

JOSH GREEN, M.D.
GOVERNOR OF HAWAII
KE KIA'AINA O KA MOKU'AINA 'O HAWAII



STATE OF HAWAII
DEPARTMENT OF HEALTH
KA 'OIHANA OLAKINO
SAFE DRINKING WATER BRANCH
ULUAKUPU BUILDING 4
2385 WAIMANO HOME ROAD, SUITE 110
PEARL CITY, HI 96782-1400

KENNETH S. FINK, MD, MGA, MPH
DIRECTOR OF HEALTH
KALUNA HO'OKELE

In reply, please refer to:
File: SDWB

P-DW303-EC02_FEA_20251216_Sub

December 16, 2025

Ms. Mary Alice Evans
Director
Office of Planning and Sustainable Development
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii'i 96804

Dear Ms. Evans:

SUBJECT: HAWAII REVISED STATUTES, CHAPTER 343,
FINAL ENVIRONMENTAL ASSESSMENT – FINDING OF NO
SIGNIFICANT IMPACT (FEA-FONSI) POTABLE WATER SOURCE
WELL FOR KUNIA VILLAGE AND AGRIBUSINESS COMPLEX
TAX MAP KEY: (1) 9-2-005:023 (POR.), KUNIA, ISLAND OF OAHU

The Hawaii State Department of Health, Safe Drinking Water Branch, is hereby submitting the FEA-FONSI for the proposed Potable Water Source Well for Kunia Village and Agribusiness Complex for review and publication in the December 23, 2025, edition of The Environmental Notice.

In addition to this letter, you will find the online Environmental Review Program (ERP) Publication Form that has been submitted through the ERP website. The online submittal includes one electronic copy of the FEA-FONSI as an Adobe Acrobat PDF file.

If you have any questions, please contact our program email at DOH.DWSRF@doh.Hawaii.gov or by phone at (808) 586-4258.

Sincerely,

A handwritten signature in blue ink that reads "Gaudencio C. Lopez".

GAUDENCIO C. LOPEZ, P.E., CHIEF
Safe Drinking Water Branch

JH:cw

From: dbedt.opsd.erp@hawaii.gov
To: [DBEDT OPSD Environmental Review Program](#)
Subject: New online submission for The Environmental Notice
Date: Tuesday, December 16, 2025 7:40:15 PM

Action Name

Final Environmental Assessment Potable Water Source Well for Kunia Village and Agribusiness Complex
TMK # 9-2-005:023

Type of Document/Determination

Final environmental assessment and finding of no significant impact (FEA-FONSI)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds

Judicial district

‘Ewa, O‘ahu

Tax Map Key(s) (TMK(s))

(1) 9-2-005:023-001

Action type

Applicant

Other required permits and approvals

Well Construction Permit, Groundwater use authorization, NPDES permits

Discretionary consent required

Minor modification to the Development Plan, Ka Pa‘akai Analysis

Agency jurisdiction

State of Hawai‘i

Approving agency

Department of Health Safe Drinking water Branch

Agency contact name

Judy Hayducsko

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Agency contact phone

(808) 586-4258

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2385 Waimano Home Road, Suite 110
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United States
[Map It](#)

Applicant

Kunia Village Development Corporation

Applicant contact name

David Robichaux

Applicant contact email

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Applicant contact phone

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Applicant address

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Haleiwa, HI 96712
United States
[Map It](#)

Is there a consultant for this action?

Yes

Consultant

North Shore Consultants, LLC

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Haleiwa, HI 96712
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Action summary

This Final Environmental Assessment (EA) has been prepared in accordance with Chapter 343, Hawai'i Revised Statutes (HRS), to support the construction and operation of a new drinking water source well for The Kunia Village and Agribusiness Complex. The new well will replace an existing source one mile north of the Village that draws from the Wahiawa Aquifer System. That well was found to have perfluoroalkyl and polyfluoroalkyl substances (PFAS) contamination. The proposed new well will draw from the Ewa-Kunia Aquifer System beneath Kunia Village. No new demand for groundwater resources is requested, only a change in its source. Following the review by agencies and interested parties the

Approving Agency has reached a finding of no significant impact (FONSI).

Reasons supporting determination

An action shall be determined to have a significant effect on the environment if it:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
The proposed action would not result in an irrevocable commitment, loss or destruction of any protected natural resource. No threatened or endangered species were identified within the development area. Previous archeological studies concluded that there is no evidence of traditional practices or cultural artifacts within the area of the proposed action. The proposed action does not increase the demand for groundwater resources but is likely to draw water from a different groundwater management area from which the water is drawn.
2. Curtails the range of beneficial uses of the environment;
Kunia Village has been in this location for nearly 100 years and will continue in its function to provide affordable housing for Hawai'i's farm workers and their families. The proposed action will benefit agriculture and the farm families residing in the Village. Agriculture is a beneficial use of the environment. No new demands will be placed on groundwater resources.
3. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

Plantation communities are protected by state statutes and city ordinances and are supported by planning documents at all levels of the government. The proposed action is consistent with the County General Plan, and the Central Oahu Functional Plans.

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

The proposed action has beneficial impacts on the social and economic welfare of the County and State. The objective of the proposed action is to provide clean drinking water to those who work in agriculture.

5. Substantially affects public health;

Public facilities and services are adequate to manage existing and planned water demands within Kunia Village. The proposed action benefits public health by providing drinking water to area residents.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities;
Secondary impacts are defined as those displaced in time or space from the proposed action yet resulting directly from the action. No population changes or increased use of groundwater resources resulting from the proposed action are anticipated.

7. Involves a substantial degradation of environmental quality;

Temporary impacts associated with construction will be mitigated through best management practices. Noise and fugitive dust are not expected to be substantial or lasting. During operations the level of use is not expected to result in degradation of the quality of life or the environment within the community.

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

Provision of farm-worker housing supports local agriculture and exerts positive impacts on the State's health and balance of trade. No commitment for larger actions is required.

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

The US Fish and Wildlife Service (June 2009) did not identify any special-status species or critical habitats located on the subject property. An IPAC assessment (June 2024) also did not anticipate impacts on special status species.

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

Temporary impacts associated with construction will be small and mitigated through best management practices. During operations there are no sources of regulated emissions or noise. The proposed action is not expected to result in degradation of the quality of life or the environment within the community

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

The project site is not within flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. It is within a traditionally used agricultural area. Land disturbance over more than 100 years has defined the biological communities that are present.

These traditional farmlands are not normally considered environmentally sensitive areas.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies; or, The scenic vistas and unique view planes, and unique community character will not be affected by the proposed action.

13. Requires substantial energy consumption.

The proposed project will require fossil fuel consumption during construction and will not increase electrical power consumption during operation. The quantities of both sources are minimal by community standards and these services are available using existing infrastructure.

Based on analysis of the 13 significance criteria listed above, the proposed action is not expected to result in significant adverse environmental impacts when conducted within the constraints of the required plans and permits. Comments received from the public and various agencies during this DEA review period will be considered in formulating the final conclusion of this assessment. Pending review of comments received from agencies and interested parties the proponent anticipates reaching a finding of No Significant Impact.

Attached documents (signed agency letter & EA/EIS)

- [Transmittal-ocr1.pdf](#)
- [FEA-Kunia-WEI-OCR-121620251.pdf](#)

ADA Compliance certification (HRS §368-1.5):

The authorized individual listed below acknowledges that they retain the responsibility for ADA compliance and are knowingly submitting documents that are unlocked, searchable, and may not be in an ADA compliant format for publication. Audio files do not include transcripts, captions, or alternative descriptions. The project files will be published without further ADA compliance changes from ERP, with the following statement included below the project summary in The Environmental Notice: "If you are experiencing any ADA compliance issues with the above project, please contact (authorized individual submitting the project at email)."

Shapefile

- The location map for this Final EA is the same as the location map for the associated Draft EA.

Action location map

- [mygeodata-12.zip](#)

Authorized individual

David Robichaux, Director KVDC

Authorized individual email

robichaud001@hawaii.rr.com

Authorized individual phone

(808) 368-5352

Authorization

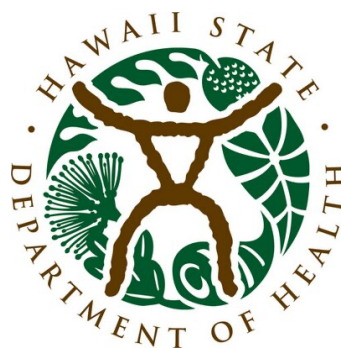
- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Final Environmental Assessment

Potable Water Source Well for Kunia Village and Agribusiness Complex TMK # 9-2-005:023



Prepared for

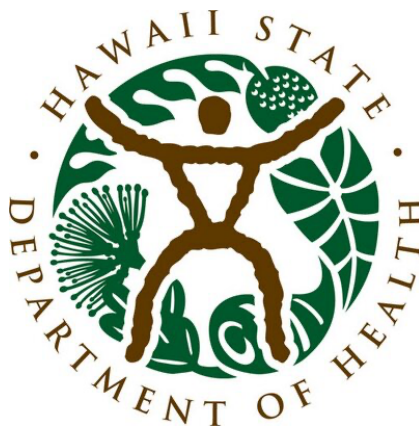


SAFE DRINKING WATER BRANCH
2385 Waimano Home Road, Suite 110
Pearl City, Hawai'i 96782

December 16, 2025

Final Environmental Assessment
Potable Water Source Well for
Kunia Village and Agribusiness Complex
TMK # 9-2-005:023

Approving Agency



SAFE DRINKING WATER BRANCH

Applicant



December 16, 2025

PROJECT SUMMARY

This Final Environmental Assessment (EA) has been prepared in accordance with Chapter 343, Hawai'i Revised Statutes (HRS), to support the construction and operation of a new drinking water source well for The Kunia Village and Agribusiness Complex. The new well will replace an existing source one mile north of the Village that draws from the Wahiawa Aquifer System. That well was found to have perfluoroalkyl and polyfluoroalkyl substances (PFAS) contamination. The proposed new well will draw from the Ewa-Kunia Aquifer System beneath Kunia Village. No new demand for groundwater resources is requested, only a change in its source. Following the review by agencies and interested parties the Approving Agency has reached a finding of no significant impact (FONSI).

Name:	Kunia Village Potable Water Source Well
Location:	Kunia, O'ahu, Hawai'i
Judicial District:	Ewa
Applicant	Kunia Village Development Corporation
Recorded Fee Owner	Hawaii Agriculture Research Center PO Box 100 Kunia, Hawaii 96759 (808) 621-1350
Approving Agency:	Hawai'i Department of Health Safe Drinking Water Branch 2385 Waimano Home Road, Suite 110 Pearl City, Hawai'i 96782 Attn: Judy Hayducsko (808) 586-4258
Agent:	North Shore Consultants, LLC 66-031 Mahaulu Ln. Hale'iwa, HI 96712 Attn: David Robichaux (808) 368-5352
Tax Map Key:	TMK (1) 9-2-005:023-001 por.
Land Area:	0.09 acres
Existing Use:	vacant
Proposed Use:	Install and operate groundwater well
Land Use Designations:	State Land Use: Agriculture District Sustainable Communities Plan: Agriculture County Zoning: Ag-1 Restricted Agriculture Special Management Area (SMA): Not within the SMA
Major Approvals Required:	Well Construction Permit Pump Installation Permit Groundwater Use Permit Minor Modification of the Kunia Village Development Plan

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Appendix D: EPA Numerical Flow Model
Appendix E: US FWS Special Status Species List
Appendix F: SDS sheet for foaming agent

1.0 PROJECT LOCATION, PURPOSE AND NEED

1.1 Project Location

Kunia Village and Agribusiness Complex (Kunia Village) is in the Honouliuli Ahupua`a, Ewa District of the Island of O`ahu. It is accessed by Kunia Road approximately 6 miles north of the intersection between Kunia Road and H-1 Freeway, at Latitude (north) 21°18`46", Longitude (west) 158°05`07" (See Figure 1-1). This location is approximately 2 miles south of the Wheeler Army Airfield in Central O`ahu. The site elevation ranges from approximately 835 feet to 890 feet above mean sea level (MSL). The subject property is accessed by Kunia Road and is within approximately 6,000 acres of agricultural land in Central O`ahu. The subject property tax key map is shown in Figure 1-2.



Figure 1-1: The project is located within the footprint of Kunia Village, 91-1700 Kunia Road in Central O`ahu



Figure 1-2: Kunia Village Aerial Photograph showing the approximate location of the proposed well in the southwest corner of TMK # 9-2-005:023. (Google Earth 2023)

Kunia Village consists of 15 CPR units. Fourteen are owned by Kunia Village Title Holding Corporation (KVTHC), a wholly owned subsidiary of the Hawaii Agriculture Research Center (HARC). CPR-1, which contains the well site, is owned by HARC. Another subsidiary of HARC is the Kunia Village Development Corporation (KVDC). KVDC and HARC are 501(c)(3) non-profit corporations. KVDC is the entity that applies for grants, loans and donations for Kunia Village. All three corporations are authorized to commit land and funding for the others.

1.2 Need for HRS 343 Environmental Assessment

HRS 343 requires public disclosure and environmental assessment for any proposed program or project that proposes one or more land uses or administrative acts that are identified in the Statute. The specific trigger for this assessment is the use of public funds. Actions that involve use within any Historic Site or District as designated in the Hawaii Register of Historic Sites are also covered by HRS 343. The majority of Kunia Village is within a Historic District designated in the State Register of Historic Places. The proposed well installation is within the same tax map key, but outside of the Historic District. The land is without historic structures or resources.

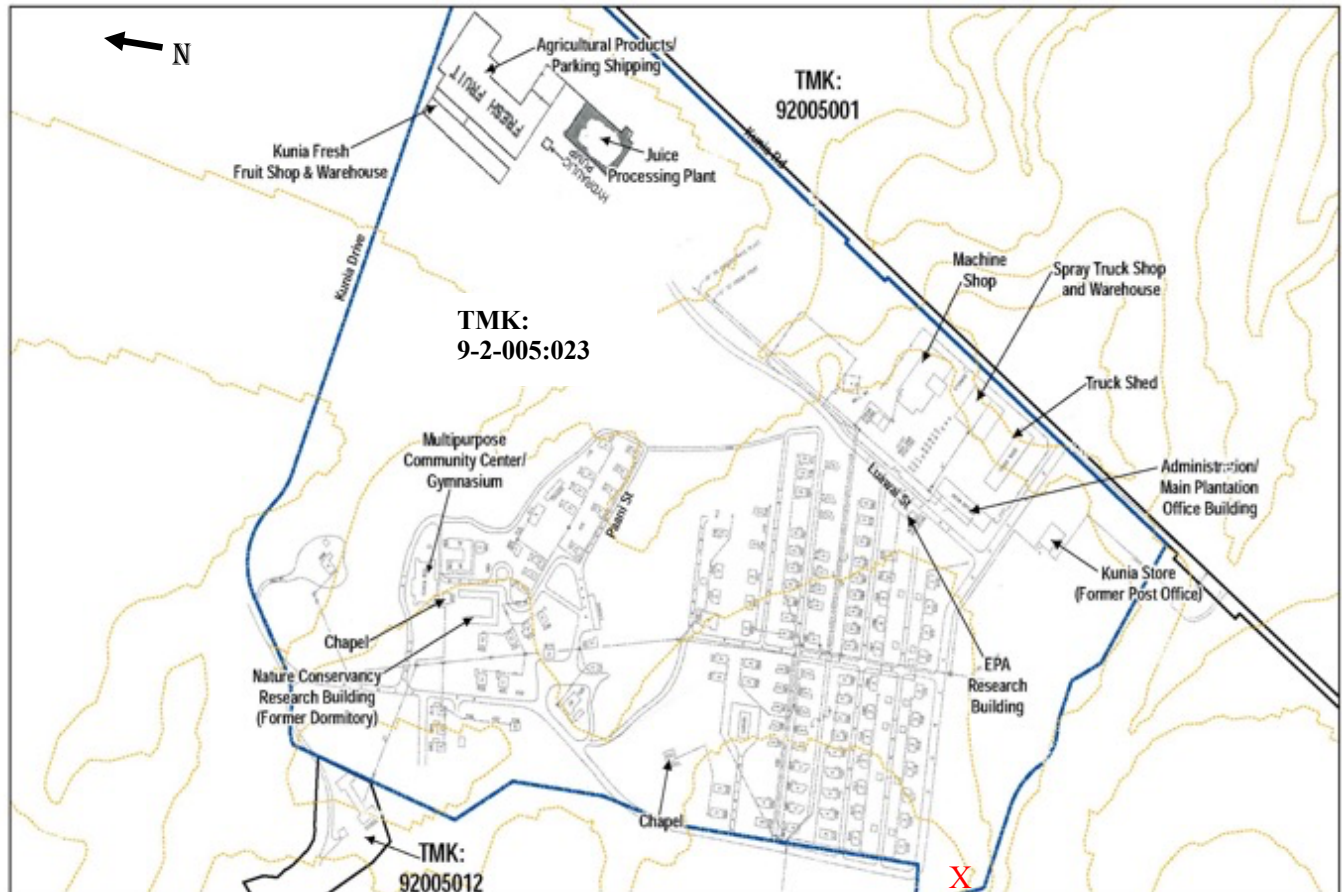


Figure 1-3 Kunia Village site plan showing major buildings and roadways. The proposed well site is shown as a red X.

1.3 Site History

Cultural Surveys Hawaii (CSH) reports that the pre-contact period within the Ewa district supported substantial populations due to the resources of Pearl Harbor and abundant freshwater streams. Exploitation of the forest reserves in the lower slopes of the Waianae range may have also provided subsistence goods to the Ewa villages. The upper valley slopes may have also been a significant resource for sporadic quarrying of basalt in Makaiwa Gulch at 500 ft elevations.

After Western Contact in the area, the landscape of the ‘Ewa plains and Waianae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Captain George Vancouver in the early 1790s and were allowed to graze freely on the land for some time after.

No *kuleana* land claims were made for land within the current project area or vicinity. The vast majority of the Land Commission Awards (LCA) located in Honouliuli were near the taro lands of the ‘ili of Pu‘uloa and the Pu‘uloa Salt Works (CSH Appendix B).

In 1877, James Campbell purchased most of Honouliuli Ahupua‘a, including the current project area, for a total of \$95,000. He then drove off 32,347 head of cattle belonging to others and constructed a fence around the outer boundary of his property. In 1879, Campbell hired a well-driller from the West Coast who discovered the vast Honouliuli groundwater body. Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource. Within ten years of the first drilled well in ‘Ewa, the addition of a series of artesian wells throughout the island was supplying most of Honolulu’s water needs.

Kunia Village also known as Kunia Camp was originally established in the second decade of the 20th century by the predecessor of Del Monte Corporation. It was continuously used as a permanent residence for Del Monte farm workers between 1920 and 2009 when Del Monte withdrew from pineapple production in Hawai‘i. The Village then reverted to the landowner, The James Campbell Company, which subdivided out the Village property from a larger parcel. It was deeded to Hawaii Agriculture Research Center, (HARC) a 501(c)(3) tax exempt organization in 2009, specifically to facilitate the preservation of housing for agricultural workers and retired Del Monte agricultural workers.

HARC, formerly The Hawaiian Sugar Planters' Association, came into existence in 1895. It had operations on O‘ahu, Maui, Kaua‘i and Hawai‘i Island. It manages private, state and federal grants; it manages its own rental property and maintains several facilities. It has survived and thrived during the downsizing of the sugarcane industry to continue serving its members while broadening its research scope and clientele. Education and outreach have been integral parts of HARC's mission. HARC is well recognized and respected by the agricultural community, and it has attracted many private sector partners who are contributing to the facility redevelopment and leasing space in this project.

HARC acquired The Kunia Village from The James Campbell Company, LLC in 2009 after Del Monte’s lease expired and the Company withdrew from the Hawai‘i Market. By agreeing to maintain the farm worker housing, HARC prevented demolition of the residential and commercial agricultural infrastructure and continued its traditional functions for farm residences and agribusiness. Agricultural warehousing, mechanical shops, administrative areas processing buildings and cold storage facilities are badly needed in this rapidly growing market. The existing Kunia Camp residences are maintained for agricultural workers and is the last known “Plantation Camp” that is still used to provide stable and affordable housing to farm workers as it was designed to do in the 1920s.

HARC established two wholly owned subsidiaries; The Kunia Village Title Holding Corporation (KVTHC) to own and operate the asset on HARC's behalf, and The Kunia Village Development Corporation (KVDC) to manage grants and outside donations for the restoration of the Village. the deed has restrictions associated with it that require that *a minimum of ninety (90) and up to one hundred and fifteen (115) of such residential units shall be used for affordable rental housing.*

In 2018, KVDC requested the City Council to exercise the authority stated in Section 201H-38, HRS, granted to the City under the provisions of Section 46-15.1, HRS, by exempting the Project from certain planning, zoning, construction standards of subdivisions, development and improvement of land, and the construction of units thereon, in order to accommodate development of the Project by the Developer on the Project Land.

In accordance with Restrictive Use Covenant, Doc. No. A-66940461, KVDC agrees with the United States Department of Agriculture to use the property for the purpose of the housing program for eligible very low-, low-, or moderate-income families. Kunia Village is restricted in perpetuity to retain and maintain up to 200 housing units as affordable rentals for farm workers and their families. Any modifications of the land use or Development Plan must be approved by the Honolulu City Council or their designated agency, Department of Planning and Permitting (DPP). One previous request for a Minor Modification was approved to support new water storage tanks. The addition of a new water source well on this property will also require a Minor Modification. This Environmental Assessment will be the primary document to support the request for a new water source under a minor modification of the Development Plan.

1.4 Purpose and Need for the proposed action

Hawai'i's economy depends on tourism, government spending and agriculture in that order. Whereas tourism is thought to have grown to its maximum sustainable level, the growth in agricultural diversity has been surprisingly reliable and steady over the past two (2) to three (3) decades but remains well below its sustainable yield. As the two (2) major agricultural businesses, sugarcane and pineapple, have reduced their contribution to the economy, specialty crops have risen substantially to form a stable economic contribution. However, the pressures and future opportunities to convert prime agricultural lands to non-agricultural uses have increased during the downsizing of plantation-style agriculture. Nowhere in the State is this more evident than Central O'ahu. Agribusinesses are generally not able to successfully compete with residential developers for new areas for expansion due to the high value for land to be used for housing development. The concept of plantation camps is more valid today than in the 1900s when the plantations provided most residential space for farm workers. Without respectable housing, which is affordable, and accessible to farm families, Hawai'i's agriculture industry cannot expand to meet the demands for locally produced fresh food.

Kunia Village provides essential services to Hawai'i's agriculture industry by:

1. Providing respectable housing to farm families who sustain Hawai'i's agriculture industry.
2. Continuing to provide housing for retirees of the former Del Monte Fresh Fruit Company, and other aging farm workers now residing in Kunia Village.
3. Supporting commercial agribusinesses with office and warehouse space.



Figure 1-4: Pineapple harvest circa 1950

The Del Monte Corporation grew and processed pineapple on the plantation from about 1946 to 2006 and used pesticides to control nematodes and other pineapple pests. The water supplies serving Kunia Village, and the surrounding areas have been repeatedly threatened by previous practices of the plantation and surrounding users.

In 1977, an accidental 500-gallon pesticide spill occurred next to the Kunia drinking water supply well, Del Monte Well 1 (3-2703-001/002), which contributed to contaminated site soil and groundwater. U.S. Environmental Protection Agency (EPA) added the site to the Superfund program's National Priorities List (NPL) in 1994. Del Monte treated contaminated groundwater in the basal aquifer from 2004 until 2014 through pumping water to its farm sites. The current site remedy includes monitored natural attenuation (MNA) of groundwater in the basal aquifer. Natural attenuation of the remaining contamination is the use of naturally occurring physical, chemical and biological processes that act without human intervention to reduce toxicity, mass, mobility and concentration of contaminants.

In September 2020, EPA concluded that groundwater levels in the basal aquifer are near or below "background" levels of ethylene dibromide (EDB), 1,2-dibromo-3-chloropropane (DBCP), 1,2-dichloropropane (1,2-DCP) and 1,2,3-trichloropropane (1,2,3-TCP). However, the levels of DBCP and 1,2,3-TCP are above Hawai'i maximum contaminant levels (MCLs). Background levels are due to the historic legal application of pesticides in the area. The 1977 spill and application of now-banned pesticides permanently removed Kunia Village's only source of drinking water from service. Del Monte previously licensed Wells 3 and 4 one mile

north of the site from the U.S. Department of the Army (Army) for irrigation. When Del Monte Well 1 (2703-001/002) was taken out of service, the plantation installed the pumps and piping from Kunia Well 3 (3-2803-005) and Kunia Well 4 (3-2803-007) to deliver drinking water to the village.

Wells 3 and 4 tap into O‘ahu’s Wahiawa Aquifer System. In the mid-1980s portions of the Wahiawa Aquifer System were found to contain unacceptable concentrations of Trichloroethene (TCE). In 1986, Del Monte installed a groundwater treatment system to treat TCE contamination in drinking water from Wells 3 and 4, the cost of operations and maintenance was assumed by the Army following the site listing on the NPL. The long-term remedy involves rapid aeration of water originating in the wells that contain TCE. TCE is highly volatile and is removed during aeration by volatilization.

In January 2023, Kunia Village was notified that chemicals known as PFAS had been detected for the first time in water samples collected at the Kunia Village Well 3 (3-2803-005). Kunia Well 4 (3-2803-007) was tested several months later and found to contain equivalent concentrations of certain PFAS.

The detections of PFAS in Kunia Well 4 exceeded the following:

- Hawai‘i State Department of Health Environmental Action Levels (EAL) for Perfluorooctane Sulfonic Acid (PFOS)
- EPA-proposed MCL for PFOS and Perfluorooctanoic Acid (PFOA) in drinking water
- EPA-proposed Hazard Index of 1.0 for the combined toxicity ratios of perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), perfluorobutane sulfonic acid and its potassium salt (PFBS) and hexafluoropropylene oxide (HFPO) dimer acid and its ammonium salt (Gen X Chemicals).

While waiting for the analyses from Kunia Well 4 the village tenants were provided with bottled water from Menehune Water. Menehune Water was used from March 9, 2023, until June 21, 2023.

After the determination of Kunia Well 4 being contaminated with PFAS, on March 24, 2023, Kunia Village requested to tap into the Army’s potable water system at neighboring Schofield Barracks due to this emergency. Kunia Village continued to receive Schofield Potable water until June 10, 2025. KVDC received a grant from the Hawai‘i DOH and EPA and completed the installation of a Granulated Activated Carbon (GAC) Treatment Plant on June 10, 2025. Kunia Village now treats the PFAS contaminated water from Well 4 (3-2803-007) first through the Aeration Stripping Tower (AST) for the TCE/TCP by the Army and then the GAC recently installed and activated to treat the PFAS for the Kunia Village Potable System.

The proposed action is to provide a permanent source of drinking water for the residents and businesses of Kunia Village, on the Village property. This action is required to maintain the assets of O‘ahu’s last plantation camp at a time when it is needed the most.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action (Project Description)

Kunia Village, through its Kunia Village Development Corporation, intends to drill a new well at the southwest corner of its property. The new well will become the primary water source for the community. Kunia Well #3 (State Well 3-2803-05) is no longer available to the community since the lease was not renewed. This location is chosen largely because it is located on the Village property and adjacent to the GAC filters and water storage. The hydrogeology and geology of the site are discussed in Section 3.1.3. The selected location is farthest away from the pesticide spill site yet still on the property owned by Kunia Village.



Figure 2-1: Showing the approximate well location.



Figure 2-2: Detail of the project site

KVDC has received three bids from drilling contractors and is awaiting approval of the well construction permit to begin construction. Commission on Water Resources Management (CWRM) has determined that the permit must await acceptance of the Final Environmental Assessment before authorizing the construction permit. Considering the standard time requirements for permits this may be in 2026-27.

Following consultation with the EPA, the proposed use of the Ewa-Kunia Aquifer System was selected based on EPA's modeling results and recommendations. The well will be drilled through the groundwater in the overlying Waipahu-Waiawa Aquifer System, through the saprolite layer that separates groundwater in the Koolau volcanics from the underlying Waianae Volcanics (Ewa-Kunia Aquifer System). Saprolite is a decomposed bedrock that has weathered-in-place during the approximately 1 million years between the volcanic events. The permeability of saprolite is very low in comparison to the basaltic lava layers above and below. The saprolite is expected to form a barrier between the two aquifer systems. The drilling plan will avoid cross contamination of the two groundwater bodies. Construction of the well (Figure 2-3) will include the following steps:

- A six-inch gravel pad of approximately 40 by 100 feet will be installed to support the drilling equipment and drilling pipes.
- An initial pilot hole, nine to twelve inches in diameter, will be advanced to the upper edge of the saprolite layer estimated to be 1170 feet below ground surface (bgs). The saprolite layer provides separation between the two (2) water bodies.
- Following completion of the initial pilot hole, a video camera will be used to document the geology of the entire length of the borehole. Natural groundwater elevation will be accurately measured, and samples of both the rock and groundwater will be obtained.
- A short-term open borehole pump test would be run to document potential contaminants in the Waipahu-Waiawa Aquifer System.
- The pilot borehole will be expanded to 23-inches to the upper edge of the saprolite layer, and a 16-inch solid casing will be installed and grouted over its entire length to the saprolite layer.
- After the grout has set, a 14-inch bit will be used inside the solid casing to reach a depth of 1270 feet bgs which is in the Ewa-Kunia Aquifer System.
- Another short-term pump test will be completed to establish water quality parameters and determine whether yield is sufficient for the Kunia Village demand.
- 100 feet of 12-inch louvered casing will be installed in the bore hole below the saprolite layer and its 16-inch casing.
- The permit-required pump test would then be run to sample for all regulated drinking water contaminants and PFAS.
- The well will be connected to a granular activated carbon filter to ensure removal of all existing or future contaminants, and the filtered effluent will be connected to existing storage tanks at the same location.

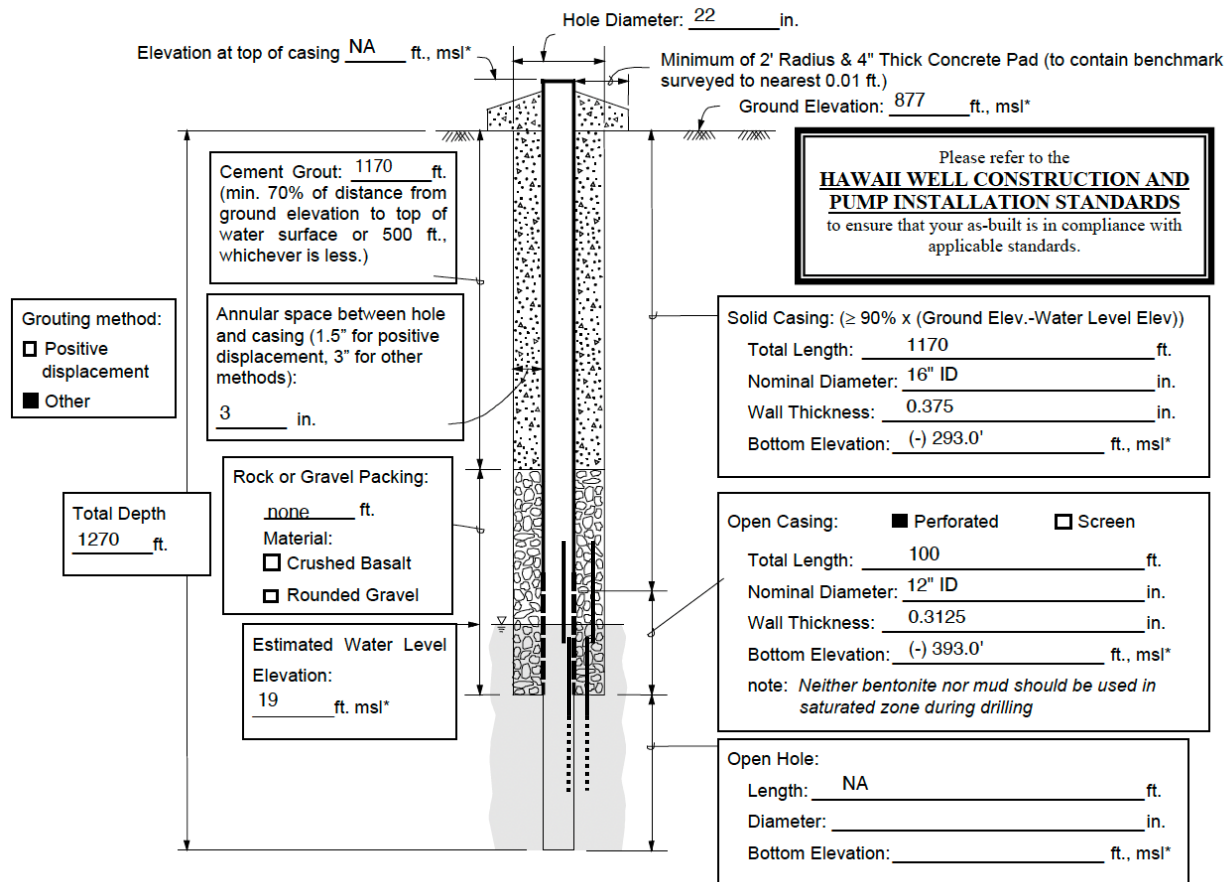
Discharge water from drilling will be tested for contamination. If the water is not contaminated as defined by Hawaii Administrative Rules (HAR), Chapter 11-54, it will be disposed into a dispersion pit with dimensions of approximately 400 sf in area and 2 feet deep. Some overflow from the seepage pits will be discharged to the adjacent dry stream bed nearby with authorization from an NPDES discharge permit. The final activity of well installation will be to determine whether the borehole has any bends that may prevent other pumping equipment from being installed. If the well is not straight to the extent that the pump would not operate properly, the entire well would be sealed using concrete and the process begins again.

A 150 hp submersible pump in the well will be connected to the existing potable water storage and distribution via a GAC filter by approximately 200 feet of 6-inch pipeline. The requested allocation is 150,000 gallons per day, which is sufficient to satisfy potable and fire water

demands for Kunia Village at its maximum capacity of 200 single family homes. Current demand is only 65% of that volume.

Upon completion of the well installation, the site will be maintained with grass or other erosion-control vegetation. The Kunia Village landscaping staff will be responsible for maintaining the vegetation surrounding the well site.

PROPOSED WELL SECTION (Please attach schematic if different from diagram provided below. Also, if this proposed well is a dug well, attach a grading plan with cross section profiles showing existing and finished grades)



* The approximate elevation must be referenced to mean sea level (msl)

Figure 2-3: Well construction specifications.

2.1.1 Discharges Associated with Well Installation

A National Pollutant Discharge Elimination System (NPDES) permit will be obtained prior to the start of construction. The proposed action is expected to be covered under an NPDES General Permit Appendix I, for discharge of treated water associated with well drilling. The first activity to be completed during well construction will be to construct a drilling pad, approximately 4,000 square feet (sf). The well location has a slope of approximately three (3) feet across its width. The site will be leveled, and excess soil will be removed for landscaping use within the Village. Erosion control fences and mulch stockings will be installed on the

downhill side to prevent soil and/or soil-laden stormwater from entering the adjacent dry gulch during storm events. The drilling pad will be covered with gravel shortly after compaction, further reducing soil erosion.

Drilling fluids will be supplied to the well bit for cooling and lubrication from the Kunia Village potable water storage tanks and GAC filter during the period prior to encountering groundwater. The flow will range from 5-10 gallons per minute initially and gradually increase as the depth increases. After the drill bit reaches groundwater, the source of cooling water will change to in-situ water and the discharge may increase to 50-100 gallons per minute. Groundwater will be tested for contaminants as drilling is advanced into the first groundwater layer. If contaminants are found in excess of the Hawai'i Tier 1 Environmental Action Levels (EALs) appropriate measures for containment and disposal will be employed. If contaminants are not present in significant concentrations, drilling water will be discharged to a dispersion pit to allow rock cuttings and sediment to settle. Dispersion pits must be wider than they are deep. Following residence in the dispersion pit, the water will be re-used for drilling or pumped through a long discharge pipe and filter sock into the bottom of the adjacent dry gulch where it will infiltrate. Drilling will cease in the unlikely event that the gulch has stormwater accumulation due to a heavy rainfall.

Drilling water may have a foam additive that is mixed at a rate of 0.5 gallons per 1000 gallons of water. The foam contains sodium olefin sulfonate which is a biodegradable anionic surfactant known for its excellent cleansing, foaming, and emulsifying properties, commonly found in personal care items like shampoos, body washes, and household cleaners. The foamers trade name is Matex Foamer ES, or another foaming agent, both of which are biodegradable and non-hazardous (See Appendix F).

Other compounds that may be found in the drilling water include grease used at the joints of the drilling rods that facilitate assembly and disassembly of the drill string. A biodegradable vegetable-oil based hydraulic fluid is used when the drill is being hammered. No discharge of the oil is planned, but accidental bursting hoses would release small amounts into the environment. Analysis of drilling fluids will be performed early in the drilling process to ensure that potential contaminants are not present at levels that are actionable.

No environmental damage or long-term effects are anticipated from the discharge of drilling fluids that comply with the NPDES permit conditions.

2.2 Alternative Actions Considered and Rejected

Several alternatives to the proposed action include: the no-action alternative, continued use of water from Schofield Barracks, continued use of Kunia Well 4 (3-2803-007), and installing a new well in another location. These alternatives have been considered and rejected.

No-Action: Upon discovery of PFAS contamination of Kunia Well 4 (3-2803-007) Kunia Village had provided bottled water for residents to drink until an emergency pipeline from Schofield Barracks was installed. This alternative is rejected because the cost and labor involved with supplying bottled water to residents is prohibitive over the long term.

Continued use of Schofield Barracks Water: The Army is responsible for maintaining readiness of America's defense. They have come to the aid of Kunia Village on a previous emergency situation and have supplied water to the Village until the emergency passed. The existing emergency connection is an above-ground 4-inch line that connects into the northern portion of the Village distribution system. The Army maintains its position that this is a temporary solution. This connection could not be made permanent without authorization from the top levels of the Department of Defense and/or Congress. This alternative is rejected due to the time required to obtain authorization and the risk that that request would ultimately be rejected.

Continued use of Kunia Well 3: Kunia Well 3 (3-2803-005) is located approximately one (1) mile north of Kunia Village on land owned by the State of Hawai'i, Executive Ordered to the Army in 1948. It is a military well that was leased to Del Monte since the late 1940s. That lease expired in April 2023 and was not renewed by the Army after the discovery of PFAS in the well's water. This alternative is rejected because the Army has declined to re-license the well for use by Kunia Village.

Continued use of Kunia Well 4: Kunia Well 4 (3-2803-007) is located approximately one (1) mile north of Kunia Village, is owned and operated by the Kunia Water Association (KWA) on land owned by Island Palms Communities (IPC). Kunia Village and IPC are two (2) of the total six (6) members of KWA who have water allocations from this well. It has served as the primary water source for Kunia Village for the past decade until it was found to contain relatively high concentrations of PFAS. Following the point of discovery of these contaminants it was not used for potable water supply. Until treatment was installed. The continued use of Well 4 would require a method of filtering the PFAS contamination as well as TCE that is found in that aquifer. These conditions as well as the distance from the Village, being located on property owned by others and the high cost of filtering two (2) different chemicals led to the rejection of this alternative as the primary source of drinking water for Kunia Village.

Re-open Del Monte Well 1: Del Monte Well 1 (3-2203-001 and 002) were the primary source of potable water for Kunia Village for decades. In 1977, a Del Monte Truck carrying 500 gallons of pineapple fumigant Ethylene dibromide (EDB) and dibromochloropropane (DBCP) backed into an obstacle and broke off the valve releasing most of its contents to the ground in the vicinity of Kunia's well¹. The Kunia Village well site was placed on the NPL (Superfund) list, and the potable water source for the Village was moved approximately 1-mile north to Kunia Well 3 (3-2803-005) and Well 4 (3-2803-007).

Del Monte Corporation began remediation of Well 1 that included pumping large quantities of groundwater to other locations for use in their pineapple fields and supplemented by soil vapor extraction and bioremediation. Del Monte treated contaminated groundwater in the basal aquifer from 2004 until 2014. The current site remedy includes monitored natural attenuation (MNA) of groundwater in the basal aquifer. EPA's investigations identified other areas in Central O'ahu that were contaminated by the same pineapple fumigants, which are now known to be area-wide within the Waipahu-Waiawa Aquifer Systems. This alternative is rejected because the well remains on the NPL list despite having very low levels of pineapple pesticides. EPA concurrence

¹ <https://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=0902876>

to restore the site to use would be a lengthy process with questionable probability of success. In addition, the structural properties of the well caused Del Monte's consultant to recommend against reactivation of the old well.

The proposed action is selected for the following reasons:

- it is on the Kunia Village property,
- Drilling into the lower Ewa-Kunia Aquifer is expected to avoid the area-wide contamination present in the upper Waipahu-Waiawa. aquifer², and
- It is the low-cost alternative when considered over the next 30 years.

3.0 ENVIRONMENTAL SETTING AND IMPACTS

3.1 Physical Environment

3.1.1 Geology and Soils

The Island of O'ahu covers 597 square miles and is the third-largest island in the Hawaiian chain. The island is the eroded remnant of two coalesced shield volcanoes, the Waianae Volcano and the Koolau Volcano are shield volcanoes. Shield building lavas emanated mainly from the rift zones of both volcanoes. Eruptions of the Waianae Volcano occurred between 3.9 and 2.5 million years ago and eruption of the Koolau Volcano occurred between 2.6 and 1.8 million years ago. Both volcanoes have subsided more than 6000 feet and erosion has destroyed all but the western rim of the Koolau and eastern part of the Waianae volcano. Central O'ahu is an elevated plateau bordered by the Waianae and Koolau mountain ranges.

The shield-building rocks of the Waianae and Koolau Volcanoes are known respectively as the Waianae Volcanics and the Koolau Basalt (Swanson, 1981;)³. The Koolau Basalt is wholly of basaltic composition. The Waianae Volcanics encompass shield and post-shield stages of activity (Langenheim and Clague, 1987) and are diverse, therefore, the broader term "volcanics" is applied. Waianae Volcanics and Koolau Basalt form the uplands and mountains of western and eastern O'ahu, respectively. Later authors have characterized both Waianae and Koolau lavas as "volcanics"³.

Although most volcanic rocks in the islands of Hawaii have similar basaltic composition, their modes of emplacement caused a variety of physical properties that govern their hydraulic properties. For purposes of discussion, the volcanic rocks have been divided into four groups: (1) lava flows, (2) dikes, (3) pyroclastic deposits, and (4) saprolite and weathered basalt. Each of these groups of rocks have markedly different physical and hydraulic properties. Much of the following discussion of rock textures and of the areal extent of lava flows is from Wentworth and Macdonald (1953) and Macdonald and others (1983).

LAVA FLOWS

² Data used by US EPA for the numerical flow model in Appendix D. Data is from a single sample from the basal monitoring well located in the Ewa-Kunia Aquifer

³ Swanson, R.W, Hubert, M.L., Luttrell, G.W, and Jussen, V.M., 1981, *Geologic names of the United States through 1975: U.S. Geological Survey Bulletin 1535*

Lava flows in Oahu, are mainly of two textural types: (1) pahoehoe (ropy lava), which has a smoothly undulating surface and contains numerous elongate voids³; and (2) aa (clinker lava), which has a surface of coarse rubble and an interior of massive rock. Stratified sequences of thin bedded lava flows form the most productive aquifers in Hawaii. At the local scale, the hydraulic properties of lava aquifers depend on the number, size, types, and distribution of openings or pores. The diverse rock textures encompassed by the two types of lava impart a complex porosity distribution to the lavas, one that differs in character other types of rocks. Lava sequences also typically include cinders and ash transported by the wind from eruptive vents.

In a layered sequence of lava flows, several types of primary porosity are present:

- 1. Vesicular small gas vesicles that form in molten lava;*
- 2. Fracture joints, cracks, and bedding-plane separations;*
- 3. Intergranular fragmental rock, including cinders, rubble, and clinkers and*
- 4. Conduit large openings such as lava tubes and interflow voids*

Vesicular porosity is a conspicuous element of bulk porosity, but the vesicles are poorly connected and contribute little to effective porosity. Fracture and intergranular porosity form a pervasive network of small openings that facilitates diffuse ground-water flow. Conduits provide avenues for highly channelized flow³.

Hydraulic properties of the volcanic rock aquifers are determined by the distinctive textures and geometry of individual lava flows. These lava flows are characterized by their fracture properties and conduit-like porosity. Successive flows are vertically layered. Water flows occur in three (3) dimensions with the largest permeability in the longitudinal direction of the flow; intermediate permeability in the crossflow direction and smallest permeability in the vertical direction⁴. Soroos (1973) estimated horizontal hydraulic conductivity from 79 different specific capacity tests and estimated average hydraulic conductivity between 1000 and 2000 feet per day⁵.

⁴ *Geohydrology of the Island of Oahu 1996 USGS Professional Paper 1412-b.*

⁵ *Soroos, R.L., 1973, Determination of hydraulic conductivity of some Oahu aquifers with step-drawdown data: Honolulu, University of Hawaii*

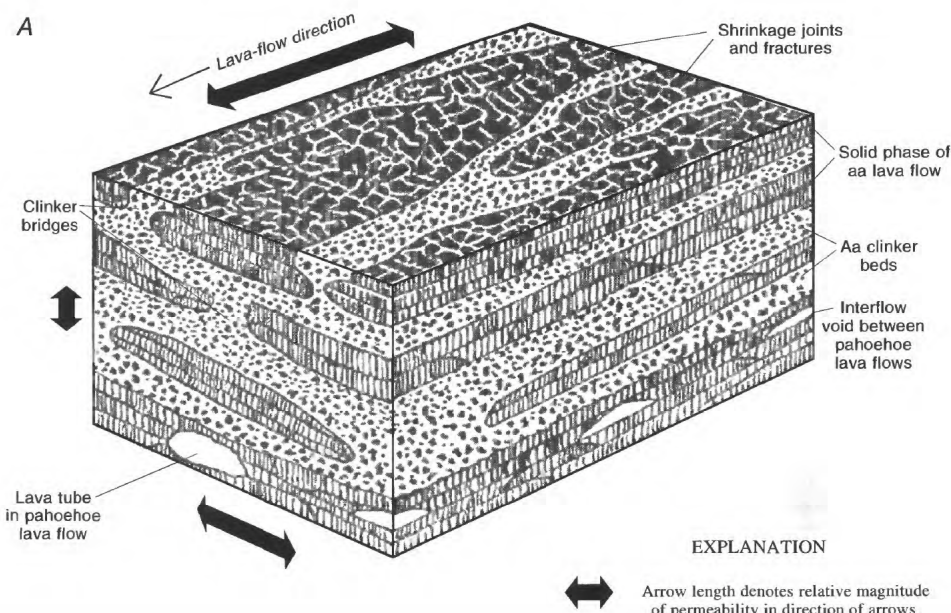


Figure 3-1: diagrams of typical basalts underlying the project site (Geohydrology of the Island of Oahu 1996)⁴

The mineral composition is different between the Waianae and Koolau Volcanoes because of their different geochemical history and source. The main type of lavas from both volcanoes is tholeiitic, but the mineral composition and trace element signatures distinguish the two. Koolau lavas are geochemically distinct due to their enrichment in silicon dioxide and lower content of iron and calcium oxide. Koolau lavas can also be distinguished by certain isotopic ratios of Strontium. The Waianae lavas have a distinctive geochemical composition which tend to be more primitive tholeiites with lower SiO₂, higher Fe/MgO, and distinct isotope ratios⁵.

The subsurface volcanic layers in the vicinity of the project site are separated by a layer of saprolites, which are rocks that are weathered in place to form a soft rock clay-rich rock that is often the precursor to soil formation. Waianae lavas were exposed for around 1 million years and formed a layer of saprolite that was subsequently covered by lavas from the Koolau volcano. The saprolite layer probably slopes downward from west to east in the vicinity of the project site. Soil and rock that originated in the Koolau volcano thins from east to west as it flowed onto the ancient slopes of the Waianae volcano. Groundwater originating in the Koolau range largely travels horizontally in the Koolau volcanics, while groundwater originating in the Waianae Range travel horizontally within the Waianae volcanic layers. Further discussion of groundwater movements and layering is contained in Section 3.3. Figure 3-3 shows a hatched area that signifies the probable location where the Waianae and Koolau volcanics meet around 800 feet below ground surface at the elevation of the groundwater surface.

The subject property has soils from the Kolekole series (KuB).

The Kolekole Series is the latest post-shield stage of Waianae volcano. Koolau does not have a post-shield stage. The post-shield cap of the volcano comprises the Pālehua and Kolekole Members. The Kolekole is separated from the Pālehua by a substantial erosional disconformity;

but their difference in age is barely distinguishable. A huge landsliding event has been suggested as a mechanism to precipitate the major erosional episode prior to Kolekole time, with the evidence preserved as the Wai‘anae Slump (Presley and others, 1997)⁶

The following soil description is from the Soil Survey of the Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i and Lāna‘i, State of Hawai‘i (US Soil Conservation Service, 1972)⁷.

Kolekole Series

This series consists of well-drained soils on uplands on the island of Oahu. These soils developed in old gravelly alluvium mixed with volcanic ash. They are gently sloping to moderately steep. Elevations range from 500 to 1,200 feet. The annual rainfall amounts to 35 to 50 inches, most of which occurs between November and April. The mean annual soil temperature is 71° F. Kolekole soils occur on the windward slopes of the Waianae Range. They are geographically associated with Kunia, Mahana, and Wahiawa soils. These soils are used for sugarcane, pineapple, and pasture. The natural vegetation consists of guava, lantana, bermudagrass, and Natal redtop.

Kolekole silty clay loam, 1 to 6 percent slopes (KuB).

This soil occurs on smooth slopes. Included in mapping were small areas of Kunia and Mahana soils, small-eroded spots, and steep side slopes along drainageways.

In a representative profile the surface layer is dark reddish-brown silty clay loam about 12 inches thick. The subsoil, about 48 inches thick, is dark reddish-brown silty clay loam and silty clay that has subangular and angular blocky structure. The substratum is old gravelly alluvium. A compact, panlike layer typically occurs at a depth of 24 to 40 inches. The soil is extremely acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil.

Permeability is moderately rapid to the panlike layer and moderate in the compact subsoil. Runoff is slow, and the erosion hazard is slight. The available water capacity is about 1.3 inches per foot of soil. Roots are restricted by the compact layer.

The soil at the subject property appears to support vegetation including grasses, weeds, shrubs and trees. This soil type tends to be quite slippery when wet and dusty when dry. In general, this soil stays wet much of the winter and dry during the summer months.

3.1.2 Surface Water

Kunia Village is roughly 7 miles upgradient from the Pacific Ocean at Pearl Harbor, 8 miles from the Waianae Coast, and 9 miles from the North Shore. All open Coastal waters are classified as Class A or AA Open Coastal Marine waters. Storm water is likely to drain into Waikele Gulch, and ultimately into the Middle Loch of Pearl Harbor. Pearl Harbor has a special

⁶ https://pubs.usgs.gov/of/2007/1089/Hawaii_expl_pamphlet.pdf

⁷ <https://websoilsurvey.nrcs.usda.gov/app/>

classification for water quality standards. The nearest surface water body is Lake Wilson (Wahiawa Reservoir) approximately 2.5 miles to the northeast and upgradient from the subject property.

A normally dry wide gulch which is a historical tributary to Honouliuli Stream lies within approximately 100 feet of the well site. The well will be approximately 20 feet above the bottom of this stream bed. Although it is listed as a perennial stream in the State GIS, the past century of agricultural activity has eliminated traces of the stream bed to the west of Kunia Village. Mass grading prevents any inflow into the stream bed from above the Village. The broad shallow stream bed collects runoff from a watershed west of the Village during extreme storm events, with flows normally lasting only a few hours. The site is in FEMA flood zone D (not studied). It is outside the 100-year floodplain, and the tsunami inundation zone. Kunia Village has existing erosion control measures in those locations that are prone to stormwater runoff. Construction contractors will obtain an NPDES Form I permit for discharge of well water into the dry stream during the well development period. All construction will be required to use best management practices to control well testing and stormwater runoff. Discussion of the methods used for disposal under the NPDES permit are discussed in Section 3.5.

Honouliuli Stream is an intermittent losing stream, only flowing during storm events and when unused Waiahole Ditch water is discharged into the stream in lower Kunia. It is understood that the aquifer water level is approximately 18 ft above MSL (BWS Kunia index monitor well, State Well No. 3-2201-10, Kunia T-41) and that there is no hydraulic connection between the basalt aquifer and the intermittent stream. Therefore, pumping the Kunia Village New Source Well is anticipated to not have a detrimental effect on Honouliuli Stream.

3.1.3 Groundwater Resources

The proposed action does not include any new demand for groundwater resources; only a change in the location of the source. The existing source of potable water for Kunia Village draws from the Wahiawa Aquifer System, a portion of the Central Aquifer Sector. The new source will draw from the Ewa-Kunia Aquifer System, a portion of the Pearl Harbor Aquifer Sector. Groundwater in the Wahiawa Aquifer System occurs at high levels, approximately 270 to 290 above sea level and is constrained by low permeability “groundwater dams,” whereas groundwater in the Pearl Harbor aquifers is much lower in elevation (approximately 18 to 21 feet above sea level near Kunia Village) and is considered basal (in contact with seawater). It is generally accepted that overflow from the Wahiawa aquifer enters the Waipahu-Waiawa and Ewa-Kunia aquifers north of the Village where they are combined and flow toward the south. There is no additional impact on the groundwater resources or downgradient water users as a result of the proposed action.

Island hydrogeology is unique in every location, but all major groundwater resources used to supply municipal and private demand originate as rainfall and infiltrate into the ground. The local geology heavily influences the location and depth of groundwater below ground surface. Volcanic dikes, which occur in the interior of an inactive volcano, were formed by the formerly active conduits that allowed lava to flow to the surface. These dikes cool very slowly and are dense and almost impermeable. They can store underground water 10s to 100s of feet above sea level. Once these dikes are overtopped or leak through underground cracks, they enter the basal aquifers, where freshwater floats atop seawater due to differences in density (Figure 3-2).

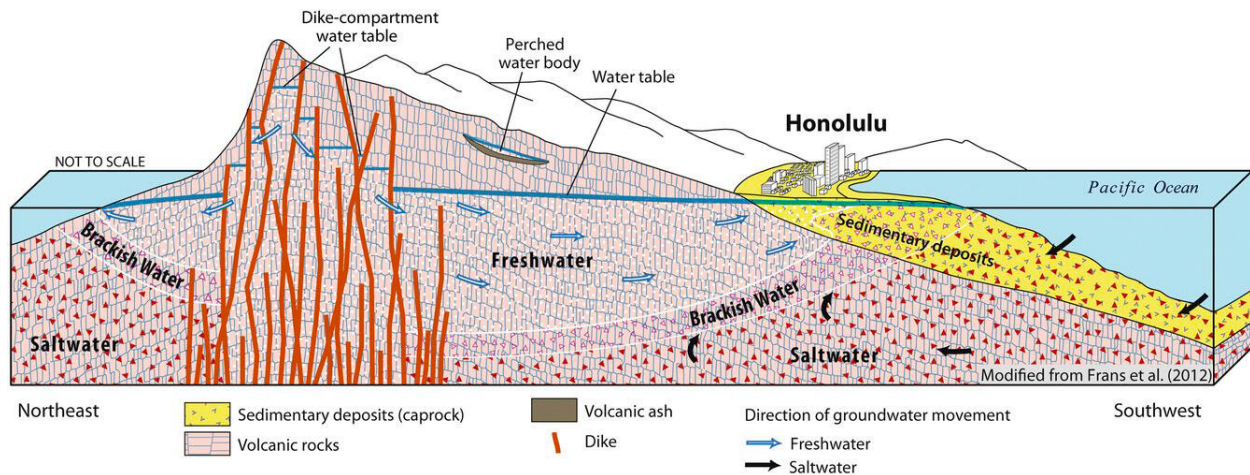


Figure 3-2: A general schematic of various types of groundwater in relation to island geology.

Groundwater origin and flow near the proposed well site is complex. The proposed well site is in the Pearl Harbor Aquifer Sector approximately 1 mile south of its boundary with the Central Aquifer Sector (Figure 3-2). The boundaries between groundwater bodies are formed by geologic non-conformities that are both oriented both vertically and horizontally below ground surface. These non-conformities were created by different geological events many of which are separated by millions of years. Aquifer horizontal boundaries are shown on Figure 3-3, and 3-4 as hatched lines. The well site is intentionally placed near the suspected non-conformity that marks the boundary between the Waipahu-Waiawa Aquifer System and the Ewa-Kunia Aquifer System. There is some uncertainty as to the lateral location of that non-conformity, and the precise area where these water management sections converge. A well located west of the dotted line (Figure 3-3 and 3-4) should initially intercept the Ewa-Kunia aquifer, and a well drilled east of the dotted line would first intercept the Waipahu-Waiawa aquifer. The unconformity dips at an angle from west-northwest to east-southeast. Thus, a well located at the ground surface in the Waipahu-Waiawa Aquifer will encounter groundwater from the Ewa-Kunia Aquifer at depth.

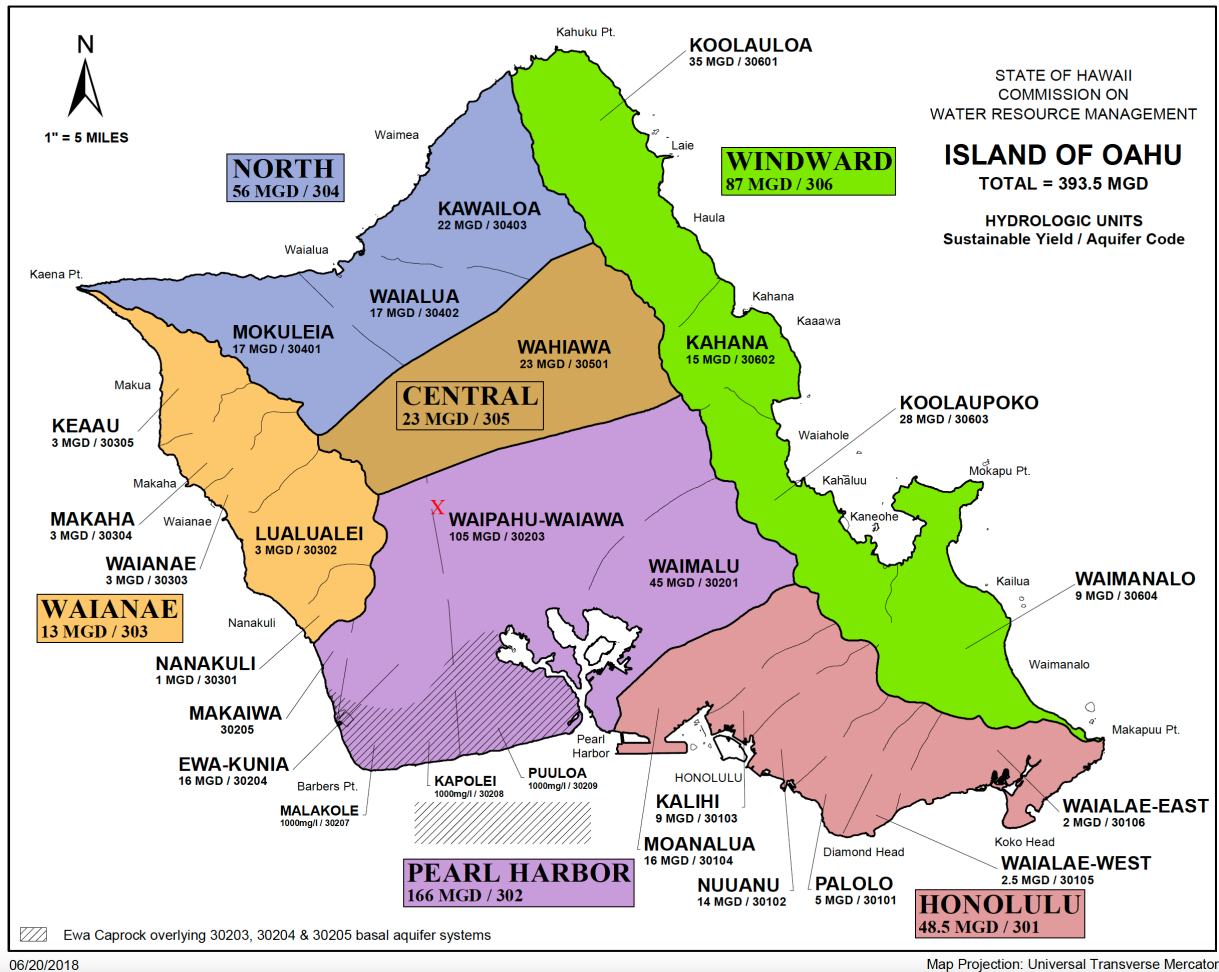


Figure 3-3: General map of the groundwater aquifers serving Oahu. Courtesy of The Commission on Water Resources Management. Red X signifies the approximate well location.

