MALVACEAE</u>		
<i>Sida ciliaris</i> L.	----	X
<u>MELASTOMATACEAE</u>		
<i>Clidemia hirta</i> (L.) D.Don var. <i>hirta</i>	Koster's curse	X
<u>MELIACEAE</u>		
<i>Melia azedarach</i> L.	chinaberry, pride-of-India	X
<u>MYRTACEAE</u>		
<i>Psidium guajava</i> L.	guava	X

Scientific Name	Common and Hawaiian Name(s)	Status
<u>PLANTAGINACEAE</u>		
<i>Plantago lanceolata</i> L.	narrow-leaved or English plantain	X
<u>SOLANACEAE</u>		
<i>Solanum mauritianum</i> Scop.	pua nānā honua	X
<u>STERCULIACEAE</u>		
<i>Waltheria indica</i> L.	'uhaloa	I
<u>VERBENACEAE</u>		
<i>Citharexylum caudatum</i> L.	fiddlewood	X
<i>Lantana camara</i> L.	lantana	X

Archaeological Assessment
Keala Pono Archaeological Consulting, LLC
May 2015

FINAL—Archaeological Assessment of TMK: (1) 7-1-001:002 (por.) and :005 (por.), Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, Island of O‘ahu, Hawai‘i



Prepared For:
Environmental Planning Solutions, LLC
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Honolulu, Hawai‘i, 96816

May 2015

Keala Pono 

**FINAL— Archaeological Assessment of TMK: (1) 7-1-001:002
(por.) and :005 (por.), Wahiawā Ahupua‘a, Wahiawā District,
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May 2015



MANAGEMENT SUMMARY

An archaeological inventory survey was conducted for TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, on the island of O‘ahu, Hawai‘i. This was done in preparation for ground disturbance associated with construction of four reservoirs. The archaeological inventory survey consisted of pedestrian survey that covered 100% of the four reservoir project areas, as well as subsurface testing on all four project areas, in the form of eight trench excavations.

No pre- or post-contact surface architecture was found during pedestrian survey of the project areas. All areas were found to be disturbed by previous pineapple cultivation. Likewise, subsurface testing did not yield any evidence of subsurface cultural material or deposits. Evidence of more recent disturbance was noted at Reservoir 3, as the entire area had been bulldozed. A collection of secondarily-deposited glass and ceramic was recovered from the surface and in backdirt piles from Reservoir 3. Given that this material was not found *in situ* and its primary context has been lost, the artifacts were not assigned a site number. A total of 85 ceramic and glass items were collected. They are thought to be trash from pineapple or sugarcane laborers in the early 20th century.

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INTRODUCTION

At the request of Environmental Planning Solutions, Keala Pono Archaeological Consulting conducted an archaeological inventory survey (AIS) of TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, on the island of O‘ahu, Hawai‘i. Four reservoirs are proposed for the properties. The archaeological survey was designed to identify any historic properties that may be located in the four reservoir project areas in anticipation of the proposed construction. Due to negative findings the AIS results are reported here as an archaeological assessment.

This report is drafted to meet the requirements and standards of state historic preservation law, as set out in Chapter 6e of the Hawai‘i Revised Statutes and SHPD’s draft *Rules Governing Standards for Archaeological Inventory Surveys and Reports*, §13–276. The report begins with a description of the project areas and a historical overview of land use and archaeology in the region. The next section delineates methods used in the fieldwork, followed by the results of the archaeological survey. Project results are summarized and recommendations are made in the final section. Hawaiian words, flora and fauna, and technical terms are defined in a glossary at the end of the document.

Project Location and Environment

The project area is located in Wahiawā Ahupua‘a, Wahiawā District, and Kamananui Ahupua‘a, Waialua District, in Central O‘ahu (Figure 1). The district of Wahiawā is a relatively modern construct, created in 1913 (Kamehameha Schools 1987). Before this change, the entire project site was within Kamananui Ahupua‘a in the district of Waialua.

Wahiawā is located on the Schofield Plateau in Central O‘ahu, sandwiched between the Wai‘anae and Ko‘olau Mountain Ranges. Wahiawā District is the only *moku* that does not stretch from the mountains to the sea, but is landlocked by Waialua to the north, Ko‘olauloa to the east, ‘Ewa to the south, and Wai‘anae to the west. MacDonald et al. explain the geology of this region:

Lava flows from the Koolau volcano banked against the already-eroded slope of the Waianae volcano to form the gently sloping surface of the Schofield Plateau. An erosional unconformity between the rocks of the two volcanoes is visible along Kaukonahua Gulch, at the eastern foot of the Waianae Range, where Waianae lavas slope 10° to 15° northeastward and are overlapped by Koolau lavas dipping 5° northwestward. (1983:420)

The four reservoirs are located on three TMK parcels, all of which are owned by the State of Hawai‘i (see The Project section, below). The total acreage surveyed, including all four reservoir project areas is 30.83 acres (12.48 ha). The three TMK parcels and four reservoir survey areas are described below.

TMK: (1) 6-5-002:010 is a 310 acre (125 ha) parcel bounded by Kaukonahua Road to the south, Poamoho Gulch to the north, and farmlands to the east and west. This eastern boundary is also the border between the Waialua and Wahiawā Districts. The Reservoir 1 project area is located near the southwest corner of this parcel. This project area encompasses 3.31 acres (1.34 ha) of the property (see Figure 1).

TMK: (1) 7-1-001:002 is a 302 acre (122 ha) parcel bounded by Kaukonahua Road on the north, Kamananui Road on the east, Wilikina Drive on the south, and farmland to the west. This western boundary is also the border between the Waialua and Wahiawā Districts. The Reservoir 2 project area is situated on the northeast side of this parcel. This project area consists of 10.13 acres (4.10 ha) of the property (see Figure 1).

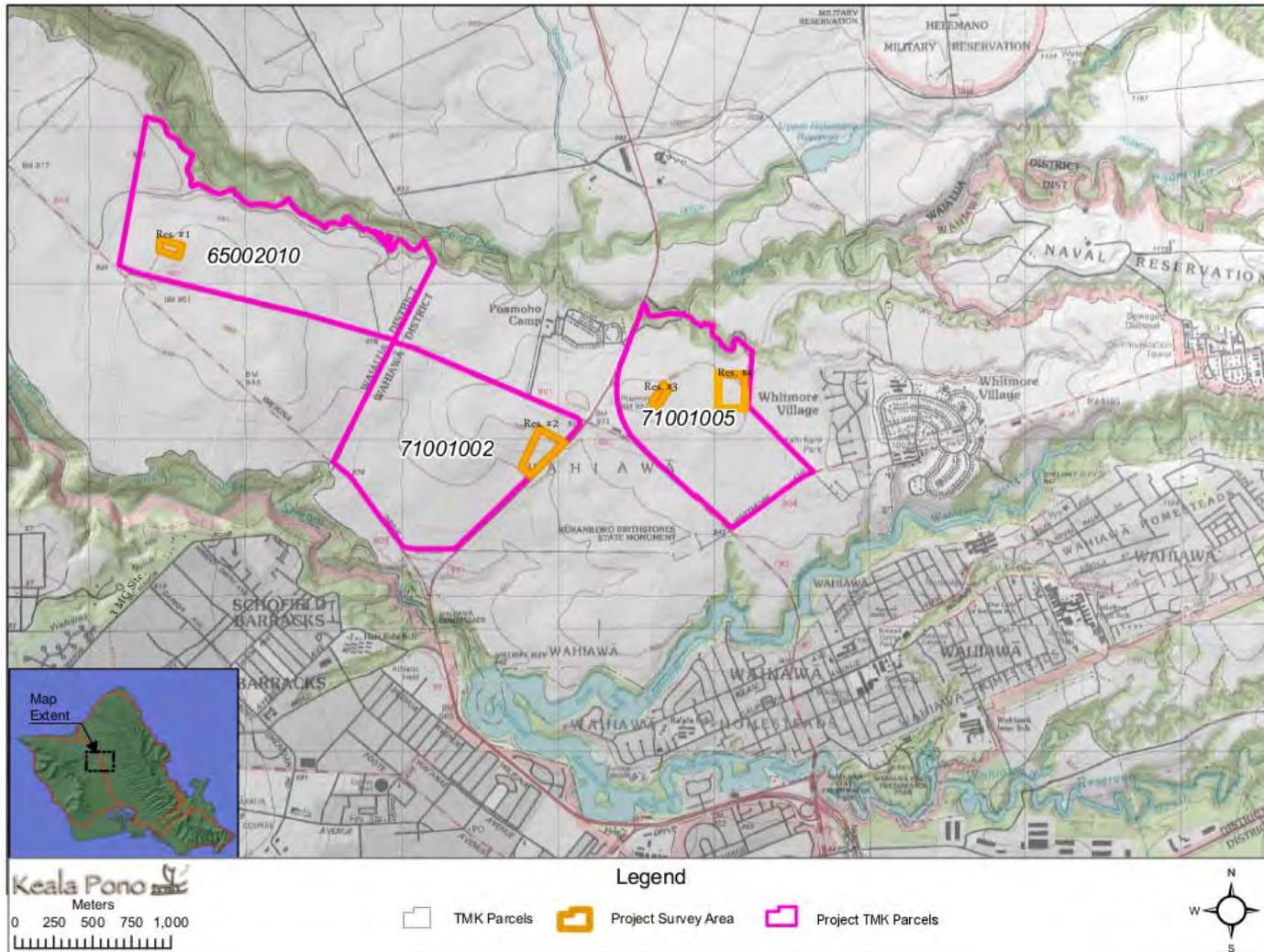


Figure 1. Project area on a 7.5 minute USGS Schofield Barracks quadrangle map with TMK overlay.

TMK: (1) 7-1-001:005 is a 236 acre (96 ha) property adjacent to undeveloped land on the north, Saipan Drive on the east, Whitmore Avenue on the southeast, and Kamehameha Highway on the southwest and west. The Reservoir 3 and 4 project areas are located within this parcel. The Reservoir 3 project area encompasses 2.71 acres (1.10 ha), while the Reservoir 4 project area consists of 14.68 acres (5.94 ha) of the property (see Figure 1).

The parcels lie between 860 and 980 feet (262–299 m) in elevation and are roughly 7 miles (11 km) from the nearest coastline, at Kaiaka Bay in Hale‘iwa. The properties are relatively flat and are currently undeveloped, with traces of former pineapple cultivation evident throughout. Vegetation within the project areas consists mainly of California grass, which was mostly cleared before the survey.

Rainfall is moderate in the Central O‘ahu project area, averaging approximately 40–80 in. (102–203 cm) per year (Juvik and Juvik 1998). The two main watercourses of Wahiawā, Poamoho Stream and Kaukonahua Stream, run north and south of the project area, respectively.

Soils are of the Helemano-Wahiawa association, described as “Deep, nearly level to moderately sloping, well-drained soils that have a fine-textured subsoil; on uplands” (Foote et al. 1972). Specifically, soils in the project area consist of Wahiawa silty clay, 0–3% slopes (WaA) and Wahiawa silty clay, 3–8 % slopes (WaB) (Figure 2).

The Project

The State of Hawai‘i Agribusiness Development Corporation (ADC) is proposing farm land preparation for construction of four reservoirs on fallow pineapple fields often referred to as the former Galbraith Estate Lands. In 2012 the State of Hawai‘i acquired approximately 1,700 acres (688 ha) of land near the town of Wahiawā in Central O‘ahu that were owned by the Estate of George Galbraith (“Galbraith Estate Lands”). As part of the acquisition, approximately 1,207 acres (489 ha) were transferred to ADC and 495 acres (200 ha) to the Office of Hawaiian Affairs. In total the acquisition of Galbraith Estate Lands comprised 12 separate land parcels.

Improvements for this project are proposed on three parcels owned by the State of Hawai‘i and controlled by ADC. Land owned by the Office of Hawaiian Affairs is not part of the proposed action. ADC is also responsible for leasing land under their control to farmers and agricultural ventures. Thus far, ADC has executed licenses with Kalena Farms for 230 acres on TMK: (1) 6-5-002:010 and with Ohana Best Farm for 160 acres of TMK: (1) 7-1-001: 005.

The proposed action is the construction of four water storage reservoirs. ADC proposes to construct two reservoirs and private parties will construct two reservoirs. An environmental assessment is being prepared for the four reservoirs because they are similar actions, serve similar purposes, are located in the same general area, and are on state land.

ADC will construct a 3.0 MG and 10.0 MG reservoir. The private parties each will construct 3.0 MG reservoirs. The reservoirs will be constructed on land under ADC jurisdiction. As shown on Figure 1, the reservoir sites are dispersed over the project area to serve existing and future agricultural users.

Reservoir 1 is a 3.0 MG reservoir to be constructed by Kalena Farms for its use. Reservoir 2 is 3.0 MG reservoir that will be funded and constructed by ADC. Reservoir No. 3 is a 3.0 MG reservoir that will be funded and constructed by Ohana Best Farms. Reservoir No. 4, a 10.0 MG reservoir, will be funded and constructed by ADC.

All reservoirs will be constructed below existing grade. The respective reservoir sites will be graded and excavated to below grade design elevations that can contain the desired storage volume. Typical design criteria for the reservoirs are listed below but may vary by individual reservoir.

- Impounding berm to be engineered at 2:1 slope (Horizontal:Vertical)
- Base and inner slopes to be lined with woven HDPE Polypropylene fabric pond liner
- Erect security and safety fencing
- Provide driveway of adequate width for service and maintenance vehicles

Preliminary design plans for the two private reservoirs show the reservoir basin enclosed by approximately 7-foot (2.1-m) high earth berms for impounding water. Above grade earth berms are not proposed for the ADC reservoirs.

Two wells, located outside the project area, will supply water for the reservoirs. A state-owned well on TMK: (1) 6-5-002:026, located across Kaukonahua Road from Reservoir 1, already is developed and in use. The well, which is identified as Well No. 3-3103-0001 on Commission on Water Resource Management maps, has a pumping capacity of 2,000 gallons per minute. There is no storage reservoir associated with this well.

A second source well is proposed in the vicinity of Reservoir 4. The well will be developed by ADC sometime in the future. Drilling, testing, engineering design, and construction of this well is subject to capital improvements funding from the State of Hawai‘i.

Well construction and water use permits will be sought from the Commission on Water Resources Management, Department of Land and Natural Resources for construction of a new well and water use.

This AIS was conducted of the reservoir sites only and did not include the proposed water distribution system lines or proposed well, because the distribution system will be legislatively funded and commissioned to be designed at a later date. The need for archaeological work at the location of the proposed well and distribution lines will be determined when funding for the well is secured.

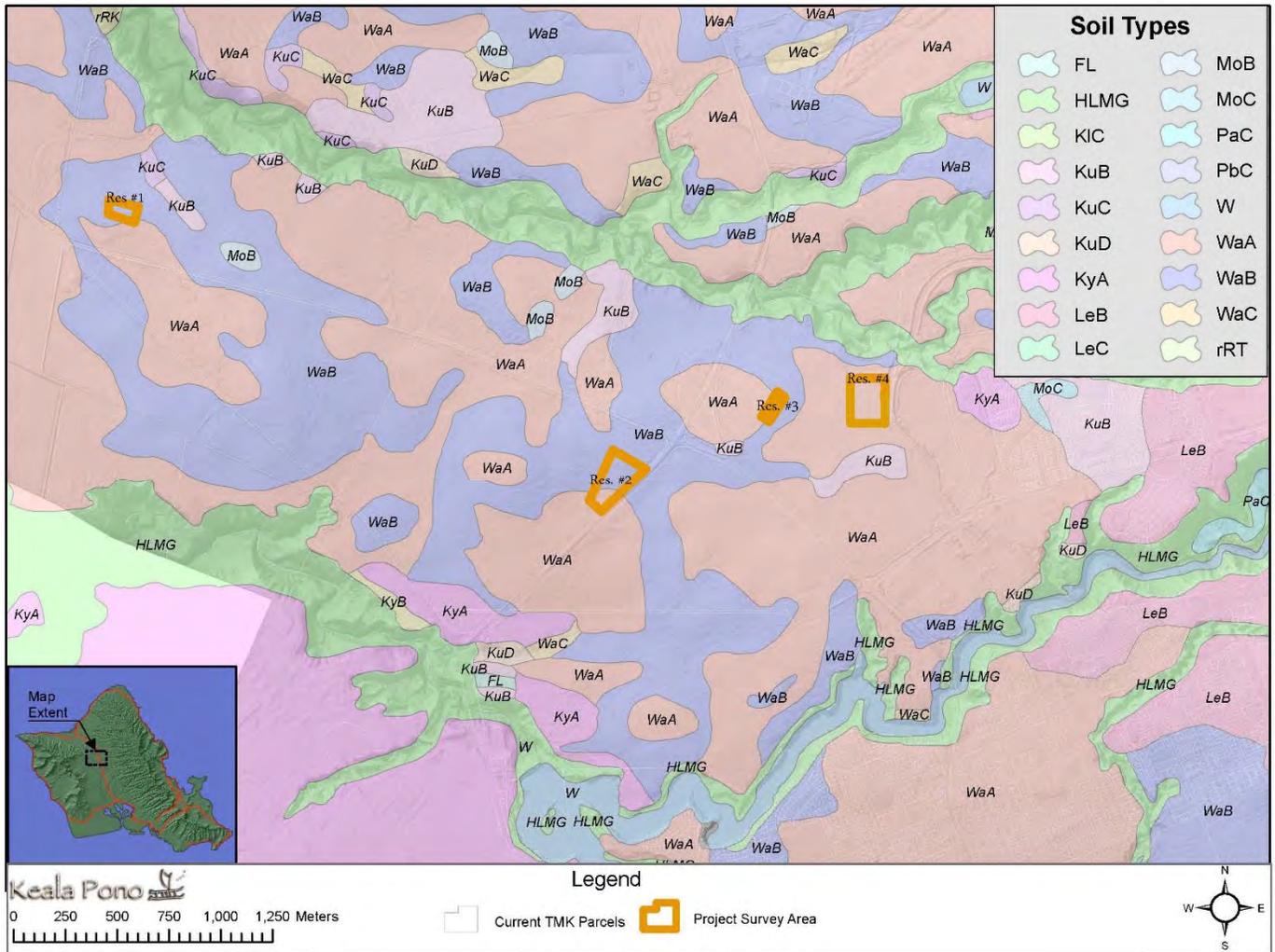


Figure 2. Soils in the vicinity of the project area.

BACKGROUND

This section of the report presents background information as a means to provide a context through which one can examine the cultural and historical significance of the project lands. In the attempt to record and preserve both the tangible (i.e., traditional and historic archaeological sites) and intangible (i.e., *mo'olelo*, *'ōlelo no'eau*) culture, this research assists in the discussion of anticipated finds. Research was conducted at the Hawai'i State Library, the University of Hawai'i at Mānoa libraries, the SHPD library, and online on the Papakilo database, Ulukau database, and the State of Hawai'i Department of Accounting and General Services (DAGS) website. Historical maps, archaeological reports, and historical reference books were among the materials examined.

Pre-Contact Wahiawā

In pre-contact times, before the arrival of Westerners in 1778, the Wahiawā region constituted the sacred center of O'ahu known as Līhu'e. Numerous *heiau* and the Kūkaniloko *ali'i* birthing stones were located here. There were agricultural areas as well, with *kalo* and *'uala* grown in the *lo'i* and *kula* lands, respectively.

Place Names and Boundaries

Before the establishment of Wahiawā District in 1913, the project area was located in the traditional *moku* of Waialua. Several conflicting accounts inform on the naming of Waialua District. Thrum (in Sterling and Summers 1978:88) states that “Waialua” translates to “two waters,” thus many believe that the name derived from Waialua's two streams. However, he believes that the district was named after a taro patch, and a common saying was that if you traveled to Waialua and did not see this taro patch, then you did not really see Waialua. Pukui (in Sterling and Summers 1978:88) asserts that the district was named for the cruel chief Waia, grandson of Wakea. Waia carried out his evil deeds at Waialua, and there was so much suffering there that the district was named Waialua, or “doubly disgraceful.” Another source attributes the name to Waialua Pool at Kemo'o (Awai in Sterling and Summers 1978:88).

The Wahiawā District boundary has a complicated history (Sterling and Summers 1978:134). At the turn of the 20th century, Wahiawā Ahupua'a fell within the Waialua District. By 1913, the community had grown apart from Waialua District, and the new district of Wahiawā was established. Thus, in 1913, the *ahupua'a* of Wahiawā and Wai'anae Uka were moved from Waialua District to the new district of Wahiawā. In 1925 the size of Waialua District was reduced as large plots of land were transferred to Wahiawā. However, in 1932 the original 1913 land boundaries were reinstated, with some small parcels added to the Schofield Barracks Military Reservation. Today the western parcel of the project area (TMK: [1] 6-5-002:010) lies within the *ahupua'a* of Kamananui, while the eastern parcels (TMK: [1] 7-1-001:002 and :005) are in Wahiawā.

Kamananui translates to “the large branch,” and a grove of trees in the *ahupua'a* was named Pōloa, or “the long night” (Pukui et al. 1974:80). Wahiawā on O'ahu should not be confused with Wahiawa on Kaua'i, a stream and *heiau* located in Kōloa. Wahiawā can be translated as “place of noise,” as rough seas were said to be heard there (Pukui et al. 1974:218). In ancient times, Hi'iaka, sister of Pele, heard the bellowing seas and composed a chant about Wahiawā and Waialua and the sound of the sea (Emerson in Handy and Handy 1991:465).

Līhu'e translates to “cold chill” (Pukui et al. 1974:132). The place name Līhu'e may pre-date the formation of *ahupua'a* on O'ahu and “seems to exist independently of the *ahupua'a* in which it falls” (Desilets et al. 2009:43). Desilets et al. help to define the boundaries of the Līhu'e region:

Judging from traditional usage, Līhu‘e appears to be an ancient place-name that refers, minimally, to the entire region west of Wahiawā and east of the Wai‘anae range. As a traditional place, its boundaries are necessarily imprecise, but it is clear that the region encompasses most of western Wai‘anae Uka and all of Schofield Barracks. Līhu‘e also appears to be used more generally to refer to the entire Central Plateau, encompassing such sacred sites as Kūkaniloko. Although it is difficult to determine with any certainty, it seems probable that Līhu‘e had broader boundaries prior to the institutionalization of the *moku* and *ahupua‘a* land divisions we know today. Līhu‘e is most often referred to as the “uplands,” although that could well mean the whole Central Plateau, which relative to coastal areas is upland. (2009:39)

Traditional Land Use

Traditionally, Kamananui was one of the three *ahupua‘a* (along with Pa‘ala‘a and Kawailoa) in the fertile heartland of Waialua Moku. The *makai* areas of Waialua once contained many *lo‘i*, while the *mauka* slopes were covered with *kula* of red soil, an environment very good for growing sweet potato (Handy and Handy 1991:466; Kirch and Sahlins 1992:1:20). Sterling and Summers (1978:103) note that “there were large terrace areas along the flatlands between the junction of Helemano and Poamoho Streams and the flatland west of Poamoho,” as well as small terraces in the lower flats of Poamoho and Kaukonahua Valleys. It is probable that sweet potato and bananas were grown around house sites along the ridges of the gulches. The upland areas of Kamananui/Wahiawā were one of the few places on the island where sweet potato agriculture was irrigated, with water brought in from Helemano Stream and Wahiawā Stream, both of which had many terraces along the stream banks (Handy and Handy 1991:464–5).

The population was most densely settled in the lower floodplains of the *ahupua‘a*, irrigated in large part by a two mile-long waterway that at the time was the longest on the island. The *lo‘i* and fishponds of the lower areas, as well as the rainfall agriculture of the *kula* supported a pre-contact community estimated at 6,000 to 8,000, which was probably the majority of the population in Waialua. In this pre-contact period (pre-Western arrival in 1778), “Kamananui was the ritual and political center of Waialua,” although the seat of power moved to the neighboring *ahupua‘a* of Kawailoa by the early 1800s (Kirch and Sahlins 1992:1:20).

Līhu‘e was home to the highest class of chiefs, the *lō ali‘i*. The *lō ali‘i* lived in the uplands of O‘ahu, including Wahiawā, and were under strict *kapu* because of their sacredness:

The chiefs of Līhu‘e, Wahiawā, and Halemano on O‘ahu were called *lō ali‘i*. Because the chiefs at these places lived there continually and guarded their *kapu*, they were called *lō ali‘i* [from whom a “guaranteed” chief might be obtained, *loa‘a*]. They were like gods, unseen, resembling men. (Kamakau 1991:40)

The chiefs of Lihue, Wahiawa, and Halemano on Oahu were called Lo chiefs, Po‘e Lo Ali‘i [“people from whom to obtain a chief”], because they preserved their chiefly *kapus*. The men had *kapus*, and the women had *kapus*, and when they joined their *kapus* and children were born, the children preserved their *kapus*. They lived in the mountains (*i kuahiwi*); and if the kingdom was without a chief, there in the mountains could be found a high chief (*ali‘i nui*) for the kingdom. Or if a chief was without a wife, there one could be found—one from chiefly ancestors. Kauakahi‘ailani, Ma‘ilikukahi, Kalona, Piliwale, Kukaniloko, Pa‘akakanilea [Pa‘akanilea], Ka‘akauualani, Ka‘au, Lale, Paoakalani, Pakapakakuaua, Nononui, Kokoloea, and a great many others were *Lo* chiefs. (Kamakau 1964:5)

Kamananui was very much the ceremonial center of the island. The *ahupua‘a* contains numerous *heiau*, including two presided over by Kū, which were also *heiau luakini* associated with human

sacrifice (Kirch and Sahlins 1992:1:21). In Wahiawā is also located one of the most sacred sites on the island, Kūkaniloko (“the sound or resonance rises from within”), birthing stones situated near where Kamehameha Highway intersects with Whitmore Road (Yent 1999:15; Yent 1995) (also see Archaeological and Historic Sites section).

The establishment of Kūkaniloko as a sacred birthplace goes back to the time of the earliest chiefs of O‘ahu. Nanakāoko was the chief, Kahihiokalani was the chiefess, and they made Kūkaniloko as a birthplace for their son, Kapawa. Kapawa’s birth and the birth of later chiefs at Kūkaniloko was accompanied by prescribed ceremony. The historian Samuel Kamakau describes the first royal birth there:

Kūkaniloko was made by Nanakāoko and his wife Ka-hihi-o-ka-lani as a place for the birth of their child Kapawa... When the child was born, it was immediately taken into the *waihau heiau* Ho‘olono-pahu. There forty-eight chiefs ministered to the child and cut the navel cord. Ho‘olono-pahu was a furlong and a half south of Kūkaniloko. Two furlongs to the east of Kūkaniloko was where the sacred drum Hāwea was beaten; it indicated the birth of a chief. On the east of the stream on that side of Kua‘ikua were the *maka‘āinana* --- a great many of them --- and to the south, three furlongs distant, were the *kauwā*. (Kamakau 1991:38)

Kamakau points out that long after Kapawa, the sacredness of Kūkaniloko continued and that all of the “chiefs born at Kūkaniloko were the *akua* of the land and were *ali‘i kapu* as well” (Kamakau 1991:53).

The historian John Papa Ii adds that besides being a sacred birthplace, Kūkaniloko was also a designated place of refuge:

The Hale o Keawe was called Kaikaialealea and was a *pu‘uhonua*, or place of refuge. Similarly, Kukaniloko in Wahiawa, Oahu; and Holoholoku in Wailua, Kauai, were places to which one who had killed could run swiftly and be saved. (Ii 1959:138)

As a place of refuge, Kūkaniloko fits in the story of the newborn twin chiefesses Laielohelohe and Laiekawai. Their mother Malaekahana feared that her newborns would be harmed, so she sent one of them to the safe haven of Kūkaniloko to be raised by Kapukaihaoa (Beckwith 1970).

Even after the arrival of Westerners, Kūkaniloko remained to be a place of great significance among the Hawaiian population. Ii reminds us that this important place was situated along one of the major trails that traversed O‘ahu Island:

From the stream of Anahulu and from Kamani, above the houses and taro patches, a trail stretched along in front of Kuokoa’s house lot and the church. This trail went on to meet the creeks of Opaepala and Halemano, the sources of the stream of Paalaa, on down to the stream of Poo a Moho, and on to the junction where the Mokuleia trail branched off to Kamananui and Keawawahie, to Kukaniloko, the birthplace of chiefs. (Ii 1959:98)

Mo‘olelo and ‘Ōlelo No‘eau

The Līhu‘e chiefs are memorialized in *mo‘olelo*, with the story of Lō Kaholi-a-Lale (Kamakau 1991:50–51). Lō Kaholi-a-Lale was born and raised in the Līhu‘e uplands, where he learned the arts of war, including throwing of the spear, for which the Līhu‘e chiefs were particularly renowned. However, the *mō‘ī* of ‘Ewa, named Piliwale, was also highly skilled at spear throwing and offered his daughter’s hand in marriage to any man who could throw as well as his own instructor, ‘Awa. It was said that ‘Awa “could grasp ten spears in his right hand and ten in his left...he could throw ten spears from the shoulder, two backwards, and two directly to the navel” (Kamakau 1991:50–51). Lō

Kaholi-a-Lale studied the moves of ‘Awa as other suitors unsuccessfully battled him. He challenged ‘Awa at Hālaulani, and his feats are memorialized as place names of ‘Ewa and Waipi‘o. These include Kūpahu, which means “to hurl,” and Hanapouli, or “make dark” (Kamakau 1991: 50–51). Lō Kaholi-a-Lale’s success earned him the hand of Piliwale’s daughter, Kohe-palaoa, and the significance of this is as follows:

That was the beginning of the combining of the *lō* and the *wohi*, the ranks of Kaholi-a-Lale. As for Kohe-palaoa, her rank was that of a Kumuhonua chief of Kūkaniloko; she was a *nī‘aupi‘o*. They had a son named Kānehōalani who became the chief of Ko‘olau. (Kamakau 1991:51)

Pukui (1983:291) notes a saying: “*Pili pono ka lā i Kamananui*,” meaning “the sun is very close to Kamananui.” Although the *‘ōlelo no‘eau* is supposed to refer to a person in power who becomes very angry and scorches people like the hot sun, the indication that the sun is very close to Kamananui in particular very likely references both Kamananui’s association with the *lō ali‘i*, as well as the solar calendar function of Kamananui’s most sacred site, Kūkaniloko. The *‘ōlelo no‘eau* for the sun’s relationship to Kamananui is in stark contrast to that of nearby Wai‘anae in the saying, “*Kapakahi ka lā ma Wai‘ane*,” meaning “lopsided is the sun at Wai‘anae” (Pukui 1983:164).

In addition to power, Kamananui is also associated with violence in a number of *mo‘olelo*. Within Kamananui, Keawawaihi (*mauka* of Hale‘iwa) was known as “The Valley of the Spears,” named for the brigands of robbers who went rogue after being trained for war using spears or a shark’s tooth tied to the hand with *olonā* fiber, and by using the warrior art of *lua*, “the art of dislocating the joints and rendering an opponent helpless” (Sterling and Summers 1978:107). Pohakukae in Keawawaihi Gulch is the location of another tale of bloodshed. The large rock on the north ridge of the gulch was named after an event in which a man named Kalaimoku stood on the rock and called out to the people below: “*E na kanaka o Keawawaihi ea ka ai he kukae*,” or “Men of Keawawaihi here is the food, excrement” (Sterling and Summers 1978:107). The people became enraged and tore Kalaimoku and his attendants to pieces.

A few miles southeast of Kūkaniloko, near the south fork of Kaukonahua Stream, was a place later called O‘ahunui (named after the last resident chief), the former residence of the ruling *ali‘i* of O‘ahu. A *mo‘olelo* associated with the site indicates that O‘ahunui practiced cannibalism, and his most horrific act involved eating his two plump nephews (his older sister’s sons), for which he and his sister were decapitated in retribution by the boys’ father. Their bodies turned to stone, and O‘ahunui is said to resemble the shape of O‘ahu. The site was considered desecrated by the act, and the residence of the ruling chief was moved from Kamananui to Waikīkī (Kawaharada 1999:52–53; Sterling and Summers 1978:137).

Historic Waihiawā

In historic times (post-1778), the Waihiawā region has been used for harvesting sandalwood, sugarcane and pineapple cultivation, and for military interests.

Early Historic Land Use

When Kamehameha I conquered O‘ahu in 1795, Waialua was given to his ally, Chief Ke‘eaumoku, and for the next 70 years, the land was controlled by his descendants, primarily his daughter, Queen Ka‘ahumanu. In the early 19th century, Waialua was a source of food, sandalwood for trade, and building lumber for the royalty (Office of State Planning 1995:1).

The sandalwood trade in Hawai‘i began in 1791, with most of the wood shipped to China, where it was valued for its fine grain and pleasant scent. The peak trade years were 1810–1840, and this was

also a period in which there was an increased desire for Western goods, which led to debts held by Hawaiian monarchs who paid these by urging or even forcing the *maka'āinana* to cut down large numbers of trees in the upper regions (Harrington 2013:33). This effort to collect sandalwood for trade placed great strain on the people of Waialua because the trees were located up in the mountains, “far from the people’s homes and gardens,” the collection of which necessitated “sustained operations of days, weeks, or sometimes months on end” (Kirch and Sahlins 1992:1:83). While away, they were then not tending to the gardens and animals needed for their own sustenance.

As the sandalwood trade died down, whaling would become an important element in the economic, political, and social structure in Waialua. The height of the whaling period was approximately 1830–1860, which was also an era in which Waialua lost roughly half of its people to disease and emigration. At the same time, the ruling *ali'i*, *konohiki*, and other officials taxed the commoners more heavily in order to pay for the Western goods and customs they had come to covet. Most income to the *ali'i* came from sales of supplies to the whaling ships, with supplies of food (e.g. cattle, taro, sweet potato), salt, and other materials generated by the *maka'āinana*. The commoners of Waialua were additionally burdened by collateral issues tied to supplying the ships. Many who worked the farms and homesteads in the area had to build walls (most were built in the late 1840s and early 1850s) around their lots not to keep personal livestock in but to keep out the cattle of supply companies that allowed their herds to wander freely (Kirch and Sahlins 1992:1:99–165).

Agricultural Interests

In the mid-1860s, Castle & Cooke, established by Samuel Castle and Amos Starr Cooke, backed the first commercial sugar cultivation in Waialua, started by two sons of Levi Chamberlain. Early businesses managed by them and others were unsuccessful, and in 1874 the operation was sold to a partnership including Robert Halstead. Halstead was able to generate a profit, and prospects improved with the development of a railroad line. Castle & Cooke and Halstead together formed Waialua Agriculture Company in 1898. Development continued and soon the company embarked on a mammoth irrigation project to dam Kaukonahua Stream and create the Wahiawā Reservoir.

The Wahiawā Reservoir has been called the “key to Waialua’s irrigation” (Wilcox 1996:109). Completed in January of 1906, it was the largest reservoir in the islands, with a capacity of 2.5 billion gallons (Wilcox 1996:109). At 136 feet (41.5 m) tall, the earthen dam is the highest in Hawai‘i. The 461 foot (140.5 m)-long dam with a 580 foot (176.8)-thick base created a massive reservoir, occupying a 7 mile (11 km) length of Kaukonahua Gulch (Wilcox 1996:109). This reservoir, later dubbed Lake Wilson, delivered 90% of the surface water for the Waialua Sugar Company’s fields. In the book *Sugar Water*, Wilcox describes the ditch system associated with the reservoir:

The source was 8000 acres of watershed at the head of the Koolau Mountains. Lake Wilson was fed by a ditch system known first as the Oahu Ditch and later as the Mauka Ditch Tunnel. It consisted of 4 miles of main ditch and 8 miles of laterals, which included thirty-eight tunnels. It was started in June 1900 and completed in March 1902 at a cost of \$80,000. The capacity of this ditch system was 90.5 mgd. Besides developing water in the Kaukonahua watershed, it also diverted from the Poamoho watershed.

Another 4 miles of ditch, tunnel, and siphons delivered the water from Lake Wilson (as well as from Helemano and Opaepala ditches) to Waialua’s upper fields at 730 feet elevation. This Wahiawā Ditch had a capacity of 50 mgd. The total cost was \$49,177.59, making it one of the least costly projects of its size, averaging out to \$1.5 a lineal foot. Of the ditch’s 20,740 feet, only 1600 feet was in open ditch. The remaining length comprised twenty tunnels, the longest of which was 1742 feet. It had the largest and tallest flume on Oahu: 130 feet high. In 1923, most of the flumes spanning the gulches were replaced by siphons. (1996:109–110)

Sugarcane production became less dominant with some of the land use in Waialua shifting to pineapple and military interests in later years. James Drummond Dole founded the first pineapple plantation in Wahiawā in 1900 (Hawkins 2011). He organized the Hawaiian Pineapple Company in 1901 and packed the first batch of pineapples in 1903 (Napoka 1976). In 1922, Dole leased 12,000 acres (4,856 ha) from the Waialua Agriculture Company for pineapple production (Office of State Planning 1995).

Both sugarcane and pineapple production in the Wahiawā/Kamananui area were enabled by the train service established from Pearl City to Wahiawā, and later up through Hale‘iwa. O‘ahu was the last island to “come aboard” the new mode of transportation following King Kalākaua’s 1878 Act to Promote the Construction of Railways, after railroad service began on Maui in 1879 and on the Big Island in 1880 (Chiddix and Simpson 2004:14). The Oahu Railway and Land Company (OR&L), founded, owned, and ran by Benjamin Franklin Dillingham, began operations in 1889 (Chiddix and Simpson 2004:19).

Established portion by portion, the OR&L line originally spanned from Honolulu to Kahuku, with a branch line running from Waipahu out to Wahiawā that was constructed in 1905 to accommodate the pineapple plantation established there by Dole. Soon after construction, this line was unofficially extended to Hale‘iwa—a “hush-hush track” due to the establishment of Schofield Barracks and the wartime need for back-up transportation (Kneiss 1957:13–14).

Poamoho Camp, to the north of the project area, was constructed in 1912 for workers of the Hawaiian Preserving Company, Ltd. pineapple cannery in Wahiawā. The camp consisted of 20 houses situated around a men’s boarding structure. It remains as a residential neighborhood today, with approximately 300 residents (Boylan 2004), although the houses have been remodeled.

The U.S. Military

Adjacent to Wahiawā, in Wai‘anae ‘Uka, the land underwent increased military use with the establishment of Schofield Barracks. The U.S. military first occupied Schofield Barracks, originally called Castner Village, in 1909. Most major planned building projects were completed by the early 1920s. Soon after World War II began, the facilities were expanded to accommodate the Ranger Combat School created to train soldiers for “jungle” activities. The current Schofield Barracks Military Reservation’s three main training areas included the Impact Zone, the South Range, and the East Range (Sullivan and Dega 2003:21).

The Helemano Military Reservation, north of Wahiawā in Pa‘ala‘a Ahupua‘a, was established in 1943. The reservation served as a communications station for the U.S. Army, and in 1944, a signal center was constructed. The reservation became a permanent sub-installation of Schofield Barracks in 1956 (Towill Corp. 1981).

Historic Maps

Historic maps help to paint a picture of Wahiawā in years past and illustrate the many changes that have taken place in the region. The earliest maps found for this area are from the late 1800s. The first shows two land grants in 1885 (Figure 3). The north and south branches of Kaukonahua Stream are illustrated, and Kokoloea is labeled along the southern boundary of the *ahupua‘a*. The second map dates to 1899 and shows the entire *ahupua‘a* (Figure 4). Several ridges and gulches are illustrated, although the only one labeled is Poamoho Gulch. Land grants are also outlined, and a fence is shown, with points designated as “Kokoloea” and “Paka.” The Government Road runs through the west side of the region with two gates and a bridge depicted. Two houses are shown: one near the south fork of Kaukonahua Stream, and the other on Galbraith lands.

Two maps were found that date to the early 1900s. The first depicts lands of the Waialua Agricultural Company in 1901 (Figure 5). The entire *ahupua'a* is shown with details of natural features such as streams and gulches. The Government Road is illustrated, along with many land grants throughout the region. The second map of this era shows Central O'ahu in 1904 (Figure 6). The only notable addition in Wahiawā is a "pile of stones" that marks the corner of the property boundaries near Poamoho Gulch.

The final two maps date to the mid-1900s. The first depicts the 'Ewa Forest Reserve in 1946 (Figure 7). In the uplands of Wahiawā, a "Mauka Ditch," and the Schofield-Waikane Trail are illustrated. The Poamoho Tunnel and an unnamed trail are shown between Poamoho Stream and the north fork of Kaukonahua Stream. Pineapple lands and a reservoir are in the western portion of the *ahupua'a*. The final map shows Wahiawā in 1950 (Figure 8). The area is much more developed, with a network of streets and several additional reservoirs illustrated.

Māhele Land Tenure

THE MAHELE is rightfully considered one of the most significant chapters in the modern history of Hawai'i. Several legislative acts during the period 1845–1855 codified a sweeping transformation from the centuries-old Hawaiian traditions of royal land tenure to the western practice of private land ownership. (Moffat and Fitzpatrick 1995)

The change in the traditional land tenure system in Hawai'i began with the appointment of the Board of Commissioners to Quiet Land Titles by Kamehameha III in 1845. The Great Māhele took place during the first few months of 1848 when Kamehameha III and more than 240 of his chiefs worked out their interests in the lands of the Kingdom. This division of land was recorded in the Māhele Book. The King retained roughly a million acres as his own as Crown Lands, while approximately a million and a half acres were designated as Government Lands. The Konohiki Awards amounted to about a million and a half acres, however title was not awarded until the *konohiki* presented the claim before the Land Commission.

In the fall of 1850 legislation was passed allowing citizens to present claims before the Land Commission for lands that they were utilizing within the Crown, Government, or Konohiki lands. By 1855 the Land Commission had made visits to all of the islands and had received testimony for about 12,000 land claims. This testimony is recorded in 50 volumes that have since been rendered on microfilm. Ultimately between 9,000 and 11,000 *kuleana* land claims were awarded to *kama'āina* totaling only about 30,000 acres and recorded in ten large volumes.

During the Māhele of 1848, the land of Waialua, at that time held by Princess Victoria Kamāmalu, was divided: Kamāmalu retained thousands of acres in Pa'ala'a and Kawailoa; 134 *kuleana* holdings were awarded; and the western sections of Kamananui and Mokuleia, as far as Ka'ena Point, were given to the government and made available for public purchase. There were no LCA awards in the immediate vicinity of the project area. Although no Central O'ahu lands were awarded to the commoners, they undoubtedly helped farm those lands. There are documents preceding the Māhele which mention the vast cultivated *lo'i* found in this central area (Henry et al. 1992).

Two years after the enactment of the Māhele, King Kamehameha III passed another law, this one allowing foreigners to buy land. The Waihona 'Aina database shows that following the allowance of foreigners to buy land in Hawai'i, the property around present-day Wahiawā were overwhelmingly bought out by Westerners. By 1860, approximately 290 patents were granted, with roughly one in eight sold to foreigners and naturalized citizens, including John S. Emerson and Samuel Northrup Castle (Office of State Planning 1995:1–2). In the case of the project area, those

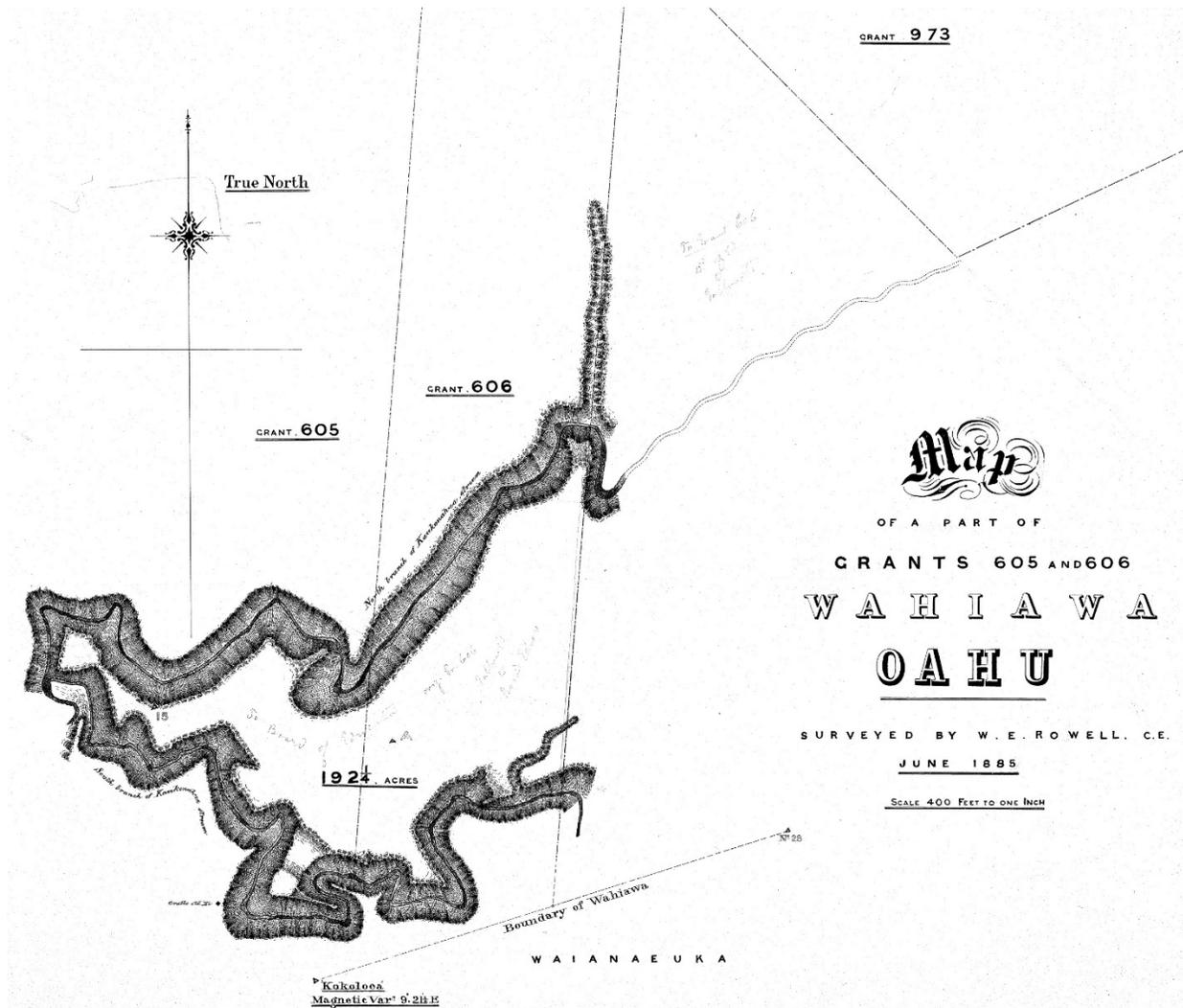


Figure 3. Land grant map of Wahiawā (Rowell 1885).

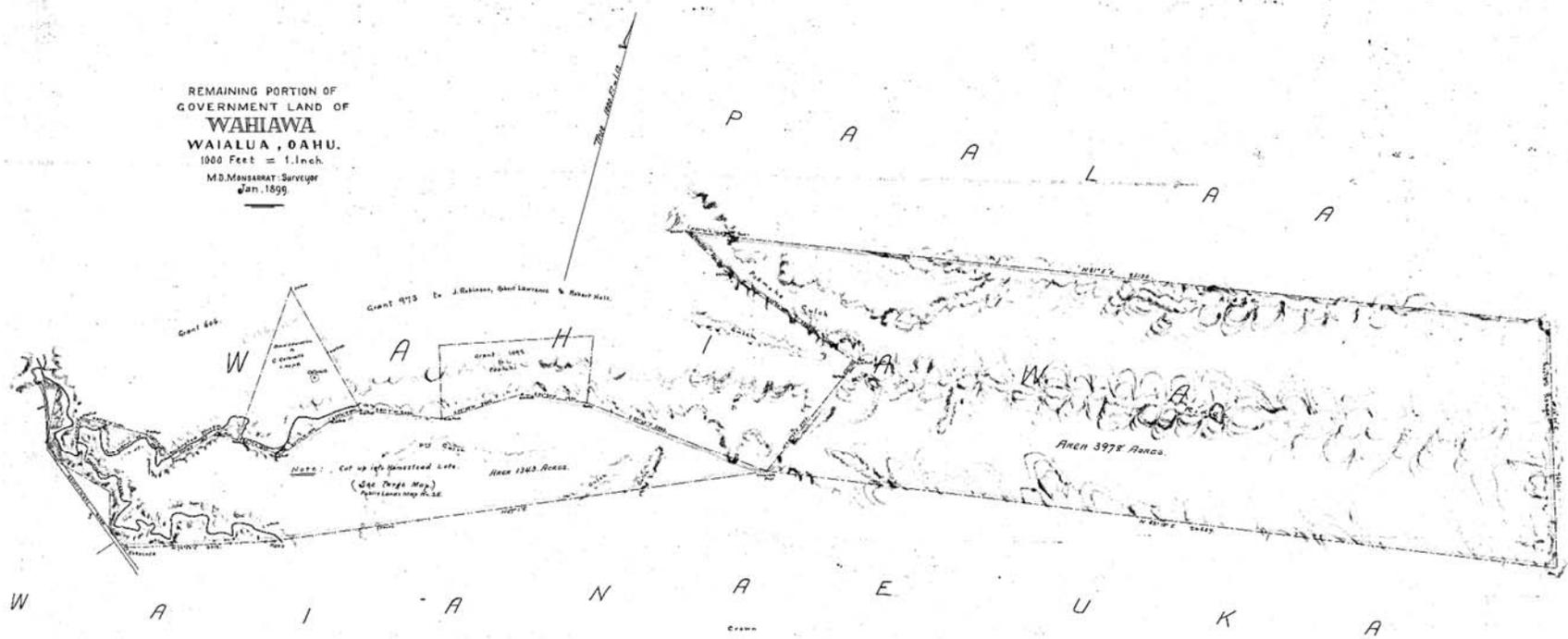


Figure 4. Government land of Wahiawā (Monsarrat 1899).