The proposed well site is near the junction (unconformity in Figure 3-3) of the Waianae volcanic and Koolau Volcanic layers with the Koolau volcanics overlying the Waianae volcanics. Groundwater in the Ewa-Kunia Aquifer System flows from the Waianae mountains into the central plain and underneath the Waipahu-Waiawa groundwater, which originates in the Koolau mountains. The geochemistry and physical properties of the basalt layers originating in the Waianae volcano differs from those formed in the Koolau volcanos. The Waianae basalts are older and were exposed to the elements for millions of years before being covered by the Koolau lava flows. The groundwater bodies generally flow within their layer of origin. Water in the Ewa-Kunia Aquifer System originates in the Waianae mountains and flows within the Waianae basalts. Groundwater in the Waipahu-Waiawa Aquifer System originates from the Koolau mountains and flows within the Koolau basalts. Surface layers of the Waianae basalt were exposed to the elements and weathered in place to become clay-like saprolite. The two water bodies near the proposed well site are separated along the buried slope of the Waianae Mountain. That interface is covered by the saprolite clay layer which may inhibit exchange between the layers because of its very low permeability (Figure 3-5).

Groundwater in both the Ewa-Kunia and the Waipahu-Waiawa Aquifer Systems flows toward the south and southwest. As the groundwater in both aquifers nears the southern shore of O‘ahu their flow is constrained by caprock formations.

The five major Pearl Harbor springs—Kalauao, Waiau, Waimano, Waiawa, and Waikele—exist where the caprock is relatively thin and fractured. These large springs flow into the East and Middle Lochs of the Pearl Harbor estuary from the Waipahu-Waiawa Aquifer System. Moving west, groundwater flows to the coast, decreasing where annual rainfall is lower and where the caprock thickens in the general area where the Ewa-Kunia Aquifer System reaches the shoreline.

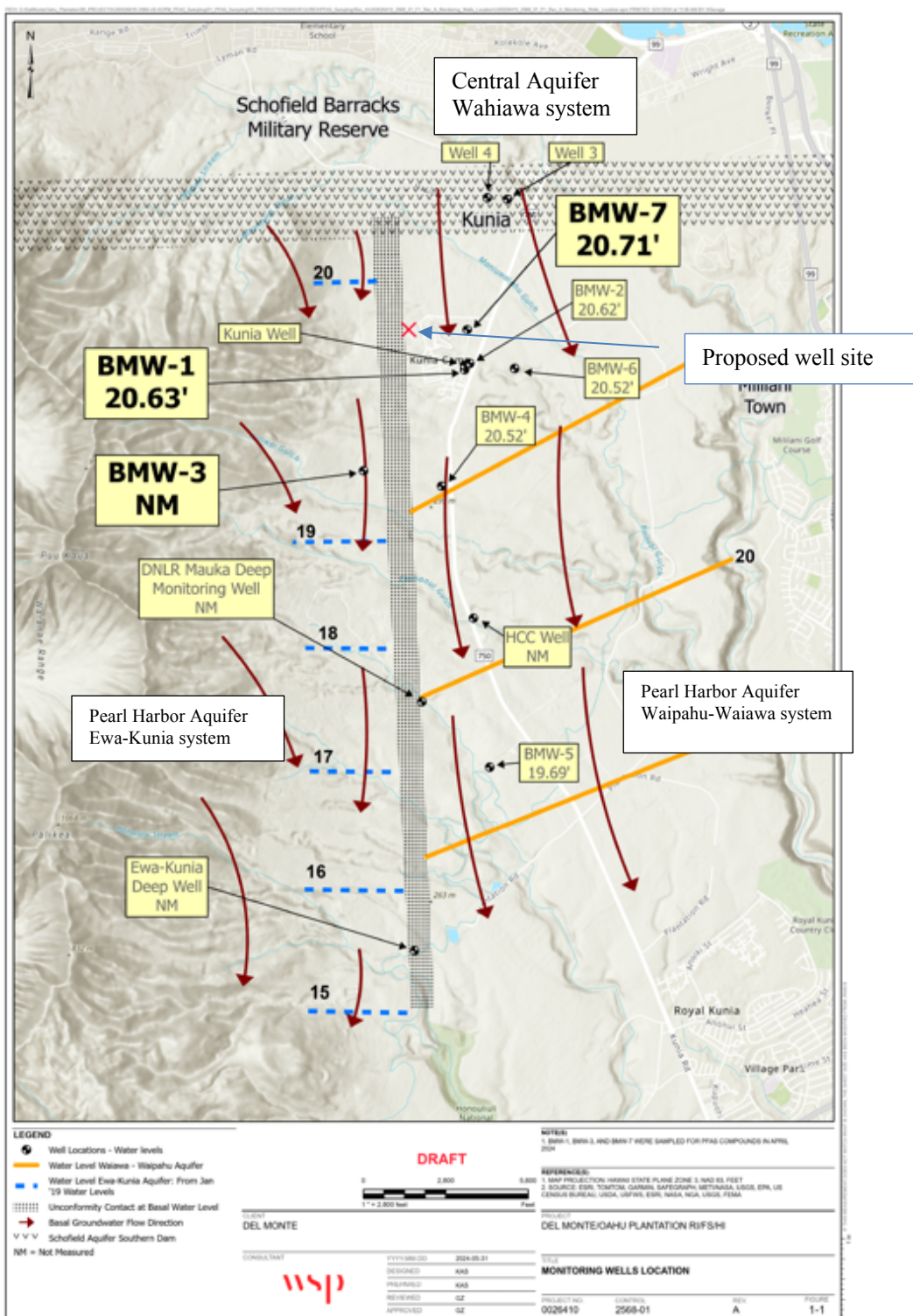


Figure 3-4: Groundwater hydrogeology of the Del Monte Plantation area (WSP 2024). Groundwater elevation differences across the non-conformity and flow direction are shown.

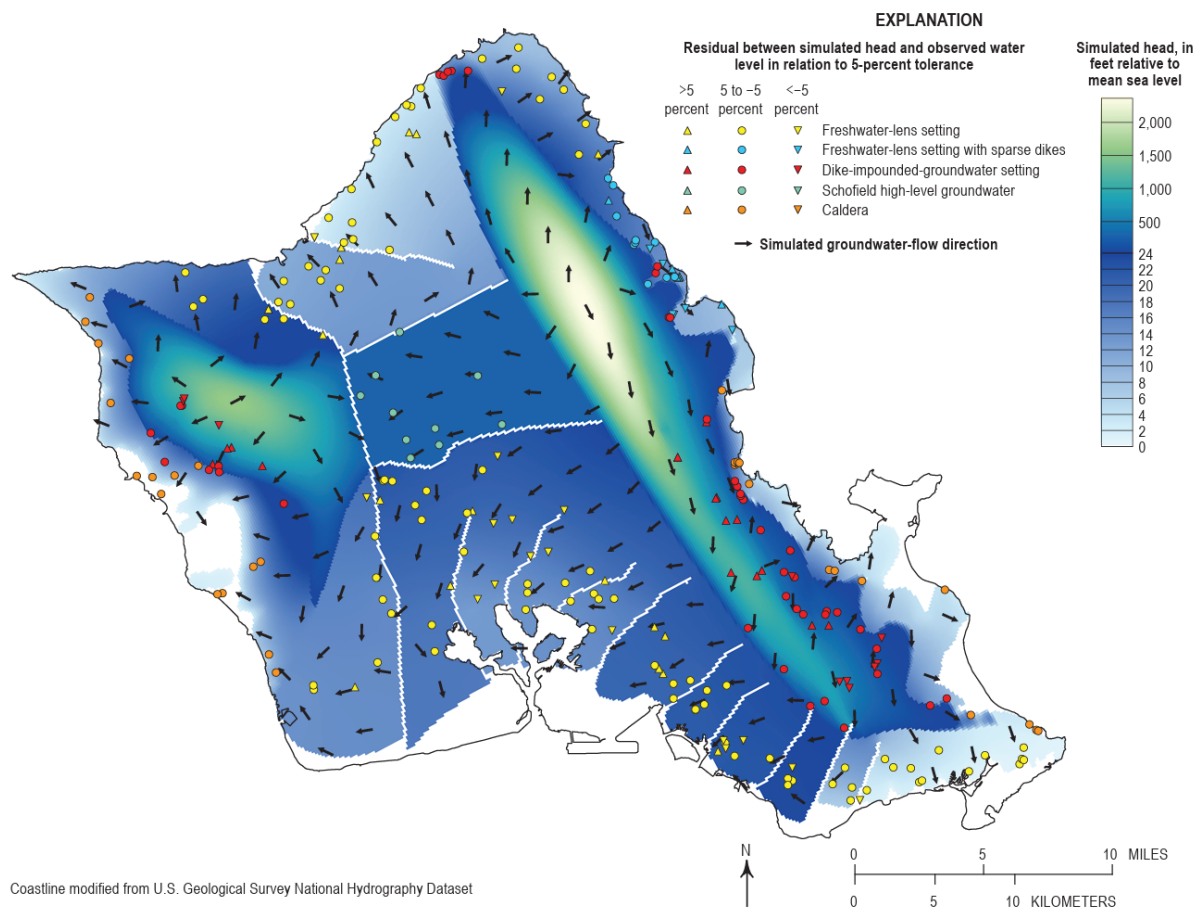


Figure 3-5: General map of groundwater flow on Oahu (Izuka, Rotzoll and Nishikawa, 2021)⁸.

The Ewa-Kunia Aquifer System at the proposed location is a basal, unconfined, flank aquifer system. Its hydrologic unit status is: (111111)

Currently used,
Drinking water source,
Fresh salinity,
Irreplaceable,
High vulnerability to contamination.⁹
Sustainable Yield: 16 mgd
Initial head: 19 feet
Authorized Water Use: 15.545 mgd
Annual reported use: 10.6 mgd

⁸ <https://doi.org/10.3133/sir20205126>.

⁹ Mink and Lau (1990) WRRC Technical Report 179. <https://health.hawaii.gov/about/files/2022/08/B-4-BWS000568.pdf>

Based on the Hawai'i Dept. of Health Source Water Assessment numerical model for the Island of O'ahu (Whittier personal communication, 2025), The Ewa-Kunia Aquifer System receives about 2.3 million gallons per day (mgd) from the Wahiawa Aquifer System and 14.2 mgd of inflow from the Waipahu-Waiawa Aquifer System. Engott (2017)¹⁰ estimated that the Ewa-Kunia Aquifer System receives an annual average of 14.7 mgd of recharge. Losses from the aquifer system are estimated to be 11.4 mgd from pumping and 11.6 mgd through coastal discharge. The proposed withdrawal of 0.15 mgd represents a little over one (1) percent of the current coastal groundwater discharge and will have no discernable impact on other users and/or the coastal ecosystems.

The Commission on Water Resource Management (CWRM) set aquifer sustainable yields in their 2019 update of the State Water Resources Protection Plan, as a percentage of aquifer recharge recognizing the importance of groundwater leaking to the coast supporting groundwater-dependent ecosystems and accounting for hydrogeologic uncertainty. Pumping will be within water use permits and less than the sustainable yield and recharge. Thus, no off-site impacts are expected even accounting for hydrogeologic uncertainty.

Area-Wide Contamination

Groundwater in Central O'ahu and particularly Kunia Village has been impacted by several classes of contaminants that have been released over the years.

In 1977 a Del Monte Truck carrying 500 gallons of pineapple fumigant ethylene dibromide (EDB) and dibromochloropropane (DBCP) backed into an obstacle and broke off the valve releasing most of its contents to the ground in the vicinity of Kunia's well¹¹. The Kunia Village well site was placed on the NPL (Superfund) list, and the potable water source for the Village was moved approximately 1-mile north to Del Monte Well 3 (3-2803-005) and Well 4 (3- 2803-007).

Del Monte Corporation began remediation that included pumping large quantities of groundwater to other locations, soil vapor extraction and bioremediation. Del Monte treated contaminated groundwater in the basal aquifer from 2004 until 2014. The current site remedy includes MNA of groundwater in the basal aquifer. Natural attenuation is the use of naturally occurring physical, chemical and biological processes that act without human intervention to reduce toxicity, mass, mobility and concentration of contaminants. These investigations identified other areas in Central O'ahu that were contaminated by the same pineapple fumigants, which are now known to be area-wide within the Waipahu-Waiawa Aquifer System.

Around the same period, industrial operations at (US Army) Schofield Barracks released volatile organic compounds (VOCs), including Trichloroethene (TCE) into the high-level Central

¹⁰ Engott, J.A., Johnson, A.G., Bassiouni, Maoya, Izuka, S.K., and Rotzoll, Kolja, 2017, Spatially distributed groundwater recharge for 2010 land cover estimated using a water-budget model for the Island of O'ahu, Hawai'i (ver. 2.0, December 2017): U.S. Geological Survey Scientific Investigations Report 2015–5010, 49 p., <https://doi.org/10.3133/sir20155010>.

¹¹ <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0902876>

aquifer¹². The exact release point was not positively identified but believed to be the Schofield Barracks landfill. In 1986, groundwater treatment systems were installed on production wells within the Schofield high-level water body to address TCE contamination in drinking water. Treatment for the Kunia Village water supply in Well 3 (3-2803-005) which taps the Central Aquifer Sector is treated by off-gassing volatile compounds in an aeration tower. The long-term remedy includes wellhead treatment at each of the contaminated wells and regrading and vegetation of the landfill cover to slow leaching from the potential source. Most recently chemicals known as PFAS (perfluoroalkyl and polyfluoroalkyl substances) were reported in 2023 water samples collected at the Kunia Village Wells 3 (3-2803-005) and 4 (3-2803-007) which have supplied the Kunia Village water system since the Pineapple fumigant spill in 1977. Contaminant concentrations were higher than the Maximum Concentration Limits (MCLs). Kunia Village issued a no-drink order at the time contamination was discovered. While waiting for the analyses from Kunia Well 4 the village tenants were provided with bottled water from Menehune Water from March 9, 2023, until June 21, 2023.

After the determination of Kunia Well 4 being contaminated with PFAS, on March 24, 2023, Kunia Village requested to tap into the Army's potable water system at neighboring Schofield Barracks due to this emergency. Kunia Village continued to receive Schofield Potable water until June 10, 2025, when KVDC installed a GAC Treatment Plant. As of June 10, 2025, Kunia Village now treats the PFAS contaminated water from Well 4 first through the AST for the TCE/TCP and the GAC to treat the PFAS for the Kunia Village Potable System.

There are currently no potable water sources known that are contaminant-free in the vicinity, thus the need to install a new well on land that is owned and controlled by Kunia Village.

EPA Region 9 Superfund and Emergency Management Division Hydrologists studied the site hydrology and geology to determine potential strategies for avoiding contaminants at the location selected by Kunia Village. The EPA numerical flow model and analysis provided an excellent summary of groundwater history, current conditions and strategies for minimizing contaminants entering the public water supply. Information presented below is largely excerpted from that study (Figure 3-6 and *Appendix C*).

Groundwater conductivity can be used to identify various groundwater units. Figure 3-6 shows the estimated differences in horizontal (K_h), and vertical (K_v) movements of water as estimated by two separate hydrogeologic models. The Koolau volcanics have 2 to 3 zones with slightly different speeds through the volcanic rocks. Groundwater in the Koolau layers on average move about half as fast as groundwater in the Waianae layers. Both are likely to be moving to the south toward Pearl Harbor or Ewa. The significant feature of this chart is the incredibly slow movement of water through the saprolite layer that divides the Koolau and Waianae volcanics.

¹² <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0902923>

Conductivity Zones

Lithologic Unit		K_h (ft/day)	K_v (ft/day)	Goldner Layer	EPA Layer
Koolau	Upper zone	1,367	27.3	1	1
	Middle zone	1,000	20	2	2
	Lower zone	750	15	3 (& 4 and 5 east of saprolite)	Eliminated in EPA Model
Saprolite		0.05	0.005	4	3
Waianae		2,500	50	5	4,5,6

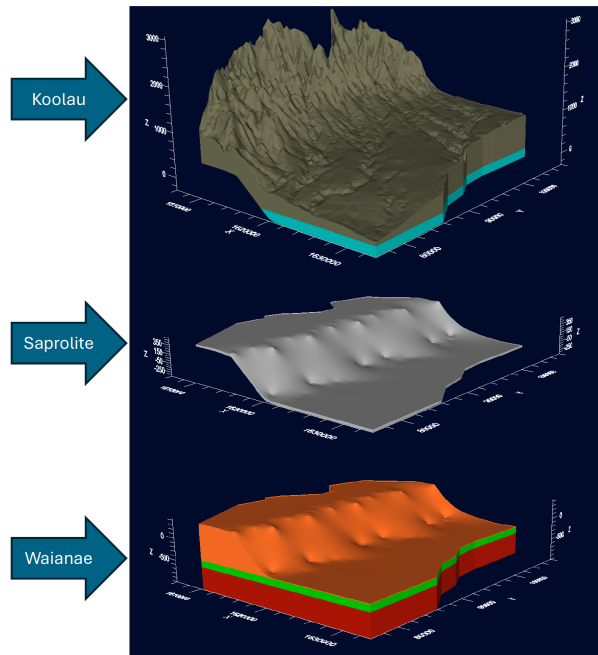


Figure 3-6: Groundwater conductivity and a 3-D model of the underground water bodies that are separated both horizontally and vertically.

Monitoring well data from the vicinity of the proposed well site indicates the highest concentrations of EDB and DBCP have moved south of the Village over the years since its release but that almost all the surrounding areas in the upper (Waipahu-Waiawa) layers contain some level of pineapple fumigants (Figure 3-7).

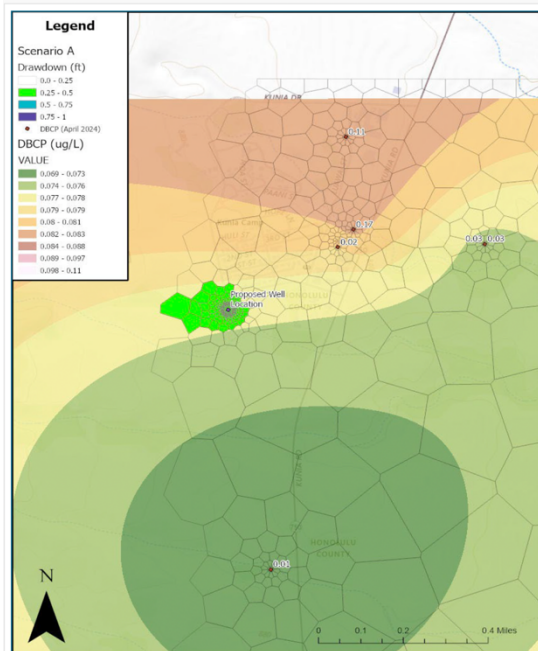


Figure 3-7: EPA model of the Upper Koolau layer of groundwater showing concentrations of pineapple pesticide DBCP in the vicinity of Kunia Village. The 1977 spill originated northeast of the proposed well location near monitoring well 2 and 17 but has since migrated to the south. Lower concentrations remain throughout the vicinity. The light green areas show the area of influence of the proposed well when pumping at 250 gallons per minute. The light green areas show the area over which water and potentially contaminants are drawn into the water system. The model shows similar levels of EDB and TCP in the vicinity.

EPA's draft model concludes that drawing water from the Koolau basalts anywhere in the vicinity of the proposed well site would encounter water that contains pineapple pesticides in excess of the MCLs. There is only a single monitoring well in the Waianae basalts (MW-3) which did not contain detectable quantities of any contaminants of concern from the single sample that was taken from that well. Based on these data the EPA model suggests that the groundwater beneath the proposed well site that originates in the Waianae mountains is much cleaner than the groundwater originating in the Koolau volcanics. The two groundwater bodies are separated both horizontally by origin and flow direction; and vertically by a layer of saprolite that accumulated during the millennia between the two active volcanic periods. The data suggests that the saprolite barrier is effective at separating the contaminated Koolau groundwater above from the Waianae groundwater that flows beneath it.

Some of the water from the eastern slope of the Waianae range (Ewa-Kunia Aquifer System) flows to the ocean near the southwestern point beneath Kalaeloa.

The EPA model recommends drilling the well to a depth of 1175 feet with a well intake screen significantly below the saprolite layer. The well casing should be sealed with concrete to a depth below the saprolite layer with the objective of excluding contamination in the overlying Waipahu-Waiawa Aquifer System. The reasoning is to reduce operating costs, primarily by extending the life of the granular activated carbon used to clean the water. Vertical partitioning of the two layers is essential to support this strategy. The recommendation to pump from the deeper layer assumes that the saprolite layer is continuous in this vicinity and has not been compromised by improperly abandoned wells or other conduits. If unacceptable levels of contamination are encountered following stable operations, contaminants may be removed using the existing GAC and air stripping treatment systems.

3.1.4 Climate and Air Quality

The project site has a mild, semi-tropical climate of characteristic of most regions of O'ahu. The average maximum daily temperature ranges from 78 °F to 87 °F, with an average minimum temperature ranging from 60 °F to 68 °F depending on the season (Atlas of Hawaii 1992). Rainfall for this area averages 45 inches annually, with much of it occurring between November and April. Winds from the northeast, known as trade winds, are the most predominant over the Hawaiian Islands. Typical wind velocities range from 3 to 14 knots. There is an occasional shift in the wind patterns to the westerly "Kona" winds which are sometimes quite strong.

In Hawai'i, 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 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 the Clean Air Act.

There are no significant air emissions sources associated with Kunia Village or the installation of the well and transmission line. During construction there will be temporary contributions to air

pollution from fugitive dust and the diesel-powered drilling rig. Construction equipment will be limited to that necessary to build the project, and fugitive dust will be managed under best management practices as defined by the State of Hawai‘i.

3.1.5 Noise and Odor

Kunia Village is relatively quiet. Ambient noise levels are characteristic of rural communities. Helicopter traffic into Wheeler Army Airfield is the largest source of ambient noise. Flight operations exist day and night. Noise associated with the proposed action to install the well and transmission line will include construction noise during business hours. This construction noise is expected to be intermittent, temporary, and confined to business hours during construction periods. Additional vehicular traffic is also expected to be minimal.

3.1.6 Scenic Value and View Plane

The topography of the area is gently sloping toward the east southeast. The land begins to slope much more rapidly about one mile to the west where the eastern flank of the Waianae range begins. There is no public access to the well site. There are exceptional views from the site toward the east flank of the Waianae Mountain range and agricultural areas on the lower slopes. View planes toward the west from most areas of Village are of farmland and the Waianae range. Views to the north, east and south are also of farmland although most are obstructed by trees.

The proposed action will not affect the view planes in or around the Village following completion of the drilling activities. Drilling rigs are large pieces of equipment which will be visible from the areas of the village immediately south and east. Following construction, the well will only be visible from the well site.

3.1.7 Hazardous Substances

Construction equipment using fossil fuels, hydraulic power and drilling fluids will be used in grading and construction. There is a possibility of leaks, spills or accidents during construction. The construction contractors will be required to develop and maintain an emergency action plan for management and recovery of any release to the environment.

3.2 Biological Environment

3.2.1 Vegetation

Kunia Village is slightly over 100 acres, rhomboidal with the eastern boundary along Kunia Road. The property is gently sloping with 40-to-60-foot maximum elevation difference and bisected by two dry stream beds. The subject property is on the order of 4000 square feet including the gravel pad used for storing equipment. The well location is near the southwest corner of the property inside an unused portion of a plant nursery. Bayer conducts active farming operations on large portions to the west of the site; the water storage facility is on the north boundary; the plant nursery is to the east and a broad portion of unused agriculture land is to the south. The well site, like other areas that are not actively managed supports dense stands of guinea (napier)grass (*Pennisetum purpureum*) and invasive trees or shrubs. There are no natural lands within the subject property only those that are actively managed and those whose

management has lapsed. During the period when the Plantation managed the property most undeveloped areas were mowed. Land that is not actively managed begins to grow Koa haole (*Leucaena luciocephala*) and ironwood (*Casuarina equisetifolia*) are both introduced and considered invasive species.

3.2.2 Wildlife

The subject property has been bounded by residential use for almost 100 years. Wildlife that transits the property would originate primarily in the pineapple fields that formerly surrounded the property, and more recently the agricultural and small areas of unmanaged land that lie near the Village. The nearest wild land is on the slopes of the Waianae Range in the conservation land to the west. Those areas may be relatively important habitat for endemic Hawaiian birds including the O‘ahu elepaio (*Chasiempis sandwichensis ibidis*), Apapane, (*Himatione sanguinea*) and Amakihi (*Hemignathus virens*). Other species common to the area include northern cardinal (*Cardinalis cardinalis*), spotted dove (*Streptopelia chinensis*), red-vented bulbul (*Pycnonotus cafer*), Indian myna (*Acridotheres tristis*) and gray francolin (*Francolinus pondicerianus*). Feral mammals include pigs (*Sus scrofa*), Indian mongoose (*Herpestes javanicus*), rats (*Rattus rattus* or *Rattus norvegicus*) and common mice (*mus musculus*) and cats (*Felis domesticus*).

3.2.3 Special-Status Species

The US Fish and Wildlife Service was consulted to support the biological assessment required under Section 7 of the endangered species act. The IPAC interface generated a list of special status species, critical habitats and management recommendations.

One Mammal, seven birds, one reptile, twenty-seven flowering plants, and one fern have potential to be present in the general area. The vast majority of these occupy the eastern slopes of the Waianae range that begin around ½ mile west of the site. None of the threatened and endangered species designated critical habitats are in the immediate vicinity of the project site. The following habitat descriptions are taken from publicly available literature published by the US Fish and Wildlife Service¹³.

Hawai‘i’s endemic mammal is the Hawaiian hoary bat (*Lasiurus cinereus semotus*). Hawaiian hoary bats are known to live on all the main islands from sea level to 14,000 feet. They prefer moist forests of native or non-native trees over 15 feet tall. Their preferred habitat occurs on the slopes of the Waianae range within ½ mile west of the project site. It is likely that these bats fly over the site but are not likely to nest on the project site because it is cleared. Bats are not known to nest or be obstructed by objects such as the drilling rig mast. No mitigation measures are planned.

The seven birds identified are primarily marine or water birds. Of those three are primarily sea birds and four are common to wetlands.

Endangered Seabirds

Band-rumped Storm-petrel (*Hydrobates castro*)

¹³ <https://ecos.fws.gov>

Historically, band-rumped storm-petrels were likely present on all the main Hawaiian Islands from the island of Ni‘ihau to the island of Hawai‘i. Band-rumped storm-petrels are regularly observed in coastal waters around Kaua‘i, Ni‘ihau, and Hawai‘i Island (Harrison et al. 1990, p. 49; Holmes and Joyce 2009, 4 pp.), and in rafts of a few birds to as many as 100, possibly awaiting nightfall before coming ashore to breeding colonies. No reports of nesting on the Island of O‘ahu were found in research for this assessment. There is a low probability of fly-over by this species, but due to the lack of suitable habitat, no nesting is expected in the vicinity and no adverse impacts are expected to result from the proposed action.

Hawaiian Petrel (*Pterodroma sandwichensis*)

The Hawaiian petrel was formerly found on all the main Hawaiian Islands except Ni‘ihau, but today it is mostly restricted to Haleakalā crater on Maui; smaller populations exist on Mauna Loa on the island of Hawai‘i, Waimea Canyon on the island of Kaua‘i, Lāna‘i, and Moloka‘i. No reports of nesting on the Island of O‘ahu were found in research for this assessment. There is a low probability of fly-over by this species, but due to the lack of suitable habitat, no nesting is expected in the vicinity, and no adverse impacts are expected to result from the proposed action.

Newell's Shearwater (*Puffinus newelli*)

Newell's Shearwater normally breeds on Mountain slopes of Kaua‘i but has been sighted in all Hawaiian Islands. It was formerly a much more common bird with a wider breeding distribution in the islands. It has declined due habitat loss and predation by introduced species such as mongooses, rats, cats and barn owls. Young birds are attracted to the lights of urban areas at night and many die in collisions with power lines and buildings. The population was estimated at 84,000 birds in the mid-1990s. A severe decline has occurred in recent years which may be associated with the effects of Hurricane Iniki in 1992. There is a low probability of fly-over by this species, but due to the lack of suitable habitat, no nesting is expected in the vicinity, and no adverse impacts are expected to result from the proposed action.

Threatened and endangered wetland birds

Hawaiian common moorhen (*Gallinula galeata sandvicensis*)

The Hawaiian common moorhen is predominately a species of the lowlands, found in natural ponds marshes, streams seep lagoons taro and lotus fields aquaculture ponds wet basins, sewage lagoons and drainage ditches as its primary habitats. Kunia Village maintains a normally wet sewage lagoon approximately ¼ mile east of the project site. The Hawaiian common moorhen may be expected to visit or nest in this area. There is a potential for fly-over by this species, no nesting or visitation is expected in the project vicinity, and no adverse impacts are expected to result from the proposed action.

Hawaiian Coot (*alae Ke‘oke‘o*) *Fulica alai*

This species is currently found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, taro lo‘i or patches, irrigation ditches, sewage treatment ponds. Hawaiian coots prefer freshwater wetlands, but will use brackish wetlands, and rarely, saline habitats. They utilize more open water areas than do Hawaiian common moorhens, particularly for feeding. There is a potential for fly-over by this species, no

nesting or visitation is expected in the project vicinity, and no adverse impacts are expected to result from the proposed action.

Hawaiian Duck (*Koloa, Anas wyvilliana*)

The koloa inhabit low wetlands, river valleys, coastal ponds, lakes, swamps, flooded grasslands and streams in mountains. This species is visible from sea level up to 3,300 meters of elevation. Both managed and cultivated wetlands may play an important role in fulfilling fundamental daily and seasonal resource requirements of the koloa. Koloa are frequent visitors to the sewage lagoon in Kunia Village to feed on the duckweed that is normally present. Nesting may also occur in this lagoon, which is ¼ mile east of the project site. Fly-overs of the project site would be expected. However, the proposed project is not likely to have significant impacts on this species.

Hawaiian Stilt (*Himantopus mexicanus knudseni*)

Hawaiian stilts use a variety of aquatic habitats, primarily at lower elevations, but are limited by water depth and vegetation cover. Hawaiian stilts require early successional marshlands with water depth less than 24 centimeters (9 inches), and utilize areas of sparse, low-growing perennial vegetation or exposed tidal flats. Hawaiian stilts appear to select sites with little or even no cover surrounding the nest presumably so their ability to spot predators is not affected. There is a potential for fly-over by this species, no nesting or visitation is expected in the project vicinity, and no adverse impacts are expected to result from the proposed action.

Endangered Reptiles

The Hawksbill Sea Turtle (*Eretmochelys imbricata*) is listed as a potential visitor, but due to the distance from the ocean this is highly unlikely.

Endangered Flowering Plants and Ferns

Hawai'i's vast and diverse community of flowering plants have many representatives on the windward slopes of the Waianae range, located as close as ½ mile west of the project site. The Species list produced by IPAC indicates that our project site does not overlap any of the critical habitat for the listed species. Some species have no designated critical habitat. No impacts on the threatened and endangered flowering plants are expected due to the small area involved and its management as a pineapple field for the past 80 years.

Critical Habitats

No critical habitats are designated for the project site; however, there is a large habitat designated for the O'ahu elepaio (*Chasiempis ibidis*) in preservation land from the ridgeline to the western foothills of the Waianae range (Figure 3-8). The O'ahu elepaio is a small monarch flycatcher. It is dark brown above and white below, with light brown streaks on the breast. The tail is long and often cocked up at an angle. Adults have conspicuous white wing bars, a white rump, and white tips on the tail feathers that are often displayed. This species occurs in a variety of forest types and across a range of elevations, primarily in valleys and particularly those with tall riparian vegetation, a continuous canopy, and dense understory. O'ahu elepaio are not found in very wet forests, on windswept summits, or in very dry scrubland. Much of their current range is managed by the U.S. military or by the State of Hawai'i. They currently occur in the Koolau Range

between 325 to 1,800 feet elevation, and in the Waianae Range between 1,625 to 2,775 feet elevation. Dispersal between the ranges is unlikely.

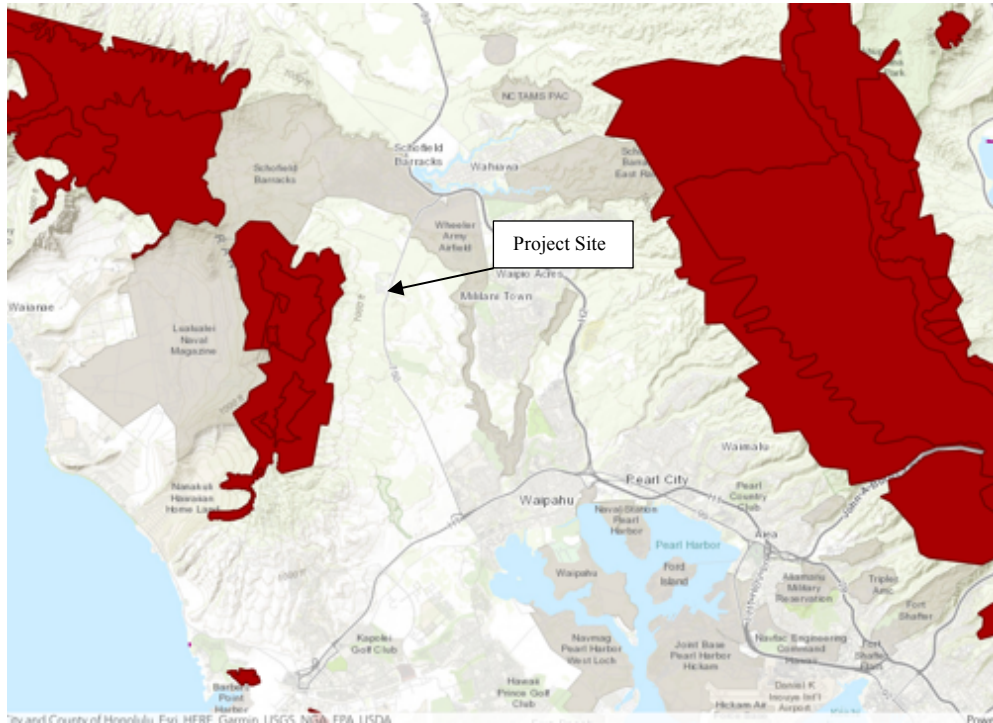


Figure 3-8: Critical habitats primarily for the O'ahu Elepaio, and other forest birds.

Each subpopulation consists of several populations; the amount of dispersal among these is likely low. The current geographic range of the O'ahu Elepaio encompasses about 5,187 hectares, declining by about 75% since 1975, and becoming fragmented into four larger subpopulations with 100 or more birds each and 12 smaller subpopulations, many of which are isolated by urban and agricultural development. Flyovers by Elepaio are possible but not likely. The project site is open farmland slightly over 1/2 miles east of the critical habitat area and approximately one-half the minimum elevation. The open agriculture and suburban land are likely to act effectively to buffer the project site from the normal habitat of this species.

3.3 Socioeconomic

Table 3-1 from the US Census Bureau shows the statistical description of Kunia Village. There are no other residential areas within the Zip code included in these statistics, therefore all housing units were owned and operated by Del Monte in 2000 and KVTHC in 2010. In 2000 the economics of pineapple were not favorable, and Del Monte planned to close the Hawai'i Plantation but had not announced the closing date. By 2010 Del Monte had withdrawn from the Hawai'i Market and Kunia Village was in transition. Many of the former Del Monte employees had not yet found employment, and many had moved away. Many of the Del Monte retirees remained and still reside in Kunia Village.

Table 3-1: Census Comparison for ZIP Code 96759 2000-2020

SEX AND AGE	2000	2010	2020	% Change
Total population	667	457	277*	-31.48%*
Median age (years)	32.6	34.9	51	+7.06%
HOUSEHOLDS BY TYPE	2000	2010		% Change
Total households	157	109	91	-30.57%
Family households (families) [7]	129	95	91	-26.36%
With own children under 18 years	65	39		-40.00%
Two adult family	98	70		-28.57%
With own children under 18 years	51	34		-33.33%
Single Female householder	18	14		-22.22%
With own children under 18 years	10	5		-50.00%
Nonfamily households [7]	28	14		-50.00%
Householder living alone	21	9		-57.14%
Households with individuals under 18 years	86	58		-32.56%
Households with individuals 65 years and over	47	37		-21.28%
Average household size	4.11	4.19	3	+1.95%
Average family size [7]	4.53	4.42		-2.43%
HOUSING OCCUPANCY	2000	2010	2020	% Change
Total housing units	167	119	135	-28.74%
Occupied housing units	157	109	135	-30.57%
Vacant housing units	10	10	5	0%
For seasonal, recreational, or occasional use	0	0	0	0%
Homeowner vacancy rate (percent) [8]	0	0	0	0%
Rental vacancy rate (percent) [9]	3.3	8.5	3	+157.58%

*2020 census population data is inaccurate. Actual population is 400-500 based on rental records

Table 3-2: ZIP Code 96759 2020 Census Demographics

2010 Population:	277
Households per ZIP Code:	135
Average House Value:	\$0
Average household income	\$224,777
Persons Per Household:	3
Persons living below the poverty level	31.8%

The population of the State of Hawai‘i was 1,436,000 in 2020, which represents an average annual growth rate of 1.2% from 2000 to 2010 (US Census Bureau 2010). This compares with an average annual growth of 0.9% for the remainder of the nation. Many O‘ahu neighborhoods lost population over the past decade. Few neighborhoods lost as many as Kunia (31.4%). During this decade Del Monte Hawaii left Hawai‘i and during 2010 the transition between Del Monte and HARC was still on-going. The James Campbell Estate was also liquidating assets, but the new buyers had not made structural changes to allow them to put land back into service. Many farm workers left the area to look for new employment; in some cases, it was the first time that Del Monte was not their employer and landlord. The proposed action is not expected to impact the socioeconomics of the area.

3.3.1 Social Factors and Community Identity

Community identity is strong within Kunia Village, and some current residents have spent most of their lives within its boundaries. A significant fraction of Hawai‘i’s local population either lived in a plantation camp or had relatives who did during their early years. This type of close-knit community recalls a simpler time in our history. During much of this period fathers, sons and daughters worked the same fields, stayed close together and faced life’s challenges as part of this community. It is a part of our history that was lost with the loss of the sugar and pineapple plantations. Many social support mechanisms were lost at the same time. Kunia Village has been a community of Pineapple workers since 1910. Most employees walked or rode a bicycle to assembly point for assignments. The Plantation paid the bills, ran the store, and clinic, provided church buildings and recreational facilities. This was a place where neighbors came together when one of their neighbors was sick or injured. The plantation lifestyle in Hawai‘i has largely disappeared with the decline of the plantation and worker amenities were lost as the price paid to support progress. Many wonder if the price was too high.

Kunia Village is now on the State and Federal Historic Registers as one of the few remaining intact plantation villages. It will be run as an agricultural village in perpetuity, supporting many farms instead of one. While not all the amenities of the original village can be kept, KVTHC has maintained as much of the social fabric and community identity of Kunia Village as possible.

3.3.2 Public Services

Much of the infrastructure in the vicinity of the subject property is privately-owned by KVTHC. The infrastructure inherited from Del Monte, like the housing needs repair and maintenance. KVTHC owns, operates and maintains (through contracts) the roads, water distribution system, wastewater treatment plant, and Community Center. The proposed action is expected to exert a positive impact on the public services of the area.

3.3.2.1 Electricity

Most power poles and lines within Kunia Village belong to Hawaiian Electric Company. Electrical power is provided through a Hawaiian Electric Company (HECO) substation located on the East side of Kunia Road near the center of the Village. 46-kilovolt (kV) power is reduced and distributed to pole-mounted transformers for local distribution through a combination of 11.5 kV and 46 kV overhead power lines. Commercial areas are supplied with 480V three phase power, while residential areas have 115- and 220-volt single phase power.

Local generation activities are being considered but are not designed or contracted at this time. The total demand for Kunia Village is less than 1 MW. The island O‘ahu total electric demand is estimated at 1.3 GW. The proposed action is not expected to significantly affect the stability of the grid or impact the Utility’s ability to provide quality electric service to its customers.

3.3.2.2 Telecommunications

Telephone systems in Kunia Village are currently owned and operated by Hawaiian Telephone or Oceanic Cable Company. No changes of the existing telephone services are planned. Cable and internet services may be obtained from various providers and is left to the discretion of tenants. No changes in the existing arrangement are planned for cable or internet.

3.3.2.3 Potable Water

The water system is operated through Second City Property Management (SCPM) who provides a certified operator for the potable water supply. SCPM is a service contractor for the Kunia Water Association.

The historical components of the existing potable water system were Del Monte Well 1 (3-2703-001/002), located within the Village. Well 1 was taken out of service in 1980 when it was discovered that pineapple pesticides originating from an accidental spill had appeared in the drinking water. At that point the source was shifted to Kunia Well 3 (3-2803-005), and Kunia Well 4 (3-2803-007). Wells 3 and 4 draw from the Wahiawa Aquifer System, a subset of the Central Aquifer Sector which is contaminated with Trichloroethene from unknown sources. An air stripping tower is used to remove volatile organic compounds from the water.

Kunia Well 3 (3-2803-005) was drilled in 1959 to a depth of 1020 feet below ground elevation of 857 feet, and 661 feet of 16” solid casing and 226 feet of 16” perforated casing was installed in the well. The pump is a vertical line shaft pump driven by a 500 horsepower (HP), 2300-volt

electric motor rated at 1500 gallons per minute (gpm) at 990 feet of head, and 1400 gpm at 1050 feet of head. The pump shaft is lubricated with food grade oil. Del Monte Well 3 was originally the primary source for potable water to Kunia Village.

Kunia Well 4 (2803-007) was drilled in 1979 to a depth of 990 feet which is below sea level. No perforated casing was installed. Until recently it was driven by a 500 horsepower (HP) diesel engine. The engine was replaced with an electric motor in summer 2013 with vertical line shaft pump. Well 4 is mainly used to supply the agricultural irrigation system. However, the well was used to supply the potable water system when needed. Kunia Well 4 (3-2803-007) is now the only source of potable water for Kunia Village and agricultural irrigation water for the entire area. It is activated only during the day, and power turns off between 4:45 p.m. and 9:00 a.m. every day. Liquid sodium hypochlorite for disinfection is injected into the water at the well head before the water is pumped to the air stripping tower.

The purpose of the air stripping tower is to remove contaminants (Trichloroethene and 1,2,3 Trichloropropane) in the water from past activities at the adjacent Schofield Barracks. Therefore, all costs associated with this tower and its ancillary equipment, including operation and maintenance costs, are borne by the U.S. Army. The major ancillary equipment includes the fan that blows air into the tower and the generator that provides standby power for this fan. The stripping tower is rated for 1,300 gallons per minute (gpm) to 1,500 gpm and is activated when the Kunia Well pump is energized. Water from the well enters the top of the stripping tower and exits at the bottom for discharge to the two water storage tanks, 258,000 gallons each.

A major renovation of the water distribution system was completed in 2021, when new water storage tanks, transmission, and distribution lines were installed throughout the Village. The water source was not upgraded or changed.

In January 2023, chemicals known as PFAS were detected for the first time in water samples collected at the Kunia Village Well 3 (3-2803-005). Kunia Well 4 (3-2803-007) was tested several months later and found to contain equivalent concentrations of certain PFAS.

The detections of PFAS in Kunia Well 4 exceeded the following:

- Hawai'i State Department of Health Environmental Action Levels (EAL) for PFOS
- EPA-proposed MCL for PFOS and PFOA in drinking water
- EPA-proposed Hazard Index of 1.0 for the combined toxicity ratios of PFNA, PFHxS, PFBS and Gen X

After the determination of Kunia Well 4 being contaminated with PFAS, on March 24, 2023, Kunia Village requested to tap into the United States Army's potable water system at neighboring Schofield Barracks due to this emergency. Kunia Village continued to receive Schofield Potable water until June 10, 2025. KVDC received a grant from the Hawai'i DOH and EPA, and completed the installation of a Granulated Activated Carbon (GAC) Treatment Plant on June 10, 2025, Kunia Village and now treats the PFAS contaminated water from Well 4 (3-3208-007) first through the Aeration stripping tower (AST) for the TCE/TCP by the Army and then the GAC recently installed and activated to treat the PFAS for the Kunia Village Potable System.

The proposed action is to provide a permanent source of drinking water for the residents and businesses of Kunia Village, on the Village property. This action is required to maintain the assets of O‘ahu’s last plantation camp at a time when it is needed the most.

The proposed action is to provide an alternative source of drinking water for the residents and businesses of Kunia Village. There will be no new demand from groundwater resources, only a change from offsite Well 4 (3-2803-007), to the new onsite well. Well 4 is thought to draw from the Wahiawa Aquifer System while the new well will draw from the Ewa-Kunia Aquifer System of the Pearl Harbor Aquifer Sector. The requested allocation will be 150,000 gallons per day, which is small in comparison to the allocation for Well 3 (3-2803-005) and Well 4 (3-2803-007), which is set at 3.96 million gallons per day. The water demand for the new well may be subtracted from the Well 3 and Well 4 allocations. Well 4 will continue to provide water for agricultural irrigation and have the capacity to supply potable water to Kunia Village in a major emergency but will not normally be used for Kunia Village potable water demand.

3.3.2.4 Wastewater

The Kunia Village Title Holding Corporation owns and, through subcontractors, operates wastewater collection and treatment systems.

Wastewater from Kunia Village is conveyed to the Kunia wastewater treatment plant (WWTP) for treatment to produce an effluent that is intended for irrigation use. Wastewater from the residential units of Kunia Village discharges into individual grease traps for removal of fats, oils and grease (FOG) and then into one of three septic tanks for removal of solids that can settle by gravity within these septic tanks, before continuing to flow by gravity to the WWTP.

The treatment process at the WWTP is an aerobic intermittent re-circulating reactor (AIRR) with a fixed media trickling filter, for which DOH approval for use was issued on October 2, 1991, for a design flow of 55,000 gallons per day (gpd). The quality of the effluent was originally intended to conform to what is now classified by DOH for reuse as R-2 Water. This classification allows for subsurface (mainly drip) irrigation with the effluent, and under controlled conditions inclusive of buffer areas, spray irrigation of non-edible crops during limited hours of the day. There are currently 32 acres of land near Kunia Village which is being used for forage, and which is being sub-surface irrigated with effluent from the WWTP. Current plans are to remove 13 acres from this reuse area and add an area across Kunia Road to be used for banana production. The effluent is stored in a 1.4-million-gallon (MG) reservoir near the WWTP. The treatment capacity and effluent quality were upgraded in 2003, primarily because of installing a duplex DynaSand Filter system and improving the chlorine contact tank. The capacity was increased to 70,000 gpd, with the intent of producing an R-1 water effluent, which allows for spray irrigation without the restrictions of R-2 Water. The ability to consistently produce R-1 Water is marginal, and thus, the effluent is R-2 Water. The Preliminary Engineering Report recommended that wastewater collection system be replaced to increase the slope of lines and provide adequate cover over the drainage lines. The facility does experience increased flows during rainy periods as do municipal wastewater plants.

The subject property is in the critical wastewater disposal area as determined by the O‘ahu Wastewater Advisory Committee. The proposed project in the No Pass Zone as defined by the Honolulu Board of Water Supply as an area where waste disposal facilities have the potential to contaminate groundwater resources expected to be used for domestic water supplies. The construction of waste disposal facilities is closely regulated within the No Pass Zone. Disposal of effluent from the Kunia Wastewater Treatment Plant is done via subsurface drip irrigation at a design application rate that corresponds with the site-specific evapotranspiration rate. The disposal field is rated for 55,000 gallons per day.

Wastewater generation is now estimated to be around 27 to 35 thousand gallons per day from all sources within Kunia Village. If 90% is generated from residences, the 135 occupied farm dwellings that are now in use generate less than 25,000 gallons per day or less than 295 gallons per household per day. Using a design figure of 300 gallons per day, the potential addition of 65 housing units is expected to add a similar amount or a total of 23,700 gpd of wastewater. At full development the wastewater treatment plant will be operating at less than 50,000 gallons per day or approximately 70% capacity. The proposed increase wastewater volumes resulting from the proposed action will be within the design and operating capacity of the WWTP. Should the wastewater volumes increase beyond these design capacities the Wastewater treatment plant will be upgraded to handle additional flow requirements.

Kunia Village is anticipating upgrading the wastewater disposal system within the next 5 years. Any modification will require a permit application renewal through the Hawai‘i Department of Health Wastewater Branch.

3.3.2.5 Solid Waste

Solid waste generated within the community is collected by the City and County of Honolulu. Waste generated by the commercial establishments within the Village is collected by various licensed contractors and disposed at a permitted disposal facility on O‘ahu in accordance with State and County requirements. No changes in this system are envisioned.

3.3.2.6 Drainage

Infiltration of stormwater at the project site is rapid until the saturation point is reached, at which time the project site is subject to relatively rapid runoff. The area is subject to heavy rainfalls on occasion. Stormwater from the site drains toward one of the two stormwater retention ponds within the Village area. Overflow from these conveyances flow into Waikele gulch and ultimately to Pearl Harbor. All areas with exception of house gardens are consistently maintained with a grass covering to minimize erosion. No permanent structures or activities are contained within the gulches. Housing is all on post and pier. No flood damage has been reported within the Village due to its rolling topography and construction type.

The proposed action is not expected to have a major impact on stormwater drainage at the site or in the vicinity because the sum of new impervious surfaces is quite small in comparison to natural areas and the presence of gulches within and adjacent to the subject property.

During construction periods, best management practices will be employed to reduce soil erosion from wind and stormwater. All construction will be consistent with the requirements of the State's anti-degradation policy and the requirements of HAR Chapter 11-54. These practices may include minimized grading, soil mats, erosion-control socks, or silt fences as necessary. Engineers for the proposed action will obtain an NPDES construction stormwater permit in advance of the start of construction.

3.3.3 Roads and Access

Access to the site is through the signalized intersection at Kunia Road, State Highway 750, and Kunia Drive, which is near the south end of the property. A commercial entrance exists on the north boundary of the property. This is used primarily by tenants of the north commercial area, and parents accessing the Head Start facility at the northwest corner of the subject property. Internal roadways include 8 paved residential roadways and 3 unimproved fire lanes and roadways. Roads have been patched or repaved over the past 5 years. Most are in good condition and do not require resurfacing.

Construction related traffic will be insignificant. It is estimated to include one heavy vehicle that remains onsite through the construction period and several medium sized trucks that commute at the beginning and end of each workday. The proposed action will not contribute significantly to local traffic impacts.

3.3.4 Archaeological and Historic Resources

An Archeological Inventory Survey (AIS) was completed in November 2014 to provide information for this environmental Assessment and to support the Village nomination for the National Register of Historic Places (Appendix C). The AIS conforms to the requirements of HRS Section 6E-42 and HAR Section 13-13-284. The Section 6 review was required by pending receipt of federal funding. That assessment has been accepted by the State previously designated as a single state historical place as (SIHP #50-80-08-7729) for its cultural and architectural significance, representing an intact plantation camp. The project site is outside of the historic district.

The AIS performed by Cultural Surveys Hawaii recognized the existing historical site but identified no new features of archeological or historic significance and recommended no further archeological studies be performed in relation to the proposed action. Cultural surveys made a site visit to the well site in October 2024 in support of the Ka Pa'akai analysis. That analysis includes a finding no impacts.

The ground surface across the entire parcel has been graded, filled and heavily disturbed over the past 100 years. No archaeological resources have been recorded or observed within at or near the well site boundaries. Given the extensive grading and development that exists, no such resources are expected to remain intact if any were ever present.

Kunia Village has sufficient historic value for placement on the State and Federal Historic Registers but was only listed on the Hawaii Historical Register of Historic Places. The following draws heavily on or directly from Mason Architects' National Register of Historic Places

nomination for Kunia Camp Historic District. Conclusions from the AIS (Mason Architects 2014, Appendix B) include:

The proposed Kunia Camp Historic District is significant under Criterion A [Property is associated with events that have made a significant contribution to the broad patterns of our history] for its association with the pineapple industry, which during the mid-twentieth century was Hawaii's second largest industry. Kunia Camp is also associated with the California Packing Company (CPC later known as Del Monte), one of the major pineapple operators in Hawaii from its inception in 1916 until the closing of the Kunia facility in 2007.

Throughout the 20th Century, the importance of pineapple in Hawaii's agricultural industry was second only to sugar... With plantations and/or canning facilities on almost every Hawaiian island, the industry was responsible for the cultivation of thousands of acres of land, the employment of thousands of workers, and the processing of millions of pineapples. In addition to the economic impact of the industry, the fruit became a powerful icon of the Territory and State of Hawaii.

Beginning around 1960, the Hawaiian pineapple industry began to lose both a portion of its world market share and its place as one of Hawaii's leading industries. This happened as countries such as Brazil, Mexico, the Philippines, and Thailand expanded their production of fresh and canned fruit, and as tourism and the military became the state's most valuable industries.

As canned pineapple from other countries began filling the market, Hawaiian canneries began to close and plantations, once located on Maui, Oahu, Molokai, Lanai, and Kauai, began to shrink.

Del Monte cannery closed in 1985, and Dole cannery in Iwilei closed in 1991. During the end of the 1990s and into the 21st century the value of fresh Hawaiian pineapple overtook the value of canned Hawaiian pineapple...

The proposed Kunia Camp Historic District is also significant under Criterion C as a concentration of Plantation Style residences. The residences display the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes vertical boards (tongue-and-groove and board-and-batten) on the exterior, single-wall construction (some with girts), and pitched roofs [some hipped] with wide, overhanging eaves.



The single-wall construction of the camp is characteristic of Hawaiian Plantation Style houses... This construction method was perfected around 1917 by Japanese construction workers on the plantations in Hawaii. It is a structurally sophisticated method of construction that exemplifies economy of material and labor. Single wall construction also reflected the difficulty of importing building materials from the mainland and the use of standardized components. Plans utilizing single wall design were subsequently codified by the Hawaii Sugar Plantation Association (HSPA) throughout the islands and ultimately migrated into urban construction.

The Period of Significance is ca. 1928 to ca. 1972, which is a span of time that reflects the initial development and prime functioning years of the camp, which loosely correlates with the peak of the pineapple industry in Hawaii. It begins with the first phase of construction at the Old Camp (pre-1928, 1928-1940), covers several decades of use and expansion as a pineapple plantation camp, and ends with the final build-out of the New Camp in 1972, when a grouping of residences was moved to the property and integrated into lots found within the existing street layout.

Still surrounded by agricultural land, Kunia Camp is the last intact pineapple plantation housing community under one ownership on Oahu... Its unique collection of plantation residences illustrating [the] architectural evolution of the single wall structure concept; and introduction of neighborhood planning features such as indoor plumbing, individual yards, grid street patterns, and community amenities (gymnasium, churches, and school) that were increasingly... provided by companies to workers desiring a stable, family-oriented workforce for the plantation.

The Kunia Camp Historic District is established under Criteria A and C; it retains its historic integrity; and most of its individual resources within the district are at least 50 years old. The project site is outside of the historic district and has been most recently utilized for pineapple farming.

3.3.5 Cultural Impacts

Cultural resources, as used in Chapter 343, HRS, refer to the “practices and beliefs of a particular cultural or ethnic group or groups”. The types of cultural practices and beliefs to be assessed may include “subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs (OEQC 1997), and may also include traditional cultural properties or other historic sites that support such beliefs and practices.

Cultural impact assessment studies have been completed for the project site in 2006 (NRC, 2006) and the Military areas immediately north of the subject property in 1998 and 2005. A Ka Pa‘akai Analysis was completed for the current assessment (Appendix C) (PACNAVFACENGCOM, 1998), (NAVFAC Pacific, 2005). These cultural impact assessment studies involved interviews with individuals and groups who are knowledgeable about the proposed project area, its resources and traditional uses. Archival research was also used to identify any traditional beliefs and customs. The findings of the cultural impact assessments include several significant features of the Central O‘ahu Plain but little information of relevance within the project site.

The areas of the central plain were the site of many battles between competing Alii before the unification of Hawai‘i by Kamehameha I. These areas were thought to be continuously vegetated by grasslands with only sparse tree covering. They were probably chosen because of the open

nature, which allows for unrestricted movement of foot soldiers, the distance from the coastline, and the space to amass people for battles. Kūkaniloko, the birthing stones are located 3.4 miles northeast of the project site. Kūkaniloko is a traditional birthing place which some historians describe as “one of the two famous places in the Hawaiian Islands for the birth of children of *tapu* chiefs” (McAllister, 1933). This tradition is believed to have been established at Kūkaniloko sometime during the 14th or 15th century by the chief Nanaka‘oko and his wife, for the birth of their son Kapawa (Fornander, 1880). Today Kūkaniloko is a state monument managed by the State Office of Hawaiian Affairs. No culturally significant locations or traditional practices were identified within the boundaries or near the project site.

3.3.6 Ka Pa‘akai Analysis

Kunia Village contracted with Cultural Surveys Hawaii to prepare a Ka Pa‘akai Analysis for the proposed action. CSH reviewed available resources on traditional cultural practices as they relate to groundwater usage and historic aspects in the vicinity and downgradient of the proposed well site (Appendix B).

In *Ka Pa‘akai vs Land Use Commission*, 94 Hawaii (2000) the Court held the following analysis must also be conducted.

- 1. The identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary native Hawaiian rights are exercised in the project area;*
- 2. The extent to which those resources including traditional and customary native Hawaiian rights will be affected or impaired by the proposed action; and*
- 3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist.*

Based on information gathered from the cultural and historical background, and community consultation for this project, there are several traditional cultural practices and resources to consider.

3.3.6.1 Cultural Practices and Resources Considered

Groundwater Utilization: Lying in the lee of the Waianae mountain range, the Honouliuli District is one of the driest areas of O‘ahu with most of the area averaging about 550 mm (22 inches) of rain on the coastal and inland region of the *ahupua‘a* and about 1,200 mm (39 inches) in the northern region up into the Waianae mountain range (Giambelluca et al. 2013). The area is drained by Kaloi Gulch and Honouliuli Gulch. These gulches are believed to rarely run with water. Historic maps also indicate a spring located to the north. Such infrequent springs may have been key to the early human activity on the southeast Waianae slope.

Fresh water remains available below the surface of Honouliuli. Dissolution “pit caves” (Mylroie and Carew 1995) or “sink holes” would accumulate water within them via a subterranean water or karst system; this water also contained nutrient-rich sediment that allowed for the cultivation

of significant plant resources such as kalo, kī, and noni. McAllister documented examples of traditional agricultural activity in Honouliuli, writing that the *kama ʻāina* of the *ahupua ʻa* utilized the soil on the floor of caves for cultivation. At the time of his survey in the 1930s both *mai ʻ* and *kō* were still being cultivated within these pits.

The lowlands fronting the West Loch of Pearl Harbor (Kaihuopalaai) were suitable for the cultivation of the traditional Hawaiian staple crop, kalo. The production (and consumption) of kalo was vitally important to many communities of Native Hawaiians living in ʻEwa. Captain James King, visiting Hawaiʻi in 1779, noted “the natives of these islands are, in general, above the middle size and well made; they walk very gracefully, run nimbly and are capable of bearing great fatigue” (Shintani 1993:10). Accordingly, the high level of physical activity and physical fitness described by Captain King was a normal part of Hawaiian life and was largely attributable to the availability of plant and food resources such as kalo, ʻuala (sweet potato; *Ipomoea batatas*), niu (coconut), *mai ʻa*, limu (seaweed), and *i ʻa* (fish).

The five major Pearl Harbor springs—Kalauao, Waiau, Waimano, Waiawa, and Waikele—exist where the caprock is relatively thin and fractured. These large springs flow into the East and Middle Lochs of the Pearl Harbor estuary. Moving west, groundwater flows to the coast, decreasing where annual rainfall is lower and where the caprock thickens. Because the caprock restricts basalt groundwater flowing to the coast, pumping the requested volumes of groundwater from the basaltic aquifers 6 to 10 miles inland is anticipated to not have a significant impact on nearshore environments.

Based on the Hawaiʻi Dept. of Health Source Water Assessment numerical model for the Island of Oʻahu (Whittier personnel communication, 2025), The Ewa-Kunia Aquifer Systems receives about 2.3 and 14.2 mgd of inflow from the Wahiawa and Waipahu-Waiawa Aquifer Systems respectively. To this add 14.7 mgd of recharge (Engott, 2017). About 11.4 and 11.6 mgd of water are removed from the Ewa-Kunia Aquifer System through pumping and coastal discharge respectively. The proposed withdrawal of 0.15 mgd represents a little over one (1) percent of the current coastal groundwater discharge. The proposed increase withdrawal is very small compared to the existing coastal discharge and will have no discernable impact on other users and/or the coastal ecosystems.

CWRM set aquifer sustainable yields in their 2019 update of the State Water Resources Protection Plan, as a percentage of aquifer recharge recognizing the importance of groundwater leaking to the coast supporting groundwater-dependent ecosystems and accounting for hydrogeologic uncertainty. Pumping will be within water use permits and less than the sustainable yield and recharge. Thus, no off-site impacts are expected even accounting for hydrogeologic uncertainty.

Burials: No burials were identified within or in the vicinity of the Kunia Village New Source Well project area. In the event that *Iwi Kupuna* or other culturally important finds are discovered work will be stopped.

Agricultural Practices: No ongoing agricultural practices were identified within the Kunia Village New Source Well project area. Kunia Country Farms, a landscaping business and

tropical nursery, is located directly southeast of the project area on Kunia Road Highway 750. The nursery is spread over 10 acres of former pineapple plantation land, presumably once owned by Del Monte. Kunia Country Farms provides various groundcovers, shrubs, fruit trees, and palms.

Floral Resources: Dietrix Jon Ulukoa Duhaylonsod mentioned wauke was plentiful in the uplands of Honouliuli in traditional times. Mr. Duhaylonsod and his hālau, Kiawekūpono O Ka Ua, have made kapa from the wauke.

Faunal Resources: Tom Berg mentioned that gulches provided refuge for wildlife including pueo, barn owls, and bats. He noted barn owls are endangered on the mainland. He believes the DLNR, and U.S. Fish and Wildlife Service should work together to protect them.

Marine Resources: No marine resources were identified within or in the vicinity of the Kunia Village New Source Well project area.

Wahi Pana: Mr. Duhaylonsod pointed out the project area is in the vicinity of a natural gulch. He expressed concern that there may be the remnants of undocumented traditional properties and resources in the gulch that may have “escaped the bulldozer” or ended up there following heavy rains.

Trails: ʻĪʻĪ (1959:96–98) notes the mauka-makai trail to Pōhākea Pass would have passed through the present project area. Mr. Duhaylonsod mentioned Pōhākea Pass was a well-frequented passageway between Honouliuli and Lualualei Ahupuaʻa. He noted Pōhākea Pass is mentioned in the moʻolelo of Hiʻiakaikapoliopole

They attempted to contact 50 Hawaiian organizations, agencies, and community members. Of the five people that responded, one of these kamaʻāina and/or kūpuna provided written testimony and two met with CSH for a more in-depth interview. Consultation was received from the following community members:

1. Tom Berg, Former Councilman, District 1
 2. William Kahula O’Brien and Dietrix Jon Ulukoa Duhaylonsod, Kaʻuikiokapō
- A summary of the Ka Paʻakai analysis appears below, and the entire report is included in Appendix A.

3.3.6.2 Analysis Valued Cultural, Historical, or Natural Resources in the Project Area

Dietrix Jon Ulukoa Duhaylonsod mentioned the project area is in the vicinity of a natural gulch. He noted the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist. Tom Berg mentioned that gulches provided refuge for wildlife including pueo, barn owls, and bats. He noted barn owls are endangered on the mainland.

The Extent to which Traditional and Customary Native Hawaiian Resources will be Affected by the Proposed Action

Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed **project**; however, he expressed concern that runoff from the project area could flow down the “hard pan” located downslope of the project area and directly into the nearby gulch causing significant erosion during heavy rains.

3.3.6.3 Feasible Action, if any, to be taken to Reasonably Protect Native Hawaiian Rights

Mr. Duhaylonsod suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering the gulch. Mr. Berg believes the DLNR and U.S. Fish and Wildlife Service should work together to protect barn owls. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. If any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. If iwi kūpuna are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. In the event that iwi kūpuna and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

3.3.7 Land Use

Kunia Village is surrounded by unique and other agricultural lands which have been rated as potentially among the most productive lands in the State for diversified agriculture and as lands for production of specific high-value food crops of statewide or local importance (Figure 3-9). For example, the State Department of Agriculture's November 1977 study, *Agricultural Lands of Importance to the State of Hawaii (Revised) (ALISH)*, indicates that the lands along Kunia Road north of Wahiawa and surrounding Mililani are uniquely suited for pineapple production. In addition, the University of Hawaii Land Study Bureau's December 1972 bulletin, *Detailed Land Classification - Island of Oahu*, rated productive capacity of the former sugar fields along Kunia Road, north of Wahiawa, and surrounding Mililani as predominately “B.” (An “A” rating was given to the lands with the highest productivity, “E” was given to the lowest and “N” was given to unclassified lands.) A soil classification of “N” was given to the Village because it was in use for residential purposes.

The project site will consist of a gravel pad of dimension 40 x 100 feet. The land use at the project site is adjacent to the existing water storage facility, and tucked between agricultural, residential use and a plant nursery. The aerial photograph shows these elements.



Figure 3-9: An aerial view of Kunia Village land use patterns. Project site is in red.

3.3.6.1 Land Use Constraints

Kunia Village is within the State agricultural district and is zoned restricted agriculture (AG-1) by the City and County of Honolulu. Land-use constraints originate from multiple sources:

- Title restriction placed on the parcel at the time of sale which requires that a number of units in the Village be dedicated to affordable rental units in perpetuity.
- Environmental restrictions placed on the property by consent decree between Del Monte Corporation and the United States Environmental Protection Agency.
- City Land-use Ordinances, some of which are exempted under the 201-H permit exemptions.

An 11-acre portion of the subject property continues to be remediated by Del Monte Corporation after a pesticide spill in 1979 that contaminated the potable water source used by the Village. 201-H exemptions are allowed for any land-use restriction that does not impact public health or the environment. The activity use limitations and engineering controls established under consent decree between Del Monte and the EPA are, by definition, designed to protect public health and will not be appealed.

Potable water wells may be considered Type A utilities in The Honolulu Land-use Ordinance master use table and are permitted in Ag zones.

3.4 Indirect, Growth-Inducing, Cumulative, and Secondary Impacts

Indirect effects include impacts related to changes induced by the proposed action, but not as a direct impact of the proposed action. Growth-induced changes in water or land-use patterns caused, for example, by building new houses would be considered impacts associated with population growth. Cumulative impacts may be defined as impacts on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes the action. A secondary impact is one that is caused by the proposed action but is removed in time or space from the project (Council on Environmental Quality, 1997).

The proposed action is to relocate water supplied to Kunia Village from one well to another. No new water demand is anticipated. No new population or water uses are reasonably foreseen to result from the proposed well. Growth inducing, cumulative and secondary impacts resulting from the proposed action are not expected to impact the quality of life within the Village or surrounding communities.

3.5 Required Permits and Approvals

Discussion follows for of the major permit approvals required prior to the start of construction.

Application for a Well Construction/Pump Installation Permit

An application for a permit for well construction shall be required for all areas of the State including water management areas and shall be made by the well driller who will construct the well or the owner. An application for a permit for installation of a pump and pumping equipment shall be made by the pump installation contractor who will install the pump and pumping equipment. Application forms for well construction and groundwater use permits are contained in Appendix B.

The Commission shall cause all such applications to be reviewed by the Department of Health for compliance with their rules and standards concerning, among other things, the appropriateness of the location of the well. The Commission may issue an amended permit if it determines that the proposed new well location will serve the same use as the original well and draw upon the same supply of water and will not be contrary to any applicable law, rule, order, or regulation, and that the incomplete and abandoned well will be sealed or plugged in a manner to prevent waste of water and damage to the water supply and to protect the public from harm.

Application for Ground Water Use Permit in a Designated Ground Water Management Area

No person shall make any withdrawal, diversion, impoundment, or consumptive use of water in any designated water management area without first obtaining a permit from the commission. However, no permit shall be required for domestic consumption of water by individual users, and no permit shall be required for the use of a catchment system to gather water. An existing use in newly designated areas may be continued until such time as the Commission has acted upon the application subject to compliance with section 174C-51.

Conditions for a permit.

(a) To obtain a permit pursuant to this part, the applicant shall establish that the proposed use of water:

- (1) Can be accommodated with the available water source.
- (2) Is a reasonable-beneficial use as defined in section 174C-3.
- (3) Will not interfere with any existing legal use of water.
- (4) Is consistent with the public interest.
- (5) Is consistent with state and county general plans and land use designations.
- (6) Is consistent with county land use plans and policies; and
- (7) Will not interfere with the rights of the Department of Hawaiian Home Lands, as provided in section 221 of the Hawaiian Homes Commission Act.

(b) Within sixty days after receipt of a notice of a permit application, the county shall inform the commission if the proposed use is inconsistent with county land use plans and policies.

(c) The common law of the State to the contrary notwithstanding, the Commission shall allow the holder of a use permit to transport and use surface or groundwater beyond overlying land or outside the watershed from which it is taken if the Commission determines that such transport and use are consistent with the public interest and the general plans and land use policies of the State and counties.

(d) The Commission, by rule, may reserve water in such locations and quantities and for such seasons of the year as in its judgment may be necessary. Such reservations shall be subject to periodic review and revision in the light of changed conditions, provided that all presently existing legal uses of water shall be protected.

(e) All permits issued by the Commission shall be subject to the rights of the Department of Hawaiian Home Lands as provided in section 221 of the Hawaiian Homes Commission Act,

City and County of Honolulu Minor Modification of the Kunia Village Development

Agreement. A Minor Modification of the Development Agreement that was recorded in 2018 will be required for the addition of the well structure on the parcel of land covered by its 201h permit. This request is supported by this Environmental Assessment and a letter request to DPP.

City and County of Honolulu, Building and Grading. The proposed project will be required to obtain all building and grading permits from the City and County of Honolulu.

State of Hawai'i NPDES Permits: Notice of Intent, (NOI), construction Stormwater Discharge (Form C), and Discharge of Well Drilling Fluids (Form I). The Clean Water Act regulates discharge of all types of water from industrial sources and construction sites as well as discharge of process waters of all types. An NPDES General permit for Construction Stormwater Discharge is required of construction projects that are grading areas greater than one acre. If an area larger than 1 acre in total is disturbed, an NPDES Notice of Intent and Form C will be prepared and approved prior to the start of construction. Construction Best Management Practices will include downgradient silt fences and mulch stockings, upgradient berms to deflect run-on. These will be further described in the permit application. There will be discharge of up to 100,000 gallons per day of drilling water during operations of the drilling equipment. An NPDES General permit for discharge of well drilling fluids under Appendix I will be prepared prior to the start of drilling activities. This general permit covers discharges of treated process

wastewater associated with well drilling activities. Process wastewater includes well drilling slurries, lubricating fluids wastewaters, and well purge wastewaters. The NPDES permit requires that discharge water be treated to minimize the discharge of pollutants. The Drilling contractor will build and operate a settling basin and utilize other filtration methods to remove sediments and rock chips before reusing the water in the drilling operations.

State Historic Preservation Division of DLNR. Substantial improvements to Kunia Village including infrastructure improvements were discussed in a 2015 Environmental Assessment¹⁴. This EA supported demolition or substantial renovation of 82 of the existing 121 occupied housing units and upgrades of the water and wastewater systems. Cultural Surveys Hawaii prepared and an AIS at that time to support the proposed improvements. SHPD accepted the final plan in February 2015. The proposed action is not within the historic district.

FAA authorization will not be required. The proposed project does not involve stationary sources or air pollution and is not required to obtain Clean Air Act permits.

4.0 CONSISTENCY WITH PLANS, POLICIES, AND REGULATIONS

The State of Hawai‘i’s Constitutional Convention identified the State’s “obligation to protect, control and regulate the use of Hawai‘i’s water resources for the benefit of its people.” Under Article XI, Section 7, of the State Constitution, *“The legislature shall provide for a water resources agency which, as provided by law, shall set overall water conservation, quality and use policies; define beneficial and reasonable uses; protect ground and surface water resources, watersheds and natural stream environments; establish criteria for water use priorities while assuring appurtenant rights and existing correlative and riparian uses and establish procedures for regulating all uses of Hawaii’s water resources.”*

CWRM was established in 1987 when the Hawai‘i State Legislature enacted the State Water Code, Chapter 174C of the Hawaii Revised Statutes. The Commission establishes and operates under these rules to implement the State Water Code.

4.1 State Water Code

The State Water Code, Chapter 174C, HRS was enacted into law by the 1987 Legislature for the purpose of protecting Hawai‘i’s water resources. It provides for the legal basis and establishment of the Commission on Water Resource Management and its authorities and responsibilities.

§174C-2 Declaration of policy.

- (a) It is recognized that the waters of the State are held for the benefit of the citizens of the State. It is declared that the people of the State are beneficiaries and have a right to have the waters protected for their use.
- (b) There is a need for a program of comprehensive water resources planning to address the problems of supply and conservation of water. The *Hawaii Water Plan*, with such future amendments, supplements, and additions as may be necessary, is accepted as the guide for developing and implementing this policy.

¹⁴ FEA *Kunia Village and Agribusiness Complex Affordable Housing Redevelopment Kunia, Oahu, Hawaii* TMK # 9-2-005:02. North Shore Consultants, LLC. February 2015

(c) The state water code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic uses, aquaculture uses, irrigation and other agricultural uses, power development, and commercial and industrial uses. However, adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture, and navigation. Such objectives are declared to be in the public interest.

(d) The state water code shall be liberally interpreted to protect and improve the quality of waters of the State and to provide that no substance be discharged into such waters without first receiving the necessary treatment or other corrective action. The people of Hawaii have a substantial interest in the prevention, abatement, and control of both new and existing water pollution and in the maintenance of high standards of water quality.

(e) The state water code shall be liberally interpreted and applied in a manner which conforms with intentions and plans of the counties in terms of land use planning.

The Hawaii Water Plan

The Hawaii Water Plan consists of five constituent parts:

- 1) a Water Resource Protection Plan which is prepared by the Commission on Water Resource Management,
- 2) a Water Quality Plan which is prepared by the Department of Health,
- 3) a State Water Projects Plan which is prepared by the Engineering Division of the Department of Land and Natural Resources,
- 4) an Agricultural Water Use and Development Plan which is prepared by the Department of Agriculture, and
- 5) Water Use and Development Plans prepared by each separate county.

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

The proposed action complies with the State water use plans by obtaining permits for well construction, water use and pump installation. The Kunia Well is within a groundwater management area and provides a beneficial use for the residents of Kunia Village. Kunia Village plays a pivotal role in supporting local agriculture through provision of respectable and affordable rental housing restricted to use by farm workers and their families.

Care is taken to prevent cross contamination of aquifers in the design and construction of the proposed well as is required in the Water Resource Protection Plan.

The proposed action does not involve new demand for groundwater resources, only a change in the aquifer system as its source. The water is now drawn from Well 4 in the Wahiawa Aquifer System. The allocation from well 4 may be decreased by 150,000 gallons per day. The new well

will draw up to 150,000 gallons per day from the Ewa-Kunia Aquifer System. The Ewa-Kunia Aquifer System has sufficient capacity to accommodate the requested allocation without exceeding the current estimate of its sustainable yield.

The certified operator of the water system will ensure compliance with State and County policies for reporting, quality control and water loss mitigation.

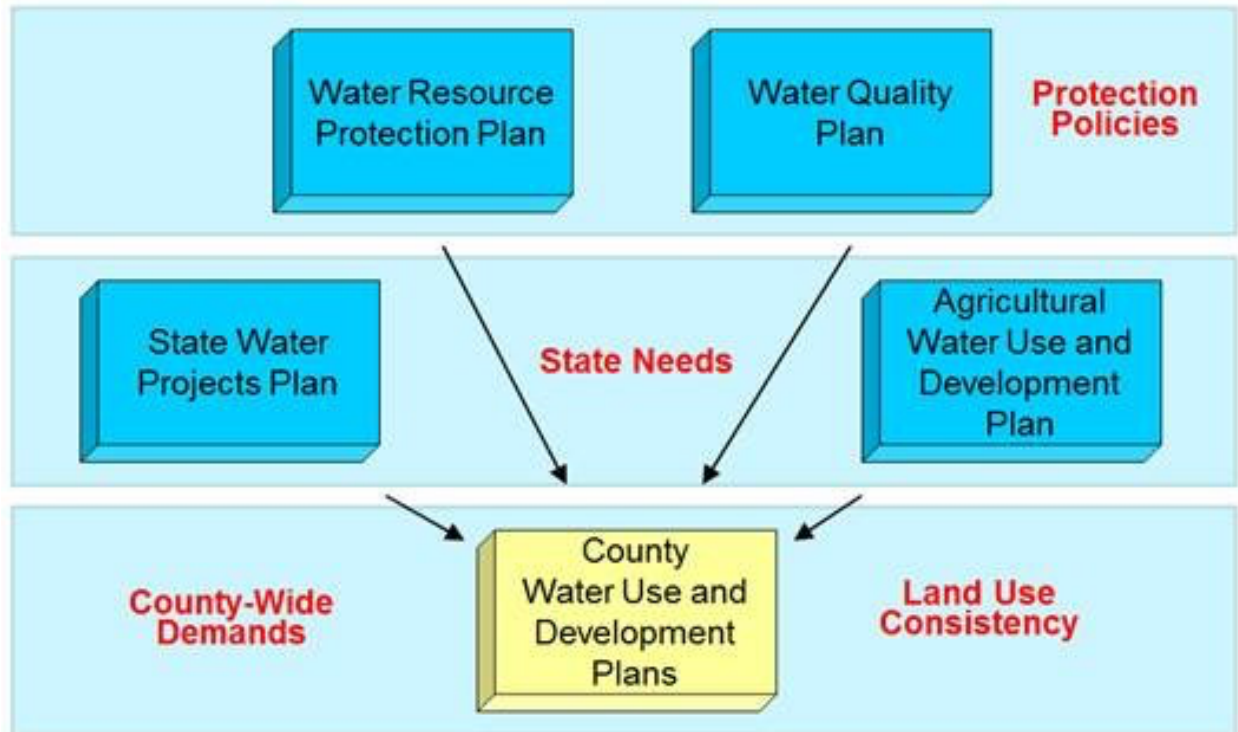


Figure 4-1: The water management regulatory structure in Hawaii

4.2 County Water Use and Development Plans

The statutory requirements for the County WUDPs include:

- Preparation of a WUDP that sets forth “the allocation of water to land use” in each county which shall be adopted by ordinance and submitted to the CWRM for approval and adoption.
- Requirement for periodic updates and modifications to the WUDP to maintain consistency with zoning and land use policies.
- Appropriate recognition of the current and future development needs of the Department of Hawaiian Home Lands (DHHL); and
- Preparation of “regional plans for water development including recommended and alternative plans, costs, adequacy of plans and relationship to water resource protection and quality plan.”

Central O‘ahu Sustainable Community Plan Vision and Policies

Vision:

- Preservation, conservation, and enhancement of community resources
- Protect open space outside the Community Growth Boundary from development
- Efficient use of all water supplies through conservation measures, distribution system leak repair, and reclaiming non-potable water from wastewater, where feasible

Policies:

- Protect prime watershed recharge areas and the Pearl Harbor potable aquifer which underlies the Central O‘ahu area
- Preserve natural gulches and ravines as drainageways and storm water retention areas
- Provide long range protection for prime agricultural lands and a sufficient water supply to meet diversified agricultural needs for Central O‘ahu
- Ensure adequacy of water supply before zoning approval of new residential or commercial developments
- Use of non-potable water for irrigation and other suitable uses to conserve the supply of potable water
- Protect water recharge areas above the 50-inch isohyet.

Central O‘ahu Watershed Preliminary Issues

- 1: Promote sustainable watersheds
 - Preserve and restore native forest areas
 - Enhance mitigation of invasive species
 - Promote resource conservation and low-impact development concepts
- 2: Protect and enhance water quality and quantity
 - Reduce sediment runoff into streams and the Pearl Harbor basin
 - Programs are needed to ensure land uses will not negatively impact water quality
 - Optimize pumpage to meet water system demands and avoid detrimental impact to the aquifer
 - Evaluate aquifer sustainable yields (SY) as allocations and pumpage approach SY limits
- 3: Protect Native Hawaiian rights and traditional and customary practices
 - Incorporate traditional Hawaiian values and cultural practices into the modern context
 - Plan for the enhancement of Native Hawaiian water rights and cultural and traditional uses
 - Develop partnerships to restore significant archaeological, cultural, and historic sites, including protecting and restoring the Pearl Harbor coastal, estuarine, and marine habitat
- 4: Facilitate public participation, education, and project implementation
 - Promote public participation in planning and implementation of watershed management projects and programs
 - Foster community-government partnerships to help with plan implementation
 - Increase public awareness and educational efforts regarding Central O‘ahu’s potable and non-potable water supply and demand
 - Establish watershed protection educational curriculum and programs on sustainability in area schools and organizations to educate future generations.
- 5: Meet future water demands at a reasonable cost
 - Explore options to diversify Central O‘ahu’s municipal water supply
 - Explore opportunities for using non-potable water for non-potable purposes (in lieu of using potable ground water)
 - Promote appropriate demand-side management programs
 - Maintain and improve BWS island-wide system reliability, adequacy, and efficiency

- Support alternate energy and/or energy efficiency projects to reduce conventional power generation costs for existing facilities
- Provide water for diversified agriculture.

The proposed action is consistent with the priorities expressed in the County Water Use Development Plan and regional plan. It does not increase the demand on groundwater resources. Kunia Village uses recycled water for irrigation and fire control.

4.3 Hawai'i State Policies Supporting Low-income Housing on Agricultural Land

The proposed well is needed to perpetuate affordable housing for farm workers that are near their area of employment.

HRS 226 “The Hawaii State Planning Act” was originally prepared in 1978. The purpose of this chapter was to prepare the Hawaii State Plan which serves as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State. The Hawaii State Plan was further divided into 12 functional plans that addressed the priority subjects. At the time The State Agriculture Functional Plan was prepared the State’s agricultural priorities addressed measures to support plantations. At that time the Plantation communities were thriving company towns which did not need preservation or much scrutiny from government at all. The functional plans do not directly address plantation communities or low-income housing, but the broader objectives contained in these plans are still quite relevant.

The objectives for agriculture that are outlined in HRS 226-7 include:

- (13) *Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency*
- (15) *Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.*
- (16) *Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.*

HRS 205-4.5 16 (e) States:

Notwithstanding any other provision in this chapter to the contrary, plantation community subdivisions as defined in this chapter shall be permitted uses within the Agriculture District, and Chapter 205-8 shall not apply.

Coastal Zone Management requirements are address in HRS 205A-2, which defines the entire State as being within the Coastal Zone. Of the 11 CZM initiatives the majority apply to coastal resources which are at its closest point 9 miles to the north near Kaiaka Bay, and 6 miles to the south at the West Loch of Pearl Harbor. Drainage flows to the south and enters West Loch via Waikele Stream. The proposed action is consistent with the remaining initiatives:

Cumulative and secondary impacts associated with stormwater and coastal non-point source pollution: The project will have minimal grading but has obtained an NPDES construction stormwater permit due to trenching for water lines. In addition, the community employs low maintenance landscaping techniques that do not rely on fertilizers. Best management practices are adopted by Village maintenance staff to reduce runoff from agricultural machinery and equipment.

Low impact Development: Plantation villages are among the original low-impact developments. Kunia Village is constrained in what it can change due to its historical nature, but little needs to be changed. Roadways are narrow, little pavement exists outside of the primary thoroughfares, lots are grassed and maintained, gulches are infrequently mowed to slow down stormwater and catch sediments. The wastewater treatment plant uses near R-1 treatment and disperses wastewater into a field growing hay.

Kunia Village is restricted to a small portion of land but perpetuates post-contact plantation lifestyle and values.

4.4 City and County Policies Supporting Affordable Housing on Agricultural Land

The Proposed 2013 **General Plan for Oahu** (DPP 2012) proposes overarching policies goals for O‘ahu. The proposed action is supported by the following policies:

Housing: Objective A: To ensure a wide range of housing opportunities, choices and prices for all residents.

Objective C: To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.

Objective C: To ensure the long-term viability and continued productivity of agriculture on Oahu

The proposed action supports the continued operation of affordable housing in proximity to employment. No municipal water supplies are available within a reasonable distance of Kunia Village by perpetuating the Plantation Camp models developed under Sugar and Pineapple industries.

The City revised its General Plan in 2021¹⁵. One of the planning studies commissioned for the Plan is the Affordable Housing Trend Report. It identifies four factors inhibiting the development of affordable housing in Hawai‘i:

- 1. Cost of production*
- 2. Development risk*
- 3. Maintenance cost, and*

¹⁵ [www.honolulu.gov/rep/site/dpp/pd/pd_docs/RES21-023_CD1 - 11-18-21_ZP.pdf](http://www.honolulu.gov/rep/site/dpp/pd/pd_docs/RES21-023_CD1_-_11-18-21_ZP.pdf)

4. Regulatory and infrastructure barriers

The report provides examples of regulatory and infrastructure barriers which include:

- *Lack of capacity and poor condition of existing infrastructure systems (e.g., sewer, drainage, water)*
- *Inappropriate development standards such as applying urban street standards in rural areas*
- *Inflexible building codes that require the use of expensive materials and building systems in low-rise housing units, and*
- *Zoning regulations that discourage redevelopment if the lot is small or nonconforming*

Kunia Village has experienced all four of the factors inhibiting development of affordable housing.

The **Central Oahu Sustainable Communities Plan** was adopted in 2002 with a planning horizon of 2025. The Plan's principals are valid, and the recommendations support the proposed action.

At the present time, neither Kunia nor Poamoho seem at risk of significant changes in operation or management. They are likely to be maintained, at least to minimum levels, for the foreseeable future. However, their long-term future currently depends on the future of pineapple production. The villages could also serve a function as affordable housing for workers from new diversified agricultural activities on lands along Kunia Road and north of Wahiawa.

Central Oahu's plantation era heritage and physical reminders of that period are important to preserve as the region becomes urbanized. The existing village structures in the two villages should be rehabilitated or adapted for reuse. Related affordable housing could be developed to support diversified agricultural employees.

PLANNING PRINCIPLES

Planning principles for the Kunia and Poamoho Plantation Villages include:

Historic Function and Character. *The existing rural forms and historic character exhibited within the villages should be preserved and enhanced. This includes the perpetuation of rural agriculture functions and activities in the surrounding area, in conjunction with village land uses.*

Preservation of Historic Structures. *Existing buildings of historical, cultural and/or architectural significance should be preserved.*

Housing Affordability. *Where feasible, existing housing units should be retained and rehabilitated in a manner which allows them to remain affordable to the existing residents.*

New Development Forms. *The design, visual appearance and placement of any new structures within or adjoining the existing villages, should reflect and complement their original*

historic character and forms.

The Central Oahu Sustainable Communities Plan contains land use designation maps in Appendix A of the document. Kunia Village is identified on the land use designation maps as agriculture or agriculture and preservation land. Although it is a residential community, Kunia Village is an agricultural community. Its residents are farm workers, many are still picked up by a bus owned by the farm, and some can walk to their farm lots within the ag parks adjacent to the Village. Kunia Village was designed by the plantation to allow farm workers a long-term stable and affordable housing within easy commute to the jobsite. This function is still intact.

The proposed action preserves and promotes agriculture by supporting affordable housing to farm workers, whose basic needs include clean drinking water. The commercial areas are all accessory to agriculture use. The proposed action is supported by Federal, State, and County policy declarations.

5.0 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Affected Environment	Level of Concern	Impact and Mitigation
Water Resources and Drainage	low	<i>Impact:</i> No new water demands. Potential stormwater runoff during construction <i>Mitigation:</i> NPDES permitting. BMPS in place prior to grading
Seismic and Geological	No	<i>None:</i> Test boring will increase understanding of the subsurface nonconformity.
Soils and Agriculture	No	Insignificant amount of agriculture land (4000 sf) utilized following construction
Flora and Fauna	No	<i>None:</i> Area is previously disturbed and dominated by invasive grasses
Air Quality	No	No emissions sources following construction
Visual Character	No	No significant changes from the existing conditions
Noise	Low	<i>Impact:</i> construction noise during business hours <i>Mitigation:</i> small scale construction. Work time is restricted to business hours.
Odor	No	None
Social	Positive	Improved living conditions due to uncontaminated drinking water.
Historical and Archaeological	Low	Site is not on historic registers. No known Archeological or historic resources. <i>Mitigation:</i> Identification of culturally sensitive artifacts and <i>Iwi</i> will stop the project
Economic	Positive	Reduces the cost of providing water.
Cultural	No	No traditional practices or important cultural sites identified
Public Facilities and Services	Positive	Clean and affordable water is an essential public requirement
Roads and Traffic	No	Two to four additional vehicles per day during construction.
Consistency with Govt. Plans and Policies	Consistent	No new water demand. Water management area(s) have sufficient sustainable yield
Irretrievable Commitment of Resources	Low	Proposed action requires public funds and use of fossil fuels

5.1 Determination of Significance

In determining whether an action may have a significant effect on the environment under HRS Chapter 11-200, the proponent must consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action.

An action shall be determined to have a significant effect on the environment if it:

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

The proposed action would not result in an irrevocable commitment, loss or destruction of any protected natural resource. No threatened or endangered species were identified within the development area. Previous archeological studies concluded that there is no evidence of traditional practices or cultural artifacts within the area of the proposed action. The proposed action does not increase the demand for groundwater resources but is likely to draw water from a different groundwater management area from which the water is drawn.

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

Kunia Village has been in this location for nearly 100 years and will continue in its function to provide affordable housing for Hawai'i's farm workers and their families. The proposed action will benefit agriculture and the farm families residing in the Village. Agriculture is a beneficial use of the environment. No new demands will be placed on groundwater resources.

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

Plantation communities are protected by state statutes and city ordinances and are supported by planning documents at all levels of the government. The proposed action is consistent with the County General Plan, and the Central Oahu Functional Plans.

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

The proposed action has beneficial impacts on the social and economic welfare of the County and State. The objective of the proposed action is to provide clean drinking water to those who work in agriculture.

5. *Substantially affects public health;*

Public facilities and services are adequate to manage existing and planned water demands within Kunia Village. The proposed action benefits public health by providing drinking water to area residents.

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

Secondary impacts are defined as those displaced in time or space from the proposed action, yet resulting directly from the action. No population changes or increased use of groundwater resources resulting from the proposed action are anticipated.

7. Involves a substantial degradation of environmental quality;

Temporary impacts associated with construction will be mitigated through best management practices. Noise and fugitive dust are not expected to be substantial or lasting. During operations the level of use is not expected to result in degradation of the quality of life or the environment within the community.

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

Provision of farm-worker housing supports local agriculture and exerts positive impacts on the State's health and balance of trade. No commitment for larger actions is required.

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

The US Fish and Wildlife Service (June 2009) did not identify any special-status species or critical habitats located on the subject property. An IPAC assessment (June 2024) also did not anticipate impacts on special status species.

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

Temporary impacts associated with construction will be small and mitigated through best management practices. During operations there are no sources of regulated emissions or noise. The proposed action is not expected to result in degradation of the quality of life or the environment within the community

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

The project site is not within flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. It is within a traditionally used agricultural area. Land disturbance over more than 100 years has defined the biological communities that are present. These traditional farmlands are not normally considered environmentally sensitive areas.

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

The scenic vistas and unique view planes, and unique community character will not be affected by the proposed action.

13. Requires substantial energy consumption.

The proposed project will require fossil fuel consumption during construction and will not increase electrical power consumption during operation. The quantities of both sources are minimal by community standards and these services are available using existing infrastructure.

Based on analysis of the 13 significance criteria listed above, the proposed action is not expected to result in significant adverse environmental impacts when conducted within the constraints of the required plans and permits. Comments received from the public and various agencies during this DEA review period will be considered in formulating the final conclusion of this assessment. Pending review of comments received from agencies and interested parties the proponent anticipates reaching a finding of No Significant Impact.

6.0 COMMENTS AND COORDINATION

6.1 Agencies and Organizations Contacted

The following agencies were contacted for assistance during preparation of the Draft Environmental Assessment.

City and County of Honolulu

Department of Planning and Permitting
Honolulu Board of Water Supply
Department of Design and Construction
Department of Environmental Services
Wahiawa Neighborhood Board
North Shore Neighborhood Board

State of Hawai‘i

Hawai‘i DBEDT Office of Planning
Hawai‘i Office of Planning and Sustainable Development
DLNR State Historical Preservation Office: DLNR.Intake.SHPD@hawaii.gov
DHHL: dhhl@hawaii.gov
OHA: info@oha.org
CWRM: dlnr.cwrn@hawaii.gov, ryan.r.imata@hawaii.gov

United States

US Fish and Wildlife Service Pacific Islands: pifwo_admin@fws.gov
US EPA Region 9: r9.info@epa.gov, dugan.nicholas@epa.gov

Representatives

Kunia Representative: repperruso@capitol.hawaii.gov
Kunia Senator: senawa@capitol.hawaii.gov

Interested Parties

KVDC Board of Directors: tpacheco@harc-hspa.com
Jennifer Hernando: jennifer.hernando@gmail.com
Marina Marcelli: MMarcelli@haleyaldrich.com

6.2 Public Coordination and Individuals Consulted

The following individuals and public interest groups were contacted for assistance during preparation of the Environmental Assessment.

Tom Nance Water Resources Engineering: Tom Nance and Greg Fukumitsu
Kunia Village residents
50 Hawaiian organizations, agencies, and community members.

6.3 Comments Received from Agencies and Interested parties

Department of Planning and Permitting
State historic Preservation Division (permit applications)
US Fish and Wildlife
Office of Planning and Sustainable Development
Environmental Protection Agency Region 9
Standard comments were reviewed from the Department of Health
Clean Water Branch and Safe Drinking Water Branch
Civil Beat
Hawaii News Now
Commission on Water Resources Management

Copies of the comments and responses are included in Appendix A

7.0 LIST OF DOCUMENT PREPARERS

This document was prepared under the direction of the Department of Health Safe Drinking Water Branch State of Hawai‘i. Document preparation and technical research was done by:

North Shore Consultants, LLC: David Robichaux, Principal
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Kunia Water Association: Alan Gottlieb, Bonnie Gottlieb, Shane Lee
Jennifer Hernando, Hydrogeologist
Kunia Village Title Holding Corporation: Stephanie Whalen, President
Hawaii Agriculture Research Center: Alice Tupou, Vice President

The authors of this document wish to thank the following for their valuable knowledge, contributions and advice:

Dietrix Jon Ulukoa Duhaylonsod, Ka‘uikiokapō
William Kahula O’Brien
Ryan Imata, Commission on Water Resources Management
Judy Hayducsko, Hawai‘i Department of Health
Robert Whittier, Hawai‘i Department of Health
Tom Nance, Tom Nance Water Resources Engineering
Greg Fukumitsu, Tom Nance Water Resources Engineering

Appendices

Appendix A: Comments/responses received during preparation of the Environmental Assessment

Appendix B: Ka Pa`akai Analysis

Appendix C : Archeological Inventory Survey (AIS)

Appendix D: Groundwater Numerical Flow Model Analysis

Appendix E: US FWS Special Status Species List

Appendix F: SDS sheets for foaming additives

Appendix A

Comments and Responses During Preparation of the Documents

Safe Drinking Water Branch

Standard Comments

April 10, 2012

Safe Drinking Water Branch

The Safe Drinking Water Branch administers programs in the areas of: 1) public water systems; 2) underground injection control; and 3) groundwater protection. Our general comments on projects are as follows.

Public Water Systems

- Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with Hawaii Administrative Rules, Title 11, Chapter 20, titled Rules Relating to Public Water Systems.
- All new public water systems are required to demonstrate and meet minimum capacity requirements prior to their establishment. This requirement involves demonstration that the system will have satisfactory technical, managerial and financial capacity to enable the system to comply with safe drinking water standards and requirements.
- Projects that propose development of new sources of potable water serving or proposed to serve a public water system must comply with the terms of Section 11-20-29 of Chapter 20. This section requires that all new public water system sources be approved by the Director of Health prior to its use. Such approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.
- The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the State of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.
- All sources of public water systems must undergo a source water assessment which will delineate a source water protection area. This process is preliminary to the creation of a source water protection plan for that source and activities which will take place to protect the source of drinking water.
- Projects proposing to develop new public water systems or proposing substantial modifications to existing public water systems must receive approval by the Director of Health prior to construction of the proposed system or modification. These projects include treatment, storage and distribution systems of public water systems. The approval authority for projects owned and operated by a County Board or Department of Water or Water Supply has been delegated to them.
- All public water systems must be operated by certified distribution system and water treatment plant operators as defined by Hawaii Administrative Rules, Title 11, Chapter 11-25 titled; Rules Relating to Certification of Public Water System Operators.
- All projects which propose the use of dual water systems or the use of a non-potable water system in proximity to an existing potable water system to meet irrigation or other needs must be carefully designed and operated to prevent the cross-connection of these systems and prevent the possibility of backflow of water from the non-potable system to the potable system. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow prevention devices to avoid

contaminating the potable water supply. In addition backflow devices must be tested periodically to assure their proper operation. Further, all non-potable spigots and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption on non-potable water. Compliance with Hawaii Administrative Rules, Title 11, Chapter 11-21 titled; Cross-Connection and Backflow Control is also required.

- All projects which propose the establishment of a potentially contaminating activity (as identified in the Hawai'i Source Water Assessment Plan) within the source water protection area of an existing source of water for a public water supply should address this potential and activities that will be implemented to prevent or reduce the potential for contamination of the drinking water source.
- For further information concerning the application of capacity, new source approval, operator certification, source water assessment, backflow/cross-connection prevention or other public water system programs, please contact the Safe Drinking Water Branch at 586-4258.

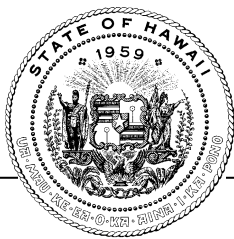
Underground Injection Control (UIC)

- Injection wells used for the subsurface disposal of wastewater, sewage effluent, or surface runoff are subject to environmental regulation and permitting under Hawai'i Administrative Rules, Title 11, Chapter 11-23, titled Underground Injection Control (UIC). The Department of Health's approval must be first obtained before any injection well construction commences. A UIC permit must be issued before any injection well operation occurs.
- Authorization to use an injection well is granted when a UIC permit is issued to the injection well facility. The UIC permit contains discharge and operation limitations, monitoring and reporting requirements, and other facility management and operational conditions. A complete UIC permit application form is needed to apply for a UIC permit.
- A UIC permit can have a valid duration of up to five years. Permit renewal is needed to keep an expiring permit valid for another term.

For further information about the UIC permit and the Underground Injection Control Program, please contact the UIC staff of the Safe Drinking Water Branch at 586-4258.

Groundwater Protection Program

- Projects that propose to develop a golf course are asked to use the Guidelines Applicable to Golf Courses in Hawai'i (Version 6) in order to address certain groundwater protection concerns, as well as other environmental concerns.



**STATE OF HAWAII
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT**

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DTS202511181340MO

Coastal Zone
Management Program

Environmental Review
Program

Land Use Commission

Land Use Division

Special Plans Branch

State Transit-Oriented
Development

Statewide Geographic
Information System

Statewide Sustainability
Branch

December 12, 2025

Mr. David M. Robichaux, Principal
North Shore Consultants, LLC
66-031 Mahaulu Lane
Haleiwa, HI 96712

Dear Mr. Robichaux:

Subject: Draft Environmental Assessment for Kunia Village Potable Water
Source Well, 91-1700 Kunia Road, Ewa District, Central O'ahu; Tax
Map Key (1) 9-2-005: 023

The Office of Planning and Sustainable Development (OPSD) is in receipt of your review request, received November 18, 2025, on the Draft Environmental Assessment (EA) for the proposed installation and operation of a new groundwater well to supply the drinking water for Kunia Village, Ewa District, Central O'ahu.

Kunia Village is within the State Agricultural District and is zoned restricted Agriculture (AG-1) by the City and County of Honolulu. The Village is located outside the county designated Special Management Area, set forth in the Hawai'i Coastal Zone Management Law.

The proposed well will drill through the Waipahu-Waiawa Aquifer System and draw from the Ewa-Kunia Aquifer System below. The new well will replace the existing source, one mile north of the Village, that was detected to have Per- and Polyfluoroalkyl Substances (PFAS) contamination.

The proposed action does not involve new demand for groundwater resources, but only a change from the Wahiawa Aquifer System to the Ewa-Kunia Aquifer System as its source. A Groundwater Use Permit and water allocation of 150,000 gallons per day will be requested from the Ewa-Kunia Aquifer System. The existing water allocation from the Wahiawa Aquifer System would be reduced accordingly by the same amount.

The proposed well is located outside the Historic District designated in the State Register of Historic Places. No archaeological resources have been recorded or observed within or near the well site boundaries.

[Environment](#)

A Deep Well May Bring Kunia Village's Toxic Water Legacy To An End

The former Del Monte pineapple plantation camp's water sources have been tainted by forever chemicals and crop fumigants.

By [Thomas Heaton](#) / October 30, 2025

For the first time in decades, Kunia Village may have a longterm source of reliable drinking water not tainted by toxic chemicals used at the former pineapple plantation camp.

State engineers have signed off on plans to drill down into the island — through one aquifer and a layer of bedrock — to reach the presumably clean underlying body of water at about 1,175 feet deep.

The plan comes almost three years after PFAS, known as forever chemicals, were found in the former Del Monte plantation camp's drinking supply, marking the third time the village's water supply was tainted since it was built in the early-1900s.



Kunia Camp has relied on a water treatment center to remove PFAS from its water supply. (Kevin Fujii/Civil Beat/2025)

Kunia Village Development Corp. still needs to jump through a few more regulatory hoops to start drilling and figure out where it will dispose of everything it dredges up in the drilling process. But the multimillion-dollar project, made possible with federal funding from the Bipartisan Infrastructure Law, is an encouraging development for longtime community members.

“We’ll have a perfectly good water system for the first time probably in 50 years,” said Stephanie Whalen, village corporation president. “It will be great for the community to be independent.”

The state Safe Drinking Water Branch has signed off on project, having found there will not be any significant impacts associated with drilling a new well for approximately 500 residents. The project’s environmental review is open to public comment until Nov. 24.

Whalen is hoping the project will secure the additional permits it needs, including an OK from the Commission on Water Resource Management, as soon as December so it can start drilling in February.

“There will be some bumps along the road,” Whalen said. “As always.”



Kunia Village President Stephanie Whalen hopes the new drinking water source will be operational midway through 2026. (Cory Lum/Civil Beat/2021) Per- and polyfluoroalkyl substances, known as PFAS, have been found throughout the state, often associated with military installations and landfill sites. They continue to be found in several state water sources — most recently on the [Big Island, in a well that provides water to Pepe'ekeo](#) — as [the state Department of Health ramps up testing statewide](#).

The new Kunia site will draw up to 150,000 gallons of water from the 'Ewa-Kunia aquifer, unlike the previous well which was sourced from the Wahiawā

aquifer that was found to be contaminated with PFAS. The 'Ewa-Kunia aquifer is deeper, going below the Waipahu-Wahiawa aquifer, and less likely to be contaminated, said Judy Hayducsko, an environmental engineer with the state Safe Drinking Water Branch.

The drilling work is complicated, however, because the pipeline will have to be sealed to prevent cross-contamination between the stacked underwater bodies of freshwater.

PFAS — found in water, soil, food and produce — can be absorbed through irrigation and has been the target of recent legislative efforts to mitigate the products' impacts. Last year, a law preventing the use of certain plastics and firefighting foams was put into force to mitigate the spread.

Other toxic chemicals are also a concern in the area, such as pesticides.

History Of Contamination

Hawai'i's sugar and pineapple plantations have a [legacy of environmental degradation](#), predominantly due to water diversions and heavy pesticide usage, including throughout Kunia.

Lawmakers recognized the prolific agricultural region this year as part of a state resolution encouraging the Department of Agriculture and Biosecurity to [prioritize projects in the area](#).

There have been three instances where the village's water has been tainted. In 1977, its water source and soils were poisoned after a 500-gallon spill of toxic pesticides near its main water supply where Del Monte stored drums of pineapple fumigants. Three years later, the state found fumigants in the soil

and water, and Del Monte stopped using the well for drinking water and non-crop irrigation.



Kunia Camp was built to house Del Monte plantation workers, some of whom continue to live in the neighborhood post-retirement, while it is now affordable housing for farm workers in other areas. (Kevin Fujii/Civil Beat/2025)

Then in 1994, the well was shuttered when the land was added to the U.S. Environmental Protection Agency's list of most contaminated sites nationwide after industrial solvents were found in 1986.

PFAS were discovered in one of two remaining wells in early-2023. The state advised concerned villagers that home water filtration systems would help reduce the presence of PFAS, but said no action was necessary until the remaining village well was found to be contaminated.

For three months, [the community survived on bottled water](#). A treatment system was later installed on one of the wells, which filters the PFAS and continues to supply the village. That well will continue to be used as a contingency for the new well, and to water crops, Hayducsko said.

Read More

Kunia Village sits close to 4,000 acres of state-designated Important Agricultural Lands. That includes Sugar Land Farms, one of the state's most productive operations, the Hawai'i Agriculture Research Center and Kō Hana Distillers, as well as land for the proposed new slaughterhouse and other key agricultural facilities, including a yet-to-be-developed [state agriculture park](#).

It is also home to the Hawai'i Farm Bureau, whose executive director Brian Miyamoto is among many hoping to keep the ag corridor in active production. That would help ensure the Kunia housing remains affordable.

Future Plans

Kunia Village's new well water will be stored, filtered and run through a state-of-the-art water system to be completed in mid-2026 at the earliest.

That project was also funded by the [Bipartisan Infrastructure Law](#), which has allocated more than \$30 million to the state health department to help mitigate the impacts of emerging contaminants such as PFAS and other manmade toxins.

Drilling the well and testing the water is not expected to happen quickly, Hayducsko said. The drilling process alone will take about 20 weeks. The water will then need to be tested for a long list of elements, from [iron and radionuclides to PFAS](#), before the go-ahead is given to drink it.

The water will likely be found clean, Hayducsko said, given the depths it will come from — a precaution required by the Environmental Protection Agency.

Whalen and Hayducsko hope they can finish the environmental review process fast enough to get on the Commission on Water Resource Management's December agenda to stay on schedule while obtaining other necessary permits.

For Whalen, it's all worth the wait to finally be self-reliant with a clean source of drinking water.

Comments are now closed on this story. Mahalo!

Neuro

Excellent article!

E_lectric

We'll see.

From "Charlie Wilson's War" (movie) about the Zen master and the little boy.

Phil_Teredego

Aloha Civil Beat — solid writing. Writing Intensive Prof? BS in Plumbing Tech? Yet this story plays too polite while the poison runs deep. We keep hearing “drill deeper,” but nobody asks who poisoned the shallows. PFAS and fumigants didn't appear by magic; they came from the same agribusiness and military operations that have treated Kunia as expendable for decades. Monsanto still leases large pieces of that land, yet not one line examines how ongoing pesticide and runoff practices might keep contaminating the aquifers we're about to tap again. The community has lived through three generations of “temporary fixes” and bottled-water promises. Where are the resident voices, the health data, the accountability for those who profited from pollution? Independence isn't drilling another hole; it's breaking the cycle of corporate contamination dressed up as progress. Hawai'i deserves journalism that doesn't just quote the engineers and funders — but the families still drinking from the tap. Nice write-up, but accountability isn't plumbing. Civil Beat says *News that Matters*. What's the matter, truly?

Uncle

This sounds like a terrible idea. Why take the risk of introducing PFAs into the deep aquifer?

Manoafolk

Why isn't Ann Lopez going after Del Monte for these costs? She seems to spend too much time on mainland issues that could be prevented by our two Senators. How quickly will this new aquifer be recharged?



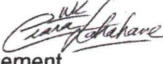
STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII'
DEPARTMENT OF LAND AND NATURAL RESOURCES | KA 'OIHANA KUMUWAIWAI 'ĀINA
COMMISSION ON WATER RESOURCE MANAGEMENT | KE KAHUWAI PONO
P.O. BOX 621
HONOLULU, HAWAII 96809

CIARA W.K. KAHANE
DEPUTY DIRECTOR

Dec 16, 2025

REF: RFD.6572.3

TO: David M. Robichaux, Principal
North Shore Consultants LLC

FROM: Ciara W.K. Kahane, Deputy Director 
Commission on Water Resource Management

SUBJECT: Proposed installation and operation of a new groundwater well to supply the drinking water

FILE NO.: RFD.6572.3
TMK NO.: (1) 9-2-005:023

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

Our comments related to water resources are checked off below.

- ☒ 1. We recommend coordination with the county to incorporate this project into the next update of the county's Water Use and Development Plan (WUDP). 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 of Hawai'i, Department of Land and Natural Resources (DLNR) to incorporate this project into the next update of the State Water Projects Plan (SWPP).
- ☐ 3. We recommend coordination with the State of Hawai'i, Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the associated agricultural water demands into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information at <https://hdoa.hawaii.gov/contact/>.
- ☐ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the project to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at <http://www.usgbc.org/leed>. A listing of fixtures certified by the EAP as having high water efficiency can be found at <http://www.epa.gov/watersense>.
- ☒ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project on the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at <http://planning.hawaii.gov/czm/initiatives/low-impact-development/>.
- ☒ 6. We recommend the use of alternative water sources, wherever practicable.
- ☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at <http://energy.hawaii.gov/green-business-program>.
- ☐ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawai'i. These practices can be found online at

<https://hawaiiscape.com/index.php>. Additional information can be found at <https://dlnr.hawaii.gov/cwrmp/planning/conservation/>.

- ☒ 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 (HDOH) and the acceptance of any resulting requirements related to water quality.
- ☒ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- ☐ 11. The Hawai'i Water Plan is directed toward the achievement of the utilization of reclaimed water for uses other than drinking and for potable water needs in one hundred per cent of State and County facilities by December 31, 2045 (§174C-31(g)(6), Hawaii Revised Statutes). We strongly recommend that this project consider using reclaimed water for its non-potable water needs, such as irrigation. Reclaimed water may include, but is not limited to, recycled wastewater, gray water, and captured rainwater/stormwater. Please contact the Hawai'i Department of Health, Wastewater Branch, for more information on their reuse guidelines and the availability of reclaimed water in the project area. Contact information can be found at <https://health.hawaii.gov/about/contact/>.
- ☒ 12. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.
- ☒ 13. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- ☐ 14. 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.
- ☐ 15. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- ☐ 16. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.
- ☐ 17. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- ☐ 18. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- ☐ 19. 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 by CWRM, or whether there are potential impacts to water resources.
- ☐ 20. The proposed water source(s) and projected water demands for the project, both potable and non-potable, should be identified. If the project will be provided water by a local water system we recommend consultation with them to ensure that system capacity is available to supply water for this project.
- ☒ OTHER: Planning -
The proposed well is located in a water management area. The development of a new source well from an existing off-site well will require a water use permit. Coordination with the existing HBWS watershed management plan in the area is recommended.

Groundwater -

Impacts to ground water dependent ecosystems are becoming an emerging issue as impacts to these are related to impacts to traditional & customary practices of sustenance from these ecosystems. We recommend consultation with the region's (moku) Aha Moku Council on whether a land use conversion or project that uses water will impact any traditional & customary practices.

If you have any questions, please contact Ryan Imata of the Groundwater Regulation Branch at (808) 587-0225 or Katie Roth of the Planning Branch (808) 587-0216.

From: David Robichaux robichaud001@hawaii.rr.com
Subject: Re: Kunia Village DEA - DPP Comments
Date: November 25, 2025 at 10:16 AM
To: Beatty, Alexander D abeatty@honolulu.gov

DR

Thanks Alex: We will expand the description of entitlements for the property.

Dave

On Nov 25, 2025, at 9:38 AM, Beatty, Alexander D <abeatty@honolulu.gov> wrote:

Hello Dave,

Regarding the subject project, we have no substantive comments.

Please make sure the Final EA adequately discloses the unit land use and entitlement situation, including references to the Resolution approving the 201H Project and the subsequent modifications.

ALEX D. BEATTY
URBAN DESIGN BRANCH
DEPARTMENT OF PLANNING AND PERMITTING
650 SOUTH KING STREET, 7TH FLOOR
HONOLULU, HAWAII 96813
PHONE: (808) 768-8032

JOSH GREEN, M.D.
GOVERNOR OF HAWAII
KE KIA'AINA O KA MOKU'AINA 'O HAWAII



KENNETH S. FINK, MD, MGA, MPH
DIRECTOR OF HEALTH
KALUNA HO'OLELE

STATE OF HAWAII
DEPARTMENT OF HEALTH
KA 'OIHANA OLAKINO
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File.

07016CMHK.23

July 28, 2023

MEMORANDUM

SUBJECT: Clean Water Branch Standard Project Comments

TO: Agencies and Project Owners

FROM: DARRYL LUM, P.E., CHIEF *Darryl Lum*
Clean Water Branch

This memo is provided for your information and sharing. You are encouraged to share this memo with your project partners, team members, and appropriate personnel.

The Department of Health (DOH), Clean Water Branch (CWB) will no longer be responding directly to requests for comments on the following documents (Pre-consultation, Early Consultation, Preparation Notice, Draft, Final, Addendums, and/or Supplements):

- Environmental Impact Statements (EIS)
- Environmental Assessments (EA)
- Stream Channel Alteration Permits (SCAP)
- Stream Diversion Works Permits (SDWP)
- Well Construction/Pump Installation Permits
- Conservation District Use Applications (CDUA)
- Special Management Area Permits (SMAP)
- Shoreline Setback Areas (SSA)

For agencies or project owners requiring DOH-CWB comments for one or more of these documents, please utilize the DOH-CWB Standard Comments below regarding your project's responsibilities to maintain water quality and any necessary permitting. DOH-CWB Standard Comments are also available on the DOH-CWB website located at: <http://health.hawaii.gov/cwb/>.

DOH-CWB Standard Comments

The following information is for agencies and/or project owners who are seeking comments regarding environmental compliance for their projects with the Hawaii Administrative Rules (HAR), Chapters 11-53, 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program.

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 point source water pollutant discharges into State surface waters (HAR, Chapter 11-55). Point source means any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee (\$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.

The DOH, Environmental Health Administration (EHA) e-Permitting Portal received Cross-Media Electronic Reporting Rule (CROMERR) certification by the Environmental Protection Agency (EPA) for electronic signature. Currently, Applicants and Permittees may now certify and submit EHA Electronic Signature Forms electronically through the EHA e-Permitting Portal without the need to physically send in an ink signature and CD/DVD/flash drive.

Beginning January 31, 2023, the DOH-CWB will only utilize electronic signature e-Permitting forms and discontinue the hard-copy signature forms. All hard-copy signature certification e-Permitting forms, including compliance forms, will be inactivated.

The electronic signature forms will require electronic signature approval to submit a form to the CWB. For details on how to obtain the electronic signature approval please visit CWB website located at:

<https://health.hawaii.gov/cwb/announcements/cwb-announces-new-requirement-for-electronic-signature-approval-for-all-submissions-beginning-january-31-2023/>.

The NPDES NOI or application will be processed after the filing fees submitted and payable to the "State of Hawaii" in the form of a pre-printed check, cashier's check, money order, or as otherwise specified by the director is received by the CWB.

Some of the activities requiring NPDES permit coverage include, but, are not limited to:

a. Discharges of Storm Water.

- i. For Construction Activities Disturbing One (1) or More Acres of Total Land Area.

By HAR Chapter 11-55, an NPDES permit is required before the start of the construction activities that result in the disturbance of one (1) or more acres of total land area, including clearing, grading, and excavation. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale.

- ii. For Industrial Activities for facilities with primary Standard Industrial Classification (SIC) Codes regulated in the Code of Federal Regulations (CFR) at 40 CFR 122.26(b)(14)(i) through (ix) and (xi). If a facility has more than one SIC code, the activity that generates the greatest revenue is the primary SIC code. If revenue information is unavailable, use the SIC code for the activity with the most employees. If employee information is also unavailable, use the SIC code for the activity with the greatest production.
- iii. From a small Municipal Separate Storm Sewer System (along with certain non-storm water discharges).

- b. Discharges to State surface waters from construction activity hydrotesting or dewatering.
- c. Discharges to State surface waters from cooling water applications.
- d. Discharges to State surface waters from the application of pesticides (including insecticides, herbicides, fungicides, rodenticides, and various other substances to control pest) to State waters.
- e. Well-Drilling Activities.

Any discharge to State surface waters of treated process wastewater effluent associated with well drilling activities is regulated by HAR Chapter 11-55. Discharges of treated process wastewater effluent (including well drilling slurries, lubricating fluids wastewater, and well purge wastewater) to State surface waters requires NPDES permit coverage.

NPDES permit coverage is not required for well pump testing. For well pump testing, the discharger shall take all measures necessary to prevent the discharge of pollutants from entering State waters. Such measures shall include, if necessary, containment of initial discharge until the discharge is essentially free of pollutants. If the discharge is entering a stream or river bed, best management practices (BMPs) shall be implemented to prevent the discharge from disturbing the clarity of the receiving water. If the discharge is entering a storm drain, the discharger must obtain written permission from the owner of the storm drain prior to discharge. Furthermore, BMPs shall be implemented to prevent the discharge from collecting sediments and other pollutants prior to entering the storm drain.

- 3. A Section 401 Water Quality Certification (WQC) may be required if your project/activity:
 - a. Requires a federal license or permit; and
 - b. May result in a discharge into waters of the United States (WOTUS).

"License or permit" means any permit, certificate, approval, registration, charter, membership, statutory exemption, or other form of permission granted by an agency of the federal government to conduct any activity which may result in any discharge.

The term "discharge" is defined in Clean Water Act, Subsections 502(16), 502(12), and 502(6).

Examples of "discharge" include, but are not limited to, allowing the following pollutants to enter WOTUS from the surface, or in-water: solid waste, rock/sand/dirt, heat, sewage, construction debris, any underwater work, chemicals, fugitive dust/spray paint, agricultural wastes, biological materials, industrial wastes, concrete/sealant/epoxy, and washing/cleaning effluent.

Determine if your project/activity requires a federal permit, license, certificate, approval, registration, or statutory exemption by contacting the appropriate federal agencies (e.g. Department of the Army (DA), U.S. Army Corps of Engineers (COE), Pacific Ocean Division Honolulu District Office (POH) Tel: (808) 835-4303; U.S. Environmental Protection Agency, Region 9 Tel: (415) 947-8021; Federal Energy Regulatory Commission Tel: (866) 208-3372; U.S. Coast Guard Office of Bridge Programs Tel: (202) 372-1511). If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the COE-POH regarding their DA permitting requirements.

To request an individual Section 401 WQC, you must complete and submit the Section 401 WQC application together with \$1,000 filing fee made payable to the "State of Hawaii" in the form of a check or other method specified by the department. This application is available on the e-Permitting Portal website located at: <https://eha-cloud.doh.hawaii.gov/epermit/>.

The processing of a Section 401 WQC application will begin after the CWB has received filing fee. The processing of a Section 401 WQC application is also subject to the compliance with 40 CFR §121 requirements.

Beginning January 31, 2023, the DOH-CWB will only utilize electronic signature e-Permitting forms and discontinue the hard-copy signature forms. All hard-copy signature certification e-Permitting forms, including compliance forms, will be inactivated.

The electronic signature forms will require electronic signature approval to submit a form to the CWB. For details on how to obtain the electronic signature approval please visit CWB website located at: <https://health.hawaii.gov/cwb/announcements/cwb-announces-new-requirement-for-electronic-signature-approval-for-all-submissions-beginning-january-31-2023/>.

Please see HAR, Chapters 11-53 and 11-54 for the State's Water Quality Standards and for more information on the Section 401 WQC. HAR, Chapters 11-53 and 11-54 are available on the CWB website at: <http://health.hawaii.gov/cwb/>.

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, Chapters 11-53 and 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of \$25,000 per day per violation and up to two (2) years in jail.
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. Consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.



REGION 9

SAN FRANCISCO, CA 94105

May 23, 2025

Ms. Stephanie Whalen
President
Kunia Village Title Holding Corp. and Kunia Village Development Corp.
P.O. Box 100
Kunia, Hawaii 96759

Dear Ms. Whalen:

EPA Region 9 received a request from the Kunia Village Development Corporation for prior written approval to apply for a water use permit to drill a new drinking water well at the Del Monte Corporation (Oahu Plantation) Superfund Site ("Site") in Oahu, Hawaii. Based on EPA Region 9's technical analysis, it is granting prior written approval to Kunia Village Development Corporation to apply for a state water use permit.

Del Monte Corporation (Oahu Plantation) Superfund Site Institutional Controls

EPA finalized a Record of Decision on September 25, 2003, selecting a remedy for the Site which requires, among other actions, that institutional controls be implemented to prevent activities that interfere with the effectiveness of the remedy and the installation of drinking water supply wells in the plume.¹ EPA entered into a Consent Decree with James Campbell Company LLC on September 18, 2007, pursuant to which James Campbell Company LLC agreed to execute and record a Declaration of Environmental Restrictions for the "part of the Site where contaminants from releases at or from the Site may exceed maximum contaminant levels in the basal groundwater," also known as the Well Restriction Area.² A Declaration of Environmental Restrictions (Well Restriction Area) was recorded on November 2, 2007, in the Land Court of the State of Hawaii and in the Bureau of Conveyances. Pursuant to the Declaration of Environmental Restrictions (Well Restriction Area):

No application for a water use permit to withdraw water from any well located or to be located in the Well Restriction Area shall be filed by any owner, lessee, licensee, or other occupant or user of such property (collectively "Occupant"), absent prior written approval of the EPA, which approval shall be granted if such withdrawal would not interfere with the Remedy for the Basal Aquifer and/or cause exposure to basal groundwater impacted by Site contaminants.³

¹ Del Monte Corporation (Oahu Plantation) Superfund Site Record of Decision, II-11-7 (Sept. 25, 2003).