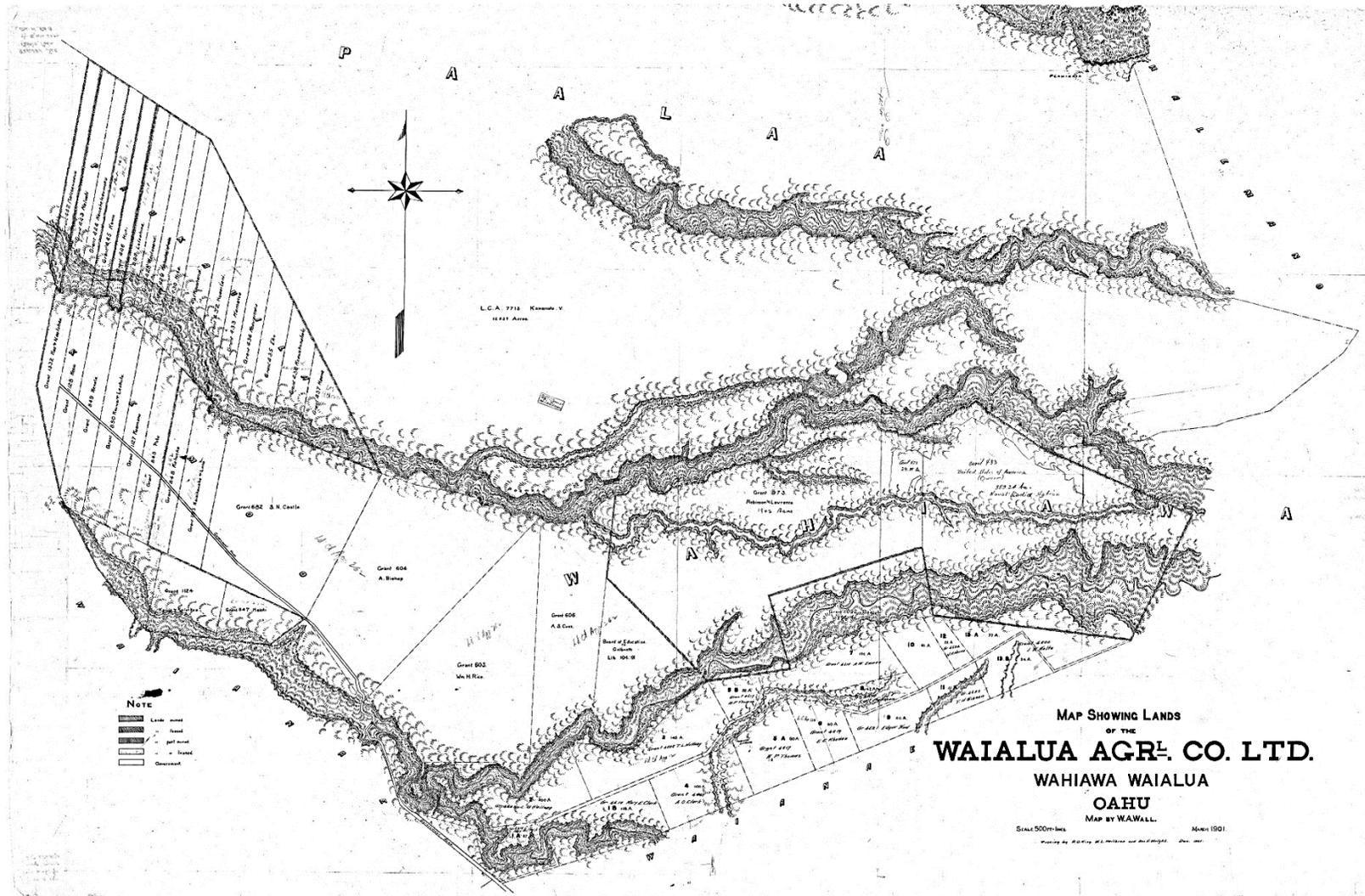


Figure 5. Waialua agricultural land (Wall 1901).

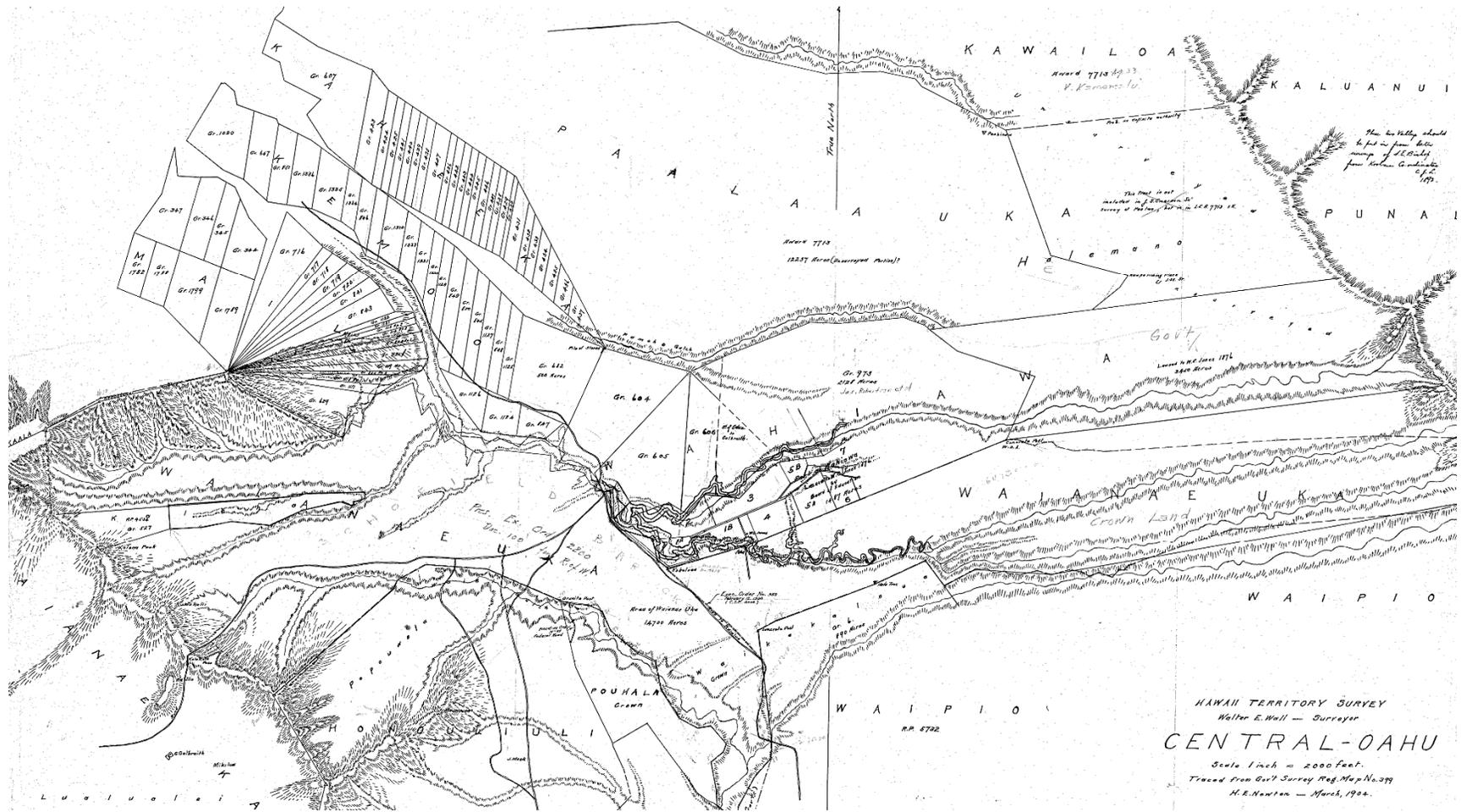


Figure 6. Portion of a Central O'ahu map (Wall 1904).

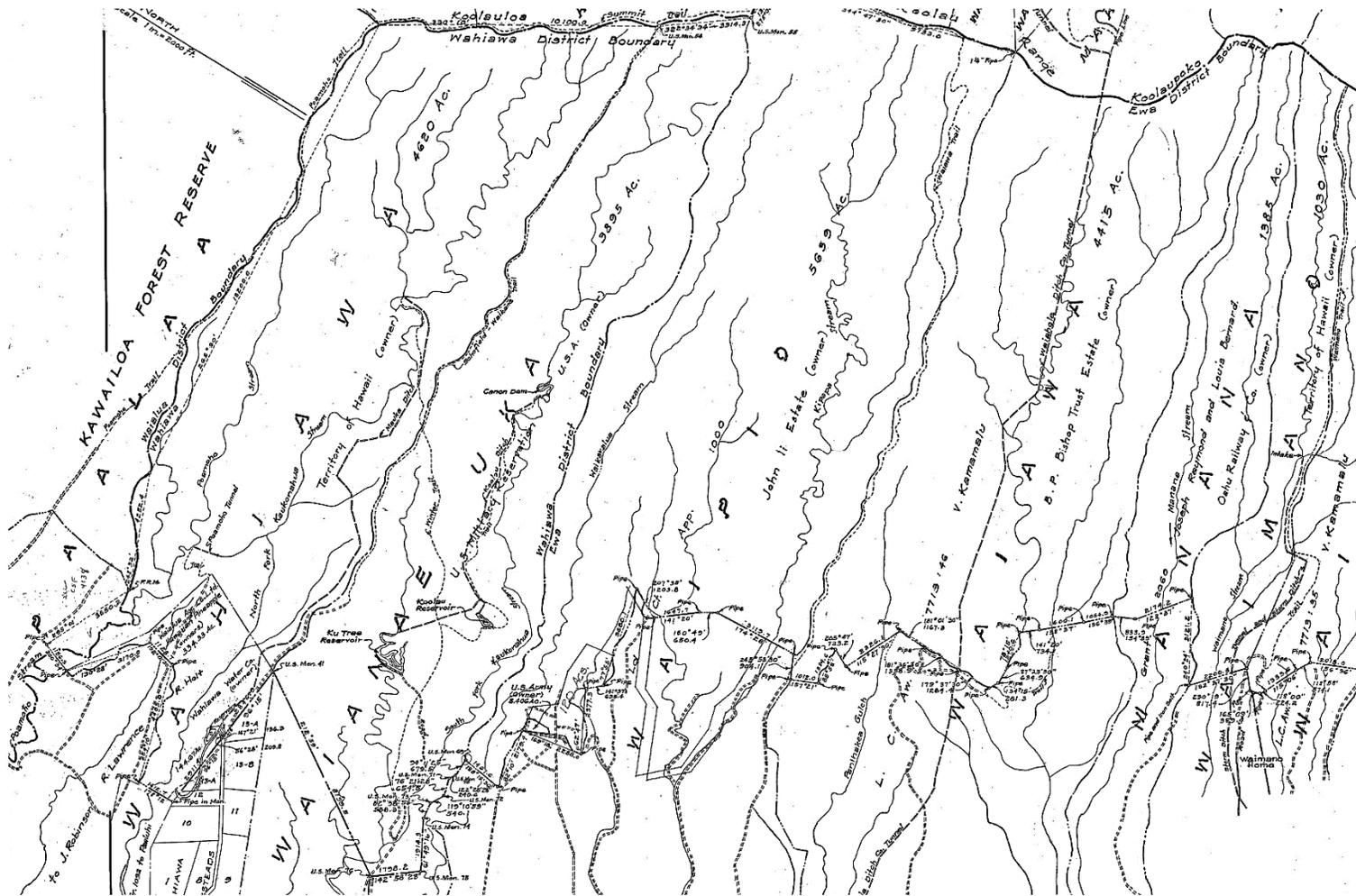


Figure 7. Portion of an 'Ewa Forest Reserve map (Marks 1946).

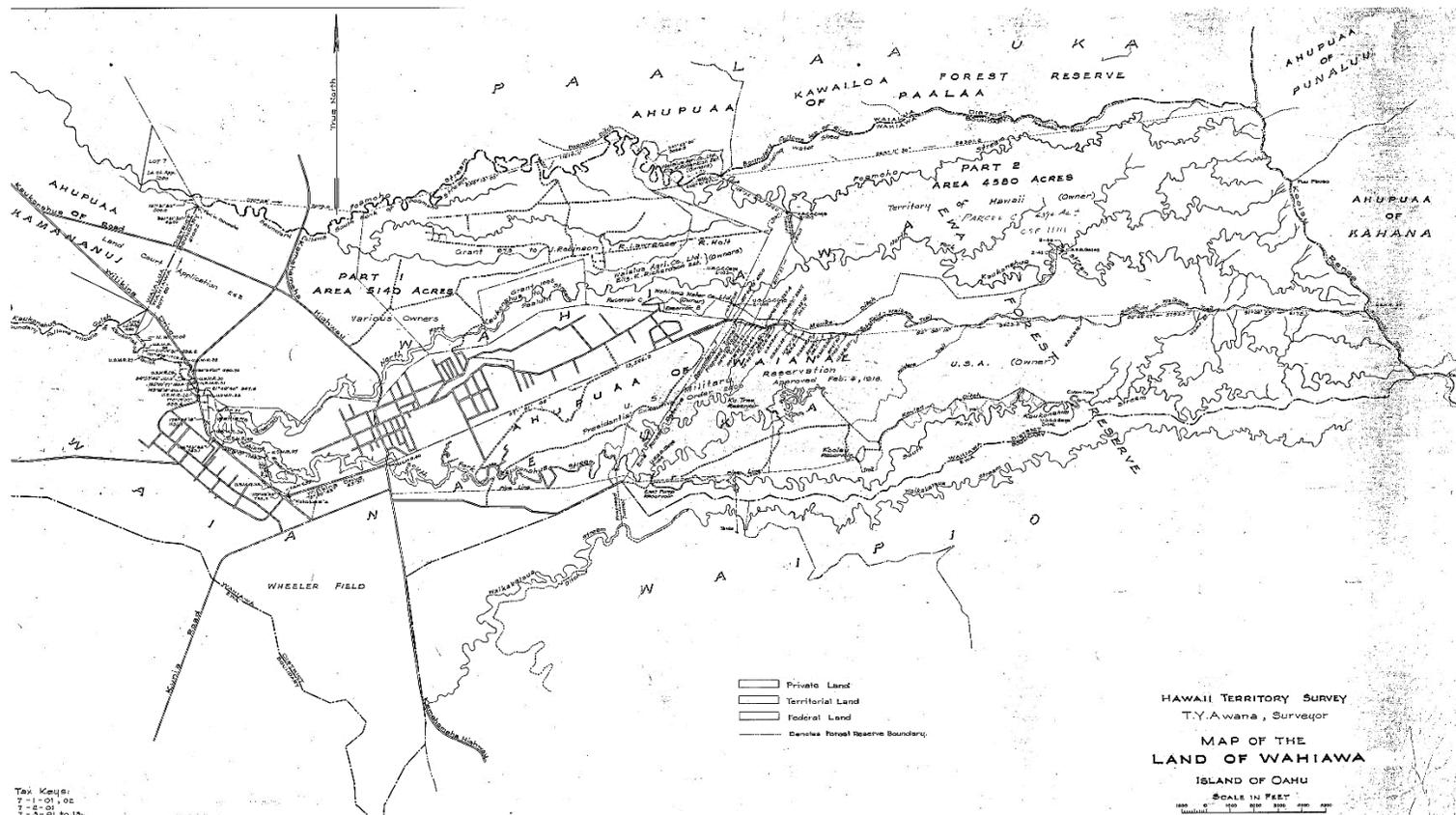


Figure 8. Territory Survey map of Wahiawā (Awana 1950).

lands eventually fell into the ownership of George Galbraith. Neither the exact date of Galbraith's purchase of the property could be found, nor whether he bought his lands all at once or if he bought it piecemeal.

Archaeological and Historic Sites

Many historic sites are located within Wahiawā, the most notable of which is Kūkaniloko, or the Birthing Stones, one of the most sacred sites on O'ahu. Kūkaniloko is comprised of a number of stones associated with royal births, and a birth there legitimized a chief's high ranking right to be a leader (Yent 1999).

The site was established in the 12th century, when Nānākāoko and his wife, Kahihokalani birthed their son, Kapawa at Kūkaniloko. This became the traditional birth site of the *ali'i* (Sterling and Summers 1978:139–40; James 2010:113; Beckwith 1970:377). A child born here was then taken to nearby Ho'olonopahu Heiau, the site of the sacred drums 'Ōpuku and Hāwea, that would sound the announcement of sacred births (Yent 1999:18–23). This location, as Beckwith (1970:377) notes, "is one frequently visited by thunderstorms, whose manifestations were regarded as the voice of ancestral gods of the heavens welcoming an offspring of divine rank," and it is therefore possible that the drums "simulated the voice of the deity." Kakuhihewa, later king of O'ahu, was born at Kūkaniloko, "in the sleeping place consecrated by the tabu of Liloe," and was announced according to such a ritual (Sterling and Summers 1978:139).

It is also posited that some of the stones were arranged to represent the various islands of Polynesia, and the area served as a navigational school. One of the stones, shaped somewhat like O'ahu, contains carved ridges aligned with peaks on the Ko'olau and Wai'anae mountain ranges, and these ridges cast shadows across concentric circles at the center of the stone that were likely used in an astronomical/calendrical function to tell the solstice and equinox times of the year (James 2010:114; Yent 1999:35).

Traditionally, Kūkaniloko referred to a much larger area that spanned from Waikakalaua and Līhu'e in the south, Kalena in the west, and Helemano in the north (Yent 1999:15). The central site included 36 stones aligned in two parallel rows of 18 (seats for the presiding chiefs of the island), a resting stone for the woman giving birth, and numerous other stones (Kawaharada 1999:51; Kirch 1996:35). The sitting stones from the original parallel rows of 18, many of which have bowl-like indentations, are now arranged "haphazardly in a small grove of coconut and eucalyptus trees" (James 2010:113).

The entire complex includes approximately 180 stones in a 25 x 50 m area. Petroglyphs have been recorded on three of the stones. Two of the petroglyphs are believed to be post-contact; one petroglyph, identified in Yent (1995:4) as Stone #103, features concentric circles with a dot in the center, and the stone in which the image is set contains fluted points that most likely had "an astronomical function." From Kūkaniloko, "the solstitial and equinoctial positions of the sun could be observed and marked for use as a calendar" (Yent 1999:35).

Identified by McAllister (1933:134–137) as Site 218, the .5-acre (.2-ha) Kūkaniloko site was placed on the National Register of Historic Places in 1972. In 1994, it was listed on the Hawai'i Register of Historic Places, and the size of the official site was increased to 5 acres (2 ha). In 1997, The Department of Land and Natural Resources-State Parks entered into an agreement with the Hawaiian Civic Club of Wahiawā and the Friends of Kūkaniloko, who are the recognized curators of the monument. Tom Lenchenko "placed several alignments of boulders within the 5-acre parcel to symbolize the traditions associated with the site," including the current arrangement (which is not the original) of 36 stones in two parallel rows leading to the site and the 48 stones at the western

edge of the 5-acre site (Yent 1995:14). Other improvements have been made to the site to repair damage and to help protect the site.

Ho‘olonopahu, McAllister’s Site 219 (1933:137) was a *kapu* place for rituals but did not necessarily have a permanent structure. The temporary structure on the sacred site, believed to have been approximately 400 m northwest of Kūkaniloko, was probably constructed of wood of the *mākālei*, a supernatural tree of Moloka‘i. It is said that the drums ‘Ōpuku and Hāwea were kept there (McAllister 1933:137). These sacred drums were sounded to announce an *ali‘i* birth at Kūkaniloko. What remained of the site was presumed destroyed by the 1920s when the land was used for pineapple (Yent 1999:18–23).

The Wahiawā Healing Stones, several rocks with healing properties, are reported to have been moved several times in fairly recent history. In Sterling and Summers (1978:141), William Galbraith recounts that his father and grand-uncle moved a stone from its original location on a river bed on the lower side of the Wahiawā Dam to Kūkaniloko to serve as the headstone of a Hawaiian chief. It was moved to Wahiawa Cemetery in 1927. James (2010:115) gives a slightly more curious account:

In the late 19th century, prompted by a dream in which the spirit of the stone addressed him, an Irish rancher by the name of George Galbraith moved the stone from a riverbed to a clearing at Kūkaniloko, where it drew many Hawaiians who experienced its curative powers. Pilgrims flocked to the sacred stones, offering prayers and gifts, and the stone was moved to a cemetery in Wahiawā, a mile away. However, the next day it appeared back at its original location. It was moved again, and again it somehow returned, people said, on its own. A third time it was moved in a wagon from which it fell and broke in two. The two stones now remained at the spot where they were placed, and became even more popular.

Two stones are now located in a Japanese crypt-like shelter near a Hindu structure, worshiped by some as a manifestation of Shiva, at a suburban housing development that was built over the former cemetery at 108 California Street. The larger stone is called Pōhaku Ho‘ola Kino or Keanianileihua, while the name of the smaller rock is not known (James 2010:115–116).

Helemano Trail (connected to the Wahiawa-Pupukea Trail, later called Drum Road) was a traditional thoroughfare near the project area (Kakesako 2002). Not much of the earlier history of the trail is known before the military extended and developed the road in the 1930s, which involved reconstructing old trails and creating new paths (Cultural Resources Section Staff 2012).

The Chinese cemetery of Wahiawā, a historic-era site, was originally located at 130 California Avenue, next to Ka‘ala School (south of the current project area). The site was reported to have been used for the burial of Dole company employees, with the last burial done in 1947. In 1972, all marked and unmarked burials were disinterred and relocated to Mililani Memorial Park (Char and Char 1988:163–164).

Previous Archaeological Studies

The earliest archaeological work in the Wahiawā region was part of McAllister’s islandwide survey (1933). Two sites were identified near the project area: Site 218, Kūkaniloko, and Site 219, Ho‘olonopahu Heiau, both described above. McAllister noted that Kūkaniloko was “one of the two famous places in the Hawaiian islands for the birth of children of tapu chiefs. The other is at Holoholoku, Wailua, Kauai” (1933:134). At the time of McAllister’s survey, Kūkaniloko was the only archaeological site on O‘ahu that was being “officially preserved” (1933:135). Ho‘olonopahu Heiau is where drums were beaten to signal the birth of an *ali‘i*. The site was reported as destroyed by the time of McAllister’s survey, and only pineapple lands remained (1933:137).

Modern archaeological work consists of archaeological surveys, monitoring, and other such projects. The following discussion provides information on archaeological investigations that have been carried out in the vicinity of the project area, based on reports found in the SHPD library in Kapolei, Hawai'i (Figure 9, Table 1).

A surface survey was conducted on Phase I of the Wahiawa Fresh Water Park (Griffin and Yent 1977). Structures found during the survey include a railroad trestle and the roadbed for railroad tracks, as well as a terrace complex that is either historic or historically modified. Griffin and Yent (1977) recommended contacting the Hawaiian Railway Society to determine the significance of the railroad structures. No State Inventory of Historic Places (SIHP) site numbers were assigned.

James Saifuku submitted to the SHPD several drawings of sites he had encountered along Poamoho Stream, drawn from his memory of what had been there in the 1940s (Saifuku 1987a and 1987b). Drawings and notes indicate the presence of traditional Hawaiian artifacts in the pineapple fields along Poamoho Gulch, as well as a rock wall alignment and former *heiau* within the gulch.

An archaeological reconnaissance survey was completed in three areas associated with Helemano family housing construction (Watanabe 1990). Work Area 1 was a waterline re-route approximately 220 m (722 ft.) long, south of the Helemano Radio Station. No cultural features were encountered. Work Area 2 was an access road corridor approximately 15 m (49 ft.) wide and 750 m (2,640 ft.) long, running through former pineapple fields to the northeast of the current project area. Excavation revealed a plow zone in the upper meter that seemed associated with seasonal field preparation. Work Area 3 was approximately 100 m², adjacent to Kamehameha Highway, also in an active pineapple field. No cultural materials were encountered there. No further archaeological work was recommended (Watanabe 1990).

An archaeological inventory survey of Galbraith Trust Lands was performed as part of an environmental impact statement to be submitted in support of a proposed development plan amendment application (Henry et al. 1992). The survey area included the current project parcels, along with additional lands in between and south toward Schofield Barracks. Survey methods included an aerial survey by helicopter, a variable-intensity ground survey, and subsurface testing. During the aerial and pedestrian surveys, two previously identified sites were documented: SIHP 50-80-04-218, Kūkaniloko, located outside of the current project area to the south, and SIHP 50-80-04-4571, a stacked rock wall outside of the current project area to the north (Henry et al. 1992:18). Saifuku (1987a) had previously identified a *heiau* (SIHP 50-80-04-1605) to the north of the current project area, in Poamoho Gulch, but this could not be located. Henry et al. note: "If future development plans include ground disturbance in Poamoho Stream Gulch, further efforts to locate Site 1605 may be necessary" (1992:32). No cultural deposits were found in the shovel tests.

An archaeological assessment of an exploratory well site was completed within the Board of Water Supply Corporation Yard on California Avenue (Colin and Hammatt 1994), south of the current project area. The pedestrian survey produced no findings and the area was determined to be "devoid of archaeological potential" (Colin and Hammatt 1994:7).

A cultural resources overview with an archaeological survey was conducted at the Naval Communications Center Area Master Station (Landrum et al. 1997). No pre-contact archaeological sites were identified, although it was suggested that they may be located in the gulch that was not surveyed (Landrum et al. 1997:i). Several historic buildings were documented.

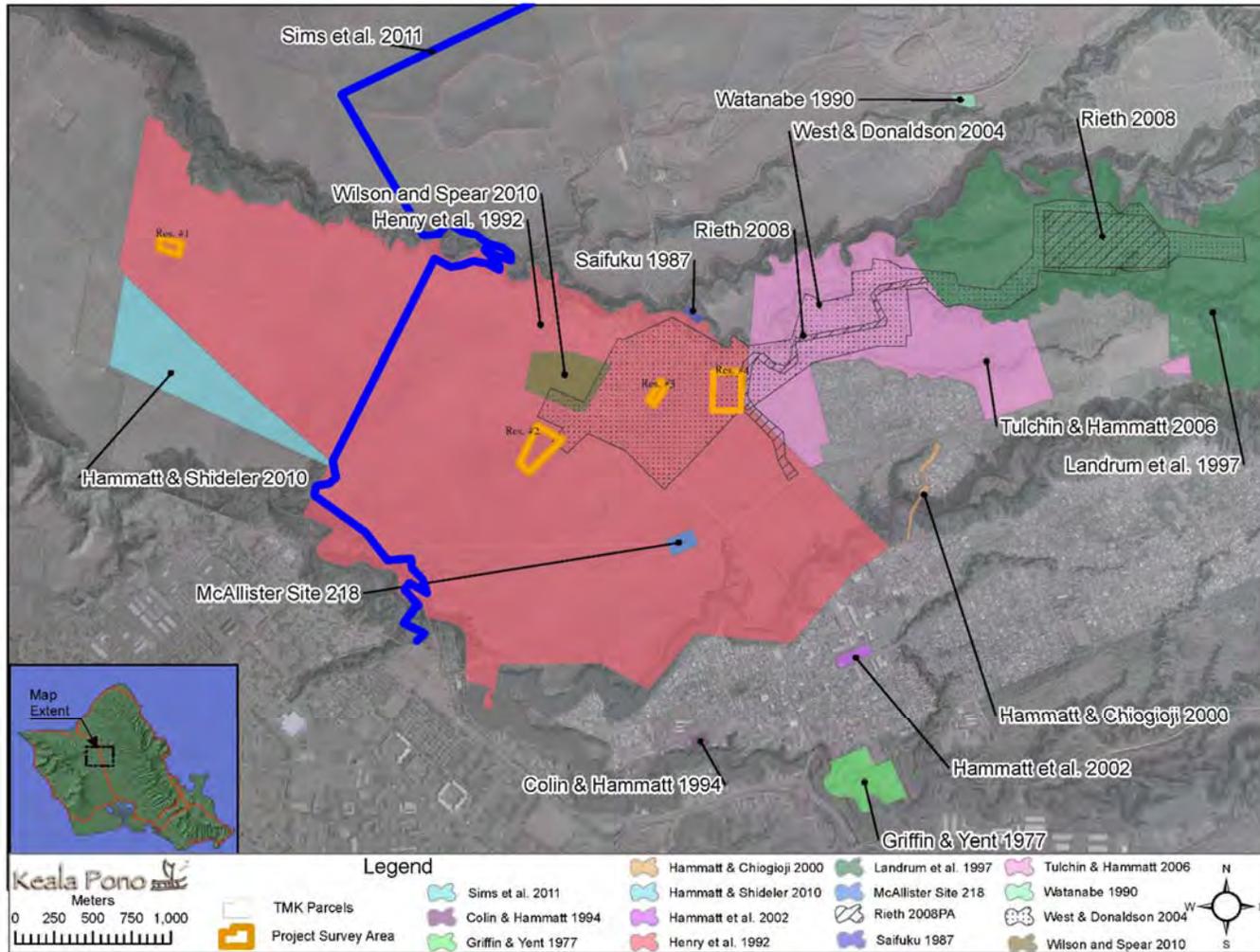


Figure 9. Location of previous studies in the vicinity of the project area.

Table 1. Previous Archaeology in Wahiawā

Author and Year	Work Completed	Findings
McAllister 1933	Islandwide Survey	Identified Site 218, Kūkaniloko, and Site 219, Ho‘olonopahu Heiau near the project area.
Griffin and Yent 1977	Archaeological Inventory Survey	Documented terraces in Kaukonahua Stream and a railroad bed.
Saifuku 1987a and b	Site Drawings	Documented several new sites, including a wall and <i>heiau</i> along Poamoho Stream.
Watanabe 1990	Archaeological Reconnaissance Survey	No findings.
Henry et al. 1992	Archaeological Inventory Survey	No findings.
Colin and Hammatt 1994	Archaeological Assessment	No findings.
Landrum et al. 1997	Cultural Resources Overview Survey	Documented several historic buildings.
Hammatt and Chiogioji 2000	Archaeological Assessment	No findings.
Hammatt et al. 2002	Archaeological and Cultural Impact Evaluation	No findings.
West and Donaldson 2004	Archaeological Inventory Survey	No findings.
Tulchin and Hammatt 2006	Literature Review and Field Inspection	Identified historic railroad trestle foundations.
Reith 2008	Archaeological Monitoring	No findings.
Hammatt and Shideler 2010	Archaeological Assessment	No findings.
Wilson and Spear 2010	Archaeological Inventory Survey	No findings.
Sims et al. 2011	Archaeological & Cultural Monitoring	Identified a subsurface charcoal lens.

An archaeological assessment of a 16-inch water line route connecting the Wahiawā and Whitmore Village water systems was conducted east of the current project area (Hammatt and Chiogioji 2000). No surface archaeological sites were observed. No further archaeological work and no monitoring during construction activities were recommended.

An archaeological and cultural impact evaluation for the Wahiawā Community Transit Center was completed, which involved a literature review and field inspection (Hammatt et al. 2002). The field inspection revealed no surface archaeological sites and the cultural and historic research produced no evidence of traditional, historic, or ongoing cultural practices.

An archaeological survey was conducted at the proposed location of the new Hawaii Regional Security Operations Center (HRSOC), including a new access road (West and Donaldson 2004). Surface surveys were conducted, portions of which overlap with the current project area. Subsurface testing, consisting of two shovel test units, was conducted only on military land. No cultural materials were found in the pedestrian survey or shovel tests. It was concluded that “the project area has a low potential for any archaeological resources, and no further archaeological treatment or consideration is recommended” (West and Donaldson 2004:iii).

A literature review and field inspection were done for the proposed Whitmore Village development project (Tulchin and Hammatt 2006), adjacent to the easternmost parcel of the current project area. During the field inspection, Tulchin and Hammat (2006) encountered one historic property, a series of historic railroad trestle foundations in the northeastern portion of their project area that are presumed to be part of a spur off the OR&L Helemano Extension (Tulchin and Hammatt 2006:28). No SIHP site number was given in the report. An archaeological inventory survey was recommended to further document the site.

Archaeological monitoring was performed at the HRSOC, east of the current project area (Reith 2008). No archaeological features, deposits, or artifacts were found; however, historical documents and previous archaeological studies describe a *heiau* and a traditional stone wall in the vicinity, suggesting “the possibility that truncated subsurface features and, more likely, agricultural features within the drainages are present” (Reith 2008:5).

An archaeological assessment was completed for a proposed composting facility in a parcel adjacent to the current project area (Hammatt and Shideler 2010). The field inspection yielded no finds. Observations indicated that the landscape had been impacted by decades of sugarcane and pineapple cultivation.

An archaeological inventory survey of 34.117 acres (13.807 ha) of former agricultural land was conducted south of Poamoho Camp (Wilson and Spear 2010). Fieldwork consisted of a pedestrian survey and 24 test excavations. The surface survey yielded no sites. Subsurface testing revealed a layer of tilled soil at 0–80 cmbs, with modern debris over a soil layer of dark reddish-brown clayey silt (Wilson and Spear 2010:7). No subsurface cultural remains were encountered and no further archaeological work was recommended.

Archaeological and cultural monitoring were conducted for the construction of the Helemano Trail, located to the west of the current project area, extending from Schofield Barracks Military Reservation to Helemano Military Reservation (Sims et al. 2011). A subsurface charcoal lens, SIHP 50-80-04-7173, was identified near the north edge of the plateau above Kaukonahua Gulch. The lens was excavated in full and two radiocarbon dates were obtained. A sample of *‘ulei* dated to 371±30 BP (1440–1530 and 1550–1640 cal AD), while a sample of *‘ulu* dated to 393±31 BP (1430–1530 and 1550–1630 cal AD) (Sims et al. 2011:50). The lens was interpreted as a pre-contact combustion feature (Sims et al. 2011).

Summary and Settlement Patterns

According to the Hawaiian history and culture scholar George Kanahale, the major colonization of the Hawaiian Islands occurred around AD 300 (Kanahale 1995). The initial settlers came from other Pacific Islands looking for a new home that was accessible to the sea and able to sustain their new population. Although the Central O‘ahu area was rich with fresh water and food resources, it was far upland from the canoe landing sites on the seashore and the abundance that the ocean provided. As a result, it was settled relatively late compared to the villages on the coastal areas.

While the earliest form of society throughout the Hawaiian Islands centered on extended family units headed by a number of patriarchs, as the population expanded, it evolved into a strict hierarchal class-society ruled by divine chiefs. It is suggested that the archipelago’s organization under divine chiefdoms probably first appeared around AD 800 (Kanahale 1995). The Hawaiian Islands consisted of several sovereign island kingdoms independent of each other for almost 1,000 years. During this time, different islands were consolidated under one ruler, and at other times, the chiefdoms consisting of several islands were splintered, all of this fluidity due to inter-island wars and alliances.

Regarding the project area in the present-day region of Wahiawā and upper Kamananui, its appearance on the historical record begins as the birthplace and home of the great chiefly line known as the Lō Ali‘i. Therefore, all of Central O‘ahu was a sacred region peopled by high-ranking chiefs. At the center of these chiefly lands were the hallowed grounds called Kūkaniloko.

As the birthplace and residence of the high chiefs, Central O‘ahu remained a sacred place throughout the centuries even after the O‘ahu kingdom fell to the Maui kingdom of Chief Kahekili, and the Maui kingdom subsequently fell to the Hawai‘i kingdom of Chief Kamehameha. In the late 18th century, the arrivals of Westerners to O‘ahu, first under the rule of Kahekili and then under Kamehameha, eventually brought with it incursions into Central O‘ahu for sandalwood harvesting. It also brought the infiltration of newly introduced animals such as cattle into the central uplands from ranching enterprises around the island, yet Central O‘ahu continued to be the land of the chiefs.

At the time of the Māhele, the Central O‘ahu locale of Wahiawā was not yet delineated as its own district, and the project area was within Kamananui Ahupua‘a. With the increased presence of foreign influence and interests in the islands, the 19th century ended with the overthrow of the Hawaiian monarchy by foreign residents backed by their foreign government. The overthrow was in 1893, and it was followed by American annexation in 1898.

That same year, the Waialua Agriculture Company, a sugarcane-growing enterprise, was founded, and it soon embarked on a project to dam the Central O‘ahu waters and create a massive reservoir later named Lake Wilson. With this reservoir, there was established an important irrigation system which enabled the plains of Central O‘ahu to be converted into fields of sugarcane and pineapple. In 1912, land was set aside to house pineapple plantation workers in a housing project called Poamoho Camp.

Around the same time that the sugarcane and pineapple industries were profiting from the cultivation of Central O‘ahu fields, the American military established its presence in the adjacent area of Wai‘anae Uka. The Army lands of Schofield started as Castner Village in 1909, but by 1920, most of the major construction was done, and it remains a significant military base today. Another important but smaller military installation was established in Pa‘ala‘a in 1943. This is the present-day Helemano Military Reservation, and it was designated a sub-installation of Schofield in 1956.

By the latter half of the 20th century, Central O‘ahu had seen a marked growth in its population with a corresponding increase in housing at Schofield Barracks Military Reservation, Wahiawā Town, and Whitmore Village. Poamoho Camp still exists today next to the open lands of the project area at the Galbraith Estate, and next to that, Kūkaniloko is now a historical property protected by the State of Hawai‘i (Henry et al. 1992). After raising several generations of families, this area of O‘ahu, now recognized as its own district of Wahiawā, continues to grow and prosper.

Anticipated Finds and Research Questions

Given the extensive alteration of the land during the pineapple and sugar eras, a relevant research question may be to determine if any vestiges of post-contact land use remain. The noteworthy sites Kūkaniloko and Ho‘olonopau Heiau are near the project area, therefore the project lands were frequented in pre-contact times. Also significant were the adjacent lands of Wai‘anae Uka which served as training grounds for the warriors, and also the lands of Helemano which were the haunts of the man-eating ones. Although the Central O‘ahu region was peopled by the *ali‘i*, there was a steady presence of *maka‘āinana* and *kauwā*, who undoubtedly were the ones working the noted *lo‘i kalo* and *kula ‘uala*. They were also mentioned to be present, though at some distance, during the birthing ceremonies of the royals. All of this suggests that the lands in the project area may reveal a wide range of archaeological remains. Site types that may be encountered include traditional

agricultural or habitation structures, as have been found along nearby gulches, or subsurface features such as the charcoal lens that was uncovered during the monitoring of Helemano Trail. In addition, there may yet be a host of artifacts to be found. These may include items associated with warfare (e.g., weaponry), games (e.g., *'ulu maika*), and tools (e.g., adzes).

Remnants of historic-era land use would likely be related to sugar or pineapple cultivation, and might include the remains of water control features and/or historic artifacts, or vestiges of the OR&L railway and its infrastructure. WWII-era use of the region might be evident in bunkers, pillboxes, and other military structures. Portions of the pre-contact trail that was still observed by Ii (1959:98) after the arrival of foreigners might also be uncovered.

Research questions are a general inquiry geared toward the specific use of this area from the pre-contact period into the post-contact. Initially, the investigation seeks to uncover the following:

1. What extent of archaeological and cultural resources from the pre-contact era still remain on the landscape? And if any new resources are identified, to what extent are they associated with nearby Kūkaniloko and the centuries of chiefly residence in the area?
2. Are there any undocumented significant post-contact remnants from the use of the land by ranchers, by the military, or by the sugarcane and pineapple industries?

Depending on what archaeological resources are identified, the research questions will become more specifically focused in consultation with SHPD.

METHODS

Pedestrian survey and subsurface testing were conducted on October 8, 2014 by Windy McElroy, PhD and Jeffrey Lapinad. McElroy served as Principal Investigator, overseeing all aspects of the project.

For the pedestrian survey, the ground surface was visually inspected for surface archaeological remains, with transects walked for each of the four project areas. Of the 30.83-acre (12.48-ha) survey area for all four reservoirs, 100% was covered on foot. The boundaries of the project areas were marked by surveyors stakes, and a State of Hawai'i surveyor was present for the archaeological surveys of Reservoirs 1, 2, and 4 to answer any questions regarding the project boundaries.

Vegetation was relatively light in most areas, consisting of California grass that had been partially cleared prior to the survey (Figure 10). Because of the high visibility, the spacing between archaeologists was relatively wide, with archaeologists spread 5–10 m. Archaeological sites and their boundaries were identified visually, with any feature possibly made or used by humans and more than 50 years old considered a site, although none were found.

Test trenches (TR) were excavated in eight locations throughout the survey area: two trenches at Reservoir 1; two trenches at Reservoir 2; one trench at Reservoir 3; and three trenches at Reservoir 4. A mini excavator was used for digging of the trenches at Reservoirs 1 and 2 (Figure 11), while a backhoe was used at Reservoirs 3 and 4. Vertical provenience was measured from the surface, and trenches were excavated to sterile deposits. Profiles were drawn and photographed, and sediments were described using Munsell soil color charts and a sediment texture flowchart (Thien 1979). Trench locations were recorded with a 3 m-accurate Garmin GPSmap 62st, and all trenches were backfilled after excavation, except for TR 8 at Reservoir 3. This latter trench was left open by request of the leasee.

The scale in all field photographs is marked in 10 cm increments. The north arrow on all maps points to magnetic north. Throughout this report rock sizes follow the conventions outlined in *Field Book for Describing and Sampling Soils*: Gravel <7 cm; Cobble 7–25 cm; Stone 25–60 cm; Boulder >60 cm (Schoeneberger 2002:2–35). Collected material is being temporarily curated at the Keala Pono office in Kāneʻohe and final disposition will be determined in consultation with the landowner and SHPD.



Figure 10. Reservoir 4, facing south, showing vegetation conditions.



Figure 11. Excavation of TR 4 at Reservoir 2, facing south.

RESULTS

Pedestrian survey and subsurface testing were conducted in the 30.83 acre (12.48-ha) project area. No historic properties were found and the entire area was previously disturbed by pineapple cultivation. Excavation of eight test trenches did not yield any evidence of subsurface cultural deposits or features. The only find was previously disturbed historic material at Reservoir 3.

Community Consultation

Community consultation for the project was conducted in the form of Cultural Impact Assessment (CIA) interviews by Keala Pono Ethnographer, Dietrix Duhaylonsod, BA. Interviews were done in person with Aunty Kaleo Paik, Uncle Glen Kila, and Chris Oliveira on October 13, 2014. Aunty Kaleo was interviewed separately, while Uncle Glen and his nephew, Chris Oliveira, were interviewed together. Uncle Tom Lenchanko was consulted in a face to face meeting on November 3, 2014, and he shared his thoughts but requested to submit his comments in writing. Aunty Vicki Pakele opted to write a letter statement instead of having an interview.

The interviewees are *kūpuna* whom the community recognizes as cultural experts, aside from Chris Oliveira who is from a younger generation; he is a cultural practitioner with ties to the project area. In general, some of the interviewees support agricultural development, but most expressed reservations due to the presence of subsurface archaeological features. Uncle Tom also questioned the legitimacy of land conveyance and ownership. Uncle Glen and Chris noted that Kūkaniloko covers a much larger area than what the site is designated as today. Several other questions and concerns were raised by the interviewees. These include seeing limits stipulated on the development so that farming plans do not change later into a future blueprint for buildings, disclosing exactly where the reservoirs will be pumping water from, and implementing a program of cultural monitoring during construction. Finally, Uncle Glen and Chris stressed the importance of keeping the community involved in the cultural monitoring process, and they specifically requested that Uncle Tom Lenchanko and the Wahiawā Civic Club be consulted because of their ties to and knowledge of the area.

Pedestrian Survey

The surface survey included 100% of the 30.83-acre project area. The survey areas were relatively flat and free of stones, and supported non-native vegetation, predominantly California grass. These conditions suggest previous disturbance. In addition, the ground had been tilled in the past, and scraps of black plastic indicative of pineapple cultivation were evident throughout.

No surface archaeological features were found within any of the project areas. However, it was noted that Reservoir 3 had been extensively disturbed in recent times (Figure 12), and historic material was visible on the surface near the center of the survey area. The backdirt piles were searched in the vicinity of the historic material and any diagnostic artifacts were collected. This amounted to 85 items of glass and ceramic (see Laboratory Analysis). Given that this material was not found *in situ* and its primary context has been lost, the artifacts were not assigned a site number.

Subsurface Testing

A total of eight trenches were excavated throughout the property to determine the presence or absence of subsurface cultural deposits or material (Table 2, Figure 13). Note that stratigraphy was actually quite uniform throughout the project area, and the variability in color seen in the following photographs is due to differences in lighting conditions (very sunny or overcast).



Figure 12. Reservoir 3, showing the extent of recent disturbance. Orientation is to the northeast.

TR 1 was located near the south corner of Reservoir 2 (see Figure 13). The trench measured 6.5 m long and .65 m wide. It was excavated to 135 cm below surface (cmbs), well into sterile sediment. Stratigraphy consisted of an organic-rich deposit with black plastic fragments typical of pineapple cultivation, above the sterile layer (Figure 14). No cultural deposits or features were identified.

TR 2 was placed within the east-central portion of Reservoir 2 (see Figure 13). The trench measured 5.2 m long and .65 m wide. It was excavated to 140 cmbs, well into the sterile layer. Stratigraphy was composed of an organic-rich deposit containing black plastic fragments typical of pineapple cultivation, above the sterile layer (Figure 15). No cultural material or deposits were found.

TR 3 was on the east side of Reservoir 1 (see Figure 13). It measured 5.5 m long and .65 m wide. The trench was excavated to 80 cmbs, into very compacted sterile sediment. Stratigraphy consisted of an organic-rich deposit containing black plastic fragments typical of pineapple cultivation, above the sterile layer (Figure 16). No cultural deposits or features were identified.

TR 4 was placed on the west side of Reservoir 1 (see Figure 13). The trench measured 5.7 m long and .65 m wide. It was excavated to 70 cmbs, into very compacted sterile sediment. Stratigraphy consisted of the same organic-rich deposit with black plastic, above the sterile layer (Figure 17). No cultural material or deposits were found.

TR 5 was placed on the southwest side of Reservoir 4 (see Figure 13). The trench measured 4.7 m long and .65 m wide. It was excavated to 135 cmbs, well into the sterile layer. Stratigraphy was composed of an organic-rich deposit containing black plastic fragments typical of pineapple cultivation, above the sterile layer (Figure 18). No cultural materials or deposits were found.

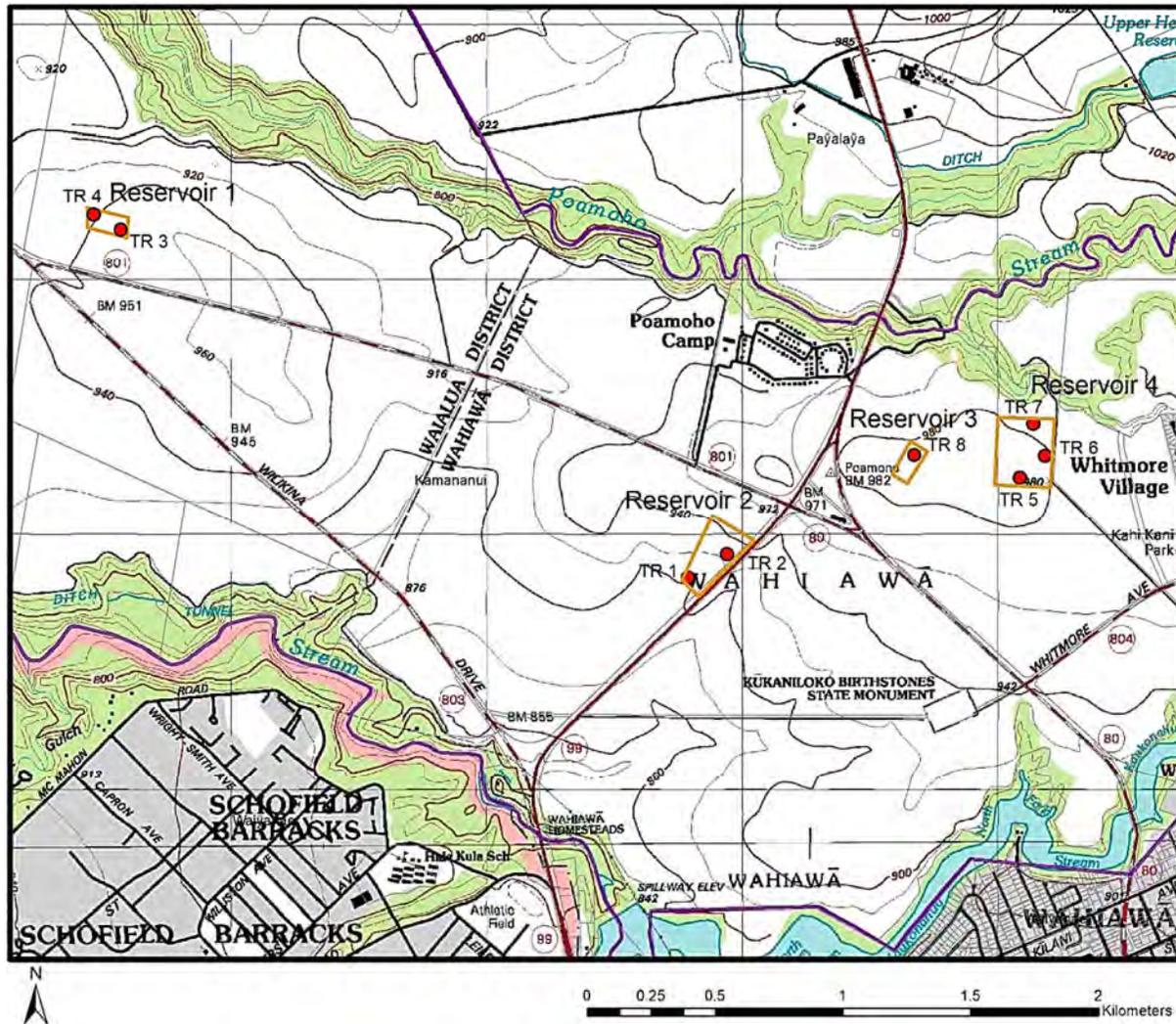


Figure 13. Location of Trenches 1–8 on a USGS Schofield Barracks quadrangle.

Table 2. Sediment Descriptions

Location	Layer	Depth (cmbs)	Color	Description	Interpretation
TR 1	I	0–75	2.5YR 2.5/2	Silty clay loam; 1% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	75–135+	2.5YR 2.5/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 2	I	0–45	2.5YR 2/3	Silty clay loam; 1% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	45–140+	2.5YR 3/6	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 3	I	0–42	2.5YR 2/3	Silty clay loam; 10% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	42–80+	10R 3/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 4	I	0–30	2.5YR 2.5/2	Silty clay loam; 10% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	30–70+	10R 3/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 5	I	0–58	2.5YR 3/3	Silty clay loam; 10% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	58–135+	2.5YR 3/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 6	I	0–48	2.5YR 3/3	Silty clay loam; 5% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	48–100+	2.5YR 3/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 7	I	0–65	2.5YR 3/3	Silty clay loam; 10% roots; 1% rocks; modern debris; smooth, very abrupt boundary.	Pineapple Cultivation
	II	65–130+	2.5YR 3/4	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile
TR 8	II	0–70+	2.5Y 3/6	Silty clay loam; 1% roots; 1% rocks; base of excavation.	Sterile

TR 6 was positioned in the east-central portion of Reservoir 4 (see Figure 13). The trench measured 4.9 m long and .5 m wide. It was excavated to 100 cmbs, well into the sterile layer. Stratigraphy was composed of an organic-rich deposit containing black plastic fragments typical of pineapple cultivation, above the sterile layer (Figure 19). No cultural deposits or features were identified.

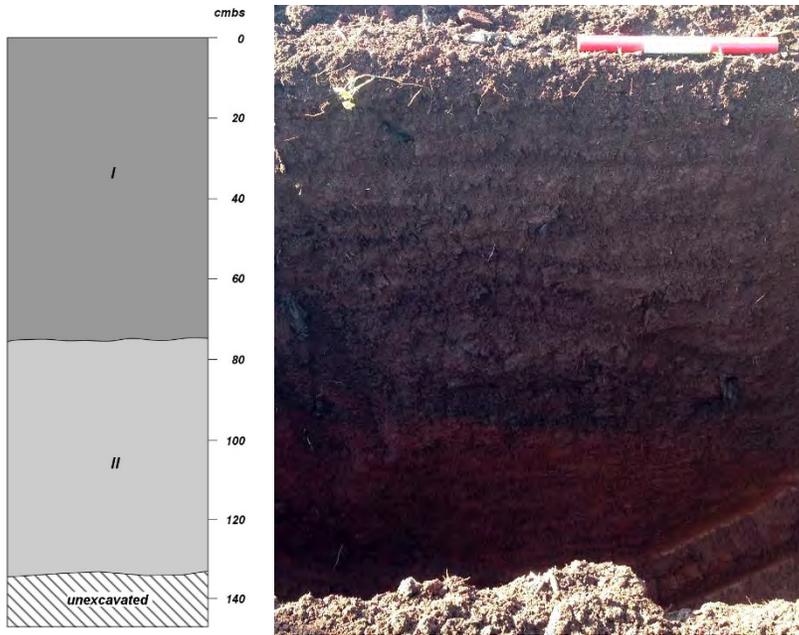


Figure 14. TR 1 south face profile drawing (left) and photo (right).