² James Campbell Company LLC Consent Decree, §§ 3, 19, Appendix B (Sept. 18, 2007).

³ Declaration of Environmental Restrictions (Well Restriction Area), § 2a (Nov. 2, 2007).

Kunia Village Development Corporation's Proposed New Drinking Water Well

Kunia Village Development Corporation's proposed new drinking water well location (see Proposed Well Location in Figure 1) lies within the Well Restriction Area designated in the Declaration of Environmental Restrictions (Well Restriction Area). The Kunia Village Title Holding Corporation, 501(c)(2), owns the surface and subsurface rights for the proposed new drinking water well location. The Kunia Village Development Corporation, 501(c)(3), would be the applicant for the proposed new drinking water well. EPA Region 9's Superfund and Emergency Management and Water Divisions have been communicating with the Kunia Village Development Corporation and Hawaii Department of Health ("HDOH") regarding the proposed new drinking water well.

EPA Region 9's Prior Written Approval for the Kunia Village Development Corporation to Apply for a State Water Use Permit

Prior to applying for a state water use permit to withdraw water from a well located or to be located in the Well Restriction Area, an applicant must secure prior written approval from EPA. Following submittal, the application shall be approved only if the withdrawal will not interfere with the remedy for the basal aquifer and/or cause exposure to basal groundwater impacted by Site contaminants.

Based on the information currently available about the basal aquifer and the Kunia Village Development Corporation's proposed new drinking water well, EPA Region 9 does not anticipate that the proposed new drinking water well will interfere with the remedy for the basal aquifer or cause exposure to basal groundwater impacted by Site contaminants, so EPA Region 9 is providing prior written approval for the Kunia Village Development Corporation to apply for a state water use permit.

To reach its decision to issue prior written approval to the Kunia Village Development Corporation to apply for a state water use permit for the proposed new drinking water well, EPA Region 9 conducted modeling using specific assumptions about hydraulic properties of the aquifer, including that the saprolite layer is continuous, and limited water quality data from the lower Waianae basalts. The modeling was conducted specifically for Proposed Well Location (see Figure 1) and also assumed that the pumping rate of the proposed new drinking water well will not exceed 500 gallons per minute ("gpm"). Based on this modeling, if the proposed new drinking water well is completed below the saprolite layer and the borehole is sealed across hydrostratigraphic units, EPA Region 9 does not anticipate that the proposed drinking water well will impact the remedy for the basal aquifer. If additional pumping is proposed beyond 500 gpm, drilling observations indicate an absence of the saprolite, or if the Proposed Well Location changes, the modeling results and EPA Region 9's analysis may differ. EPA Region 9 also does not anticipate the proposed drinking water well will cause exposure to basal groundwater impacted by Site contaminants because it assumes that point-source treatment will be implemented and HDOH will monitor the treatment.

Although EPA Region 9 is providing approval for the Kunia Village Development Corporation to submit an application for a state water use permit, EPA is requesting additional information throughout the permitting process for the proposed drinking water well to ensure that the well will not interfere with the remedy for the basal aquifer or cause exposure to basal groundwater impacted by Site

contaminants. Please continue to keep EPA Region 9 involved as the permitting process progresses. If you have any questions about this letter, please contact me at young.kristen@epa.gov or (415) 972-3305.

Sincerely,

Kristen Young
Remedial Project Manager


cc: Judy Hayducsko, HDOH
Robert Whittier, HDOH
Sven Lindstrom, HDOH
Gail L. Gottehrer, Del Monte Fresh Produce Company
Gary Zimmerman, WSP
Matt Caires, James Campbell Company LLC
Elizabeth Borowiec, EPA Region 9



STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES | KA 'ŌIHANA KUMUWAIWAI 'ĀINA
COMMISSION ON WATER RESOURCE MANAGEMENT | KE KAHUWAI PONO
P.O. BOX 621
HONOLULU, HAWAII 96809

November 25, 2024

TO: Ms. Jessica Puff, Administrator
State Historic Preservation Division

FROM: Ciara W.K. Kahahane, Deputy Director
Commission on Water Resource Management 

SUBJECT: Well Construction/Pump Installation Permit Application
KVDC Well (Well No. 3-2703-007) TMK: (1) 9-2-005-023-0001
Address: 92-1700 Kunia Road

In accordance with HRS §6E-42, the Commission is advising and allowing SHPD an opportunity for review and comment on the effect of the proposed well construction and/or pump installation on historic properties, aviation artifacts, or burial sites, consistent with section 6E-43, including those listed in the Hawaii register of historic places.

For your information, standard condition 6 of our well construction permit will state the following:

In the event that historically significant remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee shall stop work and immediately contact the Department of Land and Natural Resources' State Historic Preservation Division. Work may recommence only after written concurrence by the State Historic Preservation Division.

Based on submitted material, CWRM's project determination is no historic properties affected. CWRM requests the SHPD's concurrence.

The reviewer and primary contact for this project is Ryan Imata. Please direct any correspondence to ryan.r.imata@hawaii.gov.

HAR 13-171-19(c) requires that the accompanying water use permit application "shall be acted upon by the commission within ninety calendar days of an application not requiring a hearing..." Please provide us a comment letter by December 30, 2024.

PUBLIC NOTICE

Application for Water Use Permit Waipahu-Waiawa Ground Water Management Area, Oahu

The Commission on Water Resource Management received the following Ground Water Use Permit Application. Public Notice is given pursuant to Hawaii Administrative Rules, Section 13-171, "Designation and Regulation of Water Management Areas."

GWUPA No. 01199 KVDC Well (Well No. 3-2703-007)

Full application link: <https://dlnr.hawaii.gov/cwrm/newsevents/notices>

Applicant: Kunia Village Development Corporation
66-031 Mahaulu Lane
Haleiwa, HI 96712

Landowner: Hawai'i Agriculture Research Center
P.O. Box 100
Kunia, HI 96759

Date Application Filed as Complete: October 25, 2024

Hydrologic Unit / Aquifer System Area: Waipahu-Waiawa System, Pearl Harbor Sector, Oahu

Water Source

Well No.	Well Name	Tax Map Key	Aquifer System Area
3-2703-007	KVDC	(1) 9-2-005-023-0001	Waipahu-Waiawa System, Pearl Harbor Sector, Oahu

Quantity Requested: 0.150 million gallons per day

Proposed Use: Agriculture, Domestic

End Use

New/Existing	Description	Place of Water Use	Qty of Use (GPD)
New	Marijuana Farm	at Tax Map Key: (1) 9-2-005:023	15,000
	Hydroponic Lettuce / Fish	at Tax Map Key: (1) 9-2-005:023	5,000
New	Domestic	at Tax Map Key: (1) 9-2-005:023	130,000

Written objections or comments on this application may be filed by any person who has property interest in any land within the hydrologic unit of the source of water supply, any person who will be directly and immediately affected by the proposed water use, or any other interested person. Written objections must (1) state the property or other interest in the matter (provide TMK information); (2) set forth questions of procedure, fact, law, or policy, to which objections are taken; and (3) state all grounds for objections to the proposed permit. Written objections must be received by December 30, 2024. Objections must be sent to 1) the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809 and 2) the applicant at the above address.

COMMISSION ON WATER RESOURCE MANAGEMENT



CIARA W. K. KAHANE, Deputy Director for
DAWN N. S. CHANG, Chairperson

Dated: Nov 18, 2024

Publish in: Honolulu Star Advertiser issues of December 6, 2024 and December 13, 2024

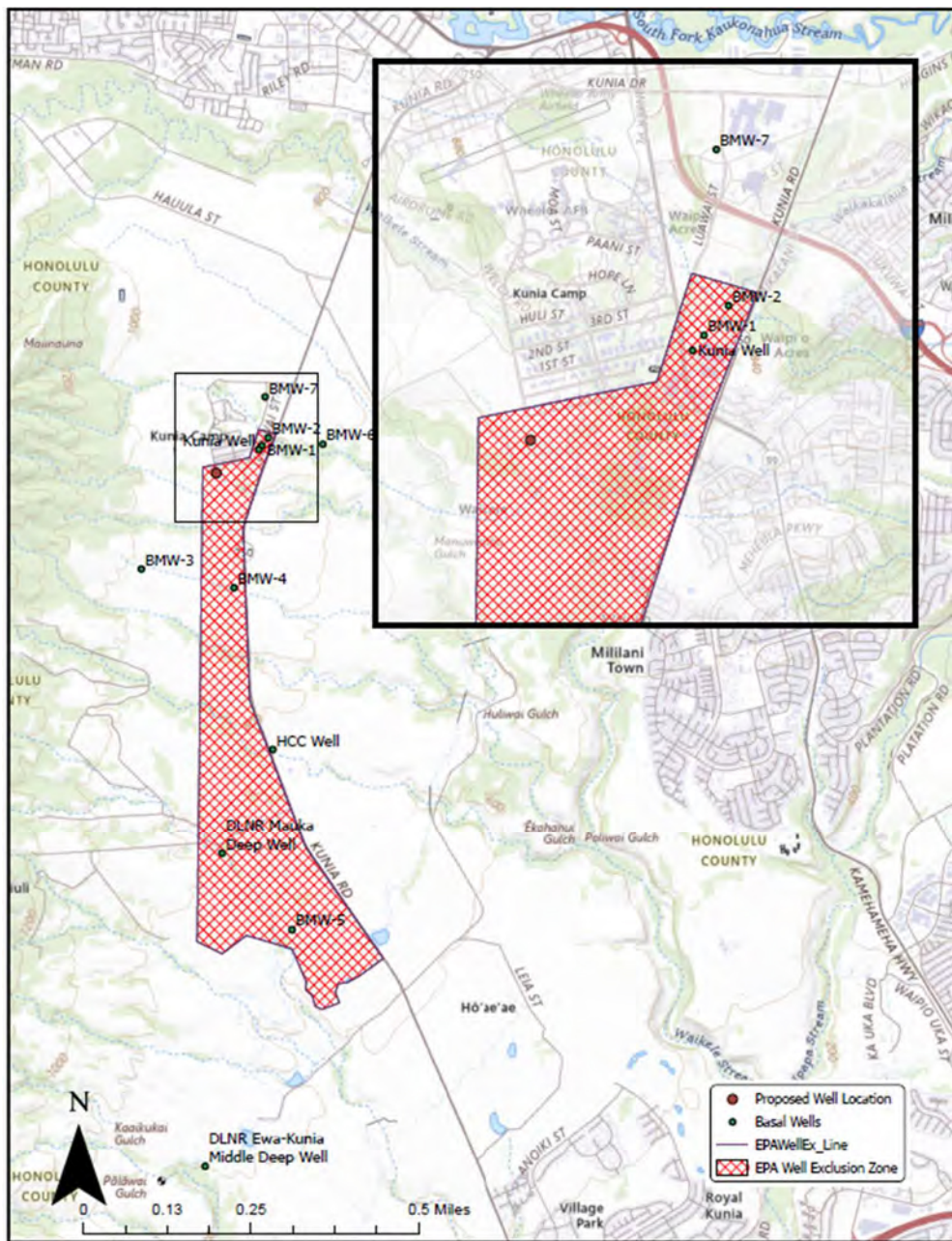


Figure 1. EPA Map of Well Restriction Area, February 2025.

North Shore Consultants, LLC

Kale Watson, Director
Department of Hawaiian Home Lands
91-5420 Kapolei Pkwy, Kapolei, HI 96707

August 28, 2024

Consultation for new Potable water source In Kunia, Oahu TMK # 9-2-005:023

Director Watson:

The State Water Code in Section 174C-101(a) States:

Provisions of this chapter shall not be construed to amend or modify rights or entitlements to water as provided for by the Hawaiian Homes Commission Act, 1920, as amended, and by chapters 167 and 168, relating to the Molokai irrigation system. Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act.

By this letter Kunia Village Development Corporation requests your assessment on the probable impacts associated with our proposed construction and operation of a new potable water well in Kunia Village (TMK # 9-2-005:023) as described below. The new well will replace pumpage from an existing well that has been found to contain Per and Polyfloroalkyl substances (PFAS). It will not increase demand for groundwater resources. The allocation of water will be transferred from the existing, contaminated well to the new one, which is less likely to be contaminated.

Kunia Village is the former Del Monte Plantation Camp, which was turned over to the Hawaii Agriculture Research Corporation in 2009. It is located off of Kunia Road approximately 6 miles north of the intersection between Kunia Road and H-1 Freeway, at Latitude (north) 21° 18' 46", Longitude (west) 158° 05' 07" (Figure 1). This location is approximately 2 miles south of the Wheeler Army Air Field in Central Oahu. The site elevation ranges from approximately 835 feet to 890 feet above mean sea level (MSL). The subject property Tax Key Map # 9-2-005:023 shown in Figure 2.

The Del Monte Corporation grew and processed pineapple on the plantation from about 1946 to 2006 and used pesticides to control nematodes and other pineapple pests. The water supplies serving Kunia Village, and the surrounding areas have been repeatedly threatened by previous practices by the plantation and surrounding users.

In 1977, an accidental 500-gallon pesticide spill occurred next to the Kunia drinking water supply well (Well 1), which contributed to contaminated site soil and groundwater. EPA added the site to the Superfund program's National Priorities List (NPL) in 1994. Del Monte treated contaminated groundwater in the basal aquifer from 2004 until 2014 through pumping water to other farm sites.

66-031 Mahaulu Lane
Hale'iwa, HI 96712

robichaud001@hawaii.rr.com
(808)368-5352



Figure 1: Site location South of Schofield Barracks and west of Mililani.



Figure 2: Kunia Village Aerial Photograph showing the approximate location of the proposed well in the southwest corner of the property. (Google Earth 2023). The proposed well location is shown as a yellow spot in the figure.

In September 2020, EPA concluded that groundwater levels in the basal aquifer are near or below "background" levels of ethylene dibromide (EDB), 1,2-dibromo-3-chloropropane (DBCP), 1,2-dichloropropane (1,2-DCP) and 1,2,3-trichloropropane (1,2,3-TCP). However, the levels of DBCP and 1,2,3-TCP are above Hawaii maximum contaminant levels (MCLs). The background levels are due to the historic application of pesticides in the area.

The 1977 spill and application of now-banned pesticides permanently removed Kunia's only source of drinking water from service. Del Monte previously leased Wells 3 and 4 one mile north of the site from the US Army for irrigation. When Well 1 was taken out of service the plantation installed the pumps and piping from Wells 3 and 4 to deliver drinking water to the village.

Wells 3 and 4 tap into Oahu's Central aquifer, also known as the Schofield High Level Water Body. In the mid 1980s the Central aquifer was found to contain unacceptable concentrations of Trichloroethene (TCE). In 1986, the Army installed a groundwater treatment system to treat TCE contamination in drinking water from Wells 3 and 4. The long-term remedy involves rapid aeration of water originating in wells that utilize the central aquifer. TCE is highly volatile and is removed during aeration by evaporation. Treatment and monitoring of Kunia's water from Wells 3 and 4 is ongoing.

In January 2023 Chemicals known as PFAS (perfluoroalkyl and polyfluoroalkyl substances) were detected for the first time in water samples collected at the Kunia Village Well 3. Well 4 was tested several months later and found to contain equivalent concentrations of certain PFAS. PFAS cannot be removed through aeration.

Kunia Village purchased bottled water for its residents for a period of 3 months while the water source was switched to an emergency connection to an Army water system, which continues to serve the Village residents and businesses. The Army determined that the current connection is temporary until a permanent solution is determined.

The proposed construction and operation of a new potable water well is to provide a permanent source of drinking water for the residents and businesses of Kunia Village. This action is required to maintain the potable water supply to Oahu's last plantation camp at a time when is needed more than ever.

Groundwater near the proposed well site is near the intersections of the Wahiawa, Waiau-Waipahu, and Ewa-Kunia Water management sectors (Figure 3). Kunia Village currently obtains its water from Del Monte Well #4 which is in the Wahiawa water management sector. Due to PFAS contamination Well 4 will be used only until the new well is established and then will cease to supply potable water to Kunia Village. The proposed location of the new well is likely to be in the Pearl Harbor Aquifer Waiau-Waipahu water management sector, immediately south of its boundary with the Wahiawa sector. The well site is intentionally placed near the suspected non-conformity that marks the boundary between the Waipahu-Waiawa Sector (30203111) and the Ewa-Kunia sector (30205111). Data on monitoring wells in this vicinity is insufficient to positively identify the boundaries of these water management sectors. According to studies by John Mink the Ewa-Kunia sector underlies the Waipahu-Waiawa sector, so if the well was drilled to the first groundwater layer it will draw from the Waiau-Waipahu Sector, if it is drilled deeper, it would intercept the underlying Ewa-Kunia Sector. A final determination will be made on the depth and aquifer source following installation and testing of the pilot well.

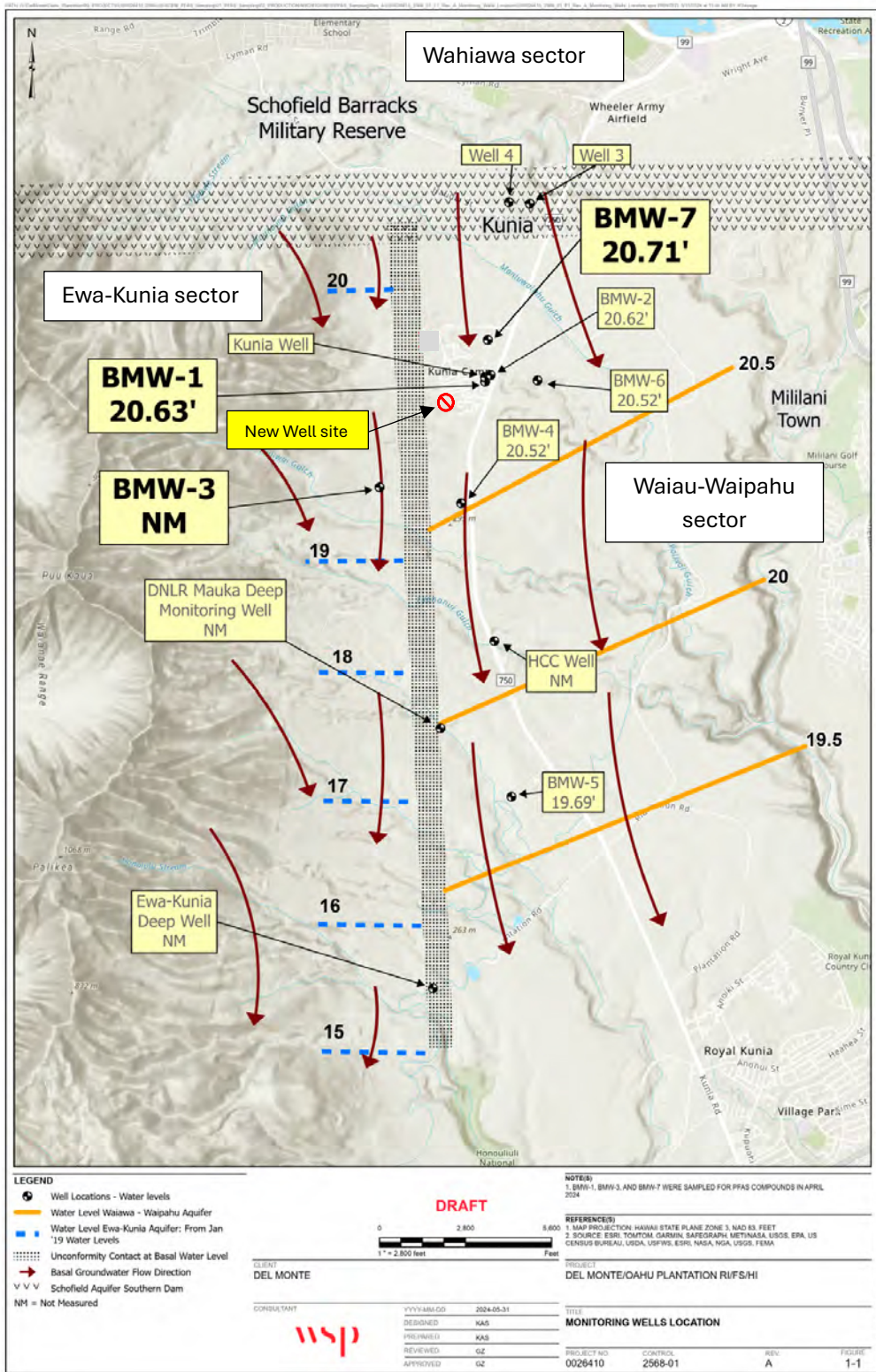


Figure 4: showing the groundwater hydrology. The existing water source is Well 4 in the Wahiawa groundwater management sector. The proposed location of the new well is in the Waiau-Waipahu Sector.

David Robichaux, Principal
North Shore Consultants, LLC

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA



DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

RYAN K. P. KAHAKA'OLE
FIRST DEPUTY

CIARA W.K. KAHAHANE
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
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII'
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

January 16, 2025

IN REPLY REFER TO:
Project No. 2024PR01411
Doc. No. 2501SCH11

MEMORANDUM

TO: Ciara W.K. Kahahane, Deputy Director
State Commission on Water Resource Management
P.O. Box 621, Honolulu, Hawai'i 96809
c/o Queenie Komori, queenie.k.komori@hawaii.gov

FROM: Samantha Hemenway, O'ahu Archaeologist

SUBJECT: Chapter 6E-42 Historic Preservation Review
Well Construction/Pump Installation Permit Application
Ground Water Use Permit Application (GWUPA No. 01199)
KVDC Well (Well No. 3-2703-007)
Kawailoa Ahupua'a, Waialua District, Island of O'ahu
TMK: (1) 9-2-005:023 (por.)

RESPONSE:

[] This is a [] public (county or state) project [X] private project and [] will [] may affect historic properties.

[X] SHPD's determination is **no historic properties affected** for the work described under these permits
(*no historic properties have been identified within or near the proposed project area*).

Pursuant to HAR §13-284-7(e), when the SHPD agrees that the action will not affect any significant historic properties, this is the SHPD's written concurrence and historic preservation review ends. The historic preservation review process is ended. The permit issuance process may proceed.

Please attach to permit: In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, artifacts, sand deposits, or sink holes are identified during the demolition and/or construction work, cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division, at (808) 695-8015.

Please contact Samantha C. Hemenway, O'ahu Archaeologist, at Samantha.Hemenway@hawaii.gov, for any questions or concerns regarding this letter.

Signed:

Jessica L. Puff
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

cc. Ryan Imata, ryan.r.imata@hawaii.gov
David Robichaux, robichaud001@hawaii.rr.com

Appendix B

**Ka Pa‘akai Analysis for the Kunia Village New Source Well Project,
Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu
TMK: (1) 9-2-005:023 por.**

**Ka Pa‘akai Analysis for the
Kunia Village New Source Well Project,
Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu
TMK: (1) 9-2-005:023 por.**

**Prepared for the
Kunia Village Development Corporation (KVDC)**

**Prepared by
Kellen Tanaka, B.A.,
David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.**

**Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: HONOULIULI 217)**

November 2024

**O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950**

www.culturalsurveys.com

**Maui Office
1860 Main St.
Wailuku, Hawai‘i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994**

Management Summary

Reference	Ka Pa‘akai Analysis for the Kunia Village New Source Well Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: (1) 9-2-005:023 por. (Tanaka et al. 2024)
Date	November 2024
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 217
Agencies	State of Hawai‘i, Department of Land and Natural Resources Commission on Water Resource Management (CWRM)
Land Jurisdiction	Private
Project Location	The Kunia Village New Source Well project area is located just north of Kunia Village at 92-1700 Kunia Road (Waipahu, Hawai‘i 96797) in Honouliuli Ahupua‘a, ‘Ewa District, southwest O‘ahu. The project area is located 9.46 km (5.9 miles) north of the intersection between H-1 and Kunia Road, and 2.41 km (1.5 miles) south of Schofield Barracks. The well site is 9–12 m (30–40 feet [ft]) outside the Kunia Village Historic District Boundary to the south side of Kunia Drive. The location is on the southern end of Kunia Village near the potable water storage tanks.
Project Description	<p>The project scope includes planning design, permitting, and installation of a new potable water well to serve the affordable housing community in Kunia, O‘ahu, Hawai‘i. The new well is required due to the emerging contamination from per- and polyfluoroalkyl substances (PFAs). The new well will have a water allocation of 150,000 gallons per day. That volume is now pumped from wells that are approximately 1 mile to the north of Kunia Village. The volume of water withdrawn from the new well will not be pumped from the existing well. The water allocation is only switched from one well to another. There is no new demand for water resources, only a change in the location from which it is drawn. No change in water demand is requested.</p> <p>It will consist of a 21-inch well casing drilled to a depth of close to 1,000 ft below ground surface to tap the basal aquifer beneath Kunia Village. An electric submersible pump will provide water via 6-inch underground pipeline to the existing water storage tanks located 30 yards north of the well site. The well will be protected by a simple pumphouse.</p> <p>The project will be funded by the Hawai‘i Department of Health Clean Water Branch through the Safe Drinking Water Revolving Fund. Other aspects of the project including the Environmental Assessment will be completed using the State of Hawai‘i standards rather than federal standards.</p>

Consideration of (Possible) Off-Site Impacts	<p>Honouliuli Stream is an intermittent losing stream, only flowing during storm events and when unused Waiahole Ditch water is discharged into the stream in lower Kunia. It is understood that the aquifer water level is approximately 18 ft above MSL (BWS Kunia index monitor well, State Well No. 3-2201-10, Kunia T-41) and that there is no hydraulic connection between the basalt aquifer and the intermittent stream. Therefore, pumping the Kunia Village GAC & New Source Well is anticipated to not have a detrimental effect on Honouliuli Stream.</p> <p>The five major Pearl Harbor springs—Kalauao, Waiau, Waimano, Waiawa, and Waikele—exist where the caprock is relatively thin and fractured. These large springs flow into the East and Middle Lochs of the Pearl Harbor estuary. Moving west, groundwater flows to the coast, decreasing where annual rainfall is lower and where the caprock thickens. Because the caprock restricts basalt groundwater flowing to the coast, pumping groundwater from the basalt aquifers is anticipated to not have a significant impact on nearshore environments.</p> <p>The Commission on Water Resource Management set aquifer sustainable yields in their 2019 update of the State Water Resources Protection Plan, as a percentage of aquifer recharge recognizing the importance of groundwater leaking to the coast supporting groundwater-dependent ecosystems and accounting for hydro-geologic uncertainty. Pumping will be within water use permits and less than the sustainable yield and recharge. Thus, no off-site impacts are expected even accounting for hydro-geologic uncertainty.</p>
Project Acreage	The project area comprises approximately 400 square (sq) ft.
Document Purpose and Regulatory Context	<p>The Commission on Water Resource Management (CWRM) has indicated a need for a Ka Pa‘akai Assessment study to attend this proposed project. The purpose of the present Ka Pa‘akai Analysis and Assessment is to 1) assist the CWRM and any other relevant agencies in their effort to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and 2) to provide sufficient documentation to support the applicant’s assessment.</p> <p>This work is designed to address the letter and spirit of the following:</p> <ul style="list-style-type: none"> • Ka Pa‘akai O Ka‘aina v. Land Use Commission (94 Hawai‘i 31), in which the Hawai‘i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices exercised by Native Hawaiians and any other concerned parties, to the extent feasible, and • The mandate set forth by the Hawai‘i State Constitution (Articles IX and XII), courts, Hawai‘i Revised Statutes (HRS),

	and Hawai‘i Administrative Rules (HAR) and other Hawai‘i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.
Results of Background Research	<p>Background research for the proposed project yielded the following information:</p> <ol style="list-style-type: none"> 1. Honouliuli is the largest <i>ahupua‘a</i> (traditional land division usually extending from the mountains to the sea) in the <i>moku</i> (district) of ‘Ewa. The literal translation of Honouliuli is “dark water,” “dark bay,” or “blue harbor,” and thus is named for the waters of Pearl Harbor which marks the eastern boundary of the <i>ahupua‘a</i> (Jarrett 1930:22). Another source translates Honouliuli as “The blue bays or inlets” (<i>Saturday Press</i>, 11 August 1883). Honouliuli appears in the “Mo‘olelo of Lepeamoa,” the chicken-girl of Pālama, where Honouliuli is the name of the husband of the chiefess Kapālama, and grandfather of Lepeamoa (Westervelt 1923:164–184). 2. Honouliuli is generally described as very hot and dry. Evidence for drought-like conditions is further supported by the relative lack of traditional rain names associated with the Honouliuli Ahupua‘a (Akana and Gonzalez 2015:187). The Nāulu rain is the only known rain associated with Honouliuli. Due to the lack of rainwater, freshwater resources were accessed via a karstic system (Mylroie and Carew 1995). 3. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. According to McAllister (1933), holes and pits in the coral were generally accessed for water, while larger pits, often containing soil, were used for cultivation. McAllister additionally remarked that at the time of his 1930s survey, <i>mai‘a</i> (banana; <i>Musaceae</i>) and <i>kō</i> (sugarcane; <i>Saccharum officinarum</i>) were being cultivated within the pit caves (sinkholes) (McAllister 1933:109). 4. The traditional <i>ka‘ao</i> (legends) associated with the area speak of the <i>akua</i> (godly) brothers, Kāne and Kanaloa. It was their supernatural feat of hurling <i>pōhaku</i> (stone) across the island that determined the boundaries of land divisions (Sterling and Summers 1978:1). Additional <i>mo‘olelo</i> (stories) speak of Hi‘iaka and her travels across the plains of ‘Ewa. In particular, the <i>wahi pana</i> (storied place) of Kaupe‘a is described. Kamakau describes Kaupe‘a as a wide plain where a grove of <i>wiliwili</i> (<i>Erythrina sandwicensis</i>) stands (Kamakau 1991a:47). This plain is an <i>ao kuewa</i>, a realm belonging to homeless souls. In

	<p>general, the <i>kama 'āina</i> (native born) of both Honouliuli Ahupua'a and 'Ewa District made a point to avoid this place.</p> <ol style="list-style-type: none"> 5. Pu'uokapolei, a prominent hill located on the 'Ewa coastal plain, was the primary landmark for travelers on the trail running from Pearl Harbor to Wai'anae. A <i>heiau</i> (pre-Contact place of worship) was once on the summit of the hill, however, by the time of McAllister's survey of O'ahu it had been destroyed (McAllister 1933:108). The hill was also used as a point of solar reference or as a place for celestial observations of the winter solstice and summer solstice. 6. John Papa 'Ī'ī describes a network of Leeward O'ahu trails which in later historic times encircled and crossed the Wai'anae Range, allowing passage from Lualualei to Honouliuli via Pōhākea Pass ('Ī'ī 1959:96–98). 7. Various Hawaiian legends and early historical accounts indicate the <i>ahupua'a</i> of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian <i>ali'i</i> (royalty). This would be attributable for the most part to the plentiful marine and estuarine resources available at the coast, where several sites interpreted as permanent habitations and fishing shrines were located. Other attractive subsistence-related features of the <i>ahupua'a</i> include irrigated lowlands suitable for wetland taro cultivation (Hammatt and Shideler 1990), as well as the lower forest area of the mountain slopes for the procurement of forest resources. 8. Subsequent to Western Contact in the area, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species (Frierson 1972:2). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing (Frierson 1972:10). 9. Following the Māhele of 1848, 96 individual land claims were made in the <i>ahupua'a</i> of Honouliuli, with 72 claims registered and awarded by King Kamehameha III to <i>maka 'āinana</i> (commoners). The 72 <i>kuleana</i> (individual parcels) awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, <i>lo'i</i> (irrigated taro field), <i>kula</i> (pasture/field), and house lots. 10. In 1877, James Campbell purchased most of Honouliuli Ahupua'a for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property
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	<p>(Bordner and Silva 1983:C-12). By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with “abundant pasturage of various kinds” (Briggs in Haun and Kelly 1984:45)</p> <ol style="list-style-type: none"> 11. In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) in 1890. To attract business to his new railroad system, Dillingham subleased all land below 200 ft elevation to William Castle who in turn sublet the area to the Ewa Plantation Company for sugar cane cultivation (Frierson 1972:15). Dillingham’s Honouliuli lands above 200 ft elevation suitable for sugarcane cultivation were sublet to the Oahu Sugar Company. 12. The Ewa Plantation Company was incorporated in 1890 and lands throughout Honouliuli were designated for sugarcane cultivation. Sugar production exploded with the successful drilling of an artesian well by James Campbell on the ‘Ewa Plain. Campbell’s first well was named Waianiani (“crystal waters”) by the <i>kama ‘āina</i> of ‘Ewa (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho‘okuleana 2014). 13. Around 1896, Harry Von Holt, Superintendent of the OR&L Ranch Department, was actively constructing a fence around the <i>mauka</i> (toward the mountains) Honouliuli lands. This established the Honouliuli Forest Reserve, within which Von Holt planted “experimental trees” to reforest areas damaged by sandalwood harvesting and livestock grazing (Von Holt 1985:142). 14. James Dole initially began planting pineapples in 1903 after paying \$4,000 for just over 60 acres of homestead land in Wahiawā in 1900 (Larsen and Marks 2010:168). Such was Dole’s success that by the late 1950s, Hapco (Hawaiian Pineapple Company), had so grown in size and scope that it could boast production of 80% of the pineapple bought by consumers world-wide (Bolante 2006). 15. Kunia Camp was the last village in O‘ahu designated exclusively for Del Monte Corporation’s workers who processed pineapples from the adjacent pineapple fields (Bolante 2006).
Results of Community Consultation	<p>CSH attempted to contact 50 Hawaiian organizations, agencies, and community members. Of the five people that responded, one of these <i>kama ‘āina</i> and/or <i>kūpuna</i> (elder) provided written testimony and two met with CSH for more in-depth interviews. Consultation was received from the following community members:</p> <ol style="list-style-type: none"> 1. Tom Berg, Former Councilman, District 1

	2. William Kahula O'Brien and Dietrix Jon Ulukoa Duhaylonsod, Ka'uikiokapō
Identification of Cultural Practices	<p>Based on the results of community consultation and background research conducted as part of this Ka Pa'akai Analysis, CSH has identified the following cultural resources and practices within Honouliuli Ahupua'a:</p> <ol style="list-style-type: none"> 1. Agricultural resources 2. Floral resources 3. Faunal resources 4. Marine resources 5. <i>Mo'olelo</i> and <i>Wahi pana</i> 6. Trails 7. Burial practices <p>No ongoing cultural resources and practices were identified within the project area during community consultation. The project area is also located in the general vicinity of ongoing cultural resources and practices such as floral and faunal resources, trails, and <i>wahi pana</i>.</p>
Identification of Impacts to Cultural Practices	<p>No impacts to ongoing cultural resources and practices were identified within the project area during community consultation for this Ka Pa'akai Analysis. Consultation identified a number of concerns related to the environment and the broader community:</p> <ol style="list-style-type: none"> 1. Faunal resources 2. <i>Wahi pana</i>

Mitigation Possibilities Identified During Background Research and Consultation	<p>Based on information gathered from the community consultation, participants voiced their concerns in the following cultural context:</p> <ol style="list-style-type: none"> 1. Dietrix Jon Ulukoa Duhaylonsod mentioned the project area is in the vicinity of a natural gulch. He noted the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist. 2. Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project, however, he expressed concern that runoff from the project area could flow down the “hard pan” located downslope of the project area and directly into the nearby gulch causing significant erosion during heavy rains. 3. Mr. Duhaylonsod suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering the gulch. 4. Mr. Berg believes the Department of Land and Natural Resources (DLNR) and U.S. Fish and Wildlife Service should work together to protect barn owls. 5. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the State Historic Preservation Division (SHPD) will be notified pursuant to HAR §13-280-3. In the event that <i>iwi kūpuna</i> (ancestral remains) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 6. In the event that <i>iwi kūpuna</i> and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.
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Ka Pa‘akai Analysis	<p>In <i>Ka Pa‘akai vs Land Use Commission</i>, 94 Hawai‘i (2000) the Court held the following analysis must also be conducted:</p> <ol style="list-style-type: none"> 1. The identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary native Hawaiian rights are exercised in the project area; 2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and 3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist. <p>Based on information gathered from the cultural and historical background, and community consultation for this project, there are a number of traditional cultural practices and resources to consider.</p> <p>During consultation, Dietrix Jon Ulukoa Duhaylonsod mentioned the project area is in the vicinity of a natural gulch. He noted the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist.</p> <p>Tom Berg mentioned gulches provided refuge for wildlife including <i>pueo</i> (Hawaiian Short-eared Owl, <i>Asio flammeus sandwichensis</i>), barn owls (<i>Tyto alba</i>), and bats. He noted barn owls are endangered on the mainland.</p> <p>Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project, however, he expressed concern that runoff from the project area could flow down the “hard pan” located downslope of the project area and directly into the nearby gulch causing significant erosion during heavy rains.</p> <p>Mr. Duhaylonsod suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering the gulch.</p> <p>Mr. Berg believes the DLNR and U.S. Fish and Wildlife Service should work together to protect barn owls.</p> <p>Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that <i>iwi kūpuna</i> are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified</p>
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	<p>pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.</p> <p>In the event that <i>iwi kūpuna</i> and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.</p>
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Section 1 Introduction

1.1 Project Description

At the request of the Kunia Village Development Corporation (KVDC), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this Ka Pa‘akai Analysis study for the Kunia Village GAC & New Source Well Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: (1) 9-2-005:023 por. The Kunia Village New Source Well project area is located just north of Kunia Village at 92-1700 Kunia Road (Waipahu, Hawai‘i 96797) in Honouliuli Ahupua‘a, ‘Ewa District, southwest O‘ahu. The project area is located 9.46 km (5.9 miles) north of the intersection between H-1 and Kunia Road, and 2.41 km (1.5 miles) south of Schofield Barracks. The well site is 9–12 m (30–40 feet [ft]) outside the Kunia Village Historic District Boundary to the south of Kunia Drive. The location is on the south end of Kunia Village in the vicinity of the existing water storage tanks. The project area is depicted on a portion of the 2017 Schofield Barracks U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and aerial photographs (Figure 3 and Figure 4).

The project scope includes planning design, permitting, and installation of a new potable water well to serve the affordable housing community in Kunia, O‘ahu, Hawai‘i. The new well is required due to the emerging contamination from per- and polyfluoroalkyl substances (PFAs).

It will consist of a 21-inch well casing drilled to a depth of close to 1,000 ft below ground surface to tap the basal aquifer beneath Kunia Village. An electric submersible pump will provide water via 6-inch underground pipeline to the existing water storage tanks located 30 yards north of the well site. The well will be protected by a simple pumphouse. The new well will have a water allocation of 150,000 gallons per day. That volume is now pumped from wells that are approximately 1 mile to the north of Kunia Village. The volume of water withdrawn from the new well will not be pumped from the existing well. The water allocation is only switched from one well to another. There is no new demand for water resources, only a change in the location from which it is drawn. No change in water demand is requested.

The project will be funded by the Hawai‘i Department of Health Clean Water Branch through the Safe Drinking Water Revolving Fund. Other aspects of the project including the Environmental Assessment will be completed using the State of Hawai‘i standards rather than federal standards.

1.1.1 Discussion of Project-Related Off-Site Impacts

Honouliuli Stream is an intermittent losing stream, only flowing during storm events and when unused Waiahole Ditch water is discharged into the stream in lower Kunia. It is understood that the aquifer water level is approximately 18 ft above MSL (BWS Kunia index monitor well, State Well No. 3-2201-10, Kunia T-41) and that there is no hydraulic connection between the basalt aquifer and the intermittent stream. Therefore, pumping the Kunia Village GAC & New Source Well is anticipated to not have a detrimental effect on Honouliuli Stream.

The five major Pearl Harbor springs—Kalauao, Waiau, Waimano, Waiawa, and Waikele—exist where the caprock is relatively thin and fractured. These large springs flow into the East and Middle Lochs of the Pearl Harbor estuary. Moving west, groundwater flows to the coast, decreasing where annual rainfall is lower and where the caprock thickens. Because the caprock

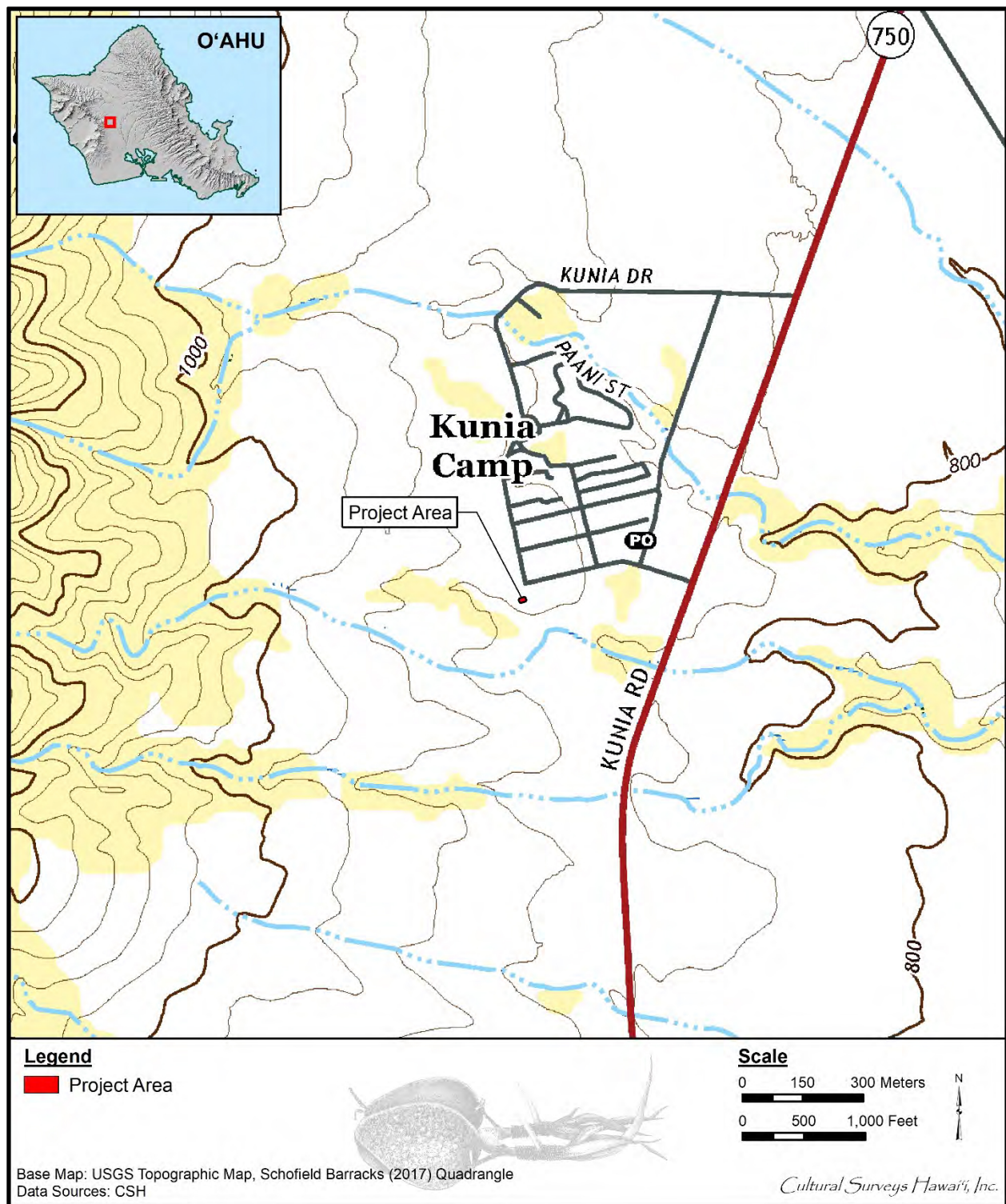


Figure 1. Portion of the 2017 Schofield Barracks USGS topographic quadrangle showing the Kunia Village New Source Well project area

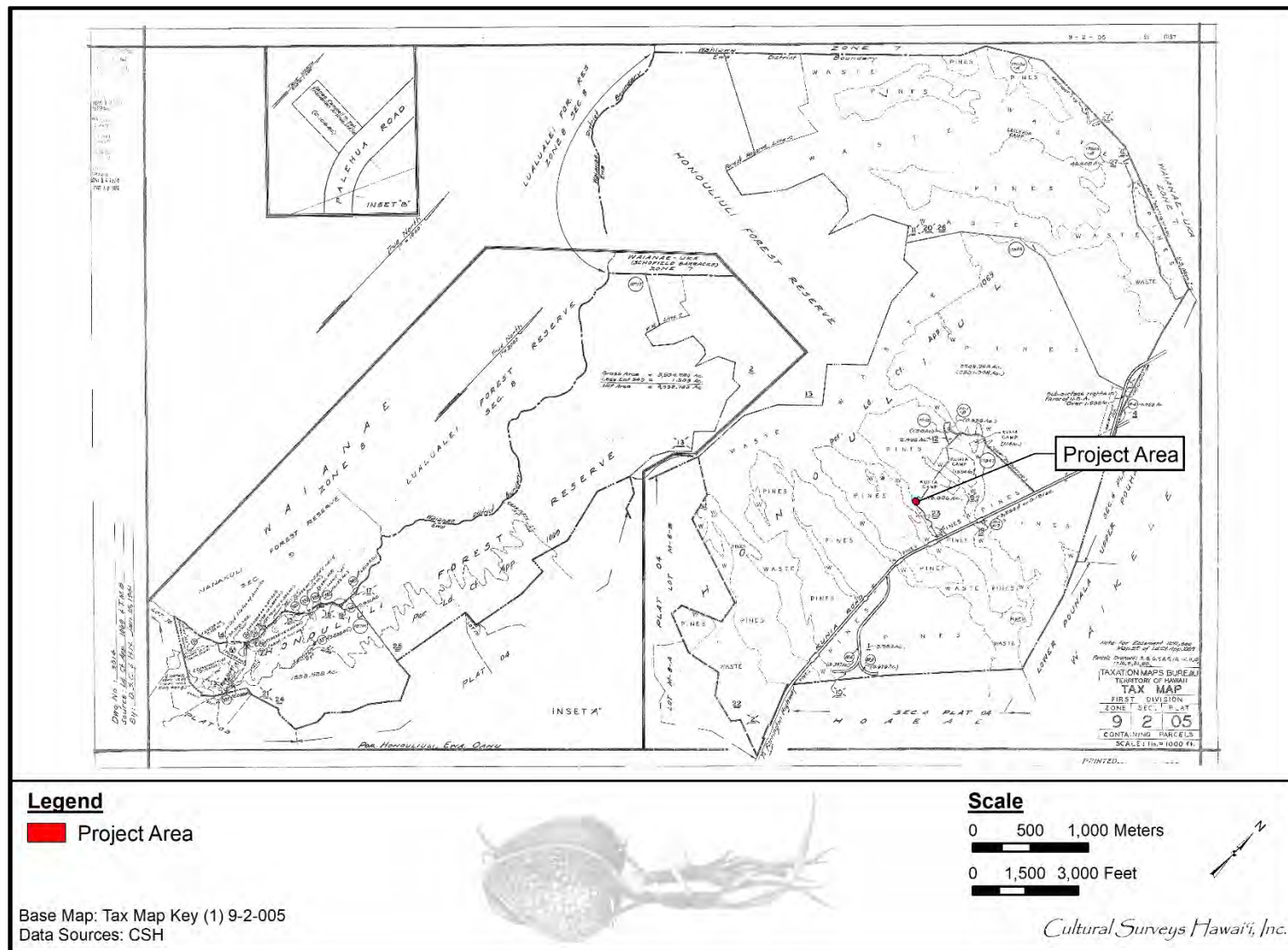


Figure 2. Tax Map Key (TMK) (1) 9-2-005, showing the Kunia Village New Source Well project area (Hawai'i TMK Service 2024)



Figure 3. Aerial photograph showing the Kunia Village New Source Well project area (Google Earth 2018)



Figure 4. Location map of the proposed well site (courtesy of client)

restricts basalt groundwater flowing to the coast, pumping groundwater from the basalt aquifers is anticipated to not have a significant impact on nearshore environments.

The Commission on Water Resource Management set aquifer sustainable yields in their 2019 update of the State Water Resources Protection Plan, as a percentage of aquifer recharge recognizing the importance of groundwater leaking to the coast supporting groundwater dependent-ecosystems and accounting for hydro-geologic uncertainty. Pumping will be within water use permits and less than the sustainable yield and recharge. Thus, no off-site impacts are expected even accounting for hydro-geologic uncertainty. The new well will have a water allocation of 150,000 gallons per day. That volume is now pumped from wells that are approximately 1 mile to the north of Kunia Village. The volume of water withdrawn from the new well will not be pumped from the existing well. No change in water demand is requested.

1.2 Regulatory Context

The Commission on Water Resource Management (CWRM) has indicated a need for a Ka Pa'akai Assessment study to attend this proposed project. The purpose of the present Ka Pa'akai Analysis and Assessment is to 1) assist the CWRM and any other relevant agencies in their effort to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and 2) to provide sufficient documentation to support the applicant's assessment.

This work is designed to address the letter and spirit of the following:

- *Ka Pa'akai O Ka 'aina v. Land Use Commission* (94 Hawai'i 31), in which the Hawai'i Supreme Court established a three-part analytical framework to assist the state and counties in fulfilling their constitutional obligation to preserve and protect traditional and customary practices exercised by Native Hawaiians and any other concerned parties, to the extent feasible, and
- The mandate set forth by the Hawai'i State Constitution (Articles IX and XII), courts, Hawai'i Revised Statutes (HRS), and Hawai'i Administrative Rules (HAR) and other Hawai'i State laws requiring government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups.

1.3 Document Purpose

The purpose of the Ka Pa'akai Analysis is to assist the client and responsible overseeing agencies to ensure the applicant has sufficiently assessed that the proposed project/action will not harm traditional and customary practices exercised by Native Hawaiians; and to provide sufficient documentation to support the overseeing agency's assessment.

In *Ka Pa'akai O Ka 'Aina v. Land Use Commission*, the Hawai'i Supreme Court

[...] articulated an analytical framework to assist state agencies in balancing the State's obligation to protect traditional and customary practices against private property (as well as competing public) interests, by requiring specific findings and conclusions about:

- 1) the identity and scope of 'valued cultural, historical, or natural resources' in the relevant area, including the extent to which traditional and customary native Hawaiian

- rights are exercised in relevant area;
- 2) the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
 - 3) the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist. [*Ka Pa ‘akai O Ka ‘Aina v. Land Use Comm’n*, 94 Hawai‘i 31, 35, 47 and 52–53, 7 P.3d 1068, 1072, 1084 and 1089–90 (2000)]

1.4 Natural Environment

1.4.1 *Nā Lepo* (Soils)

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils consist of Kolekole silty clay loam, 1 to 6% slopes, (KuB) (Figure 5).

Soils on the Kolekole series are described as follows:

This series consists of well-drained soils on uplands on the island of Oahu. These soils developed in old gravelly alluvium mixed with volcanic ash. They are gently sloping to moderately steep. Elevations range from 500 to 1,200 feet. The annual rainfall amounts to 35 to 50 inches, most of which occurs between November and April. The mean annual soil temperature is 71°F. Kolekole soils occur on the windward slopes of the Waianae Range. They are geographically associated with Kunia, Mahana, and Wahiawa soils.

These soils are used for sugarcane, pineapple, and pasture. The natural vegetation consists of guava, lantana, Bermuda grass, and Natal redtop. [Foote et al. 1972:73]

KuB soils are further described, “Permeability is moderately rapid to the panlike layer [typically at a depth of 24 to 40 inches] and moderate in the compact subsoil. Runoff is slow, and the erosion hazard is slight” (Foote et al. 1972:74).

1.4.2 *Nā Ua* (Rains)

Precipitation is a major component of the water cycle and is responsible for depositing *wai* (fresh water) on local flora. Pre-Contact *kānaka* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer), lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *ho‘oilo* (winter, rainy season), continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more common (Giambelluca et al. 1986:17).

Each small geographic area on O‘ahu had a Hawaiian name for its own rains. According to Akana and Gonzalez (2015),

Our kūpuna had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishable from

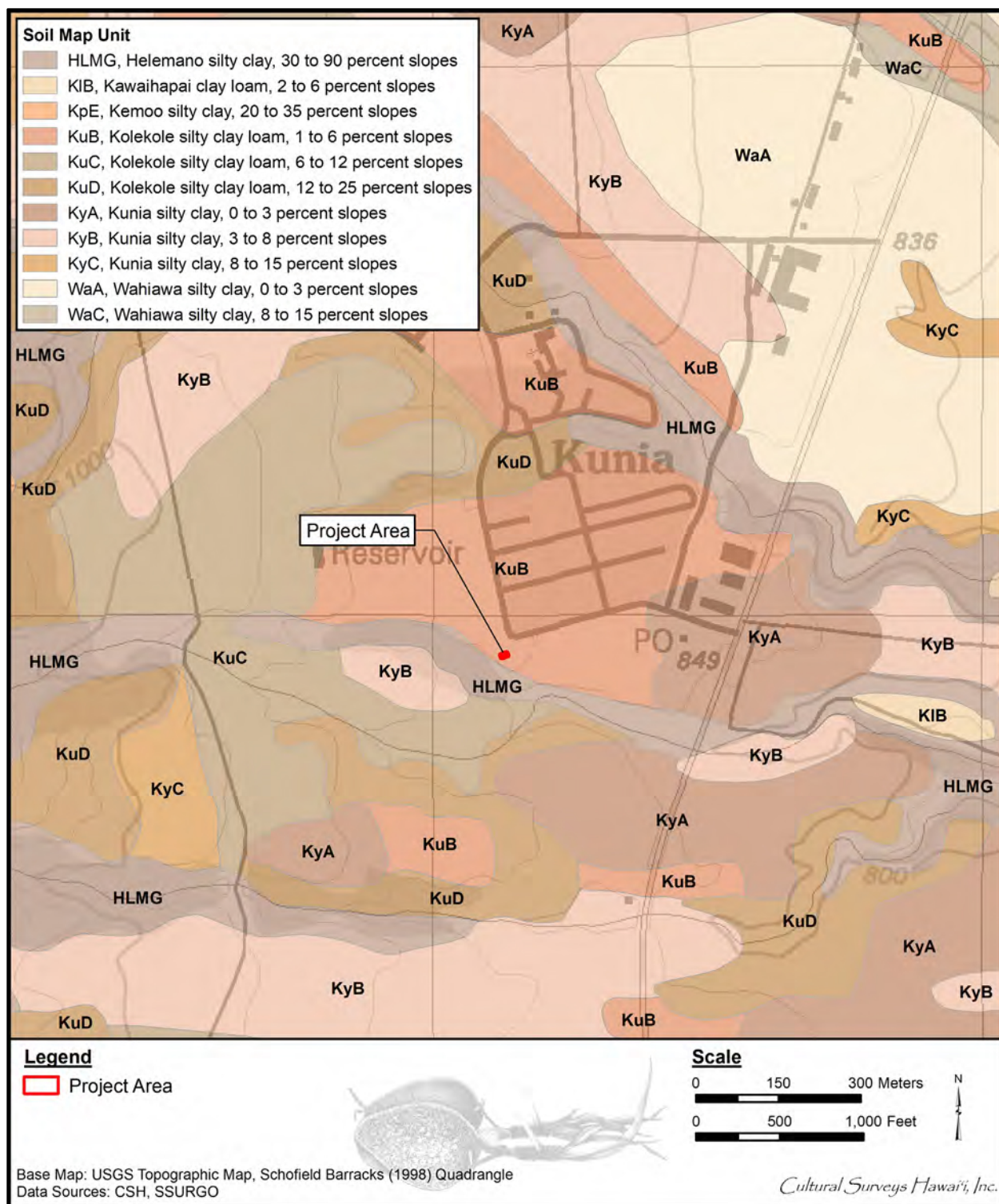


Figure 5. Overlay of *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001 on a portion of the 1998 Schofield Barracks USGS 7.5-minute-series topographic quadrangle base map)

another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people. [Akana and Gonzalez 2015:xv]

Honouliuli was no exception to this naming practice. Despite the relative lack of rainfall in this area, the Nāulu rain is known to be associated with the *ahupua‘a* (traditional land division) of Honouliuli. This rain is generally understood as a sudden shower, and more commonly associated with Kawaihae, Hawai‘i, and Ni‘ihau (notoriously dry locations as well) (Akana and Gonzalez 2015:187).

The Nāulu rain is mentioned in a chant offered by Hi‘iakaikapoliopole, the younger sister of the volcanic goddess Pele. In *Ka Mo‘olelo o Hi‘iakaikapoliopole*, the goddess Hi‘iaka, embarks on a quest to retrieve her older sister’s lover, Lohi‘auipo. During Hi‘iaka’s travel through ‘Ewa, she recites an affectionate *oli* (chant) as she recalls the Kai‘okia edict placed on her and Lohi‘auipo by Pele. One of the main focal points in this chant is the line, “*Ke koi lā i ke ao o ka Nāulu e hanini i ka wai ola i hola nā kupa kama ‘āina i ka wai a ka ‘ōpua.*” This line introduces the Nāulu rain as the rain of Honouliuli. The line continues to say the water from the clouds is what the natives survive on.

<i>Ola i ke ahe a ka makani Māunuunu</i>	I am spared by the Māunuunu wind
<i>I ka hapahapai mai aka makani</i>	By the uplifting ‘Ao‘aoa breeze
<i>‘Ao‘aoa</i>	
<i>Ke koi lā i ke ao o ka Nāulu e hanini i ka wai</i>	Urging the Nāulu storm clouds to pour down their waters
<i>Ola i hola nā kupa kama ‘āina i ka wai a ka ‘ōpua</i>	The natives here survive on water from the clouds
<i>Ke halihali a ‘ela nā ‘ōpua i ke awa lau</i>	Which billowing clouds carry along to the branching lochs
<i>E koi mai ana iā Hi‘iaka e kūo‘e helei ke kula</i>	Compelling Hi‘iaka to trudge that open stretch
[Ho‘oulumāhie 2008a:294–295]	[Ho‘oulumāhie 2008b:275–276]

The general lack of rain names is indicative of historic environmental conditions within the *ahupua‘a*; these conditions, in turn, shaped agricultural practices in the area. Environmental limitations forced ingenuity and innovation. McAllister provides written evidence of the innovative ways in which Honouliuli’s *kama ‘āina* (native born) approached agricultural activities:

[...] It is probable that the holes and pits in the coral were formerly used by Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here. [McAllister 1933:109]

1.4.3 Nā Makani (Winds)

Similar to rain, *makani* (wind) were named for various reasons such as describing the intensity or direction of the wind, relating the wind to a story, or even relating the wind to the landscape. David Malo, a Native Hawaiian historian, explains some general terms related to wind:

[...] There was the *kona*, a wind from the south, of great violence and of wide extent. It affected all sides of an island, east, west, north, and south, and continued for many days [...] The *kona* wind often brings rain, though sometimes it is rainless [...] The *hoolua*, a wind that blows from the north, sometimes brings rain and sometimes is rainless [...] The *hau* is a wind from the mountains, and they are thought to be the cause of it, because this wind invariably blows from the mountains outwards towards the circumference of the island. [Malo 1951:14]

Malo has supplied a foundation of names for winds, however, there is an abundance of names in various stories and chants.

A'e loa is a term given to the prevailing northeasterly trade winds (Nakuina 1992:138) along with *A'e* (Pukui and Elbert 1986:3), *Moa'e*, and *Moa'e Lehua* (Pukui and Elbert 1986:249).

The four commonly known winds associated with the *moku* (district) of 'Ewa are Māunuunu of Pu'uloa, Moa'e kū of Ewaloa, Waikōloa of Līhu'e, and Kona of Pu'ukapolei (Alameida 1997). Māunuunu is a strong blistering sea breeze at Pu'uloa (Andrews 1865; Pukui and Elbert 1986). Moa'e kū is a northeasterly wind which means to resist, or a foreign wind (Andrews 1865; Pukui and Elbert 1986). Waikōloa is a cold northwest wind (Pukui and Elbert 1986). Kona is a name of the southwest wind (Andrews 1865). Another mentionable wind found in most chants associated with the *moku* of 'Ewa is Wai'ōpua. Its literal translation means the water of cloud banks (Pukui and Elbert 1986).

In the traditional story *The Wind Gourd of La'amaomao*, Pāka'a and his son Kūapāka'a are descendants of the wind goddess La'amaomao whose traditional home was in a gourd that also contained all the sacred winds of Hawai'i. La'amaomao controlled and called forth the winds by chanting their names (Nakuina 1992). Pāka'a's chant traces the winds from the *moku* of 'Ewa. The winds of this region are poetically recalled as follows:

<i>He Moaeku ko Ewaloa</i>	Moa'e-ku is of 'Ewaloa
<i>He Kehau ko Wai'ōpua</i>	Kēhau is of Wai'ōpua
<i>He Waikoloa ko Lihue</i>	Waikōloa is of Līhu'e
<i>He Kona ko Puuokapolei</i>	Kona is of Pu'uokapolei
<i>He Maunuunu ko Pu'uloa</i>	Māunuunu is of Pu'uloa
[Ke Au Okoa, Volume III, Number 30, 14 November 1867]	[Nakuina 1992:51]

In *The Epic Tale of Hi'iakaikapoliopele*, the goddess Hi'iaka, born as an egg and carefully warmed and nourished by Pele herself (Westervelt 1916:69), embarks on a quest to retrieve her older sister's lover, Lohi'au. While traversing the island chain, Hi'iaka encounters various gods and demi-gods, spirits and shapeshifters, as well as chiefs and commoners. According to the *mo'olelo* (story), Hi'iaka watches as her beloved friend Hōpoe is killed by the embers of her sister Pele. She chants atop of Pōhākea and tells of the cold harsh wind of Waikōloa, Maunauna and Wai'ōpua.

<i>KAU HO'OKAHI HANERI A ME</i>	CHANT ONE HUNDRED AND
<i>KANALIMAKUMAMĀKOLU</i>	FIFTY-THREE
<i>Aloha ku'u hoa i ka pū'ali lā</i>	Alas my friend of the rugged mountain
	pass

<i>A luna i Pōhākea, he luna o Kamaoha</i>	On high at Pohakea, above Kamaoha
<i>He lae ‘ino ‘o Maunauna</i>	Maunauna is a dangerous escarpment
<i>‘O Lihu‘e ke hele ‘ia</i>	Lihu‘e’s high plain yet to be traversed
<i>Honi i ke ‘ala mau‘u</i>	Inhaling the scent of the grasses
<i>I ke ‘ala o ke kupukupu</i>	The fragrance of kupukupu fern
<i>E linoa ala e ka Waikōloa</i>	Entwined by the Waikoloa breeze
<i>E ka makani he Wai‘ōpua</i>	By the wind called Wai‘ōpua
<i>Ku‘u pua, me he pua lā i ku‘u maka</i>	My blossom, like a flower in my sight
<i>Ka ‘oni i ka haku ‘ōnohi, kā ka wai lā</i>	Moving before my eyes, washed salty
<i>i li‘u</i>	by tears
<i>I ku‘u maka lā, e uē au lā.</i>	There in my sight, I weep.
[Ho‘oulumāhie 2008a:280]	[Ho‘oulumāhie 2008b:262]

1.4.4 Nā Kahawai (Streams and Freshwater)

Honouliuli Ahupua‘a, and the encompassing ‘Ewa District, are notoriously dry. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. Limestone outcrop, composed of detritus, calcareous sand, reef dwelling organisms, and coralline algae, is subject to dissolution from water. This dissolution has formed a series of connected and isolated caves under the ‘Ewa Plains. Although invisible to human eyes, streams flow under the surface of Honouliuli via the karstic system. “Sink holes” would accumulate water within them via a subterranean water or karst system; this water also contained nutrient-rich sediment that allowed plants such as *kalo* (taro; *Colocasia esculenta*), *kī* (ti; *Cordyline fruticosa*), and *noni* (Indian mulberry; *Morinda citrifolia*) to survive.

The “karstic desert” and marginal characterization of the limestone plain, which is the most readily visible terrain, does not do justice to the *ahupua‘a* as a whole. A broad limestone plain with innumerable limestone sinkholes offered a nesting home for a large population of avifauna, in addition to providing agricultural opportunities. This resource may have been one of the early attractions to human settlement. The lower portion of Honouliuli Valley in the ‘Ewa plain offered rich level alluvial soils with plentiful water for irrigation from the stream as well as abundant springs. This irrigable land would have stretched well up the valley, consisting of an extensive upland forest zone extending as much as 12 miles inland from the edge of the coastal plain. As Handy and Handy (1972:469) have pointed out, the forest was much more distant from the lowlands here than on the windward coast, but it was much more extensive. Much of the upper reaches of the *ahupua‘a* contained biologically diverse forest with *kukui* (candlenut; *Aleurites moluccana*), *‘ōhi‘a lehua* (*Metrosideros macropus*), *‘iliahi* (sandalwood; *Santalum* spp.), *hau* (beach hibiscus; *Hibiscus tiliaceus*), *kī*, and banana. These valuable resources contributed to the richness of Honouliuli and the ‘Ewa Moku.

Proceeding *mauka* (inland, toward the mountains) from the ‘Ewa Plain, a series of gulches marks the landscape. The largest of these is Honouliuli Gulch toward the east side of the plain that drains into West Loch. The gulch is bisected by the Honouliuli Stream, the primary water body of the Honouliuli Watershed. The tributary valley of Honouliuli Gulch is understood as an intermittent stream but may have run with water more frequently in traditional Hawaiian times prior to water diversion for commercial agriculture. The “perennial/intermittent” Honouliuli

Stream and its tributaries “have a total stream length of 32.5 miles” (O‘ahu Resource Conservation and Development Council 2013:16).

To the west are fairly steep gradient gulches forming a more linear than dendritic drainage pattern. The major gulches from east to west are Awanui, Pālailai, Makaīwa, Waimānalo, and Limaloa. These gulches are steep-sided in the uplands and generally of a high gradient until they emerge onto the flat ‘Ewa plain. The alluvium they have carried has spread out in delta fashion over the *mauka* portions of the plain, which comprise a dramatic depositional environment at the stream gradient change. These gulches are generally dry, but during seasonal Kona storms they carry immense quantities of runoff onto the plain and into the ocean. As typical drainages in arid slopes, they either rage uncontrollably or are dry, and do not form stable water sources for traditional agriculture in their upper reaches. The western Honouliuli gulches, in contrast to those draining into Pu‘uloa (Pearl Harbor) to the east, do not have valleys suitable for extensive irrigated agriculture. However, this lack is more than compensated by the rich watered lowlands at the base of Honouliuli Gulch.

The lowlands fronting the west loch of Pu‘uloa (Kaihuopala‘ai) were suitable for the cultivation of the traditional Hawaiian staple crop, *kalo*. For spiritual and dietary reasons, *kalo* (taro) was a sacred staple in the Hawaiian diet. According to Hawaiian mythology, man was born from the taro plant.

However, by the mid-nineteenth century traditional agriculture was becoming quickly supplanted by large-scale commercial ventures. The focus of agricultural production soon shifted toward sugarcane and pineapple, with concerted efforts made to turn open space into plantations. The drilling for artesian wells began in 1879 with cattle rancher James Campbell on the ‘Ewa Plains (Board of Water Supply, City and County of Honolulu 2017). Utilizing a well driller, Campbell drilled several hundred feet down until reaching a large supply of pure, fresh water (Board of Water Supply, City and County of Honolulu 2017). According to the Board of Water Supply (2017):

This discovery led to a water boom on the island, as ranchers and plantation developers began drilling furiously for more of the precious resource. Within 20 years, the boom came to a bust. Artesian wells, abandoned and neglected, wasted millions of gallons of water. By the turn of the century, Oahu suffered a water panic. Wells were salting up. Water levels were dropping. The problem was that the system had grown too much, too fast and too haphazardly. [Board of Water Supply, City and County of Honolulu 2017]

Campbell’s first well was named *Waianiani* (“crystal waters”) by the *kama‘āina* of Honouliuli (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho‘okuleana 2014). Campbell’s original Honouliuli well was finally sealed by the City and County of Honolulu in 1939 (Ho‘okuleana 2014).

1.4.5 *Ka Lihikai a me Ka Moana* (the Coast and Ocean)

Several naming traditions exist for Honouliuli, one being that it was named for the waters of Pu‘uloa (Jarrett 1930:22), which marks the eastern boundary of the *ahupua‘a*. According to *mo‘olelo*, Pu‘uloa was a storied place due to the presence of Ka‘ahupāhau. Ka‘ahupāhau, queen

of all sharks of O‘ahu, dwelled in a large cavern on the Honouliuli side of Pearl Harbor (Clark 1977:69).

The Hawaiians knew Pearl Harbor as Pu‘uloa, and they believed that there, dwelling in a large cavern on the Honouliuli side of the harbor, Ka‘ahupāhau, the queen of all sharks on O‘ahu, made her home. Her chief guard was a brother shark, who lived in a pit at the entrance to the lochs. The Hawaiian people said the drydock was built over the cavern of Ka‘ahupāhau’s son, who also lived in Pu‘uloa. Angered by the violation of his home, the shark prince destroyed the imposing structure. The engineers in charge of the project attributed the collapse of the foundation to hydrostatic pressure. Whatever the cause, several years’ work was wrecked within minutes [...] this time, before starting to rebuild, they asked the Hawaiians to bless the site. After that the work continued without further trouble. [Clark 1977:69–70]

According to Malo, the ocean was divided into smaller divisions, stretching from ‘*ae kai* (water’s edge) to *moana* (pelagic zone) (Malo 1951:25–26). Outside the coastal areas was the belt known as *kua-au*, where the shoal water ended (Malo 1951:26). Further out was the *kai-au*, deeper waters designated for surfing, swimming, or spearing squid (Malo 1951:26). For Honouliuli Ahupua‘a, specifically between Kalaeloa and Kūalaka‘i, the sea of this region was identified as Hilo-one. It appears the name is drawn from an on-shore locality known as Hilo-one. According to Maly and Maly (2012),

That place, Hilo-one, [...] is situated on the northern side of Kualakai, towards Kalaeloa. And the name of the spring in which Hiiaka looked and saw her reflection was Hoakalei (Reflection of a lei). It was at this place that Hiiaka saw the two lehua trees growing, from which she picked the blossoms to make her four garlands. [Maly and Maly 2012:125]

While walking the coastline between Kalaeloa and Kūalaka‘i, the goddess sang out the following:

<i>O Hiiaka ka wahine,</i>	Hiiaka is the woman
<i>Ke ako la i ka pua o Hoakalei,</i>	Who picked the flowers of Hoakalei,
<i>Ke kui la, ke uo la i ka manai</i>	And with a needle strung and made them into
<i>Eha ka lei, ka apana lei lehua a ka wahine</i>	four garlands, the sectioned lei of the woman,
<i>Kuu pokii.</i>	O my younger sibling.
<i>Kuu pokii mai ke ehu makani o lalo.</i>	My younger sibling who came from the place
<i>Lulumi aku la i ke kai o Hilo-one.</i>	where the dusty wind rises from below.
<i>No Hilo ke aloha, Aloha wale ka lei-e.</i>	Overtaken in the sea of Hilo-one.
[Ka Na‘i Aupuni 1906]	The aloha is for Hilo, Love for the lei.
	[Maly and Maly 2012:125]

Moving westward from Pu‘uloa are Iroquis Beach, Pu‘uloa Beach Park (formerly ‘Ewa Beach Park), and One‘ula Beach Park, in addition to Keahi Point. These beaches comprise the coastal

portion of Honouliuli; use of these beaches increased during the plantation era when employees of the nearby sugar plantations utilized the coastal areas for subsistence and recreation.

Traditionally, the seashore and ocean areas were vitally important for resource extraction in the early days of settlement; these areas provided both physical and spiritual sustenance (NOAA 2017) to the people of Honouliuli. Within the *ahupua'a* there are 12 miles of coastline with continuous shallow fringing reef, which offers rich marine resources in addition to the 4 miles of waterfront along the west side of the West Loch of Pu'uloa that offered extensive fisheries (mullet, *awa* [*Chanos chanos*; milkfish], shellfish) as well as frontage suitable for development of fishponds (e.g., Laulaunui). Fishermen along the coast maintained a respected status within traditional Hawaiian society; Kanahale asserts that "early Hawaiians regarded fishing as the oldest, and hence the most prestigious of professions" (Kanahale 1995:17).

According to Charles Howard Edmondson (1946:5), the coastal waters of Pearl Harbor were "a natural aquarium for many varieties of marine animals." Titcomb (1952:7) identifies the Pearl Harbor area as the only large natural inland lagoon, famous for its fish and fishponds. The *nehu* (anchovy; *Anchoviella purpurea*) was said to fill the lochs of Pearl Harbor. Citing Kamakau, Margaret Titcomb writes that the *nehu*, "filled the lochs from the channel of Pu'uloa (Pearl Harbor) inland to the Ewas" (Titcomb 1952:97). Due to the presence of the *nehu*, the *kama'āina* of Honouliuli and 'Ewa developed this saying: "*He kai puhi nehu, puhi lala ke kai o 'Ewa e, e noho i ka la'i o 'Ewa nui a La'akona*" ('A sea that blows up nehu, blows them up in rows, is 'Ewa, until they rest in the calm of great 'Ewa-a-La'akona') (Kamakau 1991a:84).

1.5 Built Environment

Kunia Camp is located in the State of Hawai'i, on the island of O'ahu, in the County of Honolulu, and lies along Hawai'i Route 750, which runs northwest of Pearl Harbor. Historically the area surrounding the village has been used for large-scale pineapple and sugarcane cultivation. The areas outside Kunia Village that have not been impacted by agricultural activities have been utilized for ranching or historic military purposes.

Based on an architectural review in the National Register of Historic Places Registration Form for Kunia Village (Bacon 2012; Appendix A), the camp can be divided into two distinct areas, Old Camp and New Camp. The Old Camp comprises the northern portion of the project area with the New Camp to the southeast. In the Old Camp are the Kunia School and associated administrative buildings, Kunia Gymnasium, and Kunia Chapel. In the new camp are the Kunia Store, Agricultural Research Building, and the Main Office Building.

Section 2 Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka ‘ao* (legends), *wahi pana* (storied places), *‘ōlelo no ‘eau* (proverbs), *oli* (chants), *mele* (songs), traditional *mo ‘olelo* (stories), traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. Other archives and libraries including the Hawai‘i State Archives, the Bishop Museum Archives, the University of Hawai‘i at Mānoa’s Hamilton Library, Ulukau, the Hawaiian Electronic Library (Ulukau.org 2014), the State Historic Preservation Division (SHPD) Library, the State of Hawai‘i Land Survey Division, the Hawaiian Historical Society, and the Hawaiian Mission Houses Historic Site and Archives are also repositories where CSH cultural researchers gather information. Information on Land Commission Awards (LCAs) were accessed via Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2022), the Office of Hawaiian Affairs (OHA) Papakilo Database (Office of Hawaiian Affairs 2015), and the Ava Konohiki Ancestral Visions of ‘Āina website (Ava Konohiki 2015).

2.2 Community Consultation

2.2.1 Scoping for Participants

The CSH cultural department commences our consultation efforts by utilizing our previous community contact list to facilitate the interview process. We then review an in-house database of *kūpuna* (elders), *kama ‘āina*, cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHOs; includes Hawaiian Civic Clubs and those listed on the Department of Interior’s NHO list), and community groups. CSH also contacts agencies such as SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response on the project and to identify lineal and cultural descendants, individuals and/or NHO with cultural expertise and/or knowledge of the study area. CSH is also open to referrals and new contacts. Outreach was attempted with 50 parties.

2.2.2 “Talk Story” Sessions

Prior to the interview, CSH cultural researchers explain the nature of cultural consultation, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (knowledge) and *mana ‘o* (thought, opinion) will be used in the report. The interviewee is given an Authorization and Release Form to read and sign.

“Talk Story” sessions range from the formal (e.g., sit down and *kūkā* [consultation, discussion] in the participant’s place of choice over set interview questions) to the informal (e.g., email, telephone, Zoom-type, or face-to-face consultation, hiking to cultural sites near the study area and asking questions based on findings during the field outing). In some cases, interviews are recorded and transcribed later.

CSH also conducts group interviews, as appropriate, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewees' answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) adding missing details to *mo'olelo*.

CSH seeks *kōkua* (assistance) and guidance in identifying past and current traditional cultural practices of the study area. Those aspects include general history of the *ahupua'a*; past and present land use of the study area; knowledge of cultural sites (for example, *wahi pana*, archaeological sites, and burials); knowledge of traditional gathering practices (past and present) within the study area; cultural associations (*ka'ao* and *mo'olelo*); referrals; and any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the study area.

2.2.3 Interview Completion

After an interview, CSH cultural researchers transcribe and create an interview summary based on information provided by the interviewee. Cultural researchers give a copy of the transcription and interview summary to the interviewee for review and ask that they make any necessary edits. Once the interviewee has made those edits, CSH incorporates their *'ike* and *mana'o* into the report. When the draft report is submitted to the client, cultural researchers then prepare a finalized packet of the participant's transcription, interview summary, and any photos taken during the interview. We also include a thank you card and honoraria.

"I ulu no ka lālā i ke kumu—the branches grow because of the trunk," is an *'ōlelo no'eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: "Without our ancestors we would not be here" (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we do not lose their wisdom and words. We routinely check obituaries and gather information from other community contacts if we have lost our *kūpuna*. CSH makes it a point to reach out to the *'ohana* of our *kūpuna* who have passed on and pay our respects including sending past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 Traditional Accounts

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained lessons while interweaving elements of Hawaiian lifestyles, genealogy, history, relationships, arts, and the natural environment (Pukui and Green 1995:IX). According to Pukui and Green (1995), storytelling is better heard than read for much becomes lost in the transfer from the spoken to the written word and *ka ‘ao* are often full of *kaona* or double meanings.

Nā ka ‘ao are defined by Pukui and Elbert (1986:108) as a “legend, tale [...], romance, [and/or], fiction.” *Nā ka ‘ao* may be thought of as oral literature or legends, often fictional or mythic in origin, and have been “consciously composed to tickle the fancy rather than to inform the mind as to supposed events” (Beckwith 1970:1). Conversely, Pukui and Elbert (1986:254) define *mo ‘olelo* as a “story, tale, myth, history, [and/or] tradition.” The *mo ‘olelo* are generally traditional stories about the gods, historic figures or stories which cover historic events and locate the events with known places. *Mo ‘olelo* are often intimately connected to a tangible place or space (*wahi pana*).

In differentiating *ka ‘ao* and *mo ‘olelo* it may be useful to think of *ka ‘ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. *Mo ‘olelo* on the other hand, reference a host of characters from *ali ‘i* (royalty) to *akua*; *kupua* (supernatural beings) to *maka ‘āinana* (commoners); and discuss their varied and complex interactions within the *wao kānaka* (realm of man). Beckwith elaborates, “In reality, the distinction between *ka ‘ao* as fiction and *mo ‘olelo* as fact cannot be pressed too closely. It is rather in the intention than in the fact” (Beckwith 1970:1). Thus a so-called *mo ‘olelo*, which may be enlivened by fantastic adventures of *kupua*, “nevertheless corresponds with the Hawaiian view of the relation between nature and man” (Beckwith 1970:1).

Both *ka ‘ao* and *mo ‘olelo* provide important insight into a specific geographical area, adding to a rich fabric of traditional knowledge. The preservation and passing on of these stories through oration remains a highly valued tradition. Additionally, oral traditions associated with the study area communicate the intrinsic value and meaning of a place, specifically its meaning to both *kama ‘āina* as well as others who also value that place.

The following section presents traditional accounts of ancient Hawaiians living in the vicinity of the project area. Many relate an age of mythical characters whose epic adventures inadvertently lead to the Hawaiian race of *ali ‘i* and *maka ‘āinana*. The *ka ‘ao* in and around the project area shared below are some of the oldest Hawaiian stories that have survived; they still speak to the characteristics and environment of the area and its people.

3.1 *Ka ‘ao and Mo ‘olelo* (Legends and Stories)

3.1.1 The Naming of Honouliuli

Honouliuli is the largest *ahupua‘a* in the *moku* of ‘Ewa. One translation of ‘Ewa is given as “unequal” (*Saturday Press*, 11 August 1883). Others translate the word as “strayed” and associate it with the legends of the gods Kāne and Kanaloa:

When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of the land they would throw a stone and where the stone fell

would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by the name. The stone that strayed. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

Honouliuli means “dark water,” “dark bay,” or “blue harbor,” and was named for the waters of Pearl Harbor (Jarrett 1930:22), which marks the eastern boundary of the *ahupua‘a*. The Hawaiians called Pearl Harbor, Pu‘uloa (*lit.* long hill). Another explanation for the names comes from the “Legend of Lepeamoa,” the chicken-girl of Pālama. In this legend, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa. The land of Honouliuli was named for the grandfather of Lepeamoa (Westervelt 1923:164–184).

It is likely that the boundaries of the westernmost *ahupua‘a* of ‘Ewa were often contested with people of the neighboring Wai‘anae District. The ‘Ewa people could cite divine sanction that the dividing point was between two hills at Pili o Kahe:

This is a spot where two small hills of the Waianae range come down parallel on the boundary between Honouliuli and Nanakuli (Ewa and Waianae). The ancient Hawaiians said the hill on the Ewa side was the male and the hill on the Waianae side was female. The stone was found on the Waianae side hill and the place is known as Pili o Kahe (Pili = to cling to, Kahe = to flow). The name refers, therefore, to the female or Waianae side hill. And that is where the boundary between the two districts runs. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

3.1.2 Pu‘okapolei, Astronomical Marker and Heiau

Pu‘uokapolei was the primary landmark for travelers on the cross-*ahupua‘a* trail that ran from Pearl Harbor in the east to Wai‘anae in the West (‘Ī‘Ī 1959:27, 29; Nakuina 1992:54; E.M. Nakuina 1904 in Sterling and Summers 1978:34). *Pu‘u* means “hill” and *Kapolei* means “beloved Kapo,” a reference to the sister of the goddess, Pele. Kamakau says ancient Hawaiians used Pu‘uokapolei as an astronomical marker to designate the seasons:

[...] the Oahu people who reckoned the time (Oahu *po‘e helu*) called the season Kau for the setting of the sun from Pu‘uokapolei, a hill in Honouliuli, ‘Ewa, to the opening of Mahinaona (*i ke kawaha o Mahinaona*). When the sun moved south from Pu‘uokapolei—and during the season of the sun in the south—for the coming of coolness and for the sprouting of new buds on growing things—the season was called Ho‘oilo [winter, rainy season]. [Kamakau 1976:14]

A ceremony commemorating the changing of the seasons is still observed each year in the beginning of May at Waikīkī and Honouliuli. This ceremony was documented in a previous cultural impact assessment conducted by CSH (Genz et al. 2012). Sam ‘Ohukani‘ōhi‘a Gon III, Na Wa‘a Lalani Kahuna O Pu‘u Koholā, and the late Kumu Hula John Keola Lake’s *hula hālau* (*hula* instruction) perform *oli* and *hula* (dance), explaining that the *kilo hōkū* (astronomers) of O‘ahu observed how, from the perspective of Waikīkī, the sun sets in a southerly direction over the ocean during the winter solstice and in a northerly direction behind the ‘Ewa ridgeline during

the summer solstice. During the springtime, the position of the setting sun marches steadily northward each day, and at the beginning of May, the sun sets behind Pu'uokapolei, perfectly centered within its depression from the vantage point of Kūpalaha Heiau just west of the Waikīkī Aquarium. A coinciding ceremony at a *heiau* (pre-Christian place of worship) on Pu'uokapolei similarly views the setting of the sun behind Pu'ula'ila'i farther west, and a line of sight extending eastward from Pu'ula'ila'i, Pu'uokapolei, and the former site of Kūpalaha Heiau ends at the closely associated Papa'ena'ena Heiau. Mr. Gon suggests Papa'ena'ena Heiau may have been part of the ceremonies of this astronomical event.

3.1.3 Kamapua'a and Kamaunuanoho at Pu'uokapolei

Pu'uokapolei was also known to be the home of Kamapua'a's grandmother, Kamaunuanoho, one of the three migrants from Kahiki that were ancestors to the people of O'ahu (Legend of Kamapuaa, Fornander 1918-1919:5[2]:318; Kahiolo 1978:81, 107). Kamapua'a, the Hawaiian pig god, once lived in Kaluanui on the windward side of O'ahu, but he escaped to 'Ewa when he was pursued by the chief Olopana.

Kamapua'a subsequently conquered most of the island of O'ahu, and, installing his grandmother [Kamaunuanoho] as queen, took her to Puuokapolei, the lesser of the two hillocks forming the southeastern spur of the Wai'anae Mountain Range, and made her establish her court there. This was to compel the people who were to pay tribute to bring all the necessities of life from a distance, to show his absolute power over all. [Nakuina 1904:50]

Emma Nakuina goes on to note, "A very short time ago [prior to 1904] the foundations of Kamaunuanoho's house could still be seen at Puuokapolei" (Nakuina 1904:50). Another account in the Hawaiian newspaper *Ka Loea Kālai'āina* (13 January 1900 in Sterling and Summers 1978:34) speaks of Kekele'aikū, the older brother of Kamapua'a, who also lived on Pu'uokapolei.

In another version of the *mo'olelo*, Pele and Kamapua'a meet and a battle ensues on Hawai'i Island. Kamapua'a tells Kekele'aikū, "Listen to me, elder brother. You wait here. When you smell the stench of burning bristles, then you must assume I am dead. However, if indeed you do not smell the stench of the bristles, you will know that your younger brother has not been harmed and that he has 'eaten of the cooked taro'" (Kame'eleihiwa 1996:62). Kamapua'a travels to Hawai'i Island where Pele chases him with fire out of the *lehua* (*Metrosideros*) forest. Kamapua'a ran from Pele but could only cling to an 'ama'uma'u (*Sadleria cyatheoides*) fern (Kame'eleihiwa 1996:95). The fire continued to burn around Kamapua'a as he clung for his life. His bristles began to burn as well, sending a stench of burning pig bristles around the Hawaiian Islands. Kekele'aikū smelled the stench of burning pig bristles and began to cry, thinking that his brother perished in battle with Pele (Kame'eleihiwa 1996:95). Kekele'aikū then hung himself, deeply saddened for the loss of his beloved brother, Kamapua'a. Kekele'aikū's body was left at Pu'uokapolei with their grandmother.

Kamapua'a eventually makes his way back to O'ahu where he begins to call to Kekele'aikū's spirit:

<i>Ho 'ālohaloha main a ana ia 'u ku 'u kaikua 'ana</i>	Show me your love and compassion, O my elder brother
<i>'O ka pili manu kahi a kāua e haele pū ai</i>	In the bird-catching places where we two have traveled together

<i>I ke kula o Kahinahina</i>	On the plain of Kahinahina
<i>Iā ‘Oloheimiki</i>	At ‘Oloheimiki
<i>Iā ‘olua la ke kia holomanu</i>	You two had the bird-snaring rod
<i>Ia ‘u la ke kia mahi ‘ai</i>	I had the farming rod
<i>I na kea ali ‘i kaikaina</i>	Made by the younger brother chief
<i>‘O koko maka pehupehu i ka lā e—</i>	Of the bloody eyes, swollen in the sun
<i>E ha ‘a—e, ha ‘a kai ‘a ha ‘o o</i>	Dancing, dancing is the humble fish of
<i>Ko ‘olina—e</i>	Ko ‘olina
<i>‘O nā pa ‘ako pani ua o Waiku ‘i la</i>	Of the rain-filled coral beds of Waiku ‘i
<i>Iā Waku ‘i ho ‘i e—</i>	Yes, at Waiku ‘i!
<i>Ho ‘ohali i kana i ‘a ma waho</i>	Bearing his fish outside
<i>Ma loko ka ‘i ‘o, ma waho ka iwi</i>	Inside is the flesh, outside are the bones
<i>‘O ka pipipi kai welawela</i>	O the <i>pipipi</i> of the burning sea
<i>‘O Kahunaiki ‘ulalena nei la e—</i>	O this Kahunaiki ‘ulalena
<i>‘O kou inoa ia, e ō mai ‘oe!</i>	Here is your name chant—answer!
[Kame‘eleihiwa 1996:130]	

The spirt of Kekele‘aikū returned and Kamapua‘a urged his brother’s spirit to return to Pu‘uokapolei to where his body lay with his grandmothers, Kamaunuanoho and Wahineokama‘o (Kame‘eleihiwa 1996:131).

3.1.4 Kahalaopuna at Pōhākea Pass

One of the most popular legends of O‘ahu is that of Kahalaopuna (or Kaha), a young woman of Mānoa who was slandered by others and then killed by her betrothed, Kauhi, a chief from Ko‘olau, O‘ahu. While the numerous accounts (e.g., Day 1906:1-11; Fornander 1918-1919:5[1]:188–192; Kalākaua 1990:511–522; Nakuina 1904:41–45; Patton 1932:41–49; Skinner 1971:220–223; Thrum 1907:118–132) vary in details, they typically have Kahalaopuna slain and then revived repeatedly with the aid of a protective owl spirit. Kauhi forces her to hike west from Mānoa through the uplands until they get to Pōhākea Pass through the southern Wai‘ānae Range in north Honouliuli. At Pōhākea Pass, Kauhi beats her with a stick until she is very dead (“*Ia hahau ana a Kauhi i ka lā ‘au, make loa o Kahalaopuna*”). Her spirit (*‘uhane*) flies up into a *lehua* tree and chants for someone to go notify her parents of her fate. Upon hearing the news, her parents fetch Kahalaopuna back to Mānoa and she is restored to life.

3.1.5 Palila

In the *mo‘olelo* of the hero Palila, the famous warrior had a supernatural war club. He could throw the club a long distance, hang on to the end of it, and fly along the club’s path. Using this power, he touched down in several places in Honouliuli, Waipi‘o, and Waikele. One day he used his supernatural war club to carry himself to Ka‘ena Point at Wai‘ānae, and from there east across the district of ‘Ewa. Fornander writes,

Ha ‘alele keia ia Ka ‘ena, hele mai la a Kalena, a Pōhākea, Maunauna, Kānehoa, a ke kula o Keahumoa, nana ia ‘Ewa. Kū kēia i laila nānā i ke kū a ka ea o ka lepo i nā kākāka, e pahu aku ana kēia i ka la ‘au palau aia nei i kai o Honouliuli, kū ka ea o ka lepo, nu lalo o ka honua, me he olai la, makau nā kākāka holo a hiki i

Waikele. A hiki o Palila, i laila, e pa‘apu ana nā kānaka i ka nānā lealea a ke ‘li‘i o O‘ahu nei, oai o Ahupau.

After leaving Ka‘ena, he came to Kalena, then on to Pōhākea, then to Manuauna [a peak in Honouliuli], then to Kānehōa [a peak in Honouliuli], then to the plain of Keahumoa [upland plain from Honouliuli to Waipi‘o] and looked toward ‘Ewa. At this place he stood and looked at the dust as it ascended into the sky caused by the people who had gathered there; he then pushed his war club toward Honouliuli. When the people heard something roar like an earthquake they were afraid and they all ran to Waikele. When Palila arrived at Waikele he saw the people gathered there to witness the athletic games that were being given by the king of O‘ahu, Ahupau by name. [Fornander 1918-1919:5(1):142–143]

3.2 *Wahi Pana* (Storied Places)

Wahi pana are legendary or storied places of an area. These legendary or storied places may include a variety of natural or human-made structures. Oftentimes dating to the pre-Contact period, most *wahi pana* are in some way connected to a particular *mo‘olelo*, however, a *wahi pana* may exist without a connection to any particular story. Davianna McGregor outlines the types of natural and human-made structures that may constitute *wahi pana*:

Natural places have *mana* or spiritual power, and are sacred because of the presence of the gods, the *akua*, and the ancestral guardian spirits, the ‘*aumakua*. Human-made structures for the Hawaiian religion and family religious practices are also sacred. These structures and places include temples, and shrines, or *heiau*, for war, peace, agriculture, fishing, healing, and the like; *pu‘uhonua*, places of refuge and sanctuaries for healing and rebirth; agricultural sites and sites of food production such as the *lo‘i* pond fields and terraces slopes, ‘*auwai* irrigation ditches, and the fishponds; and special function sites such as trails, salt pans, *hōlua* slides, quarries, petroglyphs, gaming sites, and canoe landings. [McGregor 1996:22]

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or ‘*ili* (traditional land division smaller than an *ahupua‘a*), and man-made structures such as fishponds. In this way, the *wahi pana* of Honouliuli tangibly link the *kama‘āina* of Honouliuli to their past. It is common for places and landscape features to have multiple names, some of which may only be known to certain ‘*ohana* (family) or even certain individuals within an ‘*ohana*, and many have been lost, forgotten or kept secret through time. Place names also convey *kaona* and *huna* (secret) information that may even have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including individual garden plots and ‘*auwai* (water courses), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku*, *pūnāwai* (freshwater springs), and many others. According to Landgraf (1994), Hawaiian *wahi pana* “physically and poetically describes an area while revealing its historical or legendary significance” (Landgraf 1994:v). Place names and *wahi pana* of Honouliuli are identified on Figure 6.

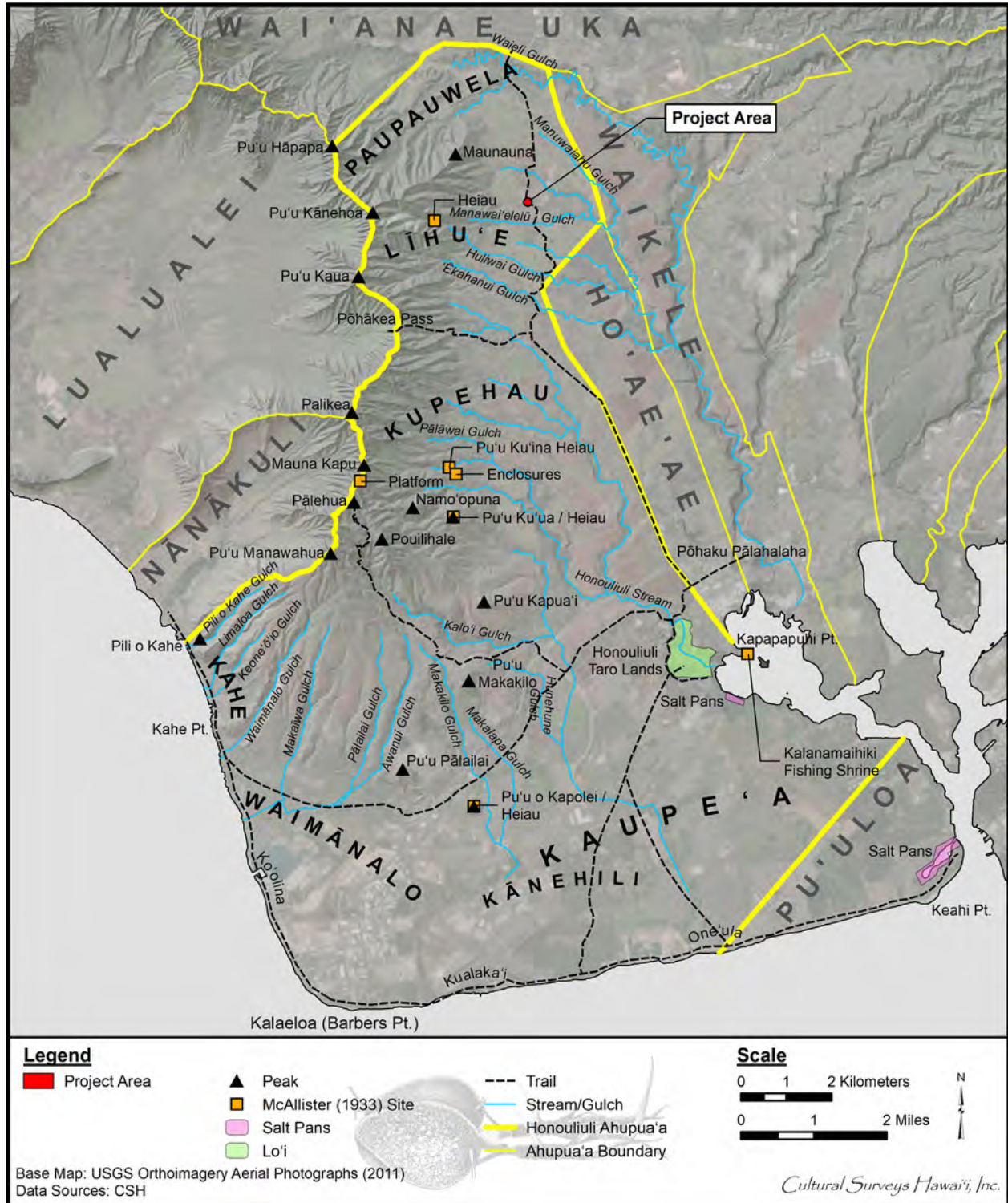


Figure 6. Overlay of traditional Hawaiian place names for Honouliuli Ahupua'a, trails and streams, McAllister archaeological sites, and the Kunia Village New Source Well project area on a (2011) USGS orthoimagery aerial photograph

3.2.1 Heiau

Heiau were pre-Contact places of worship. Construction of some *heiau* was elaborate, consisting of large communal structures, while others were simple earth terraces or shrines (McAllister 1933:8). *Heiau* are most commonly associated with important religious ceremony; large structures with platforms or altars of one or more terraces were indicative of such function (McAllister 1933:8).

Archaeologist Gilbert McAllister reports on two known *heiau* in the *ahupua'a* of Honouliuli, as well as two other sites that could have possibly been *heiau*. These *heiau* were located on Pu'u o Kapolei, on Pu'u Ku'ua, at the foot of Pu'u Kanehoa, and at the foot of Mauna Kapu (McAllister 1933).

3.2.1.1 Pu'u o Kapolei

A *heiau* was once located on Pu'u o Kapolei, but it had been destroyed by the time of McAllister's (1933:108) survey of the island in 1930. The hill was used as a point of solar reference or as a place for such observations (Fornander 1919-1920:6[2]:297). Pu'uokapolei may have been regarded as the gate of the setting sun, just as the eastern gate of Kumukahi in Puna is regarded as the gate of the rising sun; both places are associated with the Hawaiian goddess Kapō (Emerson 1915:41). This somewhat contradicts some Hawaiian cosmologies, in which Kū was the god of the rising sun, and Hina, the mother of Kamapua'a, was associated with the setting of the sun. Fornander (1919-1920:6[2]:292) states that Pu'uokapolei may have been a *leina*, jumping off point associated with the wandering souls who roamed the plains of Kaupe'a and Kānehili, *makai* (seaward) of the hill.

McAllister writes that the stones from the *heiau* supplied the rock crusher located on the side of this elevation, about 100 ft away on the ocean side. There was once a large rock shelter on the *makai* side where it is said to have been the residence of Kamapua'a and his grandmother. (McAllister 1933:108). After conquering the majority of O'ahu, he established his grandmother as queen of this *wahi pana* (Pukui et al. 1974:203).

3.2.1.2 Pu'u Ku'ua

Pu'u Ku'ua Heiau located in Palikea, Honouliuli, overlooks both Honouliuli and Nānākuli, and is at the height of approximately 1,800 ft. Most of the stones from the *heiau* were used for a cattle pen located on the *makai* side of the site. The part of the *heiau* that hadn't been cleared for pineapples has been planted in ironwoods (McAllister 1933:108).

3.2.1.3 Unidentified *heiau* at the foot of Pu'u Kanehoa

Located at the foot of Pu'u Kanehoa is a small enclosure thought to have possibly been a *heiau*. McAllister writes,

My informant, Reiney, recalls the respect the old Hawaiians had for the place when he was punching cattle with them in his youth. It is a walled enclosure 25 by 35 feet. On the inside the walls are between 2 and 3 feet high, and on the outside they range from 2 to 5 feet, depending upon the slope of the land. On three sides the walls are 2 feet wide, but the fourth is 3 feet wide. The walls are evenly faced with a fill of smaller stones. At present the site is surrounded with a heavy growth of *Lantana*; but only a thick growth of grass and two small guava bushes are in the interior,

which is most unusual unless human hands keep the interior clear. Possibly this is not a *heiau* but a small inclosure considered sacred for some reason. [McAllister 1933:107]

3.2.1.4 Unidentified *heiau* at the foot of Pu'u Kuina

Located in Aikukai, Honouliuli, at the foot of Mauna Kapu, what looked to be a terrace is all that remained when McAllister cataloged Pu'u Kuina Heiau (Site 134). He notes the inability to determine the size of the *heiau* or the number of terraces that once stood (McAllister 1933:107).

3.2.2 Plains of 'Ewa

3.2.2.1 The Plains of Kaupe'a

Several places on the 'Ewa coastal plain are associated with the *ao kuewa*, the realm of homeless souls. Samuel Kamakau explains Hawaiian beliefs of the afterlife:

There were three realms (*ao*) for the spirits of the dead [...] There were, first, the realm of the homeless souls, the *ao kuewa*; second, the realm of the ancestral spirits, the *ao 'aumakua*; and third, the realm of Milu, *ke ao o Milu*.

The *ao kuewa*, the realm of homeless souls, was also called the *ao 'auwana*, the realm of wandering souls. When a man who had no rightful place in the 'aumakua [family or personal gods] realm (*kanaka kuleana 'ole*) died, his soul would wander about and stray amongst the underbrush on the plain of Kama'oma'o on Maui, or in the *wiliwili* grove of Kaupe'a on Oahu. If his soul came to Leilono [in Hālawā, 'Ewa near Red Hill], there he would find the breadfruit tree of Leiwalo, *ka 'ulu o Leiwalo*. If it was not found by an 'aumakua soul who knew it (*i ma'a mau iaia*), or one who would help it, the soul would leap upon the decayed branch of the breadfruit tree and fall down into endless night, the *pō pau 'olo o Milu*. Or, a soul that had no rightful place in the 'aumakua realm, or who had no relative or friend (*makamaka*) there who would watch out for it and welcome it, would slip over the flat lands like a wind, until it came to a leaping place of souls, *a leina a ka 'uhane*.

On the plain of Kaupe'a beside Pu'uloa [Pearl Harbor], wandering souls could go to catch moths (*pulelehua*) and spiders (*nanana*). However, wandering souls could not go far in the places mentioned earlier before they would be found catching spiders by 'aumakua souls, and be helped to escape. [...] [Kamakau 1991a:47–49]

The breadfruit tree, Leilono, was said to have been located on the 'Ewa-Kona border, above Āliamanu. In another section of his account of the dead, Kamakau (1991b:29) calls the plain of wandering souls the "plain at Pu'uokapolei." Fornander (1919-1920:6[2]:292) states Pu'uokapolei may have been a jumping off place (also connected with the setting sun) and associated with the wandering souls who roamed the plains of Kaupe'a and Kānehili, *makai* of the hill. Kamakau also writes:

There are many who have died and have returned to say that they had no claim to an 'aumakua [realm] (*kuleana'ole*). These are the souls, it is said, who only wander upon the plain of Kama'oma'o on Maui or on the plain at Pu'uokapolei on Oahu. Spiders and moths are their food. [Kamakau 1991b:29]

This association of Pu'uokapolei and Kānehili with wandering souls is also illustrated in a lament on the death of Kahahana, the paramount chief of O'ahu, who was killed by his father, Kahekili, after Kahahana became treacherous and killed the high priest Ka'opulupulu.

<i>E newa ai o hea make i ka lā,</i>	Go carefully lest you fall dead in the sun,
<i>Akua noho la i Pu'uokapolei.</i>	The god that dwells on Kapolei hill.
<i>E hanehane mai ana ka lā i nā</i>	The sun is wailing on account of the
<i>wahine o Kamao,</i>	women of Kamao,
<i>Akua pe'e, pua 'ohai o ke kaha,</i>	A hiding god, blossoming ohai of the banks,
<i>I walea wale i ke a-</i>	Contented among the stones
<i>I ka ulu kanu a Kahai.</i>	Among the breadfruit planted by Kahai.
<i>Haina 'oe e ka oo-</i>	Thou hast spoken of by the oo-
<i>E ka manu o Kānehili.</i>	By the bird of Kānehili.
[Fornander 1919-1920:6(2):297]	

Fornander provides some notes on this lament. The god dwelling at Kapolei is the god Kahahana, stating that this is where his soul has gone. Kamao is one of the names to the door of the underworld. This lament draws an association with wandering souls and the place where the first breadfruit tree was planted by Kaha'i at Pu'uloa (Fornander 1919-1920:6[2]:304).

Pukui (1983) offers this Hawaiian saying, which places the wandering souls in a *wiliwili* grove at Kaupe'a:

Ka wiliwili o Kaupe'a.

The *wiliwili* grove of Kaupe'a

In 'Ewa, O'ahu. Said to be where homeless ghosts wander among the trees.

[Pukui 1983:180]

Pukui also shared her personal experience with the wandering spirits on the plain of Kaupe'a.

A wide plain lies back of Keahi and Pu'uloa where the homeless, friendless ghosts were said to wander about. These were the ghosts of people who were not found by their family 'aumakua or gods and taken home with them, or had not found the leaping places where they could leap into the nether world. Here [on the plain of Honouliuli] they wandered, living on the moths and spiders they caught. They were often very hungry for it was not easy to find moths or to catch them when found.

Perhaps I would never have been told of the plain of homeless ghosts if my cousin's dog had not fainted there one day. My cousin, my aunt and I were walking to Kalaeloa, Barber's Point, from Pu'uloa accompanied by Teto, the dog. She was a native dog, not the so-called poi dog of today, with upright ears and body the size of a fox terrier. For no accountable reason, Teto fell into a faint and lay still. My aunt exclaimed and sent me to fetch sea water at once which she sprinkled over the dog saying, 'Mai hana ino wale 'oukou i ka holoholona a ke kaikamahine. U oki ko 'oukou makemake 'ilio.' 'Do not harm the girl's dog. Stop your desire to have it.' Then with a prayer to her 'aumakua for help she rubbed the dog. It revived quickly and, after being carried a short way, was as frisky and lively as ever.

Then it was that my aunt told me of the homeless ghosts and declared that some of them must have wanted Teto that day because she was a real native dog, the kind that were roasted and eaten long before foreigners ever came to our shores. [Pukui 1943:60–61]

Beckwith (1970:154) has stressed that “the worst fate that could befall a soul was to be abandoned by its ‘*aumakua* (ancestral spirit) and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place.” These wandering spirits were often malicious, so the places where they wandered were avoided.

3.2.2.2 The Plains of Pukaua

The Hawaiian language newspaper *Ka Loea Kālai‘āina* (13 January 1900) relates that near Pu‘uokapolei, on the plain of Pukaua, on the *mauka* side of the road, there was a large rock. This *mo‘olelo* suggests the plain around Pu‘uokapolei was called Pukaua. The *mo‘olelo* is as follows:

If a traveler should go by the government road to Waianae, after leaving the village of gold, Honouliuli, he will first come to the plain of Puu-ainako and when that is passed, Ke-one-ae. Then there is a straight climb up to Puu-o-Kapolei and there look seaward from the government road to a small hill. That is Puu-Kapolei [...] You go down some small inclines, then to a plain. This plain is Pukaua and on the mauka side of the road, you will see a large rock standing on the plain [...] There were two supernatural old women or rather peculiar women with strange powers and Puukaua belonged to them. While they were down fishing at Kualakai [near Barbers Point] in the evening, they caught these things, aama crabs (*Grapsus tenuicrustatus*), pipipi shellfish (*Nerita picea*), and whatever they could get with their hands. As they were returning to the plain from the shore and thinking of getting home while it was yet dark, they failed for they met a one-eyed person [bad omen]. It became light as they came near to the plain, so that passing people were distinguishable. They were still below the road and became frightened lest they be seen by men. They began to run—running, leaping, falling, sprawling, rising up and running on, without a thought of the a‘ama crabs and seaweeds that dropped on the way, so long as they would reach the upper side of the road. They did not go far for by then it was broad daylight. One woman said to the other, ‘Let us hide lest people see us,’ and so they hid. Their bodies turned into stone and that is one of the famous things on this plain to this day, the stone body.

This is the end of these strange women. When one visits the plain, it will do no harm to glance on the upper side of the road and see them standing on the plain. [*Ka Loea Kālai‘āina*, 13 January 1900, translation in Sterling and Summers 1978:39]

In another version of this story, the two women met Hi‘iaka as she journeyed toward the ‘Ewa coast. The women were *mo‘o* (lizard or water spirit) and were afraid Hi‘iaka would kill them, so they changed into their lizard form. One of the lizards hid in a little space on a stone beside the coastal trail, and the other hid nearby (*Ka Hōkū o Hawai‘i*, 15 February 1927, translated in Maly 1997:19). From that time on the stone was known as “Pe‘e-kāua,” meaning “we two hidden.” Hi‘iaka greeted the two women but did not harm them, and passed on.

When she reached Pu‘uokapolei, she also greeted two old women who lived at an ‘*ohai* (*Sesbania tomentosa*) grove on the hill. These women were named Pu‘uokapolei and Nāwahineokama‘oma‘o (*Ka Hōkū o Hawai‘i*, 22 February 1927, translated in Maly 1997:19). As she continued her travels, she looked to the ocean and saw the canoe carrying Lohi‘au:

<i>Ku‘u kāne i ke awa lau o Pu‘uloa</i>	My man on the many harbored sea of Pu‘uloa
<i>Mai ke kula o Pe‘ekāua ke noho</i>	As seen from the plain of Pe‘ekāua
<i>E noho kāua i ke kaha o ka ‘ōhai</i>	Let us dwell upon the ‘ <i>ōhai</i> covered shore
<i>I ka wiliwili i ka pua o ka lau noni</i>	Where the <i>noni</i> blossoms are twisted together
<i>O ka ihona i Kānehili la</i>	Descending along Kānehili
<i>Ua hili ho‘i au-e</i>	I am winding along.

[*Ka Hōkū o Hawai‘i*, 22 February 1927, translated in Maly 1997:20]

3.2.2.3 The Inland Plain of Keahumoa

In several legends of ‘Ewa, mention is made of the “plain of Keahumoa.” John Papa ‘Ī‘ī (1959:96) has this plain opposite the trail to Pōhakea Pass, stretching across the *ahupua‘a* of Honouliuli and Hō‘ae‘ae. McAllister (1933:107) states that the plain was west of Kīpapa Gulch in Waikele. It is also mentioned in legends of Waipi‘o. Thus, this is probably a general name for the flat plain *mauka* of the productive floodplain area directly adjacent to Pearl Harbor.

3.2.2.3.1 Legend of Nāmakaokapao‘o

Nāmakaokapao‘o was a Hawaiian hero of legendary strength. Nāmakaokapao‘o’s mother was Pokai and his father was Kaulukahai, a great chief of Kahiki, the ancestral home of the Hawaiians. The two met in Hō‘ae‘ae and conceived their child there. The father returned to his home in Kahiki before the birth of his son, leaving his O‘ahu family destitute. A man named Puali‘i saw Pokai and married her. The couple then resided on the plains of Keahumoa, planting sweet potatoes. Nāmakaokapao‘o was a small, brave child who took a dislike to his stepfather, and pulled up the sweet potatoes Puali‘i had planted at their home in Keahumoa. When Puali‘i came after Nāmakaokapao‘o with an axe, Nāmakaokapao‘o delivered a death prayer against him, and slew Puali‘i, hurling his head into a cave in Waipouli, near the beach at Honouliuli (Fornander 1918-1919:5[2]:274–276).

3.2.2.3.2 Legend of Pikoi

Pikoi was a legendary hero, the son of a crow (‘*alalā*) and brother to five god-sisters in the form of rats. He was famous for his ability to shoot arrows, and often made bets that he could hit rats from a long distance (Fornander 1916-1917:4[3]:450–463). Pikoi’s skill was commemorated in a saying (Pukui 1983:200):

<i>Ku aku la i ka pana a</i>	Shot by the arrow of Pikoi-[son]
<i>Pikoi-a-ka-‘alalā, keiki pana</i>	of-the-crow, the expert rat-shooter
<i>‘iole o ke kula o Keahumoa.</i>	Of the plain of Keahumoa.

[Pukui 1983:200]

3.2.2.3.3 The Demi-god Māui

In the stories of the demi-god Māui, Keahumoa is the home of Māui’s grandfather, Kūlokele (Kū-honeycreeper). One day, Māui’s wife, Kumulama, was stolen by the chief Pe‘ape‘amakawalu, called the eight-eyed-bat, who is identified in the creation chant, *Kumulipo*, as the octopus god (Beckwith 1951:136). The chief disappeared with Kumulama in the sky beyond the sea, and escaped so quickly that Māui could not catch him. To recover his wife, Māui’s mother advised him to visit the hut of his grandfather at Keahumoa:

Maui went as directed until he arrived at the hut; he peeped in but there was no one inside. He looked at the potato field on the other side of Poha-kea, toward Honouliuli, but could see no one. He then ascended a hill, and while he stood there looking, he saw a man coming toward Waipahu with a load of potato leaves, one pack of which, it is said, would cover the whole land of Keahumoa. [Thrum 1923:253–254]

Kūlokele made a *moku-manu* (“bird-ship”) for Māui, who entered the body of the bird and flew to Moanalua, the land of the chief Pe‘ape‘amakawalu. This chief claimed the bird as his own when it landed on a sacred box and took it with him into the house he shared with Māui’s wife. When Peapeamakawalu fell asleep, Māui killed him, cut off his head, and flew away back to O‘ahu with his wife and the chief’s head (Thrum 1923:252–259).

3.2.3 Paupauwela and Lihue

Paupauwela, also spelled Popouwela (derivation unknown), is the name of the land area in the extreme *mauka* section of Honouliuli Ahupua‘a. The land area of Lihue is just *makai* of this land, and extends into the *ahupua‘a* of Waipi‘o (adjacent to the eastern border of Honouliuli). Both place names are mentioned in a chant recorded by Abraham Fornander, which was composed as a *mele* for the O‘ahu king, Kūali‘i, as he was preparing to battle Kuiaia, the chief of Wai‘anae:

<i>Ihea, ihea la ke kahua,</i>	Where? Where is the battle field
<i>Paio ai o ke koa-a?</i>	Where the warrior is to fight?
<i>I kai i kahua i Kalena,</i>	On the field of Kalena,
<i>I Manini, i Hanini</i>	At Manini, at Hanini,
<i>I ninia i ka wai akua,</i>	Where was poured the water of the god
<i>I ko hana i Malamanui</i>	By your work at Malamanui;
<i>Ka luna o Kapapa, i Paupauwela,</i>	On the heights of Kapapa, at Paupauwela,
<i>I ka hilinai i ke kalele,</i>	Where they lean and rest;
<i>Ka hala o Halahalanui maauea,</i>	At the <i>hala</i> trees of indolent Halahalanui,
<i>E kula ohia ke Pule-e,</i>	At the <i>ohia</i> grove of Pule-e
<i>Ke ‘kua o Lono o Makalii</i>	The god of Lono, of Makalii
<i>Ka lala aalao Ukulonoku,</i>	The fragrant branch of the Ukulonoku,
<i>No Kona paha, no Lihue.</i>	Mayhap from Kona, from Lihue,
<i>No ka la i Maunauna,</i>	For the day at Maunauna
<i>No ka wai i Paupauwela.</i>	For the water at Paupauwela.
<i>Ula ka wai i Paupauwela,</i>	Red is the water of Paupauwela,
<i>Ke kilau o Malamani</i>	From the slain at Malamani,
<i>Ka moo kilau i Kapapa.</i>	The slain on the ridge at Kapapa.

[Fornander 1916-1917:4(2):384–386]

3.2.4 Maunauna

The hill Maunauna lies between the lands of Paupauwela and Līhu‘e. One translation of Maunauna is “mountain sent [on errands].” “Two servant *mo‘o* who lived here had no keepers to supply their needs” (Pukui et al. 1974:149). It was at Maunauna, according to one tradition, that the forces of the chiefs Kūali‘i and Kuiaia of Wai‘anae met to do battle, which was averted when a *mele* honoring the god Kū was chanted (see Section 3.5.1). (Fornander 1916-1917:4[2]:348). In the Legend of Ke-ao-melemele, a woman named Paliuli traveled in this area.

In a very short time she [Paliuli] walked over the plain of Ewa; Ewa that is known as the land of the silent fish (pearl oysters) [...] She went on to the plain of Punalu‘u and turned to gaze at Maunauna point and the plain of Lihue. [Manu 1885, translation in Sterling and Summers 1978:21]

Moses Manu in recounting the Legend of Keaomelemele also makes reference to a *mo‘o* named Maunauna who lived above Līhu‘e (presumably at the landform of that name in extreme northern Honouliuli) and who was regarded as a bad lizard (*Kuokoa* 25 April 1885 in Sterling and Summers 1978:37).

Certain place names in the uplands, including Maunauna, are also mentioned in the story of Lolale’s Lament. The place of Lolale’s residence is given in King Kalākaua’s version of this story (Kalākaua 1990:232): “There lived there at that time in Lihue, in the district of Ewa, on the island of O‘ahu, a chief named Lo-Lale, son of Kalona-iki, and brother of Piliwale, the *alii-nui*, or nominal sovereign, of the island, whose court was established at Waialua.”

In this story, Lolale was a chief of O‘ahu who asked his friend Kalamakua to find him a bride (Kalākaua 1990:228–246; Skinner 1971:217–219). Kalamakua traveled to Maui and chose Kelea, the chief’s sister, and returned with her to O‘ahu; during this time the two grew close. Kelea lived with Lolale for a while, but he was a silent type who was often away from home playing sports and walking in the woodlands. Longing for Kalamakua, Kelea decided to leave her husband, Lolale who voiced no “spoken bitterness;” however, after she left, he sang this lament:

Farewell, my partner of the lowland plains,
On the waters of Pohakeo,
Above Kanehoa,
On the dark mountain spur of Mauna-una!
O, Lihue, she is gone!
Sniff the sweet scent of the grass,
The sweet scent of the wild vines
That are twisted by Waikoloa,
By the winds of Waiopua,
My flower!
As if a mote were in my eye.
The pupil of my eye is troubled;
Dimness covers my eyes. Woe is me!

[Kalākaua 1990:228–246]

3.2.5 Ka-lua-ōlohe Caves of Honouliuli

‘Ewa was famous for the many limestone caves formed in the uplifted coral, called the “Ewa Karst.” This Pleistocene limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution “pit caves” (Mylroie and Carew 1995), which are nearly universally, but erroneously, referred to as “sink holes” (Halliday 2005). These pit caves, or sinkholes, vary widely in areal extent and depth, with some of the more modest features comparable in volume to 5-gallon buckets, while some of the larger features, although usually irregularly shaped, are several meters wide and several meters deep. In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive.

Some of these caves, called *ka-lua-‘ōlohe* were inhabited by the *‘ōlohe*, a type of people that looked like other humans but had tails like dogs (Beckwith 1940:343). These people were skilled in wrestling and bone-breaking and often hid along narrow passes to rob travelers; they were also reputed to be cannibals. One famous cannibal king, Kaupe, who lived in Līhu‘e in upland Honouliuli, was an *‘ōlohe*.

The caves of Pu‘uloa were sometimes also used as burial caves. In 1849, Keali‘iahonui, son of Kaua‘i’s last king, Kaumuali‘i, died. He had once been married to the chiefess Kekau‘ōnohi, who had stayed with him until 1849. She wanted to bury her deceased-husband at sea.

It seems that by Kekauonohi’s orders, the coffin containing her late husband’s remains was removed to Puuloa, Ewa, with the view of having it afterwards taken out to sea and there sunk. It was temporarily deposited in a cavern in the coral limestone back of Puuloa, which has long been used for a burial place, and has lately been closed up. [Alexander 1907:27]

After some initial objections by the niece of Keali‘iahonui, the body was removed from the outer coffin, the rest was sunk, and the coffin was later buried somewhere in Pu‘uloa.