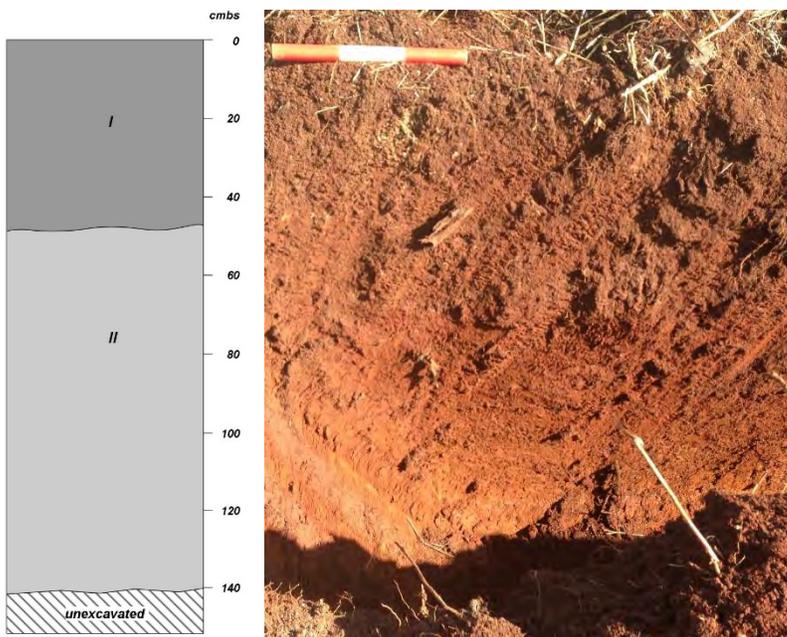


Figure 15. TR 2 northwest face profile drawing (left) and photo (right).

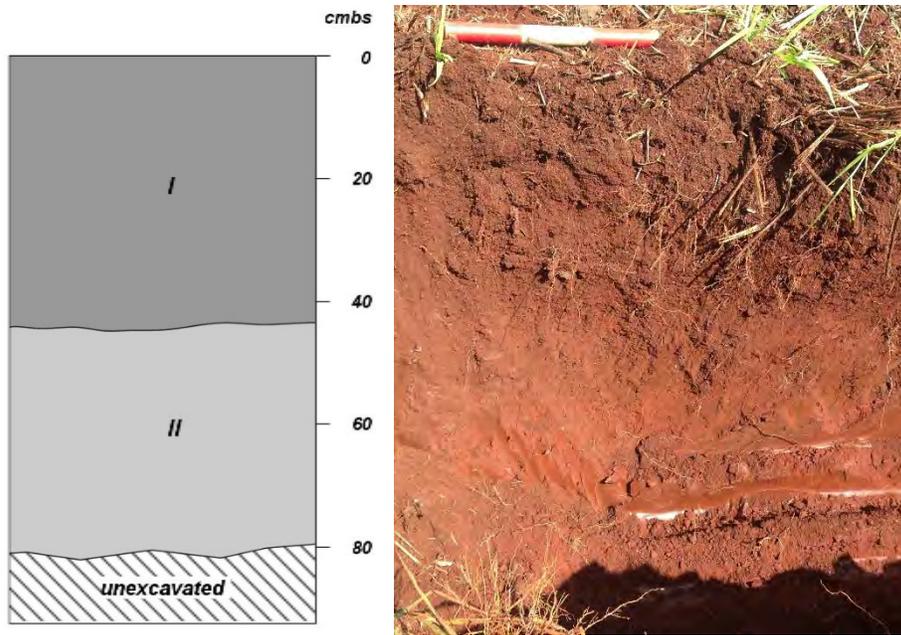


Figure 16. TR 3 northwest face profile drawing (left) and photo (right).

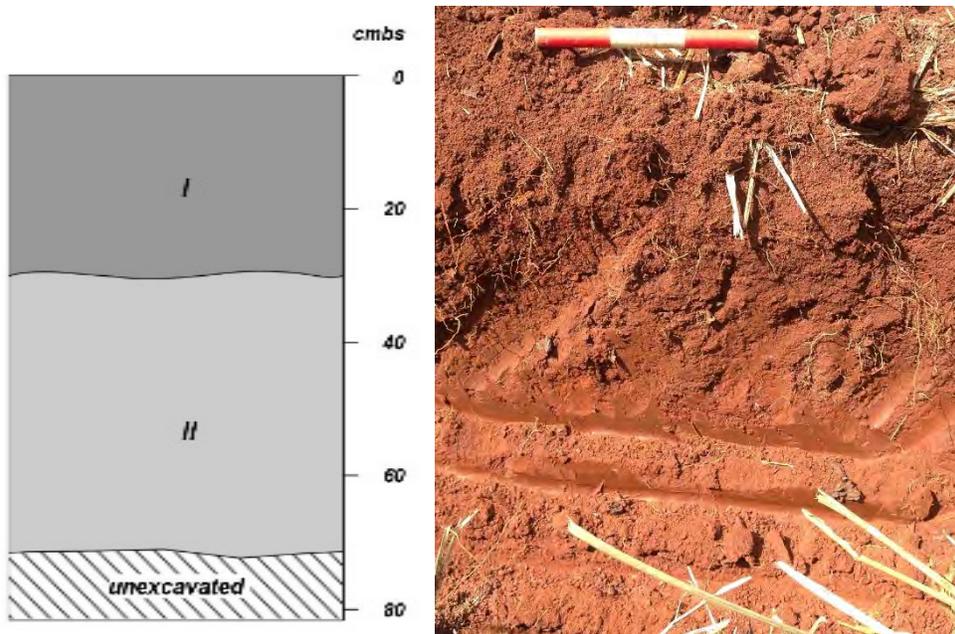


Figure 17. TR 4 southwest face profile drawing (left) and photo (right).

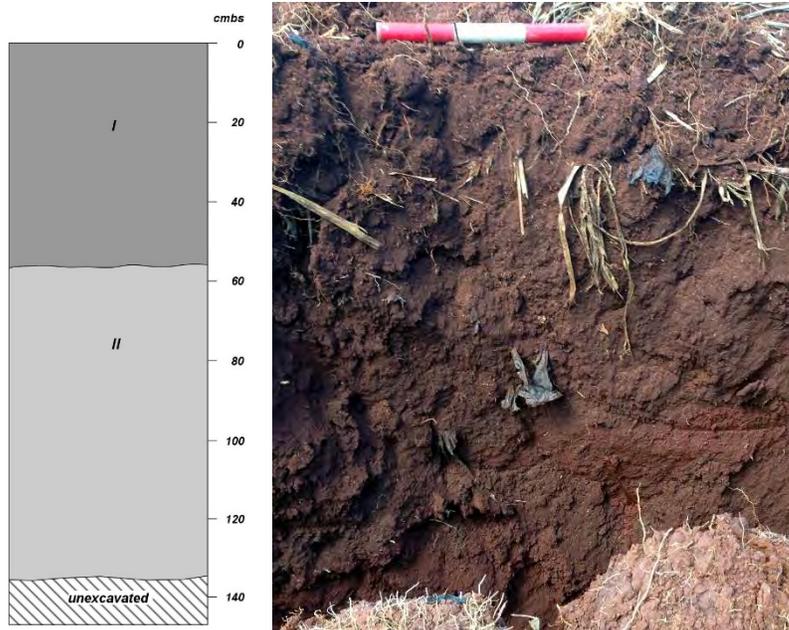


Figure 18. TR 5 west face profile drawing (left) and photo (right).

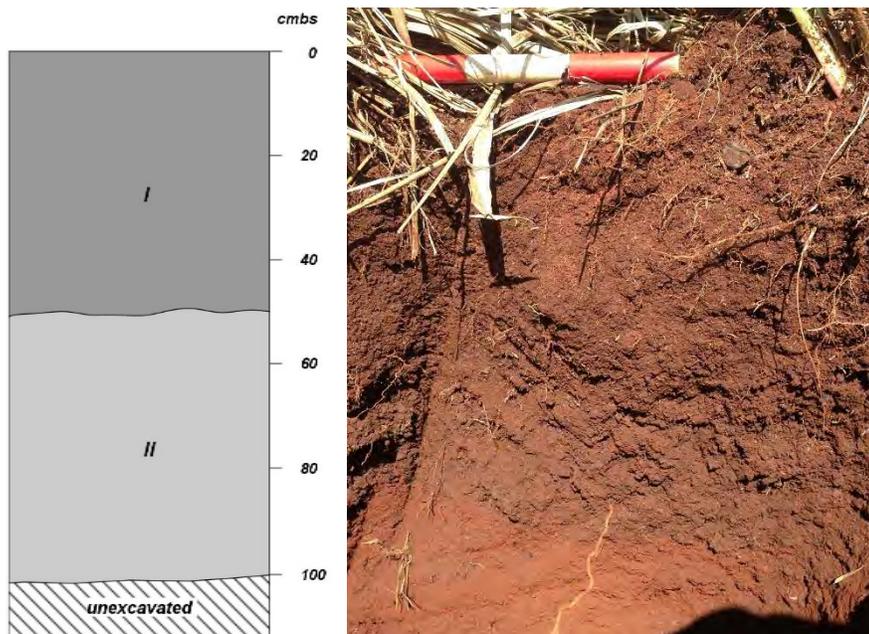


Figure 19. TR 6 north face profile drawing (left) and photo (right).

TR 7 was located toward the northwest corner of Reservoir 4 (see Figure 13). It measured 5.2 m long and .5 m wide and was excavated to 130 cmbs, well into the sterile layer. Stratigraphy consisted of the same organic-rich deposit with black plastic fragments, above the sterile layer (Figure 20). No cultural material or deposits were found.

TR 8 was located toward the northeast end of Reservoir 3 (see Figure 13). Only one trench was excavated at this reservoir because of the extensive previous disturbance in this area (see Figure 12). The trench measured 4.1 m long and .5 m wide. It was excavated to 70 cm below the disturbed surface, which is approximately 115 cm below the natural ground surface. Only the sterile layer was exposed in this trench, as the upper organic-rich layer had already been removed (Figure 21). No cultural deposits or features were identified.

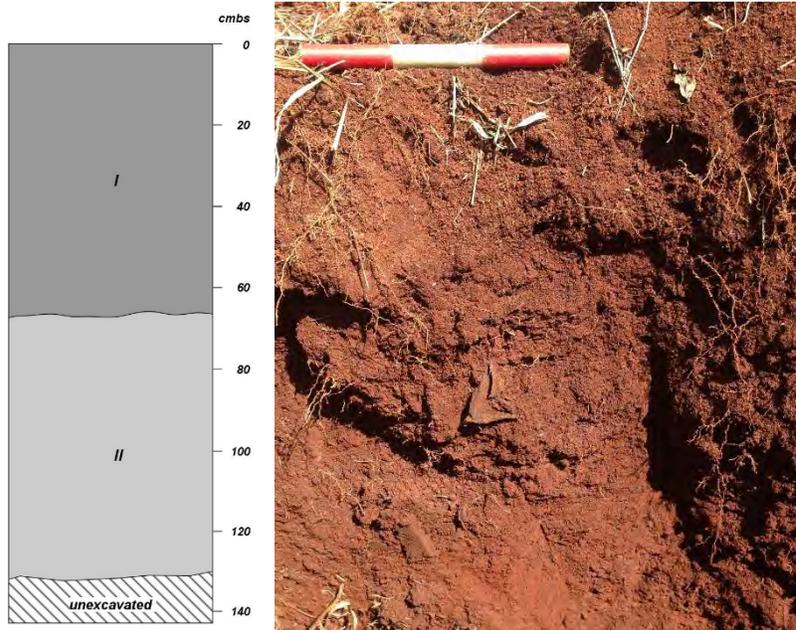


Figure 20. TR 7 east face profile drawing (left) and photo (right).

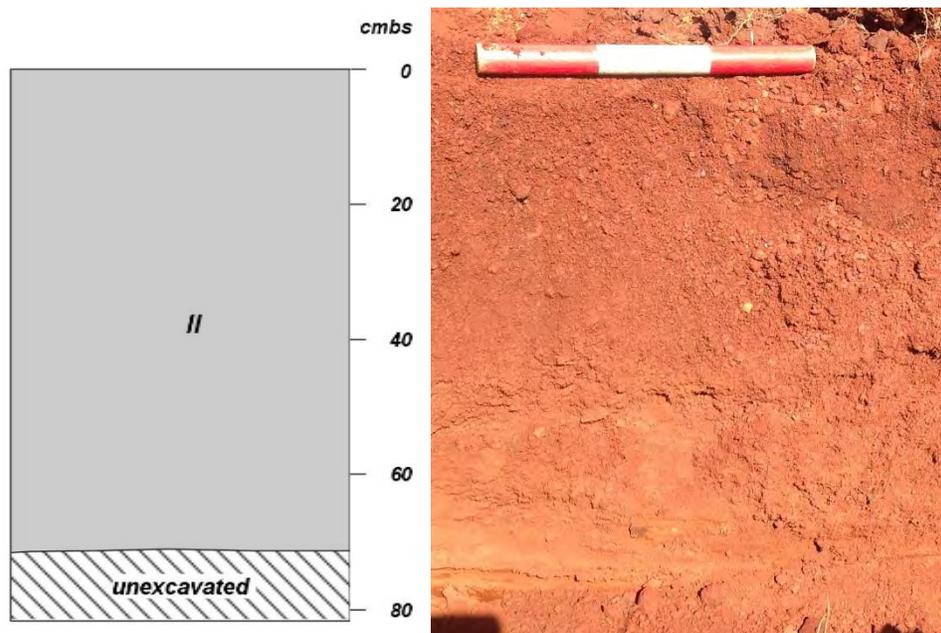


Figure 21. TR 8 north face profile drawing (left) and photo (right).

Laboratory Analysis

During the archaeological inventory survey, 85 historic artifacts were found. The artifacts consisted of 10 whole glass bottles, 50 bottle glass fragments, and 25 ceramic/tableware fragments. This collection was gathered in its entirety out of a secondary context at Reservoir 3.

Bottle Glass

All terminology used to describe bottle traits and all bottle dating information in this report section is based on information from the U.S. Department of Interior, Bureau of Land Management (BLM)/ Society of Historic Archaeology (SHA) “Historic Glass Bottle Identification and Information Website” (BLM/SHA 2014). The Wahiawā material included 10 whole bottles and 50 bottle glass fragments. Data for all glass is presented in Table 3, while a selection of whole bottles are pictured in Figures 22–24.

Bottle Mold Seams and Finishes

There are three major technological divisions in the manufacture of glass bottles. In the United States, free-blown utilitarian bottles generally pre-date 1860. From ca. 1800, bottles were mouth-blown into some type of mold and the mouth of the bottle was finished by hand. Around 1903, Michael Owens invented a fully-automatic bottle machine (ABM) to blow bottles from the base to the lip. By 1920, in North America, use of the fully automatic machines had completely replaced the older methods of manufacture. Thus the mold-blown era for American bottles extends from ca. 1800 to 1920, which overlaps with the fully automatic machine-made bottle era from ca. 1903 to the present (BLM/SHA 2013_Glassmaking).

There are no definite free-blown bottles in the Wahiawā collection; all are machine blown or mold blown and thus post-date 1903. Also, thicker mold seams and bubbles in the glass generally mean the bottles and bottle fragments collected originated from an earlier manufacturing date, pre-1930s.

In the mid- to late- 19th century, molds became more complicated, having two or more parts. The most common mold used was a two-piece mold with a separate cup-bottom plate. These types of bottles have a mold seam around the base of the bottle, and two side seams that run vertically up the sides of the bottle. The side mold seams usually end on the neck, as the lip on mold-blown bottles was finished by hand. Two bottles (Acc. # 15 and 16) in the collection were made in a four-piece cup mold (see Figure 22) and several other bottle fragments were made in some type of two-piece or four-piece mold. Two-piece molds were the dominant form used in the post-1880 period. One wine/champagne bottle base fragment (Acc. # 45) had no side seams and was probably produced in a turn mold, commonly used from 1880–1915. In a turn mold, the seams are erased during the manufacturing process (BLM/SHA_Glassmaking).

During the mold-blown era (ca. 1800–1920), the lip of the bottle continued to be finished by hand. Determining the method employed in finishing a mouth-blown bottle can be one of the more useful diagnostic tools in determining the approximate manufacturing date range.

The standard tooled finish was first used as early as the 1860s with smaller bottles, although it became the dominant finishing method by the 1890s. The glass for the finish is not added, but the neck of the bottle is refired and formed into the finish by a lipping tool. Some diagnostic features of the tooled finish are side mold seams that fade out on the neck of the bottle below the finish, concentric horizontal tooling marks present on the finish and upper neck, absence of glass sloping over onto the upper neck, and absence of the interior ridge in the bore in an improved tooled finish, first used around 1890. The side seams end at the finish or extend almost to the rim of the finish.

Table 3. Data for Glass Artifacts

Provenience	Acc. #	L/H (cm)	Diam. (cm)	Contents	Origin; Date	Description
Reservoir 3, unknown depth	15	19.7	6 x 3.4	Soda	American, ca. 1910	Whole clear glass bottle; "WAIALUA SODA WORKS LTD. BOTTLE IS NOT SOLD" on body; "W.S.W." on round base; two vertical seams only on body; one horizontal seam just above lettering on body; bubbles in glass. 4 piece cup mold, mold blown. Tooled Hutchinson finish. See example in "Elliott & Gould 1988 Hawaiian Bottles of Long Ago" on page. 129, fig. 128, bottle number 317.
Reservoir 3, unknown depth	16	19.9	6 x 3.2	Soda	American, ca. 1908	Whole clear glass bottle; "WAIALUA SODA WORKS" on body; "W" on round base; two vertical seams only on body; one horizontal seam just above lettering on body; metal stopper inside; bubbles in glass. 4 piece cup mold, mold blown. Tooled Hutchinson finish. See example in "Elliott & Gould 1988 Hawaiian Bottles of Long Ago" on page. 127, fig. 126, bottle number 312.
Reservoir 3, unknown depth	17	13.8	2.2	Utilitarian	American, 1905-1930	Whole aqua glass bottle, rectangular base and body; "88" on base; two seams that extend to base but not to lip; bubbles in glass. Patent lip with a tooled finish. Mold blown.
Reservoir 3, unknown depth	18	16.5	4.5 x 2.9	Utilitarian	American, 1905-1920	Whole aqua/light green glass bottle; four triangles on base; two seams only on body; bubbles in glass. Patent lip applied top, and a tooled finish.
Reservoir 3, unknown depth	19	11.3	2.7	Utilitarian	American, Post 1920	Whole clear glass bottle; rectangular base and body; "120 H" on base; two seams only on body. Eternal screw threaded top, machine made.
Reservoir 3, unknown depth	20	9.3	5.3 x 3.7	Shoe Polish	American, 1910-1930s	Whole clear glass bottle; "WHITTEMORE'S POLISH" on shoulder; "3" on base; two seams extend from base to lip; bubbles in glass. Two piece cup mold, machine made, with a bead finish.
Reservoir 3, unknown depth	21	9.5	5.3 x 3.5	Ink	American, Post 1905	Whole aqua glass bottle; two seams only on body, with a round base. Patent finish, Mold blown., most likely ink an well as it fits the shape commonly used between 1900-1930s
Reservoir 3, unknown depth	22	6.4	6.1 x 3.1	Ink	American, 1910-1930s	Whole clear glass bottle, recently broken; "CARTER'S MADE IN USA" on base; two seams extend from base to lip; bubbles in glass. Bead finish, machine made.

Table 3. (Continued)

Provenience	Acc. #	L/H (cm)	Diam. (cm)	Contents	Origin; Date	Description
Reservoir 3, unknown depth	23	5.4		Utilitarian	1905-1920	Base fragment of clear glass bottle; rectangular base and body; two seams. Machine made. Most likely a medicine bottle.
Reservoir 3, unknown depth	24	5.7	2 x 1.7	Utilitarian	1905-1920	Whole clear glass bottle; octagonal base and body; two seams only on body. Patent finish, machine made. Most likely a medicine bottle
Reservoir 3, unknown depth	25		6.1	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "WAIAL SODA WORKS LTD. BOTTLE IS NOT SOLD" on body; "W.S.W." on base; two seams; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	26		6.1	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "WAIALUA SODA WORKS LTD. BOTTLE IS NOT SOLD" on body; "W.S.W." on base; two seams; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	27		6.1	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "WAIAL SODA WORK LTD. BOTTLE IS NOT SOLD" on body; "W.S.W." on base; two seams; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	28		6.1	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "LTD. BOTTLE IS NOT SOLD" on body; "W.S.W." on base; two seams; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	29		6.1	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "DA W LTD. BOTTLE IS NOT" on body; "W.S.W." on base; one seam visible; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	30			Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; deformed from heat; "NOT SOLD" on body; "W.S.W." on base; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	31		5.9	Soda	American, ca. 1910-1912	Base and body fragment of light green glass bottle; "KS BOTTLE IS NOT SOLD" on body; "WAIALUA" on base; two seams on body; bubbles in glass. Mold blown.

Table 3. (Continued)

Provenience	Acc. #	L/H (cm)	Diam. (cm)	Contents	Origin; Date	Description
Reservoir 3, unknown depth	32			Soda	American, ca. 1910-1912	Body fragment of clear glass bottle; "WAIALUA SODA WORKS LTD. NOT SOLD" on body; one vertical and one horizontal seam visible; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	33			Soda	American, ca. 1910-1912	Body fragment of clear glass bottle; "WA SODA WORKS LTD. BOTTLE IS NOT SOLD" on body; two vertical and one horizontal seam visible. Mold blown.
Reservoir 3, unknown depth	34			Soda	American, ca. 1910-1912	Body fragment of clear glass bottle; "AIALUA A WORKS LTD. S NOT" on body; one seam visible. Mold blown.
Reservoir 3, unknown depth	35			Soda	American, ca. 1910-1912	Body fragment of clear glass bottle; "A RKS" on body; one seam visible; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	36			Soda	American, ca. 1910-1912	Body fragment of clear glass bottle; "WAIA" on body; bubbles in glass. Mold blown.
Reservoir 3, unknown depth	39		7.8	Soda	American, 1906-1914	Base and body fragment of aqua glass bottle; "A. B. Co. E 3" on base; two seams on body; bubbles in glass. American Bottle Co. emblem on base. Mold blown, two piece cup mold (BLM SHA 2014)
Reservoir 3, unknown depth	40			Soda	American, 1911-1917	Body fragment of very light green glass bottle; "HONOLUL HONOLU" vertically oriented on body; bubbles in glass. Two piece cup mold, Mold blown. Tooled crown top finish. See page 189 of Elliott and Gould (1988) fig. 188 bottle number 837.
Reservoir 3, unknown depth	41		2.6	Soda	American, 1912-1915	Lip, neck, and shoulder fragment of clear glass bottle; script "e," backwards "j," and "m" as well as "KC MO" on shoulder; two seams visible on neck; bubbles in glass. Crown top tooled finish, Mold blown.
Reservoir 3, unknown depth	42			Soda	American, 1910-1920	Body fragment of very light aqua glass bottle; "LU, T." vertically oriented on body. Most likely read "...HONOLULU T.H" referring to Territory of Hawaii as shown in many examples of different Hawaii brand soda works bottles in Elliott and Gould (1988).

Table 3. (Continued)

Provenience	Acc. #	L/H (cm)	Diam. (cm)	Contents	Origin; Date	Description
Reservoir 3, unknown depth	43			Soda	Post 1905	Base and body fragment of clear glass bottle; "44 x" on base. Machine made.
Reservoir 3, unknown depth	44		6.1	Alcohol	1905-1920	Base and body fragment of dark green glass bottle. Machine made.
Reservoir 3, unknown depth	45		6.3	Alcohol	1890-1920	Base and body fragment of dark amber glass bottle; bubbles in glass. Round base, with a small kick-up. Turn mold.
Reservoir 3, unknown depth	46		2.6	Soda	American, Post 1910	Lip, neck, and shoulder fragment of light green glass bottle; two seams visible on neck and shoulder. Crown top finish, Mold blown.
Reservoir 3, unknown depth	47		7.0	Soda	American, 1902-1920	Base and body fragment of aqua glass bottle; "830" and "IPG Co" in diamond on base; no seams visible; bubbles in glass. Two piece cup mold, mold blown. Illinois Pacific Glass Co. emblem on base (BLM SHA 2014).
Reservoir 3, unknown depth	48		2.5	Soda	Post 1910	Lip, neck, and shoulder fragment of light green glass bottle; two seams visible on neck and shoulder.
Reservoir 3, unknown depth	49		7.8	Soda	Post 1910	Round base and body fragment of light green glass bottle; "12" on body; two seams visible from base to body. Mold blown.
Reservoir 3, unknown depth	50			Utilitarian	American, 1905-1930	Base and body fragment of light green glass bottle; rectangular base and body; "88" on base.
Reservoir 3, unknown depth	51		6.3	Soda	American, 1906-1909	Base and body fragment of aqua glass bottle; recently broken; "AB D 25" on circular base; two seams from base to body; bubbles in glass. Mold blown, two piece cup mold. American Bottle Co. emblem on base (BLM SHA 2014).

Table 3. (Continued)

Provenience	Acc. #	L/H (cm)	Diam. (cm)	Contents	Origin; Date	Description
Reservoir 3, unknown depth	52		2.7	Soda	American, 1910-1920	Lip, neck, and shoulder fragment of aqua glass bottle; two seams on neck and shoulder; bubbles in glass. Applied crown top and tooled finish, mold blown.
Reservoir 3, unknown depth	53		2.7	Soda	American, 1910-1920	Lip, neck, and shoulder fragment of aqua glass bottle; no seams. Crown top tooled finish.
Reservoir 3, unknown depth	54		2.9	Utilitarian	American, 1910-1920s	Lip, neck, and shoulder fragment of clear glass bottle; two seams visible on neck and shoulder; bubbles in glass. Straight brandy finish, mold blown.
Reservoir 3, unknown depth	55		2.4	Utilitarian	American, Post 1920	Lip, neck, and body fragment of clear glass bottle; square body; two seams visible from lip to body; bubbles in glass. External thread srew top, mold blown.
Reservoir 3, unknown depth	56		2.8	Soda	American, ca. 1910-1912	Lip, neck, and body fragment of clear glass bottle; one seam visible on neck and shoulder; portion of metal stopper intact; bubbles in glass. Blob top, tooled finish.
Reservoir 3, unknown depth	57		2.3	Utilitarian	American, Mid to late 1920s	Lip, neck, and shoulder fragment of clear glass bottle; no seams visible; bubbles in glass. Oil finish.
Reservoir 3, unknown depth	58		2.5	Utilitarian	American, Post 1920	Lip, neck, and shoulder fragment of clear glass bottle; two seams visible from lip to shoulder; bubbles in glass. External threaded screw top. Mold blown.
Reservoir 3, unknown depth	59		6.0	Soda	American, ca. 1910-1912	Base and body fragment of clear glass bottle; "W" on base; one seam visible on body; bubbles in glass. Machine made.
Reservoir 3, unknown depth	60		2.5	Soda	American, ca. 1910-1912	Lip, neck, and shoulder fragment of clear glass bottle; no seams visible. Blob top finish. Most likely mold blown.

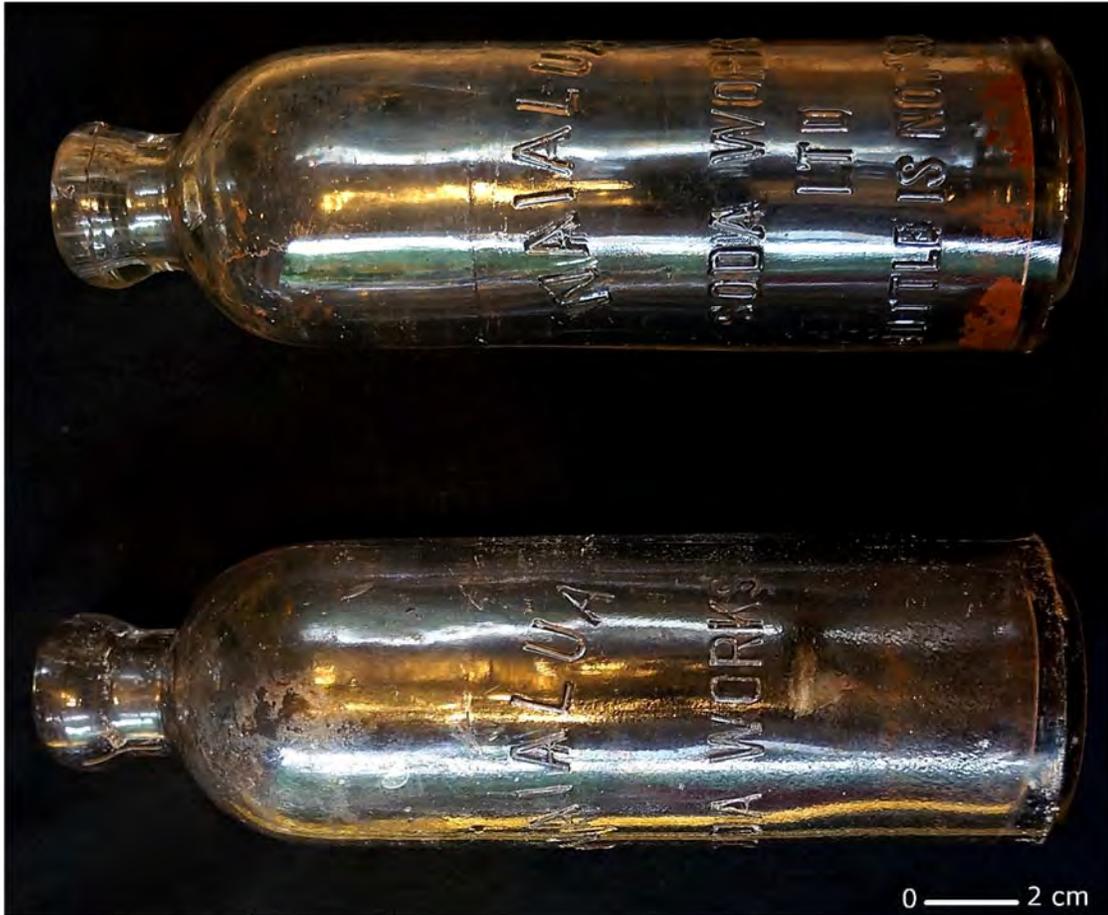


Figure 22. Acc. # 15 (top) and 16 (bottom), found in secondary context.

Five beverage bottles (Acc. # 15, 16, 19, 54, and 57), had a standard tooled finish (BLM/SHA 2014_Finishes).

In 1903, Michael Owens invented a machine that replaced the human glassblower. The machine was used to blow wide-mouth bottles as early as 1905 and narrow-necked bottles (such as beverage bottles) as early as 1908. The Automatic Bottle Machine blew a bottle from base to lip, usually using a two-piece cup mold. The two side seams extend to and over the lip of the bottle, although the lip seams could be erased later by fire-polishing (BLM/SHA 2014_Bottle Dating_Machine-Made Bottles). There were only two bottles that have machine made characteristics with a seam that runs all the way to the lip, which are Acc. # 20 and 58.

Bottle Contents and Information

In the mold-blown and early years of the machine-made periods, information on the glass manufacturer, the brand, the bottler, and the distributor, and other information were embossed (raised



Figure 23. Bottles from secondary context. Left to right: Acc. # 17, 19, 18.

letters formed from a mold plate) on the bottle. After ca. 1910, most machine-made bottles lost the embossing and switched to paper labels. In 1933, label information was baked onto the bottle color enamels, called Applied Color Label (ACL) (BLM/SHA 2014_Glossary). No bottles with paper labels were found in the collection, as these paper labels would have deteriorated. There were also no bottles with ACL bottle labels found.

In the Wahiawā collection, we have identified several different soda works bottles that read “W,” “W.S.W.,” and “WAILUA” on their bases, which has given us a narrow date range of ca. 1910–1912. Other embossed lettering and variations on the Wailua Soda Works bottles and fragments have made it possible to identify each bottle to a specified date of ca. 1908 to about ca. 1913. Another bottler’s maker’s mark is a connected “AB” and “A.B. Co.” which is from the American Bottle Co. The connected AB mark almost certainly belonged to the American Bottle Co. instead of Adolphus Busch. The dates for the use of the mark probably extended from about 1904 until at least 1909, and possibly as late as 1917 (BLM/SHA 2014_ABConnectedMark_BLockhart). See the glass bottle table for more information (Table 3).



Figure 24. Bottles from secondary context. Left to right: Acc. # 20, 21, 22.

Ceramics

Ceramics found during the survey consist of both porcelain of Japanese/Asian and Euro-American origin (Table 4 and Figures 25–28). The majority of the ceramic items however were porcelain items made in Japan for the export market.

Trademarks/Markers Marks

The word trademark was used on English pieces after the Trademark Act of 1862. Coincidentally the McKinley Tariff Act of 1891 required that the name of the country where the ceramic was originally made must be printed on each piece. Sometimes country names were used as part of the mark before 1891 with the earliest known date for Japan being 1921 (Kovel and Kovel 1986).

The mark of the Royal Coat of Arms icon (a lion and a unicorn) of Great Britain consists of the maker's name and the word "England" below the name. Staffordshire used this specific mark from 1873 to 1907, and "England" was added to the mark in 1891. Thus, the tableware was manufactured from 1891 to 1907 (Stoke on Trent_Potteries 2014).

Japanese and Asian wares

Official Japanese emigration to Hawai'i did not occur until 1868. The main immigration period for Japanese brought to Hawai'i to work in the sugar plantations is from 1868 to 1907 (Nordyke and Matsumoto 1977:162). A recent study on Japanese immigration to Hawai'i has stated that before emigration to Hawai'i began, no Japanese products were shipped there (Moriyama 1985:109). This leads us to conclude that none of the Japanese ceramics/tableware artifacts in our collection could have been brought to Hawai'i prior to 1868.

Several of the porcelain pieces found in the Wahiawā collection were made with a blue stencil transfer print technique called "Dashed Line," as a dashed line separates the different design

Table 4. Data for Ceramic Artifacts

Provenience	Acc. #	Portion	Surface Decoration	Vessel Form	Origin, Date Range	Comments
Reservoir 3, unknown depth	1	body fragment	blue floral		Japanese, porcelain post 1868	Porcelain, white paste, lead transparent glaze, blue floral transfer print, thickness .5 cm
Reservoir 3, unknown depth	2	rim fragment	blue dashed line		Japanese, porcelain post 1868	Diameter of rim 17 cm; thickness .6 cm, blue stenciled dashed-line transfer print.
Reservoir 3, unknown depth	3	base fragment	blue floral	bowl	Japanese, porcelain post 1868	Diameter of base 7.5 cm; thickness .4-1.2 cm lead transparent glaze, blue floral transfer print.
Reservoir 3, unknown depth	4	base fragment	none		Euro-American, Earthenware/ Ironstone, post 1880	Diameter of base 8 cm; thickness .3-.5 cm; black unicorn and "...RE" on base which resembles that of the Royal Arms found on many of the mid-19 th century to early 20 th century tablewares as seen in Kovel & Kovel (1986) page 10-14 in the Animals and Insects section.
Reservoir 3, unknown depth	5	base fragment	none	bowl	Euro-American, earthenware/ ironstone, post 1880	Diameter of base 7 cm; thickness .2-.4 cm; black possible horse or unicorn on base, with "HIRE...ND." Burned. The emblem resembles that of the royal coat of arms which belongs to Staffordshire England tablewares, which are made of earthenware/ironstone.
Reservoir 3, unknown depth	6	rim fragment	red floral patterning, inside only	plate	Euro-American 1828-20 th century	Diameter of rim 26 cm; thickness .4-.6 cm; rim slightly scalloped, with red transfer print.
Reservoir 3, unknown depth	7	base fragment	green stripes, outside only	cup	Asian, porcelain 1870-1920s	Porcelain, base to body fragment, with celadon glaze, and high footring. Diameter of base 5 cm; thickness .3-.7. Most likely an Asian/Japanese style straight-sided tea cup.

Table 4. (Continued)

Provenience	Acc. #	Portion	Surface Decoration	Vessel Form	Origin, Date Range	Comments
Reservoir 3, unknown depth	8	rim fragment	raised vine pattern, inside only, no color		Asian, porcelain post 1868	Diameter of rim 14 cm; thickness .2 cm.
Reservoir 3, unknown depth	9	rim to base fragment	blue floral	bowl	Japanese, porcelain post 1868	Two articulating fragments; diameter of rim 13 cm; diameter of base 5 cm; thickness .3-.8 cm, blue floral transfer print.
Reservoir 3, unknown depth	10	rim fragment	blue floral		Japanese, porcelain post 1868	Rim portion too small to measure diameter; thickness .2 cm, blue floral transfer print.
Reservoir 3, unknown depth	11	rim to base fragment	blue floral	bowl	Japanese, porcelain post 1868	Diameter of rim 12 cm; base portion too small to measure; thickness .2-.7 cm, blue floral transfer print.
Reservoir 3, unknown depth	12	rim fragment	blue floral	bowl	Japanese, porcelain post 1868	Diameter of rim 14 cm; thickness .3-.4 cm; raised mark on outside surface, blue floral transfer print.
Reservoir 3, unknown depth	13	base fragment	blue half flower	bowl	Japanese, porcelain post 1921	Diameter of base 4.5 cm; thickness .3-.6; "TRADEMARK MADE IN JAPAN" on base in blue with half flower transfer print.
Reservoir 3, unknown depth	14	base fragment	blue and green leaves, outside only	bowl	Japanese, porcelain post 1921	Diameter of base 4 cm; thickness .2-.6 cm; "TRADEMARK DE IN APAN" in blue on base with half flower graphic.
Reservoir 3, unknown depth	15	rim fragment	none	bowl	Euro-American ironstone/hotelware 1880 to present	Diameter of rim 17 cm; thickness .4 cm, white ironstone/hotelware fragment.

Table 4. (Continued)

Provenience	Acc. #	Portion	Surface Decoration	Vessel Form	Origin, Date Range	Comments
Reservoir 3, unknown depth	16	base fragment	none		Euro-American ironstone/hotelware 1880 to present	Diameter of base 12 cm; thickness .3 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	17	rim fragment	none	plate	Euro-American ironstone/hotelware 1880 to present	Diameter of rim 26 cm; thickness .4-.5 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	18	foot or knob fragment?	none		Euro-American ironstone/hotelware 1880 to present	Thickness .2-.9, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	19	base fragment	none		Euro-American ironstone/hotelware 1880 to present	Diameter of base 3 cm; thickness .3-.5 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	20	rim fragment	none	cup	Euro-American ironstone/hotelware 1880 to present	Diameter of rim 9 cm; thickness .3-.4 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	21	rim fragment	none	bowl	Euro-American ironstone/hotelware 1880 to present	Diameter of rim 14 cm; thickness .2-.4 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	37	rim to base fragment	blue floral	bowl	Japanese, porcelain post 1868	Diameter of rim 14 cm; diameter of base 4 cm; thickness .2-.4 cm.

Table 4. (Continued)

Provenience	Acc. #	Portion	Surface Decoration	Vessel Form	Origin, Date Range	Comments
Reservoir 3, unknown depth	38	rim to base fragment	blue and brown/green unidentified design, outside only; blue band outside footring	bowl	Japanese, porcelain post 1868	Diameter of rim 10 cm; diameter of base 4 cm; thickness .2-.7 cm.
Reservoir 3, unknown depth	61	rim fragment	none	plate	Euro-American ironstone/hotelware 1880 to present	Diameter of rim 26 cm; thickness .4-.5 cm, white ironstone/hotelware fragment.
Reservoir 3, unknown depth	62	body fragment	none		Euro-American ironstone/hotelware 1880 to present	Thickness .2-.3 cm, white ironstone/hotelware fragment.

elements. These were made in Japan from about 1870 to the 1920s and exported to Japanese communities on the west coast of the United States, Hawai‘i, and anywhere the Chinese had made an overseas settlement (Ross 2012:5). An example of the “Dashed Line” technique is shown on Acc. # 2 (see Figure 25).

Euro-American wares

A durable type of ironstone, called Hotelware, became popular after 1880 (Lebo 1997:Appendix G:5). Several of the Ironstone base fragments (Acc. # 4 and 5) have partial stamp marks visible with the Royal Coat of Arms and what most likely read “Staffordshire, England” (see Figure 26). There were numerous potteries in Staffordshire, but the placement and style of the letters and the figures on the coat of arms are most similar to the mark used by George Jones & Sons between 1873 and 1907 (Stoke-on-Trent Potteries 2013). Ironstone (whiteware) is a type of refined earthenware introduced in 1840. These wares are sometimes molded, but have little to no decoration.



Figure 25. Ceramics found in secondary context. Left to right: Acc. # 1, 2, 3.



Figure 26. Ceramics from secondary context. Acc. # 4 (left) and 5 (right).



Figure 27. Ceramic plate fragment, Acc. # 8, from secondary context.

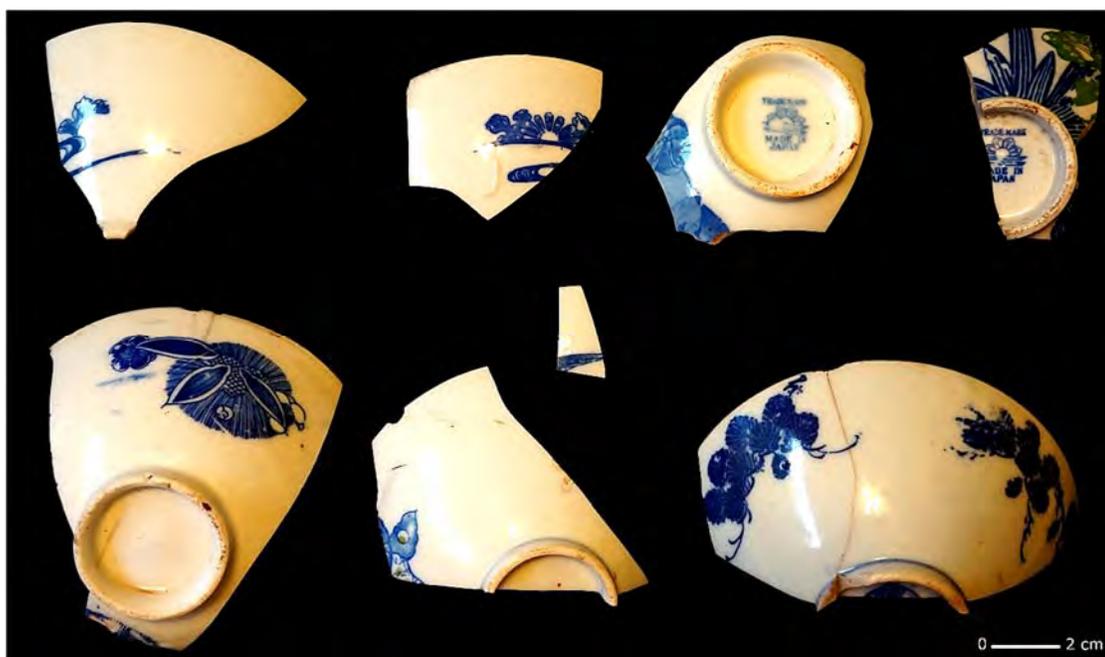


Figure 28. Ceramics from secondary context. Bottom left to right: Acc. # 37, 38, 9. Center: 10. Top left to right: Acc. # 11, 12, 13, 14.

Laboratory Analysis Discussion

The Wahiawā collection has material that could date back to as early as 1868 with the Japanese porcelain fragments found without any maker's marks (Acc. # 1–3, 8–12, 37 and 38), or as late as 1930 with the Whittemore's Polish bottle (Acc. # 20) and Carter's Ink well (Acc. # 22). The possible date range for the collection would be the late 19th century to the early 20th century. Artifacts, including many beverage bottles and household ceramics, indicate that this trash is most likely related to residential property usage, possibly from laborers working on the pineapple and sugarcane fields.

The majority of glass (66%) consisted of soda bottles, with more than half (52%) of the soda bottles identifiable as manufactured by Waiialua Soda Works. The Waiialua Soda Works bottles could be dated to within a few years, between ca. 1910 and 1912. Other glass uses include utilitarian (23%), alcohol (4.5%), ink (4.5%), and shoe polish (2%).

The ceramics were roughly evenly split between Euro-American (48%) and Asian (52%). Of the Asian ceramics, most (85%) were Japanese in origin. All of the items with identifiable vessel form were tableware, with 11 bowl fragments, three plate fragments, and two cup fragments. This suggests residential use, with possibly two or more households represented, given the split between Euro-American and Asian items.

Summary of Findings

Pedestrian survey and subsurface testing at all four reservoir sites confirmed extensive disturbance from earlier pineapple cultivation, and at Reservoir 3, from modern bulldozing activity. No surface or subsurface archaeological sites remain in any of the four survey blocks. At Reservoir 3, an assemblage of historic material was collected from the surface in a heavily disturbed area. Given that this material was not found *in situ* and its primary context has been lost, the artifacts were not assigned a site number. A total of 85 items were collected, including 10 whole glass bottles, 50 bottle glass fragments, and 25 ceramic/tableware fragments. Much of the collection consisted of Waiialua Soda Works bottles, manufactured between ca. 1910 and 1912. Ceramic tableware was also common, with both Euro-American and Asian pieces represented. The items may have been deposited as trash from pineapple or sugarcane laborers.

CONCLUSION AND RECOMMENDATIONS

An archaeological inventory survey was conducted for TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, on the island of O‘ahu. This was done in preparation for ground disturbance associated with construction of four reservoirs. The archaeological assessment included pedestrian survey that covered 100% of the four reservoir project areas, as well as test excavations consisting of eight trenches.

No pre- or post-contact surface architecture was found during pedestrian survey of the project areas. All areas were found to be disturbed by pineapple cultivation. Likewise, subsurface testing did not yield any evidence of subsurface cultural features or deposits. Stratigraphy consists of the pineapple cultivation layer speckled with black plastic fragments, with a sterile layer below.

Evidence of more recent disturbance was noted at Reservoir 3, as the entire area had been bulldozed. An assemblage of historic material was collected from the surface and in backdirt piles, in secondary context. These consisted of 85 items of ceramic and glass that may be trash from pineapple or sugarcane field laborers. Items within the collection may date to as early as 1868 or as late as 1930.

The ceramics were roughly evenly split between Euro-American and Asian. Of the Asian ceramics, most were Japanese in origin. The majority of glass consisted of soda bottles, with more than half of these from the Waialua Soda Works. The Waialua Soda Works bottles could be dated to within a few years, between ca. 1910 and 1912.

In sum, archaeological survey was conducted on TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā and TMK: (1) 6-5-002:010 (por.) in Kamananui. No archaeological sites were found, and the only remains were glass and ceramics collected from a disturbed context. Construction of the four reservoirs will have no effect on historic properties because no historic properties occur within the project area. Archaeological and/or cultural monitoring is recommended, however, due to community concerns regarding the potential to encounter subsurface archaeological remains.

It should be noted that isolated human burial remains may be discovered during construction activities, even though no evidence of human burials was found during the survey. Should human burial remains be discovered during construction activities, work in the vicinity of the remains should cease and the SHPD should be contacted.

GLOSSARY

<i>ahupua‘a</i>	Traditional Hawaiian land division usually extending from the uplands to the sea.
<i>akua</i>	God, goddess, spirit, ghost, devil, image.
<i>ali‘i</i>	Chief, chiefess, monarch.
<i>‘auwai</i>	Ditch, often for irrigated agriculture.
boulder	Rock 60 cm and greater.
California grass	The invasive <i>Brachiaria mutica</i> that forms dense stands up to 2 m tall.
cobble	Rock fragment ranging from 7 cm to less than 25 cm.
gravel	Rock fragment less than 7 cm.
<i>heiau</i>	Place of worship and ritual in traditional Hawai‘i.
<i>kalo</i>	The Polynesian-introduced <i>Colocasia esculenta</i> , or taro, the staple of the traditional Hawaiian diet.
<i>kapu</i>	Taboo, prohibited, forbidden.
<i>kauwā</i>	Outcast or slave caste within the traditional Hawaiian social hierarchy.
<i>konohiki</i>	The overseer of an <i>ahupua‘a</i> ranked below a chief; land or fishing rights under control of the <i>konohiki</i> ; such rights are sometimes called <i>konohiki</i> rights.
<i>Kū</i>	The Hawaiian god of war.
<i>kula</i>	Plain, field, open country, pasture, land with no water rights.
<i>kuleana</i>	Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.
<i>lo‘i, lo‘i kalo</i>	An irrigated terrace or set of terraces for the cultivation of taro.
<i>lua</i>	The ancient style of fighting involving the breaking of bones, dislocation of joints, and inflicting pain by applying pressure to nerve centers.
<i>luakini</i>	Large <i>heiau</i> of human sacrifice.
Māhele	The 1848 division of land.
<i>maka‘āinana</i>	Common people, or populace; translates to “people that attend the land.”
<i>makai</i>	Toward the sea.
<i>mākālei</i>	A supernatural tree of Moloka‘i Island; parts of its root were placed near fishpond gates to attract fish.
<i>mauka</i>	Inland, upland, toward the mountain.
<i>mō‘ī</i>	King.
<i>moku</i>	District, island.
<i>mo‘olelo</i>	A story, myth, history, tradition, legend, or record.
<i>‘ōlelo no‘eau</i>	Proverb, wise saying, traditional saying.
<i>olonā</i>	The native plant <i>Touchardia latifolia</i> , traditionally used for making cordage.
<i>pu‘uhonua</i>	Place of refuge.

sandalwood	<i>Iliahi (Santalum)</i> , several varieties endemic to Hawai‘i. Known for their aromatic wood and medicinal qualities. Heavily exported in the 1800s.
stone	Rock fragment ranging from 25 cm to less than 60 cm.
‘uala	The sweet potato, or <i>Ipomoea batatas</i> , a Polynesian introduction.
‘ūlei	The native shrub <i>Osteomeles anthyllidifolia</i> , the berries of which were eaten, sewn into <i>lei</i> , and used to make lavender dye, and its hard wood used to produce a variety of implements.
‘ulu	The Polynesian-introduced tree <i>Artocarpus altilis</i> , or breadfruit.
‘ulu maika	Stone used in the <i>maika</i> game, similar to bowling.

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Cultural Impact Assessment
Keala Pono Archaeological Consulting, LLC
January 2015

FINAL—Cultural Impact Assessment of TMK: (1) 7-1-001:002 and :005, Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010, Kamananui Ahupua‘a, Waialua District, Island of O‘ahu, Hawai‘i



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MANAGEMENT SUMMARY

A Cultural Impact Assessment was conducted for TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.), Kamananui Ahupua‘a, Waialua District, on the island of O‘ahu, Hawai‘i. This was done in preparation for ground disturbance associated with construction of four proposed reservoirs.

The current study took the form of background research and an ethnographic survey consisting of five interviews, all of which are included in this report. The background research synthesizes traditional and historic accounts and land use history for the Wahiawā area. Community consultations were performed to obtain information about the cultural significance of the subject properties and Wahiawā as a whole, as well as to address concerns of community members regarding the effects of the proposed construction on places of cultural or traditional importance.

As a result of this work, the cultural significance of the project lands has been made clear. The background study revealed that the project area was a sacred region peopled by high-ranking chiefs. At the center of these chiefly lands were the hallowed grounds called Kūkaniloko. Consultations with individuals knowledgeable about Wahiawā produced information on its rich cultural history.

The consultants expressed a wide range of concerns regarding construction of the proposed reservoirs. They stated that the reservoirs will adversely affect places of cultural significance, and recommended that the reservoirs are not built or that archaeological and cultural monitoring is implemented during construction.

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INTRODUCTION

At the request of Environmental Planning Solutions, Keala Pono Archaeological Consulting conducted a Cultural Impact Assessment of TMK: (1) 7-1-001:002 (por.) and :005 (por.) in Wahiawā Ahupua‘a, Wahiawā District, and TMK: (1) 6-5-002:010 (por.) in Kamananui Ahupua‘a, Waialua District, on the island of O‘ahu, Hawai‘i. Four reservoirs are proposed for the properties. The Cultural Impact Assessment study was designed to identify any cultural resources or practices that may occur in the area and to gain an understanding of the community’s perspectives on the proposed reservoir construction.

The report begins with a description of the project area and an historical overview of land use and archaeology in the area. The next section presents methods and results of the ethnographic survey. Project results are summarized, and recommendations are made in the final section. Hawaiian words, flora and fauna, and technical terms are defined in a glossary, and an index at the end of the report assists readers in finding specific information. Also included are appendices with documents relevant to the ethnographic survey, including full transcripts of the interviews.

Project Location and Environment

The project area is located in Wahiawā Ahupua‘a, Wahiawā District, and Kamananui Ahupua‘a, Waialua District, in Central O‘ahu (Figure 1). The district of Wahiawā is a relatively modern construct, created in 1913 (Kamehameha Schools 1987). Before this change, the entire project site was within Kamananui Ahupua‘a in the district of Waialua.

Wahiawā is located on the Schofield Plateau in Central O‘ahu, sandwiched between the Wai‘anae and Ko‘olau Mountain Ranges. Wahiawā District is the only moku that does not stretch from the mountains to the sea, but is landlocked by Waialua to the north, Ko‘olauloa to the east, ‘Ewa to the south, and Wai‘anae to the west. MacDonald et al. explain the geology of this region:

Lava flows from the Koolau volcano banked against the already-eroded slope of the Waianae volcano to form the gently sloping surface of the Schofield Plateau. An erosional unconformity between the rocks of the two volcanoes is visible along Kaukonahua Gulch, at the eastern foot of the Waianae Range, where Waianae lavas slope 10° to 15° northeastward and are overlapped by Koolau lavas dipping 5° northwestward. (1983:420)

The four reservoirs are located on three TMK parcels, all of which are owned by the State of Hawai‘i. An archaeological inventory survey (AIS) was conducted for the four reservoir project areas, for a total of 30.83 acres (12.48 ha). However, this Cultural Impact Assessment was designed to include the entire TMK parcels within which the reservoirs are located. The TMK parcels are described below.

TMK: (1) 6-5-002:010 is a 310 acre (125 ha) parcel bounded by Kaukonahua Road to the south, Poamoho Gulch to the north, and farmlands to the east and west. This eastern boundary is also the border between the Waialua and Wahiawā Districts.

TMK: (1) 7-1-001:002 is a 302 acre (122 ha) parcel bounded by Kaukonahua Road on the north, Kamananui Road on the east, Wilikina Drive on the south, and farmland to the west. This western boundary is also the border between the Waialua and Wahiawā Districts.

TMK: (1) 7-1-001:005 is a 236 acre (96 ha) property adjacent to undeveloped land on the north, Saipan Drive on the east, Whitmore Avenue on the southeast, and Kamehameha Highway on the southwest and west.

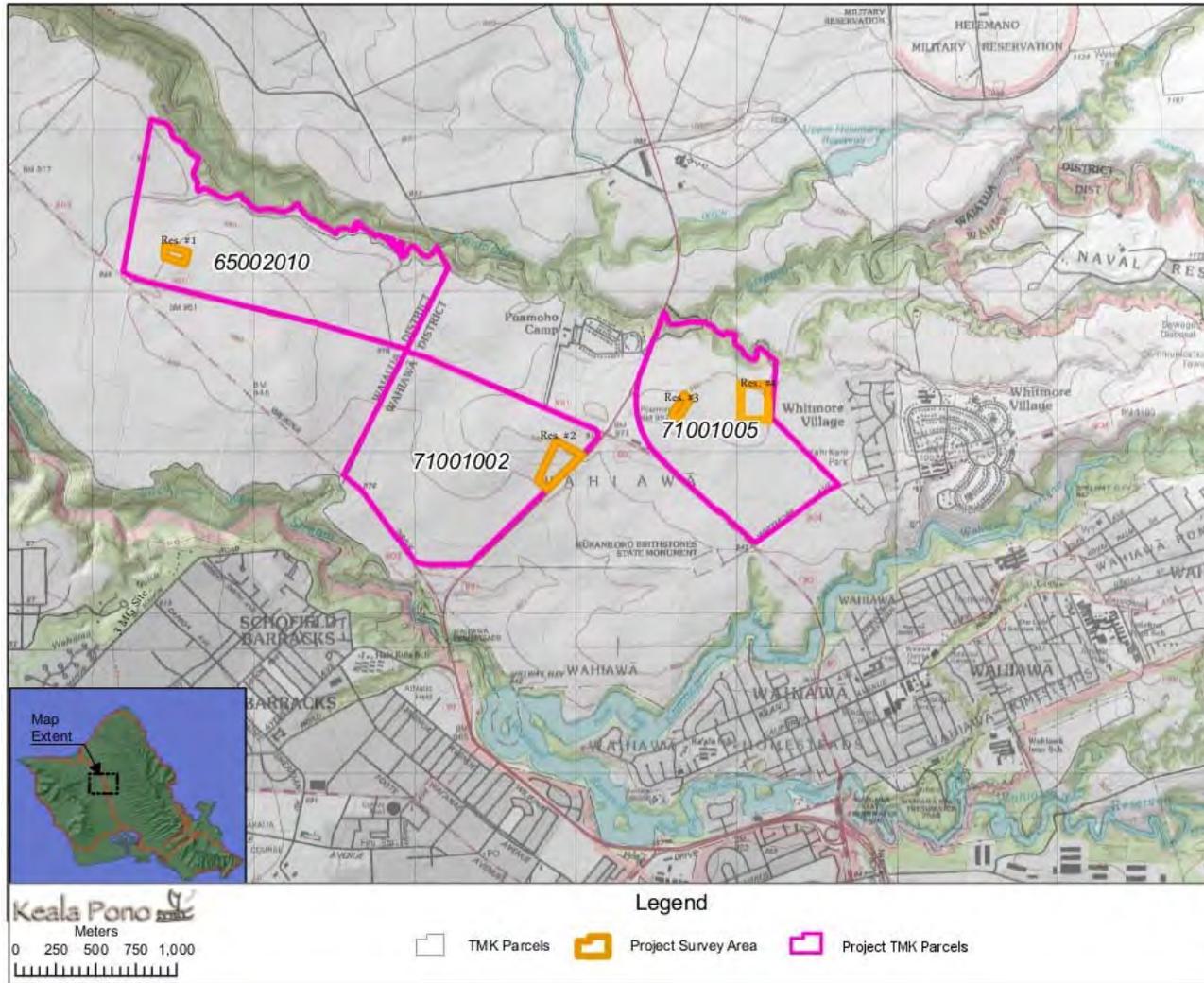


Figure 1. Project area on a 7.5 minute USGS Haleiwa quadrangle map with TMK overlay.

The parcels lie between 860 and 980 feet (262–299 m) in elevation and are roughly 7 miles (11 km) from the nearest coastline, at Kaiaka Bay in Hale‘iwa. The properties are relatively flat and are currently undeveloped, with traces of former pineapple cultivation evident throughout. Vegetation within the project areas consists mainly of California grass.

Rainfall is moderate in the Central O‘ahu project area, averaging approximately 40–80 in. (102–203 cm) per year (Juvik and Juvik 1998). The two main watercourses of Wahiawā, Poamoho Stream and Kaukonahua Stream, run north and south of the project area, respectively.

Soils are of the Helemano-Wahiawa association, described as “Deep, nearly level to moderately sloping, well-drained soils that have a fine-textured subsoil; on uplands” (Foote et al. 1972). Specifically, soils in the project area mostly consist of Wahiawa silty clay, 0–3% slopes (WaA) and Wahiawa silty clay, 3–8 % slopes (WaB) (Figure 2). There are also small patches of Kolekole silty clay loam, 1–6% slopes (KuB), Kolekole silty clay loam, 6–12% slopes (KuC), Kunia silty clay, 0–3% slopes (KyA), and Manana silty clay loam, 2–6% slopes (MoB) (see Figure 2).

The Undertaking

The State of Hawai‘i Agribusiness Development Corporation (ADC) is proposing farm land preparation for construction of four reservoirs on fallow pineapple fields often referred to as the former Galbraith Estate Lands. In 2012 the State of Hawai‘i acquired approximately 1,700 acres (688 ha) of land near the town of Wahiawā in Central O‘ahu that were owned by the Estate of George Galbraith (“Galbraith Estate Lands”). As part of the acquisition, approximately 1,207 acres (489 ha) were transferred to ADC and 495 acres (200 ha) to the Office of Hawaiian Affairs. In total the acquisition of Galbraith Estate Lands comprised 12 separate land parcels.

Improvements for this project are proposed on three parcels owned by the State of Hawai‘i and controlled by ADC. Land owned by the Office of Hawaiian Affairs is not part of the proposed action. ADC is also responsible for leasing land under their control to farmers and agricultural ventures. Thus far, ADC has executed licenses with Kalena Farms for 230 acres on TMK: (1) 6-5-002:010 and with Ohana Best Farm for 160 acres of TMK: (1) 7-1-001: 005.

The proposed action is the construction of four water storage reservoirs. ADC proposes to construct two reservoirs and private parties two reservoirs. An environmental assessment is being prepared for the four reservoirs because they are similar actions, serve similar purposes, are located in the same general area, and are on state land.

ADC will construct a 3.0 MG and 10.0 MG reservoir. The private parties each will construct 3.0 MG reservoirs. The reservoirs will be constructed on land under ADC jurisdiction. As shown on Figure 1, the reservoir sites are dispersed over the project area to serve existing and future agricultural users.

Reservoir 1 is a 3.0 MG reservoir to be constructed by Kalena Farms for its use. Reservoir 2 is 3.0 MG reservoir that will be funded and constructed by ADC. Reservoir No. 3 is a 3.0 MG reservoir that will be funded and constructed by Ohana Best Farms. Reservoir No. 4, a 10.0 MG reservoir, will be funded and constructed by ADC.

All reservoirs will be constructed below existing grade. The respective reservoir sites will be graded and excavated to below grade design elevations that can contain the desired storage volume. Typical design criteria for the reservoirs are listed below but may vary by individual reservoir.

Impounding berm to be engineered at 2:1 slope (Horizontal:Vertical)

Base and inner slopes to be lined with woven HDPE Polypropylene fabric pond liner

Erect security and safety fencing

Provide driveway of adequate width for service and maintenance vehicles

Preliminary design plans for the two private reservoirs show the reservoir basin enclosed by approximately 7-foot (2.1-m) high earth berms for impounding water. Above grade earth berms are not proposed for the ADC reservoirs.

Two wells, one located outside the project area, will supply water for the reservoirs. A state-owned well on TMK: (1) 6-5-002:026, located across Kaukonahua Road from Reservoir 1, already is developed and in use. The well, which is identified as Well No. 3-3103-0001 on Commission on Water Resource Management maps, has a pumping capacity of 2,000 gallons per minute. There is no storage reservoir associated with this well.

A second source well is proposed in the vicinity of Reservoir 4. The well will be developed by ADC sometime in the future. Drilling, testing, engineering design, and construction of this well is subject to capital improvements funding from the State of Hawai'i.

Well construction and water use permits will be sought from the Commission on Water Resources Management, Department of Land and Natural Resources for construction of a new well and water use.

This cultural impact assessment was conducted of the reservoir sites only and did not include the proposed water distribution system lines or proposed well, because the distribution system will be legislatively funded and commissioned to be designed at a later date. The need for archaeological work at the location of the proposed well and distribution lines will be determined when funding for the well is secured.

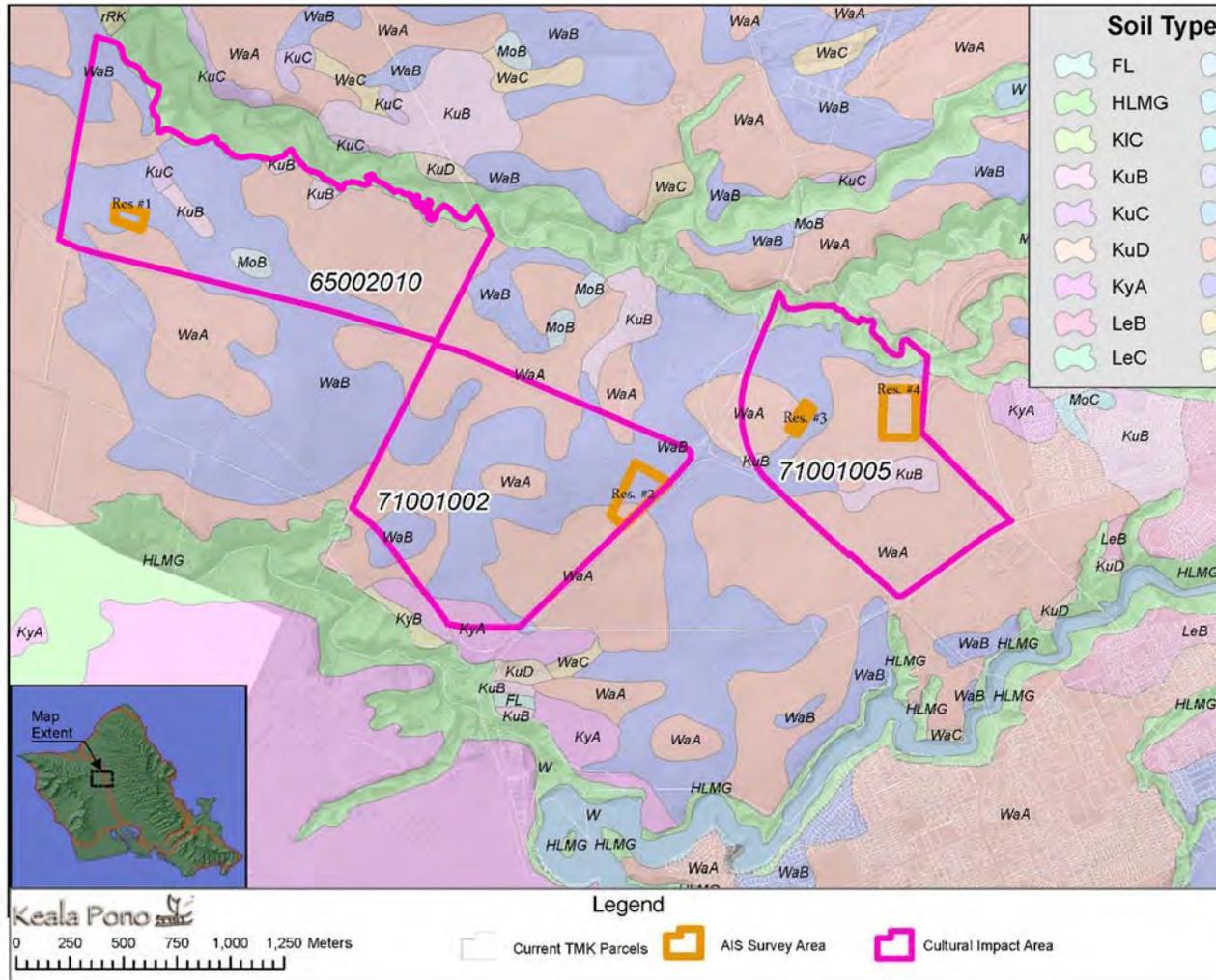


Figure 2. Soils in the vicinity of the project area.

BACKGROUND

This section of the report presents background information as a means to provide a context through which one can examine the cultural and historical significance of the project lands. In the attempt to record and preserve both the tangible (i.e., traditional and historic archaeological sites) and intangible (i.e., mo‘olelo, ‘ōlelo no‘eau) culture, this research assists in the discussion of anticipated finds. Research was conducted at the Hawai‘i State Library, the University of Hawai‘i at Mānoa libraries, the SHPD library, and online on the Papakilo database, Ulukau database, and the State of Hawai‘i Department of Accounting and General Services (DAGS) website. Historical maps, archaeological reports, and historical reference books were among the materials examined.

Pre-Contact Wahiawā

In pre-contact times, before the arrival of Westerners in 1778, the Wahiawā region constituted the sacred center of O‘ahu known as Līhu‘e. Numerous heiau and the Kūkaniloko ali‘i birthing stones were located here. There were agricultural areas as well, with kalo and ‘uala grown in the lo‘i and kula lands, respectively.

Place Names and Boundaries

Before the establishment of Wahiawā District in 1913, the project area was located in the traditional moku of Waialua. Several conflicting accounts inform on the naming of Waialua District. Thrum (in Sterling and Summers 1978:88) states that “Waialua” translates to “two waters,” thus many believe that the name derived from Waialua’s two streams. However, he believes that the district was named after a taro patch, and a common saying was that if you traveled to Waialua and did not see this taro patch, then you did not really see Waialua. Pukui (in Sterling and Summers 1978:88) asserts that the district was named for the cruel chief Waia, grandson of Wakea. Waia carried out his evil deeds at Waialua, and there was so much suffering there that the district was named Waialua, or “doubly disgraceful.” Another source attributes the name to Waialua Pool at Kemo‘o (Awai in Sterling and Summers 1978:88).

The Wahiawā District boundary has a complicated history (Sterling and Summers 1978:134). At the turn of the 20th century, Wahiawā Ahupua‘a fell within the Waialua District. By 1913, the community had grown apart from Waialua District, and the new district of Wahiawā was established. Thus, in 1913, the ahupua‘a of Wahiawā and Wai‘anae Uka were moved from Waialua District to the new district of Wahiawā. In 1925 the size of Waialua District was reduced as large plots of land were transferred to Wahiawā. However, in 1932 the original 1913 land boundaries were reinstated, with some small parcels added to the Schofield Barracks Military Reservation. Today the western parcel of the project area (TMK: [1] 6-5-002:010) lies within the ahupua‘a of Kamananui, while the eastern parcels (TMK: [1] 7-1-001:002 and :005) are in Wahiawā.

Kamananui translates to “the large branch,” and a grove of trees in the ahupua‘a was named Pōloa, or “the long night” (Pukui et al. 1974:80). Wahiawā on O‘ahu should not be confused with Wahiawa on Kaua‘i, a stream and heiau located in Kōloa. Wahiawā can be translated as “place of noise,” as rough seas were said to be heard there (Pukui et al. 1974:218). In ancient times, Hi‘iaka, sister of Pele, heard the bellowing seas and composed a chant about Wahiawā and Waialua and the sound of the sea (Emerson in Handy and Handy 1991:465).

Līhu‘e translates to “cold chill” (Pukui et al. 1974:132). The place name Līhu‘e may pre-date the formation of ahupua‘a on O‘ahu and “seems to exist independently of the ahupua‘a in which it falls” (Desilets et al. 2009:43). Desilets et al. help to define the boundaries of the Līhu‘e region:

Judging from traditional usage, Līhu‘e appears to be an ancient place-name that refers, minimally, to the entire region west of Wahiawā and east of the Wai‘anae range. As a traditional place, its boundaries are necessarily imprecise, but it is clear that the region encompasses most of western Wai‘anae Uka and all of Schofield Barracks. Līhu‘e also appears to be used more generally to refer to the entire Central Plateau, encompassing such sacred sites as Kūkaniloko. Although it is difficult to determine with any certainty, it seems probable that Līhu‘e had broader boundaries prior to the institutionalization of the moku and ahupua‘a land divisions we know today. Līhu‘e is most often referred to as the “uplands,” although that could well mean the whole Central Plateau, which relative to coastal areas is upland. (2009:39)

Traditional Land Use

Traditionally, Kamananui was one of the three ahupua‘a (along with Pa‘ala‘a and Kawailoa) in the fertile heartland of Waialua Moku. The makai areas of Waialua once contained many lo‘i, while the mauka slopes were covered with kula of red soil, an environment very good for growing sweet potato (Handy and Handy 1991:466; Kirch and Sahlins 1992:1:20). Sterling and Summers (1978:103) note that “there were large terrace areas along the flatlands between the junction of Helemano and Poamoho Streams and the flatland west of Poamoho,” as well as small terraces in the lower flats of Poamoho and Kaukonahua Valleys. It is probable that sweet potato and bananas were grown around house sites along the ridges of the gulches. The upland areas of Kamananui/Wahiawā were one of the few places on the island where sweet potato agriculture was irrigated, with water brought in from Helemano Stream and Wahiawā Stream, both of which had many terraces along the stream banks (Handy and Handy 1991:464–5).

The population was most densely settled in the lower floodplains of the ahupua‘a, irrigated in large part by a two mile-long waterway that at the time was the longest on the island. The lo‘i and fishponds of the lower areas, as well as the rainfall agriculture of the kula supported a pre-contact community estimated at 6,000 to 8,000, which was probably the majority of the population in Waialua. In this pre-contact period (pre-Western arrival in 1778), “Kamananui was the ritual and political center of Waialua,” although the seat of power moved to the neighboring ahupua‘a of Kawailoa by the early 1800s (Kirch and Sahlins 1992:1:20).

Līhu‘e was home to the highest class of chiefs, the Lō Ali‘i. The Lō Ali‘i lived in the uplands of O‘ahu, including Wahiawā, and were under strict kapu because of their sacredness:

The chiefs of Līhu‘e, Wahiawā, and Halemano on O‘ahu were called lō ali‘i. Because the chiefs at these places lived there continually and guarded their kapu, they were called lō ali‘i [from whom a “guaranteed” chief might be obtained, loa‘a]. They were like gods, unseen, resembling men. (Kamakau 1991:40)

The chiefs of Lihue, Wahiawa, and Halemano on Oahu were called Lo chiefs, Po‘e Lo Ali‘i [“people from whom to obtain a chief”], because they preserved their chiefly kapus. The men had kapus, and the women had kapus, and when they joined their kapus and children were born, the children preserved their kapus. They lived in the mountains (i kuahiwi); and if the kingdom was without a chief, there in the mountains could be found a high chief (ali‘i nui) for the kingdom. Or if a chief was without a wife, there one could be found—one from chiefly ancestors. Kauakahi‘ailani, Ma‘ilikukahi, Kalona, Piliwale, Kukaniloko, Pa‘akakanilea [Pa‘akanilea], Ka‘akauualani, Ka‘au, Lale, Paoakalani, Pakapakaua, Nononui, Kokoloea, and a great many others were Lo chiefs. (Kamakau 1964:5)

Kamananui was very much the ceremonial center of the island. The ahupua‘a contains numerous heiau, including two presided over by Kū, which were also heiau luakini associated with human

sacrifice (Kirch and Sahlins 1992:1:21). In Wahiawā is also located one of the most sacred sites on the island, Kūkaniloko (“the sound or resonance rises from within”), birthing stones situated near where Kamehameha Highway intersects with Whitmore Road (Yent 1999:15; Yent 1995) (also see Archaeological and Historic Sites section).

The establishment of Kūkaniloko as a sacred birthplace goes back to the time of the earliest chiefs of O‘ahu. Nanakāoko was the chief, Kahihiokalani was the chiefess, and they made Kūkaniloko as a birthplace for their son, Kapawa. Kapawa’s birth and the birth of later chiefs at Kūkaniloko was accompanied by prescribed ceremony. The historian Samuel Kamakau describes the first royal birth there:

Kūkaniloko was made by Nanakāoko and his wife Ka-hihi-o-ka-lani as a place for the birth of their child Kapawa... When the child was born, it was immediately taken into the waihou heiau Ho‘olono-pahu. There forty-eight chiefs ministered to the child and cut the navel cord. Ho‘olono-pahu was a furlong and a half south of Kūkaniloko. Two furlongs to the east of Kūkaniloko was where the sacred drum Hāwea was beaten; it indicated the birth of a chief. On the east of the stream on that side of Kua‘ikua were the maka ‘āinana --- a great many of them --- and to the south, three furlongs distant, were the kauwā. (Kamakau 1991:38)

Kamakau points out that long after Kapawa, the sacredness of Kūkaniloko continued and that all of the “chiefs born at Kūkaniloko were the akua of the land and were ali‘i kapu as well” (Kamakau 1991:53).

The historian John Papa Ii adds that besides being a sacred birthplace, Kūkaniloko was also a designated place of refuge:

The Hale o Keawe was called Kaikaialealea and was a pu‘uhonua, or place of refuge. Similarly, Kukaniloko in Wahiawa, Oahu; and Holoholoku in Wailua, Kauai, were places to which one who had killed could run swiftly and be saved. (Ii 1959:138)

As a place of refuge, Kūkaniloko fits in the story of the newborn twin chiefesses Laielohelohe and Laiekawai. Their mother Malaekahana feared that her newborns would be harmed, so she sent one of them to the safe haven of Kūkaniloko to be raised by Kapukaihaoa (Beckwith 1970).

Even after the arrival of Westerners, Kūkaniloko remained to be a place of great significance among the Hawaiian population. Ii reminds us that this important place was situated along one of the major trails that traversed O‘ahu Island:

From the stream of Anahulu and from Kamani, above the houses and taro patches, a trail stretched along in front of Kuokoa’s house lot and the church. This trail went on to meet the creeks of Opaepala and Halemano, the sources of the stream of Paalaa, on down to the stream of Poo a Moho, and on to the junction where the Mokuleia trail branched off to Kamanui and Keawawahie, to Kukaniloko, the birthplace of chiefs. (Ii 1959:98)

Mo‘olelo and ‘Ōlelo No‘eau

The Līhu‘e chiefs are memorialized in mo‘olelo, with the story of Lō Kaholi-a-Lale (Kamakau 1991:50–51). Lō Kaholi-a-Lale was born and raised in the Līhu‘e uplands, where he learned the arts of war, including throwing of the spear, for which the Līhu‘e chiefs were particularly renowned. However, the mō‘ī of ‘Ewa, named Piliwale, was also highly skilled at spear throwing and offered his daughter’s hand in marriage to any man who could throw as well as his own instructor, ‘Awa. It was said that ‘Awa “could grasp ten spears in his right hand and ten in his left...he could throw ten spears from the shoulder, two backwards, and two directly to the navel” (Kamakau 1991:50–51). Lō

Kaholi-a-Lale studied the moves of ‘Awa as other suitors unsuccessfully battled him. He challenged ‘Awa at Hālaulani, and his feats are memorialized as place names of ‘Ewa and Waipi‘o. These include Kūpahu, which means “to hurl,” and Hanapouli, or “make dark” (Kamakau 1991: 50–51). Lō Kaholi-a-Lale’s success earned him the hand of Piliwale’s daughter, Kohe-palaoa, and the significance of this is as follows:

That was the beginning of the combining of the lō and the wohi, the ranks of Kaholi-a-Lale. As for Kohe-palaoa, her rank was that of a Kumuhonua chief of Kūkaniloko; she was a nī‘aupi‘o. They had a son named Kānehōalani who became the chief of Ko‘olau. (Kamakau 1991:51)

Pukui (1983:291) notes a saying: “Pili pono ka lā i Kamananui,” meaning “the sun is very close to Kamananui.” Although the ‘ōlelo no‘eau is supposed to refer to a person in power who becomes very angry and scorches people like the hot sun, the indication that the sun is very close to Kamananui in particular very likely references both Kamananui’s association with the Lō Ali‘i, as well as the solar calendar function of Kamananui’s most sacred site, Kūkaniloko. The ‘ōlelo no‘eau for the sun’s relationship to Kamananui is in stark contrast to that of nearby Wai‘anae in the saying, “Kapakahi ka lā ma Wai‘ane,” meaning “lopsided is the sun at Wai‘anae” (Pukui 1983:164).

In addition to power, Kamananui is also associated with violence in a number of mo‘olelo. Within Kamananui, Keawawaihi (mauka of Hale‘iwa) was known as “The Valley of the Spears,” named for the brigands of robbers who went rogue after being trained for war using spears or a shark’s tooth tied to the hand with olonā fiber, and by using the warrior art of lua, “the art of dislocating the joints and rendering an opponent helpless” (Sterling and Summers 1978:107). Pohakukae in Keawawaihi Gulch is the location of another tale of bloodshed. The large rock on the north ridge of the gulch was named after an event in which a man named Kalaimoku stood on the rock and called out to the people below: “E na kanaka o Keawawaihi ea ka ai he kukae,” or “Men of Keawawaihi here is the food, excrement” (Sterling and Summers 1978:107). The people became enraged and tore Kalaimoku and his attendants to pieces.

A few miles southeast of Kūkaniloko, near the south fork of Kaukonahua Stream, was a place later called O‘ahunui (named after the last resident chief), the former residence of the ruling ali‘i of O‘ahu. A mo‘olelo associated with the site indicates that O‘ahunui practiced cannibalism, and his most horrific act involved eating his two plump nephews (his older sister’s sons), for which he and his sister were decapitated in retribution by the boys’ father. Their bodies turned to stone, and O‘ahunui is said to resemble the shape of O‘ahu. The site was considered desecrated by the act, and the residence of the ruling chief was moved from Kamananui to Waikīkī (Kawaharada 1999:52–53; Sterling and Summers 1978:137).

Historic Waihiawā

In historic times (post-1778), the Waihiawā region has been used for harvesting sandalwood, sugarcane and pineapple cultivation, and for military interests.

Early Historic Land Use

When Kamehameha I conquered O‘ahu in 1795, Waialua was given to his ally, Chief Ke‘eaumoku, and for the next 70 years, the land was controlled by his descendants, primarily his daughter, Queen Ka‘ahumanu. In the early 19th century, Waialua was a source of food, sandalwood for trade, and building lumber for the royalty (Office of State Planning 1995:1).

The sandalwood trade in Hawai‘i began in 1791, with most of the wood shipped to China, where it was valued for its fine grain and pleasant scent. The peak trade years were 1810–1840, and this was

also a period in which there was an increased desire for Western goods, which led to debts held by Hawaiian monarchs who paid these by urging or even forcing the maka‘āinana to cut down large numbers of trees in the upper regions (Harrington 2013:33). This effort to collect sandalwood for trade placed great strain on the people of Waialua because the trees were located up in the mountains, “far from the people’s homes and gardens,” the collection of which necessitated “sustained operations of days, weeks, or sometimes months on end” (Kirch and Sahlins 1992:1:83). While away, they were then not tending to the gardens and animals needed for their own sustenance.

As the sandalwood trade died down, whaling would become an important element in the economic, political, and social structure in Waialua. The height of the whaling period was approximately 1830–1860, which was also an era in which Waialua lost roughly half of its people to disease and emigration. At the same time, the ruling ali‘i, konohiki, and other officials taxed the commoners more heavily in order to pay for the Western goods and customs they had come to covet. Most income to the ali‘i came from sales of supplies to the whaling ships, with supplies of food (e.g. cattle, taro, sweet potato), salt, and other materials generated by the maka‘āinana. The commoners of Waialua were additionally burdened by collateral issues tied to supplying the ships. Many who worked the farms and homesteads in the area had to build walls (most were built in the late 1840s and early 1850s) around their lots not to keep personal livestock in but to keep out the cattle of supply companies that allowed their herds to wander freely (Kirch and Sahlins 1992:1:99–165).

Agricultural Interests

In the mid-1860s, Castle & Cooke, established by Samuel Castle and Amos Starr Cooke, backed the first commercial sugar cultivation in Waialua, started by two sons of Levi Chamberlain. Early businesses managed by them and others were unsuccessful, and in 1874 the operation was sold to a partnership including Robert Halstead. Halstead was able to generate a profit, and prospects improved with the development of a railroad line. Castle & Cooke and Halstead together formed Waialua Agriculture Company in 1898. Development continued and soon the company embarked on a mammoth irrigation project to dam Kaukonahua Stream and create the Wahiawā Reservoir.

The Wahiawā Reservoir has been called the “key to Waialua’s irrigation” (Wilcox 1996:109). Completed in January of 1906, it was the largest reservoir in the islands, with a capacity of 2.5 billion gallons (Wilcox 1996:109). At 136 feet (41.5 m) tall, the earthen dam is the highest in Hawai‘i. The 461 foot (140.5 m)-long dam with a 580 foot (176.8)-thick base created a massive reservoir, occupying a 7 mile (11 km) length of Kaukonahua Gulch (Wilcox 1996:109). This reservoir, later dubbed Lake Wilson, delivered 90% of the surface water for the Waialua Sugar Company’s fields. In the book *Sugar Water*, Wilcox describes the ditch system associated with the reservoir:

The source was 8000 acres of watershed at the head of the Koolau Mountains. Lake Wilson was fed by a ditch system known first as the Oahu Ditch and later as the Mauka Ditch Tunnel. It consisted of 4 miles of main ditch and 8 miles of laterals, which included thirty-eight tunnels. It was started in June 1900 and completed in March 1902 at a cost of \$80,000. The capacity of this ditch system was 90.5 mgd. Besides developing water in the Kaukonahua watershed, it also diverted from the Poamoho watershed.

Another 4 miles of ditch, tunnel, and siphons delivered the water from Lake Wilson (as well as from Helemano and Opaepala ditches) to Waialua’s upper fields at 730 feet elevation. This Wahiawā Ditch had a capacity of 50 mgd. The total cost was \$49,177.59, making it one of the least costly projects of its size, averaging out to \$1.5 a lineal foot. Of the ditch’s 20,740 feet, only 1600 feet was in open ditch. The remaining length comprised twenty tunnels, the longest of which was 1742 feet. It had the largest and tallest flume on Oahu: 130 feet high. In 1923, most of the flumes spanning the gulches were replaced by siphons. (1996:109–110)

Sugarcane production became less dominant with some of the land use in Waialua shifting to pineapple and military interests in later years. James Drummond Dole founded the first pineapple plantation in Wahiawā in 1900 (Hawkins 2011). He organized the Hawaiian Pineapple Company in 1901 and packed the first batch of pineapples in 1903 (Napoka 1976). In 1922, Dole leased 12,000 acres (4,856 ha) from the Waialua Agriculture Company for pineapple production (Office of State Planning 1995).

Both sugarcane and pineapple production in the Wahiawā/Kamananui area were enabled by the train service established from Pearl City to Wahiawā, and later up through Hale‘iwa. O‘ahu was the last island to “come aboard” the new mode of transportation following King Kalākaua’s 1878 Act to Promote the Construction of Railways, after railroad service began on Maui in 1879 and on the Big Island in 1880 (Chiddix and Simpson 2004:14). The Oahu Railway and Land Company (OR&L), founded, owned, and ran by Benjamin Franklin Dillingham, began operations in 1889 (Chiddix and Simpson 2004:19).

Established portion by portion, the OR&L line originally spanned from Honolulu to Kahuku, with a branch line running from Waipahu out to Wahiawā that was constructed in 1905 to accommodate the pineapple plantation established there by Dole. Soon after construction, this line was unofficially extended to Hale‘iwa—a “hush-hush track” due to the establishment of Schofield Barracks and the wartime need for back-up transportation (Kneiss 1957:13–14).

Poamoho Camp, to the north of the project area, was constructed in 1912 for workers of the Hawaiian Preserving Company, Ltd. pineapple cannery in Wahiawā. The camp consisted of 20 houses situated around a men’s boarding structure. It remains as a residential neighborhood today, with approximately 300 residents (Boylan 2004), although the houses have been remodeled.

The U.S. Military

Adjacent to Wahiawā, in Wai‘anae ‘Uka, the land underwent increased military use with the establishment of Schofield Barracks. The U.S. military first occupied Schofield Barracks, originally called Castner Village, in 1909. Most major planned building projects were completed by the early 1920s. Soon after World War II began, the facilities were expanded to accommodate the Ranger Combat School created to train soldiers for “jungle” activities. The current Schofield Barracks Military Reservation’s three main training areas included the Impact Zone, the South Range, and the East Range (Sullivan and Dega 2003:21).

The Helemano Military Reservation, north of Wahiawā in Pa‘ala‘a Ahupua‘a, was established in 1943. The reservation served as a communications station for the U.S. Army, and in 1944, a signal center was constructed. The reservation became a permanent sub-installation of Schofield Barracks in 1956 (Towill Corp. 1981).

Historic Maps

Historic maps help to paint a picture of Wahiawā in years past and illustrate the many changes that have taken place in the region. The earliest maps found for this area are from the late 1800s. The first shows two land grants in 1885 (Figure 3). The north and south branches of Kaukonahua Stream are illustrated, and Kokoloea is labeled along the southern boundary of the ahupua‘a. The second map dates to 1899 and shows the entire ahupua‘a (Figure 4). Several ridges and gulches are illustrated, although the only one labeled is Poamoho Gulch. Land grants are also outlined, and a fence is shown, with points designated as “Kokoloea” and “Paka.” The Government Road runs through the west side of the region with two gates and a bridge depicted. Two houses are shown: one near the south fork of Kaukonahua Stream, and the other on Galbraith lands.

Two maps were found that date to the early 1900s. The first depicts lands of the Waialua Agricultural Company in 1901 (Figure 5). The entire ahupua‘a is shown with details of natural features such as streams and gulches. The Government Road is illustrated, along with many land grants throughout the region. The second map of this era shows Central O‘ahu in 1904 (Figure 6). The only notable addition in Wahiawā is a “pile of stones” that marks the corner of the property boundaries near Poamoho Gulch.

The final two maps date to the mid-1900s. The first depicts the ‘Ewa Forest Reserve in 1946 (Figure 7). In the uplands of Wahiawā, a “Mauka Ditch,” and the Schofield-Waikane Trail are illustrated. The Poamoho Tunnel and an unnamed trail are shown between Poamoho Stream and the north fork of Kaukonahua Stream. Pineapple lands and a reservoir are in the western portion of the ahupua‘a. The final map shows Wahiawā in 1950 (Figure 8). The area is much more developed, with a network of streets and several additional reservoirs illustrated.

Māhele Land Tenure

THE MAHELE is rightfully considered one of the most significant chapters in the modern history of Hawai‘i. Several legislative acts during the period 1845–1855 codified a sweeping transformation from the centuries-old Hawaiian traditions of royal land tenure to the western practice of private land ownership. (Moffat and Fitzpatrick 1995)

The change in the traditional land tenure system in Hawai‘i began with the appointment of the Board of Commissioners to Quiet Land Titles by Kamehameha III in 1845. The Great Māhele took place during the first few months of 1848 when Kamehameha III and more than 240 of his chiefs worked out their interests in the lands of the Kingdom. This division of land was recorded in the Māhele Book. The King retained roughly a million acres as his own as Crown Lands, while approximately a million and a half acres were designated as Government Lands. The Konohiki Awards amounted to about a million and a half acres, however title was not awarded until the konohiki presented the claim before the Land Commission.

In the fall of 1850 legislation was passed allowing citizens to present claims before the Land Commission for lands that they were utilizing within the Crown, Government, or Konohiki lands. By 1855 the Land Commission had made visits to all of the islands and had received testimony for about 12,000 land claims. This testimony is recorded in 50 volumes that have since been rendered on microfilm. Ultimately between 9,000 and 11,000 kuleana land claims were awarded to kama‘āina totaling only about 30,000 acres and recorded in ten large volumes.

During the Māhele of 1848, the land of Waialua, at that time held by Princess Victoria Kamāmalu, was divided: Kamāmalu retained thousands of acres in Pa‘ala‘a and Kawailoa; 134 kuleana holdings were awarded; and the western sections of Kamananui and Mokuleia, as far as Ka‘ena Point, were given to the government and made available for public purchase. There were no LCA awards in the immediate vicinity of the project area. Although no Central O‘ahu lands were awarded to the commoners, they undoubtedly helped farm those lands. There are documents preceding the Māhele which mention the vast cultivated lo‘i found in this central area (Henry et al. 1992).

Two years after the enactment of the Māhele, King Kamehameha III passed another law, this one allowing foreigners to buy land. The Waihona ‘Aina database shows that following the allowance of foreigners to buy land in Hawai‘i, the property around present-day Wahiawā were overwhelmingly bought out by Westerners. By 1860, approximately 290 patents were granted, with roughly one in eight sold to foreigners and naturalized citizens, including John S. Emerson and Samuel Northrup Castle (Office of State Planning 1995:1–2). In the case of the project area, those

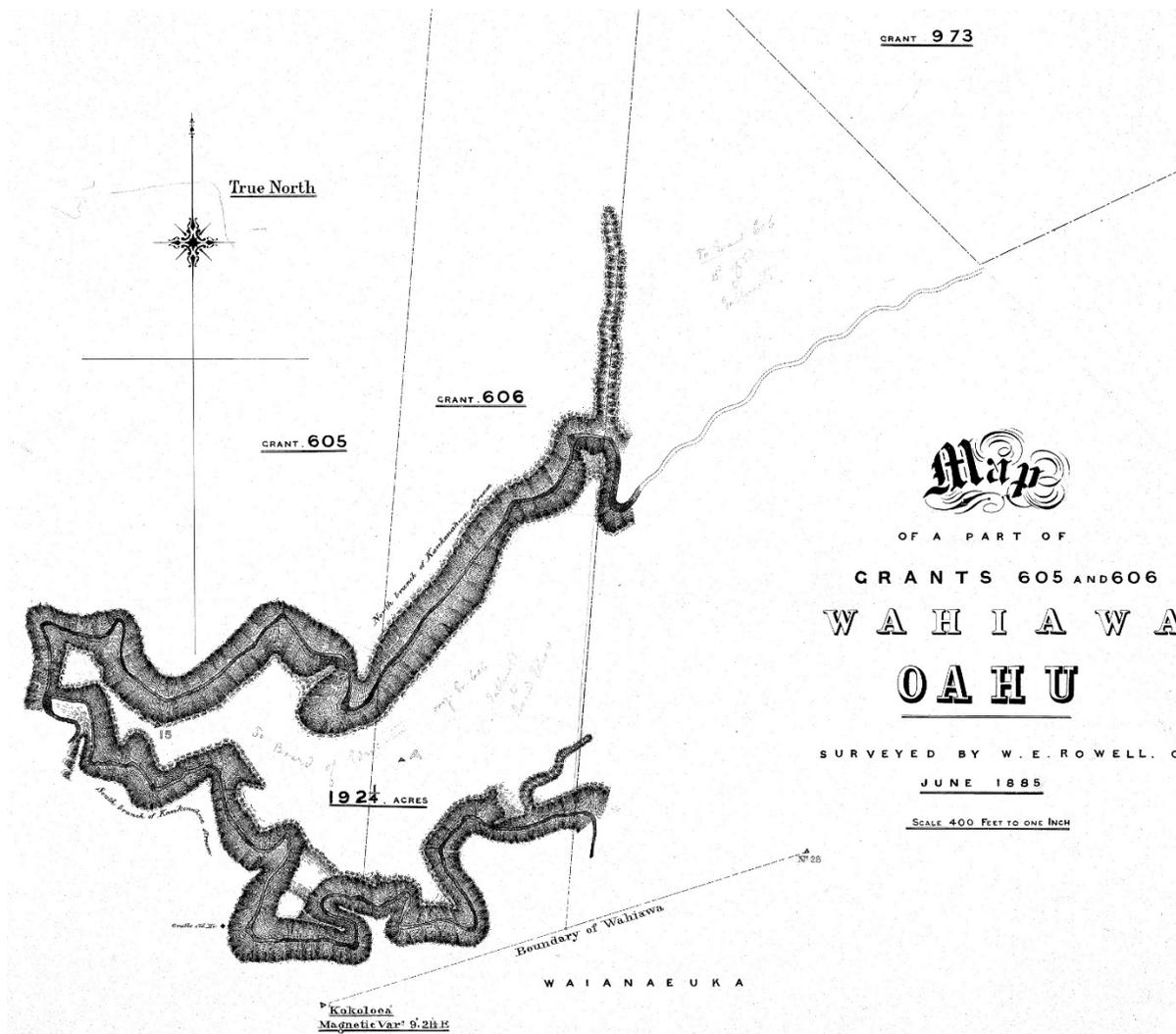


Figure 3. Land grant map of Wahiawā (Rowell 1885).

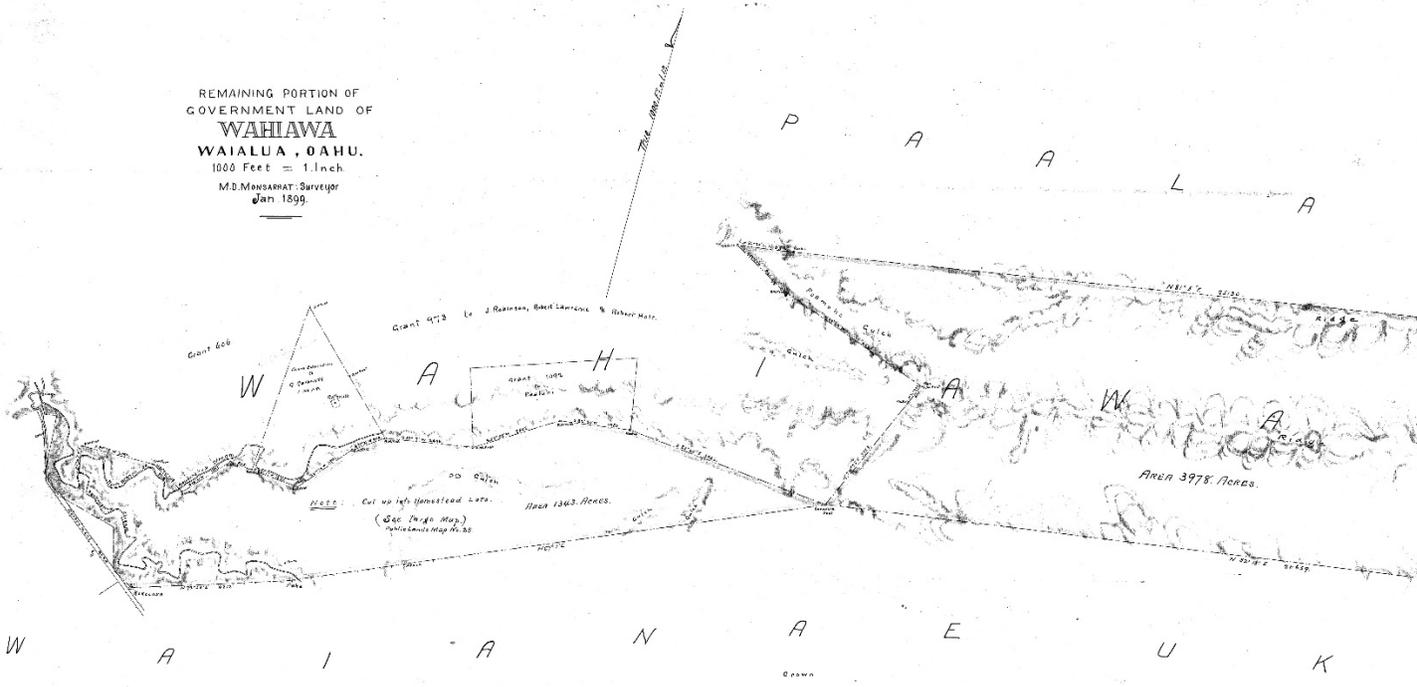


Figure 4. Government land of Wahiawā (Monsarrat 1899).

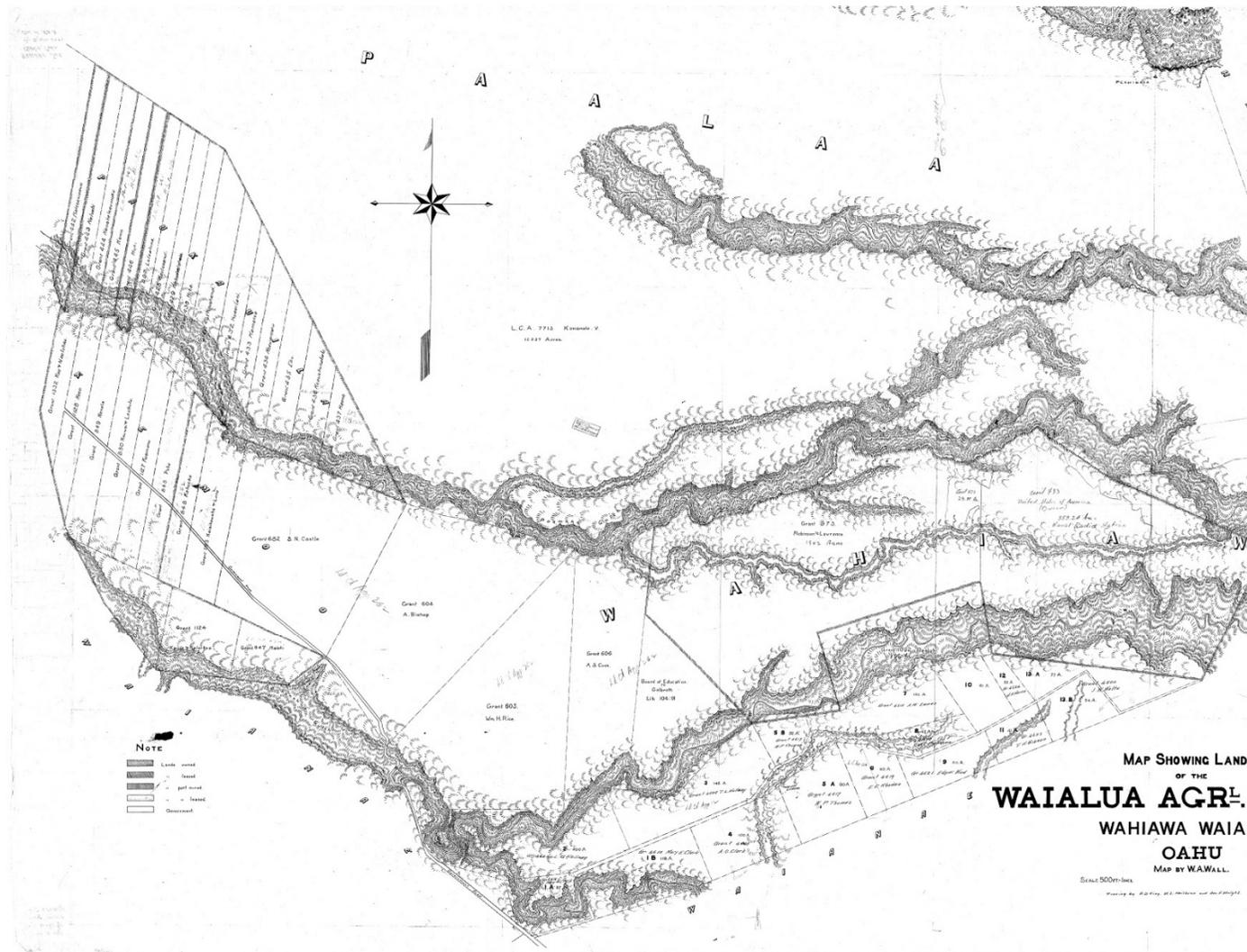


Figure 5. Waialua agricultural land (Wall 1901).