3.2.6 Ala Hele (Trails)

John Papa ‘Ī‘Ī describes a network of Leeward O‘ahu trails (Figure 7) which in later historic times encircled and crossed the Wai‘anae Range, allowing passage from Lualualei to Honouliuli via Pōhākea Pass (‘Ī‘Ī 1959:96-98). A map with an overlay of traditional Hawaiian place names for Honouliuli Ahupua‘a and the McAllister archaeological sites (see Figure 6) also shows these trails. Following ‘Ī‘Ī’s description, the trail to Pōhākea Pass would have passed through the present project area. An account of the use of the trail through Pōhākea Pass is described in ‘Ī‘Ī’s *Fragments of Hawaiian History*:

It was at this time that the king, chiefs, and court members left Honolulu and sailed by canoe to Waianae. Liholiho, the heir to the kingdom, went overland with Papa and others from Honolulu and spent the night at Kumelewai in Ewa [...] The travelers stopped only one night and spent the following night on the other (Wai‘anae) side of Pohakea. The elders and the children who went with them slept above Kunia, on the other side of Pohakea. [‘Ī‘Ī 1959:23]

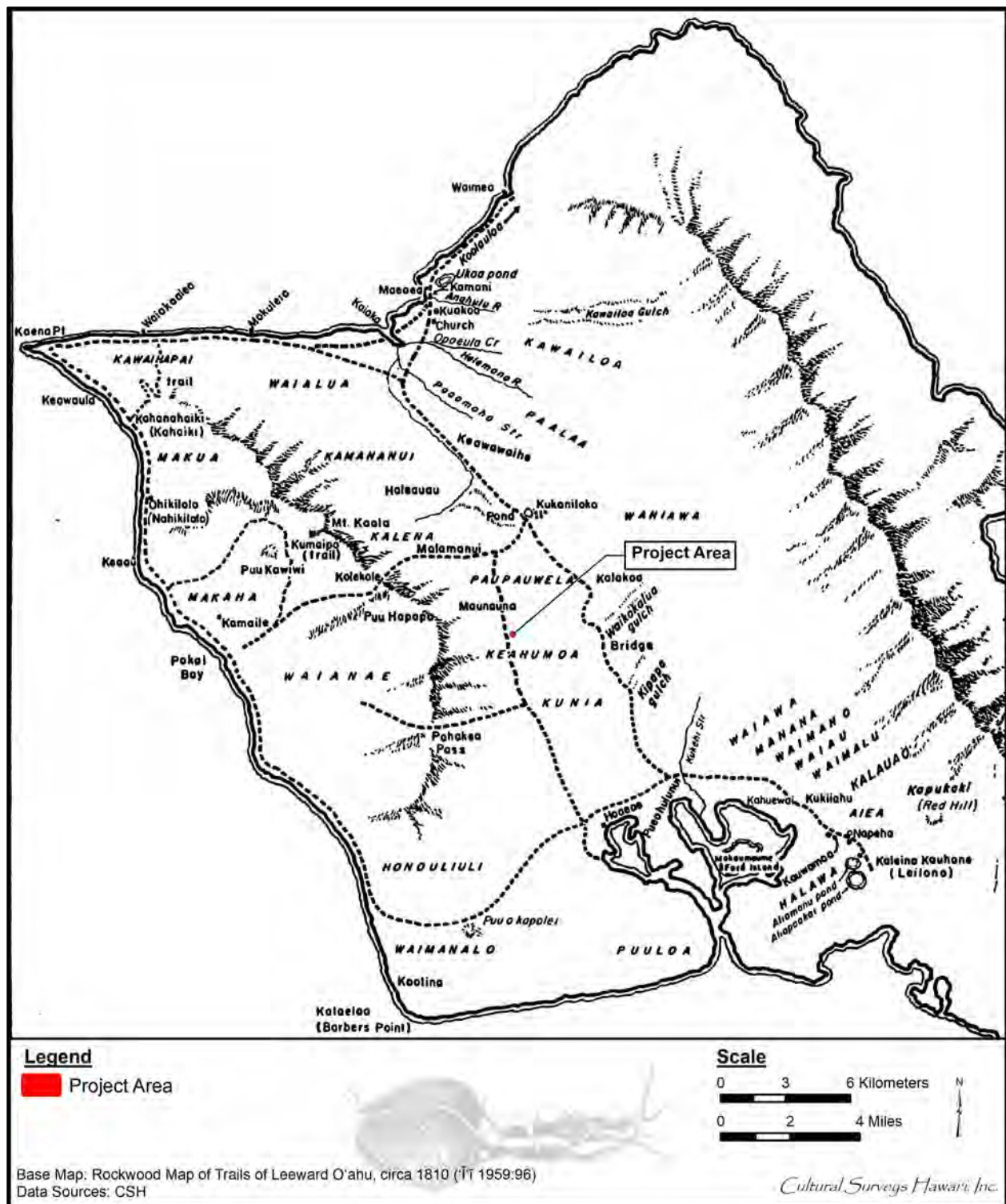


Figure 7. Overlay of the Kunia Village project area on the Rockwood map of leeward trails as described by 'Ī'ī ('Ī'ī 1959:96)

3.3 ‘Ōlelo No‘eau (Proverbs)

Hawaiian knowledge was shared by way of oral histories. One’s *leo* (voice) is often presented as *ho‘okupu* (“a tribute or gift” given to convey appreciation, to strengthen bonds, and to show honor and respect); the high valuation of spoken word underscores the importance of oral tradition (in this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian “aesthetic, historic, and educational values” (Pukui 1983:vii). Thus, these expressions may be understood as inspiring growth within the reader or between speaker and listener:

They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values. The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as “a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation.” It is a pithy or short form of folk wisdom. Pukui equates proverbs as a treasury of Hawaiian expressions (Pukui 1995:xii). Oftentimes within these Hawaiian expressions or proverbs are references to places. This section draws from the collection of author and historian Mary Kawena Pukui and her knowledge of Hawaiian proverbs describing *‘āina* (land), chiefs, plants, and places.

3.3.1 ‘Ōlelo No‘eau #80

The following proverb describes the red landscape of the ‘Ewa plain.

‘Āina koi ‘ula i ka lepo.

Land reddened by the rising dust.

Said of ‘Ewa, O‘ahu. [Pukui 1983:11]

3.3.2 ‘Ōlelo No‘eau #493

This *‘ōlelo no‘eau* is in reference to a wind of ‘Ewa, named Moa‘e. ‘Ewa Moku was known for its oysters and when fishermen went to gather the oysters, they did so in silence so as not to scare off the oysters. However, when the Moa‘e wind blew, it would ripple the water, scaring the oysters away.

Haunāele ‘Ewa i ka Moa‘e.

‘Ewa is disturbed by the Moa‘e wind.

Used about something disturbing, like a violent argument. When the people of ‘Ewa went to gather pipi (pearl oyster), they did so in silence, for if they spoke, a Moa‘e breeze would suddenly blow across the water, rippling it, and the oysters would disappear. [Pukui 1983:59]

3.3.3 ‘*Ōlelo No‘eau* #1330

This ‘*ōlelo no‘eau* is referring to the ‘*anae* (full-sized ‘*ama‘ama* [mullet, *Mugil cephalus*]) fish that would travel from ‘Ewa to Ko‘olau, hence the name ‘*anaeholo* or travelling mullet fish.

Ka i‘a hali a ka makani

The fish fetched by the wind

The ‘*anaeholo*, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u, on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong. [Pukui 1983:145]

The migration of the ‘*anae-holo* of Honouliuli is described in the following excerpt:

The home of the ‘*anae-holo* is at Honouliuli, Pearl Harbor, at a place called Ihuopala‘ai. They make periodical journeys around to the opposite side of the island, starting from Pu‘uloa and going to windward, passing successively Kumumanu, Kalihi, Kou, Kālia, Waikīkī, Ka‘alāwai, and so on, around to the Ko‘olau side, ending at Lā‘ie, and then returning by the same course to their starting point. [Nakuina 1998:271]

3.3.4 ‘*Ōlelo No‘eau* #1331

This ‘*ōlelo no‘eau* is in reference to the oysters of ‘Ewa as well as a reminder to “*hāmau leo*,” (be silent) when gathering this type of fish.

Ka i‘a hāmau leo o ‘Ewa

The fish of ‘Ewa that silences the voice

The pearl oyster, which has to be gathered in silence. [Pukui 1983:145]

Handy and Handy (1972:471) offer a different interpretation: “The pipi was sometimes called ‘the silent fish,’ or, ‘*i‘a hāmau leo o ‘Ewa*,’ ‘Ewa’s silent sea creature since the collectors were supposed to stay quiet while harvesting the shells.”

3.3.5 ‘*Ōlelo No‘eau* #1666

Pukui (1983:180) offers this Hawaiian saying, which places the wandering souls in a “*wiliwili*” grove at Kaupe‘a, a place in Honouliuli where homeless ghosts wandered among the trees.

Ka wiliwili o Kaupe‘a

The *wiliwili* grove of Kaupe‘a

In ‘Ewa, O‘ahu. Said to be where homeless ghosts wander among the trees. [Pukui 1983:180]

3.3.6 ‘*Ōlelo No‘eau* #1855

The expression below discusses the boundaries between *ali‘i* and *maka‘āinana* lands in ‘Ewa.

Ku a‘e ‘Ewa; Noho iho ‘Ewa.

Stand-up ‘Ewa; Sit-down ‘Ewa.

The names of two stones, now destroyed, that once marked the boundary between the chiefs’ land (Kua‘e ‘Ewa) and that of the commoners (Noho iho ‘Ewa) in ‘Ewa, O‘ahu. [Pukui 1983:200]

3.3.7 ‘*Ōlelo No‘eau* #2770

A rare taro called the “kāi o ‘Ewa” was grown in mounds in marshy locations in ‘Ewa (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the following saying:

Ua ‘ai i ke kāi-koi o ‘Ewa

He has eaten the kāi-koi taro of ‘Ewa

Kāi is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of a youth of a maiden of ‘Ewa, who, like the kāi taro, is not easily forgotten. [Pukui 1983:305]

3.4 *Oli* (Chants)

Nā oli, according to Mary Kawena Pukui (Pukui 1995:xvi–xvii), are often grouped according to content. Chants often were imbued with *mana* (divine power); such *mana* was made manifest through the use of themes and *kaona*. According to Pukui, chants for the gods (*pule*; prayers) came first, and chants for the *ali‘i*, “the descendants of the gods,” came second in significance. Chants “concerning the activities of the earth peopled by common humans” were last in this hierarchy (Pukui 1995:xvi–xvii). Emerson conversely states,

In its most familiar form the Hawaiians—many of whom [were lyrical masters]—used the *oli* not only for the songful expression of joy and affection, but as the vehicle of humorous or sarcastic narrative in the entertainment of their comrades. The dividing line, then, between the *oli* and those other weightier forms of the *mele*, the *inoa*, the *kanikau* (threnody), the *pule*, and that unnamed variety of *mele* in which the poet dealt with historic or mythologic subjects, is to be found almost wholly in the mood of the singer. [Emerson 1965:254]

While *oli* may vary thematically, subject to the perspective of the *ho‘opa‘a* (chanter), it was undoubtedly a valued art form used to preserve oral histories, genealogies, and traditions, to recall special places and events, and to offer prayers to *akua* and ‘*aumākua*’ alike. Perhaps most importantly, as Alameida (1993:26) writes, “chants [...] created a mystic beauty [...] confirming the special feeling for the environment among Hawaiians: their *one hānau* (birthplace), their *kula iwi* (land of their ancestors).”

3.4.1 *Oli* for Kūali‘i

A chant for the chief Kūali‘i, an ancient chief of O‘ahu, mentions the *ahupua‘a* names of the ‘Ewa District including Honouliuli Ahupua‘a. Each phrase usually contains a play on words, as

the place name and one meaning of the word, or portion of the word, appears on each line, for example, *kele* in Waikele means “slippery.” However, these word plays are not necessarily related to the actual place name meanings of the *ahupua‘a*.

<i>Uliuli ka poi e piha nei—o</i>	Blue is the <i>poi</i> [pounded taro] which
<i>Honouliuli;</i>	appeases [the hunger] of Honouliuli;
<i>Aeae ka paakai o Kahuaiki—Hoeae;</i>	Fine the salt of Kahuaiki—Hoeae;
<i>Pikele ka ia e Waikele—o Waikele;</i>	Slippery the fish of Waikele—of
	Waikele;
<i>Ka hale pio i Kauamoa—o Waipio;</i>	The arched house at Kauamoa—of
	Waipio;
<i>E kuu kua i ka loko awa—o Waiawa;</i>	Let us cast the net in the <i>awa</i> -pond—of
	Waiawa;
<i>Mai hoomanana ia oe—o Manana.</i>	Do not stretch yourself at—Manana.
<i>He kini kahawai,</i>	Many are the ravines,
<i>He lau kamano—o Waimano;</i>	Numerous the sharks, at Waimano;
<i>Ko ia kua e ke au—o Waiau;</i>	We are drawn by the current—of
	Waiau;
<i>Kukui mahumu kua—Waimalu;</i>	In the <i>kukui</i> grove we are sheltered—in
	Waimalu;
<i>E ala kua ua ao-e—o Kalauao;</i>	Let us arise, it is daylight—at Kalauao;
<i>E kipi kua e ai—o Aiea;</i>	Let us enter and dine—at Aiea;
<i>Mai hoohalawa ia oe—O Halawa.</i>	Do not pass by—Halawa.
[<i>Ka Nupepa Kuokoa</i> , Book 7, Number 21, 23 May 1868, He mele no Kualii, Kulanipipili, Kulanioka, Kunuiakea; Fornander 1916-1917:4(2):400–401]	

3.4.2 *Oli* for Kaumuali‘i

A chant for the Kaua‘i chief, Kaumuali‘i, a rival of Kamehameha I, also mentions place names of the ‘Ewa District (Fornander 1919-1920:6[3]:474-480). In a portion of this chant, the wind that blows from one end of ‘Ewa to the other is compared to love.

Filled was the air of Ewa with the report,	Kupuni ula ka ea o Ewa i ke ala.
20. Like the sea-spray on the forest trees,	20. Me he puakai la i ka lau laau.
The forest of the ilima plain at Ulihale.	Ka laau i ka ilima o Ulihale,
Even reddening the outside of the house:	Ula no mawaho o ka hale.
The redness extends and covers the	Ka ea ula. ke pili ka lau o ka weuweu,
leaves of the field.	
The ridge covering of the house is	Haki ke kaupaku o ka hale i ka ea,
broken by the whirlwind,	
25. Which blows from Halawa to	25. Ka ea no mai Halawa a Honouliuli,
Honouliuli.	
Unfit is the man who forsakes love,	He uli ke kanaka haalele i ke ‘loha.

How can he propagate love!

Me he mea la hala ke ‘loha iaia

[Fornander 1919-1920:6(3):475]

3.4.3 Hi‘iaka and the Plains of Keahumoa

While passing through ‘Ewa, Hi‘iaka, sister of the goddess Pele, met women stringing *lei* (garland) with *ma‘o* (*Gossypium tomentosum*, Hawaiian cotton) flowers. Desiring a *lei* of her own, Hi‘iaka offered a chant:

*E lei ana ke kula o Keahumoa i ka
ma‘o*

*Ohuohu wale na wahine kui lei o ka
nahele*

[Ho‘oumāhiehiemalie 2008a:287; Ho‘oumāhiehiemalie 2008b:268]

The plains of Ke‘ehumoa are garlanded
with ma‘o

The lei-stringing women of the forest
are festively adorned

In the chant, Hi‘iaka mentions the plains of Ke‘ehumoa, which according to McAllister (1933:107) are located west of Kīpapa Gulch in Waikele. Ke‘ehumoa was also possibly a general name for the flat plain *mauka* of the productive floodplain area directly adjacent to Pearl Harbor.

3.4.4 Hi‘iaka and the Plains of Kaupe‘a

Hi‘iaka sang this bitter chant addressed to Lohi‘au and Wahine‘ōma‘o, which uses the association of the Plains of Kaupe‘a as a place for the wandering of lost souls:

Ku‘u aikana i ke awa lau o Pu‘uloa,

*Mai ke kula o Pe‘e-kaua, ke noho oe,
E noho kaua e kui, e lei i ka pua o ke
kauno‘a,*

*I ka pua o ke akuli-kuli, o ka wili-wili;
O ka iho‘na o Kau-pe‘e i Kane-hili,
Ua hili au; akahi no ka hili o ka la
pomaika‘i;*

*E Lohiau ipo, e Wahine-oma‘o,
Hoe ‘a mai ka wa‘a i a‘e aku au.*

We meet at Ewa’s leaf-shaped lagoon,
friends;

Let us sit, if you will on this lea
And bedeck us with wreaths of
Kauno‘a,

Of *akuli-kuli* and *wili-wili*,
My soul went astray in this solitude;
It lost the track for once, in spite of
luck,

As I came down the road to Kau-pe‘a.
No nightmare dream was that which
tricked my soul.

This way, dear friends; turn the canoe
this way;

Paddle hither and let me embark.

[Emerson 1915:167–168]

Several other Honouliuli places are mentioned in this chant, including Pe‘ekaua, which may be a variation of Ka-pe‘e or Kaupe‘a, and the plains of Kānehili, the last of which again refers to wandering, as the word *hili* means “to go astray” (Emerson 1993:162). In the chant, Hi‘iaka is moving downhill from Kaupe‘a, probably the plains adjacent to Pu‘uokapolei, toward the coast, the plain of Kānehili.

3.4.5 Ka‘ao no Halemano

In the Legend of Halemano, the romantic O‘ahu anti-hero, he chants a love song with a reference to Honouliuli:

Huli a‘e la Ka‘ala kau i luna, Waiho wale kai o Pōka‘ī, Nānā wale ke aloha i Honouliuli, Kokolo kēhau he makani no Līhu‘e [...]

Search is made to the top of Ka‘ala, the lower end of Pōka‘ī is plainly seen. Love looks in from Honouliuli, The dew comes creeping, it is like the wind of Līhu‘e [...]. [Fornander 1918-1919:5(2):252]

3.5 Mele (Songs)

The following section draws from the Hawaiian art of *mele*, poetic songs intended to create two styles of meaning.

Words and word combinations were studied to see whether they were auspicious or not. There were always two things to consider the literal meaning and the *kaona*, or ‘inner meaning.’ The inner meaning was sometimes so veiled that only the people to whom the chant belonged understood it, and sometimes so obvious that anyone who knew the figurative speech of old Hawai‘i could see it very plainly. There are but two meanings: the literal and the *kaona*, or inner meaning. The literal is like the body and the inner meaning is like the spirit of the poem. [Pukui 1949:247]

The Hawaiians were lovers of poetry and keen observers of nature. Every phase of nature was noted and expressions of this love and observation woven into poems of praise, of satire, of resentment, of love and of celebration for any occasion that might arise. The ancient poets carefully selected men worthy of carrying on their art. These young men were taught the old *meles* and the technique of fashioning new ones. [Pukui 1949:247]

There exist a few *mele* that speak of or mention Honouliuli. These particular *mele* may also be classified as *mele wahi pana* (songs for legendary or historic places). *Mele wahi pana* such as those presented here may or may not be accompanied by *hula* or *hula wahi pana* (dance for legendary or historic places). As the Hula Preservation Society notes,

Hula Wahi Pana comprise a large class of dances that honor places of such emotional, spiritual, historical, or cultural significance that chants were composed for them. Only the composers of the chants could know the deepest meanings, as they would be reflections of their feelings and experiences [...] Since the subjects of *Wahi Pana* compositions are extremely varied, their implementation through hula are as well. Coupled with the differences from one *hula* style and tradition to the next, *Hula Wahi Pana* can be exceptionally diverse. They can be done sitting or standing, with limited body movement or wide free movement; with or without the use of implements or instruments; with the dancers themselves chanting and/or playing an implement or being accompanied by the *ho‘opa‘a* [drummer and *hula* chanter (memorizer)]. Beyond the particular *hula* tradition, what ultimately determines the manner in which a *Hula Wahi Pana* is performed are the specific

place involved, why it is significant, the story being shared about it, and its importance in the composer’s view. [Hula Preservation Society 2014]

3.5.1 *Mele no Kūali‘i*

The celebrated chief, Kūali‘i, is said to have led an army of twelve thousand against the chiefs of Ko‘olauloa with an army of twelve hundred upon the plains of Keahumoa (Fornander 1916-1917:4[2]:364–401). According to McAllister (1933:107), the plains of Keahumoa are located west of Kīpapa Gulch in Waikele. Perhaps because the odds were so skewed the battle was called off and the *ali‘i* of Ko‘olau ceded the districts of Ko‘olauloa, Ko‘olaupoko, Waialua, and Wai‘anae to Kūali‘i. When the *ali‘i* of Kaua‘i heard of this victory at Honouliuli they gave Kaua‘i to Kūali‘i as well and thus he became in possession of all the islands. The strife at Honouliuli was the occasion of the recitation of a song for Kūali‘i by a certain Kapa‘ahulani. This *mele* compares the king to certain places and objects in the islands, in this instance to the first breadfruit planted by Kaha‘i at Pu‘uloa, and a pig and a woman on Pu‘uokapolei, possibly a reference to Kamapua‘a and his grandmother. In this *mele*, the cold winds of Kumomoku and Leleiwe, near Pu‘uloa in Honouliuli are compared unfavorably to the god Kū:

<i>Aole i like Ku.</i>	Not like these are thou, Ku
<i>Ia ua hoohali kehau,</i>	[Nor] the rain that brings the land breeze,
<i>Mehe ipu wai ninia la,</i>	Like a vessel of water poured out.
<i>Na hau o Kumomoku;</i>	Nor to the mountain breeze of Kumomoku,
<i>Kekee na hau o Leleiwi,</i>	[The] land breeze coming round to Leleiwi.
<i>Oi ole ka oe i ike</i>	Truly, have you not known?
<i>I ka hau kuapuu</i>	The mountain breezes, that double up your back,
<i>Kekee noho kee, o Kaimohala,</i>	[That make you] sit crooked and cramped at Kaimohala,
<i>O Kahili i Kaupea-la</i>	The Kahili at Kaupea?
<i>Aole i like Ku</i>	Not like these are thou, Ku
[Fornander 1916-1917:4(2):390–391]	

A later section of this *mele* also refers to Pu‘uokapolei and makes mention of the famous blue *poi* of Honouliuli.

<i>O Kawelo-e, e Kawelo-e,</i>	O Kawelo! Say, Kawelo!
<i>O Kaweloiki puu oioi,</i>	Kawelokiki, the sharp-ponted hill,
<i>Puu o Kapolei-e-</i>	Hill of Kapolei.
<i>Uliuli ka poi e piha nei-o Honouliuli.</i>	Blue is the poi which appeases [the hunger] of Honouliuli.
[Fornander 1916-1917:4(2):400–401]	

3.5.2 *Eia Mai Au ‘o Makalapua*

This particular *mele* honors the royal train called *Lanakila* and its most honored and well-known passenger, Queen Lili‘uokalani. This *mele* may also be understood as a protest song. In analyzing

this *mele*, cultural historian Kīhei de Silva notes that “Eia mai Au ‘o Makalapua” is the second of three chants that make up *hō‘alo i ka ihu o ka Lanakila* (Three Train Chants for Lili‘uokalani). He adds that these songs,

[...] when considered in chronological succession [...] add a Hawaiian dimension to the story of Benjamin Franklin (B.F.) Dillingham’s Oahu Railway and Land Company (OR&L), a story that otherwise reads far too much like an early script of *How the West was Won*. [de Silva 2003]

De Silva provides a chronology of B.F. Dillingham’s rise to influence within Hawaiian political spheres, and his eventual founding and construction of the OR&L line. Dillingham also figures prominently within Honouliuli Ahupua‘a (see Section 4.4). Dillingham’s personal history is described by de Silva as follows:

- Arrived in Honolulu in 1865 as first mate of the *Whistler*.
- He promptly fell off a horse and broke his leg. When his ship left without him, he took a job as a clerk in a hardware store.
- 20 years later, in 1885, he had become Hawai‘i’s first big-time land speculator, buying and leasing vast tracts of property in West O‘ahu in hopes of reselling it to housing and ag. interests.
- When no one, in fact, took interest in his largely inaccessible property, he decided to build a railroad through it.
- In 1888, Dillingham convinced Kalākaua to sign a franchise giving him three years to build a line running from Honolulu to the far end of Pearl River Lagoon. His critics called it ‘Dillingham’s Folly,’ but Dillingham boasted that he would put his railroad into operation by Sept. 4, 1889, his 45th birthday.
- Things did not go well in the early months of construction, and in order to fulfill this boast, Dillingham had to fire up a miniscule saddle-tank engine named *Kauila*, hitch it to a flatcar that carried his passengers on jury-rigged seats, and send it bucking, wheezing, and spewing greasy foam down a mile-and-a-half of track that ended in the rice paddies of Pālama.
- Despite this farcical beginning, the construction of Dillingham’s railroad then proceeded in rather impressive fashion: the line was opened to ‘Aiea in November 1889, to Mānana in January 1890, to Honouliuli and ‘Ewa Mill in June and July 1890, to Wai‘anae in July 1895, to Waialua in June, 1898, and to Kahuku in January 1899. [de Silva 2003]

In 1890, as construction of the railway moved forward, B.F. Dillingham bought and shipped to Hawai‘i a passenger coach named the *Pearl* and a locomotive named *General Valleho*. According to de Silva (2003), the *Pearl* was built in San Francisco and was “paneled in rich woods and outfitted with plush chairs, velvet drapes, electric lights, a kitchen, a lānai with a striped canvas awning, and a new-fangled contraption called a flush toilet.” The *General Valleho* was renamed the *Lanakila* by Dillingham:

[...] [He] gave it the number 45, a tribute to his 45th birthday boast and erstwhile victory in the rice paddies of Pālama. The *Lanakila* became Dillingham’s 4th locomotive—after the *Kauila*, *Leahi*, and *Ka‘ala*—and for many years it was

regarded as the most attractive engine in the OR&L stable. Dillingham apparently wasted no time in hitching the Pearl to the *Lanakila* and using the pair as his wine-‘em and dine-‘em celebrity train, the vehicle in which he wooed financial and political support for his business ventures. [de Silva 2003]

As part of Dillingham’s plans to woo the influential, he invited King Kalākaua on the inaugural ride on the *Lanakila*. Dillingham also insisted the luxury coach *Pearl* serve as the king’s own royal car. De Silva (2003) notes it is “safe for us to assume that Queen Lili‘u[okalani] rode in the Pearl when the *Lanakila* took her on the train rides.” With the opening of the ‘Ewa Mill station, Queen Lili‘uokalani once again embarked on a journey on the *Lanakila*; this particular journey took her through “the lowlands of Honouliuli, and finally to the exposed coral plain of Pōlea on which the ‘Ewa Mill Station was located” (de Silva 2003).

<i>Eia mai au ‘o Makalapua</i>	Here I am, Makalapua
<i>Hō‘alo i ka ihu o ka Lanakila.</i>	Traveling where the <i>Lanakila</i> goes.
<i>‘O ke ku‘e a ka hao a i Kūwili</i>	The piston works at Kūwili
<i>Ka hiona ‘olu a ‘o Hālawa.</i>	And down the pleasant descent of Hālawa.
<i>Ua lawa ka ‘ikena i ke awalau</i>	Satisfying is the view of the lochs
<i>Iā ‘Ewa ka i ‘a hāmau leo.</i>	Of ‘Ewa, “land of the silent fish.”
<i>Ua piha ka uahi a i Mānana</i>	The smoke rises at Mānana
<i>Aweawe i ke kula o Waipi‘o.</i>	And streams along at Waipi‘o.
<i>I kai ho ‘i au a Honouliuli</i>	Then I reached the lowlands of Honouliuli
<i>Ahuwale ke ko ‘a o Pōlea.</i>	Where the corals of Pōlea lie exposed.
<i>Ha ‘ina ‘ia mai ana ka puana</i>	This is the conclusion of the song
<i>Hō‘alo i ka ihu a ka Lanakila.</i>	Of traveling where the <i>Lanakila</i> goes.
[de Silva 2003]	

De Silva (2003) provides a remarkable breakdown of this *mele*, delving into the subtext to reveal another layer of understanding, of *kaona*:

‘Makalapua’ shares [...] the sense of awesome efficiency and harmony [...] These are apparent in ‘Makalapua’s’ description of the working of the train’s piston at Kūwili, in the rising and billowing of steam at Mānana and Waipi‘o, and especially in the sense of speed with which the *mele* whisks us from Honolulu to Pōlea in the space of its six, two-line verses. Efficiency and harmony, however, are not at the heart of ‘Makalapua;’ it is inspired and driven, instead, by *aloha ‘āina*—love for the land—and by *kū‘ē ho ‘ohui ‘āina*—resistance to annexation. In my reading of the *mele*, the dominant imagery is that of flower-stringing. The train and track serve as the contemporary equivalent of lei needle and thread; with them, Lili‘u sews a series of beloved place-names and place-associations into a lei of adornment and protection for Ke-awalau-o-Pu‘uloa. Keawalauopu‘uloa, the many-harbored sea of Pu‘uloa, is the old name for Pearl Harbor. The cession of Pearl Harbor to America in return for sugar reciprocity was one of the hottest political issues of ‘Makalapua’s’ day. Lili‘u was absolutely opposed to any Keawalau deals; her brother, on the other hand, had regularly waved this bait at the American nose; he was even rumored, on his Nov. 1890 departure to San Francisco, to have harbored a hidden Pearl Harbor agenda. The key lines of ‘Makalapua’ are ‘Ua lawa ka ‘ikena

i ke awalau / Iā ‘Ewa ka i‘ā hāmau leo [...] I kai ho‘i au a Honouliuli / Ahuwale ke ko‘a o Pōlea.’ In my reading, these lines say: ‘We hold to our knowledge of Keawalau, we are like its closed-mouthed pipi, its oysters; we will never give up the pearl that we contain; here at the shoreline of Honouliuli we normally silent fish reveal this deeply held conviction.’ [de Silva 2003]

Section 4 Historic Background

4.1 Pre-Contact Period

Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i*. This would be attributable for the most part to the plentiful marine and estuarine resources available at the coast, where several sites interpreted as permanent habitations and fishing shrines were located. Other attractive subsistence-related features of the *ahupua‘a* include irrigated lowlands suitable for wetland taro cultivation (Hammatt and Shideler 1990), as well as the lower forest area of the mountain slopes for the procurement of forest resources. Handy and Handy (1972) report the following:

The lowlands, bisected by ample streams, were ideal terrain for the cultivation of irrigated taro. The hinterland consisted of deep valleys running far back into the Ko‘olau range. Between the valleys were ridges, with steep sides, but a very gradual increase of altitude. The lower parts of the valley sides were excellent for the culture of yams and bananas. Farther inland grew the *‘awa* for which the area was famous. [Handy and Handy 1972:429]

In addition, breadfruit, coconuts, *wauke* (paper mulberry; *Broussonetia papyrifera*), bananas, and *olonā* (*Touchardia latifolia*) and other plants were grown in the interior. ‘Ewa was known as one of the best areas to grow gourds and was famous for its *māmaki* (*Pipturus*). It was also famous for a rare taro called the *kāi o ‘Ewa*, which was grown in mounds in marshy locations (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the saying:

Ua ‘ai i ke kāi-koi o ‘Ewa.

He has eaten the kāi-koi taro of ‘Ewa.

Kāi is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of a youth of a maiden of ‘Ewa, who, like the kāi taro, is not easily forgotten.

[Pukui 1983:305]

Exploitation of the forest resources along the slopes of the Wai‘anae Range—as suggested by E.S. and E.G. Handy—probably acted as a viable subsistence alternative during times of famine:

The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the wao, or upland jungle, than was the case on the windward coast. Yet the wao here was more extensive, giving greater opportunity to forage for wild foods during famine time. [Handy and Handy 1972:469-470]

These upper valley slopes may have also been a significant resource for sporadic quarrying of basalt for the manufacturing of stone tools. This is evidenced in part by the existence of a probable quarrying site (State Inventory of Historic Places [SIHP] # 50-80-12-04322) in Makaiwa Gulch at 152 m (500 ft) AMSL (Hammatt et al. 1991).

4.2 Early Historic Period

Early historical accounts of the general region typically refer to the more populated areas of the ‘Ewa district, where missions and schools were established and where subsistence resources were perceived to be greater (Figure 8). However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli Ahupua‘a indicates prehistoric (pre-Contact) and early historic populations also adapted to less inviting areas, despite the environmental hardships.

Subsequent to Western Contact in the area, the landscape of the ‘Ewa plains and Wai‘anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Vancouver in the early 1790s, and were allowed to graze freely on the land for some time after. It is unclear when domesticated animals were brought to O‘ahu. However, L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae prior to 1840 (Frierson 1972:10).

During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing. The following dates of specific vegetation introduced to Hawai‘i are given by R. Smith and outlined by Frierson (1972:10–11):

1. ‘early,’ c. 1790: for the establishment of Prickly pear cactus, (*Opuntia tuna*), *Haole koa*, (*Leucaena leucocephala*) and Guava (*Psidium guajava*)
2. 1835-1840: Burmuda [*sic*] grass (*Cynodon dactylon*) and Wire grass (*Eleusine indica*)
3. 1858: Lantana (*Lantana camara*)

The *kiawe* (*Prosopis pallida*) tree was also introduced during this period, either in 1828 or 1837 (Frierson 1972:11).

4.3 The Māhele and Kuleana Act

Following the Māhele of 1848, 96 individual land claims were made in the *ahupua‘a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to *maka‘āinana*. The 72 *kuleana* (individual parcels) awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, *lo‘i* (irrigated taro field), *kula* (pasture/field), and house lots.

No *kuleana* land claims were made for land within the current project area or vicinity. The vast majority of the Land Commission Awards (LCA) were located in Honouliuli near the taro lands of the *‘ili* of Pu‘uloa and the Pu‘uloa Salt Works. The largest award (Royal Patent 6071, LCA 11216, ‘Āpana [parcel] 8) in Honouliuli Ahupua‘a was granted to Miriam Ke‘ahi-Kuni Kekau‘onohi on January 1848 (Native Register 1848). Kekau‘onohi acquired a deed to all unclaimed land within the *ahupua‘a*, including a total of 43,250 acres including the present project area.

Samuel Kamakau relates the following about Kekau‘onohi as a child:

Kamehameha’s granddaughter, Ke-ahi-Kuni Ke-kau-‘onohi [...] was also a tabu chiefess in whose presence the other chiefesses had to prostrate and uncover

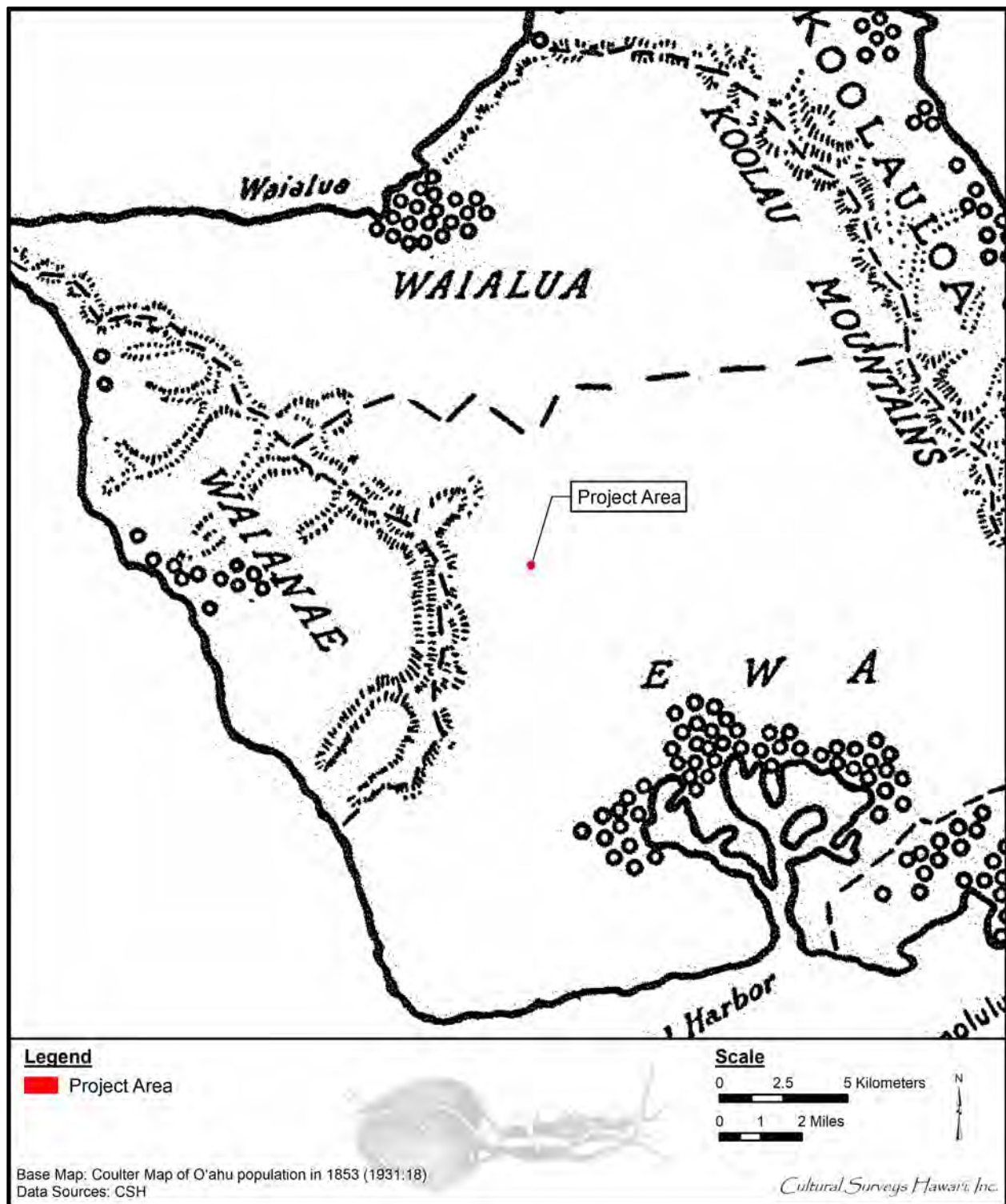


Figure 8. Coulter map of O'ahu population in 1853 (1931:18) with an overlay of the Kunia Village New Source Well project area (each circle represents 50 people)

themselves, and Kamehameha would lie face upward while she sat on his chest.
[Kamakau 1992:208–209]

Kekau'onohi was one of Liholiho's (Kamehameha II's) wives, and after his death she lived with her half-brother, Luanu'u Kahala'i'a, who was governor of Kaua'i (Hammatt and Shideler 1990:19–20). Subsequently, Kekau'onohi ran away with Queen Ka'ahumanu's stepson, Keli'i-ahonui, and then became the wife of Chief Levi Ha'alelea. Upon her death on 2 June 1851, all her property passed on to her husband and his heirs. When Levi Ha'alelea died, the property (including the current project area) went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for stock running and grazing. The location of the cattle ranch is within the vicinity of the project area as seen on an 1873 W.D. Alexander map (Figure 9).

4.4 Mid- to Late 1800s

In 1877, James Campbell purchased most of Honouliuli Ahupua'a, including the current project area, for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). In 1879, Campbell brought in a well-driller from California to search the 'Ewa plains for water, and a "vast pure water reserve" was discovered (Armstrong 1983).

Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource. By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with "abundant pasturage of various kinds" (Briggs in Haun and Kelly 1984:45). Within ten years of the first drilled well in 'Ewa, the addition of a series of artesian wells throughout the island was supplying most of Honolulu's water needs (Armstrong 1983).

In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) in 1890. To attract business to his new railroad system, Dillingham subleased all land below 200 ft elevation to William Castle who in turn sublet the area to the Ewa Plantation Company for sugarcane cultivation (Frierson 1972:15). Dillingham's Honouliuli lands above 200 ft elevation suitable for sugarcane cultivation were sublet to the Oahu Sugar Company.

Ewa Plantation Company was incorporated in 1890 and continued in full operation up into modern times. The plantation grew quickly with the abundant artesian water. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

The Oahu Sugar Company was incorporated in 1897 and included lands in the foothills above the 'Ewa plain and Pearl Harbor. The sprawling plantation "covered some 20 square miles [...] ranging in elevation from 10 feet at the Waipio Peninsula [...] to 700 feet at the Waiahole Ditch" (Condé and Best 1973:313). Prior to commercial sugar cultivation, the lands occupied by the Oahu Sugar Company were described as being "of near desert proportion until water was supplied from drilled artesian wells and the Waiahole Water project" (Condé and Best 1973:313). The Oahu Sugar Company took control over the Ewa Plantation lands in 1970 and continued operations into the 1990s.

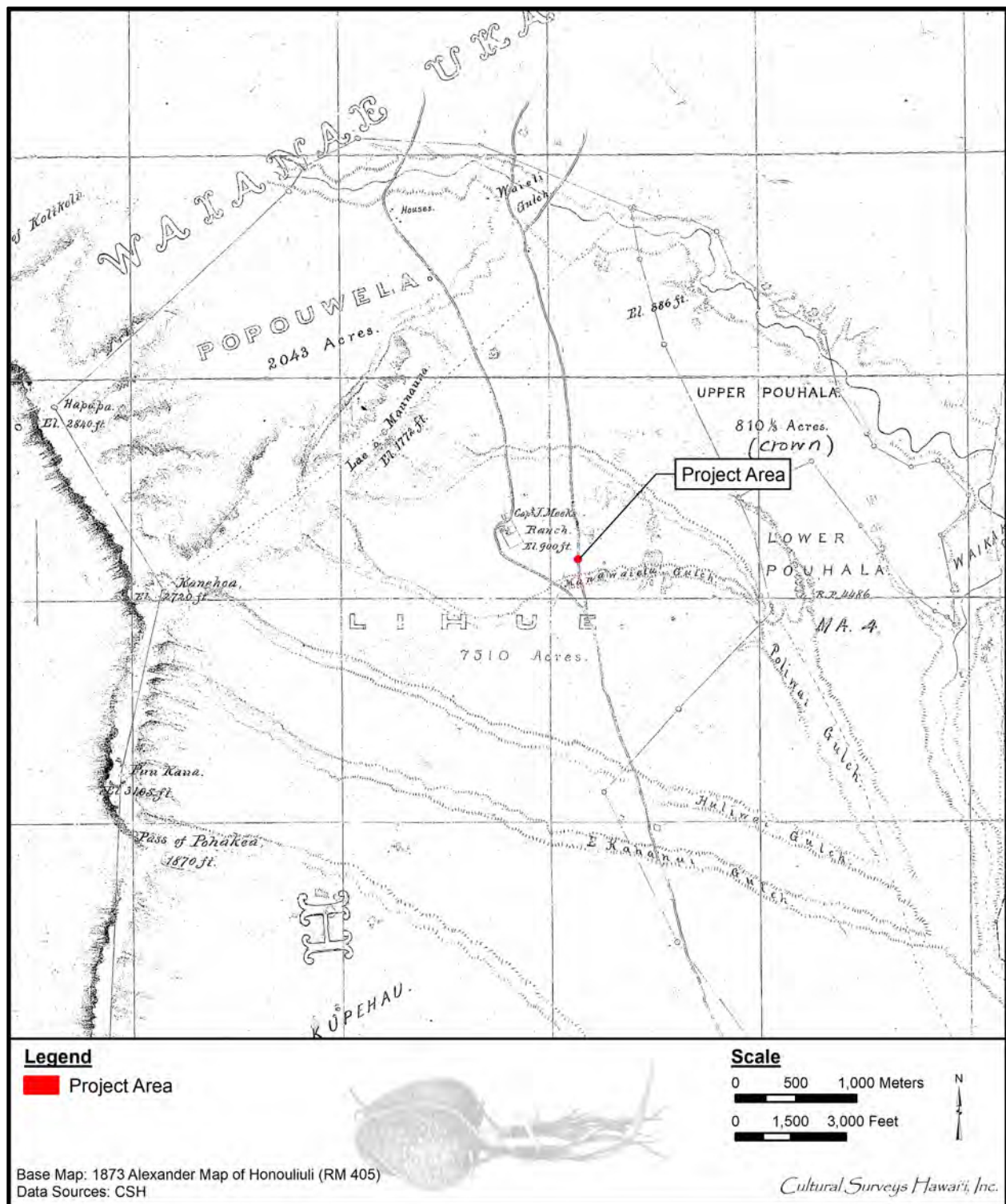


Figure 9. Portion of 1873 Alexander map of Honouliuli (RM 405) with an overlay of the Kunia Village New Source Well project area

Around 1896, Harry Von Holt, Superintendent of the OR&L Ranch Department, was actively constructing a fence around the *mauka* Honouliuli lands. This established the Honouliuli Forest Reserve, within which Von Holt planted “experimental trees” to reforest areas damaged by sandalwood harvesting and livestock grazing (Von Holt 1985:142). During this time, Von Holt set up a camp for his family at Akupu, approximately 3 km southwest of the current project area. The camp was later moved to Pālehua, also southwest of the current project area. The camp site and forest reserve were accessed by a horse trail which began near the mouth of Kalo‘i Gulch. Several additional trails were constructed in the Honouliuli uplands, as mentioned in the following account:

New trails were built—‘Over the Hills and Far Away,’ ‘Punahuna’ to the tunnel, where one went in a long way with a candle, and where we all hunted for small kukui nuts; ‘Glen Ida’ trail to Akupu, the ‘Golden Stairs’ joining Glen Ida to the ridge trail, and the ‘Hog Back’ trail where we went to watch the hunters [...] Later on the Schuyler Trail was built [...] The Schuyler Trail connected our mountains with Schofield [...] [Von Holt 1985:150]

4.5 1900s

Located on O‘ahu’s central plain along Hawai‘i Route 750, amidst some 3,000 acres of farmland leased and cultivated by Del Monte Fresh Produce, Kunia Camp was the last village in O‘ahu designated exclusively for Del Monte Corporation’s workers who processed pineapples from the adjacent pineapple fields. The father of the corporation, “Pineapple King” James Dole, initially began planting pineapples in 1903, after paying \$4,000 for just over 60 acres of homestead land in Wahiawā in 1900 (Larsen and Marks 2010:168). Such was Dole’s success that by the late 1950s, Hapco (Hawaiian Pineapple Company), had so grown in size and scope that it could boast production of 80% of the pineapple bought by consumers world-wide (Bolante 2006).

At the time, prior to commercial and residential development, towns such as ‘Ewa, ‘Aiea, and Waipahu were company towns, encompassing the plantations that the workers farmed and the camps where they and their families resided (Bolante 2006). As of 2006, the small agricultural community of Kunia Camp was comprised of 200 pineapple workers and their families, living on 119 acres in cottages that numbered close to 120.

According to United States Department of the Interior (Mason Architects 2014:7:5), all the residential houses in the Kunia Camp “have the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes walls a single board thick, [...] set against a backdrop of pineapple fields, and provided housing [...] for pineapple field workers [...] from the years 1928 until 2007.”

The 1906 Donn Hawaii Territory Survey map (Figure 10) shows the current project area was designated grazing lands at the beginning of the twentieth century. The 1916 Harrison map of the Hawaii Preserving Company shows the outline of the project area in its original position in 1916, centered in a pasture (Figure 11). The 1919 U.S. Army War Department fire control map (Figure 12) shows the same area, only slightly more developed. Newly built roads, dwellings, and a section of railway are shown running near the current project area. The 1929 Schofield Barracks USGS topographic quadrangle (Figure 13) shows Kunia Camp a bit later in development. This map again shows the Oahu Railroad running through the vicinity. The 1935 and 1943 U.S. Army War

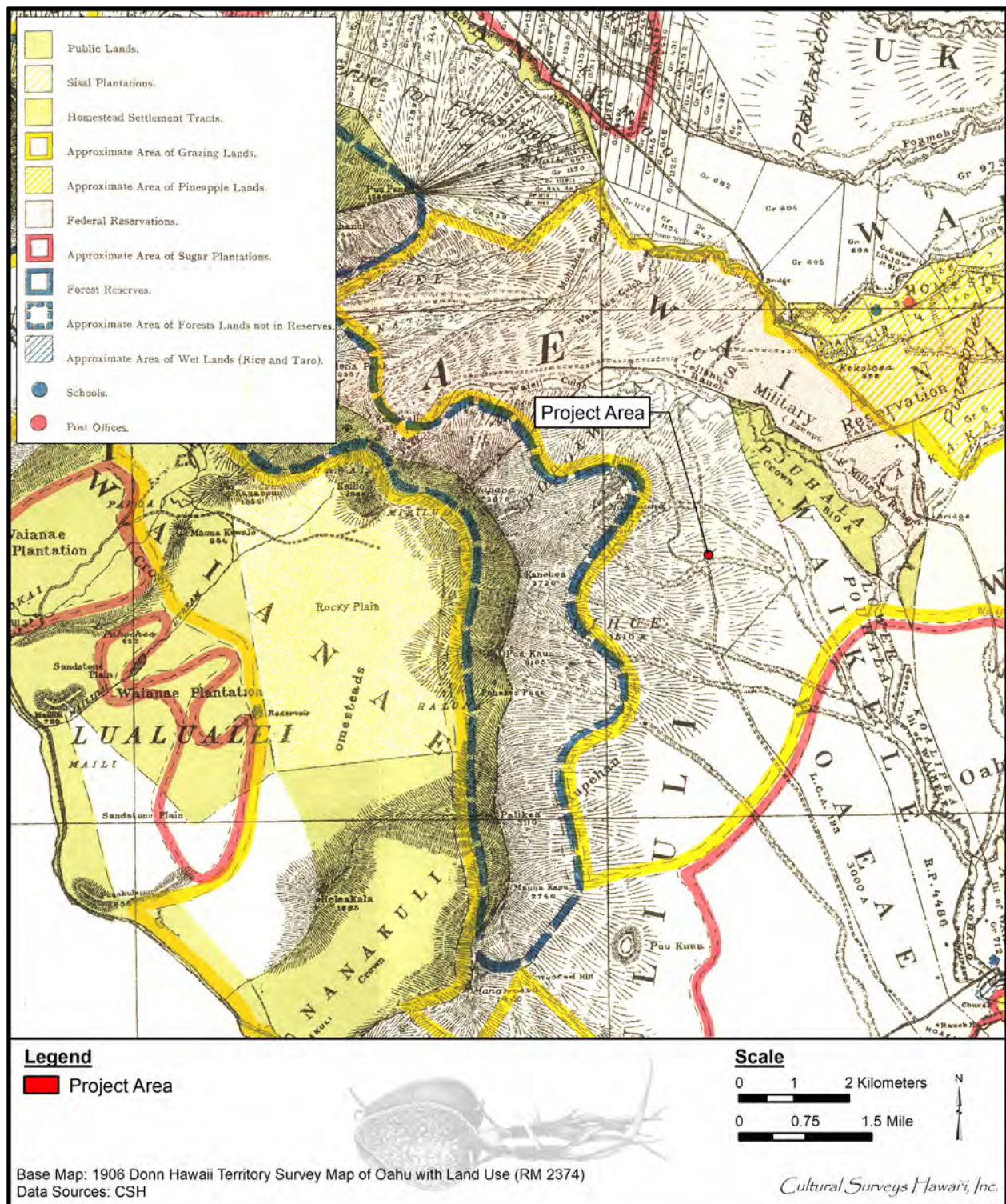


Figure 10. Portion of the 1906 Donn Hawaii Territory Survey map of O'ahu with land use (RM 2374) showing the Kunia Village New Source Well project area

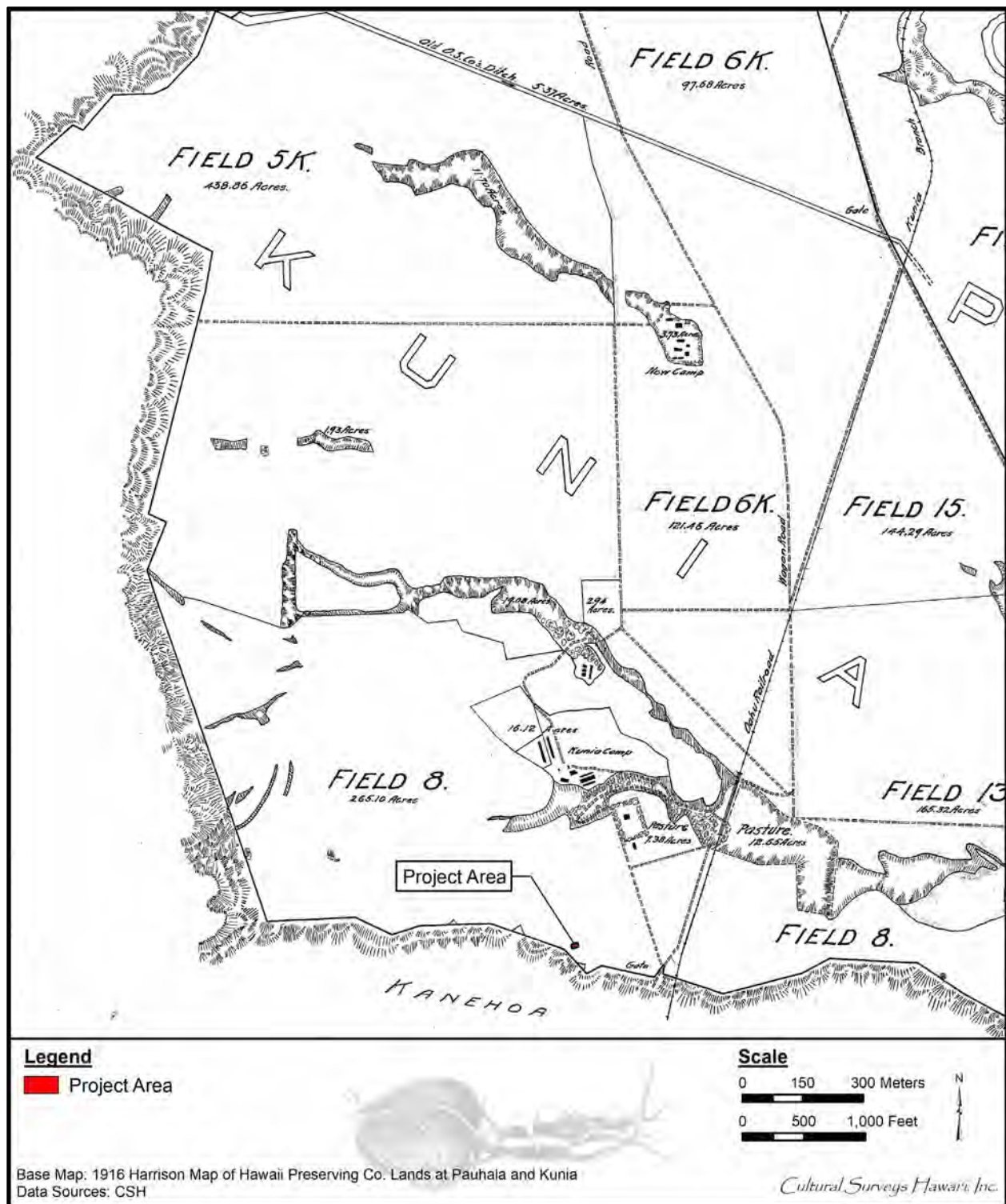


Figure 11. Portion of the 1916 Harrison map of Hawaii Preserving Company Lands at Pauhala and Kunia (RM 405) showing the Kunia Village New Source Well project area

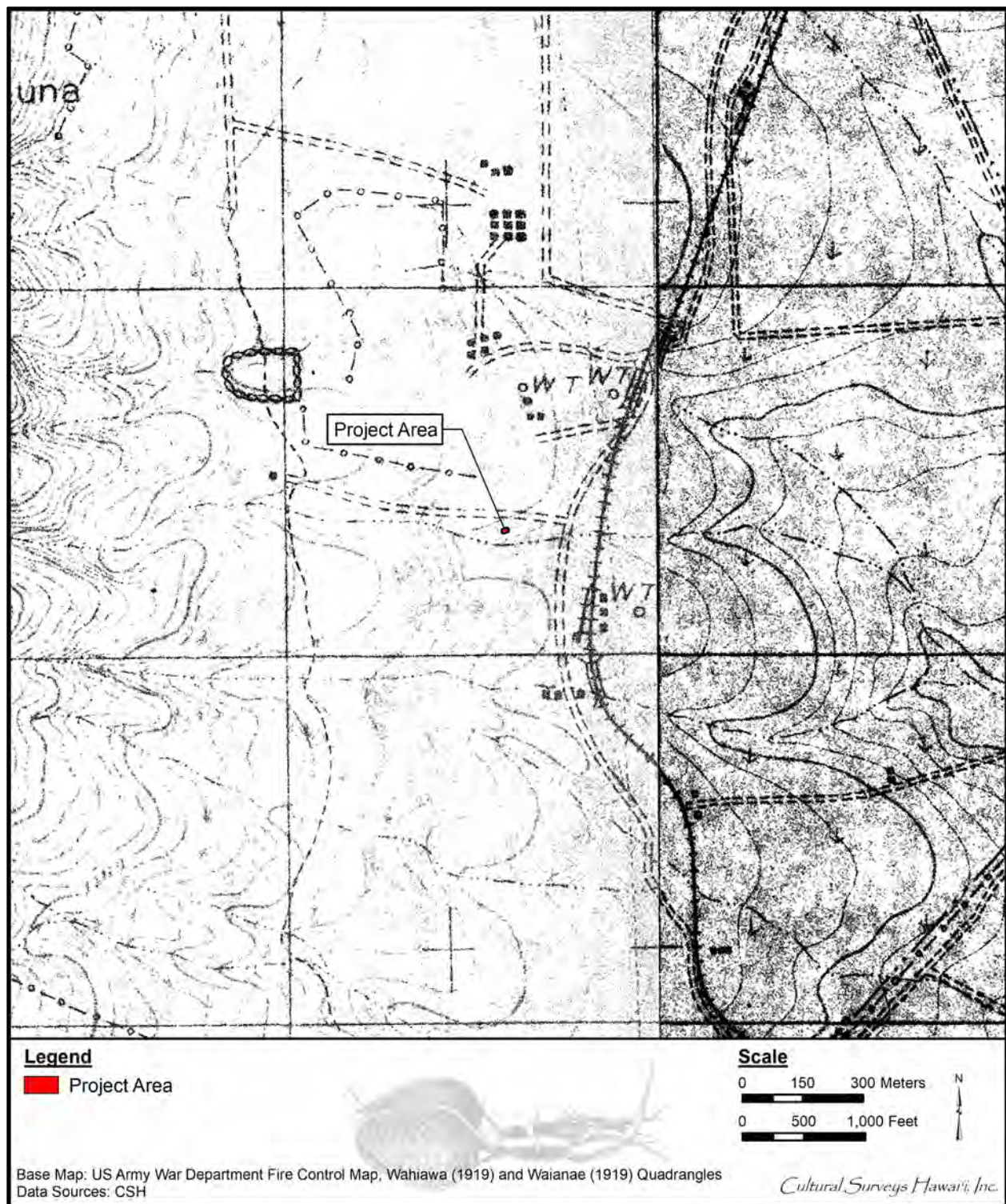


Figure 12. Portion of 1919 U.S. Army War Department fire control maps, Waianae and Wahiawa quadrangles showing the Kunia Village New Source Well project area and vicinity

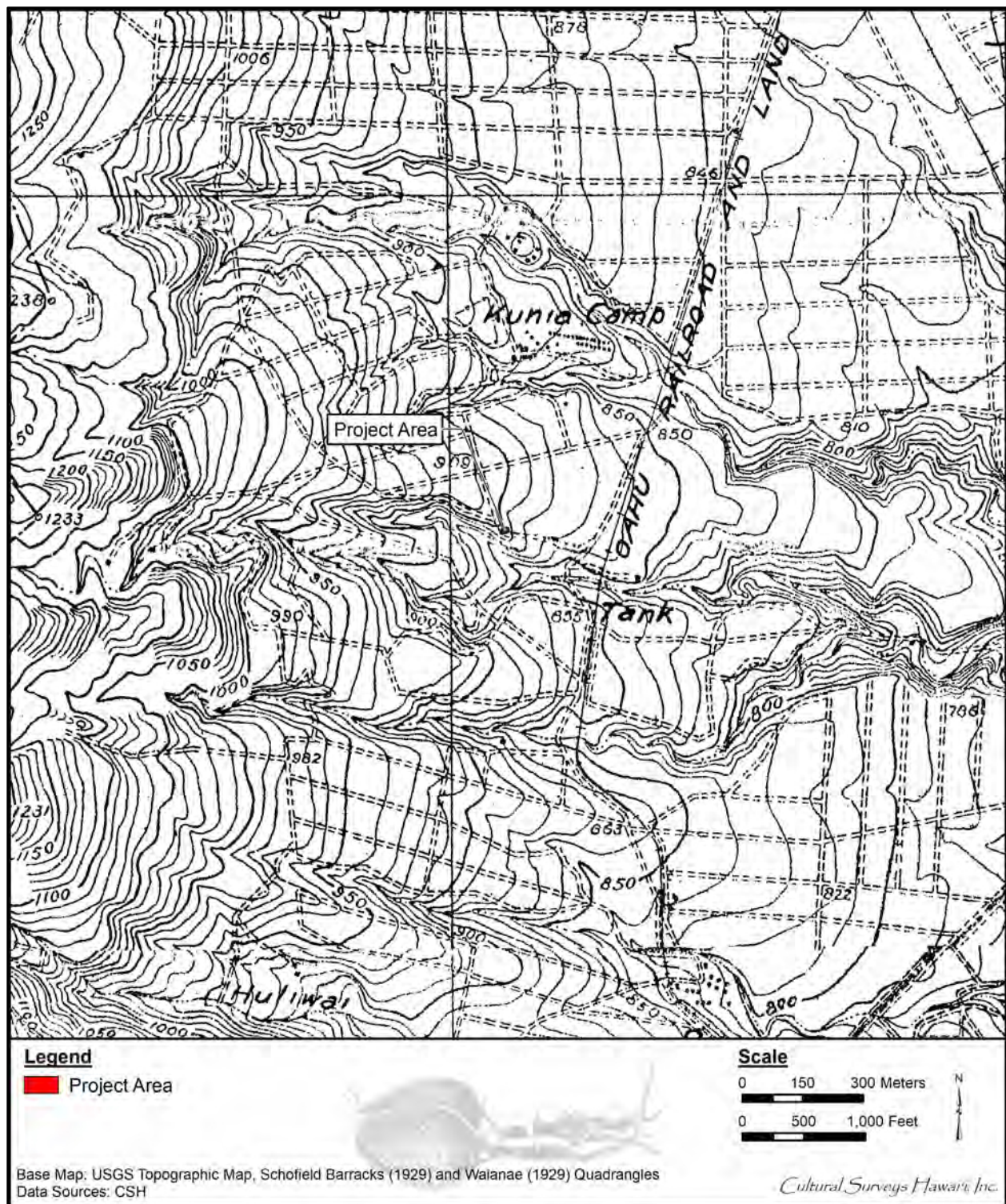


Figure 13. Portion of 1929 USGS topographic map, Schofield Barracks and Waianae quadrangles, showing the Kunia Village New Source Well project area and vicinity

Department terrain maps, Schofield Barracks quadrangle, both show the same area, only slightly farther along in development, with access and country roads now surrounding the camp (Figure 14 and Figure 15). A 1951 USGS aerial photograph, 1953 USGS topographic map, 1969 USGS topographic map, 1977 USGS orthophotograph, and 1998 USGS topographic map all show Kunia Village more or less in its modern state (Figure 16 through Figure 21).