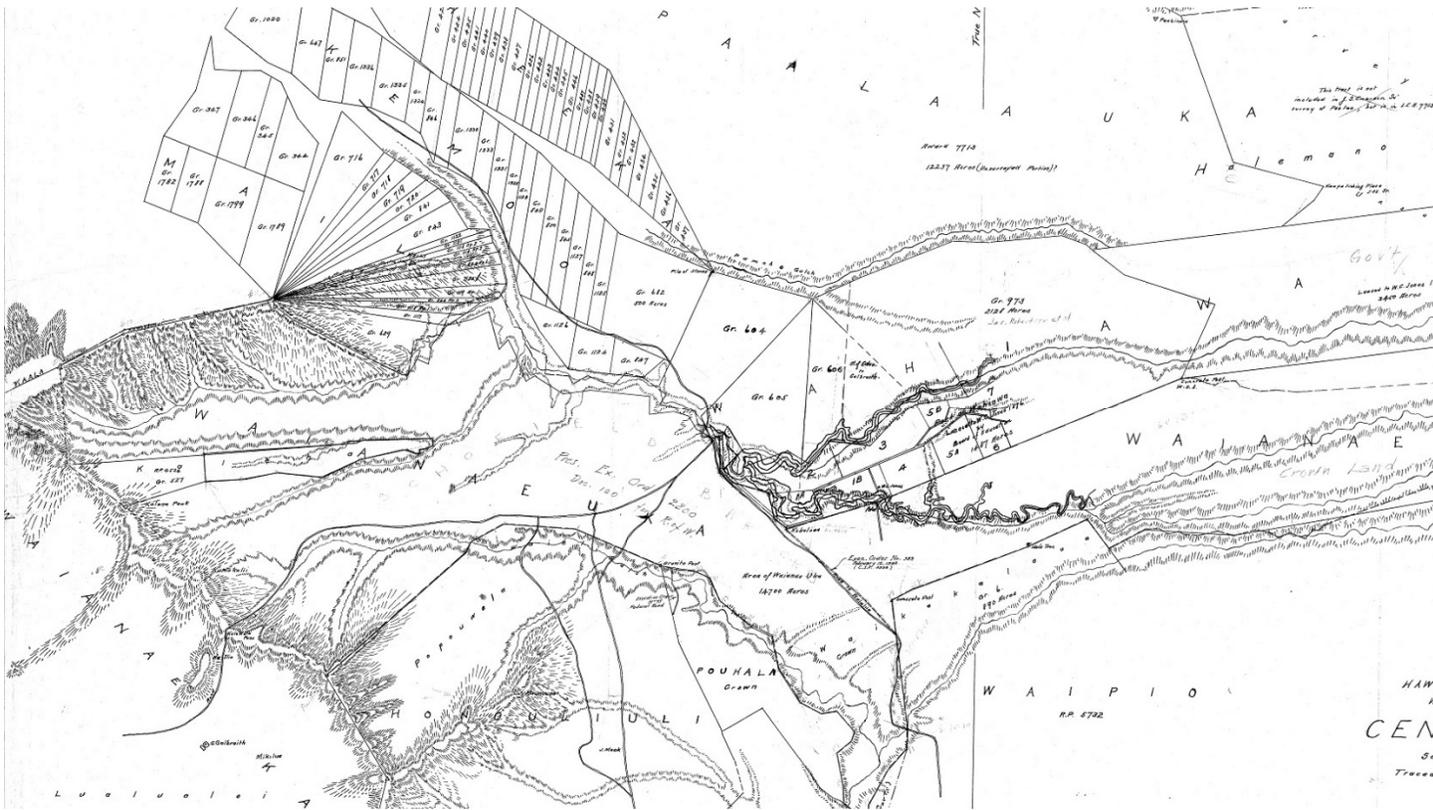


Figure 6. Portion of a Central O'ahu map (Wall 1904).

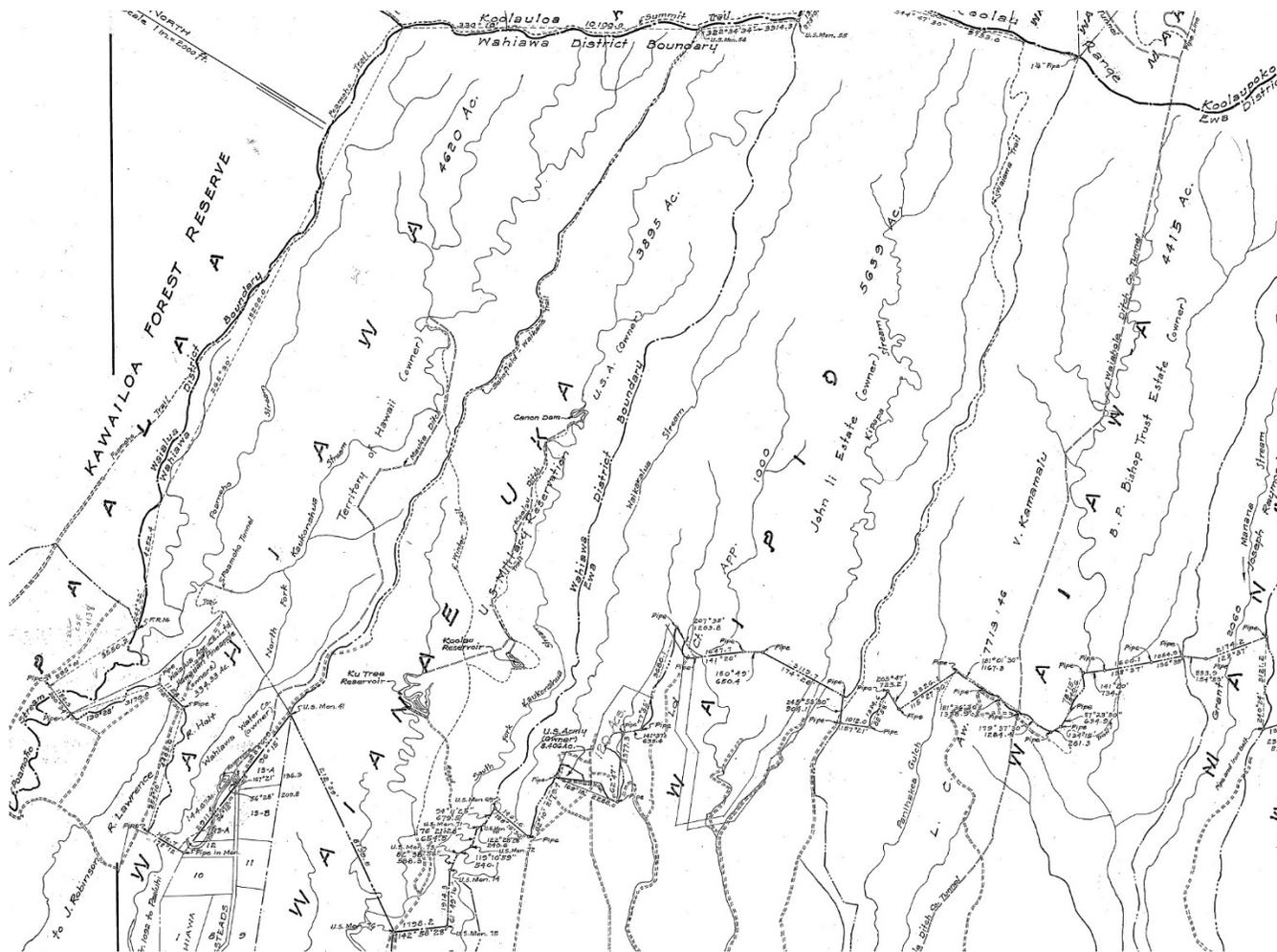


Figure 7. Portion of an 'Ewa Forest Reserve map (Marks 1946).

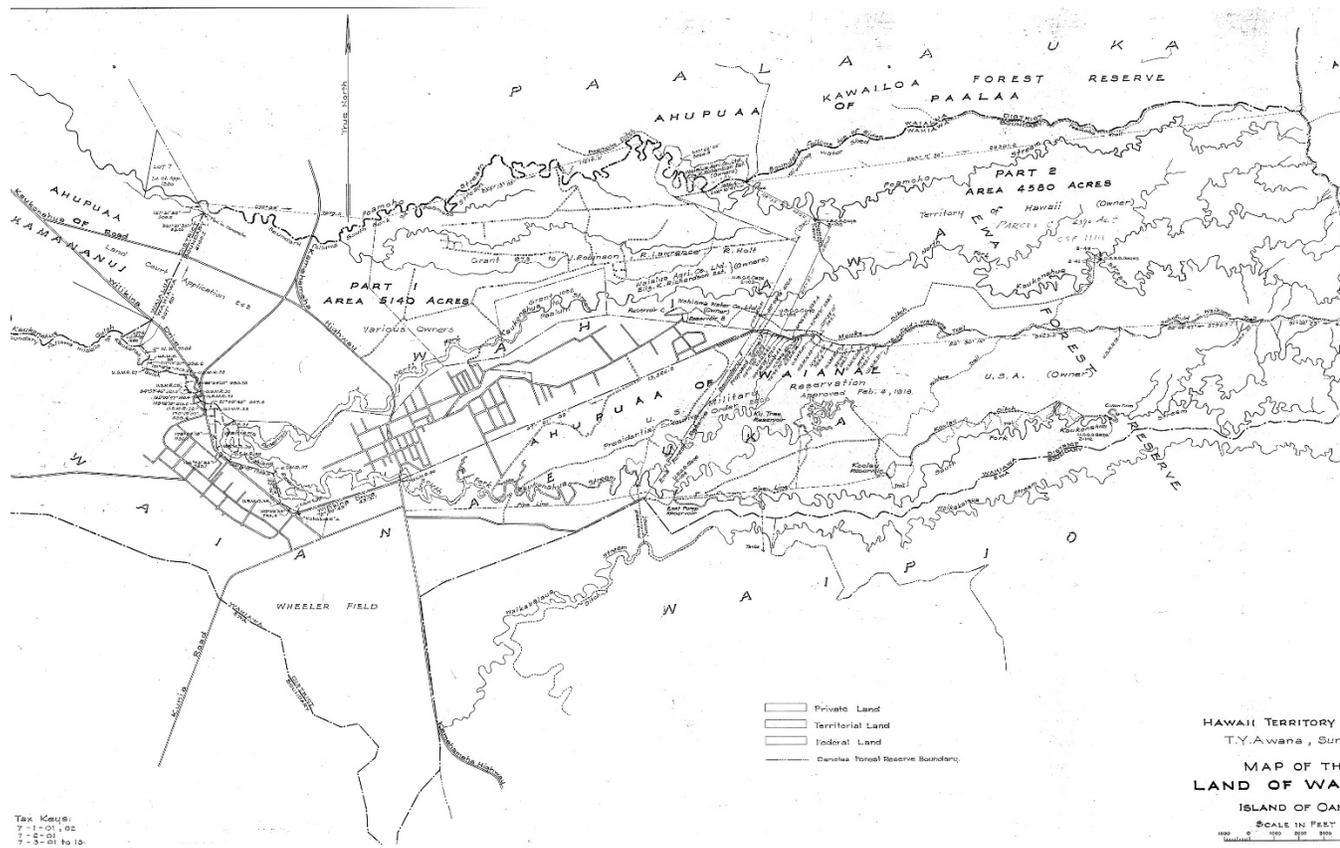


Figure 8. Territory Survey map of Wahiawā (Awana 1950).

lands eventually fell into the ownership of George Galbraith. Neither the exact date of Galbraith's purchase of the property could be found, nor whether he bought his lands all at once or if he bought it piecemeal.

Archaeological and Historic Sites

Many historic sites are located within Wahiawā, the most notable of which is Kūkaniloko, or the Birthing Stones, one of the most sacred sites on O'ahu. Kūkaniloko is comprised of a number of stones associated with royal births, and a birth there legitimized a chief's high ranking right to be a leader (Yent 1999).

The site was established in the 12th century, when Nānākāoko and his wife, Kahihokalani birthed their son, Kapawa at Kūkaniloko. This became the traditional birth site of the ali'i (Sterling and Summers 1978:139–40; James 2010:113; Beckwith 1970:377). A child born here was then taken to nearby Ho'olonopahu Heiau, the site of the sacred drums 'Ōpuku and Hāwea, that would sound the announcement of sacred births (Yent 1999:18–23). This location, as Beckwith (1970:377) notes, "is one frequently visited by thunderstorms, whose manifestations were regarded as the voice of ancestral gods of the heavens welcoming an offspring of divine rank," and it is therefore possible that the drums "simulated the voice of the deity." Kakuhihewa, later king of O'ahu, was born at Kūkaniloko, "in the sleeping place consecrated by the tabu of Liloe," and was announced according to such a ritual (Sterling and Summers 1978:139).

It is also posited that some of the stones were arranged to represent the various islands of Polynesia, and the area served as a navigational school. One of the stones, shaped somewhat like O'ahu, contains carved ridges aligned with peaks on the Ko'olau and Wai'anae mountain ranges, and these ridges cast shadows across concentric circles at the center of the stone that were likely used in an astronomical/calendrical function to tell the solstice and equinox times of the year (James 2010:114; Yent 1999:35).

Traditionally, Kūkaniloko referred to a much larger area that spanned from Waikakalaua and Līhu'e in the south, Kalena in the west, and Helemano in the north (Yent 1999:15). The central site included 36 stones aligned in two parallel rows of 18 (seats for the presiding chiefs of the island), a resting stone for the woman giving birth, and numerous other stones (Kawaharada 1999:51; Kirch 1996:35). The sitting stones from the original parallel rows of 18, many of which have bowl-like indentations, are now arranged "haphazardly in a small grove of coconut and eucalyptus trees" (James 2010:113).

The entire complex includes approximately 180 stones in a 25 x 50 m area. Petroglyphs have been recorded on three of the stones. Two of the petroglyphs are believed to be post-contact; one petroglyph, identified in Yent (1995:4) as Stone #103, features concentric circles with a dot in the center, and the stone in which the image is set contains fluted points that most likely had "an astronomical function." From Kūkaniloko, "the solstitial and equinoctial positions of the sun could be observed and marked for use as a calendar" (Yent 1999:35).

Identified by McAllister (1933:134–137) as Site 218, the .5-acre (.2-ha) Kūkaniloko site was placed on the National Register of Historic Places in 1972. In 1994, it was listed on the Hawai'i Register of Historic Places, and the size of the official site was increased to 5 acres (2 ha). In 1997, The Department of Land and Natural Resources-State Parks entered into an agreement with the Hawaiian Civic Club of Wahiawā and the Friends of Kūkaniloko, who are the recognized curators of the monument. Tom Lenchenko "placed several alignments of boulders within the 5-acre parcel to symbolize the traditions associated with the site," including the current arrangement (which is not the original) of 36 stones in two parallel rows leading to the site and the 48 stones at the western

edge of the 5-acre site (Yent 1995:14). Other improvements have been made to the site to repair damage and to help protect the site.

Ho‘olonopahu, McAllister’s Site 219 (1933:137) was a kapu place for rituals but did not necessarily have a permanent structure. The temporary structure on the sacred site, believed to have been approximately 400 m northwest of Kūkaniloko, was probably constructed of wood of the mākālei, a supernatural tree of Moloka‘i. It is said that the drums ‘Ōpuku and Hāwea were kept there (McAllister 1933:137). These sacred drums were sounded to announce an ali‘i birth at Kūkaniloko. What remained of the site was presumed destroyed by the 1920s when the land was used for pineapple (Yent 1999:18–23).

The Wahiawā Healing Stones, several rocks with healing properties, are reported to have been moved several times in fairly recent history. In Sterling and Summers (1978:141), William Galbraith recounts that his father and grand-uncle moved a stone from its original location on a river bed on the lower side of the Wahiawā Dam to Kūkaniloko to serve as the headstone of a Hawaiian chief. It was moved to Wahiawa Cemetery in 1927. James (2010:115) gives a slightly more curious account:

In the late 19th century, prompted by a dream in which the spirit of the stone addressed him, an Irish rancher by the name of George Galbraith moved the stone from a riverbed to a clearing at Kūkaniloko, where it drew many Hawaiians who experienced its curative powers. Pilgrims flocked to the sacred stones, offering prayers and gifts, and the stone was moved to a cemetery in Wahiawā, a mile away. However, the next day it appeared back at its original location. It was moved again, and again it somehow returned, people said, on its own. A third time it was moved in a wagon from which it fell and broke in two. The two stones now remained at the spot where they were placed, and became even more popular.

Two stones are now located in a Japanese crypt-like shelter near a Hindu structure, worshiped by some as a manifestation of Shiva, at a suburban housing development that was built over the former cemetery at 108 California Street. The larger stone is called Pōhaku Ho‘ola Kino or Keanianileihua, while the name of the smaller rock is not known (James 2010:115–116).

Helemano Trail (connected to the Wahiawa-Pupukea Trail, later called Drum Road) was a traditional thoroughfare near the project area (Kakesako 2002). Not much of the earlier history of the trail is known before the military extended and developed the road in the 1930s, which involved reconstructing old trails and creating new paths (Cultural Resources Section Staff 2012).

The Chinese cemetery of Wahiawā, a historic-era site, was originally located at 130 California Avenue, next to Ka‘ala School (south of the current project area). The site was reported to have been used for the burial of Dole company employees, with the last burial done in 1947. In 1972, all marked and unmarked burials were disinterred and relocated to Mililani Memorial Park (Char and Char 1988:163–164).

Previous Archaeological Studies

The earliest archaeological work in the Wahiawā region was part of McAllister’s islandwide survey (1933). Two sites were identified near the project area: Site 218, Kūkaniloko, and Site 219, Ho‘olonopahu Heiau, both described above. McAllister noted that Kūkaniloko was “one of the two famous places in the Hawaiian islands for the birth of children of tapu chiefs. The other is at Holoholoku, Wailua, Kauai” (1933:134). At the time of McAllister’s survey, Kūkaniloko was the only archaeological site on O‘ahu that was being “officially preserved” (1933:135). Ho‘olonopahu Heiau is where drums were beaten to signal the birth of an ali‘i. The site was reported as destroyed by the time of McAllister’s survey, and only pineapple lands remained (1933:137).

Modern archaeological work consists of archaeological surveys, monitoring, and other such projects. The following discussion provides information on archaeological investigations that have been carried out in the vicinity of the project area, based on reports found in the SHPD library in Kapolei, Hawai'i (Figure 9, Table 1).

A surface survey was conducted on Phase I of the Wahiawa Fresh Water Park (Griffin and Yent 1977). Structures found during the survey include a railroad trestle and the roadbed for railroad tracks, as well as a terrace complex that is either historic or historically modified. Griffin and Yent (1977) recommended contacting the Hawaiian Railway Society to determine the significance of the railroad structures. No State Inventory of Historic Places (SIHP) site numbers were assigned.

James Saifuku submitted to the SHPD several drawings of sites he had encountered along Poamoho Stream, drawn from his memory of what had been there in the 1940s (Saifuku 1987a and 1987b). Drawings and notes indicate the presence of traditional Hawaiian artifacts in the pineapple fields along Poamoho Gulch, as well as a rock wall alignment and former heiau within the gulch.

An archaeological reconnaissance survey was completed in three areas associated with Helemano family housing construction (Watanabe 1990). Work Area 1 was a waterline re-route approximately 220 m (722 ft.) long, south of the Helemano Radio Station. No cultural features were encountered. Work Area 2 was an access road corridor approximately 15 m (49 ft.) wide and 750 m (2,640 ft.) long, running through former pineapple fields to the northeast of the current project area. Excavation revealed a plow zone in the upper meter that seemed associated with seasonal field preparation. Work Area 3 was approximately 100 m², adjacent to Kamehameha Highway, also in an active pineapple field. No cultural materials were encountered there. No further archaeological work was recommended (Watanabe 1990).

An archaeological inventory survey of Galbraith Trust Lands was performed as part of an environmental impact statement to be submitted in support of a proposed development plan amendment application (Henry et al. 1992). The survey area included the current project parcels, along with additional lands in between and south toward Schofield Barracks. Survey methods included an aerial survey by helicopter, a variable-intensity ground survey, and subsurface testing. During the aerial and pedestrian surveys, two previously identified sites were documented: SIHP 50-80-04-218, Kūkaniloko, located outside of the current project area to the south, and SIHP 50-80-04-4571, a stacked rock wall outside of the current project area to the north (Henry et al. 1992:18). Saifuku (1987a) had previously identified a heiau (SIHP 50-80-04-1605) to the north of the current project area, in Poamoho Gulch, but this could not be located. Henry et al. note: "If future development plans include ground disturbance in Poamoho Stream Gulch, further efforts to locate Site 1605 may be necessary" (1992:32). No cultural deposits were found in the shovel tests.

An archaeological assessment of an exploratory well site was completed within the Board of Water Supply Corporation Yard on California Avenue (Colin and Hammatt 1994), south of the current project area. The pedestrian survey produced no findings and the area was determined to be "devoid of archaeological potential" (Colin and Hammatt 1994:7).

A cultural resources overview with an archaeological survey was conducted at the Naval Communications Center Area Master Station (Landrum et al. 1997). No pre-contact archaeological sites were identified, although it was suggested that they may be located in the gulch that was not surveyed (Landrum et al. 1997:i). Several historic buildings were documented.

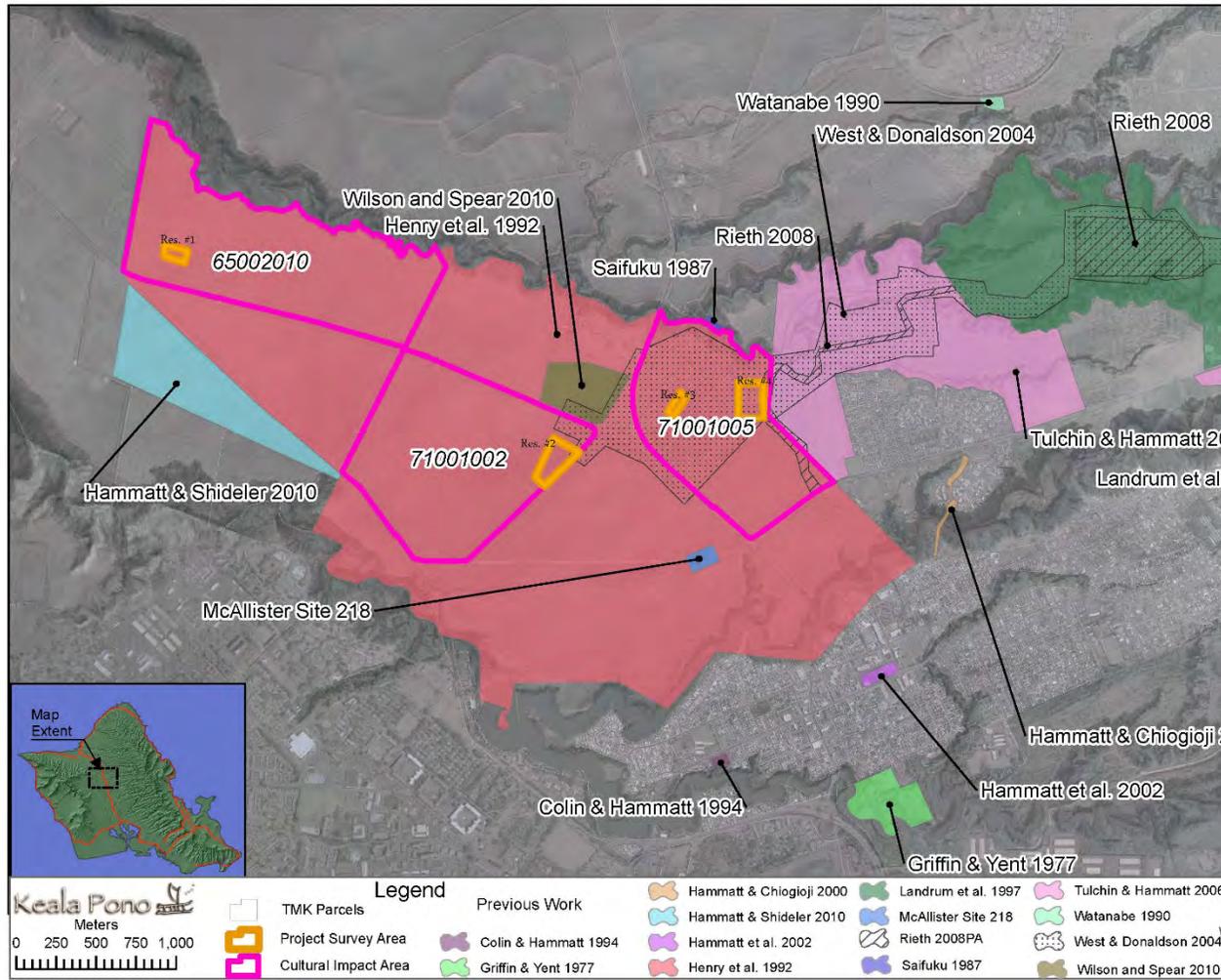


Figure 9. Location of previous studies in the vicinity of the project area.

Table 1. Previous Archaeology in Wahiawā

Author and Year	Work Completed	Findings
McAllister 1933	Islandwide Survey	Identified Site 218, Kūkaniloko, and Site 219, Ho‘olonopahu Heiau near the project area.
Griffin and Yent 1977	Archaeological Inventory Survey	Documented terraces in Kaukonahua Stream and a railroad bed.
Saifuku 1987a and b	Site Drawings	Documented several new sites, including a wall and heiau along Poamoho Stream.
Watanabe 1990	Archaeological Reconnaissance Survey	No findings.
Henry et al. 1992	Archaeological Inventory Survey	No findings.
Colin and Hammatt 1994	Archaeological Assessment	No findings.
Landrum et al. 1997	Cultural Resources Overview Survey	Documented several historic buildings.
Hammatt and Chiogioji 2000	Archaeological Assessment	No findings.
Hammatt et al. 2002	Archaeological and Cultural Impact Evaluation	No findings.
West and Donaldson 2004	Archaeological Inventory Survey	No findings.
Tulchin and Hammatt 2006	Literature Review and Field Inspection	Identified historic railroad trestle foundations.
Reith 2008	Archaeological Monitoring	No findings.
Hammatt and Shideler 2010	Archaeological Assessment	No findings.
Wilson and Spear 2010	Archaeological Inventory Survey	No findings.
Sims et al. 2011	Archaeological & Cultural Monitoring	Identified a subsurface charcoal lens.

An archaeological assessment of a 16-inch water line route connecting the Wahiawā and Whitmore Village water systems was conducted east of the current project area (Hammatt and Chiogioji 2000). No surface archaeological sites were observed. No further archaeological work and no monitoring during construction activities were recommended.

An archaeological and cultural impact evaluation for the Wahiawā Community Transit Center was completed, which involved a literature review and field inspection (Hammatt et al. 2002). The field inspection revealed no surface archaeological sites and the cultural and historic research produced no evidence of traditional, historic, or ongoing cultural practices.

An archaeological survey was conducted at the proposed location of the new Hawaii Regional Security Operations Center (HRSOC), including a new access road (West and Donaldson 2004). Surface surveys were conducted, portions of which overlap with the current project area. Subsurface testing, consisting of two shovel test units, was conducted only on military land. No cultural materials were found in the pedestrian survey or shovel tests. It was concluded that “the project area has a low potential for any archaeological resources, and no further archaeological treatment or consideration is recommended” (West and Donaldson 2004:iii).

A literature review and field inspection were done for the proposed Whitmore Village development project (Tulchin and Hammatt 2006), adjacent to the easternmost parcel of the current project area. During the field inspection, Tulchin and Hammat (2006) encountered one historic property, a series of historic railroad trestle foundations in the northeastern portion of their project area that are presumed to be part of a spur off the OR&L Helemano Extension (Tulchin and Hammatt 2006:28). No SIHP site number was given in the report. An archaeological inventory survey was recommended to further document the site.

Archaeological monitoring was performed at the HRSOC, east of the current project area (Reith 2008). No archaeological features, deposits, or artifacts were found; however, historical documents and previous archaeological studies describe a heiau and a traditional stone wall in the vicinity, suggesting “the possibility that truncated subsurface features and, more likely, agricultural features within the drainages are present” (Reith 2008:5).

An archaeological assessment was completed for a proposed composting facility in a parcel adjacent to the current project area (Hammatt and Shideler 2010). The field inspection yielded no finds. Observations indicated that the landscape had been impacted by decades of sugarcane and pineapple cultivation.

An archaeological inventory survey of 34.117 acres (13.807 ha) of former agricultural land was conducted south of Poamoho Camp (Wilson and Spear 2010). Fieldwork consisted of a pedestrian survey and 24 test excavations. The surface survey yielded no sites. Subsurface testing revealed a layer of tilled soil at 0–80 cmbs, with modern debris over a soil layer of dark reddish-brown clayey silt (Wilson and Spear 2010:7). No subsurface cultural remains were encountered and no further archaeological work was recommended.

Archaeological and cultural monitoring were conducted for the construction of the Helemano Trail, located to the west of the current project area, extending from Schofield Barracks Military Reservation to Helemano Military Reservation (Sims et al. 2011). A subsurface charcoal lens, SIHP 50-80-04-7173, was identified near the north edge of the plateau above Kaukonahua Gulch. The lens was excavated in full and two radiocarbon dates were obtained. A sample of ‘ulei dated to 371±30 BP (1440–1530 and 1550–1640 cal AD), while a sample of ‘ulu dated to 393±31 BP (1430–1530 and 1550–1630 cal AD) (Sims et al. 2011:50). The lens was interpreted as a pre-contact combustion feature (Sims et al. 2011).

Summary and Settlement Patterns

According to the Hawaiian history and culture scholar George Kanahale, the major colonization of the Hawaiian Islands occurred around AD 300 (Kanahale 1995). The initial settlers came from other Pacific Islands looking for a new home that was accessible to the sea and able to sustain their new population. Although the Central O‘ahu area was rich with fresh water and food resources, it was far upland from the canoe landing sites on the seashore and the abundance that the ocean provided. As a result, it was settled relatively late compared to the villages on the coastal areas.

While the earliest form of society throughout the Hawaiian Islands centered on extended family units headed by a number of patriarchs, as the population expanded, it evolved into a strict hierarchal class-society ruled by divine chiefs. It is suggested that the archipelago’s organization under divine chiefdoms probably first appeared around AD 800 (Kanahale 1995). The Hawaiian Islands consisted of several sovereign island kingdoms independent of each other for almost 1,000 years. During this time, different islands were consolidated under one ruler, and at other times, the chiefdoms consisting of several islands were splintered, all of this fluidity due to inter-island wars and alliances.

Regarding the project area in the present-day region of Wahiawā and upper Kamananui, its appearance on the historical record begins as the birthplace and home of the great chiefly line known as the Lō Ali‘i. Therefore, all of Central O‘ahu was a sacred region peopled by high-ranking chiefs. At the center of these chiefly lands were the hallowed grounds called Kūkaniloko.

As the birthplace and residence of the high chiefs, Central O‘ahu remained a sacred place throughout the centuries even after the O‘ahu kingdom fell to the Maui kingdom of Chief Kahekili, and the Maui kingdom subsequently fell to the Hawai‘i kingdom of Chief Kamehameha. In the late 18th century, the arrivals of Westerners to O‘ahu, first under the rule of Kahekili and then under Kamehameha, eventually brought with it incursions into Central O‘ahu for sandalwood harvesting. It also brought the infiltration of newly introduced animals such as cattle into the central uplands from ranching enterprises around the island, yet Central O‘ahu continued to be the land of the chiefs.

At the time of the Māhele, the Central O‘ahu locale of Wahiawā was not yet delineated as its own district, and the project area was within Kamananui Ahupua‘a. With the increased presence of foreign influence and interests in the islands, the 19th century ended with the overthrow of the Hawaiian monarchy by foreign residents backed by their foreign government. The overthrow was in 1893, and it was followed by American annexation in 1898.

That same year, the Waialua Agriculture Company, a sugarcane-growing enterprise, was founded, and it soon embarked on a project to dam the Central O‘ahu waters and create a massive reservoir later named Lake Wilson. With this reservoir, there was established an important irrigation system which enabled the plains of Central O‘ahu to be converted into fields of sugarcane and pineapple. In 1912, land was set aside to house pineapple plantation workers in a housing project called Poamoho Camp.

Around the same time that the sugarcane and pineapple industries were profiting from the cultivation of Central O‘ahu fields, the American military established its presence in the adjacent area of Wai‘anae Uka. The Army lands of Schofield started as Castner Village in 1909, but by 1920, most of the major construction was done, and it remains a significant military base today. Another important but smaller military installation was established in Pa‘ala‘a in 1943. This is the present-day Helemano Military Reservation, and it was designated a sub-installation of Schofield in 1956.

By the latter half of the 20th century, Central O‘ahu had seen a marked growth in its population with a corresponding increase in housing at Schofield Barracks Military Reservation, Wahiawā Town, and Whitmore Village. Poamoho Camp still exists today next to the open lands of the project area at the Galbraith Estate, and next to that, Kūkaniloko is now a historical property protected by the State of Hawai‘i (Henry et al. 1992). After raising several generations of families, this area of O‘ahu, now recognized as its own district of Wahiawā, continues to grow and prosper.

ETHNOGRAPHIC SURVEY

As we all know, there are some things that cannot be found in the archives, in textbooks, or at the library. It is here, through the stories, knowledge and experiences of our kama 'āina and kūpuna, that we are able to better understand the past and plan for our future. With the goal to identify and understand the importance of, and potential impacts to, traditional Hawaiian and/or historic cultural resources and traditional cultural practices of Wahiawā, ethnographic interviews were conducted with community members who are knowledgeable about the project area.

Methods

This Cultural Impact Assessment was conducted through a multi-phase process between October and November 2014. Guiding documents for this work include The Hawai'i Environmental Council's Guidelines for Assessing Cultural Impacts, A Bill for Environmental Impact Statements, and Act 50 (State of Hawai'i). Key personnel involved with this study include Windy McElroy, PhD, Principal Investigator of Keala Pono Archaeological Consulting, and Dietrix Duhaylonsod, BA, Ethnographer and Archival Researcher.

Consultants were selected because they met one or more of the following criteria: 1) was referred by Keala Pono Archaeological Consulting or Environmental Planning Solutions; 2) had/has ties to the project area or vicinity; 3) is a known Hawaiian cultural resource person; 4) is a known Hawaiian traditional practitioner; or 5) was referred by other cultural resource professionals. Five individuals participated in the current study. Mana 'o and 'ike shared during these interviews are included in this report.

Interviews were taped using a digital MP3 recorder. During the interviews, consultants were provided with a map or aerial photograph of the subject property, the Agreement to Participate (Appendix A), and Consent Form (Appendix B), and briefed on the purpose of the Cultural Impact Assessment. Research categories were addressed in the form of open questions which allowed the consultant to answer in the manner that he/she was most comfortable. Follow-up questions were asked based on the consultant's responses or to clarify what was said.

Transcripts were produced by listening to recordings and typing what was said. A copy of the edited transcript was sent to each consultant for review, along with the Transcript Release Form. The Transcript Release Form provided space for clarifications, corrections, additions, or deletions to the transcript, as well as an opportunity to address any objections to the release of the document (Appendix C). When the forms were returned, transcripts were corrected to reflect any changes made by the consultant. Three consultants provided written statements in lieu of or in addition to their interview transcript. Tom Lenchanko wanted his written statement used instead of his transcript, and Christophor Oliveira submitted written answers to the interview questions in addition to participating in an in-person interview with Glen Kila. Vicki Pakele opted to write a letter statement instead of having an interview.

The ethnographic analysis process consisted of examining each transcript and organizing information into research themes, or categories. Research topics include traditional land use and archaeological sites, connections to Wahiawā, mo'olelo, change through time, effects on cultural resources, and concerns and recommendations. Following the topical breakouts, letter statements by Tom Lenchanko and Vicki Pakele are reprinted in full. Edited transcripts for the other interviews are presented in Appendices D–F.

Consultant Background

The following section includes background information for each consultant. This includes information on the consultant's 'ohana and where the consultant was born and raised. If interview transcripts were completed, this is in the consultant's own words, as conveyed during the interview. Consultants include Glen Kila, Tom Lenchanko, Christophor Oliveira, Kaleo Paik, and Vicki Pakele.

Glen Kila

This is Glen Kila, and I am a kupu ka 'āina of the Wai'anae moku that extends from Wai'anae Kai, the Wai'anae Coast, to Wahiawā, or what we called in the old days, Wai'anae Uka. I am familiar of the properties in Wahiawā-Wai'anae Uka because one of my ancestors, Kahaleula, lived in Waianae Valley. And he also received properties next to this Galbraith property next to Kūkaniloko. So that's my family roots to this area.

Back in the 1960s, my grandfather Soren Nelson and my relatives, the Willet family, moved to that area called California Avenue. So as a teenager growing up, this has been part of our grounds where we grew up, next to Kūkaniloko and the streams.

Specifically, our family, the Kahaleula family, which is part of our family, received land grants to Kūkaniloko area. He was the Kahuna Nui responsible for the religious sites. His property consisted of sweet potato lands that the priest used to feed the people in Wai'anae Uka, or next to Kūkaniloko.

Later on, as I was growing up, in the area we used to frequent Kūkaniloko because we knew it was a sacred wahi pana, and so it became a part of our family heritage. We also went to Lake Wilson and through the streams over there.

Tom Lenchanko

In response to the questions asked of the community consultants, Uncle Thomas Joseph Lenchanko submitted his reply in writing. Rather than give his own personal background, Uncle Tom Lenchanko emphasizes his roots inside the project area and adjacent lands. His knowledge about the project area stems from this family connection. Speaking on behalf of Aha Kukaniloko Koa Mana Mea Ola Kanaka Maui Hawaiian Lineal Descendants, he expresses his objection to any development on their ancestral lands of Central O'ahu.

Christophor Oliveira

My name is Christophor Oliveira, I was born in October 1983 in Oahu. I moved to Nanakuli homestead at 3 and was fostered to Solomon Waiolama and Vivia Purdy. I went to Nanakuli Elementary for kindergarten and first grade. After leaving Nanakuli I lived in many different places.

My mother is Spaniard, German, Portuguese, Hawaiian and my father is Spaniard, Norwegian, Portuguese, Hawaiian. My mother's father is German Hawaiian, parents' name Edward Wilhelm and Margaret Kaheluahi from Hana and Kipahulu. My father's mother is Hawaiian, parents' name John Kealiinohomoku and Lilia Wahine Maika'i Ka'apuiki.

Kaleo Paik

...My name is Kaleo Paik, and I'm originally from Kona Hema. I was born and raised there. My high school is Konawaena High School, and when I was growing up, it's very interesting because I was born in 1951, and in that time, South Kona still had many of our kūpuna who practiced the old ways. So I was able to see for myself and witness for myself many of the old traditional ways. I moved to Honolulu, O'ahu I should say, when I went to college. So I went to the University of Hawai'i, and I stayed here ever since then. And

for about 25 years, I lived out in Mokulē‘ia, so right on Crozier Drive. So right in the midst of that, which is considered that same, Helemano, Moklē‘ia, you know, Pa‘ala Kai, and all of those places, so I got to meet people and hear a lot of the stories of the area. I think in that respect, I can connect to that property by living on that side for that many years. And I think that is what my contribution will be today. [Kaleo Paik]

My grandmother was pure Hawaiian, and she came from Keālia which is South Kona, and her parents were both from Keālia. So in that one Keālia area, I have five generations of my ‘ohana who actually were born, raised, never left. If you move further north to Nāpō‘opo‘o, it is where we originally came from, going back another ten generations. So we were right in the midst of the rise of Kalani‘ōpu‘u, rise of Kamehameha, and all of that area. So our ‘ohana and our names in our ‘ohana are Kuluwaimaka, Kahumoku, Kālua, Palakē. That is our ‘ohana from that side basically for many, many generations. [Kaleo Paik]

Vicki Pakele

In response to the questions asked of the community consultants, Aunty Vicki Pakele had a very busy schedule that prevented a sit-down interview with her. However, she did submit her reply in writing. Aunty Vicki is a community member connected with the Wahiawa Civic Club and the ‘Aha Kukaniloko organization. She introduced herself as follows:

My name is Vicki Pakele. I am of Hawaiian descent of both maternal and paternal sides. My family’s connection to the land goes back centuries. My personal link to the Hawaiian Civic Club of Wahiawa is the result of long time involvement in the conservation and protection of the Hawaiian Heritage site of Kukaniloko Birthstones State Monument including all of the 36,000 acres of kalana Kukaniloko.

Wahiawa population shares a single water resource. Sequestering significant quantities of this limited resource for the benefit for a corporate interest is a worrisome and a serious matter. Our concerns are more far reaching than simply the neighborhoods of Wahiawa.

Topical Breakouts

A wealth of information was obtained through the oral interviews. Quotes from the interviews are organized in the following sections by topic. Topical breakouts include traditional land use and archaeological sites, connections to Wahiawā, mo‘olelo, change through time, effects on cultural resources, and concerns and recommendations. Note that data from the two written statements are not included in the topical breakouts, and the statements are instead reproduced at the end of the chapter in their original form.

Traditional Land Use, Archaeological Sites

The area is part of Waianae Moku. It is in the vicinity of the remnants of Kukaniloko and also in certain sacred sites. [Christophor Oliveira]

...As I recall thirty, forty years ago, our kūpunas talked about Kūkaniloko, which those rocks that we see there [today] are only a small portion of the complex for the ali‘i. The ali‘i used it [the Kūkaniloko area] as part of their habitation, like I mentioned about my tūtū, my ancestor, he had several acres of sweet potato land. So it was part of the agricultural lots as well as religious sites. And as I recall, it went all the way down to the stream, on the Honolulu side, and then it went all the way up to the Whitmore area, to Halemano. So when we talk about Kūkaniloko, we’re talking from the ridges of Halemano, all the way down through the stream, all the way to Schofield Barracks, and also down to Poamoho. [Glen Kila]

The entire area was once Kūkaniloko and part of a much larger system called kaananiau. Rather than boundaries as emphasized in the ahupua‘a system, kaananiau is about the piko. [Christophor Oliveira]

I do not know the specific sites and the extent of the construction so I can't intellectually comment. However, I would like to point out that the places least visited are usually the most sacred and important. [Christophor Oliveira]

And we used to go up Helemano. I had a good friend was a biker, and we used to travel and go up in there, and we actually saw sites up in here that are unrecorded [pointing at Helemano on map]. And I'm sure you're going to find unrecorded sites in here as well [pointing at the project area on the map], because they are just too close in proximity to each other. But that's the one story you'd be interested in, the stones, the unmoving stones. [Kaleo Paik]

Absolutely, absolutely [there are archaeological sites in the area], and what is difficult, I think, in looking for the undocumented sites, is that some of them might be so obscured. There really needs to be a trained eye to see the relationship of what the area has, and by gathering these stories, I think you'll find that there might be a commonality, or there might be an anthropological view of it of how people traveled in these areas, because I know Wai'anae Uka, from other people, they traveled over here a lot from Wai'anae. So this was not a secretive place as far as our people knowing about it. People traveled to this place. [Kaleo Paik]

...It makes a lot of sense that you will find unrecorded sites because if you have a site like this, there have to have been other sites around to support this area. So that would be my caution and my advice. [Kaleo Paik]

...And we've seen sites up here in Schofield that really triangulates the importance to Kūkaniloko, so I'm sure you're going to see some more this way and that way. [Kaleo Paik]

It would be naïve of us to think that such a sacred site as Kūkaniloko would not have travelers traveling from all different directions, congregating and having sites along the way for them to stop, to rest, to cook their food, to prepare offerings because they would not have done it at Kūkaniloko because that's a birthing place, and there's certain protocols. So you would give all of your ceremony for your own families outside of that area and then have all of these different places for you. So I don't know specifically where they are, but I can almost guarantee, I would be 100% sure that gathering happened, because as I said, even the grandparents of people I knew, the secondhand stories all said they came up here. They would gather from up here because they had certain things that they needed, whether it was lā'au that they needed, whether it was only the mountain things that could provide for down below. But not a whole lot of people lived here. So this was really the place for gathering rather than down below where most of the people lived. I would definitely say it would be naïve for us to think that gathering did not happen in this area. And I can see, even coming from the BAX and looking at some of those site visits we went on or just listening to their conversations and looking at the pictures, I'm going. "Yeah, that's something right there." What it is I can't tell you, but I can tell you that our people would have put something there to mark paths. [Kaleo Paik]

And just to share something, people might ask, "Oh, why was the whole site special?" Well, when we isolate our view in looking at the project area, we're really limiting ourselves because that's not how our ancestors looked at our 'āina. When we look at O'ahu, we have to look at it as an ahū, and really the bigger picture and the connections and everything that goes between. [Christophor Oliveira]

I know there's an 'auwai from the plantation time that goes all the way from Kahana Valley, the tunnels that they dugged in the mountain, and it brings the water from the Ko'olaus right through this area all the way down to Waipi'o. They still get 'em actually.

If you go behind Waipi‘o Park, they still got the beds for the water channels and everything.
[Christophor Oliveira]

Connections to Wahiawā

...Living out in Mokulē‘ia area doesn’t restrict me only from that area. We did extensive hiking up in Poamoho. So we went all the way up on the trail, all the way up to the cliff, and were looking. And we were very active in community efforts. So we always had our pulse on what was going on, not just in our neighborhood, but also North Shore, going up to Wahiawā. So that whole north side from Wahiawā down was pretty much what we kept our pulse on. I was very active with the Waiālua Community Association, and I know a lot of people in the Mokulē‘ia Community Association, and of course, we always had our hands in the pot with any kind of community concerns. [Kaleo Paik]

A lot of our friends worked for Dole, so that also was a connection for us. And then there was the Galbraith Estate. I believe that they still had pineapple growing even in their lands all the way up to Schofield. Whether they leased it or not, they had all that acreage. So we were able to take private little tours in all the different areas in the subject area. It’s kinda interesting to come here and sit here today and talk about things I almost forgot about. Yeah, going back on all those old, you know, pineapple roads, getting dust in your hair, and also going up to Mount Ka‘ala. We’ve had several trips up there, overlooking the valleys, it was nice. But that would be my association here. [Kaleo Paik]

A lot of information I got was second-hand stories from people who actually had the story. Now I’m not sure how far up the family did own property, but I know that they owned a lot of Mokulē‘ia, the whole ahupua‘a coming up over Helemano and all of that, and these were the Hawaiian ancestors of modern-day Matsugoras, the Almeidas, and the Soares families. When the war came about, they [the military] took over a lot of their lands. The Dillingham Airfield, they had to give up that land and also other lands. [Kaleo Paik]

Some of the properties are still under our family, but again this is not the kuleana lands, but lands that were purchased during the 1960s. Kūkaniloko was very, very important because of its relationship to the ali‘is. So back in the 1970s, our kūpunas took me to Kūkaniloko to share the history about the area which is part of this development that you folks are looking at. Specifically with Auntie Lei Fernandez and one of our uncles, Kekawa—Papa Kekawa. So Uncle Kekawa and Auntie Lei took me to Kūkaniloko back in the ‘70s, and then they shared about the history about the area. [Glen Kila]

And so, that area that we call Kūkaniloko is just a small portion of the greater historic site called Kūkaniloko, which incorporates, right now, hundreds of acres, or even thousands of acres that was part of the piko of the ‘āina. [Glen Kila]

It is our, Koa Mana, kuleana. I am the haumana of Glen Kila, whom is haumana of ‘Imilani and Kahu o Kanenuiakea, ‘o Kane‘ilio, ‘o Kaneikapualena ‘o Kukaniloko, Kahu kula‘iwi o Wai‘anae moku. [Christophor Oliveira]

[I have acquired knowledge] mainly through my kupuna as well as personal research and professional consultations. Our ‘āina is our religion. [Christophor Oliveira]

Mo‘olelo

It’s almost never that we’re at home, we’re always traveling all over the place. Same thing with our kūpuna. They would travel from Ka‘ena over to Wai‘anae side. They would come from Mokulē‘ia, and come up the hill, coming to these areas. So the stories that they had was of their upbringing or their grandparents’ upbringing because that’s who they were talking about, really traversing through trails, coming up and down, to getting supplies from the uplands, which was more verdant than in Mokulē‘ia side. And they would come up here and get what they needed, bring it back down, and in turn, they would bring fish

from the shoreline, and bring it up to them. And they would go Ka'ena and collect salt, and they would do all these different things as a means of, not just commerce, I think commerce is a misused word here, it's more of a western sense. But in the Hawaiian sense, they would barter, [and say], "This is what I have; do you need some of this?" This area was frequented. There's also stories, and this is from McAllister, and I take whatever he has to say with a grain of salt because I'm not sure if they told him everything, misdirected him to show him only what they wanted to show him. But there were, from other sources, there were the 'aikanaka. And Poamoho—what is the one [place] right by the pineapple stand? Is that Poamoho? That is yeah? [Kaleo Paik]

And Helemano. They were in that area. So a lot of the travelers would avoid that area and hug closer to Mount Ka'ala side, come up through Kaukonahua side, and then come up to this area. So they stayed away from this side. And that is one of the stories that they shared. So it was kind of interesting to see that in the old days, how they actually traversed between districts. [Kaleo Paik]

This is what our tūpunas called the land of the mo'o, which there were several water deities of the area that we worshipped, and also [this land was] an alignment to the sun, Ka'aumakua. Going back to my tūpunas that took me over there in the 1970s, we went to pray at Ka'aumakua on the Līhu'e side, or the Helemano side, by 'Ōpae'ula area, we went all over the valley, Ko'olaus. And next to Mililani prison, which they shared with me, the goddess Kaiona, the pregnant wahine from next to Mililani Mauka, and so all of that area encompasses this area called Kūkaniloko which even the Shinto in Wahiawā, the Shinto religion also recognizes that as the piko for the universe, for Hawai'i. So when we meet with other religious groups, be it Buddhist, Hawaiian, Shinto, Christian, and all that, we share our understanding of the importance of this area. [Glen Kila]

So Kūkaniloko, all the history about our kūpunas, the ali'is being born there, the babies were taken from Kūkaniloko right after birth and sent to Wai'anae Kai to be raised because it was warm weather, it was healthier for the children to live, [there was] more protein, the fish and other protein, in Wai'anae Kai than in Wahiawā. So that place was basically used for giving birth and rituals. [Glen Kila]

We're talking about the history of the ali'i. The genealogies of all the islands, their connection to Kūkaniloko. During the time of Huanuikala'ila'i, and his daughter, one being the priestess in the Wahiawā area and the other one being the priestess or ali'i for Moloka'i, and so you're talking about 2,000 years of history in this specific area next to Kūkaniloko, and the mo'olelo of our ali'is stemming from there, such as Mailikūkahiki. Yeah, so Mailikūkahiki was the eighth ali'i aiwohi directly from Moikeha. He was born in Kūkaniloko. Hawea sounded during his birth up there. Those drums were brought back by Kila and La'amaikahiki to Hawai'i along with the hula in the beginning, the old, old sit-down style and the kā'eke drum. [Glen Kila]

So when you look at Kūkaniloko, it's not just our ancient history. Kamehameha also tried to have his son, Kauikeaouli, born at Kūkaniloko, but because what have you, Akua said, "'A'ole," so he was born in Keauhou. But just to show you how much mana that place has. Chiefess Kūkaniloko was born there, all the way back, this is like to Moikeha. The first ali'i aiwohi of Maui, Paumakua, traces back to Huanuikala'ila'i who is directly associated with there. So this is not just O'ahu's history that we're talking about. We're talking about every island's history and a whole lineage of chiefs, all of 'em. [Christophor Oliveira]

We also gotta be very careful because if we're looking at the construction sites, they're all in Wai'anae Uka, yeah? All of them. And the reason why Wai'anae is named Wai'anae is for a very specific reason. Although it's named Wahiawā now, originally it was Wai'anae. And religiously, that name says a lot about the characteristics of the land, and being that all of them [reservoirs] are in here, it's kind of worrisome. [Christophor Oliveira]

Now, however, I did hear some stories about rocks. And this is also coming from people that worked in the plantation. And they said that they went to go I think in this area here [pointing at map], at least very close to Whitmore Village, so it would be in this approximate area where they tried to move the stones. Now can you tell me where Helemano is? [Kaleo Paik]

Right here, yeah? So it's a little bit distance from it. But they were talking about bulldozing, and I believe that it was in this area, where the machine stopped. They could not move the stones. So what they did was they left the stones in place, and dug around it. And there are many, many stories of things happening in Helemano, and in this area, the same, exact things, where they would bulldoze, and they would move the rock, but the rock would be back. It happened so many times, to so many different people. I owned a drive-in down in Waialua, and so they would always come and tell me stories. The old timers would tell me stories about their days in the plantation, days when they had to work up in here or Dole, and they would always tell us the stories about the rocks, not being able to be moved. So if you look at when they used to burn the sugarcane, you'd see an area where there's just a pile of rocks, and you'd wonder why are there just these rocks and everything else is flat. But there's these rocks, but they refuse to move them because of the stories that happened with it, so they left them in place. So if anytime you see that in this particular area, I would say that that might be a sign of caution for any other development, any other farming in the area, that if they see stones that have no reason to be there except if they're all fallow all around it except for those, my suggestion would be, just leave them in place, because these have stories behind them. I know it happened in this area, between here and here [pointing at map between Helemano and Kūkaniloko]. [Kaleo Paik]

Change through Time

I'd say over a span of 30 years, I've been in the area. And over the 30 years, I have not seen the area change considerably because it was mostly in agriculture. It was in either sugarcane or pineapple, yeah? So I am not familiar with what it was prior to that. [Kaleo Paik]

However, in talking with some of the old, old timers, they would talk about riding their horses along the trails. Some of them had small little ranches, and what they would do is ride their horses up along some of those trails and come up to the uplands, which would be this area here. And they said that during their time, waters were still running in the streams. So for them, in their lifetime, they saw a huge change in water flow. Whether it be Lake Wilson, stopping the flow, diversion of water, whatever the reasons may be, they saw a huge difference in water. Their lands were starting to get drier. [Kaleo Paik]

Back in the '60s, it was overgrown, the area, sugarcane as I remember, specifically where the reservoirs are going to be constructed. Whitmore [Village], I believe, was just starting to grow or develop. It was a plantation town. Kunia was part of this development in Wahiawā. So it was basically agricultural. And there was not much going into the sugarcane area. But its close proximity to Kūkaniloko concerns me because of the reservoirs, being excavated in that area, could disturb the integrity of that area of Kūkaniloko. [Glen Kila]

And also, the stories I heard was it was highly vegetated before. It was forested. There were a lot of trees and stuff. I think they mentioned that cattle was one that kind of brought down the [vegetation of the] land, as well as feral animals. I'm not sure if it was goats, but anyway a very destructive element came in and just kind of wiped away a lot of their vegetation. And of course, the drought happened, so it dropped. But the interesting thing was hearing that the streams were running, and not just the main stream that goes by Otake Store, which comes from Lake Wilson and passes right through these areas here, but it was actually places like in between the valleys, there'd be running streams. They said they weren't like flowing, like really rough running streams. They were just meandering streams running

down, and the horses would stop, drink water. So that's a big change for them. But for my own self, I already saw it was agriculture. And I'm not sure, I never saw any streams, but you could see a lot of stream beds, lots of stream beds. So you have to wonder, where did the water go? Could be diverted, you know, to Mililani maybe, from the damming of Lake Wilson, going to other places, so therefore not enough. I'm not sure, but to hear that story, was quite interesting. [Kaleo Paik]

Effects on Cultural Resources and Practices

As far as construction, without going to the actual sites I would not be able to determine. However I am worried about the source of the water that will be used to fill these reservoirs and for what purpose. As is well-known, wai is sacred to our creator. It is critical to our faith that we manage our sacred waters from Kane, Kaneikawaiola. [Christophor Oliveira]

The source and use of the water is our biggest concern. This is the water that generations of our descendants will rely on. [Christophor Oliveira]

Also, there are concerns because when you put the reservoirs on higher ground, you gotta understand that that's where our kūpuna went too, yeah? Our kūpuna went up to the higher ground. They didn't go in the low ground. You have more of a vantage point. So whenever you build anything on high ground, you really gotta look, especially in Hawai'i. [Christophor Oliveira]

Without going to the sites and actually seeing it, my main concern is about the proximity to Kūkaniloko being that this is just a small part of this larger sacred site. I'm very concerned about that. [Glen Kila]

Several years ago, I'm not sure, but about fifteen years ago, Uncle Tom Lenchanko can give the specific dates, there was a concern about the continued rituals and practices of kupu ka 'āina, lineal descendants, using the area as a place to sanctify the next generation. And so for me, it's that we took people to that Whitmore and Halemano area, so I'm not sure if the reservoirs are going to impact those sites. I do know that during the birth of an ali'i, the sacred drums from Moikeha's family from Ra'iatea were beaten for the next generation, during the birth. [Glen Kila]

And just to add, these practices and traditions never stopped despite all of the influx of foreigners, despite the banning of the language, despite the overflow of the religions and the governments and all of that, these practices have never stopped. These traditions are still here. We have to make sure that we keep these intact. This is our religion, if you want to call it that, for lack of a better English word. [Christophor Oliveira]

That ola i ka wai underneath this 'āina is sacred water. There's a lens there. We know there's water there. Wai'anae says there's water there. Wai'anae speaks of hidden waters yeah? So we know, just by the name, we don't really need to dig to know what we have under there. We know. And if the plan is to go into that water source, I would be very mindful of doing that. You open that up to contamination when you do it. [Christophor Oliveira]

Yes, because this is the piko of our 'āina, yeah? It's similar to when they are trying to build a telescope on Mauna a Wākea, and that is the first place where the rains start to seep into the aquifer. So when we do these kinds of things, we have to be careful. This is being dug deep into the ground if it's a reservoir. This is not spraying surface chemicals on plants during agriculture. This is going into our water system. These waters flow through Wai'anae Mountain and end up as springs on our side. So we gotta be very careful. [Christophor Oliveira]

For myself, I'm very concerned about the religious aspect and cultural aspect of the development of these lands for agricultural use. I want to be sure that it doesn't impact any of the existing archaeological sites in the area. So we do need to have close cultural

monitoring or some kind of impact statement because it's very close to the piko of this island of O'ahu. [Glen Kila]

Ok, I'll give you an example [about gathering], and I don't know if you can use this, but we went to the BAX [area on Schofield] meetings, and the first thing that I told [the Schofield archaeologist] Gilda, "Do you think that our practices ended?" Because they were talking about finding organic material that was at the turn of the century, early 1900s. And I said, "Do you think we stopped our practices?" I would be surprised if you did not find any organic [material] because we still would have come over and paid our respects well into the 1900s until the Army made it harmful for us, with all of their live ammo, to traverse over these properties. [Kaleo Paik]

We just need to know and maybe fully investigate not the damage that was done but the anthropology of what our people would have done given the resources. So that's how I would kinda look at it. We need to study the migration of these people, even though they had a home somewhere, a hale somewhere, not all of what they needed was gathered in one area, so they had to go out and look for things. Let's say they had to do a ceremony, and they needed certain types of plants. Where would they go? Climb Ka'ala? Maybe. I think if people lived in Mokulē'ia, the much easier route would be around Ka'ala, come up to the saddle. Yeah? [Kaleo Paik]

I'll tell you this one story that was told to me by my cousin, and this happened in Kona. He was always sent out to get the lā'au. And it was lā'au kāhea, when you call. Now he was a young boy, and he had to go down without any light, because we're talking about the 1940s, late '30s. He would go down, and the plant would reveal itself to him. And he knew it. And he would ask [beforehand], "What is the plant? What does it look like?" And they [his elders] would tell him, "You will know." Yeah? [Kaleo Paik]

Those practices are still alive. We just are not accessing them. So if we don't have places to exercise those things, we are gonna truly lose them. So let's create those havens. And some of that was also ranchlands, so our practices and the other western practices did live together. We don't need to make it one or the other. We just need to make sure that one doesn't critically impact the other... [Kaleo Paik]

Concerns and Recommendations

Because so many concerns and recommendations were raised, this topic is broken down into several areas of discussion. These include 1) archaeological sites, archaeological monitoring, and consultation; 2) restricting development; 3) respectful, responsible development; 4) access; 5) water concerns and pesticides; and 6) avoiding the mistakes that happened at Kunia.

Archaeological Sites, Archaeological and Cultural Monitoring, Consultation

Maintaining the integrity of our sites as a whole is critical for our family. Potential developers should make a concerted effort to consult with the community and families of the area to avert any adverse effect. Not just to consult but also to respect and implement their wishes in order to develop in a way that is responsible and benefits the community that has always been there. [Christophor Oliveira]

Looking at the four reservoirs area, it's above Kūkaniloko. Although it's above, I have concerns of any excavations in the area because although it was used as plantation, they didn't really dig deep as you have to in a reservoir. [Glen Kila]

That's why we have to be very careful because although the development has changed the terrain, what we see today, it doesn't mean that that reservoirs are outside Kūkaniloko. What it means is that that whole area can incorporate the religious site, the birthing place wahi pana, so we need to look at the height. [Glen Kila]

So whenever you disturb 'āina, or excavate, we gotta be really careful, especially near this area because you don't know, even if it was developed by plantation, you're not sure what's under one, two, three feet. I'm almost sure there's going to be monitoring, or there's going to be sites that we have to be really careful for monitoring. So during that time when they would protest against the military, the Stryker force, over several hundreds of Hawaiians gathered over there, and for our families, we recognized the various lineal descendants from Wahiawā, Wai'anae Kai, they were blessed over there. And throughout the years, our kumu hula, our people that were leaders were blessed at Kūkaniloko. And so my concern is that I would like to see where the development is going to be because it might be a major part of where the sites are. [Glen Kila]

So I'll reiterate the point on getting somebody who is trained in this specific area. Too often we have a lot of ka po'e Hawai'i, and they're put in a lot of areas, and they don't necessarily understand the specifics of the area. They know a generalized view of the culture, but not the actual specific practices. I would also want that cultural consultant to come from an NHO [native Hawaiian organization] and not be paid directly to that person, but rather to the NHO. This is just so we stay pono with our kūpuna in the area, and we make sure that the person there is going to be pono because if there is cultural monitoring, I believe the money should go back to the community, and the person monitoring should be an advocate for their community not an employee. This is one of the ways that we can avoid conflicts of interest between our culture and the current system that is now in place. [Christophor Oliveira]

I would like to echo that. That's very important for us to look at individual kuleana, their responsibility to the history and to the 'āina and also to the 'ohana, the 'ohana's kuleana. By having an NHO monitor and all that, then you know that people are responsible for the culture. [Glen Kila]

And just one suggestion, if we were to go and look for somebody, it would be only kuleana for it to go to the people who steward the land as of now. So when I refer to NHOs and these type of things, I'm talking about Wahiawā Civic Club, Uncle Tom Lenchanko, and that they decide. [Christophor Oliveira]

My major emphasis is again having the families that reside there, making the appropriate monitoring and recommendations for the safekeeping of this area, the integrity of not just throwing anything up there. So our recommendation goes back to Uncle Tom Lenchanko as the kahu for Kūkaniloko and the Wahiawā Civic Club as the caretakers of the area to be consulted throughout the development of agricultural lots as well as reservoirs in the area. And also to tell the community that the State is responsible to include the community in the development of these parcels. [Glen Kila]

Ok, be at the table. In other words, Keala Pono, be at the table. Be at the table at DPP. Be at the table of the State when they want to do their planning so that they have a clear understanding, from a professional standpoint, some of the areas that need it. See right now they're not at the table. They're not. The developer is at the table. And I think that that needs to change. The only way you can change that is from the very top. It's to have that, from the governor, go down to his minions, and their minions go down to their super-minions, and on and on and on. But that's the only way to make that kind of change. I don't think it's impossible. I don't think it's asking a lot. I think it can be done. We have the right people. [Kaleo Paik]

We'd prefer an on-site visit, specifically to look at the terrain, and for us it's to look at the directions. There are some traditions that we know will specifically tell us where the major features are. You might not see it above ground now, but it's there underneath if you didn't disturb too much. So that's the major thing, like I said or what Chris mentioned, these ceremonies continue to now, in recognizing the different families or masters, people that will continue the traditions of the kanaka maoli and the history. [Glen Kila]

And also if they do go forward with building it, an actual on-site cultural monitor that is not going to be doing anything else but monitoring, somebody who is trained and who actually knows what they are looking for because without these people, construction guys don't really know, and there are too much times that people get hurt because they didn't know. So it would be in the best interest of everybody, including the workers and our families and the developers, that an on-site trained cultural consultant be there during construction. [Christophor Oliveira]

I believe that without actually seeing the sites, on-site, we wouldn't know what we're talking about as far as access goes. So in order to answer that question, I would believe we would need to actually have a site visit to actually see what the specific area is. [Christophor Oliveira]

Restricting Development

Let me say that we are not against progress. We really are not against development or anything like that. Usually we're a little bit more flexible on these types of things. But because the project area is such a sensitive place to us, our history, our traditions, I could see the only way of lessening the impact is not building it. However, the surface area was used previously. We understand that. A lot of our sites that would have been there are gone to history. Still though, we gotta remember that our ancestors lived here for thousands of years, thousands. So things accumulate, especially when you're growing sugarcane, the sugarcane die, burning, everything goes up, then people are moving things, things fall over, yeah there is no way to minimize the impact. [Christophor Oliveira]

When I say, too, about not developing over there, I'm serious about that, only because of the, again reiterating, the close proximity. My question is, "Why there?" There must be other places, there must be a reason why you folks have selected those four areas. Is it because of existing infrastructures during the plantation time that has water means in that area? It just seems awkward for me to put three, four reservoirs in this specific area. If they're serious, they should have been spaced out more appropriately. It just doesn't make sense to have it right there unless there's a reason. [Glen Kila]

Now if they're gonna use it for agriculture, which means that they're going to subdivide it up into more independent farmers, if they're gonna lease it out, the only thing I would say is, "Do not let it be 'gentleman farming'." In other words, the state has to be very cautious because with 'gentleman farming' comes structures, come buildings, comes different types of things, rather than agriculture. So I think that the developer needs to have a very clear idea of exactly what the measure of the agricultural purposes will be because that will determine the impact on the land. If you have farming, it's a much lower impact than you would have if they build structures to process their crops, or like bottling or drying or any of those other kinds of things. That would be the key—to find out what is the limit of their agricultural purposes. [Kaleo Paik]

Respectful, Responsible Development

And we would also like to talk about responsible and respectful development. Whoever is gonna be developing this land really, really needs to take a good look at what is happening with Kunia right now. Aunty Sheila Valdez and Uncle Tom and everybody have been fighting for that for ages now, five, six years going on. And now it comes to a head where the project is being stopped. So just on another note, besides cultural, please be respectful and responsible when developing. If you do that, you'll avoid all kinds of headaches. [Christophor Oliveira]

And also the City and County Permitting and Planning Office, they're very flexible to most developers. I would ask any developer, out of just respect and kuleana and responsibility, even though you can get away with it, please don't. [Christophor Oliveira]

Keeping the human footprint smaller than the agricultural one by a large percentage. 90% to 10% is more my idea instead of 60/40. [Kaleo Paik]

I'll say this is a general rule that I have for anything I look at. I'm not against development. What I am against is poorly planned development, in other words, a developer that does not take into account, not just their project, but the entire area of which they will impact. [Kaleo Paik]

So let's say that this will be used for agriculture. And yet, right here is all the military, and all the housing, and all of these other things. This impacts this [pointing at map]. I'm sorry you can't see this on the tape recorder, but what happens in Schofield definitely impacts the project area not just in physical contact, but also in atmospheric. You know with all the bombing, with all the leveling of this area in the BAX area, it has caused an incredible amount of erosion which to me is a direct effect on what's happening here. Whatever this project develops, and how it develops, must be very cognizant of the needs, not of us, but of the future. We need to think much further ahead than they are right now and see what kind of practices can be here, and I'm talking about agricultural practices. [Kaleo Paik]

Access

Ok, now if it's agricultural land, the access should not be a problem, even if it's leased land, because you're not having to deal with roadways, you're not having to deal with houses. You're having to deal with making a pathway which doesn't impact much. So access would be very easy to do to these sites once it's agriculture. But if you have roadways, and you have this, and you have that in between, then you have a problem with people going, "Well this is my private driveway. Oh I'm sorry, but you're going straight through my garage area." And then people have a little bit more cautiousness. But if it's in a field, and you say, "Ok, we're gonna dedicate a pathway to this site, with a boundary around it of so many feet." And then it's plausible, and you can have it anywhere, anytime. They can come on that public access road, park their cars, whatever, go in, come out. And even if they want to secure it because of the thefts, agricultural theft is really huge, you can still have a guard there, but the guards do not have to be asinine. They can be understanding that these are people who are going for their religious practices and going to visit sites. I think we need to educate others how to behave to us and our practices. [Kaleo Paik]

Now for our traditional practices, we need to have full access, not just to gather, but to protect things we need for our ceremonies. And if things can only grow in a certain area, a certain elevation, those things should be set aside, at least an area where we can start to propagate them again, so we can use our ancestral traditional lau for our practices. So far no one has done that. And I think that that's something that we can do here, because it's a large enough area, that they set aside some areas that they deem to be culturally good to produce back some of the things we need. Collecting water that has not touched the ground, how are we gonna do that, unless we have an area that foliage will collect for us, so we need to start really thinking of things in that nature. And as I said, I hope this can be a model, and hopefully with the political change, hopefully in the right direction, we can influence top leaders. And I can say this on tape because I said this in public, when I talked to [gubernatorial candidate] David Ige, I said, "We need to have change from the very top. We need to have change in decision makers because they're the ones who are limiting our access." We're supposed to have access to our sites, but we have to have a lawsuit just to practice our right. I don't think that's fair. So I'm thinking that if we use this as an example and we set aside areas, we really are cognizant of the cultural, the traditional comes first, and then live in harmony with each other, it's not about one or the other. [Kaleo Paik]

Water Concerns, Pesticides

The digging of the reservoirs, even though they're marked here right now, they may or may not have to be changed depending on what is found. But also, I believe that agriculture

brings back to the aquifers more than it takes out. People don't realize. They say, "Oh well, you know, farming requires more water than a development." But for a development, their water goes straight to the sewer. Agriculture percolates down right into the aquifers. That's what we want. We want to have a sustainable aquifer. Having agriculture helps us to do that. So that's the only thing I would be concerned about, the extent. [Kaleo Paik]

With that in mind, if it's purely agricultural, without too much structure, like I'm gonna have a 5 acre parcel, but a large portion of that is going to be used for humans, you know, instead of farming, then I think we have a problem. But if we have a clear understanding that this project is to promote agriculture and to provide crops, then I think we have a real good model for other places to follow. Who knows? If we do well enough and re-vegetate our uplands closer to Ka'ala, we may be able to bring back some of our rain that we're losing, and bring back the water, bring back our springs, bring back all those that have dried up. I think it's a domino effect on what we are trying to achieve at least, but as I said, I'm not real sure exactly what the sites are. We'd have to go on the property itself and you know, we go by our HPS yeah? Hawaiian Positioning System. We feel the sites. [Kaleo Paik]

And also with the existing infrastructure, I mean, they brought water from the Ko'olau through there already. We know this was done. We can actually go and see the whole channel that goes all the way to the holes in the back of Kahana Valley below Ka'aumakua. So like my kumu said, "Why the reservoirs?" [Christophor Oliveira]

And also, it being ag land, I don't know how this can be done, but the use of chemicals on this 'āina, you know, is it ag land like Monsanto ag land? Or is it individual plots for small time farms? Or is it big companies? If it's big companies, and they're spraying these things in our soil, you gotta understand that this is at the top, the piko of our 'āina, and all of that stuff is gonna spread outward and radiate to every side. [Christophor Oliveira]

Avoiding What Happened at Kunia

I think the only other issue would be making sure that these reservoirs do not happen like at Kunia, where it's falling apart. It's actually eroding out. I think it's so incredible. And the damage that reservoirs do is so huge. So the concern I would have is that these reservoirs are really researched—double, triple, quadruple times over—for impact before they're even considered as a site, because to build a reservoir, it's not just a reservoir. You have to have the land mass around it, in so much footage around it, in order to make sure it sustains the water. It's a really big impact. So that would be the only concern. Other concerns, I don't know except, you know, it would directly affect people in this area here, people coming and going to this area. [Kaleo Paik]

Well, my dad was actually in the Soil Conservation, so I grew up traveling with him, and so I got to see a lot of things. And one of the things about reservoirs is, if you're gonna build up a reservoir, like they did in Kunia, you have to be darn sure that it doesn't erode. You need to have ground cover immediately. You need to try to shore up your edgings along the way because if not, you're gonna have the runoff. And because it's not "packed in soil", it's just going to be easy for it to [erode]. Water coming down will make big huge gorges. So that's building up a reservoir. So in other words, if you're on a promontory like this (pointing to map), here's your reservoir, it starts off on solid ground, but then you have to build up. And I'm not sure how these will be. These might be ground level, but you'll still need a berm of some kind. [Kaleo Paik]

That's the problem. So ground cover needs to happen, or some kind of netting, something to keep the soil in place. And I think that what happened in Kunia was just so many violations of good practice. It was like, wow they bulldozed a road and had the sides, 45-degree angle. You cannot do that, you know, the collapse of that [is bound to happen]. They even tell you that in [making] trenches, you go 6 feet down, they tell you, "Oh, you're gonna have to have so much [of an angle]," and yet these guys. It was like crazy. So

anyway, I just don't want to see that happen. Kunia should be an example of what not to do for reservoirs. And as a matter of fact, there may be some historical data on ancient [types], not just wells, but keepers of water. So that might be a research item to look at. [Kaleo Paik]

Yeah, so I know in the news we hear a lot about permitting and all of these other violations. But the impetus to all of this was culture. The reason why Kunia got into the place it is was because the developers refused to listen to the families of the area. The developers refused to take our advice. The developers hid our iwi, illegally. The developers broke nearly every law. So this is one of our greatest worries. It's not just residential developments that can ruin 'āina, it can be agricultural developments, too. [Christophor Oliveira]

Yeah, there are laws regarding the agricultural lots, that it's to be used for raising animals or for growing plants for food. What happened at Kunia is that it was used as a land banking where developers or families were purchasing these [agriculturally zoned] properties with the intent to develop it for smaller home lots. So from five-acre subdivision lots, they went down and resold and redivided them into one-acre, and even the one-acre lots were redivided to smaller lots of 10,000 square feet. So it became a land grab. It became a no-man's land where people that had money could purchase these farm lots and could subdivide it and make millions of dollars from these kinds of uncontrolled developments. So our concern is that if it's for agricultural, then the laws to protect agricultural enterprises need to be adhered to and not used for other developments. [Glen Kila]

Statement from Tom Lenchanko

In lieu of publishing transcripts from his interview, Tom Lenchanko provided a letter statement of his view of the project. The statement is reproduced in full below.

November 06, 2014

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

Agribusiness Development Corporation
235 South Beretania Street
Honolulu, Hawaii 96813

Akinaka & Associates
3375 Koapaka Street B206
Honolulu, Hawaii 96819

Environmental Planning Solutions
945 Makaiwa Street
Honolulu, Hawaii 96816

OBJECTION : Proposed reservoir project land north of Wahiawa...

**Hawaiian Traditional Cultural Property [Analysis] kalana Līhu`e, Wahiawā, Halemano...
36,000 acres O`ahu Island, Ko Hawaii Pae Aina, H.I. the Hawaiian Islands.**

Regarding: The State of Hawaii to reveal and affirm clear, unbroken chain of ownership to the subject parcel; and to prove transfer of "exclusive territorial jurisdiction" of

Kingdom of Hawaii, Hawaiian National Government land throughout the Hawaiian Archipelago to the United States of America; interpolation by foreign cultural resource management, cultural anthropologists and professional archaeologists; their remiss to include our Hawaiian perspectives of ontology, cosmology and epistemology articulated by the erudition of our family's deep ancestral connection to the genesis of our homeland; adverse effects, imminent harm and irreparable injury to our family's inheritance and traditional comprehension for our Hawaiian National Treasures.

Subject: Testimony for our family complexes iloko a me iwaho [within and without] relative contiguous property set, thereupon, a 36,000 acre region – kalana Lihu'e, Wahiawa, Halemano – as described within and without the ka'anani'au, O'ahu island, Ko Hawaii Pae Aina, H.I.; and perpetual access to affirm their connectivity, as well as ours, to all components of our traditional comprehension, cultural property and its celestial view plane throughout the heavens.

he pule ho'ola'a ali'i [an ancient prayer for the dedication of an ali'i to the gods].

Our family's inheritance in perpetuity oia ua `ike a `aia la [so it is, this is known. there it is] no thing is older than Kukaniloko and those family members whom are buried in our homeland. apa`akuma iwiawaloa wahi huna kele [a place for secreting Hawaiian human remains from the earliest line, ho`ali'i, descendants from the gods].

`ike pono a me ho'oia`i`o pule paulele [a prayer of faith to verify the truth and to know it is right and just]. Acknowledging that we are the hereditary guardian of our family's inheritance situated within and without the ka'anani'au, O'ahu island. Respectfully, he Hawaii au [I am Hawaiian] since time immemorial, time eternal. We are taught by kupuna ma [our elders] and those of whom came even before them, a prayer petitioning na aumakua o ka po [gods of the dim antiquity] a me na aumakua o ke ao [and the gods of the traditional times] to send forth a child, a child of character, strength and vision possessing the mental acumen moral rectitude imbued from on high to lead our people, our nation, toward a life filled with peace and prosperity. `eli`eli kau mai [may profound reverence alight].

ua `a`e lakou i luna o kahi la`a [they trespass upon a sacred place, they broke an agreement, law, kapu (a family privilege without the intrusion of a stranger)]. wahi mana pili pono [places of exact and concise supernatural power, mana] ka'anani'au [navigation points set on the land] their relationship to the celestial view plane of the Constellation Orion and their relative placement upon O'ahu island. These ancient structures though they may have succumbed to deterioration and deliberate, irreparable injury there remains kilipue na kupuna ma [embrace those ancients we choose to follow].

wahi mana pili pono na ka'anani'au – oahunui e maunauna, maunauna e puu kuua, puu kuua e kulihemo, kulihemo e kanewai, kanewai e leina kauhane, leina kauhane e halahape, halahape e oio, oio e halemano, halemano e paupalai, paupalai e halawa, halawa e hawea, hawea e kou... ho`ohewahewa mauiauhonua malama o pa `oe [to fail to recognize descendants of old ali'i of the land, be careful lest it be disastrous to you, a warning not to break a kapu].

Our family's expansive view of the cultural landscape on O'ahu island and the celestial posture of the stars and planets in the heavens draws from the cosmogonic and genealogical origins of the Kumuuli, Kumulipo, Ololo, Paliku and others, and highlights the connectivity of our traditional comprehension of cultural sites within and without the vast region of the ka'anani'au. This described land determination predates and is superimposed upon the moku and ahupua`a system of land division and tenure, circa the 10th century. The land within and without the ka'anani'au perpetuates all that is seen and unseen, the genesis of our homeland. Reaffirmed in 1891 Hawaiian Annual “ The divisions of the land were to a great extent made on rational lines, following a ridge, the bottom of a ravine or depression, but were often without these and sometimes in disregard of them. Sometimes a stone or rock known to the aboriginals

and notable for some tradition, or sacredness, marks a corner or determines a line. The line of growth of a certain kind of tree, herb or grass, the habitat of a certain kind of bird sometimes made a division. Certain persons were specially taught and made the repositories of this knowledge, which was carefully delivered from father to son.” Any disturbance to our land will disrupt the perpetuation of our family’s inheritance. `ike aina , malama aina , aloha aina [know your family, care for your family, love your family].

As the life giving waters fall as rain from the heavens, cascading down along the mountains sides, into the rivers and streams fulfilling our family’s subsistence/sustenance, nurturing our loi kalo and loko ea and out into the extreme ocean, to once again return to fall as rain from the heavens... we continue our petition na aumakua o ka po a me na aumakua o ke ao...

apa`akuma a me iwiawaloa [Hawaiian human remains from the earliest line, ho`ali`i, descendants from the gods] of critical note, mana [supernatural power] of a traditional cultural property remains for all time despite the unauthorized removal of its guardian, physical features and structures. We contend to not merely preserve our family’s traditional comprehension, but to perpetuate the integrity of the generation upon generation of Hawaiian Nationals domiciled and buried within the 36,000 acre region –kalana Lihue, Wahiawa, Halemano and the ka`anani`au.

“In the old days the inheritance of the family burial place, the caves and secret burial places of our ancestors, was handed down from these to their descendants, without the intrusion of a single stranger unless by consent of the descendant, so that whenever a death occurred the body would be conveyed to its inheritance. These immovable barriers belonged to the burial rights for all time. The rule of kings and chiefs and their land agents might change, but the burial rights of the family survived on their land.” Ke Au Oko`a 1869 reaffirms our family’s traditional practice. We are the living evidence of those who came before us and now have become the land we manage and care for.

kahamalu`ihi – kaho`owahaokalani – kauakahiakaho`owaha a me mahuluanuiokalani na pua kukealaikauaokalani kunuiakea kuali`i – peleioholani a me kamakaimoku na pua kalanikumaieiwakamoku a me kalanikupuapaikalaninui...Criterion by association.

no ka noho aina ka aina [Land was given to people by the ali`i. Should members of the family go elsewhere, the one who dwelled on the land was considered the owner. A returning family member was always welcome, but the one who tilled the soil was recognized as holding the ownership].

We, Aha Kukaniloko Koa Mana mea ola kanaka maui Hawaiian descendants, OBJECT to the adverse effects, imminent harm and irreparable injury to our family inheritance kalana Lihue, Wahiawa, Halemano... and relative contiguous traditional cultural property, O`ahu Island, Ko Hawaii Pae Aina, H.I. the Hawaiian Islands.

he `ulaleo eia no ka `ula la
[a calling appeal a sacred thing is this]
Hawaiian ontology, cosmology and epistemology

Thomas Joseph Lenchanko, Hawaiian National 11/06/2014
kahuakai ola ko laila waha olelo Aha Kukaniloko Koa Mana mea ola kanaka maui
na`au koa au pono e makaneole kalimapau pili aloha

Statement from Vicki Pakele

Vicki Pakele provided a letter statement instead of participating in an in-person interview. Her letter is reproduced in full below:

Welina, E Ulukoa,

Hope the Holiday Thanksgiving was with family and friends.

I deeply appreciate your patience and time, to compose my letter.

With profound consideration, I too, stand firmly with Uncle Tom and Uncle Glen with their comprehension and questions opposing the reservoirs in Wahiawa and Waialua.

There are three main concerns regarding the proposal to construct new water reservoirs in the Wahiawa/ Waialua area of O'ahu.

Water is a finite resource on the island. Current demand by independent farmers and residents for available water exceeds the available supply.

In order for additional reservoirs to be filled, the water will by necessity be diverted from existing users; thereby, decreasing their supply and increasing farmers.

There is no proposal benefit to existing residents and farmers. The only proposal industrial agriculture is the production of GMO seed crop necessitating the excessive saturation of the ground water with highly toxic herbicidal chemicals. This form of agriculture poisons the land and is opposed by the majority of inhabitants of the island and the state.

Proceeding with these proposed environmental modifications is tantamount to an act of treason and sabotages the health, welfare and economic base of the community.

The disregarding for ancient cultural heritage sites compounds the evil of this proposal.

EO!

Mahalo,
Vicki

Summary of Ethnographic Survey

A total of five ethnographic interviews were conducted with individuals knowledgeable about Wahiawā: Glen Kila, Tom Lenchanko, Christophor Oliveira, Kaleo Paik, and Viki Pakele. The consultants are all knowledgeable of cultural resources and traditional practices and beliefs associated with the study area. They continue to actively work toward preservation and perpetuation of Hawaiian practices and/or resources in the region.

The interviewees discussed the traditional importance of the project lands, which focused on the sacred site Kūkaniloko. They also noted that Kūkaniloko was not limited to its modern boundaries and once covered a larger area. They shared their 'ohana background and connections to the project lands and noted that Wahiawā has seen many changes over time, particularly with regard to stream flow and vegetation.

The consultants expressed a wide range of concerns regarding construction of the proposed reservoirs. They stated that the reservoirs will adversely affect places of cultural significance, and recommended that the reservoirs should not be built or that archaeological and cultural monitoring is implemented during construction.

CONCLUSIONS AND RECOMMENDATIONS

The project lands played an important role in Hawai‘i in both the traditional and historic past. A rich corpus of background information was found for the region, including place names and their meanings, ‘ōlelo no‘eau, mo‘olelo, information on land use in traditional and historic times, and data from archaeological work. Adding significantly to this is the information shared during the oral history interviews and within the consultants’ written statements. The consultants for this project all have strong ties to the region, and offered important insight into the history of the area.

Cultural Resources, Practices, and Beliefs Identified

Research and ethnographic survey compiled for the current study revealed that the project area was a culturally significant region as the birthplace and home of the great chiefly line known as the Lō Ali‘i. Therefore, all of Central O‘ahu was a sacred area peopled by high-ranking chiefs. At the center of these chiefly lands were the hallowed grounds called Kūkaniloko. As the birthplace and residence of the high chiefs, Central O‘ahu remained a revered place throughout the centuries.

Community members who are knowledgeable of the cultural resources of the study area provided their ‘ike which identified significant cultural practices that continue to today. One consultant noted the importance of preserving areas “not just to gather [plants], but to protect things we need for our ceremonies.” It was asserted that the Kūkaniloko site is much more extensive than generally recognized today, and that buried cultural resources might lie beneath the surface.

Traditional religious practices are still carried out in the project lands. One consultant reaffirmed this with the following statement:

...These practices and traditions never stopped despite all of the influx of foreigners, despite the banning of the language, despite the overflow of the religions and the governments and all of that, these practices have never stopped. These traditions are still here. We have to make sure that we keep these intact. This is our religion, if you want to call it that, for lack of a better English word.

Potential Effects of the Proposed Project

Consultants expressed concern over several resources that may be affected by construction of the proposed reservoirs. Resources that might be affected include Kūkaniloko, other known and previously undocumented cultural sites, as well as the wai and ‘āina (water and land).

Confidential Information Withheld

After one of the interviews was completed, a consultant asked to not have the interview transcribed and published. The consultant provided a written statement instead. During the course of researching the present report and conducting the ethnographic survey program, this is the only confidential information that was withheld.

Conflicting Information

No conflicting information was obvious in analyzing the gathered sources. On the contrary, a number of themes were repeated and information was generally confirmed by independent sources.

Recommendations/Mitigations

The consultants had many reservations about the construction of the proposed reservoirs. Their recommendations for mitigation are summarized here:

- not constructing the reservoirs at all
- restricting or limiting development
- practicing respectful and responsible development
- implementing a program of archaeological and cultural monitoring during construction
- resolving claims regarding the legitimacy of land conveyance and ownership
- allowing continued access to places of cultural significance
- avoiding what happened in Kunia (erosion/runoff, dishonesty, land banking)
- offering site visits so further information can be obtained before plans move forward
- continuing to consult with interested parties

One consultant summarized the significance of the region as follows:

...That area that we call Kūkaniloko is just a small portion of the greater historic site called Kūkaniloko, which incorporates, right now, hundreds of acres, or even thousands of acres that was part of the piko of the 'āina.

GLOSSARY

‘ae	Yes, to say yes, or to agree, approve, or consent.
ahu	A shrine or altar.
ahupua‘a	Traditional Hawaiian land division usually extending from the uplands to the sea.
‘āina	Land.
akua	God, goddess, spirit, ghost, devil, image.
ali‘i	Chief, chiefess, monarch.
‘a‘ole	No, never, not; to have none.
‘auwai	Ditch, often for irrigated agriculture.
boulder	Rock 60 cm and greater.
California grass	The invasive <i>Brachiaria mutica</i> that forms dense stands up to 2 m tall.
cobble	Rock fragment ranging from 7 cm to less than 25 cm.
gravel	Rock fragment less than 7 cm.
hale	House.
haumana, haumāna	Student, apprentice..
heiau	Place of worship and ritual in traditional Hawai‘i.
‘ike	To see, know, feel; knowledge, awareness, understanding.
iwi	Bone.
ka po‘e Hawai‘i	The people of Hawai‘i.
kāhea	To call, cry out, or invoke.
kahu	Honored attendant, guardian, nurse, keeper, administrator, pastor.
kahuna nui	High priest and councilor to a high chief.
kalo	The Polynesian-introduced <i>Colocasia esculenta</i> , or taro, the staple of the traditional Hawaiian diet.
kama‘āina	Native-born.
kanaka maoli	A person of pure Hawaiian blood.
kapu	Taboo, prohibited, forbidden.
kauwā	Outcast or slave caste within the traditional Hawaiian social hierarchy.
konohiki	The overseer of an ahupua‘a ranked below a chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights.
Kū	The Hawaiian god of war.
kula	Plain, field, open country, pasture, land with no water rights.
kuleana	Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.
kumu	Teacher.

kumu hula	Hula teacher/master.
kupu	Sprout, growth, offspring; to rise suddenly; a supernatural being or spirit.
kupuna	Grandparent, ancestor; kūpuna is the plural form.
lā‘au	Medicine, medical, trees, plants.
lau	Leaf, greens.
lo‘i, lo‘i kalo	An irrigated terrace or set of terraces for the cultivation of taro.
lua	The ancient style of fighting involving the breaking of bones, dislocation of joints, and inflicting pain by applying pressure to nerve centers.
luakini	Large heiau of human sacrifice.
mahalo	Thank you.
Māhele	The 1848 division of land.
maka‘āinana	Common people, or populace; translates to “people that attend the land.”
makai	Toward the sea.
mākālei	A supernatural tree of Moloka‘i Island; parts of its root were placed near fishpond gates to attract fish.
mana	Divine power.
mana‘o	Thoughts, opinions, ideas.
mauka	Inland, upland, toward the mountain.
mō‘ī	King.
moku	District, island.
mo‘o	Lizard, dragon, water spirit.
mo‘olelo	A story, myth, history, tradition, legend, or record.
‘ohana	Family.
ola	Life, health, livelihood.
‘ōlelo no‘eau	Proverb, wise saying, traditional saying.
olonā	The native plant <i>Touchardia latifolia</i> , traditionally used for making cordage.
piko	Navel; summit; center.
pono	Correct, proper, good.
pu‘uhonua	Place of refuge.
sandalwood	Iiliahi (<i>Santalum</i>), several varieties endemic to Hawai‘i. Known for their aromatic wood and medicinal qualities. Heavily exported in the 1800s.
stone	Rock fragment ranging from 25 cm to less than 60 cm.
tūtū	Grandmother or grandfather.
‘uala	The sweet potato, or <i>Ipomoea batatas</i> , a Polynesian introduction.
‘ūlei	The native shrub <i>Osteomeles anthyllidifolia</i> , the berries of which were eaten, sewn into lei, and used to make lavender dye, and its hard wood used to produce a variety of implements.

‘ulu	The Polynesian-introduced tree <i>Artocarpus altilis</i> , or breadfruit.
‘ulu maika	Stone used in the maika game, similar to bowling.
wahi pana	Sacred places or legendary places that may or may not be kapu, or taboo.
wahine	Woman, wife; femininity. Wāhine is the plural.

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APPENDIX A: AGREEMENT TO PARTICIPATE

Agreement to Participate in the Cultural Impact Assessment for the Wahiawā Galbraith Estate Reservoirs Project

Dietrix J. U. Duhaylonsod, Ethnographer, Keala Pono Archaeological Consulting

You are invited to participate in a Cultural Impact Assessment (CIA) of the Galbraith Estate Reservoirs Project in Wahiawā, on the island of O‘ahu (herein referred to as “the Project”). The Project is being conducted by Keala Pono Archaeological Consulting (Keala Pono), a cultural resource management firm, on behalf of Environmental Planning Solutions. The ethnographer will explain the purpose of the Project, the procedures that will be followed, and the potential benefits and risks of participating. A brief description of the Project is written below. Feel free to ask the ethnographer questions if the Project or procedures need further clarification. If you decide to participate in the Project, please sign the attached Consent Form. A copy of this form will be provided for you to keep.

Description of the Project

This CIA is being conducted to collect information about Wahiawā and the subject properties in the central region of O‘ahu Island, through interviews with individuals who are knowledgeable about this area, and/or about information including (but not limited to) cultural practices and beliefs, mo‘olelo, mele, or oli associated with this area. The goal of this Project is to identify and understand the importance of any traditional Hawaiian and/or historic cultural resources, or traditional cultural practices in properties on the current subject properties. This Assessment will also attempt to identify any affects that the proposed development may have on cultural resources present, or once present within the Project area.

Procedures

After agreeing to participate in the Project and signing the Consent Form, the ethnographer will digitally record your interview and it may be transcribed in part or in full. The transcript may be sent to you for editing and final approval. Data from the interview will be used as part of the ethno-historical report for this project and transcripts may be included in part or in full as an appendix to the report. The ethnographer may take notes and photographs and ask you to spell out names or unfamiliar words.

Discomforts and Risks

Possible risks and/or discomforts resulting from participation in this Project may include, but are not limited to the following: being interviewed and recorded; having to speak loudly for the recorder; providing information for reports which may be used in the future as a public reference; your uncompensated dedication of time; possible misunderstanding in the transcribing of information; loss of privacy; and worry that your comments may not be understood in the same way you understand them. It is not possible to identify all potential risks, although reasonable safeguards have been taken to minimize them.

Benefits

This Project will give you the opportunity to express your thoughts and opinions and share your knowledge, which will be considered, shared, and documented for future generations. Your sharing of knowledge may be instrumental in the preservation of cultural resources, practices, and information.

Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected upon request. You may request, for example, that your name and/or sex not be mentioned in Project material, such as in written notes, on tape, and in reports; or you may request that some of the information you provide remain off-the-record and not be recorded in any way. To ensure protection of your privacy, confidentiality and/or anonymity, you should immediately inform the ethnographer of your requests. The ethnographer will ask you to specify the method of protection, and note it on the attached Consent Form.

Refusal/Withdrawal

At any time during the interview process, you may choose to not participate any further and ask the ethnographer for the tape and/or notes. If the transcription of your interview is to be included in the report, you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

APPENDIX B: CONSENT FORM

Consent Form

I, _____, am a participant in the Galbraith Estate Reservoirs Project Cultural Impact Assessment (herein referred to as “Project”). I understand that the purpose of the Project is to conduct oral history interviews with individuals knowledgeable about the subject property and Wahiawā, in the central region of O‘ahu Island. I understand that Keala Pono Archaeological Consulting and/or Environmental Planning Solutions will retain the product of my participation (digital recording, transcripts of interviews, etc.) as part of their permanent collection and that the materials may be used for scholarly, educational, land management, and other purposes.

_____ I hereby grant to Keala Pono and Environmental Planning Solutions ownership of the physical property delivered to the institution and the right to use the property that is the product of my participation (e.g., my interview, photographs, and written materials) as stated above. By giving permission, I understand that I do not give up any copyright or performance rights that I may hold.

_____ I also grant to Keala Pono and Environmental Planning Solutions my consent for any photographs provided by me or taken of me in the course of my participation in the Project to be used, published, and copied by Keala Pono and Environmental Planning Solutions and its assignees in any medium for purposes of the Project.

_____ I agree that Keala Pono and Environmental Planning Solutions may use my name, photographic image, biographical information, statements, and voice reproduction for this Project without further approval on my part.

_____ If transcriptions are to be included in the report, I understand that I will have the opportunity to review my transcripts to ensure that they accurately depict what I meant to convey. I also understand that if I do not return the revised transcripts after two weeks from the date of receipt, my signature below will indicate my release of information for the draft report, although I will still have the opportunity to make revisions during the draft review process.

By signing this permission form, I am acknowledging that I have been informed about the purpose of this Project, the procedure, how the data will be gathered, and how the data will be analyzed. I understand that my participation is strictly voluntary, and that I may withdraw from participation at any time without consequence.

Consultant Signature	Date

Print Name	Phone

Address	

Thank you for participating in this valuable study.

APPENDIX C: TRANSCRIPT RELEASE

Transcript Release

I, _____, am a participant in the Cultural Impact Assessment for the Galbraith Estate Reservoirs Project (herein referred to as “Project”) and was interviewed for the Project. I have reviewed the transcripts of the interview and agree that the transcript is complete and accurate except for those matters delineated below under the heading “CLARIFICATION, CORRECTIONS, ADDITIONS, DELETIONS.”

I agree that Keala Pono Archaeological Consulting and/or Environmental Planning Solutions may use and release my identity, biographical information, and other interview information, for the purpose of including such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading “OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS.”

CLARIFICATION, CORRECTIONS, ADDITIONS, DELETIONS:

OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

Consultant Signature

Date

Print Name

Phone

Address

APPENDIX D: INTERVIEW WITH GLEN KILA AND CHRISTOPHOR OLIVEIRA

TALKING STORY WITH

GLEN KILA (GK) and CHRISTOPHOR OLIVEIRA (CO)

Oral History for the Wahiawa reservoirs project at Galbraith Estate by Dietrix Duhaylonsod (DD)

For Keala Pono 10/13/2014

DD: Aloha, today is Monday, October 13, 2014. We're sitting at Zippy's Kapolei, with Uncle Glen Kila and his nephew Chris Oliveira. We'd like to thank them for taking the time to talk story with us regarding the building of reservoirs in Wahiawā at the Galbraith Estate.

We've talked story with Uncle before, and so we have some background about him that he shared previously, and we will add that [background information] in later, then we'll let Uncle look that over to see if it's okay, so we're gonna go straight to talking about the property area. So once again, thank you, Uncle, and Chris, for coming down. Aloha. GK: Aloha. This is Glen Kila, and I am a kupu ka 'āina of the Wai'anae moku that extends from Wai'anae Kai, the Wai'anae Coast, to Wahiawā, or what we called in the old days, Wai'anae Uka. I am familiar of the properties in Wahiawā-Wai'anae Uka because one of my ancestors, Kahaleula, lived in Waianae Valley. And he also received properties next to this Galbraith property next to Kūkaniloko. So that's my family roots to this area.

Back in the 1960s, my grandfather Soren Nelson and my relatives, the Willet family, moved to that area called California Avenue. So as a teenager growing up, this has been part of our grounds where we grew up, next to Kūkaniloko and the streams.

DD: Thank you Uncle. Could you spell that name Soren Nelson?

GK: Soren is s-o-r-e-n. Soren. Nelson. n-e-l-s-o-n. Soren Nelson.

DD: Mahalo Uncle.

So Uncle is sharing his association to the property that we are talking about today. Uncle, if maybe, could you mention any ways that you may have acquired certain knowledge or just 'ike of this area that we're talking about?

GK: Specifically, our family, the Kahaleula family, which is part of our family, received land grants to Kūkaniloko area. He was the Kahuna Nui responsible for the religious sites. His property consisted of sweet potato lands that the priest used to feed the people in Wai'anae Uka, or next to Kūkaniloko.

Later on, as I was growing up, in the area we used to frequent Kūkaniloko because we knew it was a sacred wahi pana, and so it became a part of our family heritage. We also went to Lake Wilson and through the streams over there.

Some of the properties are still under our family, but again this is not the kuleana lands, but lands that were purchased during the 1960s. Kūkaniloko was very, very important because of its relationship to the ali'is. So back in the 1970s, our kūpunas took me to Kūkaniloko to share the history about the area which is part of this development that you folks are looking at. Specifically with Auntie Lei Fernandez and one of our uncles, Kekawa—Papa Kekawa. So Uncle Kekawa and Auntie Lei took me to Kūkaniloko back in the '70s, and then they shared about the history about the area.

And so, that area that we call Kūkaniloko is just a small portion of the greater historic site called Kūkaniloko, which incorporates, right now, hundreds of acres, or even thousands of acres that was part of the piko of the 'āina.

DD: Thank you Uncle for sharing that.

As far as you remember and your experiences there, could you share how the area has changed, like how it used to be and how it's different now?

GK: Back in the '60s, it was overgrown, the area, sugarcane as I remember, specifically where the reservoirs are going to be constructed. Whitmore [Village], I believe, was just starting to grow or develop. It was a plantation town. Kunia was part of this development in Wahiawā. So it was basically agricultural. And there was not much going into the sugarcane area. But its close proximity to Kūkaniloko concerns me because of the reservoirs, being excavated in that area, could disturb the integrity of that area of Kūkaniloko.

Chris, do you want to add?

CO: I know there's an 'auwai from the plantation time that goes all the way from Kahana Valley, the tunnels that they dugged in the mountain, and it brings the water from the Ko'olaus right through this area all the way down to Waipi'o. They still get 'em actually. If you go behind Waipi'o Park, they still got the beds for the water channels and everything.

I'll write some of the stuff down about some of the sites, so that way I can gather my thoughts.

DD: Ok, thank you for that, for putting together your thoughts regarding the placement of these.

And Uncle was mentioning that Kūkaniloko encompasses a larger area? Would you be able to kind of illustrate maybe some of the boundaries so that people can get a better grasp on what it means that Kūkaniloko is smaller or larger?

GK: Ok, as I recall thirty, forty years ago, our kūpunas talked about Kūkaniloko, which those rocks that we see there [today] are only a small portion of the complex for the ali'i. The ali'i used it [the Kūkaniloko area] as part of their habitation, like I mentioned about my tūtū, my ancestor, he had several acres of sweet potato land. So it was part of the agricultural lots as well as religious sites. And as I recall, it went all the way down to the stream, on the Honolulu side, and then it went all the way up to the Whitmore area, to Halemano. So when we talk about Kūkaniloko, we're talking from the ridges of Halemano, all the way down through the stream, all the way to Schofield Barracks, and also down to Poamoho.

This is what our tūpunas called the land of the mo'o, which there were several water deities of the area that we worshipped, and also [this land was] an alignment to the sun, Ka'aumakua. Going back to my tūpunas that took me over there in the 1970s, we went to pray at Ka'aumakua on the Līhu'e side, or the Halemano side, by 'Ōpae'ula area, we went all over the valley, Ko'olaus. And next to Mililani prison, which they shared with me, the goddess Kaiona, the pregnant wahine from next to Mililani Mauka, and so all of that area encompasses this area called Kūkaniloko which even the Shinto in Wahiawā, the Shinto religion also recognizes that as the piko for the universe, for Hawai'i. So when we meet with other religious groups, be it Buddhist, Hawaiian, Shinto, Christian, and all that, we share our understanding of the importance of this area.

Looking at the four reservoirs area, it's above Kūkaniloko. Although it's above, I have concerns of any excavations in the area because although it was used as plantation, they didn't really dig deep as you have to in a reservoir. So Kūkaniloko, all the history about our kūpunas, the ali'is being born there, the babies were taken from Kūkaniloko right after birth and sent to Wai'anae Kai to be raised because it was warm weather, it was healthier for the children to live, [there was] more protein, the fish and other protein, in Wai'anae Kai than in Wahiawā. So that place was basically used for giving birth and rituals.

DD: Mahalo Uncle, mahalo for sharing that.

So to clarify, looking at the map, when you say these reservoirs are above Kūkaniloko, are you meaning the smaller portion of Kūkaniloko as designated by the state site? Because when you mention the larger Kūkaniloko, it looks like some of these reservoirs are within that larger Kūkaniloko area that you were talking about. Is that correct?

GK: That is correct. That's why we have to be very careful because although the development has changed the terrain, what we see today, it doesn't mean that that reservoirs are outside Kūkaniloko. What it means is that that whole area can incorporate the religious site, the birthing place wahi pana, so we need to look at the height. If Chris can share where the [reservoir] sites are, like is it on the hillside? All of these things need to be taken into consideration. You want to comment, Chris?