Beyond residential housing, the Kunia Camp was in actuality a small town. With a chapel, gymnasium, and store all patronized by the resident workers and their families. The atmosphere of Kunia Camp was that of a tight-knit community, with most homes housing family members from multiple generations. The links among families and the surrounding neighbors of the camp forged a strong sense of community-inspired trust, where people seldom locked the doors to their homes, and where residents were generally familiar with one another; “Everybody know each other. No one complain if you cook and get any kine smell. Get plenty parties at the gym, [...] graduation, birthday, baptismal. You invite the whole camp” (Bolante 2006).

4.6 Contemporary Land Use

In February 2006, Del Monte revealed that their last crop had been planted, and that they would be closing pineapple production operations in Hawai'i within two years. Nine months later, Del Monte announced that operations would draw to a close in January 2007, although the terms of their lease stated they would retain jurisdiction over the grounds that Kunia Camp sat on throughout the remainder of their lease. In December 2008, proprietorship was transferred to the Campbell Estate, and less than a year later in November 2009, the Kunia camp was under the ownership of the Hawaii Agriculture Research Center (HARC). Finally, in April 2011, ownership of the Kunia Camp was appropriated by the Kunia Village Title Holding Company, where it currently remains.

Based on observations made in the field during this survey it is clear that little has changed in Kunia Camp since ownership of the village was appropriated by the Kunia Village Title Holding Company. The residential houses in the Kunia Camp still show distinct characteristics of the Hawaiian plantation style of architecture, with little having been done in the way of renovations and remodeling in subsequent years. The atmosphere is still very much that of a tight-knit community. The main draw to the camp for those who are not residents of the camp itself appears to be a United States Post Office located just southeast of the project area.

Kunia Store is located in the New Camp area and is situated in the southern and easternmost portion of the district, near the entrance to Kunia Camp from Kunia Road, and is comprised of a variety of different establishments.

Kunia Country Farms, a landscaping business and tropical nursery, can also be found directly southeast of the project area on Kunia Road Highway 750 and is perhaps the largest commercial establishment located near the camp. The nursery opened in 2010 and is spread over 10 acres of former pineapple plantation land, presumably once owned by Del Monte. Kunia Country Farms is a subsidiary of the Takenaka Landscaping Company and provides various groundcovers, shrubs, fruit trees, and palms, as well as residential and commercial landscaping services to central and leeward O'ahu areas including Mililani, Waipi'o, Pearl City, 'Aiea, 'Ewa Beach, Waipahu, Kapolei, and Makakilo (Takenaka Landscaping Company Inc. 2014).

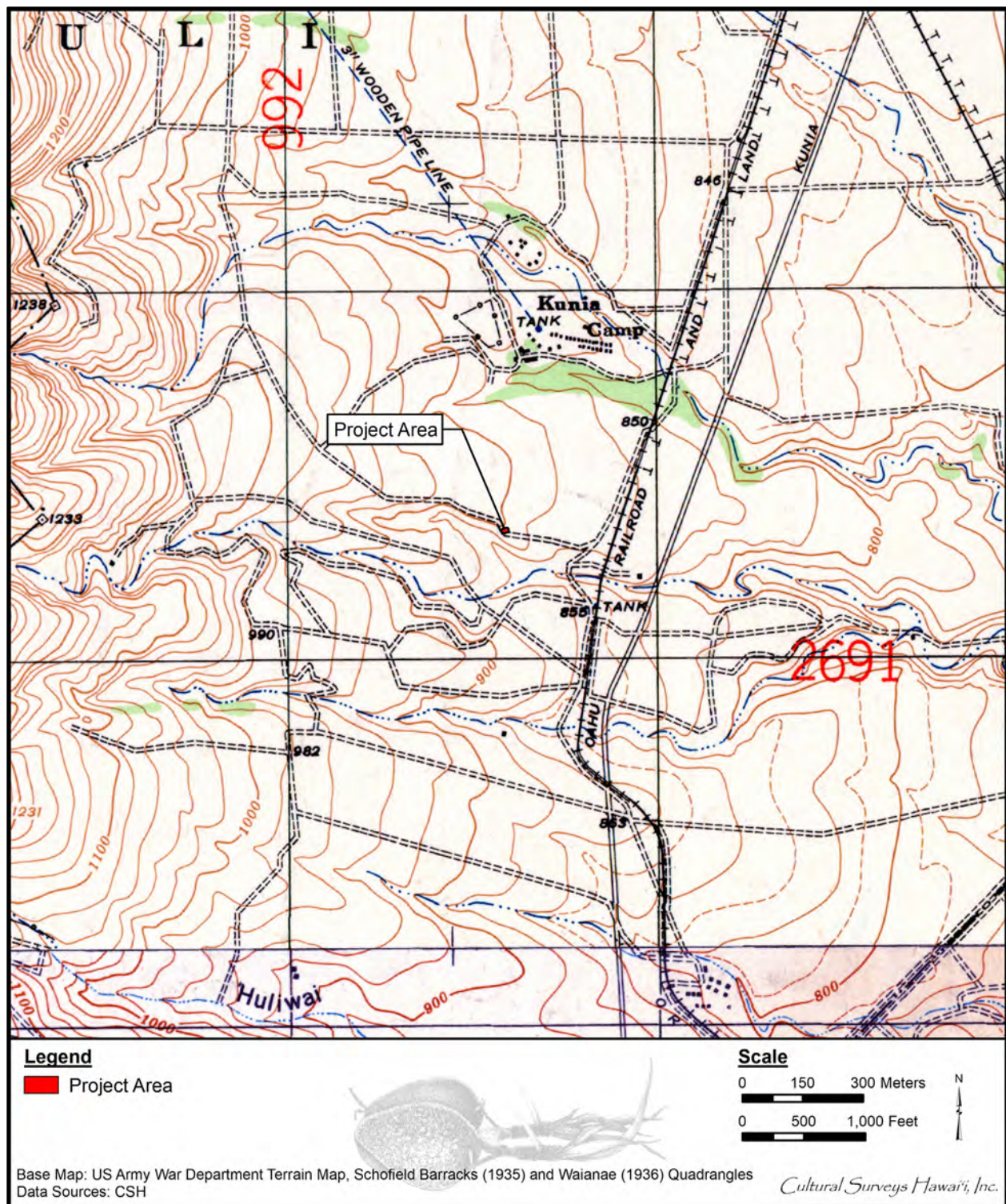


Figure 14. Portion of 1935-1936 U.S. Army War Department terrain map, Schofield Barracks (1935) and Waianae (1936) quadrangles showing the Kunia Village New Source Well project area and vicinity

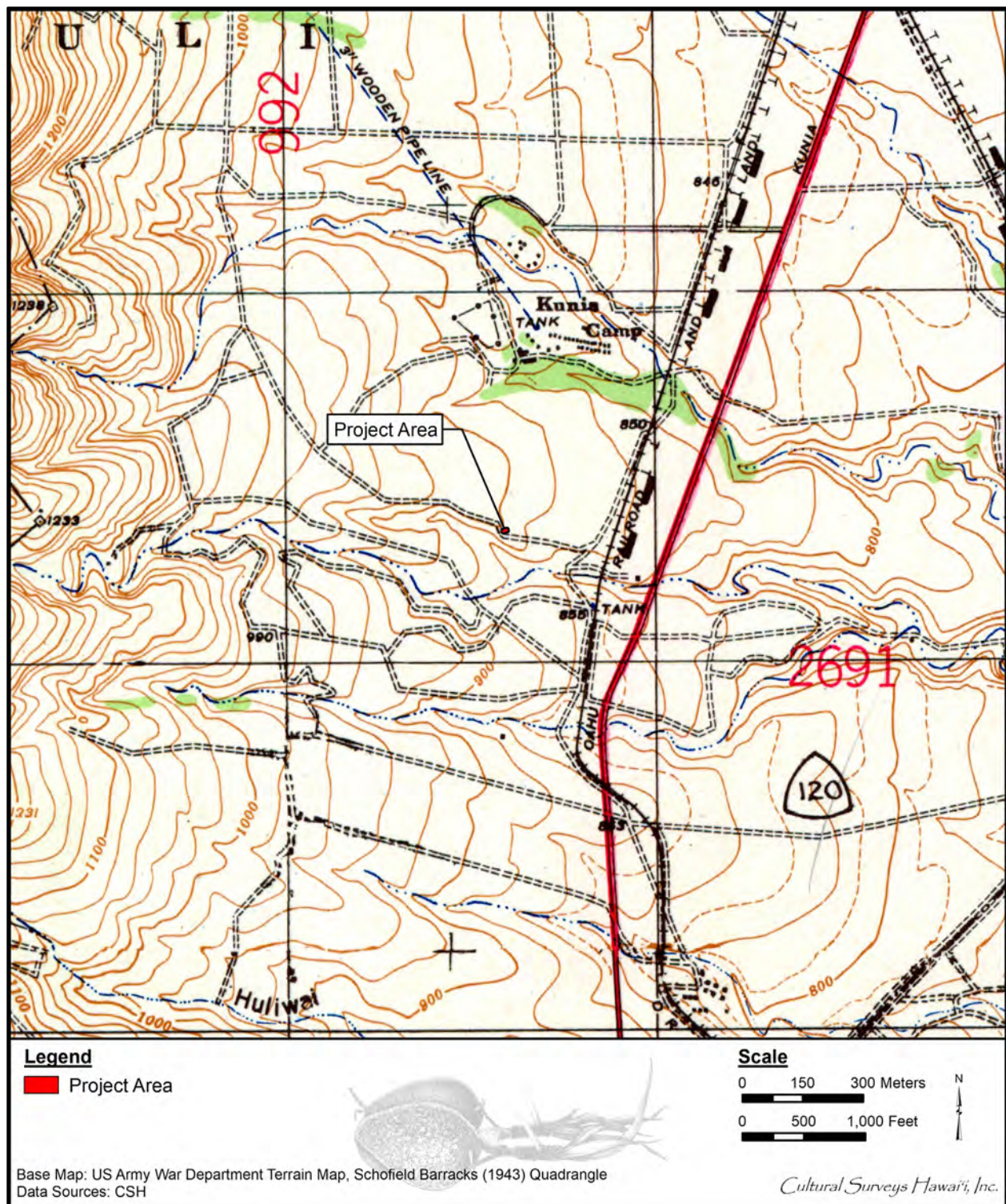


Figure 15. Portion of 1943 U.S. Army War Department Terrain map, Schofield Barracks quadrangle showing the Kunia Village New Source Well project area and vicinity



Figure 16. 1951 USGS aerial photograph of Kunia (UH MAGIS) showing the Kunia Village New Source Well project area and vicinity

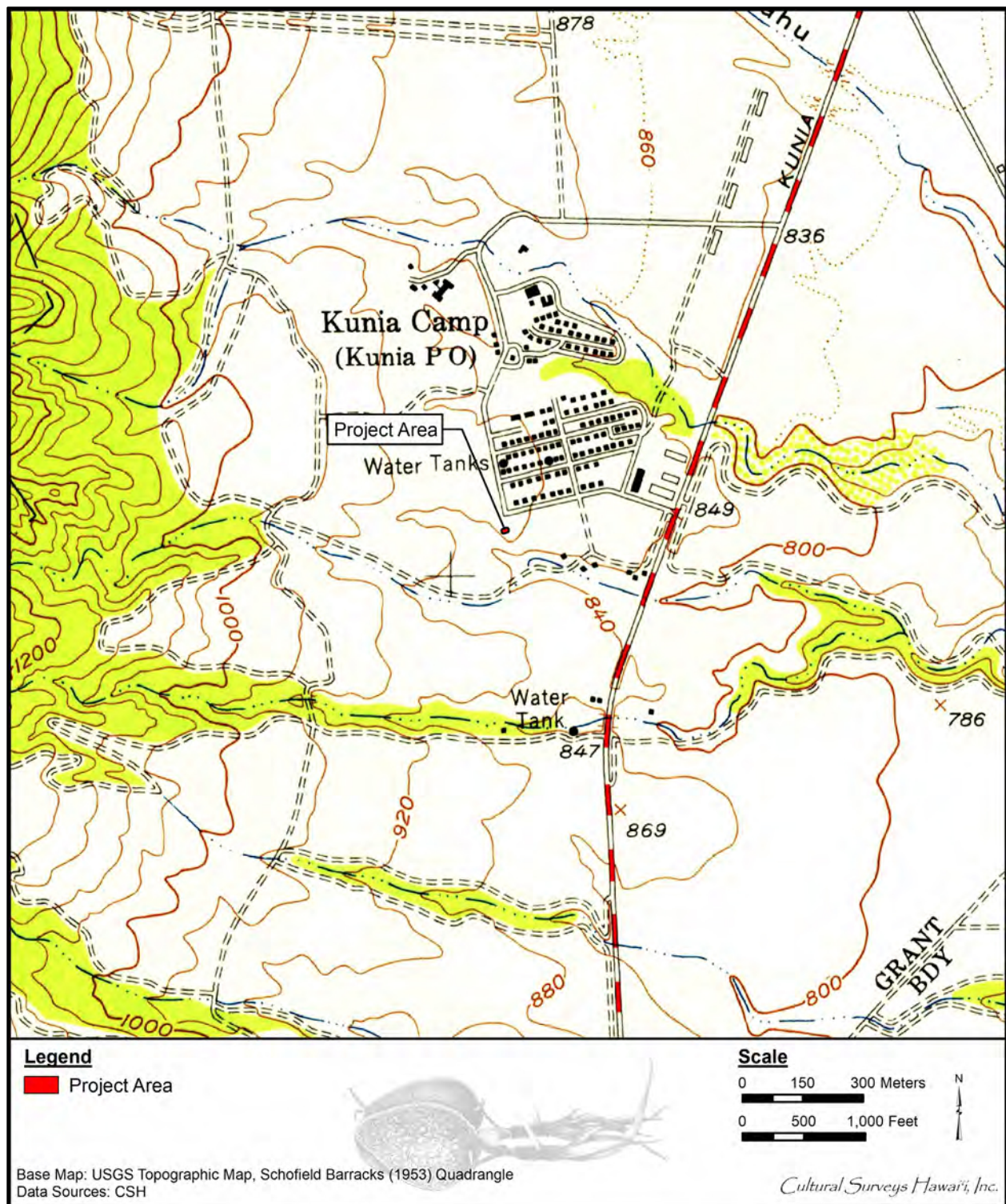


Figure 17. Portion of 1953 USGS topographic map, Schofield Barracks quadrangle, showing the Kunia Village New Source Well project area and vicinity



Figure 18. 1968 USGS aerial photograph of Kunia (UH MAGIS) showing the Kunia Village New Source Well project area and vicinity

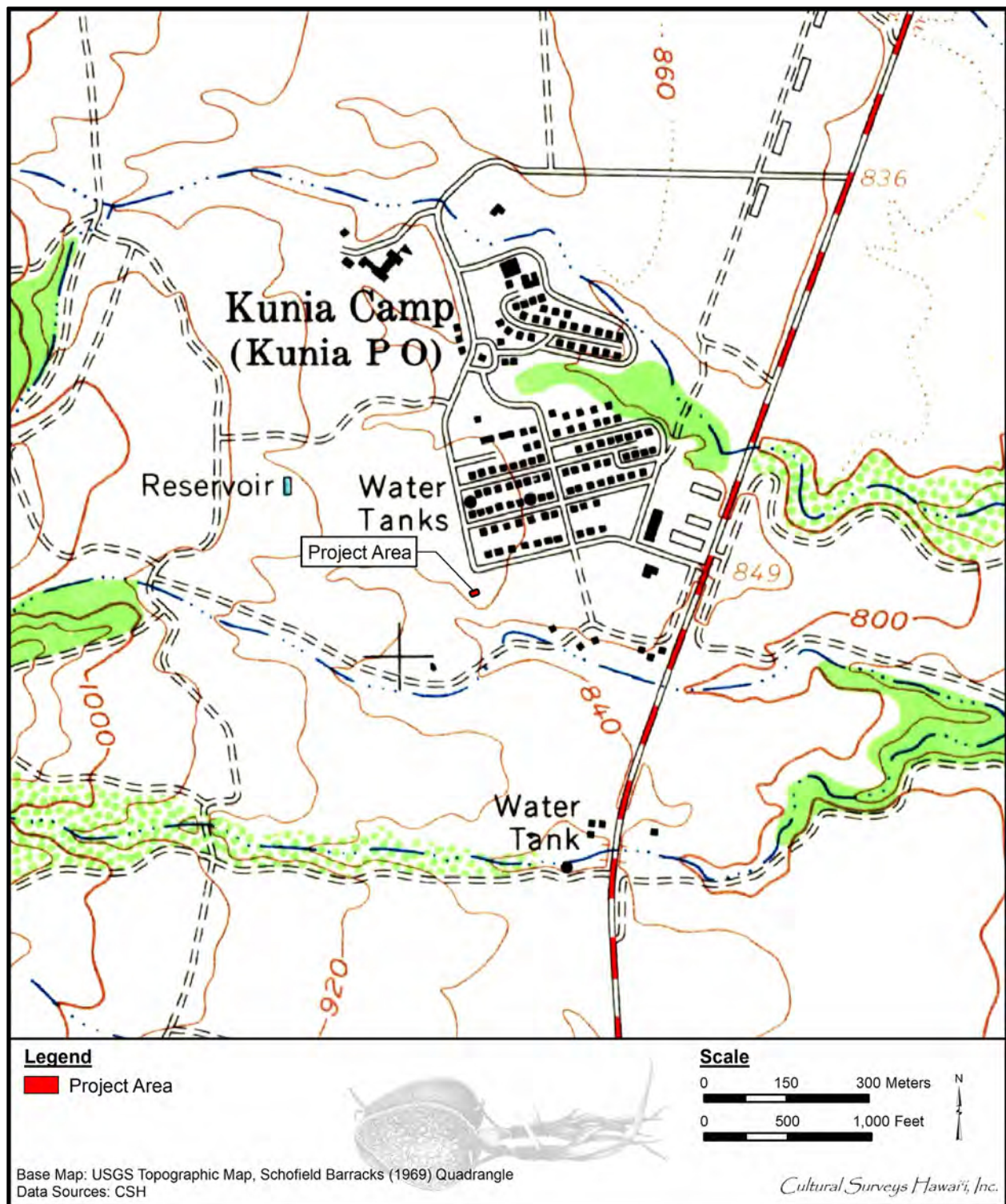


Figure 19. Portion of 1969 USGS topographic map, Schofield Barracks quadrangle, showing the Kunia Village New Source Well project area and vicinity

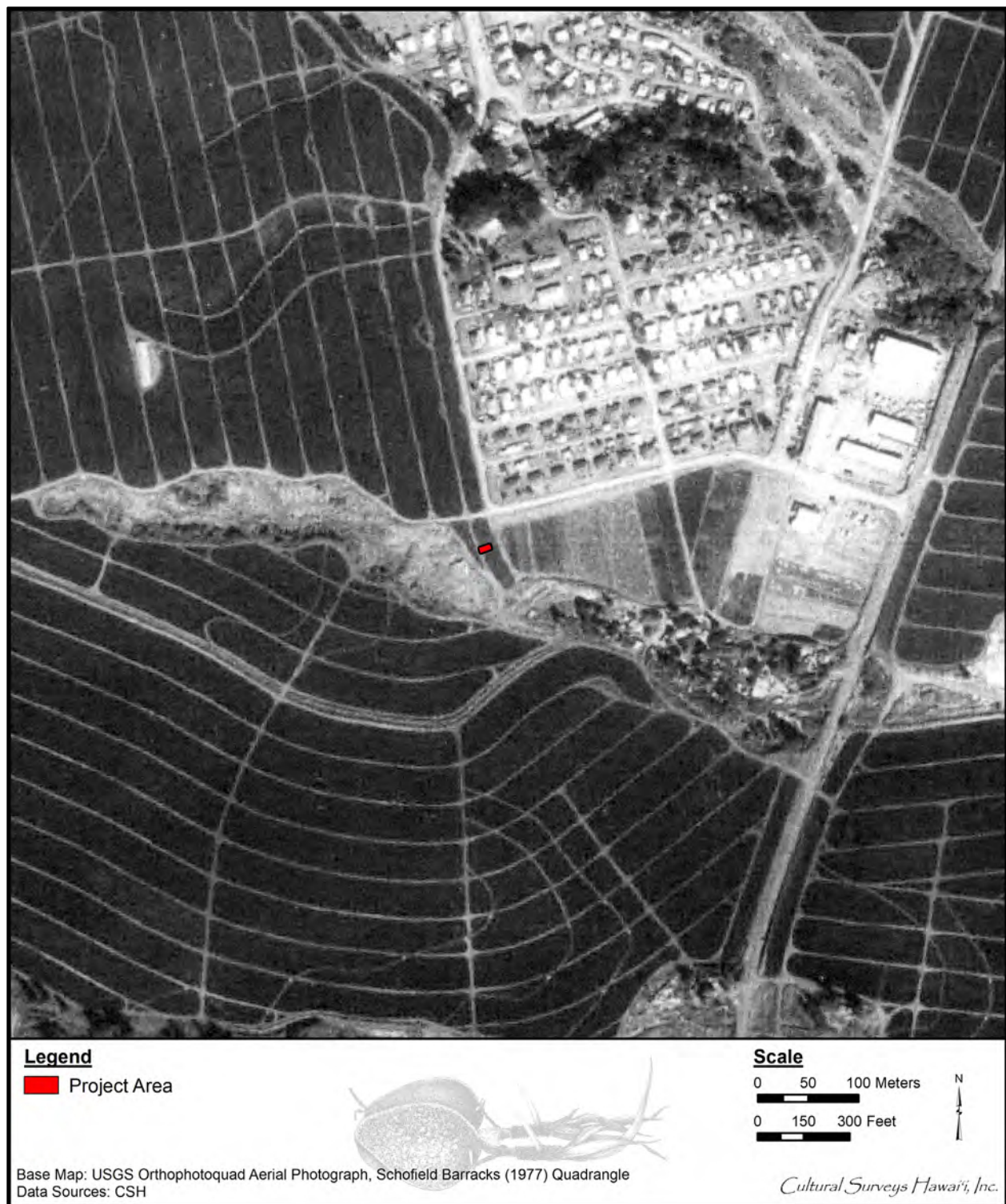


Figure 20. Portion of 1977 USGS Orthoquad aerial photograph, Schofield Barracks quadrangle showing the Kunia Village New Source Well project area and vicinity

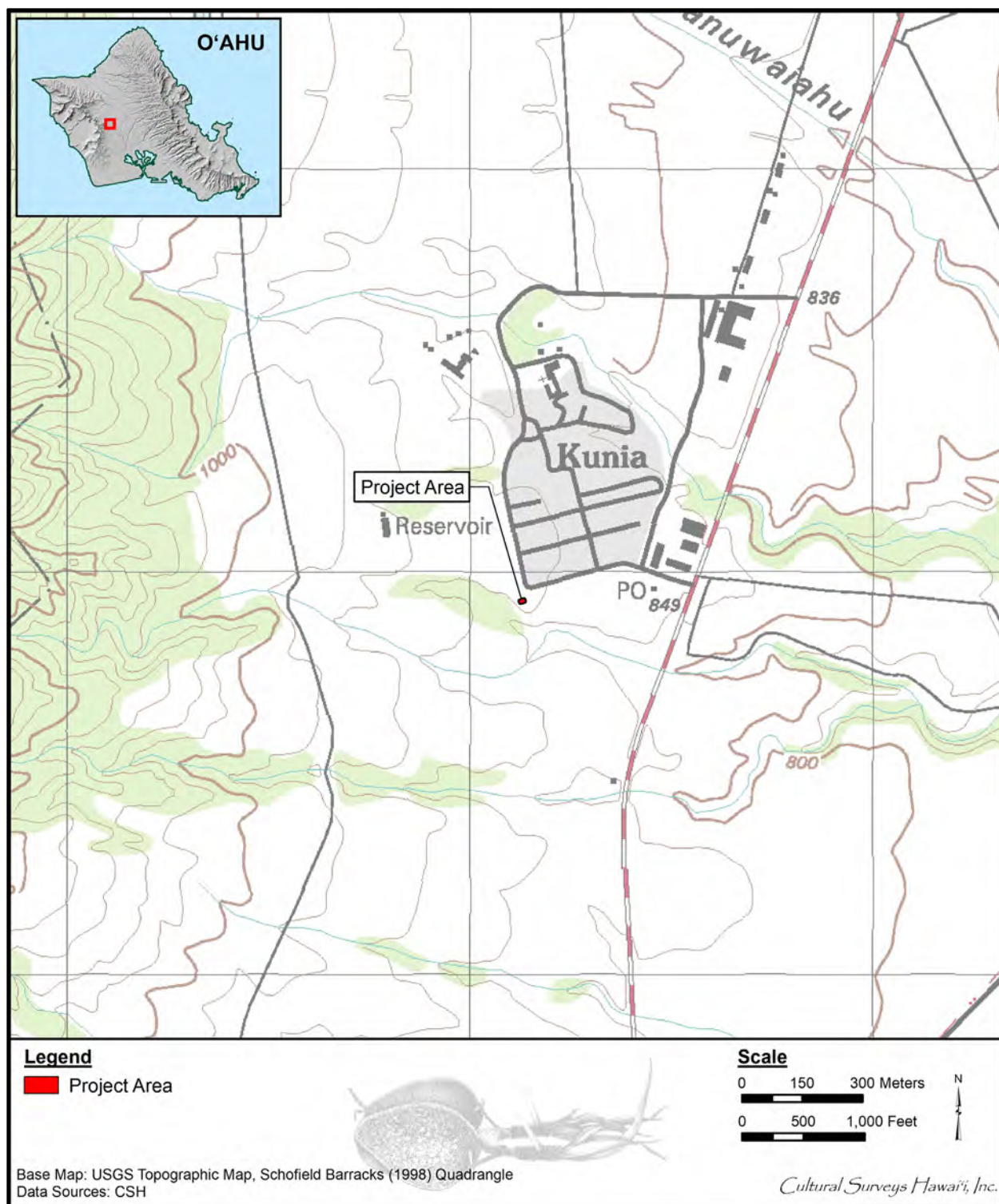


Figure 21. Portion of the 1998 Schofield Barracks USGS 7.5-minute-series topographic quadrangle showing the Kunia Village New Source Well project area

Section 5 Previous Archaeological Research

5.1 Previous Archaeological Studies in the Immediate Vicinity

This discussion of previous archaeological studies and previously identified archaeological resources in the Kunia Village New Source Well project area vicinity is included to inform understandings of land and local communities from the initial Hawaiian discovery and settlement of the islands through the historic era, and to provide additional context for the historic documentation, traditional cultural practices, and oral histories associated with the project area and vicinity. Archaeological studies document the presence or absence of trails, burials, *heiau*, and other traditional Hawaiian religious structures.

Previous archaeological studies within approximately 1.8 km of the project area are depicted in Figure 22 and summarized in Table 1. The locations of previously identified historic properties within approximately 1.8 km of the project area are depicted in Figure 23 and summarized in Table 2.

The immediate vicinity of the Kunia Village New Source Well project area is not well studied in the archaeological literature. We only show one archaeological study (Krause et al. 2015) within 900 m. This reflects 1) the general lack of development in the vicinity which typically drives archaeological study, 2) the perception that this area was not intensively utilized in traditional Hawaiian times (as reflected for example in the lack of native tenant LCAs), and 3) the long history of intensive agriculture in the area which is commonly believed to have removed any evidence of the prior archaeological record as may have been present.

The Wheeler Army Airfield and Schofield Barracks lands, well to the north (see Figure 22) are an exception and have been addressed in a number of military sponsored archaeological studies but these largely plateau lands have been heavily impacted by both prior agricultural and military activities.

5.2 Historic Properties Near the Project Area

McAllister's (1933) island-wide reconnaissance survey documented sites in the general vicinity including Site 133, a small *heiau*; Site 134, Pu'u Kuina Heiau; Site 135 Inclosures; Site 136 a small platform; and Site 137 Pu'u Ku'ua Heiau, but none of these were close (within 1.8 km of the Kunia Village New Source Well project area). The pattern of traditional Hawaiian sites in the general vicinity is that they are very much located in the foothills of the western side of the Wai'anae range, or within stream gulches.

No historic properties have seemingly been identified within 1.5 km of the project area with the exception of the Kunia Camp Historic District (SIHP # 50-80-08-07729).

5.3 The Kunia Camp Historic District (SIHP # 50-80-08-07729)

The (50-page) National Register of Historic Places (NRHP) Registration Form-Kunia Camp (Bacon 2012) provides a thorough review of the history of Kunia camp and notes 127 contributing resources of which 107 are residences, 15 are associated residential garages, and five non-residential buildings including Kunia Gymnasium and Kunia Chapel (within Old Camp); and

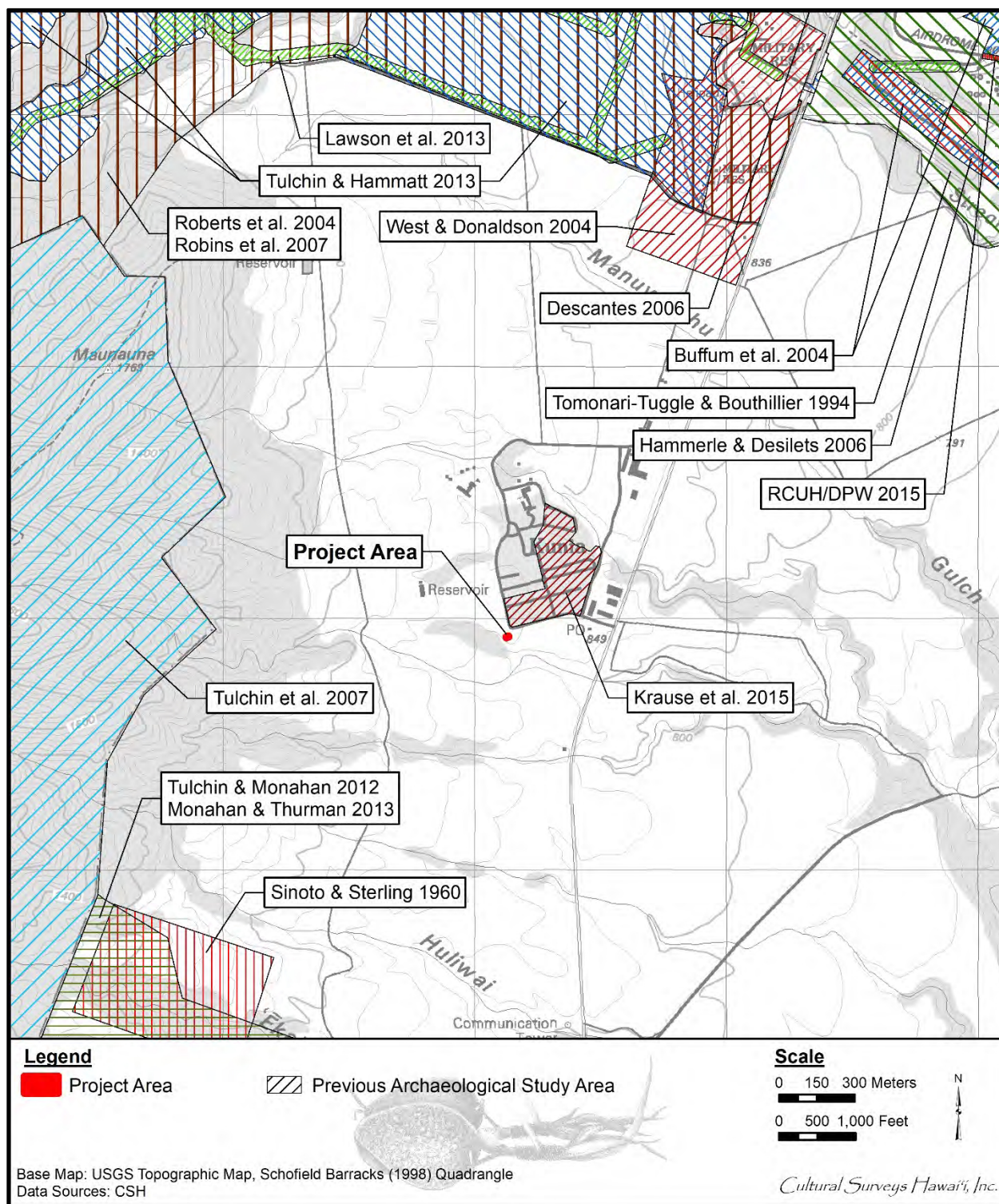


Figure 22. Previous archaeological studies within approximately 1.8 km of the Kunia Village New Source Well project area (1998 Schofield Barracks USGS topographic quadrangle base map)

Table 1. Previous archaeological studies within approximately 1.8 km of the Kunia Village New Source Well project area

Reference	Type of Study	Location	Results
Sinoto and Sterling 1960 (cited in Sterling and Summers 1978:37)	Archaeological literature review/site review	‘Ēkaha Nui Gulch area, approx. 2 km SW of project area	Agricultural terraces, house sites along sides of stream, pavings, platforms, a burial platform and a possible <i>heiau</i> (no SIHP #s believed to have been assigned)
Tomonari-Tuggle and Bouthillier 1994	Cultural resources assessment	Wheeler Army Airfield	Five archaeological sites found but only remnants of Oahu Rail & Land Company Waipahu-to-Wahiawa line can be definitely evaluated as historically significant; other four sites probable military features, although they could be traditional Hawaiian or early ranching features altered by more recent activity
Buffum et al. 2004	Archaeological reconnaissance survey	Included six areas in west, east, and south Schofield Barracks	No historic properties identified
Roberts et al. 2004	Archaeological reconnaissance survey	U.S. Army Schofield Barracks Military Reservation, South Range Land acquisition	Comprised of 43 sites and 129 features, some with pre-Contact components as well as historic sites, related to military and plantation activities (see following Table 2 for SIHP #s)
West and Donaldson 2004	Archaeological inventory survey	Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC) and vicinity, Wahiawa, TMK: (1) 7-1-002:007	No historic properties or cultural materials identified
Descantes 2006	Archaeological monitoring	Schofield Barracks SW of Wright Ave	Three artifacts recovered: one glass Coke bottle and two horseshoes; likely artifacts date between 1920s and 1950s
Hammerle and Desilets 2006	Archaeological monitoring	SW Wheeler Air Force Base	No historic properties identified

Reference	Type of Study	Location	Results
Robins et al. 2007	GPS relocation report/pedestrian survey	Northern portion of Honouliuli Ahupua'a bounded by Schofield Barracks west of Kunia Rd, TMK: (1) 9-2-005	Documented 28 archaeological sites, with habitation, ceremonial, and possible burial components (see following Table 2 for SIHP #s)
Tulchin et al. 2007	Archaeological literature review and field inspection	Approx. 4,600-acre property at Honouliuli Forest Reserve, TMKs: (1) 9-2-004:001 por., 005 por.; 9-2-005:013 por., 016, 018	Eight historic properties identified including mounds and platforms of SIHP # 50-80-08-06497 traditional Hawaiian agricultural complex, possible grinding stone, airplane crash site, a terrace, a wall, and a mound
Tulchin and Monahan 2012	Archaeological reconnaissance survey	162-acre project area on eastern side of Wai'anāe Mountain Range, approx. 1.5 km east of Hawai'i Country Club, TMK: (1) 9-2-004:013 por.	Documented SIHP #s 50-80-08-07328, -07339, -07340, -07341 and -07344, associated with traditional Hawaiian land use
Lawson et al. 2013	Archaeological monitoring	South Schofield Barracks (Grow the Army) project	No historic properties identified
Monahan and Thurman 2013	Archaeological inventory survey	854-acre Kunia Mauka Loa Ridge project area on east side of southern Wai'anāe Range	Identified 23 new historic properties including a platform <i>heiau</i> , a lithic scatter, plantation infrastructure, and a burial (see following Table 2 for SIHP #s)
Tulchin and Hammatt 2013	Archaeological inventory survey	South Schofield Barracks (Grow the Army) project	Documented previously identified (Bouthillier et al. 1997) historic trash deposit and previously identified (Williams et al. 1995) stacked-stone terrace and concrete drainage ditch
Krause et al. 2015	Archaeological inventory survey	Kunia Village Housing Development project	Project area located within boundaries of one historic property, Kunia Camp (SIHP # 50-80-08-07729), architectural complex including 128 features

Reference	Type of Study	Location	Results
RCUH/DPW 2015	Archaeological monitoring	SE Wheeler Army Airfield	No historic properties identified; resulted in re-designating area from medium archaeological sensitivity to low archaeological sensitivity

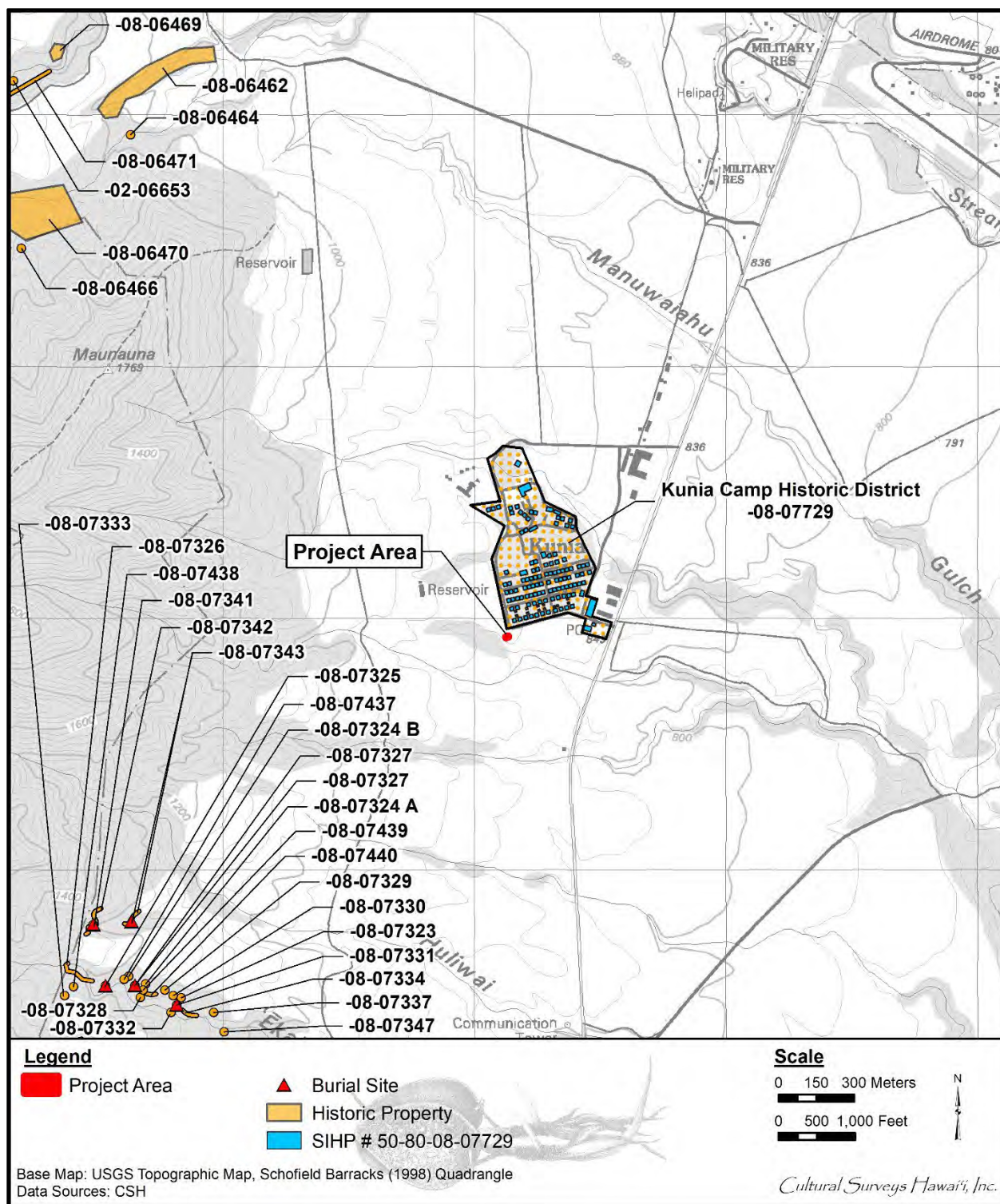


Figure 23. Previously identified historic properties within approximately 1.8 km of the Kunia Village New Source Well project area (1998 Schofield Barracks USGS topographic quadrangle base map)

Table 2. Archaeological historic properties within approximately 1.8 km of the Kunia Village New Source Well

SIHP #	Site Type	Site Age	Source
50-80-08-06462	Earthen dam complex	Post-Contact	Robins et al. 2007
50-80-08-06464	Historic structure foundation	Post-Contact	Robins et al. 2007
50-80-08-06466	Road/retaining wall	Post-Contact	Robins et al. 2007
50-80-08-06469	Agricultural complex	Both	Robins et al. 2007
50-80-08-06470	Road/culvert system	Post-Contact	Robins et al. 2007
50-80-08-06471	Historic road	Post-Contact	Robins et al. 2007
50-80-02-06653	Habitation/agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-07323	Wall and mound	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07324 A	Low mounded wall segment	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07324 B	A single-course alignment of basalt boulders	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07325	Terraces and mound	Indeterminate	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07326	Enclosure (145 m long by 35 m wide)	Indeterminate	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07327	Terrace	Indeterminate	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07328	Cobble pavement with coral manuport, possible shrine	Pre-Contact to early post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07329	Enclosure (14.0 m long by 10.5 m wide)	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07330	Wall and modified outcrops	Post-Contact (Ranching and/or Plantation)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07331	Enclosure (9.0 m by 8.0 m)	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07332	Wall, low and mounded with no formal facing	Post-Contact (Ranching and/or Plantation)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07333	Terrace and road cut	Post-Contact (Plantation)	Tulchin and Monahan 2012, Monahan and Thurman 2013

SIHP #	Site Type	Site Age	Source
50-80-08-07334	Road/trail segment	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07337	Petroglyphs (7 images on one boulder)	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07341	Platform, terrace complex (burial ?)	Pre-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07342	Terrace/trail	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07343	Terrace (burial ?)	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07347	Wall (22 m long)	Post-Contact (Ranching)	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07437	Small Rock shelter (Natural Overhang)	Indeterminate	Monahan and Thurman 2013
50-80-08-07438	Rock shelter (Natural Overhang)	Indeterminate	Monahan and Thurman 2013
50-80-08-07439	Lithic Scatter and Core Tools (Basalt)	Pre-Contact	Monahan and Thurman 2013
50-80-08-07440	Bulldozed Dirt Road	Post-Contact (Ranching)	Monahan and Thurman 2013
50-80-08-07729	Kunia Camp Historic District (127 contributing resources) – does not include present project area	Post-Contact	NRHP Registration Form-Kunia Camp (Bacon 2012)

the Agricultural Research Building, the Main Office Building, and the Kunia Store. The designated period of significance is ca. 1928 to ca. 1963 (Bacon 2012:16).

The present Kunia Village New Source Well project is outside (west) of the designated district and appears unlikely to have any secondary impacts on the district. The purpose of the project (which is being carried out for the Kunia Village Development Corporation) is to provide clean water to the residences of the district providing for continuity of village life.

In the archaeological inventory survey report (Krause et al. 2015) that addressed a 22.4-acre portion of Kunia Village, no architectural or archaeological features of SIHP # -07729 were newly identified.

We note that while “there were earlier camps before Kunia Camp that were divided by ethnic groups[,] . . . Kunia Camp did not separate workers by ethnicity” (Bacon 2012:5). The NRHP Registration Form (Bacon 2012) makes little reference to ethnicity and, as a federal form, does not evaluate whether Kunia camp has “important value” to an ethnic group. Even if it did, again the present project is outside the designated historic property and no adverse secondary impacts are expected in this project to support the camp through the provision of clean water.

Section 6 Consultation Results

6.1 Community Outreach Table

Table 3 contains the names, affiliations, dates of contact, and comments from NHOs, individuals, organizations, and agencies contacted for this project. Results are presented below in alphabetical order.

Table 3. Community outreach table

Name	Affiliation	Comment
Abrigo, Scott	President, Kapolei Community Development Corporation	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Akau, Randal H.	<i>Kama'āina</i>	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Aki, Jacob	President, Ke One O Kākuhihewa, O'ahu Council of the Association of Hawaiian Civic Clubs	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Alaka'i, Robert	Cultural Practitioner	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Aquino, Henry J.C.	Senate District 19 Pearl City, Waipahu, West Loch Estates, Hono'uli'uli, Ho'opili	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Barbieto, Leda	Raised in Ewa Plantation (Banana / Varona Camp)	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Barbieto, Pio	Raised in Ewa Plantation (Banana / Varona Camp)	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024

Name	Affiliation	Comment
Berg, Tom	Former Councilman, District 1	Letter and figures sent via email 27 August 2024 Mr. Berg provided written testimony via email 27 August 2024 Mr. Berg provided additional information via email 28 August 2024, 17 and 22 September 2024, and 2 and 3 October 2024 Mr. Berg's response is included in its entirety in Appendix B
Bond, John	‘Ewa Historian, Kanehili Cultural Hui	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Clark III, John	Chair, Neighborhood Board No.34 ‘Ewa	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
DaMate, Leimana	Executive Director, DLNR-Aha Moku	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Eaton, Ku‘uwainani	Hoakalei Cultural Foundation	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Faulkner, Kirsten	Executive Director, Historic Hawai‘i Foundation	Letter and figures sent via USPS 27 August 2024 Letter and figures sent via email 30 August 2024 Ms. Faulkner replied via email 11 September 2024 and provided link to website with information on Kunia Camp Historic District CSH replied via email 11 September 2024 thanking Ms. Faulkner for her response
Ferreira, Stacy Kealohalani	<i>Ka Pouhana</i> of OHA	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Fevella, Kurt	Senate District 20 ‘Ewa Beach, Ocean Pointe, ‘Ewa by Gentry, Iroquois Point, portion of ‘Ewa Villages	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024
Friends of Honouliuli		Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Hanohano, Anolani	Kānehili Hawaiian Homestead	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Kaleikini, Ali‘ikaua	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Kaleikini, Hāloa	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024

Name	Affiliation	Comment
Kaleikini, Kala	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Kaleikini, Mahi'aimoku	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Kaleikini, Moehonua	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Kaleikini, No'eau	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Kaleikini, Tuahine	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 1 October 2024
Kalili, Dre	President, Association of Hawaiian Civic Clubs	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Kane, Shad	'Ewa Moku Representative, Aha Moku; Kalaeloa Heritage and Legacy Foundation	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Kauhane, Michelle	President, Kaupe'a Homestead Association; President, Kapolei Community Development Corporation	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Keli'inoi, Kalahikiola	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Keli'inoi, Kilinahe	Cultural Descendant	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Laybon-McBayer, Iwalani	President, Kaupe'a Homestead Association O'ahu Mokupuni, Sovereign Council of Hawaiian Homestead Associations (SCHHA)	Ms. Laybon-McBayer replied via email 28 August 2024 and will contact CSH with any questions

Name	Affiliation	Comment
Lewis, Joe Kūhiō	Chief Executive Officer, Council of Native Hawaiian Advancement	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Lidstone, Miki'ala	Executive Director, Ulu A'e Learning Center; Hālau 'o Kaululaua'e	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
MacDonald, Kainoa	Secretary, Association of Hawaiian for Homestead Lands; Homestead Community Development Corporation	Letter and figures sent via email 27 August 2024 Mr. MacDonald replied via email 27 August 2024 and forwarded letter and figures to Iwalani McBrayer, Sovereign Council of Hawaiian Homestead Associations (SCHHA) council member
Norman, Carolyn Keala	'Ohana Keaweamahi	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
O'Brien, William	President, Ka'uikiokapō	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Mr. O'Brien replied via email 1 September 2024 requesting a zoom meeting and site visit CSH met with Mr. O'Brian and Dietrix Jon Ulukoa Duhaylonsod via Zoom on 25 September 2024 Site visit with Mr. Duhaylonsod on 6 October 2024 Interview summary sent to Mr. Duhaylonsod for review on 30 October 2024 Summary approved 3 November 2024
Paglinawan, Lynette	<i>Kumu</i> , University of Hawai'i West O'ahu (UHWO)	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Paishon, Jr., Frank	Raised in Tenney Village	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Paris, Anthony Makana	Neighborhood Board No.34 Makakilo-Kapolei-Honokai Hale	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024

Name	Affiliation	Comment
Patterson, Kaleo	Native Hawaiian Church; Pacific Justice & Reconciliation Center	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Pierick, Elijah	House District 39: Royal Kunia, Village Park, Honouliuli, Ho'opili, and Portion of Waipahu	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Philpotts, Douglas "McD"	Descendant of Campbell family	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Ramos, Rodolfo	President, Ewa Villages Community Association; Chair of 'Ewa Task Force	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via USPS 30 September 2024
Rodenhurst, Rona	President, 'Ahahui Siwila Hawai'i O Kapōlei, Kapolei Hawaiian Civic Club	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Schaedel, Homelani	President, Malu'ōhai Residents Association	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Serrao, Marleen Kau'i	Pelekikena, 'Ewa-Pu'uloa Hawaiian Civic Club	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Shibuya, Barbara	<i>Kama 'āina</i> of 'Ewa, member of the Shibuya Dayanan Family	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Victor, Dwight	President, Kalaeloa Heritage and Legacy Foundation	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024

Name	Affiliation	Comment
Watson, Kali	Chairman, Hawaiian Homes Commission	Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Wond, Kanani	Vice President, Kaupe'a Homestead Association	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024
Yee, Christian	<i>Kama'āina</i> , familiar with <i>wahi pana</i> and <i>mo'olelo</i>	Letter and figures sent via USPS 26 August 2024 Letter and figures sent via email 27 August 2024 Letter and figures sent via email 1 October 2024

6.2 Community Outreach Results

6.2.1 Tom Berg

On 27 and 28 August 2024, 17 and 22 September 2024, and 2 and 3 October 2024, Tom Berg, former City Councilman, provided CSH with written testimony regarding the Ka Pa'akai Analysis for the Kunia Village New Source Well project to share his *'ike* regarding the faunal, floral, and earth resources he has observed in the vicinity of Honouliuli Stream and the cultural sites and marine resources that are present along the coastal areas of Honouliuli Ahupua'a. Mr. Berg's entire testimony is included in Appendix B .

Mr. Berg mentioned that Honouliuli Stream and Gulch is habitat to several avian species including *pueo* (Hawaiian Short-eared Owl, *Asio flammeus sandwichensis*) and barn owls (*Tyto alba*). *Pueo* are found on all of the main Hawaiian islands and are listed by the State of Hawai'i as endangered on the island of O'ahu (Department of Land and Natural Resources 2005). The Department of Land and Natural Resources (DLNR) states that *pueo* are most commonly found in "open habitats such as grasslands, shrublands, and montane parklands, including urban areas and those actively managed for conservation" (Department of Land and Natural Resources 2005).

Mr. Berg stated, "When I found the pueo there- it was staying at one tree for a week- [...] After one week- I saw it dead on Kunia Road- [...]." He also stated, "The owls would follow me for miles- throughout the stream- at times, come so close I could feel the wind from their wings flapping - these owls are so delicate- need utmost quiet to hunt- and have so little space now to sustain themselves- [...]"

He added, "[...] it is important to quantify- these barn owls are endangered on the mainland- researches lately cannot even find any more nests- they are almost gone in many midwestern states due to rat bait poison etc- [...]"

Mr. Berg believes the "DNLR [DLNR] should be teaming up with US Fish Wildlife nationally to protect these barn owls here," however, he pointed out that "DLNR treats these owls as invasive [...]."

Mr. Berg has "hundreds of videos on this area." He shared links to several videos of *pueo* and barn owls in Honouliuli Stream and Gulch that he recorded and posted on YouTube (see Appendix B).

Mr. Berg mentioned that in 2019, House Resolution (H.R.) 152 was introduced to the Hawai‘i State Legislature proposing the creation of a Pueo Habitat Preserve at the Honouliuli Gulch area. H.R. 152 states “Honouliuli Ahupuaa was historically known to be the location with the greatest number of pueo” and recommends “an area within Honouliuli Ahupuaa, particularly in the area where the Honouliuli Stream meets the Honouliuli Gulch, should be dedicated as a wildlife preserve for pueo and other endangered species, including the hoary bat, and housing, farming, recreational, and other types of development should be prohibited in this area” (see Appendix C ; State of Hawai‘i House of Representatives 2019:1).

Mr. Berg added,

[...] with everyone bonkers on wiping out all grassy areas- and fires destroying grassy areas- and solar and wind farms taking over all open space left- this Honouliuli Gulch area is THE LAST STAND FOR MANY AVIAN SPECIES- a refuge since these wild creatures have been extirpated from elsewhere-

He also shared links to videos he recorded of *kōlea* (Pacific golden plover; *Pluvialis dominica*) and white-rumped shama (*Copsychus malabaricus*) that he observed in Honouliuli Stream (see Appendix B).

Mr. Berg also mentioned that *koloa maoli* (Hawaiian duck; *Anas wyvilliana*), ‘*alae ke‘oke‘o* (Hawaiian coot; *Fulica americana alai*), and White-faced Ibis (*Plegadis chihi*) use Honouliuli Stream.

He pointed out that the area where the groundwater beneath Kalo‘i Gulch and Honouliuli Gulch converges on the ‘Ewa Plain near Mango Tree Road was a wetland basin where shearwater birds nested. The wetland was created when underground water seeps through the soil and comes to the surface during heavy rains. Mr. Berg noted, “the ibis, coots, ducks, herons, owls, stilts-” were “all there,” however, “DLNR purged it- erased it to clear the way for Hoopili development.”

He shared a video that shows *a‘eo* (Hawaiian stilt bird; *Himantopus mexicanus knudseni*), ‘*alae ke‘oke‘o*, ‘*alae ‘ula* (Hawaiian gallinule or mudhen; *Gallinula chloropus sandvicensis*), and *koloa maoli* thriving on the “inner coastal wetland of the Ewa Plain” (see Appendix B). In the video description, Mr. Berg states,

Before the development- where Hunehune Gulch, Kaloi Gulch, and Honouliuli Stream converge on the inner coastal wetland of the Ewa Plain - these rare endangered water birds thrived! Now all they get is an old dumping area at 37 acres of a pond to protect them out of 32,000 acres on the Ewa Plain. [see Appendix B]

Mr. Berg emphasized that the area was “teeming with wildlife.” In a complaint submitted to the Office of Information Practices, Mr. Berg requested information on the methodologies, protocols, and data of surveys seeking to document *pueo* habitation on the undeveloped land which was eventually developed for the University of Hawai‘i’s West O‘ahu campus in Honouliuli, and he described the area as a “haven for wildlife” (Berg 2019:4). He stated,

When the raw, fallow agricultural land on the property sat idle for over 20- years, it blossomed into a haven for wildlife. Tall grasses and old growth trees lined the gulches and a 150-acre patch of a dense foliage thicket had matured. [Kenneth] Nagata quantified over 18 species of birds - including the indigenous Black

Crowned Night Heron using this dense foliage on the property where Kaloi Gulch converges with Hunehune Gulch. [Berg 2019:4]

Mr. Berg mentioned that a biological survey conducted by Kenneth Nagata in 1996 identified 17 avian species in Kalo'i Gulch and stated the area would make an excellent wildlife refuge (Nagata 1996:9). Mr. Berg also mentioned that Nagata found owl pellets which he turned over to DLNR to determine whether they are from a *pueo* or a barn owl, however, "DLNR did not test them."

He also mentioned Honouliuli Stream and Gulch is inhabited by bats. The *ōpe'ape'a* (Hawaiian hoary bat, *Lasiurus cinereus semotus*) is "the only land mammal native to the Hawaiian archipelago" and is found on all of the main Hawaiian islands except for Ni'ihau (Department of Land and Natural Resources 2005:3–13).

Mr. Berg mentioned that,

There are old growth trees there that farmers have left alone because these trees were in or near the gulch embankment - massive Kukui [Candlenut; *Aleurites moluccana*] Nut trees and other tree species that provide refuge from the developed world. Everything should be done to preserve these trees. I have seen bats there, owls, and herons.

Mr. Berg also noted insects such as bees and damselflies and plants that thrive in Honouliuli Gulch are not found anywhere else. He shared a link to a video he recorded of wild gourds (*Lagenaria siceraria*, also *L. vulgaris*) he observed growing along Honouliuli Stream (see Appendix B).

He suggested an "EIS [Environmental Impact Statement]/or Biological Survey for native bees, damselflies, butterflies, snails, and moths too should be undertaken there." He noted,

This gulch, specifically, gave wildlife refuge during all the intensive farming enterprises over the last couple hundred years, and now, this project proposed is poised to disrupt the last stand wildlife has.....where there was once open space, are now solar farms spreading like cancer on the landscape.

He emphasized, "There's nowhere else to go for the voiceless creatures. This is reckless."

Mr. Berg discussed the abundance of *pōhaku* (stone) formations he observed in the vicinity of Honouliuli Stream and Gulch. He shared a video he recorded of a rock alignment located in the area that has not been documented on maps (Figure 24). He recalled visiting the site with the late Michael Lee, a cultural practitioner from Honouliuli, and observing "super cold air flowing out of the earth." Mr. Lee pointed out that a *pōhaku* in the alignment was used as a "birthing stone - place to lay on and give birth" (Figure 25).

Mr. Berg also mentioned there is a "repository of obsidian" in the vicinity of Honouliuli Stream and Gulch. He shared links to a few videos he recorded of obsidian he found within the area (see Appendix B).

He also shared a link to a video he recorded of a "mysterious rock slab" observed in the area (see Appendix B).

Mr. Berg mentioned there are several large *pōhaku* in Honouliuli Gulch which he believes are sacred. He stated, "[...] there is a shitload of massive humongous boulders there no crane could



Figure 24. Rock alignment within the project area (photo courtesy of Tom Berg)



Figure 25. Birthing stone (photo courtesy of Tom Berg)

move- and they are sacred- no farming was ever here in many of these spots- the stream not altered- these boulders tell stories.”

He also observed *pōhaku* that have moved locations on their own between his visits to the area. He stated,

I myself- walked this area daily for years- and did so at night- and one night- the boulders moved on me- they were never there in the path I made- I told Mike Lee and he confirmed it can happen- the boulders actually moved not in my presence- but between visits- and no one was there but me to experience one day no boulders there- and the next day they appeared-

Mr. Berg also recalled observing “a being” floating on a *pōhaku* in Honouliuli Stream. He stated,

Also- just west of the water treatment plant facility- one night I saw ‘a being’ - it was translucent - pure white- I shit in my pants- it moved- it was the size of a small car- I ran as fast as I could away from it- almost had a heart attack- I never went back to that spot again- it was at the bowels of the stream in thick thick forest- ‘the being’ was ‘sitting’ or rather floating on a huge boulder- I think it was about 2-4am. I get the chills just thinking about it.

Mr. Berg shared a link to a video of Mr. Lee conducting a healing ceremony at the site of a proposed 20-acre solar farm in Kalaeloa in Honouliuli (see Appendix B). In the video recorded on 23 February 2013, Mr. Lee performed the ceremony after the development of new roads for the proposed solar farm disturbed archaeological sites in the area. In the ceremony, he uses *limu kala* (*Sargassum echinocarpum*) and states that *limu kala* is the “only thing that can take away the pain and the hurt and bring forgiveness in our chanting.”

Mr. Berg also shared the links to a series of videos he recorded on 12 December 2011 at One‘ula Beach Park in Honouliuli where Mr. Lee discussed the abundance of *limu* (seaweed) found along the shore and other cultural resources in the area including *iwi kupuna* (skeletal remains) (see Appendix B).

Mr. Lee stated the ocean fronting the shoreline at Honouliuli is known as the *Hale o Limu* (House of Limu). He recalled a time when 80 varieties of *limu* could be found in the ocean along Honouliuli. He noted *limu* that washed onto the shore accumulated into piles that were up to 2 ft high and people could gather *limu* from the shore.

Mr. Lee explained the karst system that exists below the surface of Honouliuli. This system of karst, fissures, and caves provides natural drainage for the area and when freshwater percolates into this system it is carried to the ocean where it enters through springs along the shore. These freshwater springs also contribute to the health of the *limu* population.

Mr. Lee also stated Ni‘ihau shells are an “indicator species” that show the health of the *limu* population. He noted certain species of Ni‘ihau shells consume certain species of *limu*. If a specific Ni‘ihau shell is observed in abundance along the shore, it is an indication there is a healthy amount of the species of *limu* that it consumes in the ocean.

He pointed out that the abundance of *limu* along the Honouliuli shoreline attracts fish and other animals. He noted Hawaiian monk seals, a federally protected species, are known to use the Honouliuli shoreline to rest and eat *limu*.