CO: Not really a comment, I have more questions as to like where the water would be coming from to fill the reservoirs because from the map that we have, it looks like a lot of 'em [the reservoirs] are on top of mounds or hills, understandably for gravity and downflow, but I was just wondering where would the water be to fill it up, where it's coming from.

Also, there are concerns because when you put the reservoirs on higher ground, you gotta understand that that's where our kūpuna went too, yeah? Our kūpuna went up to the higher ground. They didn't go in the low ground. You have more of a vantage point. So whenever you build anything on high ground, you really gotta look, especially in Hawai'i.

DD: Mahalo for that, Chris, and we'll ask about where the water source is going to be coming from, and we'll get back to you. Mahalo for those comments.

Ok, so concerning this place, do you have any personal anecdotes or mo'olelo, mele, place names, any other things that you'd like to share about this specific area, Uncle?

GK: We're talking about the history of the ali'i. The genealogies of all the islands, their connection to Kūkaniloko. During the time of Huanuikala'ila'i, and his daughter, one being the priestess in the Wahiawā area and the other one being the priestess or ali'i for Moloka'i, and so you're talking about 2,000 years of history in this specific area next to Kūkaniloko, and the mo'olelo of our ali'is stemming from there, such as Mailikūkahi.

CO: Yeah, so Mailikūkahi was the eight ali'i aiwohi directly from Moikeha. He was born in Kūkaniloko. Hawea sounded during his birth up there. Those drums were brought back by Kila and La'amaikahiki to Hawai'i along with the hula in the beginning, the old, old sit-down style and the kā'eke drum.

So when you look at Kūkaniloko, it's not just our ancient history. Kamehameha also tried to have his son, Kauikeaouli, born at Kūkaniloko, but because what have you, Akua said, "A'ole," so he was born in Keauhou. But just to show you how much mana that place has. Chiefess Kūkaniloko was born there, all the way back, this is like to Moikeha. The first ali'i aiwohi of Maui, Paumakua, traces back to Huanuikala'ila'i who is directly associated with there. So this is not just O'ahu's history that we're talking about. We're talking about every island's history and a whole lineage of chiefs, all of 'em.

DD: Mahalo, mahalo for definitely sharing the mana and the significance of this place, thank you, I appreciate it.

So we usually ask about any traditional sites in the area, but it sounds like the whole area is considered a traditional site, would that be correct, rather than picking out this little site or that site?

GK: Yes.

CO: ‘Ae. And just to share something, people might ask, “Oh, why was the whole site special?” Well, when we isolate our view in looking at the project area, we’re really limiting ourselves because that’s not how our ancestors looked at our ‘āina. When we look at O‘ahu, we have to look at it as an ahu, and really the bigger picture and the connections and everything that goes between.

DD: Thank you for sharing that.

Ok, so for this development, do you think it would affect any place of cultural significance or affect access to a place of cultural significance?

GK: Without going to the sites and actually seeing it, my main concern is about the proximity to Kūkaniloko being that this is just a small part of this larger sacred site. I’m very concerned about that.

Several years ago, I’m not sure, but about fifteen years ago, Uncle Tom Lenchanko can give the specific dates, there was a concern about the continued rituals and practices of kupu ka ‘āina, lineal descendants, using the area as a place to sanctify the next generation. And so for me, it’s that we took people to that Whitmore and Halemano area, so I’m not sure if the reservoirs are going to impact those sites. I do know that during the birth of an ali‘i, the sacred drums from Moikeha’s family from Ra‘iatea were beaten for the next generation, during the birth.

So whenever you disturb ‘āina, or excavate, we gotta be really careful, especially near this area because you don’t know, even if it was developed by plantation, you’re not sure what’s under one, two, three feet. I’m almost sure there’s going to be monitoring, or there’s going to be sites that we have to be really careful for monitoring. So during that time when they would protest against the military, the Stryker force, over several hundreds of Hawaiians gathered over there, and for our families, we recognized the various lineal descendants from Wahiawā, Wai‘anae Kai, they were blessed over there. And throughout the years, our kumu hula, our people that were leaders were blessed at Kūkaniloko. And so my concern is that I would like to see where the development is going to be because it might be a major part of where the sites are.

CO: And just to add, these practices and traditions never stopped despite all of the influx of foreigners, despite the banning of the language, despite the overflow of the religions and the governments and all of that, these practices have never stopped. These traditions are still here. We have to make sure that we keep these intact. This is our religion, if you want to call it that, for lack of a better English word.

DD: Mahalo very much for that, you both bring up the topic of practicing traditions, and that is actually the next question, whether or not there are traditional practices, if they are in the area, and if so, how they would be affected. So it’s nice that you led into it by mentioning it.

Uncle mentioned sites being underneath and monitoring for them, so how would you see the checks and balances on that?

GK: We'd prefer an on-site visit, specifically to look at the terrain, and for us it's to look at the directions. There are some traditions that we know will specifically tell us where the major features are. You might not see it above ground now, but it's there underneath if you didn't disturb too much. So that's the major thing, like I said or what Chris mentioned, these ceremonies continue to now, in recognizing the different families or masters, people that will continue the traditions of the kanaka maoli and the history.

CO: And also if they do go forward with building it, an actual on-site cultural monitor that is not going to be doing anything else but monitoring, somebody who is trained and who actually knows what they are looking for because without these people, construction guys don't really know, and there are too much times that people get hurt because they didn't know. So it would be in the best interest of everybody, including the workers and our families and the developers, that an on-site trained cultural consultant be there during construction. Mahalo.

DD: Thank you for sharing that. I would like to continue on that, but first I'd like to finish that earlier question about access. That earlier question also asked about thoughts on how this development would affect access to sites. And then we'll return to what you just brought up regarding monitoring. Are there any thoughts concerning this development affecting access?

CO: I believe that without actually seeing the sites, on-site, we wouldn't know what we're talking about as far as access goes. So in order to answer that question, I would believe we would need to actually have a site visit to actually see what the specific area is.

GK: Looking at the map, I see these wiggly lines and shaded areas, are those the streams?

CO: This is the stream [pointing at the map]. That's the boundary. This is Wahiawā.

DD: This is Pa'ala'a [pointing at the map].

CO: This is Poamoho Gulch. And so you see, Waialua is on this side of that line?

GK: Oh, I see.

CO: Wahiawā is on this side. Wahiawā goes right through here.

GK: Can you paraphrase what you asked me again?

DD: Yeah, ok, so we're talking about if this development would affect any places of cultural significance, and also, if this would affect any access.

GK: I know that when we went to Helemano, we had to go through Whitmore. And so that's why we're not sure how far the road is. The access, I'm not sure.

CO: Can I just make one more comment that I just noticed? We also gotta be very careful because if we're looking at the construction sites, they're all in Wai'anae Uka, yeah? All of them. And the reason why Wai'anae is named Wai'anae is for a very specific reason. Although it's named Wahiaiwā now, originally it was Wai'anae. And religiously, that name says a lot about the characteristics of the land, and being that all of them [reservoirs] are in here, it's kind of worrisome.

DD: Yes, thank you for bringing that up because a lot of people don't realize that this is part of Wai'anae Uka now that Wahiaiwā is the name, so thank you.

Let's return then to the site monitoring. Were you suggesting an on-site visit to get a better feel for exactly where everything is situated and the flow of things? And the other thing is on-site monitoring by somebody who is competent, is that correct?

GK: Yes.

CO: Yes.

DD: Are there any other thoughts that you'd like to add regarding an on-site visit or the on-site monitoring?

CO: So I'll reiterate the point on getting somebody who is trained in this specific area. Too often we have a lot of ka po'e Hawai'i, and they're put in a lot of areas, and they don't necessarily understand the specifics of the area. They know a generalized view of the culture, but not the actual specific practices. I would also want that cultural consultant to come from an NHO [native Hawaiian organization] and not be paid directly to that person, but rather to the NHO. This is just so we stay pono with our kūpuna in the area, and we make sure that the person there is going to be pono because if there is cultural monitoring, I believe the money should go back to the community, and the person monitoring should be an advocate for their community not an employee. This is one of the ways that we can avoid conflicts of interest between our culture and the current system that is now in place.

GK: I would like to echo that. That's very important for us to look at individual kuleana, their responsibility to the history and to the 'āina and also to the 'ohana, the 'ohana's kuleana. By having an NHO monitor and all that, then you know that people are responsible for the culture.

CO: And just one suggestion, if we were to go and look for somebody, it would be only kuleana for it to go to the people who steward the land as of now. So when I refer to NHOs and these type of things, I'm talking about Wahiaiwā Civic Club, Uncle Tom Lenchanko, and that they decide.

DD: Thank you for sharing those, Chris and Uncle. Thank you very much for explaining that.

Are there any other ways you can foresee lessening any possible adverse effects of this reservoir project?

CO: Let me say that we are not against progress. We really are not against development or anything like that. Usually we're a little bit more flexible on these types of things. But because the project area is such a sensitive place to us, our history, our traditions, I could see the only way of lessening the impact is not building it. However, the surface area was used previously. We understand that. A lot of our sites that would have been there are gone to history. Still though, we gotta remember that our ancestors lived here for thousands of years, thousands. So things accumulate, especially when you're growing sugarcane, the sugarcane die, burning, everything goes up, then people are moving things, things fall over, yeah there is no way to minimize the impact. [chuckling] I'm sorry.

GK: When I say, too, about not developing over there, I'm serious about that, only because of the, again reiterating, the close proximity. My question is, "Why there?" There must be other places, there must be a reason why you folks have selected those four areas. Is it because of existing infrastructures during the plantation time that has water means in that area? It just seems awkward for me to put three, four reservoirs in this specific area. If they're serious, they should have been spaced out more appropriately. It just doesn't make sense to have it right there unless there's a reason.

CO: And also with the existing infrastructure, I mean, they brought water from the Ko'olaus through there already. We know this was done. We can actually go and see the whole channel that goes all the way to the holes in the back of Kahana Valley below Ka'aumakua. So like my kumu said, "Why the reservoirs?"

DD: Ok, we will see if we can get an answer to that, the question being, "Why those spots were specifically chosen and how that is associated perhaps with previous infrastructure?"

CO: I just wanted to know, is it just reservoirs? Or are there going to be pumps? I would think there would be pumps to get the water into the reservoir. And that leaves me to a further question, where is the water being pumped from? And then another question, why tap into a new water source when you have an existing one, if that's the case?

DD: The existing water source you're talking about being?

CO: The existing water source being the old water source used by the plantation in Whitmore Village and all the way through.

DD: Ok, right. So also you're asking where the water is being tapped from, right?

CO: [nod]

DD: Ok, did either of you want to expand on any concerns regarding that?

CO: Yes, I do actually. That ola i ka wai underneath this 'āina is sacred water. There's a lens there. We know there's water there. Wai'anae says there's water there. Wai'anae speaks of hidden waters yeah? So we know, just by the name, we don't really need to dig to know what we have under there. We know. And if the plan is to go into that water source, I would be very mindful of doing that. You open that up to contamination when you do it.

DD: Thank you, thank you for sharing that. So to reiterate, the reason you're asking where the water is being tapped from is because you'd be opposed to opening and possibly contaminating the water lens beneath, is that correct?

CO: Yes, because this is the piko of our 'āina, yeah? It's similar to when they are trying to build a telescope on Mauna a Wākea, and that is the first place where the rains start to seep into the aquifer. So when we do these kinds of things, we have to be careful. This is being dug deep into the ground if it's a reservoir. This is not spraying surface chemicals on plants during agriculture. This is going into our water system. These waters flow through Wai'anae Mountain and end up as springs on our side. So we gotta be very careful.

DD: Mahalo.

GK: Yeah, I'm just looking at the alignments of the reservoirs. So I'm wondering if that's using the canals coming off of the Ko'olau?

CO: See I don't know until I get there.

GK: There must be a reason. And are these reservoirs in the 2,000 acres of Galbraith property that was purchased by the state? Is that the reason why they have it so close to this area? Because that's where the development is for agriculture.

CO: And we would also like to talk about responsible and respectful development. Whoever is gonna be developing this land really, really needs to take a good look at what is happening with Kunia right now. Aunty Sheila Valdez and Uncle Tom and everybody have been fighting for that for ages now, five, six years going on. And now it comes to a head where the project is being stopped. So just on another note, besides cultural, please be respectful and responsible when developing. If you do that, you'll avoid all kinds of headaches.

GK: For myself, I'm very concerned about the religious aspect and cultural aspect of the development of these lands for agricultural use. I want to be sure that it doesn't impact any of the existing archaeological sites in the area. So we do need to have close cultural monitoring or some kind of impact statement because it's very close to the piko of this island of O'ahu.

CO: And also, it being ag land, I don't know how this can be done, but the use of chemicals on this 'āina, you know, is it ag land like Monsanto ag land? Or is it individual plots for small time farms? Or is it big companies? If it's big companies, and they're

spraying these things in our soil, you gotta understand that this is at the top, the piko of our 'āina, and all of that stuff is gonna spread outward and radiate to every side.

GK: All the water lenses will be contaminated.

DD: Mahalo, mahalo for sharing that. It sounds like some things happened in Kunia. What in particular do you want us to be aware of regarding Kunia?

CO: Yeah, so I know in the news we hear a lot about permitting and all of these other violations. But the impetus to all of this was culture. The reason why Kunia got into the place it is was because the developers refused to listen to the families of the area. The developers refused to take our advice. The developers hid our iwi, illegally. The developers broke nearly every law. So this is one of our greatest worries. It's not just residential developments that can ruin 'āina, it can be agricultural developments, too.

GK: Yeah, there are laws regarding the agricultural lots, that it's to be used for raising animals or for growing plants for food. What happened at Kunia is that it was used as a land banking where developers or families were purchasing these [agriculturally zoned] properties with the intent to develop it for smaller home lots. So from five-acre subdivision lots, they went down and resold and redivided them into one-acre, and even the one-acre lots were redivided to smaller lots of 10,000 square feet. So it became a land grab. It became a no-man's land where people that had money could purchase these farm lots and could subdivide it and make millions of dollars from these kinds of uncontrolled developments. So our concern is that if it's for agricultural, then the laws to protect agricultural enterprises need to be adhered to and not used for other developments.

CO: And also the City and County Permitting and Planning Office, they're very flexible to most developers. I would ask any developer, out of just respect and kuleana and responsibility, even though you can get away with it, please don't.

DD: Mahalo. Thank you for pointing out these things at Kunia. Thank you for sharing that.

Are there any other concerns that you can think of that we haven't brought up regarding the project?

GK: My major emphasis is again having the families that reside there, making the appropriate monitoring and recommendations for the safekeeping of this area, the integrity of not just throwing anything up there. So our recommendation goes back to Uncle Tom Lenchanko as the kahu for Kūkaniloko and the Wahiawā Civic Club as the caretakers of the area to be consulted throughout the development of agricultural lots as well as reservoirs in the area. And also to tell the community that the State is responsible to include the community in the development of these parcels.

DD: Mahaaaalo, Uncle, we'll make sure to annotate that, to keep the Wahiawā Civic Club, Uncle Tom and the community in the loop.

Are there any other kūpuna, kama‘āina, descendants you can think of that might be willing to share their mana‘o of this area?

GK: Kauila Clark.

DD: Kauila Clark, ok.

GK: I’m not sure what his number is, right now I don’t have it.

DD: Maybe you could send it to me some time later?

GK: Yes, because his family is kupu ka ‘āina. They’re part of our family, but his family never left this area. Anybody else, Chris?

CO: That’s the only person I can think of.

GK: I know there was Uncle Ha‘o. So Uncle Tom can probably share with you some of the old time families that were recognized at the Kūkaniloko family ceremonies that we had.

DD: Ok.

GK: Mahalo.

DD: Mahalo ia ‘olua.

Uncle Glen Kila and our brother Chris Oliveira, we’d just like to thank you again, this has been my pleasure talking story with you both. We really appreciate. Thank you for taking the time, mahalo, take care, and aloha.

GK: Aloha.

CO: Aloha.

APPENDIX E: INTERVIEW WITH CHRISTOPHOR OLIVEIRA

Have you read the Agreement To Participate? Yes

Do you have any questions before we begin? No

Will you please sign the Consent Form. Yes

1) To start please tell us about yourself...Name? Where/When you were born? Where you grew up? Where you went to school?

My name is Christophor Oliveira, I was born in October 1983 in Oahu. I moved to Nanakuli homestead at 3 and was fostered to Solomon Waiolama and Vivia Purdy. I went to Nanakuli Elementary for kindergarten and first grade. After leaving Nanakuli I lived in many different places.

2) Could you tell us about your 'ohana/family background?

My mother is Spaniard, German, Portuguese, Hawaiian and my father is Spaniard, Norwegian, Portuguese, Hawaiian. My mother's father is German Hawaiian, parents' name Edward Wilhelm and Margaret Kaheluahi from Hana and Kipahulu. My father's mother is Hawaiian, parents' name John Kealiinohomoku and Lilia Wahine Maika'i Ka'apuiki.

3) What is your association to the subject property (family land, work place, etc.)?

It is our, Koa Mana, kuleana. I am the haumana of Glen Kila, whom is haumana of 'Imilani and Kahu o Kanenuiakea, 'o Kane'ilio, 'o Kaneikapualena 'o Kukaniloko, Kahu kula'iwi o Wai'anae moku.

4) What are the ways you have acquired special knowledge of this area (from your 'ohana, personal research, specific sources)?

Mainly through my kupuna as well as personal research and professional consultations. Our 'āina is our religion.

5) As far as you remember and your experiences, how has the area changed? Could you share how it was when you were young and how it's different now?

N/A I have not lived long enough to witness significant change in that area. I have seen minor changes but I think this is probably a question for kupuna.

6) Could you share your mana 'o relevant to the area around the area of the proposed reservoirs and the surrounding Wahiawā area (personal anecdotes, mo'olelo, mele, oli, place names, etc.)?

The area is part of Waianae Moku. It is in the vicinity of the remnants of Kukaniloko and also in certain sacred sites.

7) Do you know of any traditional sites which are or were located on the Project site--for example: historic sites, archaeological sites and/or burials? Please elaborate.

The entire area was once Kukaniloko and part of a much larger system called kaananiau. Rather than boundaries as emphasized in the ahupua'a system, kaananiau is about the piko.

8) Do you think the proposed development would affect any place of cultural significance or access to a place of cultural significance? Please elaborate.

As far as construction, without going to the actual sites I would not be able to determine. However I am worried about the source of the water that will be used to fill these reservoirs and for what purpose. As is well-known, wai is sacred to our creator. It is critical to our faith that we manage our sacred waters from Kane, Kaneikawaiola.

9) Are you aware of any traditional gathering practices at the Project area and within the surrounding area of Wahiawā, both past and ongoing?

I do not know the specific sites and the extent of the construction so I can't intellectually comment. However, I would like to point out that the places least visited are usually the most sacred and important.

10) While development of the area continues, what could be done to lessen the adverse effects on any current cultural practices in the area?

Sorry but this question assumes that development will continue and will adversely effect cultural practice. It does not mention cultural properties. Maintaining the integrity of our sites as a whole is critical for our family. Potential developers should make a concerted effort to consult with the community and families of the area to avert any adverse effect. Not just to consult but also to respect and implement their wishes in order to develop in a way that is responsible and benefits the community that has always been there.

11) Are you aware of any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the Project site and surrounding Wahiawā area?

The source and use of the water is our biggest concern. This is the water that generations of our descendants will rely on.

12) Do you know of any other kūpuna, kama'āina or cultural/lineal descendants who might be willing to share their mana 'o of the Project area and of the surrounding Wahiawā area?

Glen Kila, Alike Silva, Tom Lenchanko

APPENDIX F: INTERVIEW WITH KALEO PAIK

TALKING STORY WITH

KALEO PAIK (KP)

Oral History for the Wahiaiwā Reservoirs Project by Dietrix Duhaylonsod (DD)
For Keala Pono 10/13/2014

DD: Aloha.

KP: Aloha.

DD: Today is Monday, October 13, 2014, and we're sitting with Aunty Kaleo Paik. We'd like to mahalo her for spending time from her busy schedule and graciously talking story with us and sharing her thoughts. We will be talking about the Wahiaiwā Reservoir Project on the former Galbraith Estates. And so before we do that, we'd like to ask Aunty to introduce herself, where/when you were born, Aunty, where you grew up, where you went to school, any of that you can share about your background.

KP: Okay, my name is Kaleo Paik, and I'm originally from Kona Hema. I was born and raised there. My high school is Konawaena High School, and when I was growing up, it's very interesting because I was born in 1951, and in that time, South Kona still had many of our kūpuna who practiced the old ways. So I was able to see for myself and witness for myself many of the old traditional ways. I moved to Honolulu, O'ahu I should say, when I went to college. So I went to the University of Hawai'i, and I stayed here ever since then. And for about 25 years, I lived out in Mokulē'ia, so right on Crozier Drive. So right in the midst of that, which is considered that same, Helemano, Moklē'ia, you know, Pa'ala Kai, and all of those places, so I got to meet people and hear a lot of the stories of the area. I think in that respect, I can connect to that property by living on that side for that many years. And I think that is what my contribution will be today.

DD: Thank you, Aunty, thank you for that. Okay, is there anything more you can tell us about your 'ohana background?

KP: Sure. My grandmother was pure Hawaiian, and she came from Keālia which is South Kona, and her parents were both from Keālia. So in that one Keālia area, I have five generations of my 'ohana who actually were born, raised, never left. If you move further north to Nāpō'opo'o, it is where we originally came from, going back another ten generations. So we were right in the midst of the rise of Kalani'ōpu'u, rise of Kamehameha, and all of that area. So our 'ohana and our names in our 'ohana are Kuluwaimaka, Kahumoku, Kālua, Palakē. That is our 'ohana from that side basically for many, many generations.

I don't think there are many today who can claim, I know a few people today who can claim that they actually are continuing a line of people living in the same place for that many generations. And I'm just talking about within fifteen miles or ten miles. Prior to that we had our families go all the way back to North Kona, to Keolanahihi, all those

areas. Our family is very much in the Kona District going back a lot further. But that's pretty much, in a nutshell, our family.

DD: Thank you, Aunty. Ka po'e Kona! Thank you for sharing. So from Kona side, we return to O'ahu, and you were saying you were living in Mokulē'ia side. So of course we are talking about these reservoirs which are very close by, Wahiawā. Are there any other ways you would like to elaborate on your association to this central area?

KP: Yeah, living out in Mokulē'ia area doesn't restrict me only from that area. We did extensive hiking up in Poamoho. So we went all the way up on the trail, all the way up to the cliff, and were looking. And we were very active in community efforts. So we always had our pulse on what was going on, not just in our neighborhood, but also North Shore, going up to Wahiawā. So that whole north side from Wahiawā down was pretty much what we kept our pulse on. I was very active with the Waialua Community Association, and I know a lot of people in the Mokulē'ia Community Association, and of course, we always had our hands in the pot with any kind of community concerns.

A lot of our friends worked for Dole, so that also was a connection for us. And then there was the Galbraith Estate. I believe that they still had pineapple growing even in their lands all the way up to Schofield. Whether they leased it or not, they had all that acreage. So we were able to take private little tours in all the different areas in the subject area. It's kinda interesting to come here and sit here today and talk about things I almost forgot about. Yeah, going back on all those old, you know, pineapple roads, getting dust in your hair, and also going up to Mount Ka'ala. We've had several trips up there, overlooking the valleys, it was nice. But that would be my association here.

DD: Okay, thank you for sharing that. Are there any specific ways that you've gotten specific 'ike or knowledge of this area?

KP: A lot of information I got was second-hand stories from people who actually had the story. Now I'm not sure how far up the family did own property, but I know that they owned a lot of Mokulē'ia, the whole ahupua'a coming up over Helemano and all of that, and these were the Hawaiian ancestors of modern-day Matsugoras, the Almeidas, and the Soares families. When the war came about, they [the military] took over a lot of their lands. The Dillingham Airfield, they had to give up that land and also other lands.

So my ex-husband was very good friends with Harry Almeida, who used to work for where the water is. You know right across the street from Wheeler Air Force Base? There's a well that goes down, and you can actually go down into the subterranean. It's in that building, just a little building right by the freeway.

DD: Okay.

KP: And he was the caretaker for that. So I guess it was for the City and County, and Lake Wilson, and all of that. He would tell my ex-husband a whole lot of stories about the area. I think that what we forget is we tend to put people in an area and leave them

in that area. Today we have cars. It's almost never that we're at home, we're always traveling all over the place. Same thing with our kūpuna. They would travel from Ka'ena over to Wai'anae side. They would come from Mokulē'ia, and come up the hill, coming to these areas. So the stories that they had was of their upbringing or their grandparents' upbringing because that's who they were talking about, really traversing through trails, coming up and down, to getting supplies from the uplands, which was more verdant than in Mokulē'ia side. And they would come up here and get what they needed, bring it back down, and in turn, they would bring fish from the shoreline, and bring it up to them. And they would go Ka'ena and collect salt, and they would do all these different things as a means of, not just commerce, I think commerce is a misused word here, it's more of a western sense. But in the Hawaiian sense, they would barter, [and say], "This is what I have; do you need some of this?" This area was frequented. There's also stories, and this is from McAllister, and I take whatever he has to say with a grain of salt because I'm not sure if they told him everything, misdirected him to show him only what they wanted to show him. But there were, from other sources, there were the 'aikana. And Poamoho—what is the one [place] right by the pineapple stand? Is that Poamoho? That is yeah?

DD: Yeah, Poamoho.

KP: And Helemano. They were in that area. So a lot of the travelers would avoid that area and hug closer to Mount Ka'ala side, come up through Kaukonahua side, and then come up to this area. So they stayed away from this side. And that is one of the stories that they shared. So it was kind of interesting to see that in the old days, how they actually traversed between districts.

DD: Yeah, thank you, Aunty. So you were mentioning Alameida, that's a-l-a-m-e-i-d-a?

KP: A-l-m-e-i-d-a. Almeida.

DD: Oh, Almeida. And then the other two family names you said?

KP: Soares and Matsugora. S-o-a-r-e-s.

DD: Oh, Soares, okay.

KP: And Matsugora. And now their name is Gora. At the war, they changed their name to Gora instead of Matsugora, to be less Japanese.

DD: Oh okay.

KP: But those were all the same families, who, their progenitors came from the Mokulē'ia area, and what their names were, I'm not sure. But they had the whole ahupua'a.

DD: I remember, at my previous job, where I was tasked with finding out the Dillingham Airfield history, and I did find myself up to a brick wall trying to trace what happened with the land. So it's interesting how it's connected.

KP: It is. And as I said, once they took away the land, a lot of them dispersed and went. Some stayed in Mokulē'ia, but further towards Waialua side. But those families actually had a large influence. The Hawaiian side of that family had a lot of influence in this area.

DD: Right. Thank you, Aunty.

So as far as you remember in your experiences, how has the area changed? Could you share how it used to be as opposed to now?

KP: Well, since I came here, I was 18, and then I lived out in Waialua with my cousin for a short period of time, and then we got married, and we stayed in Waialua. So I'd say over a span of 30 years, I've been in the area. And over the 30 years, I have not seen the area change considerably because it was mostly in agriculture. It was in either sugarcane or pineapple, yeah? So I am not familiar with what it was prior to that.

However, in talking with some of the old, old timers, they would talk about riding their horses along the trails. Some of them had small little ranches, and what they would do is ride their horses up along some of those trails and come up to the uplands, which would be this area here. And they said that during their time, waters were still running in the streams. So for them, in their lifetime, they saw a huge change in water flow. Whether it be Lake Wilson, stopping the flow, diversion of water, whatever the reasons may be, they saw a huge difference in water. Their lands were starting to get drier.

And also, the stories I heard was it was highly vegetated before. It was forested. There were a lot of trees and stuff. I think they mentioned that cattle was one that kind of brought down the [vegetation of the] land, as well as feral animals. I'm not sure if it was goats, but anyway a very destructive element came in and just kind of wiped away a lot of their vegetation. And of course, the drought happened, so it dropped. But the interesting thing was hearing that the streams were running, and not just the main stream that goes by Otake Store, which comes from Lake Wilson and passes right through these areas here, but it was actually places like in between the valleys, there'd be running streams. They said they weren't like flowing, like really rough running streams. They were just meandering streams running down, and the horses would stop, drink water. So that's a big change for them. But for my own self, I already saw it was agriculture. And I'm not sure, I never saw any streams, but you could see a lot of stream beds, lots of stream beds. So you have to wonder, where did the water go? Could be diverted, you know, to Mililani maybe, from the damming of Lake Wilson, going to other places, so therefore not enough. I'm not sure, but to hear that story, was quite interesting.

DD: Yeah, I'm trying to picture it. It must've looked really nice and different, forested with all those waters coming down.

KP: Yeah. Well to give you an example --- Kohala. The stream that came down to Kawaihae was flowing when I was growing up. And it was green all around. It was like a river, really running. And over time that dried up. So what changed? We have to remember that something changed environmentally, man-made whatever, caused the stream to stop flowing. And that's what reminds me of this place. The same thing must have happened.

DD: Similar history, yeah?

KP: Mmm-hmm.

DD: Okay, so thank you for that, Aunty.

What about this area, right where the reservoirs are, would you happen to know if it was sugarcane or pineapple? And any personal anecdotes or mo'olelo, mele, oli, place names with this project area?

KP: I'm not real familiar with what the real purpose of here is. I'm not sure, because if this is Whitmore Village, yeah, the sugar and pineapple was all around here [pointing at a map]. And Kaukonahua, going down, that's this one yeah? On this side was all sugar. So I'm thinking this must have been a lot in sugar.

Now, however, I did hear some stories about rocks. And this is also coming from people that worked in the plantation. And they said that they went to go I think in this area here [pointing at map], at least very close to Whitmore Village, so it would be in this approximate area where they tried to move the stones. Now can you tell me where Helemano is?

DD: [pointing at the map] Helemano, right here.

KP: Right here, yeah? So it's a little bit distance from it. But they were talking about bulldozing, and I believe that it was in this area, where the machine stopped. They could not move the stones. So what they did was they left the stones in place, and dug around it. And there are many, many stories of things happening in Helemano, and in this area, the same, exact things, where they would bulldoze, and they would move the rock, but the rock would be back. It happened so many times, to so many different people. I owned a drive-in down in Waialua, and so they would always come and tell me stories. The old timers would tell me stories about their days in the plantation, days when they had to work up in here or Dole, and they would always tell us the stories about the rocks, not being able to be moved. So if you look at when they used to burn the sugarcane, you'd see an area where there's just a pile of rocks, and you'd wonder why are there just these rocks and everything else is flat. But there's these rocks, but they refuse to move them because of the stories that happened with it, so they left them in place. So if anytime you see that in this particular area, I would say that that might be a sign of caution for any other development, any other farming in the area, that if they see stones that have no reason to be there except if they're all fallow all around it except for those, my suggestion would be, just leave them in place, because these have stories behind them.

I know it happened in this area, between here and here [pointing at map between Helemano and Kūkaniloko].

And we used to go up Helemano. I had a good friend was a biker, and we used to travel and go up in there, and we actually saw sites up in here that are unrecorded [pointing at Helemano on map]. And I'm sure you're going to find unrecorded sites in here as well [pointing at the project area on the map], because they are just too close in proximity to each other. But that's the one story you'd be interested in, the stones, the unmoving stones.

DD: Mahalo Aunty, that actually fits in right to the next question which was asking if you would happen to know if any sites which are or were located around this project area. So you're suggesting that we'll probably find some undocumented sites, right?

KP: Absolutely, absolutely, and what is difficult, I think, in looking for the undocumented sites, is that some of them might be so obscured. There really needs to be a trained eye to see the relationship of what the area has, and by gathering these stories, I think you'll find that there might be a commonality, or there might be an anthropological view of it of how people traveled in these areas, because I know Wai'anae Uka, from other people, they traveled over here a lot from Wai'anae. So this was not a secretive place as far as our people knowing about it. People traveled to this place.

Where is Kūkaniloko in here?

DD: Kūkaniloko should be right around here [pointing on map].

KP: Oh yeah, I see it right over here. Yeah, so see, it makes a lot of sense that you will find unrecorded sites because if you have a site like this, there have to have been other sites around to support this area. So that would be my caution and my advice.

DD: It makes a lot of sense, Aunty, that you're not going to have a stand alone site with all these people coming and going.

KP: Yeah, and we've seen sites up here in Schofield that really triangulates the importance to Kūkaniloko, so I'm sure you're going to see some more this way and that way.

DD: Yes, Aunty, we'll make sure to keep that fresh on our mind and let people know about this connection to other places.

Ok, do you think the proposed development would affect any place of cultural significance or access to a place of cultural significance?

KP: Now if they're gonna use it for agriculture, which means that they're going to subdivide it up into more independent farmers, if they're gonna lease it out, the only thing I would say is, "Do not let it be 'gentleman farming'." In other words, the state

has to be very cautious because with ‘gentleman farming’ comes structures, come buildings, comes different types of things, rather than agriculture. So I think that the developer needs to have a very clear idea of exactly what the measure of the agricultural purposes will be because that will determine the impact on the land. If you have farming, it’s a much lower impact than you would have if they build structures to process their crops, or like bottling or drying or any of those other kinds of things. That would be the key—to find out what is the limit of their agricultural purposes.

The digging of the reservoirs, even though they’re marked here right now, they may or may not have to be changed depending on what is found. But also, I believe that agriculture brings back to the aquifers more than it takes out. People don’t realize. They say, “Oh well, you know, farming requires more water than a development.” But for a development, their water goes straight to the sewer. Agriculture percolates down right into the aquifers. That’s what we want. We want to have a sustainable aquifer. Having agriculture helps us to do that. So that’s the only thing I would be concerned about, the extent.

With that in mind, if it’s purely agricultural, without too much structure, like I’m gonna have a 5 acre parcel, but a large portion of that is going to be used for humans, you know, instead of farming, then I think we have a problem. But if we have a clear understanding that this project is to promote agriculture and to provide crops, then I think we have a real good model for other places to follow. Who knows? If we do well enough and re-vegetate our uplands closer to Ka‘ala, we may be able to bring back some of our rain that we’re losing, and bring back the water, bring back our springs, bring back all those that have dried up. I think it’s a domino effect on what we are trying to achieve at least, but as I said, I’m not real sure exactly what the sites are. We’d have to go on the property itself and you know, we go by our HPS yeah? Hawaiian Positioning System. We feel the sites.

DD: Well maybe one day in the future we could visit there.

KP: Yeah, and there are other people who can do it too. We have to just make sure our net is thrown out far enough so that we capture a broader perspective.

DD: Yeah. So you’re saying that agriculture would help the environment, however to watch the blueprint so that you don’t have too many building structures taking the place of actual farming.

KP: Keeping the human footprint smaller than the agricultural one by a large percentage. 90% to 10% is more my idea instead of 60/40.

DD: Right, ok, and how about access?

KP: Ok, now if it’s agricultural land, the access should not be a problem, even if it’s leased land, because you’re not having to deal with roadways, you’re not having to deal with houses. You’re having to deal with making a pathway which doesn’t impact much. So access would be very easy to do to these sites once it’s agriculture. But if you have

roadways, and you have this, and you have that in between, then you have a problem with people going, “Well this is my private driveway. Oh I’m sorry, but you’re going straight through my garage area.” And then people have a little bit more cautiousness. But if it’s in a field, and you say, “Ok, we’re gonna dedicate a pathway to this site, with a boundary around it of so many feet.” And then it’s plausible, and you can have it anywhere, anytime. They can come on that public access road, park their cars, whatever, go in, come out. And even if they want to secure it because of the thefts, agricultural theft is really huge, you can still have a guard there, but the guards do not have to be asinine. They can be understanding that these are people who are going for their religious practices and going to visit sites. I think we need to educate others how to behave to us and our practices.

DD: Yes. I agree.

Are you aware if they are any traditional gathering practices at the project area or within the surrounding area?

KP: Ok, I’ll give you an example, and I don’t know if you can use this, but we went to the BAX [area on Schofield] meetings, and the first thing that I told [the Schofield archaeologist] Gilda, “Do you think that our practices ended?” Because they were talking about finding organic material that was at the turn of the century, early 1900s. And I said, “Do you think we stopped our practices?” I would be surprised if you did not find any organic [material] because we still would have come over and paid our respects well into the 1900s until the Army made it harmful for us, with all of their live ammo, to traverse over these properties.

It would be naïve of us to think that such a sacred site as Kūkaniloko would not have travelers traveling from all different directions, congregating and having sites along the way for them to stop, to rest, to cook their food, to prepare offerings because they would not have done it at Kūkaniloko because that’s a birthing place, and there’s certain protocols. So you would give all of your ceremony for your own families outside of that area and then have all of these different places for you. So I don’t know specifically where they are, but I can almost guarantee, I would be 100% sure that gathering happened, because as I said, even the grandparents of people I knew, the secondhand stories all said they came up here. They would gather from up here because they had certain things that they needed, whether it was lā‘au that they needed, whether it was only the mountain things that could provide for down below. But not a whole lot of people lived here. So this was really the place for gathering rather than down below where most of the people lived. I would definitely say it would be naïve for us to think that gathering did not happen in this area. And I can see, even coming from the BAX and looking at some of those site visits we went on or just listening to their conversations and looking at the pictures, I’m going. “Yeah, that’s something right there.” What it is I can’t tell you, but I can tell you that our people would have put something there to mark paths.

We just need to know and maybe fully investigate not the damage that was done but the anthropology of what our people would have done given the resources. So that's how I would kinda look at it. We need to study the migration of these people, even though they had a home somewhere, a hale somewhere, not all of what they needed was gathered in one area, so they had to go out and look for things. Let's say they had to do a ceremony, and they needed certain types of plants. Where would they go? Climb Ka'ala? Maybe. I think if people lived in Mokulē'ia, the much easier route would be around Ka'ala, come up to the saddle. Yeah?

DD: Yes.

KP: Same kind of terrain as coming up here but less treacherous. That's what I look at, for what makes sense. What's more common sense?

DD: Mahalo Aunty. Good point. So while development of the area continues, what do you think could be done to lessen the adverse effects on any cultural practices of the area?

KP: I'll say this is a general rule that I have for anything I look at. I'm not against development. What I am against is poorly planned development, in other words, a developer that does not take into account, not just their project, but the entire area of which they will impact.

So let's say that this will be used for agriculture. And yet, right here is all the military, and all the housing, and all of these other things. This impacts this [pointing at map]. I'm sorry you can't see this on the tape recorder, but what happens in Schofield definitely impacts the project area not just in physical contact, but also in atmospheric. You know with all the bombing, with all the leveling of this area in the BAX area, it has caused an incredible amount of erosion which to me is a direct effect on what's happening here. Whatever this project develops, and how it develops, must be very cognizant of the needs, not of us, but of the future. We need to think much further ahead than they are right now and see what kind of practices can be here, and I'm talking about agricultural practices.

Now for our traditional practices, we need to have full access, not just to gather, but to protect things we need for our ceremonies. And if things can only grow in a certain area, a certain elevation, those things should be set aside, at least an area where we can start to propagate them again, so we can use our ancestral traditional lau for our practices. So far no one has done that. And I think that that's something that we can do here, because it's a large enough area, that they set aside some areas that they deem to be culturally good to produce back some of the things we need. Collecting water that has not touched the ground, how are we gonna do that, unless we have an area that foliage will collect for us, so we need to start really thinking of things in that nature. And as I said, I hope this can be a model, and hopefully with the political change, hopefully in the right direction, we can influence top leaders. And I can say this on tape because I said this in public, when I talked to [gubernatorial candidate] David Ige, I said, "We

need to have change from the very top. We need to have change in decision makers because they're the ones who are limiting our access." We're supposed to have access to our sites, but we have to have a lawsuit just to practice our right. I don't think that's fair. So I'm thinking that if we use this as an example and we set aside areas, we really are cognizant of the cultural, the traditional comes first, and then live in harmony with each other, it's not about one or the other.

I'll tell you this one story that was told to me by my cousin, and this happened in Kona. He was always sent out to get the lā'au. And it was lā'au kāhea, when you call. Now he was a young boy, and he had to go down without any light, because we're talking about the 1940s, late '30s. He would go down, and the plant would reveal itself to him. And he knew it. And he would ask [beforehand], "What is the plant? What does it look like?" And they [his elders] would tell him, "You will know." Yeah?

Those practices are still alive. We just are not accessing them. So if we don't have places to exercise those things, we are gonna truly lose them. So let's create those havens. And some of that was also ranchlands, so our practices and the other western practices did live together. We don't need to make it one or the other. We just need to make sure that one doesn't critically impact the other. Does that make sense?

DD: He mana'o maika'i, Anake. 'Ae. So you talk about good planning. Are there any other ways that you figure we can outline or coordinate as good planning?

KP: Ok, be at the table. In other words, Keala Pono, be at the table. Be at the table at DPP. Be at the table of the State when they want to do their planning so that they have a clear understanding, from a professional standpoint, some of the areas that need it. See right now they're not at the table. They're not. The developer is at the table. And I think that that needs to change. The only way you can change that is from the very top. It's to have that, from the governor, go down to his minions, and their minions go down to their super-minions, and on and on and on. But that's the only way to make that kind of change. I don't think it's impossible. I don't think it's asking a lot. I think it can be done. We have the right people.

DD: Yes, Aunty, mahalo.

Ok, so are you aware of any other cultural concerns the community might have related to the cultural practices in the vicinity of this project site or the surrounding area?

KP: I know some of the players that might have a real big concern, but I won't speak for them. As far as other community members, I would reach out to other people just to get how they feel about a project in the area.

I know Lloyd O'Sullivan. He's part-Hawaiian, he's lived down in Mokulē'ia for a long time, La'auapa'aina Street. He's very active in the Mokulē'ia Community Association. But he's also someone that I think is reasonable. He is easy to talk to. He's not confrontational. But to ask people like that about their opinion of the area would be great because it doesn't only affect here [pointing at places on the map]. The next

community really is here, because this is a military community. It's transient yeah? This one is a new found community made up of workers from the plantation. But the old timers are here—Wai'anae and Honuliuli. These are your key areas where we need to find people to just ask them that very simple question. We don't even have to go through the whole realm. Just ask them, "Do you think that, if we had farming there, it would impact your life? Because these people have to pass here every day to get home. And I can supply you with a few names if you want.

DD: Yes, I would like. You said Lloyd O' Sullivan?

KP: Lloyd O' Sullivan. He's very good. Both he and his wife are struggling through some health issues, but he's really, really nice, easy to talk to. I can give you his phone number. I can email it to you. And just call and ask him, and let him know that you talked to me. He knows me more as Linda, so anytime just call him.

Now other people in the area that are really, really old-timers, a lot of them have passed on. The Silvas, in particular, I don't know if she's still alive, but they used to manage the water for Mokuleia Ranch. She's a Ho'okano, yeah, and the husband is Silva. Annie.

DD: Annie.

KP: Annie Silva, and her sons. I think they still live on the way to Mokuleia Ranch, if you look, [there's] this kind of big yard, and then this one little tiny house on it. I don't know her number, but if you pop in and just ask some questions, and just say that I sent you, they would be an old-time family down in that area. The Silvas, in fact, some of the stories actually came from them, about riding their horse up there, yeah, it would have been their grand-uncle.

So anyway, those two I would definitely suggest, and newer people would be: Bob Cherrey, he has a large ranch area that is down on Kaukonahua Road, and on this side of Kaukonahua. So it's kind of close, too. But it's on the side over here. The other one is Randy Paty, because that's Bill Paty's son, that used to run DLNR for years and years. He has a macadamia nut farm, but it's in Mokulē'ia, and that might be too far out. But anyway, I'm just giving you some names of people who have been in the community a long, long time. If I think of any others, I'll let you know.

DD: Ok, thank you, Aunty!

Are there any other issues or topics that we didn't mention that you think we should keep in mind for the future?

KP: I think the only other issue would be making sure that these reservoirs do not happen like at Kunia, where it's falling apart. It's actually eroding out. I think it's so incredible. And the damage that reservoirs do is so huge. So the concern I would have is that these reservoirs are really researched—double, triple, quadruple times over—for impact before they're even considered as a site, because to build a reservoir, it's not just a reservoir. You have to have the land mass around it, in so much footage around it, in

order to make sure it sustains the water. It's a really big impact. So that would be the only concern. Other concerns, I don't know except, you know, it would directly affect people in this area here, people coming and going to this area.

DD: Right.

So real quick, could you mention how the Kunia reservoirs were degrading, and do you know what we should be aware of to prevent that?

KP: Well, my dad was actually in the Soil Conservation, so I grew up traveling with him, and so I got to see a lot of things. And one of the things about reservoirs is, if you're gonna build up a reservoir, like they did in Kunia, you have to be darn sure that it doesn't erode. You need to have ground cover immediately. You need to try to shore up your edgings along the way because if not, you're gonna have the runoff. And because it's not "packed in soil", it's just going to be easy for it to [erode]. Water coming down will make big huge gorges. So that's building up a reservoir. So in other words, if you're on a promontory like this (pointing to map), here's your reservoir, it starts off on solid ground, but then you have to build up. And I'm not sure how these will be. These might be ground level, but you'll still need a berm of some kind.

DD: Yes.

KP: That's the problem. So ground cover needs to happen, or some kind of netting, something to keep the soil in place. And I think that what happened in Kunia was just so many violations of good practice. It was like, wow they bulldozed a road and had the sides, 45-degree angle. You cannot do that, you know, the collapse of that [is bound to happen]. They even tell you that in [making] trenches, you go 6 feet down, they tell you, "Oh, you're gonna have to have so much [of an angle]," and yet these guys. It was like crazy. So anyway, I just don't want to see that happen. Kunia should be an example of what not to do for reservoirs. And as a matter of fact, there may be some historical data on ancient [types], not just wells, but keepers of water. So that might be a research item to look at.

DD: Interesting.

KP: Yeah.

DD: Okie Doke. Well Aunty, it's been a long time since I last saw you. It's really good seeing you and talking story and relaxing.

KP: [laughs] Yeah.

DD: We'd like to just thank you again for taking time and talking story. So thank you so much, and mālama pono until we see you next time. And Aloha!

KP: Aloha!

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Draft Traffic Impact Assessment Report
The Traffic Management Consultant
February 2015

**DRAFT TRAFFIC IMPACT ANALYSIS REPORT
FOR THE PROPOSED
GALBRAITH ESTATES RESERVOIRS
WAHIAWA, HAWAII
TAX MAP KEYS: 6-5-002:010 & 025,
7-1-001:002 & 003, & 7-1-001:005**

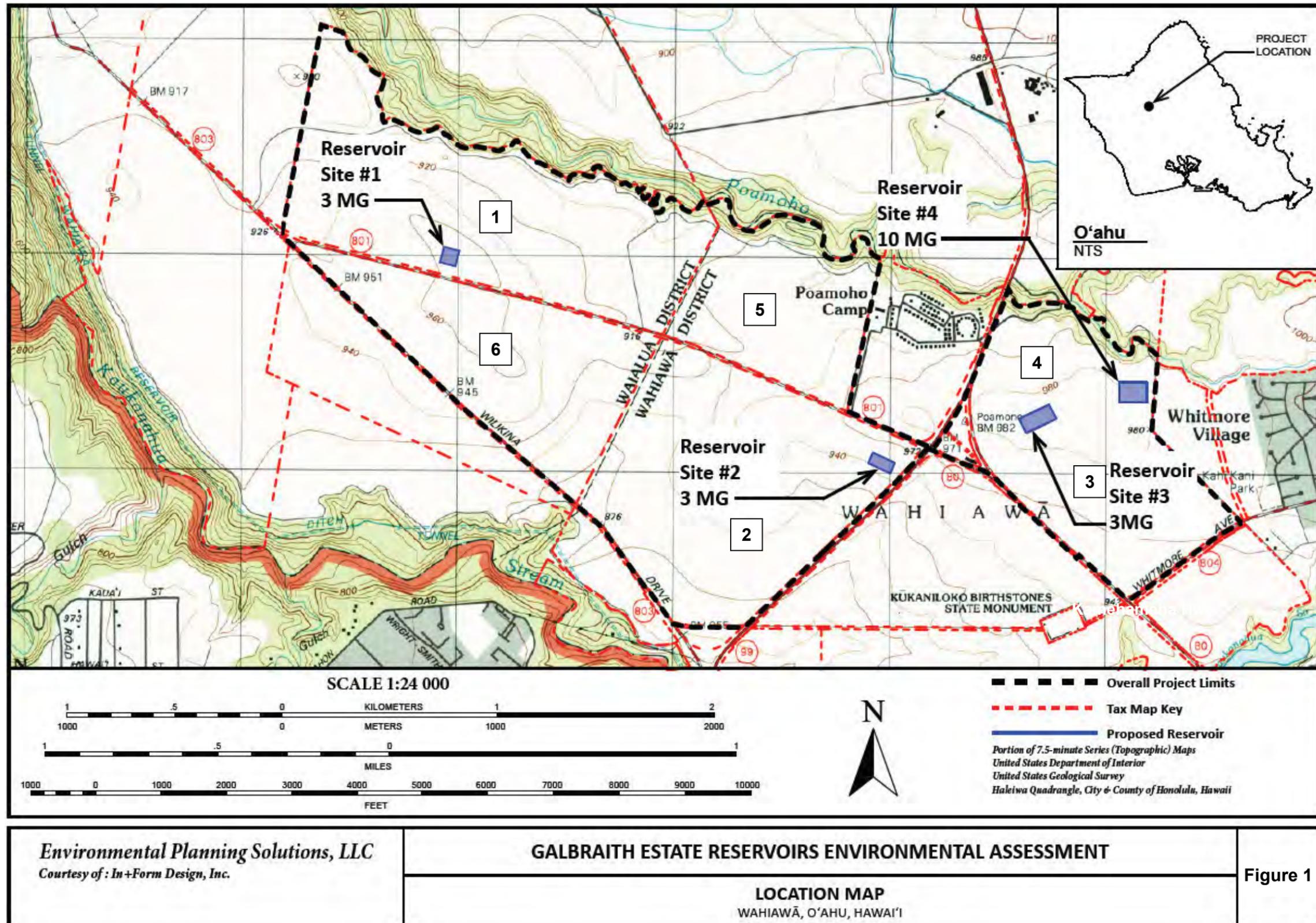
I. Introduction

A. Project Description

The State of Hawaii Agribusiness Development Corporation (ADC) is proposing to construct four (4) reservoirs on fallow pineapple fields, formerly known as the Galbraith Estate Lands, in Wahiawa, Hawaii. The purpose of the reservoirs is to increase the storage capacity of irrigation water for the anticipated diversified crop cultivation. The 1,185± acre site is identified as Tax Map Keys: 6-5-002:010 (Site #1) & 025 (Site #6), 7-1-001:002 (Site #2) & 003 (Site #5), & 7-1-001:005 (Sites #3 and #4). The project includes the active cultivation of the farm lands on the five parcels. The proposed project is expected to be developed by the Year 2017. Table 1 summarizes the site information.

Table 1. Site Information			
Site #	Tax Map Key	Land Area	Licensee/User
1	6-5-002: 010	311 Acres	Kalena Farms (230± Acres)
2	7-1-001: 002	302 Acres	ADC
3	7-1-001: 005 por.	236 Acres	Ohana Best Farm (160± Acres)
4	7-1-001: 005 por.		ADC
5	7-1-001:003	145 Acres	ADC
6	6-5-002:025	192 Acres	ADC

Reservoir Site #1 is located on the north side of Kaukonahua Road, about 2,500 feet east of its intersection with Wilikina Drive. Reservoir Site #2 is located on the northwest side of Kamananui Road, about 600 feet southwest of its intersection with Kaukonahua Road. Reservoirs Sites #3 and #4 are located to the east of the intersection of Kamehameha Highway and Kamananui Road, about 1,000 feet and 2,500 feet east of Kamehameha Highway, respectively. Figure 1 depicts the project location map.





Access to Reservoir Site #1 will be provided on Kaukonahua Road at an existing agricultural access road, which is located about 2,200 feet east of Wilikina Drive. Access to Reservoir Site #2 is proposed on the north side of Kamananui Road, about 1,600 feet southwest of its intersection with Kaukonahua Road. The Site #2 access driveway will be extended along the north side of Kamananui Road to Reservoir Site #2. Access to Reservoir Site #4 is proposed on the east side of Kamehameha Highway, about midway between its intersections with Kamananui Road and Whitmore Avenue. For the purpose of this analysis, it is assumed that Sites #1 and #6 will share access at the Reservoir Site #1 driveway. Similarly, it is assumed that Site #2 and Site #4 also will share access at their respective Reservoirs access driveways. It is also assumed that Site #3 will share access at the Reservoir Site #4 driveway. Finally, it is assumed that access to Site #5 will be provided on the north side of Kaukonahua Road at an existing agricultural access road, which is located about 1,300 feet west of its intersection with Kamananui Road. The access locations and the study area intersections are depicted on Figure 2.

ADC will be leasing land under its control to farmers and agricultural ventures. At this writing, ADC has executed licenses to Kalena Farms for 230 acres on Site #1 and to Ohana Best Farm for 160 acres on Site #3.

The current licensees have expressed their intents to minimize the use of private vehicles by their employees by providing shuttle bus services. Employee parking will be limited on site. The work schedules are expected to begin at sunrise and end at sunset. The number of employees will vary with the season. ADC has indicated that farmer's markets will not be permitted on its lands.

B. Purpose and Scope of the Study

The purpose of this study is to analyze the traffic impacts resulting from the development of the ADC property on the surrounding roadways. This report presents the findings and recommendations of the study. The scope of this study includes:

1. Description of the proposed project.
2. Evaluation of existing roadways and traffic conditions.
3. Analysis of traffic conditions without the proposed project.
4. Development of trip generation characteristics of the proposed project.
5. Identification and analysis of the traffic impacts resulting from the development of the proposed project.
6. Recommendations of improvements, as necessary, that would mitigate the traffic impacts identified in this study.



Figure 2. Study Area



C. Methodologies

1. Capacity Analysis Methodology

The highway capacity analysis, performed for this study, is based upon procedures presented in the Highway Capacity Manual (HCM), published by the Transportation Research Board, 2010. HCM defines the Level of Service (LOS) as a qualitative measure, which describes the operational conditions within a traffic stream. Several factors may be included in determining the LOS, such as: speed, travel time, freedom to maneuver, traffic interruptions, driver comfort, and convenience. LOS's "A", "B", and "C" are considered satisfactory Levels of Service. LOS "D" is generally considered a "desirable minimum" operating Level of Service. LOS "E" is an undesirable condition, and LOS "F" is an unacceptable condition. Intersection LOS is primarily based upon average delay (d) in terms of seconds per vehicle (sec/veh). Table 2 summarizes the LOS criteria.

LOS	Signalized Intersections		Unsignalized Intersections	
	Delay d (sec/veh)	Description	Delay d (sec/veh)	Description
A	$d \leq 10$	Few stops, little or no delay	$d \leq 10$	Little or no delays
B	$10 < d \leq 20$	Good progression, short cycle lengths	$10 < d \leq 15$	Short delays
C	$20 < d \leq 35$	Cycle failures begin to occur, i.e., vehicles stop at more than one red phase	$15 < d \leq 25$	Average delays
D	$35 < d \leq 55$	Noticeable number of cycle failures, unfavorable progression	$25 < d \leq 35$	Long delays
E	$55 < d \leq 80$	Frequent cycle failures, poor progression, long delays	$35 < d \leq 50$	Very long delays
F	$d > 80$	Over saturation, many cycle failures, high delays	$d > 50$	Extreme delays

"Volume-to-capacity" (v/c) ratio is another measure of effectiveness (MOE) indicating the traffic demand relative to the roadway's capacity. HCM defines capacity as "the maximum number of vehicles that can pass a given point during a specified period under prevailing roadway, traffic flow, and traffic control



conditions." A v/c ratio of 0.50 indicates that the traffic demand is utilizing 50 percent of the roadway's capacity.

Synchro is a traffic analysis software that was developed by Trafficware Corporation. Synchro is an intersection analysis program that is based upon HCM methodology. Synchro was used to calculate Levels of Service for the intersections in the study area. The capacity analysis worksheets are compiled in the Appendix.

2. Trip Generation Methodology

The trip generation methodology is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in Trip Generation. ITE trip rates are developed by correlating the total vehicle trip generation data with various activity/land use characteristics, such as the vehicle trips per hour (vph) per employee.

II. Existing Conditions

A. Roadways

Kamehameha Highway is a two-way, two-lane arterial highway between Wahiawa and the North Shore of Oahu. The posted speed limit on Kamehameha Highway in the vicinity of Kamananui Road is 45 miles per hour (mph). South of Kaukonahua Road, the posted speed on Kamehameha Highway is reduced to 35 mph. The posted speed on Kamehameha Highway is reduced again to 25 mph, north of Whitmore Avenue.

Kamananui Road is a two-way, two-lane highway between Wilikina Drive and Kamehameha Highway. The posted speed limit on Kamananui Road is 45 mph. Kamananui Road is signalized at its intersections with Wilikina Drive, Kaukonahua Road, and Kamehameha Highway.

Kaukonahua Road is a two-way, two-lane arterial highway between Waialua and Kamehameha Highway. The posted speed limit on Kaukonahua Road is 45 mph. Kaukonahua Road is unsignalized at its channelized Tee-intersection with Kamehameha Highway. Kaukonahua Road is signalized at its four-legged intersection with Kamananui Road. Kaukonahua Road is stop-controlled at its channelized Tee-intersection with Wilikina Drive.

Wilikina Drive is a two-way, two-lane roadway between Schofield Barracks and Kaukonahua Road. The posted speed limit on Wilikina Drive is 25 mph in the vicinity of Kamananui Road. North of Kamananui Road, the posted speed on Wilikina Drive increases to 45 mph.

Whitmore Avenue is a two-way, two- to four-lane roadway between Whitmore Village and Kamehameha Highway. Whitmore Avenue is signalized at its intersection with Kamehameha Highway. The posted speed limit on Whitmore Avenue is 25 mph.



B. Existing Peak Hour Traffic Volumes and Operating Conditions

1. Field Investigation and Data Collection

Turning movement traffic count surveys were conducted on September 18-19, 2014, during the AM and PM peak periods of traffic – from 7:00 AM to 9:00 AM and from 3:00 PM to 5:00 PM. The peak period traffic data are presented in the Appendix. The traffic signal timing and phasing were obtained during the field investigation.

2. Existing AM Peak Hour Traffic

The AM peak hour of traffic in the study area occurred between 7:15 AM and 8:15 AM. North of Kamananui Road, Kamehameha Highway carried about 1,450 vehicles per hour (vph), total for both directions. South of Whitmore Avenue, Kamehameha Highway carried about 1,900 vph, total for both directions. The AM peak hour traffic on Kamehameha Highway was split 50/50 in the northbound and southbound directions. Wilikina Drive carried over 1,500 vph, total for both directions, south of Kamananui Road. The AM peak hour traffic on Wilikina Drive was split 50/50 in the northbound and southbound directions. North of Wilikina Drive, Kaukonahua Road carried about 800 vph, total for both directions. The AM peak hour traffic on Kaukonahua Road was split 60/40 in the southbound direction. Kamananui Road carried about 900 vph, total for both directions, with a 60/40 split in the northeast bound direction.

During the existing AM peak hour of traffic, the intersection of Kamehameha Highway and Whitmore Avenue operated at LOS "D". The left-turn movements on westbound Whitmore Avenue and southbound Kamehameha Highway operated at LOS "F". The through movement on northbound Kamehameha Highway operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service, i.e., LOS "C", or better.

The intersection of Kamehameha Highway and Kamananui Road operated at LOS "C", during the existing AM peak hour of traffic. The left-turn movement from Kamananui Road operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The intersection of Kamananui Road and Kaukonahua Road operated at LOS "B", during the existing AM peak hour of traffic. Westbound Kaukonahua Road operated at LOS "E". The other approaches to the intersection operated at satisfactory Levels of Service.

The other intersections in the study area operated at satisfactory Levels of Service during the existing AM peak hour of traffic. Figure 3 depicts the existing AM peak hour traffic.

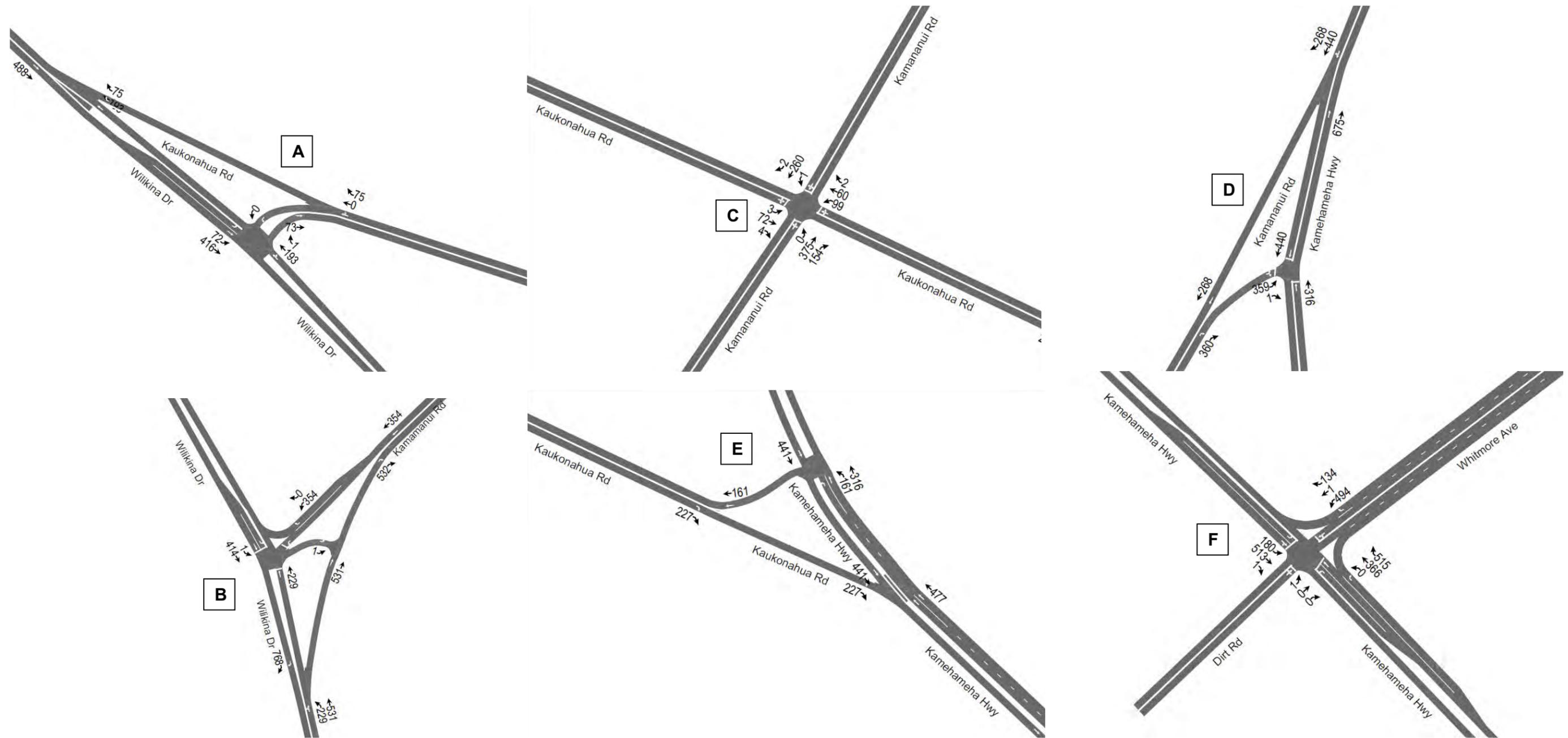


Figure 3. Existing AM Peak Hour Traffic



3. Existing PM Peak Hour Traffic

The PM peak hour of traffic in the study area occurred between 3:15 PM and 4:15 PM. Kamehameha Highway carried about 1,600 vph, total for both directions, north of Kamananui Road. South of Whitmore Avenue, Kamehameha Highway carried about 2,000 vph, total for both directions. The direction of the PM peak hour traffic was split 50/50 in the northbound and southbound directions on Kamehameha Highway. Wilikina Drive carried about 1,800 vph, total for both directions, south of Kamananui Road, with a 50/50 split in the northbound and southbound directions. North of Wilikina Drive, Kaukonahua Road carried over 900 vph, total for both directions, with a 60/40 split in the northbound direction. Kamananui Road carried over 1,000 vph, total for both directions, during the existing PM peak hour of traffic, with a 55/45 split in the southwest bound direction.

The intersection of Kamehameha Highway and Whitmore Avenue operated at LOS "D", during the existing PM peak hour of traffic. The left-turn movement on southbound Kamehameha Highway operated at LOS "F". The left-turn movement on westbound Whitmore Avenue operated at LOS "E". The through movements in both directions on Kamehameha Highway operated at LOS "D".

During the existing PM peak hour of traffic, the intersection of Kamehameha Highway and Kamananui Road operated at LOS "C". The left-turn movement from Kamananui Road operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The intersection of Kamananui Road and Kaukonahua Road operated at LOS "B", during the existing PM peak hour of traffic. Westbound Kaukonahua Road operated at LOS "E". The other approaches to the intersection operated at LOS "B".

The intersection of Wilikina Drive and Kamananui Road operated at LOS "D", during the existing PM peak hour of traffic. The left-turn movement from Kamananui Road at Wilikina Driveway operated at LOS "E". The other traffic movements at the intersection operated at satisfactory Levels of Service.

The other intersections in the study area operated at satisfactory Levels of Service during the existing PM peak hour of traffic. The existing PM peak hour traffic is depicted on Figure 4.

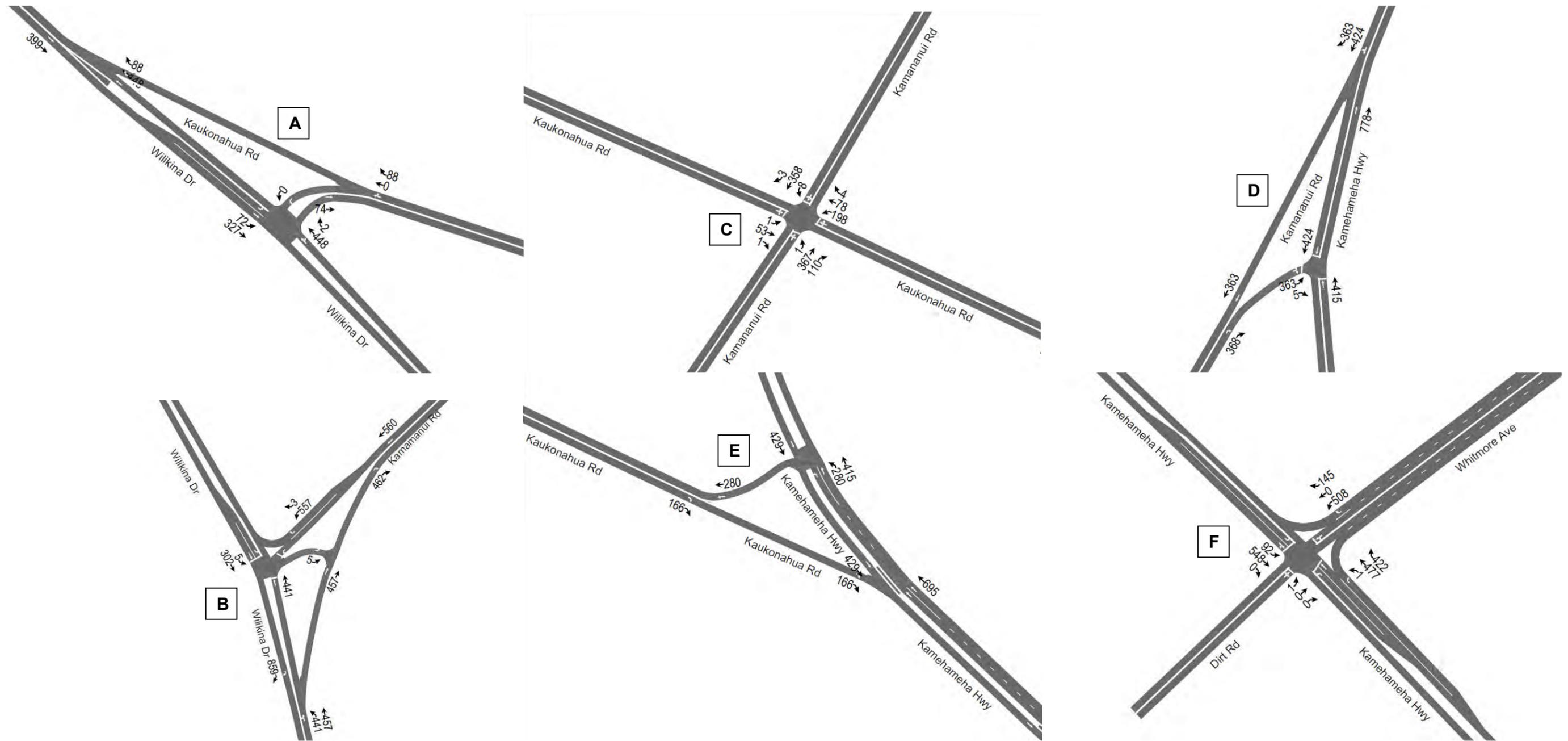


Figure 4. Existing PM Peak Hour Traffic



III. Future Traffic Conditions

A. Background Growth in Traffic

The population and employment of Central Oahu are expected to grow at annual rates of 0.9 percent and 1.1 percent, respectively, according to the Oahu Regional Transportation Plan 2035. The North Shore population is expected to grow at an annual rate of 0.5 percent, while the employment is expected to remain flat. For the purpose of this traffic impact analysis, an annual increase of 1.1 percent was applied uniformly to the existing (Year 2014) peak hour traffic to estimate the Year 2017 peak hour traffic demands.

B. Year 2017 AM Peak Hour Traffic Analysis Without Project

The AM peak hour traffic without the proposed project is expected to experience small increases in delay at the study intersections. However, Levels of Service are expected to remain the same as the existing AM peak hour conditions. Figure 5 depicts the AM peak hour traffic without the proposed project.

C. Year 2017 PM Peak Hour Traffic Analysis Without Project

During the PM peak hour of traffic without the proposed project, the intersection of Kamehameha Highway and Whitmore Avenue is expected to continue to operate at LOS "D". The through movement on northbound Kamehameha Highway is expected to operate at LOS "E". The other traffic movements at the intersection are expected to operate at the same Levels of Service as under the existing PM peak hour conditions.

The PM peak hour traffic without the proposed project is expected to experience small increases in delays at the other intersections in the study area. However, the Levels of Service are expected to remain the same as under the existing PM peak hour conditions. The PM peak hour traffic without the proposed project is depicted on Figure 6.

IV. Traffic Impact Analysis

A. Site-Generated Traffic

The ITE Trip Generation does not provide trip generation characteristics for agricultural activities. Because of the labor intensive characteristics of agricultural activities, the number of employees is expected to be the best indicator for the trips generated by the proposed project. A prospective licensee has indicated that the number of employees can range for 0.2 to 0.4 worker/acre, depending on the season. This employee/acre range corresponds to the previous traffic studies, which were prepared for Monsanto, Pioneer Hi-Bred International, Inc., and the Hawaii Agriculture Research Center in Kunia. For the purpose of this traffic impact analysis, the more conservative estimate of 0.4 employee/acre was used to develop the trip generation characteristics for the proposed project.

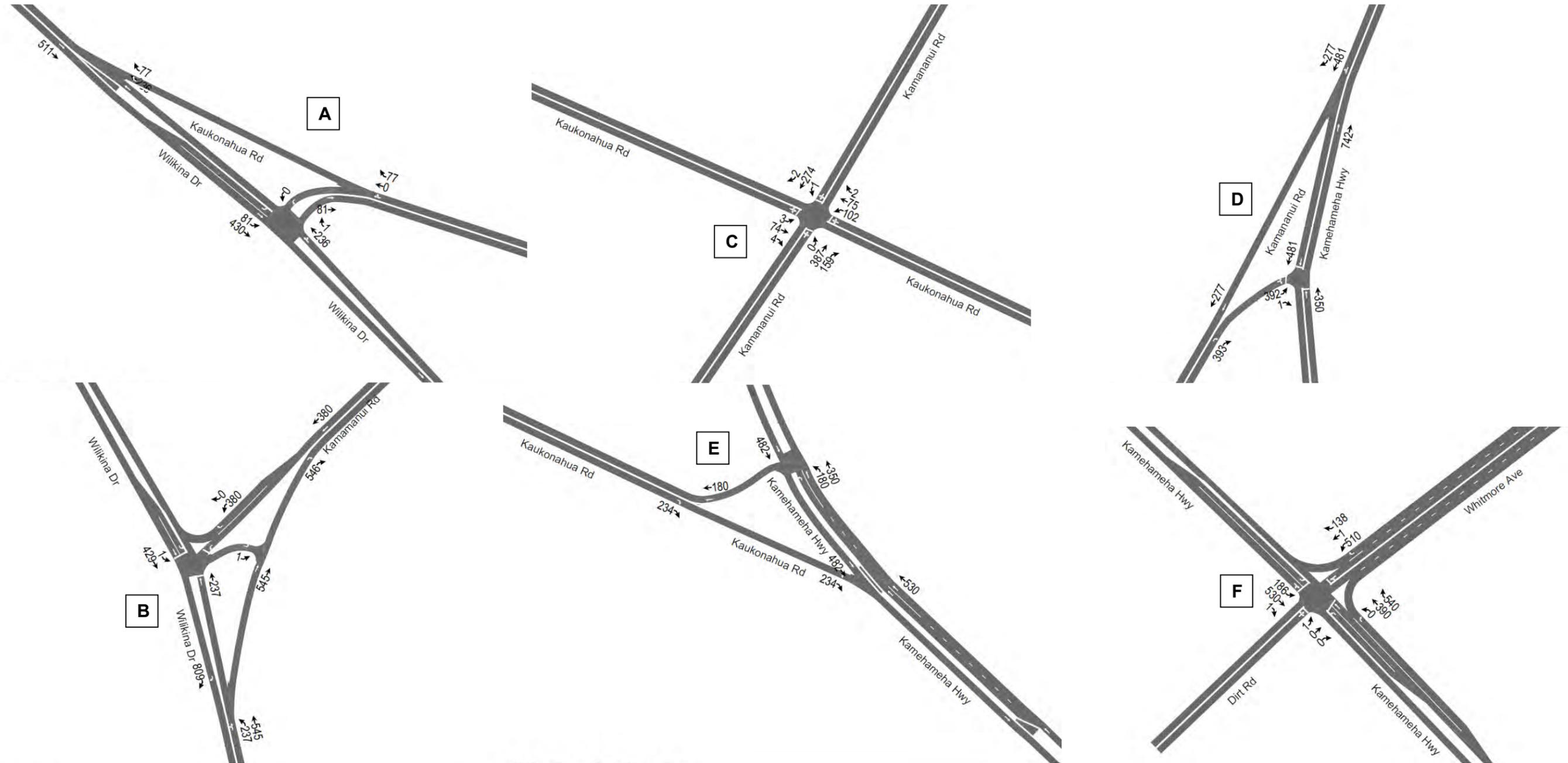


Figure 5. AM Peak Hour Traffic Without Project

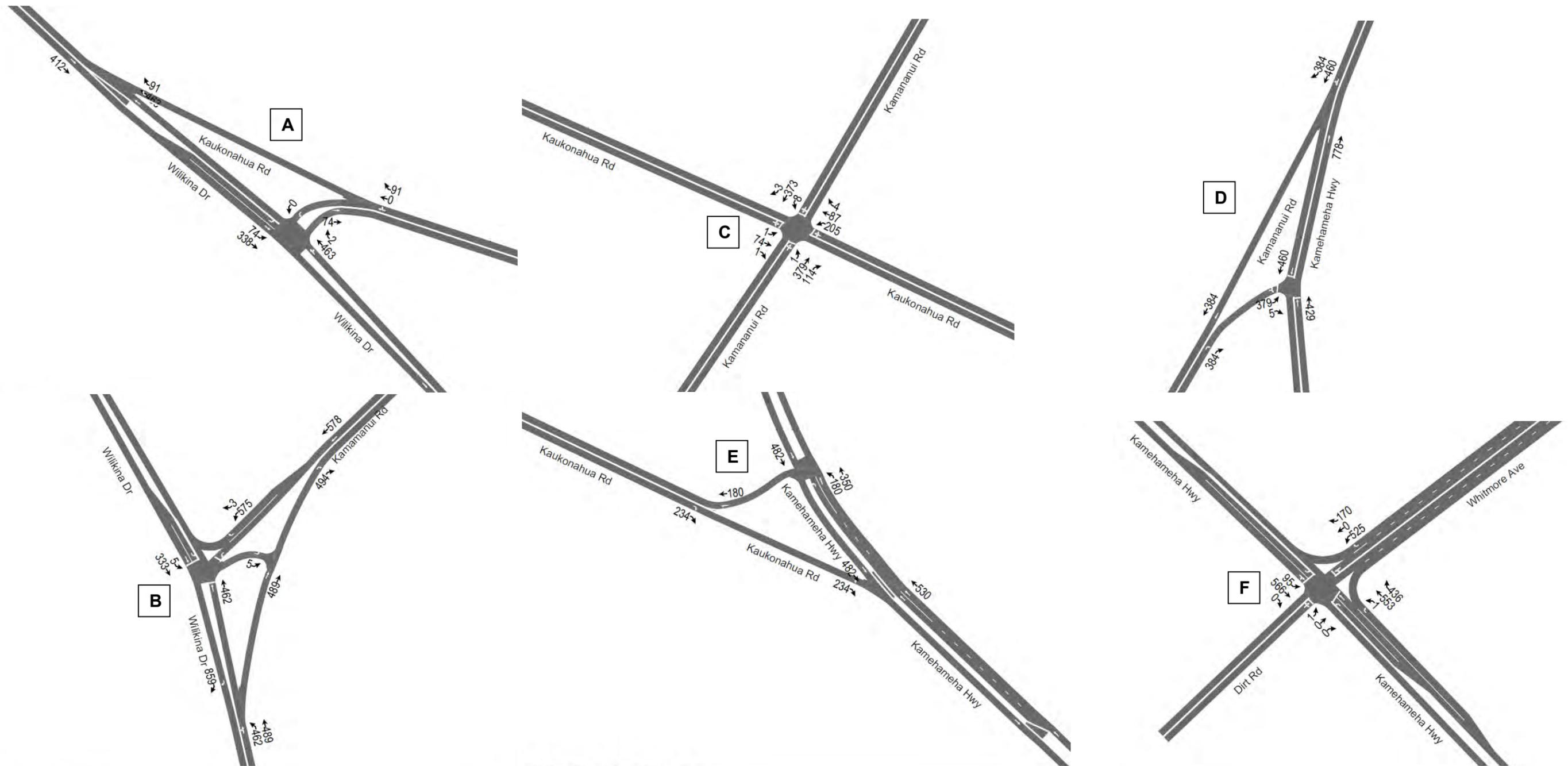


Figure 6. PM Peak Hour Traffic Without Project



A trip generation study was conducted at the Monsanto facility in Kunia and presented in the Traffic Access Analysis Report Update for the Proposed Monsanto Kunia Master Plan, which was prepared by The Traffic Management Consultant, dated January 24, 2011. Monsanto reported that about 12 percent of its employees arrived and departed the site via shuttle buses, during the trip generation study. Table 3 summarizes the trip generation study at the Monsanto facility.

Characteristics	AM Peak Hour (vph)			PM Peak Hour (vph)		
	Enter	Exit	Total	Enter	Exit	Total
Observed Trips (317 workers)	211	18	229	15	200	215
Trip Rates (vph/worker)	0.67	0.06	0.72	0.05	0.63	0.68

The Monsanto trip generation study indicated that the peak hour of generator (site-generated traffic) coincided with the peak hour of adjacent street traffic. The prospective licensees of the proposed project have indicated that their hours of operation will generally occur between sunrise and sunset. Taking a conservative approach, it was assumed that the peak hour of the site-generated traffic will coincide with the peak hours of traffic in the study area. The Monsanto trip rates were used in this traffic impact analysis to estimate the proposed project's trip generation. Table 4 summarizes the trip generation characteristics of the proposed project.

Site #	Acreage	Employees	AM Peak Hour (vph)			PM Peak Hour (vph)		
			Enter	Exit	Total	Enter	Exit	Total
1	311	124	83	7	90	6	78	84
2	302	121	81	7	88	6	76	82
3 & 4	236	94	63	5	68	4	59	63
5	145	58	39	3	42	3	37	40
6	192	77	51	4	55	4	49	53
Totals	1,186	474	316	27	344	22	299	321

The trips were distributed among Sites #1 through #6, relative to their respective acreages. The traffic assignments were based upon the existing traffic patterns in the study area. The AM and PM peak hour site-generated traffic assignments for the proposed project are depicted on Figures 7 and 8, respectively.



B. AM Peak Hour Traffic Impact Analysis With Project

The intersection of Kamehameha Highway and Whitmore Avenue is expected to operate at an overall LOS "D". However, the individual traffic movements are expected to operate at the same Levels of Service as under the AM peak hour of traffic without the proposed project. The other intersections in the study area operated at satisfactory Levels of Service, or at the same Levels of Service as during the AM peak hour of traffic without the proposed project.

All the Site Access Driveways are expected to operate at satisfactory Levels of Service, during the AM peak hour of traffic with the proposed project. The AM peak hour traffic with the proposed project is depicted on Figure 9.

C. PM Peak Hour Traffic Impact Analysis With Project

The left-turn movement from Kaukonahua Road at Wilikina Drive is expected to operate at LOS "D", during the PM peak hour of traffic with the proposed project. The other traffic movements at the intersection are expected to operate at the same Levels of Service as under the PM peak hour of traffic without the proposed project. The other intersections in the study area are expected to operate at satisfactory Levels of Service, or at the same LOS's as during the PM peak hour of traffic without the proposed project.

The Sites #3 & #4 Access Driveway is expected to operate at LOS "E" at Kamehameha Highway, during the PM peak hour of traffic with the proposed project. The other Site Access Driveways are expected to operate at satisfactory Levels of Service. Figure 10 depicts the PM peak hour traffic with the proposed project.

D. Short-Term Traffic Impacts

Kalena Farms and Ohana Best Farm will be constructing Reservoir Sites #1 and #3 on their respective sites later this year (2015). Reservoir Sites #2 and #4 are under design at this writing. Construction Management Plans (CMP) are expected to be prepared by the respective Reservoir contractors. The purpose of the CMP is to provide mitigation measures that will minimize the impacts of construction traffic on the public roadways, such as:

1. Limit the transportation of the equipment and materials to the off-peak period of traffic.
2. Provide shuttle bus services to minimize construction worker traffic to and from the reservoir sites.
3. Avoid the use of truck routes through the towns of Wahiawa, Waialua, and Haleiwa.

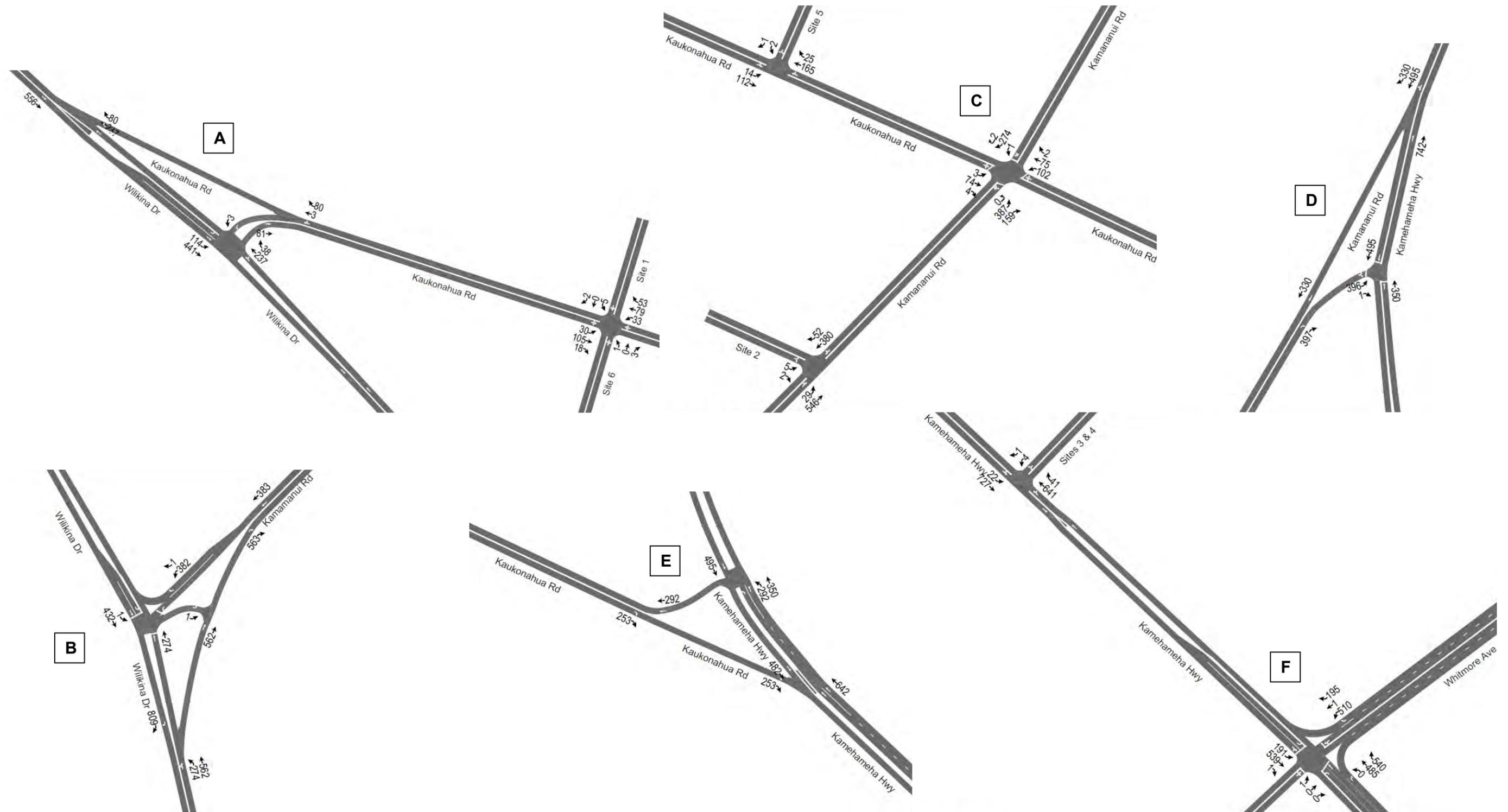


Figure 9. AM Peak Hour Traffic With Project



V. Recommendations and Conclusions

A. Recommendations

The following traffic management measures should be implemented by the ADC in collaboration with its licensees to minimize their impacts on peak hour traffic:

1. Consider providing shuttle bus services for its employees to minimize site traffic.
2. Schedule the deliveries of equipment and supplies, and the transport of farm produce, during the off-peak periods of traffic.
3. Construct paved aprons on all Site Access Driveways at the main highways.
4. Install advance warning signs on the main highways at the Site Access Driveways, as necessary.
5. ADC licensee's traffic operations should be confined to contiguous parcels to minimize the crossings of the major highways in the study area.
6. A secondary access road for Sites 3 & 4 to Whitmore Avenue should be considered to minimize the traffic impacts on Kamehameha Highway.

B. Conclusions

This traffic impact analysis is based upon conservative assumptions such as the use of the peak season of employee traffic to develop the trip generation characteristics. The peak hours of employee traffic also are assumed to coincide with the peak hours of traffic in the study area.

Access driveways to Reservoir Sites #1 through #4 should be utilized by the respective Sites to minimize the number of access points on the public highways. Accesses to Sites #1/#6 and #5 are located on the low-volume section of Kaukonahua Road. Access to Site #2 will be located near the intersection of Kamananui Road and Kaukonahua Road, where lower operating speeds are expected, as vehicles approach and depart the signalized intersection. Access to Sites #3/#4 will be located on Kamehameha Highway, where the speed limit is reduced to 35 mph. The paved aprons on the Site Access Driveways at the main highways will delineate the access locations and reduce debris on the highways.

The proposed State of Hawaii Agribusiness Development Corporation Reservoirs and agricultural activities on the former Galbraith Estates land in Wahiawa, Hawaii is expected to have minimal impacts to traffic at the major intersections in the study area. Table 5 summarizes the measures of effectiveness (MOE) of the capacity analysis prepared for this traffic impact analysis.



Table 5. Summary of Capacity Analysis

Scenario	Intersection	MOE	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection	
Existing AM Peak Hour Traffic	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			F			B	A	E	A	F	C		Intersection LOS: D
		Delay	32.0			103.7			11.0	0.0	59.7	7.2	89.7	29.5		Intersection Signal Delay: 49.9
		v/c	0.03			1.06			0.25	0.00	0.75	0.68	0.89	0.61		Maximum v/c Ratio: 1.06
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	65.9	-	-	-	-	-	-	-	16.2	-	-	17.3	0.0	Intersection Signal Delay: 31.9
		v/c	0.92	-	-	-	-	-	-	-	0.46	-	-	0.52	-	Maximum v/c Ratio: 0.92
	3: Kamananui Rd & Kaukonahua Rd	LOS	C			E			A			A			Intersection LOS: B	
		Delay	33.0			74.3			7.2			4.6			Intersection Signal Delay: 18.8	
		v/c	0.32			0.90			0.59			0.24			Maximum v/c Ratio: 0.90	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	C	-	0	-	B	A	B	B	-	-	Intersection LOS: C
		Delay	-	-	-	34.9	-	0.0	-	12.7	0.0	11.0	14.9	-	-	Intersection Signal Delay: 21.3
		v/c	-	-	-	0.78	-	0.00	-	0.30	0.00	0.00	0.47	-	-	Maximum v/c Ratio: 0.78
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	C	-	-	-	A	-	-	-	-	-	-	-
		Delay	-	-	15.5	-	-	-	9.1	-	-	-	-	-	-	-
		v/c	-	-	0.42	-	-	-	0.18	-	-	-	-	-	-	-
8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	A	-	B	-	-	-	-	A	-	-	-	
	Delay	-	-	-	0.0	-	10.1	-	-	-	-	8.0	-	-	-	
	v/c	-	-	-	-	-	0.10	-	-	-	-	0.07	-	-	-	
Existing PM Peak Hour Traffic	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			E			A	E	D	A	F	D		Intersection LOS: D
		Delay	22.0			64.2			5.5	75.0	53.7	5.5	105.1	37.5		Intersection Signal Delay: 41.7
		v/c	0.02			0.95			0.24	0.10	0.82	0.55	0.82	0.68		Maximum v/c Ratio: 0.95
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	66.4	-	-	-	-	-	-	-	12.8	-	-	13.4	0.0	Intersection Signal Delay: 29.0
		v/c	0.89	-	-	-	-	-	-	-	0.39	-	-	0.42	-	Maximum v/c Ratio: 0.89
	3: Kamananui Rd & Kaukonahua Rd	LOS	B			D			B			B			Intersection LOS: B	
		Delay	17.8			36.5			14.1			12.9			Intersection Signal Delay: 19.7	
		v/c	0.16			0.79			0.54			0.41			Maximum v/c Ratio: 0.79	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	E	-	A	-	C	A	C	C	-	-	Intersection LOS: D
		Delay	-	-	-	63.5	-	2.7	-	28.7	0.0	22.4	23.6	-	-	Intersection Signal Delay: 40.7
		v/c	-	-	-	0.92	-	0.02	-	0.57	0.00	0.03	0.36	-	-	Maximum v/c Ratio: 0.92
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	B	-	-	-	A	-	-	-	-	-	-	-
		Delay	-	-	14.2	-	-	-	9.7	-	-	-	-	-	-	-
		v/c	-	-	0.35	-	-	-	0.29	-	-	-	-	-	-	-
8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	A	-	B	-	-	-	-	A	-	-	-	
	Delay	-	-	-	0.0	-	12.4	-	-	-	-	8.7	-	-	-	
	v/c	-	-	-	-	-	0.17	-	-	-	-	0.07	-	-	-	



Table 5. Summary of Capacity Analysis (Cont'd.)

Scenario	Intersection	MOE	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection	
AM Peak Hour Traffic Without Project	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			F			B	A	E	A	F	C		Intersection LOS: D
		Delay	32.0			113.7			11.6	0.0	62.1	7.3	91.2	30.2		Intersection Signal Delay: 52.7
		v/c	0.03			1.10			0.26	0.00	0.79	0.69	0.90	0.63		Maximum v/c Ratio: 1.10
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	69.0	-	-	-	-	-	-	-	17.7	-	-	19.0	0.0	Intersection Signal Delay: 34.6
		v/c	0.94	-	-	-	-	-	-	-	0.49	-	-	0.55	-	Maximum v/c Ratio: 0.94
	3: Kamananui Rd & Kaukonahua Rd	LOS	C			E			A			A			Intersection LOS: B	
		Delay	33.1			79.9			7.5			4.7			Intersection Signal Delay: 19.9	
		v/c	0.32			0.93			0.61			0.25			Maximum v/c Ratio: 0.93	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	D	-	-	-	-	B	A	B	B	-	Intersection LOS: C
		Delay	-	-	-	35.1	-	-	-	-	13.2	0.0	12.0	15.6	-	Intersection Signal Delay: 21.8
		v/c	-	-	-	0.79	-	-	-	-	0.31	0.00	0.00	0.50	-	Maximum v/c Ratio: 0.79
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	C	-	-	-	A	-	-	-	-	-	-	-
		Delay	-	-	16.9	-	-	-	9.2	-	-	-	-	-	-	-
		v/c	-	-	0.46	-	-	-	0.19	-	-	-	-	-	-	-
8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	A	-	B	-	-	-	-	A	-	-	-	
	Delay	-	-	-	0.0	-	10.2	-	-	-	-	8.0	-	-	-	
	v/c	-	-	-	-	-	0.11	-	-	-	-	0.08	-	-	-	
PM Peak Hour Traffic Without Project	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			E			A	E	E	A	F	D		Intersection LOS: D
		Delay	22.0			65.9			5.8	76.0	74.2	5.6	111.2	39.8		Intersection Signal Delay: 47.7
		v/c	0.02			0.96			0.28	0.11	0.97	0.57	0.85	0.72		Maximum v/c Ratio: 0.97
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	68.2	-	-	-	-	-	-	-	13.2	-	-	13.9	0.0	Intersection Signal Delay: 29.9
		v/c	0.91	-	-	-	-	-	-	-	0.40	-	-	0.44	-	Maximum v/c Ratio: 0.91
	3: Kamananui Rd & Kaukonahua Rd	LOS	B			D			B			B			Intersection LOS: C	
		Delay	17.7			37.2			14.7			13.3			Intersection Signal Delay: 20.3	
		v/c	0.16			0.80			0.56			0.43			Maximum v/c Ratio: 0.80	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	E	-	A	-	C	A	C	C	-	-	Intersection LOS: D
		Delay	-	-	-	64.0	-	2.3	-	30.8	0.0	23.6	25.0	-	-	Intersection Signal Delay: 42.0
		v/c	-	-	-	0.92	-	0.02	-	0.60	0.00	0.03	0.37	-	-	Maximum v/c Ratio: 0.92
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	B	-	-	-	A	-	-	-	-	-	-	-
		Delay	-	-	14.3	-	-	-	9.9	-	-	-	-	-	-	-
		v/c	-	-	0.36	-	-	-	0.30	-	-	-	-	-	-	-
8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	A	-	B	-	-	-	-	A	-	-	-	
	Delay	-	-	-	0.0	-	12.7	-	-	-	-	8.7	-	-	-	
	v/c	-	-	-	-	-	0.17	-	-	-	-	0.08	-	-	-	



Table 5. Summary of Capacity Analysis (Cont'd.)

Scenario	Intersection	MOE	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection	
AM Peak Hour Traffic With Project	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			F			B	A	E	A	F	C		Intersection LOS: E
		Delay	32.0			113.7			11.8	0.0	71.5	6.7	126.0	30.6		Intersection Signal Delay: 57.6
		v/c	0.03			1.10			0.35	0.00	0.91	0.68	1.05	0.64		Maximum v/c Ratio: 1.10
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	67.2	-	-	-	-	-	-	-	18.1	-	-	19.9	0.0	Intersection Signal Delay: 34.5
		v/c	0.94	-	-	-	-	-	-	-	0.49	-	-	0.57	-	Maximum v/c Ratio: 0.94
	3: Kamananui Rd & Kaukonahua Rd	LOS	C			E			A			A			Intersection LOS: C	
		Delay	33.8			77.7			8.5			5.0			Intersection Signal Delay: 20.2	
		v/c	0.38			0.92			0.63			0.25			Maximum v/c Ratio: 0.92	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	D	-	A	-	B	A	B	B	-	-	Intersection LOS: C
		Delay	-	-	-	35.1	-	0.0	-	13.8	0.0	12.0	15.7	-	-	Intersection Signal Delay: 21.7
		v/c	-	-	-	0.79	-	0.00	-	0.36	0.00	0.00	0.50	-	-	Maximum v/c Ratio: 0.79
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	C	-	-	-	B	-	-	-	-	-	-	-
		Delay	-	-	17.8	-	-	-	10.0	-	-	-	-	-	-	-
		v/c	-	-	0.50	-	-	-	0.31	-	-	-	-	-	-	-
	8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	C	-	B	-	-	-	-	A	-	-	-
		Delay	-	-	-	22.1	-	10.2	-	-	-	-	8.6	-	-	-
		v/c	-	-	-	0.02	-	0.11	-	-	-	-	0.12	-	-	-
	16: Site 6/Site 1 & Kaukonahua Rd	LOS	A	A	-	A	A	-	A			B			-	
		Delay	7.6	0.0	-	7.5	0.0	-	9.6			10.8			-	
		v/c	0.02	-	-	0.03	-	-	0.01			0.01			-	
	22: Kamananui Rd & Site 2	LOS	A			-	-	A	C	A	-	-	-	-	-	-
		Delay	8.4			-	-	8.4	18.5	0.0	-	-	-	-	-	-
		v/c	0.03			-	-	0.03	0.03	-	-	-	-	-	-	-
	25: Kaukonahua Rd & Site 5	LOS	A	A	-	-	-	-	-	-	-	-	B			-
		Delay	7.7	0.0	-	-	-	-	-	-	-	-	10.2			-
		v/c	0.01	-	-	-	-	-	-	-	-	-	0.01			-
34: Kamehameha Hwy & Sites 3 & 4	LOS	-	-	-	D			-	-	-	A	A	-	-	-	
	Delay	-	-	-	32.20			-	-	-	9.3	0.00	-	-	-	
	v/c	-	-	-	0.04			-	-	-	0.03	-	-	-	-	



Table 5. Summary of Capacity Analysis (Cont'd.)

Scenario	Intersection	MOE	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Intersection	
PM Peak Hour Traffic With Project	1: Dirt Rd/Whitmore Ave & Kamehameha Hwy	LOS	C			E			A	E	E	A	F	D		Intersection LOS: D
		Delay	24.0			77.2			7.2	76.0	77.9	5.5	126.6	42.9		Intersection Signal Delay: 53.5
		v/c	0.03			1.00			0.29	0.11	0.98	0.57	0.97	0.81		Maximum v/c Ratio: 1.00
	2: Kamehameha Hwy & Kamananui Rd	LOS	E	-	-	-	-	-	-	-	B	-	-	B	A	Intersection LOS: C
		Delay	77.4	-	-	-	-	-	-	-	14.0	-	-	14.6	0.0	Intersection Signal Delay: 34.8
		v/c	0.96	-	-	-	-	-	-	-	0.41	-	-	0.45	-	Maximum v/c Ratio: 0.96
	3: Kamananui Rd & Kaukonahua Rd	LOS	C			D			B			B			Intersection LOS: C	
		Delay	27.9			50.6			19.5			16.2			Intersection Signal Delay: 27.5	
		v/c	0.64			0.91			0.67			0.47			Maximum v/c Ratio: 0.91	
	4: Wilikina Dr & Kamananui Rd	LOS	-	-	-	E	-	A	-	C	A	C	C	C	-	Intersection LOS: D
		Delay	-	-	-	64.0	-	2.3	-	30.9	0.0	23.5	25.8	-	-	Intersection Signal Delay: 41.8
		v/c	-	-	-	0.92	-	0.02	-	0.61	0.00	0.04	0.42	-	-	Maximum v/c Ratio: 0.92
	5: Kamehameha Hwy & Kaukonahua Rd	LOS	-	-	C	-	-	-	B	-	-	-	-	-	-	-
		Delay	-	-	19.4	-	-	-	10.1	-	-	-	-	-	-	-
		v/c	-	-	0.57	-	-	-	0.33	-	-	-	-	-	-	-
	8: Wilikina Dr & Kaukonahua Rd	LOS	-	-	-	D	-	B	-	-	-	-	A	-	-	-
		Delay	-	-	-	25.8	-	10.2	-	-	-	-	8.8	-	-	-
		v/c	-	-	-	0.19	-	0.11	-	-	-	-	0.08	-	-	-
	16: Site 6/Site 1 & Kaukonahua Rd	LOS	A	A	-	A	A	-	A			B			-	
		Delay	7.5	0.0	-	7.2	0.0	-	9.0			10.0			-	
		v/c	0.00	-	-	0.00	-	-	0.05			0.11			-	
22: Kamananui Rd & Site 2	LOS	A			-	-	A	C	A	-	-	-	-	-	-	
	Delay	8.8			-	-	8.8	24.1	0.0	-	-	-	-	-	-	
	v/c	0.00			-	-	0.00	0.31	-	-	-	-	-	-	-	
25: Kaukonahua Rd & Site 5	LOS	A	A	-	-	-	-	-	-	-	-	A			-	
	Delay	7.5	0.0	-	-	-	-	-	-	-	-	9.7			-	
	v/c	0.01	-	-	-	-	-	-	-	-	-	0.05			-	
34: Kamehameha Hwy & Sites 3 & 4	LOS	-	-	-	E			-	-	-	A	A	-	-	-	
	Delay	-	-	-	45.80			-	-	-	9.4	0.00	-	-	-	
	v/c	-	-	-	0.43			-	-	-	0.00	-	-	-	-	

Legend

EBL - Eastbound Left-Turn Movement
WBL - Westbound Left-Turn Movement
NBL - Northbound Left-Turn Movement
SBL - Southbound Left-Turn Movement
LOS - Level of Service

EBT - Eastbound Through Movement
WBT - Westbound Through Movement
NBT - Northbound Through Movement
SBT - Southbound Through Movement
Delay - average delay per vehicle (seconds/vehicle)

EBR - Eastbound Right-turn Movement
WBR - Westbound Right-turn Movement
NBR - Northbound Right-turn Movement
SBR - Southbound Right-turn Movement
v/c - Volume to Capacity ratio