Mr. Lee discussed the impacts of pollution on the *limu*. He noted pollutants introduced into the ground water below the surface travel through the karst system and seep into the ocean through the springs along the shore. These pollutants negatively impact the health of the *limu*, invertebrates, and other animals that live in or use the ocean, including humans.

Mr. Lee also discussed how sand protects the ocean from the pollutants in storm runoff. He noted that when the runoff reaches the beach, it percolates through the sand, which filters out the chemicals including lead and other heavy metals from roads and sidewalks. He stated, “Sand is the natural filter.”

Mr. Lee mentioned many of the caves and sinkholes in the area contain *‘iwi kupuna*, as well as artifacts associated with burial practices. He noted there are two large cave systems in Honouliuli including the Waipouli Cave system.

He also mentioned that the last *hala* (*Pandanus odoratissimus*) tree at One‘ula Beach Park was removed. He stated that *hala* leaves are used in burial practices. In his knowledge of traditional burial practices, he noted *iwi kupuna* are wrapped and then placed in a *hala* basket.

Mr. Lee noted his family’s *iwi kupuna* were disturbed during the construction of the channel for the ‘Ewa marina entrance at the Honouliuli outlet of Kalo‘i Stream (see Appendix B). The *‘iwi* were buried with artifacts including *niho palaoa* (whale-tooth pendant, a symbol of royalty) and *kūpe‘e* (bracelet, anklet) made of whale tooth bone. Mr. Lee emphasized that these artifacts are evidence of the *ali‘i* who resided in the area. The *iwi* and associated burial artifacts were reinterred in 2014 at the Hoakalei Preserve.

Mr. Berg also shared a video discussing how large housing development projects in ‘Ewa have resulted in the loss of agricultural lands and the habitats of the endangered *ko‘oloa‘ula* (red ‘ilima; *Abutilon menziesii*) and other endangered wildlife including endangered moths, butterflies, wasp, *pueo*, and Hawaiian hawks (see Appendix B).

Ko‘oloa‘ula is “a rare and endangered species once endemic to Lanai, Maui, Oahu and Hawaii. It is now extinct on Hawaii” (Nagata 1996:5). It is a “federally listed endangered species since 1986 and is protected under the provisions of the federal Endangered Species Act of 1973, as amended, and Chapter 195D, Hawaii Revised Statutes, as amended” (State of Hawai‘i Department of Transportation 2004:v).

6.2.2 William Kahula O’Brien and Dietrix Jon Ulukoa Duhaylonsod

On 25 September 2024, CSH met with William Kahula O’Brien and Dietrix Jon Ulukoa Duhaylonsod to discuss the Ka Pa‘akai Analysis for the Kunia Village New Source Well project and to share their concerns regarding any traditional cultural resources and native flora and fauna in the vicinity of the project area. Mr. O’Brien and Mr. Duhaylonsod are members of Ka‘uikiokapō,

[...] a non-governmental organization dedicated to advocate for social justice including, but not limited to, environmental and cultural preservation issues. Rooted in the area of Pūkaia and Waimānalo in Honouliuli, O‘ahu, Ka‘uikiokapō uses traditional knowledge to care for the land and sea of the area, making sure to teach the community and prepare the next generation to continue the good work. [U.S. Department of Interior 2023]

Mr. Duhaylonsod pointed out the project area is in the vicinity of a natural gulch. He shared his concern that there may be the remnants of cultural sites that have “escaped destruction or maybe rolled over and ended up in the gulches.” He asked, “What would be the chances of any kind of activities that would be affecting the gulch?”

Mr. Duhaylonsod requested a site visit to “get an awareness of where any natural vegetation is in relation to the site, to the areas, and to be able to touch the *‘āina* (land) there and get a feel.”

On 6 October 2024, CSH met with Mr. Duhaylonsod at Kunia Village to visit the site of the proposed new well. After observing the distance between the new well site and nearby gulch, Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project. However, he stressed the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist. He suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering into the gulch. He also pointed out a “hard pan” located downslope of the project area and expressed concern that runoff from the project area could flow down the “hard pan” directly into the gulch causing significant erosion during heavy rains.

Mr. Duhaylonsod pointed out two *pu‘u* (hills), Pu‘u Kānehoa (located to the west) and Pu‘u Kaua (located to the southwest), in the vicinity of the project area. He also pointed out Pōhākea Pass to the southwest which was a well-frequented passageway between Honouliuli and Lualualei Ahupua‘a. He noted Pōhākea Pass is mentioned in the *mo‘olelo* of Hi‘iakaikapoliopole. According to the *mo‘olelo*, Hi‘iaka was at Pōhākea when she realized that her *lehua* groves had been burned by her sister Pele, and her friend Hōpoe had been turned into stone (Ho‘oulumahie 2008b:262).

Mr. Duhaylonsod is also *kumu hula* (*hula* [dance] teacher) for the *hula hālau* (dance school), Kiawekūpono O Ka Ua. In the past, his *hālau* has made *kapa* (bark cloth) from the *wauke* (paper mulberry; *Broussonetia papyrifera*) which in traditional times were plentiful in the uplands of Honouliuli.

Section 7 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially regarding the active manifestation of one’s culture or aspects thereof. According to Pauketat:

People have always had traditions, practiced traditions, resisted traditions, or created traditions [...] Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change resulting from multiple influences, including modernization as well as other cultures. It is well known that within Hawai‘i, a “broader ‘local’ multicultural perspective exists” (Kawelu 2015:3). While this “local” multicultural culture is deservedly celebrated, it must be noted that it has often come into contact with “traditional Hawaiian culture.” This contact between cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of “local” culture are well noted throughout this section and understood to represent survivance or “the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry” (Vizenor 1999:vii). Acknowledgement of these “local” influences help to inform nuanced understandings of entanglement and of a “living [Hawaiian] contemporary culture” (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices as were practiced within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges “tropes of authenticity,” (Cipolla 2013) and acknowledges the multicultural influences and entanglements that may “change” or “create” a tradition.

This section integrates information from Sections 1–6 in examining cultural resources and practices identified within or in proximity of the project area in the broader context of the encompassing Honouliuli landscape.

7.1 Agricultural Practices

Lying in the lee of the Wai‘anae mountain range, the project area is one of the driest areas of O‘ahu with most of the area averaging about 550 mm (22 inches) of rain on the coastal and inland region of the *ahupua‘a* and about 1,200 mm (39 inches) in the northern region up into the Wai‘anae mountain range (Giambelluca et al. 2013). The area is drained by Kalo‘i Gulch and Honouliuli Gulch. These gulches are believed to rarely run with water. Historic maps also indicate a spring located to the north. Such infrequent springs may have been key to the early human activity on the southeast Wai‘anae slope.

Despite the relative lack of rainfall in this area, there exists a traditional rain name associated with the *ahupua‘a* of Honouliuli. This rain, known as the Nāulu, is described as a sudden shower and is more commonly associated with Kawaihae, Hawai‘i and Ni‘ihau (notoriously dry locations as well) (Akana and Gonzalez 2015:187). The general lack of distinctive, traditional rain names is

indicative of historic environmental conditions within the *ahupua'a*. Due to these conditions, *maka'āinana* living within the *ahupua'a* were forced to modify or utilize freshwater resources in innovative ways.

Fresh water remains available below the surface of Honouliuli. Dissolution “pit caves” (Mylroie and Carew 1995) or “sink holes” would accumulate water within them via a subterranean water or karst system; this water also contained nutrient-rich sediment that allowed for the cultivation of significant plant resources such as *kalo*, *kī*, and *noni*. McAllister documented examples of traditional agricultural activity in Honouliuli, writing that the *kama'āina* of the *ahupua'a* utilized the soil on the floor of caves for cultivation. At the time of his survey in the 1930s both *mai'a* and *kō* were still being cultivated within these pits.

The lowlands fronting the West Loch of Pearl Harbor (Kaihuopala'ai) were suitable for the cultivation of the traditional Hawaiian staple crop, *kalo*. The production (and consumption) of *kalo* was vitally important to many communities of Native Hawaiians living in 'Ewa. Captain James King, visiting Hawai'i in 1779, noted “the natives of these islands are, in general, above the middle size and well made; they walk very gracefully, run nimbly and are capable of bearing great fatigue” (Shintani 1993:10). Accordingly, the high level of physical activity and physical fitness described by Captain King was a normal part of Hawaiian life and was largely attributable to the availability of plant and food resources such as *kalo*, *'uala* (sweet potato; *Ipomoea batatas*), *niu* (coconut), *mai'a*, *limu* (seaweed), and *i'a* (fish). Besides the observed contributions to stamina and health, *kalo* was also a revered staple food, believed to have derived from the first-born son of Wakea and Papa.

[...] the supreme god Kane 'in the form of Wakea (a form associated with the earth) produced two sequential offspring: the first became *kalo* (taro) plant, the second became Hāloa, the ancestor of man [...] thus, in kinship terms, the taro is the elder brother and the senior branch of the family tree, mankind belongs to the junior branch, stemming from the younger brother.' [Trask 2012:75]

'Ewa was also famous for a rare taro called the “*kāi o 'Ewa*,” which was grown in mounds in marshy locations (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the saying, “*Ua 'ai i ke kāi-koi o 'Ewa*, He has eaten the Kāi-koi taro of 'Ewa” (Pukui 1983:305).

7.2 Floral Resources

In addition to taro, breadfruit, coconuts, *wauke*, bananas, *olonā* and other plants were also grown in the interior. 'Ewa was also known as one of the best areas to grow gourds and was famous for its *māmaki*. Handy and Handy (1972:429) noted the “lower part of the valley sides were excellent for the cultivation of yams and bananas.” Handy and Handy (1972:429) also noted 'Ewa was famous for its *'awa* which grew “farther inland.”

Dietrix Jon Ulukoa Duhaylonsod and his *hālau*, Kiawekūpono O Ka Ua, have made *kapa* (bark cloth) from the *wauke* which in traditional times was plentiful in the uplands of Honouliuli.

7.3 Faunal Resources

In traditional times, feathers from birds were used to create various crafts for the *ali* ‘i including ‘*ahu* ‘*ula* (feather cape), *mahiole* (feather helmet), *lei*, and *kāhili* (feather standard). To acquire these feathers, the *ali* ‘i employed men called *kia manu* who specialized in catching birds to gather. N.B. Emerson noted,

The methods used by one hunter in the capture of the birds differed from those used by another. They also varied somewhat, no doubt, in different districts, on the different islands, at different seasons of the year and even in the different hours of the day. [Emerson 1894:103]

There could be nothing stereotyped in the way the hunter of birds practiced his art. While the method might remain essentially the same, it was necessarily subject to a wide range of modification, to suit the skill and ingenuity of each hunter in his efforts to meet the habits and outwit the cunning of the birds themselves. [Emerson 1894:103]

Tom Berg mentioned that gulches provided refuge for wildlife including *pueo* (Hawaiian Short-eared Owl, *Asio flammeus sandwichensis*), barn owls (*Tyto alba*), and bats. He noted barn owls are endangered on the mainland. He believes the DLNR and US Fish and Wildlife Service should work together to protect them.

7.4 Marine Resources

Traditional Hawaiian diets were also supplemented with ocean-based proteins. Native Hawaiians historically fished the reefs, farmed fishponds, and utilized the freshwater springs in the *ahupua* ‘*a* of Honouliuli. The lochs of Pearl Harbor were ideal for the construction of fishponds and fish traps. The fact that there were so many fishponds in ‘Ewa, more than any other district on O‘ahu, indicates agricultural and aquacultural intensification was a direct link to the chiefs who resided there and to the increasing needs of the population. References to the abundance of ocean resources can be found within *mo* ‘*olelo*, *wahi pana*, and ‘*ōlelo no* ‘*eau* associated with Honouliuli Ahupua‘a.

The pearl oyster or *pipi* were so abundant in Pu‘uloa that it was “enough for all of ‘Ewa” (Kamakau 1991a:83). Pu‘uloa was also known as Waimomi (“Water of Pearl”) which led to the English name Pearl Harbor after the *pipi* which were so abundant on the harbor reefs before being decimated by over-harvesting.

Limu was very important in the Hawaiian diet and is defined by Pukui and Elbert (1986) as “A general name for all kinds of plants living under water, both fresh and salt, also algae growing in any damp place in the air, as on the ground, on rocks and other plants.” Honouliuli was well known for its abundance of edible *limu*; people from all over the island would come to gather *limu* along the coastal beaches such as Kalaeloa and Kualaka‘i. Hawaiian women practiced the gathering of seaweed and salt.

Pa ‘*akai* (salt) was one of the condiments used by Hawaiians for curing fish and other foods. Out of all of Polynesia, Hawaiians were the only group of people to produce salt from the sea by properly constructing salt pans. These salt pans were described by Reverend William Ellis:

We saw a number of their pans, in the disposition of which they display great ingenuity. They have generally one large pond near the sea, into which the water flows by a channel cut through the rocks, or is carried thither by natives in large calabashes. After remaining there some time, it is conducted into a number of smaller pans, about six to eight inches in depth, which are made with great care, and frequently lined with large evergreen leaves, in order to prevent absorption. Along the narrow banks or partitions between the different pans, we saw a number of large evergreen leaves placed. They were tied up at each end, so as to resemble a shallow dish, and filled with sea water, in which the crystals of salt were abundant. [Ellis 1839 in Buck 1964:71]

One of the first enterprises in Honouliuli in the post-Contact period was the making of salt. Soon after Kekau'ōnohi sold the land of Pu'uloa to Isaac Montgomery in 1849, the king (Kamehameha III) and Montgomery entered into a partnership to run the salt works in Pu'uloa. Kamakau (1992:409) reported, "The king and Isaac of Pu'uloa are getting rich by running the salt water into patches and trading salt with other islands." The salt was also sent to Russian settlements in the Pacific Northwest, where it was used to pack salmon (*Hawaiian Gazette*, 29 January 1897). An 1853 newspaper article (*Polynesian*, 20 August 1853) on the "Puuloa Salt Works" says this was the only place "where large quantities of salt were manufactured." Kelly (1991:160) says there was another salt works at Kualaka'i (Nimitz Beach), but does not give a reference for this claim.

7.5 *Wahi Pana*

The concept of *wahi pana* is very important in Hawaiian culture as a connection to the past and, therefore, the ancestors. From the name of a place one can know intimate details about the people who lived there, the environment, cultural practices, and historical events that took place. In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there that has meaning for the people of that time. Because Hawaiian culture was based on oral traditions, place names and their stories were an important way of remembering these traditions and ensuring these stories would be passed on to future generations. In Hawaiian thinking, the fact that a place has a name deems it important. Often, spiritual power or *mana* is attached to a place, which increases its importance. On the subject of *wahi pana*, Edward Kanahale writes,

As a native Hawaiian, a place tells me who I am and who my extended family is. A place gives me my history, the history of my clan, and the history of my people. I am able to look at a place and tie in human events that affect me and my loved ones. A place gives me a feeling of stability and of belonging to my family, those living and dead. A place gives me a sense of well-being and of acceptance of all who have experienced that place. [Kanahale in James 1995:6]

There exist a myriad of cultural sites or *wahi pana* for 'Ewa Moku; however, for the *ahupua'a* of Honouliuli plains and temples were of particular importance.

The 'Ewa coastal plain was also a place of spiritual significance as it was associated with the *ao kuenta*, the realm of homeless souls. According to Samuel Kamakau, there existed three spirit realms, the *ao kuenta*, *ao 'aumakua*, and *ke ao o milu*. Upon death, the spirit of the recently deceased was said to leave the body and then proceed toward a *leina* where they would leap into Pō, the world of the unseen (Handy and Pukui 1972:146). The spirit was guided to and over the

leina and into Pō by their *'aumakua* (Handy and Pukui 1972:146), however, if the soul of the deceased had no place in the *'aumakua* realm, or was abandoned by an *'aumakua*, they were destined to wander the *wiliwili* grove of Kaupe'a until such time that they were rescued by their *'aumakua*. Fornander (1919-1920:6[2]:292) states Pu'uokapolei may have been a *leina*, a jumping off point associated with the wandering souls who roamed the plains of Kaupe'a and Kānehili, *makai* of the hill.

Pu'uokapolei was also known to be the home of Kamapua'a's grandmother, Kamaunuanoho, (Nakuina 1904:50). There was once a large rock shelter on the *makai* side said to have been the residence of Kamapua'a and his grandmother (McAllister 1933:108). After conquering the majority of O'ahu, he established his grandmother as queen (Pukui et al. 1974:203). Another account (*Ka Loea Kālai'āina*, 13 January 1900 in Sterling and Summers 1978:34) stated that Kekele'aikū, the older brother of Kamapua'a, also lived on Pu'uokapolei.

The plain of Pukaua is located near Pu'uokapolei. Two distinct *mo'olelo* are connected with this cultural site. The first of these two stories was presented in the 13 January 1900 edition of *Ka Loea Kālai'āina* which states two old women with supernatural powers were heading to their home in Pukaua following an evening of fishing at the village of Kūalaka'i. As the sun began to rise, the women hid to avoid being seen and their bodies turned to stone. The second *mo'olelo* involves Hi'iaka, and is spread across several daily editions of *Ka Hōkū o Hawai'i* from February 1927. According to the *mo'olelo*, the two women were *mo'o*. The women met Hi'iaka as she journeyed toward the 'Ewa coast. They were afraid Hi'iaka would kill them, so they transformed into their lizard forms and hid from Hi'iaka (*Ka Hōkū o Hawai'i*, 15 February 1927, translated in Maly 1997:19). This stone was known as "Pe'e-kāua," which translates to "we two hidden."

Several *heiau* stood in Honouliuli Ahupua'a including Pu'uokapolei Heiau, Pu'u Ku'ua Heiau, and two unidentified *heiau* located at the foot of Pu'u Kanehoa, and at the foot of Mauna Kapu (McAllister 1933). Each year, a ceremony commemorating the changing of the seasons is still observed in the beginning of May at Waikīkī and Honouliuli. Sam 'Ohukani'ōhi'a Gon III, Na Wa'a Lalani Kahuna O Pu'u Koholā, and the late Kumu Hula John Keola Lake's *hula hālau* perform *oli* and *hula* during the ceremony (Genz et al. 2012). The ceremony occurs at Pu'uokapolei Heiau which is oriented so it views the setting of the sun behind Pu'ula'ila'i farther west, and maintains a line of sight extending eastward from Pu'ula'ila'i toward Papa'ena'ena Heiau, located in Waikīkī.

No historic properties have seemingly been identified within 1.5 km of the project area with the exception of the Kunia Camp Historic District (SIHP # 50-80-08-07729). The present Kunia Village New Source Well project is outside (west) of the designated district and appears unlikely to have any secondary impacts to the district.

Mr. Duhaylonsod pointed out the project area is in the vicinity of a natural gulch. He expressed concern that there may be the remnants of undocumented traditional properties and resources in the gulch that may have "escaped the bulldozer" or ended up there following heavy rains.

After observing the distance between the new well site and gulch, Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project.

7.6 Trails

Trails were and continue to be valuable resources for Native Hawaiian culture and life ways. In the past, trails were well-used for travel within the *ahupua‘a* between *mauka* and *makai* and laterally between *ahupua‘a*. There were several pre-Contact/early historic trails across the *moku* of ‘Ewa including a cross-*ahupua‘a* trail that passed through ‘Ewa connected Honolulu to Wai‘anae. Branching off from this trail, a *mauka-makai* trail followed the boundary between Honouliuli and Hō‘ae‘ae to the Pōhākea Pass and to Lualualei. Based on Ī‘ī’s (1959:96–98) description, the trail to Pōhākea Pass would have passed through the present project area.

Mr. Duhaylonsod mentioned Pōhākea Pass was a well-frequented passageway between Honouliuli and Lualualei Ahupua‘a. He noted Pōhākea Pass is mentioned in the *mo‘olelo* of Hi‘iakaikapoliopole. According to the *mo‘olelo*, Hi‘iaka was at Pōhākea when she realized her *lehua* groves had been burned by her sister Pele, and her friend Hōpoe had been turned into stone (Ho‘oulumahie 2008b:262).

7.7 Burials

‘Ewa was famous for the many limestone caves formed in the uplifted coral, called the “Ewa Karst.” In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive. Where not covered by alluvium or stockpiled material, this Pleistocene limestone outcrop has characteristic dissolution “pit caves” (Mylroie and Carew 1995). The caves of Pu‘uloa were sometimes also used as burial caves. Following the death of Keali‘iahonui, son of Kaua‘i’s last king, Kaumuali‘i, in 1849, his body was buried in Pu‘uloa (Alexander 1907:27).

Section 8 Summary and Recommendations

8.1 Summary of Background Research

Background research for this study yielded the following results, presented in approximate chronological order:

1. Honouliuli is the largest *ahupua‘a* in the *moku* of ‘Ewa. The literal translation of Honouliuli is “dark water,” “dark bay,” or “blue harbor,” and thus is named for the waters of Pearl Harbor which mark the eastern boundary of the *ahupua‘a* (Jarrett 1930:22). Another source translates Honouliuli as “The blue bays or inlets” (*Saturday Press*, 11 August 1883). Honouliuli appears in the “Mo‘olelo of Lepeamoa,” the chicken-girl of Pālāma, where Honouliuli is the name of the husband of the chiefess Kapālāma, and grandfather of Lepeamoa (Westervelt 1923:164–184).
2. Honouliuli is generally described as very hot and dry. Evidence for drought-like conditions is further supported by the relative lack of traditional rain names associated with the Honouliuli Ahupua‘a (Akana and Gonzalez 2015:187). The Nāulu rain is the only known rain associated with Honouliuli. Due to the lack of rainwater, freshwater resources were accessed via a karstic system (Mylroie and Carew 1995).
3. In traditional Hawaiian times, the areas of exposed coral (Pleistocene limestone) outcrop were undoubtedly more extensive. According to McAllister (1933), holes and pits in the coral were generally accessed for water, while larger pits, often containing soil, were used for cultivation. McAllister additionally remarked that at the time of his 1930s survey, *mai‘a* and *kō* were being cultivated within the pit caves (sinkholes) (McAllister 1933:109).
4. The traditional *ka‘ao* associated with the area speak of the *akua* brothers, Kāne and Kanaloa. It was their supernatural feat of hurling *pōhaku* across the island that determined the boundaries of land divisions (Sterling and Summers 1978:1). Additional *mo‘olelo* speak of Hi‘iaka and her travels across the plains of ‘Ewa. In particular, the *wahi pana* of Kaupe‘a is described. Kamakau describes Kaupe‘a as a wide plain where a grove of *wiliwili* stands (Kamakau 1991a:47). This plain is an *ao kuewa*, a realm belonging to homeless souls. In general, the *kama‘āina* of both Honouliuli Ahupua‘a and ‘Ewa District made a point to avoid this place.
5. Pu‘uokapolei, a prominent hill located on the ‘Ewa coastal plain, was the primary landmark for travelers on the trail running from Pearl Harbor to Wai‘anae. It was once on the summit of the hill, however, by the time of McAllister’s survey of O‘ahu, it had been destroyed (McAllister 1933:108). The hill was also used as a point of solar reference or as a place for celestial observations of the winter solstice and summer solstice.
6. John Papa ‘Ī‘Ī describes a network of Leeward O‘ahu trails which in later historic times encircled and crossed the Wai‘anae Range, allowing passage from Lualualei to Honouliuli via Pōhākea Pass (‘Ī‘Ī 1959:96–98).
7. Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i*. This would be attributable for the most part to the plentiful marine and estuarine resources available at the coast, where several sites interpreted as permanent habitations and fishing shrines were located. Other attractive subsistence-related features of the

ahupua'a include irrigated lowlands suitable for wetland taro cultivation (Hammatt and Shideler 1990), as well as the lower forest area of the mountain slopes for the procurement of forest resources.

8. Subsequent to Western Contact in the area, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species (Frierson 1972:2). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing (Frierson 1972:10).
9. Following the Māhele of 1848, 96 individual land claims were made in the *ahupua'a* of Honouliuli, with 72 claims being registered and awarded by King Kamehameha III to *maka'āinana*. The 72 *kuleana* awards were almost all made adjacent to Honouliuli Gulch, which contained fishponds, *lo'i*, *kula*, and house lots.
10. In 1877, James Campbell purchased most of Honouliuli Ahupua'a for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with "abundant pasturage of various kinds" (Briggs in Haun and Kelly 1984:45).
11. In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) in 1890. To attract business to his new railroad system, Dillingham subleased all land below 200 ft elevation to William Castle who in turn sublet the area to the Ewa Plantation Company for sugarcane cultivation (Frierson 1972:15). Dillingham's Honouliuli lands above 200 ft elevation suitable for sugarcane cultivation were sublet to the Oahu Sugar Company.
12. The Ewa Plantation Company was incorporated in 1890 and lands throughout Honouliuli were designated for sugarcane cultivation. Sugar production exploded with the successful drilling of an artesian well by James Campbell on the 'Ewa Plain. Campbell's first well was named Waianiani ("crystal waters") by the *kama'āina* of 'Ewa (Nellist 1925). By 1930, Ewa Plantation had drilled 70 artesian wells to irrigate cane lands; artesian wells provided fresh water to Honouliuli for nearly 60 years (Ho'okuleana 2014).
13. Around 1896, Harry Von Holt, Superintendent of the OR&L Ranch Department, was actively constructing a fence around the *mauka* Honouliuli lands. This established the Honouliuli Forest Reserve, within which Von Holt planted "experimental trees" to reforest areas damaged by sandalwood harvesting and livestock grazing (Von Holt 1985:142).
14. James Dole initially began planting pineapples in 1903 after paying \$4,000 for just over 60 acres of homestead land in Wahiawā in 1900 (Larsen and Marks 2010:168). Such was Dole's success that by the late 1950s, Hapco (Hawaiian Pineapple Company), had so grown in size and scope that it could boast production of 80% of the pineapple bought by consumers world-wide (Bolante 2006).
15. Kunia Camp was the last village in O'ahu designated exclusively for Del Monte Corporation's workers who processed pineapples from the adjacent pineapple fields (Bolante 2006).

8.2 Results of Community Consultation

CSH attempted to contact 50 Hawaiian organizations, agencies, and community members. Of the five people that responded, one of these *kama'āina* and/or *kūpuna* provided written testimony and two met with CSH for a more in-depth interview. Consultation was received from the following community members:

1. Tom Berg, Former Councilman, District 1
2. William Kahula O'Brien and Dietrix Jon Ulukoa Duhaylonsod, Ka'uikiokapō

8.3 Impacts and Recommendations

Based on information gathered from the community consultation, participants voiced their concerns in the following cultural context:

1. Dietrix Jon Ulukoa Duhaylonsod mentioned the project area is in the vicinity of a natural gulch. He noted the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist.
2. Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project, however, he expressed concern that runoff from the project area could flow down the “hard pan” located downslope of the project area and directly into the nearby gulch causing significant erosion during heavy rains.
3. Mr. Duhaylonsod suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering the gulch.
4. Tom Berg believes the DLNR and U.S. Fish and Wildlife Service should work together to protect barn owls.
5. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.
6. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

Section 9 Ka Pa'akai Analysis

9.1 Overview

In *Ka Pa'akai vs Land Use Commission*, 94 Hawai'i (2000) the Court held the following analysis must also be conducted:

1. The identity and scope of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary native Hawaiian rights are exercised in the project area;
2. The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian Rights if they are found to exist.

Based on information gathered from the cultural and historical background, and community consultation for this project, there are a number of traditional cultural practices and resources to consider.

9.1.1 Agricultural Practices

No ongoing agricultural practices were identified within the Kunia Village New Source Well project area.

Kunia Country Farms, a landscaping business and tropical nursery, is located directly southeast of the project area on Kunia Road Highway 750. The nursery is spread over 10 acres of former pineapple plantation land, presumably once owned by Del Monte. Kunia Country Farms provides various groundcovers, shrubs, fruit trees, and palms.

9.1.2 Floral Resources

Dietrix Jon Ulukoa Duhaylonsod mentioned *wauke* was plentiful in the uplands of Honouliuli in traditional times. Mr. Duhaylonsod and his *hālau*, Kiawekūpono O Ka Ua, have made *kapa* from the *wauke*.

9.1.3 Faunal Resources

Tom Berg mentioned that gulches provided refuge for wildlife including *pueo*, barn owls, and bats. He noted barn owls are endangered on the mainland. He believes the DLNR and U.S. Fish and Wildlife Service should work together to protect them.

9.1.4 Marine Resources

No marine resources were identified within or in the vicinity of the Kunia Village New Source Well project area.

9.1.5 Wahi Pana

Mr. Duhaylonsod pointed out the project area is in the vicinity of a natural gulch. He expressed concern that there may be the remnants of undocumented traditional properties and resources in the gulch that may have “escaped the bulldozer” or ended up there following heavy rains.

9.1.6 Trails

‘Ī (1959:96–98) notes the *mauka-makai* trail to Pōhākea Pass would have passed through the present project area.

Mr. Duhaylonsod mentioned Pōhākea Pass was a well-frequented passageway between Honouliuli and Lualualei Ahupua‘a. He noted Pōhākea Pass is mentioned in the *mo‘olelo* of Hi‘iakaikapoliopole.

9.1.7 Burials

No burials were identified within or in the vicinity of the Kunia Village New Source Well project area.

9.2 Analysis

9.2.1 Valued Cultural, Historical, or Natural Resources in the Project Area

Dietrix Jon Ulukoa Duhaylonsod mentioned the project area is in the vicinity of a natural gulch. He noted the remnants of undocumented traditional properties and resources that may have “escaped the bulldozer” or ended up in the gulch following heavy rains may still exist.

Tom Berg mentioned that gulches provided refuge for wildlife including *pueo*, barn owls, and bats. He noted barn owls are endangered on the mainland.

9.2.2 The Extent to which Traditional and Customary Native Hawaiian Resources will be Affected by the Proposed Action

Mr. Duhaylonsod does not anticipate any impacts to the gulch from the proposed project, however, he expressed concern that runoff from the project area could flow down the “hard pan” located downslope of the project area and directly into the nearby gulch causing significant erosion during heavy rains.

9.2.3 Feasible Action, if any, to be taken to Reasonably Protect Native Hawaiian Rights

Mr. Duhaylonsod suggests project proponents use best management practices such as sediment nets to prevent erosion and runoff from entering into the gulch.

Mr. Berg believes the DLNR and U.S. Fish and Wildlife Service should work together to protect barn owls.

Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.

In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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Appendix A National Register of Historic Places Registration Form for Kunia Village

<p>NPS Form 10-900 United States Department of the Interior National Park Service</p> <p style="text-align: right;">OMB No. 1024-0018</p> <p style="text-align: center;">National Register of Historic Places Registration Form</p> <p><small>This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, <i>How to Complete the National Register of Historic Places Registration Form</i>. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.</small></p> <p>1. Name of Property Historic name: <u>Kunia Camp</u> Other names/site number: <u>California Packing Company (CPC) Pineapple Plantation and Processing Operations</u> Name of related multiple property listing: <u>N/A</u> (Enter "N/A" if property is not part of a multiple property listing)</p> <p>2. Location Street & number: <u>Buildings and structures roughly bounded by Kunia & Pu'u Drives, Pa'ani & Lua Wai Streets, and Kunia Road.</u> City or town: <u>Kunia</u> State: <u>Hawaii</u> County: <u>Honolulu</u> Not For Publication: <input type="checkbox"/> Vicinity: <input checked="" type="checkbox"/></p> <p>3. State/Federal Agency Certification As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance: ___ national ___X___ statewide ___ local Applicable National Register Criteria: ___X___ A ___ B ___X___ C ___ D</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Signature of certifying official/Title:</td> <td style="width: 40%;">Date</td> </tr> <tr> <td colspan="2">State or Federal agency/bureau or Tribal Government</td> </tr> <tr> <td colspan="2">In my opinion, the property ___ meets ___ does not meet the National Register criteria.</td> </tr> <tr> <td>Signature of commenting official:</td> <td>Date</td> </tr> <tr> <td>Title :</td> <td>State or Federal agency/bureau or Tribal Government</td> </tr> </table>	Signature of certifying official/Title:	Date	State or Federal agency/bureau or Tribal Government		In my opinion, the property ___ meets ___ does not meet the National Register criteria.		Signature of commenting official:	Date	Title :	State or Federal agency/bureau or Tribal Government
Signature of certifying official/Title:	Date										
State or Federal agency/bureau or Tribal Government											
In my opinion, the property ___ meets ___ does not meet the National Register criteria.											
Signature of commenting official:	Date										
Title :	State or Federal agency/bureau or Tribal Government										

1

United States Department of the Interior National Park Service / National Register of Historic Places Registration Form NPS Form 10-900 OMB No. 1024-0018	
Kunia Camp Name of Property	Honolulu, Hawaii County and State

4. National Park Service Certification

I hereby certify that this property is:

☐ entered in the National Register
☐ determined eligible for the National Register
☐ determined not eligible for the National Register
☐ removed from the National Register
☐ other (explain:) _____

_____ Signature of the Keeper	_____ Date of Action
----------------------------------	-------------------------

5. Classification

Ownership of Property
 (Check as many boxes as apply.)

Private: ☒
 Public – Local ☐
 Public – State ☐
 Public – Federal ☐

Category of Property
 (Check only **one** box.)

Building(s) ☐
 District ☒
 Site ☐
 Structure ☐
 Object ☐

Sections 1-6 page 2

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing

Noncontributing

11

buildings

sites

127

structures

objects

Total

Number of contributing resources previously listed in the National Register 0

6. Function or Use

Historic Functions

(Enter categories from instructions.)

Domestic/Camp

Commerce/Trade/General Store

Recreation and Culture/Other

Current Functions

(Enter categories from instructions.)

Domestic/Camp

Sections 1-6 page 3

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

7. Description

Architectural Classification

(Enter categories from instructions.)

Other/Vernacular/Hawaiian Plantation Style

Materials: (enter categories from instructions.)

Principal exterior materials of the property:

Wood/Weatherboard; Metal (Corrugated)/Aluminum. Composite Shingle

Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

Kunia Camp is located in the State of Hawaii, on the Island of Oahu, in the County of Honolulu, and lies along Hawaii Route 750, which runs northwest of Pearl Harbor. The property consists of 119 acres which includes 149 buildings. Approximately 50 acres of the 119 acres and 138 buildings and structures of the 149 on the property are included in the proposed boundary for the Kunia Camp Historic District. Of these 138 buildings and structures, 127 are considered "contributing resources" while 11 are "non-contributing resources" to the district.

The proposed Kunia Camp Historic District's 127 *contributing* resources include 107 *residences* (single family homes, duplexes, and a four-plex) in the Old Camp (early historic period) and the New Camp (later historic period) areas; 15 *associated residential garages* in both camps (2 in Old Camp and 13 in New Camp); as well as 5 *non-residential buildings*, including: Kunia Gymnasium and Kunia Chapel (within Old Camp); and the Agricultural Research Building, the Main Office Building, and the Kunia Store (within the New Camp area). It is important to note that there are actually 114 residences within the proposed Kunia Camp historic district (as

Section 8 page 4

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Kunia Camp
Name of Property

Honolulu, Hawaii
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tabulated in Table 1), but 7 of these are non-contributing resources as they lack integrity due to large additions that were added to each of the residences.

The proposed boundary of the Kunia Camp Historic District is based on the boundaries of the camp's historic period and does not conform to present day property lines. The boundaries are based on contributing resources within the camp that support Criteria A and C of the NRHP as a *historic district* with a *residential community/camp* theme. The residences and community buildings within the camp are united by their physical development as a village for plantation workers provided by the California Packing Company for its employees. The relationship of the homes and associated buildings, the scale and materials of the buildings, and layout of the houses provides an intact, accurate example of a pineapple plantation camp.¹

Other buildings on the Kunia Village Title Holding Company property were evaluated and are not considered part of the proposed historic district because they were: 1) either built outside the period of significance or; 2) are not in keeping with the residential community/camp theme of the proposed district; or 3) are not on Kunia Village Title Holding Company property. These are largely the buildings along Kunia Road at the east side of the property that include the former industrial buildings of the plantation. These include a Well, Shop/Storeroom, Storage, Warehouse, Juice, Fresh Fruit Packing, and Waste Water Treatment Buildings.² Also, the school and its associated administration building are not part of the district because they are not on Kunia Village Title Holding Company property.

The vast majority of the buildings within the proposed Historic District are residences. The 114 residences (107 contributing residences) have the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes vertical boards (tongue-and-groove and board-and-batten) on the exterior, single-wall construction (some with girts), and low-pitched roof (some hipped) with wide, overhanging eaves. These residences, community buildings/structures, and industrial/agricultural buildings were set against a backdrop of pineapple fields, and provided housing and other amenities for pineapple field workers (the majority of the time for the California Packing Company (CPC) from the years 1928 until 2007.

In a 2008 report on the camp by Group 70 International, the residences were classified into twenty-five design types, according to their floor plans. Table 1 below summarizes the residential design types found within the camp³. Interviews with residents who arrived at Kunia Camp in the early 1940s revealed that there were no ethnic divisions with regards to placement of families within the camp's houses. One resident shared that the various ethnic groups in fact got along, as it was post-World War II and working well together better ensured success out in the fields.⁴ Although Kunia Camp did not separate workers by ethnicity, there were earlier camps before Kunia Camp that were divided by ethnic groups. Some of the names of these

¹ Mason Architects, Inc. "Kunia Camp Historic Evaluation", P. 18.

² Ibid, P.21.

³ Mason Architects, Inc. "Kunia Camp Historic Evaluation", Pgs. 7-8.

⁴ Gamponia, Benjamin. Interview with Monica Bacon, 26 Dec, 2012.

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Kunia Camp
Name of Property

Honolulu, Hawaii
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camps included: Leilehua Camp (located near Schofield); #84 Camp (located near the reservoir south of Kunia Camp); and Eloy Camp (located just north of Kunia Camp). The residents interviewed did not always specify which camps included which ethnic groups, but two residents recalled that Eloy Camp was specifically for Filipino workers and their families. Additionally, during World War II, Eloy Camp was used as a temporary Medical Company for the military.⁵

One resident shared that, with regard to separation of housing by work/job position within the camp, the row of houses on Kunia Drive (Buildings #515 to #524) was where the supervisors lived, with the Camp Manager living in the largest house (Building #400).⁶ This same resident now lives in one of these houses.

All four of the residents interviewed for this nomination indicated that outhouses were gone by the time they arrived in the early 1940s, and that worker housing had indoor bathrooms, plumbing, and electricity. One resident remembered that at one time there were bathhouses in the Old Camp area, designed in the Japanese "*furo*" style of bathing. This same resident also recalled that gulches in the area also historically served as cesspools, and that the present day Sewage Treatment Plant was constructed in the 1990s (specifically after 1992).⁷

The residents interviewed recalled that most of the residential housing was meant for workers and their families; three of the four residents described there also being housing for unmarried workers. These structures were called "Single Men Houses" or "Long Block Houses", likely in reference to their shape. These structures were rectangular, post and pier wooden houses, with two rows of rooms in the center (on both sides of the building) and a bathroom and a kitchen flanking both ends of the building. Open-air verandas, accessible from the rooms, were situated on both sides of each building. There were six of these structures at the camp – three near the gymnasium, one across the street and west from Building #814 in Old Camp, and two on Fourth Street, adjacent and east of Building #820 in New Camp. None of these structures are extant today.

Table 1. Summary of Residential Design Types

	Type	Number of Buildings	Estimated Year Built Dates	Exterior Material
1.	A-1	2	Ca. 1928	Board and batten
2.	B-1	10	Between 1928 - 1940	Tongue and groove
3.	B-2	5	Between 1940 - 1952	Tongue and groove
4.	B-3	1	Between 1928 - 1940	Tongue and groove
5.	B-4	2	Between 1969 – 1972 (bldgs in this date range moved onto site)	Plywood
6.	B-5	2	Between 1969 – 1972 (bldgs in this date range moved onto site)	Plywood

⁵ Iwatane, Samson and Pasco, Gilbert. Interview with Monica Bacon, 17 Jan, 2013.

⁶ Iwatane, Samson. Interview with Monica Bacon, 17 Jan, 2013.

⁷ Parilla, Henry. Interview with Monica Bacon, 26 Dec 2012.

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Kunia Camp				Honolulu, Hawaii
Name of Property				County and State
7.	B-6	2	Between 1928 - 1940	Board and batten
8.	B-7	1	Ca. 1928	Board and batten
9.	C-1	34	4 Ca. 1928, 25-between 1940 – 1952, 5-between 1969 – 1972 (bldgs in this date range moved onto site)	Tongue and groove
10.	C-2	3	Between 1928 - 1940	Tongue and groove
11.	C-3	19	16-between 1928 -1940, 3-between 1940 - 1952	16-tongue and groove, 3-board and batten
12.	C-4	3	Between 1969 – 1972 (bldgs in this date range moved onto site)	Tongue and groove
13.	C-5	4	1-between 1940 – 1952, 3-between 1969 – 1972 (bldgs in this date range moved onto site)	1-board and batten, 3-tongue and groove
14.	C-6	6	Ca. 1928	Board and batten
15.	C-7	3	Between 1969 – 1972 (bldgs in this date range moved onto site)	Tongue and groove
16.	C-8	1	Between 1928 - 1940	Board and batten
17.	C-9	1	Ca. 1928	Board and batten
18.	C-10	1	Ca. 1928	Board and batten
19.	C-11	1	Between 1928 - 1940	Board and batten
20.	C-12	1	Between 1928 - 1940	Board and batten
21.	C-13	1	Between 1928 - 1940	Tongue and groove
22.	C-14	1	Ca. 1928	Tongue and groove
23.	C-15	1	Between 1969 – 1972 (bldgs in this date range moved onto site)	Tongue and groove
24.	C-16	1	Between 1940 -1952	Tongue and groove
25.	D-1	8	Between 1928 - 1940	Tongue and groove

Narrative Description

The proposed boundary of the Kunia Camp Historic District (see Figure 2) generally follows its evolution over time, from 1928 to 1972. The district includes the residences and garages or carports (contributing and non-contributing resources) in the Old Camp (primarily built during the years 1928 to 1940) located in the northern part of the district, along with the Gymnasium and Chapel. Southeast of the Old Camp is the New Camp (primarily built during the years 1940 to 1972) located in the Southern part of the district. The New Camp area includes residences and garages (contributing and non-contributing resources), along with the Agricultural Research Center building, the Main Office building, and the Kunia Store (see Figure 3).

The Old Camp area includes 22 residences and 2 carports, and 2 non-residential buildings (for a total of 26 buildings) considered contributing resources to the district (see Table 2). The Old

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Camp had components constructed roughly from the period 1928 through 1972, and is the oldest residential area within the district. The general layout of the neighborhood is a little more informal than the New Camp area, with curving roads and wider open spaces between homes. This character is partly formed by the fact that 9 of the homes are built on a promontory between gullies, which influenced the shape of this part of the camp. The greater open space is also due to the fact that a few residences have been demolished in this area. Given that this area has the school, the gymnasium, church, and was also the location of dormitory housing, it has a greater mix of uses than the New Camp, which is entirely housing.

Table 2. Contributing Resources (26) at Old Camp to the Proposed Kunia Camp Historic District

	Camp	Building Number/Name	Type of Building	Year Built
1.	Old	400	Residential	ca 1940-1952
2.	Old	411	Residential	ca 1928-1940
3.	Old	---	Garage	?
4.	Old	412	Residential	Before 1928
5.	Old	413	Residential	Before 1928
6.	Old	418	Residential	Before 1928
7.	Old	419	Residential	Before 1928
8.	Old	421	Residential	Before 1928
9.	Old	422	Residential	Before 1928
10.	Old	423	Residential	Before 1928
11.	Old	425	Residential	Before 1928
12.	Old	430	Residential	ca 1928-1940
13.	Old	431	Residential	ca 1928-1940
14.	Old	432	Residential	ca 1928-1940
15.	Old	---	Garage	ca 1940-1952
16.	Old	433	Residential	ca 1928-1940
17.	Old	434	Residential	ca 1928-1940
18.	Old	803	Residential	ca 1969-1972
19.	Old	804	Residential	ca 1969-1972
20.	Old	812	Residential	ca 1969-1972
21.	Old	814	Residential	ca 1969-1972
22.	Old	831	Residential	ca 1969-1972
23.	Old	832	Residential	ca 1969-1972
24.	Old	833	Residential	ca 1969-1972
25.	Old	Gymnasium	Community/Amenity	ca 1928-1940
26.	Old	Chapel (Bldg 933)	Community/Amenity	ca 1928-1940

The New Camp area includes 85 residences and 13 garages, and 3 non-residential buildings (for a total of 101 buildings) considered contributing resources to the district (see Table 3). The

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New Camp was primarily built between the years 1940 to 1972 and is the younger of the two main residential areas of the district. The general layout of the neighborhood is laid out in a more formal grid, with straight, parallel streets and narrower spaces between the homes oriented on North-South and East-West axis.

Despite their names, it should be noted that today there are some newer houses in the Old Camp area (e.g. 831 and 832) and older homes in the New Camp area, notably 448 and 450. Units 448 and 450 are very similar to the oldest homes in the Old Camp, with simple gable roofs, a kitchen and bathroom constructed in the back as an addition, and they are built of board and batten construction instead of tongue and groove boards. They also have virtually no overhangs on the gable ends.

Table 3. Contributing Resources (101) at New Camp to the Proposed Kunia Camp Historic District

	Camp	Building Number/Name	Type of Building	Year Built
1.	New	443	Residential (1)	Before 1928
2.	New	441, 442, 454, 455, 456, 459-467, 476-479, 481-486, 488-494, 495-503	Residential (40)	ca 1928-1940
3.	New	444, 445, 450-453, 469-472, 474, 475, 504-511, 513-524	Residential (32)	ca 1940-1952
4.	New	Between 505 & 811; between 506 & 507; between 508 & 509; between 509 & 510; between 511 & 513; between 513 & 514; between 515 & 516; between 517 & 518; between 519 & 520; between 520 & 521; between 522 & 523; between 524 & 819; at end of 4 th St.	Garage (13)	ca 1940-1952
5.	New	Main Office Building	Industrial/Agricultural (1)	ca 1940-1952
6.	New	805, 806, 807, 810, 811, 813, 815-820	Residential (12)	ca 1969-1972
7.	New	Agricultural Research Bldg & Store	Industrial/Agricultural (2)	?

To understand the historic appearance of Kunia Camp and whether or not today's proposed Kunia Camp Historic District retains its historic integrity, it is essential to know the various

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periods of development of the camp over its roughly 85 year history. The earliest known record of the existence of Kunia Camp as a neighborhood is a USGS topographic map from 1928 (see Figure 4). The map shows buildings in an arrangement that is in keeping with today's Old Camp layout. It shows a double row of residence-sized buildings that roughly correspond to today's Old Camp residences 412 through 425.⁸ This 1928 map is the first record that supports a ca. 1928 date for the establishment of the Kunia Camp neighborhood.

A series of undated aerial photographs, likely ca. 1939-40, show the continued evolution of Kunia Camp (see Figure 5). The Old Camp appears fully built-out by ca. 1940. Residences are closely spaced in the double row between the curving arms of Pa'ani Street, and by this time the residences also extended in a cluster to the west and north, filling much of the space between the double row and gymnasium. The Chapel (Bldg. 933, extant) was also built by this time (next to the gymnasium), as was the School building. The New Camp area was constructed by ca. 1940 with 47 residential buildings and double-width garage north of Second Street. At this time there were no buildings south of Second Street and the future Kunia Village Title Holding Company Main Office building area was planted in pineapple.⁹

Another aerial photograph, this one dated November 18, 1952 (see Figure 6) shows the expansion of the New Camp area with houses built between Second Street and Kunia Drive. Several additional houses also appear at the east end of Second and Third Streets, and north of Lua Wai Street. According to one of the residents interviewed, four houses on Lua Wai Street (#448, #450, #451, #452, and #453) were not built at Kunia Camp but were houses moved in from a disbanded Camp near the reservoir south of Kunia, likely the one known as #84 Camp.¹⁰ Also, as of this date, four buildings in the commercial area (adjacent to the camp area) have been built, including the Main Office building (extant), truck shed (now demolished), and buildings on the sites of the warehouse and shop/storage building. This indicates that by late-1952 Kunia Camp had begun to function in support of growing and processing operations in addition to housing workers.

Transportation to "town" was first provided at Kunia by the Oahu Railway and Land Company (OR&L). The railroad line ran parallel and Waianae side of the present Kunia Road. According to interviews with four long-time residents of the camp, trucks carried the harvested fruits from the fields in pineapple bins, wooden crates that could hold approximately 10-12 pineapples, with each pineapple weighing approximately 3 pounds.¹¹ These trucks then delivered pineapples to the OR&L stop located north of Old Camp and just south of the warehouses, where the pineapples were loaded onto freight trains.¹² All four of the residents interviewed described "Vans", which were areas where pineapples were off-loaded/loaded onto trucks. Van 1 was

⁸ U.S. Geological Survey, Schofield Hawaii Quadrangle, 1928.

⁹ Mason Architects, Inc. "Kunia Camp Historic Evaluation", P. 12.

¹⁰ Parilla, Henry. Interview with Monica Bacon, 26 Dec, 2012.

¹¹ Parilla, Henry. Interview with Monica Bacon, 26 Dec, 2012.

¹² Gamponia, Benjamin; Parilla, Henry; Iwatane, Samson; Pasco, Gilbert. Interviews with Monica Bacon, 26 Dec, 2012 & 17 Jan, 2013

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located near the OR&L stop and Van 6 located south of Kunia Camp, in an area close to #84 Camp.

The warehouses located in the industrial area were not used to store pineapples—they were used to store fertilizer for the crops and feed for the horses. According to one resident who arrived at Kunia Camp in 1944, at that time horses were still being used by the managers to haul fertilizer and feed, as the plantation trucks were needed to transport pineapples and deliver workers to and from the fields.¹³ Lastly, the 1952 photograph also shows that by this time several small outbuildings that were located along the OR&L tracks to the northeast of Kunia Camp were replaced with four very large buildings, each approximately 200' long.

In 1960 the Kunia Store was built. According to several long time residents, the present Kunia Store building was not the original store at the camp. Benjamin Gamponia, a resident who arrived at Kunia in 1943, remembered the original Kunia Store building was located at the site of Building #814 in Old Camp and was run by Mildred Iwatane Nishiyama, sister of longtime resident Samson Iwatane. Mr. Gamponia recalled that the store was moved to its new and present location sometime in the late 1950s.¹⁴ By 1968 the present shop/storehouse buildings were built, and the last major additions to the neighborhood were undertaken sometime between 1969 and 1972 when 18 houses were added. The 18 residences currently bear address numbers in the 800s and according to some residents, were relocated from Wahiawa to Kunia Camp.¹⁵ These houses, whose construction dates are unknown, were the last major additions to the neighborhood.

Integrity Analysis

The proposed Kunia Camp Historic District retains a majority of the seven aspects of integrity (Location, Design, Setting, Materials, Workmanship, Feeling, and Association) which help to make it eligible as a Historic District.

The majority of the resources within the district have remained in their original locations. The residences and associated structures within the Old Camp and New Camp retain their same positions within Kunia, the boundaries of the neighborhoods having expanded over the years when pineapple production was at its peak, from the years 1928 to 1940.

The proposed Kunia Camp Historic District also retains most of its original setting, as the district is still today surrounded by agricultural open space, and is adjacent to a two-lane highway.

¹³ Gamponia, Benjamin. Interview with Monica Bacon, 26 Dec, 2012.

¹⁴ Gamponia, Benjamin. Interview with Monica Bacon, 26 Dec, 2012.

¹⁵ Gamponia, Benjamin. Conversation with Architectural Historians Lesleigh Jones and Monica Bacon, 31 Aug, 2011.

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The contributing resources within the district appear to retain a majority of their original exterior materials. This applies to both the earliest buildings built (prior to 1928) and those that were built post World War II. These buildings have wooden exteriors (tongue-and-groove or board-and-batten), corrugated metal roofs, and post and pier (wooden posts on concrete footings) foundations.

With Plantation Style residences comprising the majority of the proposed district, the workmanship aspect of integrity is evident in the simple, plain, non-decorative materials and finishes used in their construction. The use of vertical boards and the single-wall construction technique of residences within the camp are characteristic of Hawaiian Plantation Style houses.

The district also retains a feeling of a pineapple plantation neighborhood, as its design, materials, workmanship, and setting all help to contribute to the *feeling* that the area is still a plantation camp.

The residences in the proposed Kunia Camp Historic District are all associated with the early history of the pineapple industry in Hawaii, as the buildings were occupied by plantation workers and their families, who worked the fields in what was the second largest industry for most of the mid-twentieth century in Hawaii.

8. Statement of Significance

Applicable National Register Criteria

(Mark "X" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ B. Property is associated with the lives of persons significant in our past.
- ☒ C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ D. Property has yielded, or is likely to yield, information important in prehistory or history.

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Criteria Considerations

(Mark "x" in all the boxes that apply.)

- ☐ A. Owned by a religious institution or used for religious purposes
- ☐ B. Removed from its original location
- ☐ C. A birthplace or grave
- ☐ D. A cemetery
- ☐ E. A reconstructed building, object, or structure
- ☐ F. A commemorative property
- ☐ G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance

(Enter categories from instructions.)

Agriculture
Architecture
Community Planning and Development

Period of Significance

1928 - 1963

Significant Dates

1928-1940; 1969-1972.

Significant Person

(Complete only if Criterion B is marked above.)

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Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

Still surrounded by agricultural land, Kunia Camp is the last intact pineapple plantation housing community under one ownership on Oahu. The proposed Kunia Camp Historic District is significant for its historic association with the development of the pineapple industry in Hawaii (which was the second largest agricultural based income generator in Hawaii for much of the mid-twentieth century); its specific association with CPC/Del Monte from 1916 until 2007; its unique collection of plantation residences illustrating architectural evolution of the single wall structure concept; and introduction of neighborhood planning features such as indoor plumbing, individual yards, grid street patterns, and community amenities (gymnasium, churches, and school) that were increasingly demanded by workers and provided by companies desiring a stable, family-oriented workforce for the plantation.

The proposed Kunia Camp Historic District is eligible under Criteria A and C; it retains its historic integrity, and the majority of its individual resources within the district are at least 50 years old.

Narrative Statement of Significance (Provide at least one paragraph for each area of significance.)

The proposed Kunia Camp Historic District is significant under Criterion A for its association with the pineapple industry, which during the mid-twentieth century was Hawaii's second largest industry. Kunia Camp is also associated with the California Packing Company (later known as Del Monte), one of the major pineapple operators in Hawaii from its inception in 1916 until the closing of the Kunia facility in 2007.

Throughout the 20th Century, the importance of pineapple in Hawaii's agricultural industry was second only to sugar. With plantations and/or canning facilities on almost every Hawaiian island, the industry was responsible for the cultivation of thousands of acres of land, the employment of thousands of workers, and the processing of millions of pineapples. In addition to the economic impact of the industry, the fruit became a powerful icon of the Territory and State of Hawaii.¹⁶

Beginning around 1960, the pineapple industry began to lose both a portion of its world market share and its place as one of Hawaii's leading industries. This happened as countries such as Brazil,

Mexico, the Philippines, and Thailand expanded their production of fresh and canned fruit, and as tourism and the military became the state's most valuable industries. As canned pineapple from other countries began filling the market, Hawaiian canneries began to close and plantations, once located on Maui, Oahu, Molokai, Lanai, and Kauai, began to shrink. Del Monte cannery closed in 1985, and Dole cannery in Iwilei closed in 1991. During the end of the 1990s and into the 21st century the value of fresh Hawaiian pineapple overtook the value of canned Hawaiian pineapple.¹⁷

¹⁶ Mason Architects, "HAER HI-79, Kahului Cannery, Plant No. 28", P.6.

¹⁷ Ibid, Pgs. 7-8.

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The proposed Kunia Camp Historic District is also significant under Criterion C as a concentration of Plantation Style residences. The residences display the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes vertical boards (tongue-and-groove and board-and-batten) on the exterior, single-wall construction (some with girts), and pitched roofs (some hipped) with wide, overhanging eaves.

The single-wall construction of the camp is characteristic of Hawaiian Plantation Style houses. This construction method was perfected around 1917 by Japanese construction workers on the plantations in Hawaii. It is a structurally sophisticated method of construction that exemplifies economy of material and labor.¹⁸ Single wall construction also reflected the difficulty of importing building materials from the mainland and the use of standardized components. Plans utilizing single wall design were subsequently codified by the Hawaii Sugar Plantation Association (HSPA) throughout the islands and ultimately migrated into urban construction also.

The Period of Significance for the proposed Kunia Camp Historic District is ca. 1928 to ca. 1963. This span of time reflects the initial development and prime functioning years of the camp, which loosely correlates with the peak of the pineapple industry in Hawaii. The Period of Significance begins with the first phase of construction at the Old Camp (pre-1928, 1928-1940), covers several decades of use and expansion as a pineapple plantation camp, and ends with the final build-out of the New Camp when a grouping of residences was moved to the property, and integrated into lots found within the existing street layout.¹⁹

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

Aerial Photos (1939-1940; November 18, 1952). From Hawaii State Archives.

Group 70 International. "Kunia Plantation Village Zoning Variance Application-Addendum As-Built Drawings". Honolulu, Hawaii, August 19, 2008.

Mason Architects, Inc. "HAER HI-79, Kahului Cannery, Plant No. 28." Honolulu, Hawaii, October, 2006.

Mason Architects, Inc. "Kunia Camp Historic Evaluation." Honolulu, Hawaii, September, 2011.

Mason Architects, Inc. Various Maps (Proposed District, Sketch Map). 2011-2012.

¹⁸ Barbara Sannino Shideler, "Hawaii's Plantation Village" thesis UH Manoa, 1994. P. 27.

¹⁹ Mason Architects, Inc. "Kunia Camp Historic Evaluation", P. 20.

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Shideler, Barbara Sannino. "Hawaii's Plantation Village: History, Interpretation, and Design of an Outdoor History Museum." Honolulu: Department of American Studies, University of Hawaii at Manoa, thesis paper, 1993.

U.S. Department of the Interior, National Park Service, Bulletin 16a. "How To Complete the National Register Registration Form." Washington D.C., 1997.

U.S. Department of the Interior, National Park Service, Bulletin 15. "How To Apply the National Register Criteria for Evaluation." Washington D.C., 1997. Washington D.C., 1997.

U.S. Geological Survey Topographic Map (USGS). Schofield Quadrangle. From Hawaii State Archives. 1928, 1935, 1940.

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record // _____
- ☐ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other
- Name of repository: _____

Historic Resources Survey Number (if assigned): _____

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10. Geographical Data

Acreage of Property 50 acres

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates

Datum if other than WGS84: _____

(enter coordinates to 6 decimal places)

- | | |
|--------------|------------|
| 1. Latitude: | Longitude: |
| 2. Latitude: | Longitude: |
| 3. Latitude: | Longitude: |
| 4. Latitude: | Longitude: |

Or

UTM References

Datum (indicated on USGS map):

☐ NAD 1927 or ☒ NAD 1983

- | | | |
|-------------|-----------------|-----------------|
| 1. Zone: 04 | Easting: 97525 | Northing: 72932 |
| 2. Zone: 04 | Easting: 97551 | Northing: 72998 |
| 3. Zone: 04 | Easting: 97471 | Northing: 73020 |
| 4. Zone: 04 | Easting : 97484 | Northing: 73082 |
| 5. Zone: 04 | Easting : 97440 | Northing: 73095 |
| 6. Zone: 04 | Easting : 97481 | Northing: 73188 |
| 7. Zone: 04 | Easting : 97402 | Northing: 73378 |
| 8. Zone: 04 | Easting : 97400 | Northing: 73394 |
| 9. Zone: 04 | Easting : 97292 | Northing: 73428 |

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10. Zone: 04	Easting: 97295	Northing: 73443
11. Zone: 04	Easting: 97270	Northing: 73479
12. Zone: 04	Easting: 97198	Northing: 73690
13. Zone: 04	Easting: 97131	Northing: 73712
14. Zone: 04	Easting: 97089	Northing: 73668
15. Zone: 04	Easting: 96939	Northing: 73578
16. Zone: 04	Easting: 96901	Northing: 73536
17. Zone: 04	Easting: 97118	Northing: 73387
18. Zone: 04	Easting: 97077	Northing: 73224
19. Zone: 04	Easting: 97130	Northing: 72966
20. Zone: 04	Easting: 97369	Northing: 73019
21. Zone: 04	Easting: 97443	Northing: 73003
22. Zone: 04	Easting: 97428	Northing: 72966

Verbal Boundary Description (Describe the boundaries of the property.)

The proposed boundary for the district on the south and west is Kunia Drive. Continuing clockwise, the boundary extends northwest, following Kunia Drive until it angles sharply to the northwest (going off of Kunia Drive) until it intersects the far west portion of Pa'ani Street, where it then angles to the east, following Pa'ani Street until it once again intersects Kunia Drive. Continuing northwest along Kunia Drive, it then and wraps to the east along Pu'u Drive on the northern most portion of the boundary before reaching south to Pa'ani Street on the north and east sides of the Old Camp area. From the sharp ninety degree bend of Pa'ani Street (at its south corner) the boundary angles southeast to Lua Wai Street. It follows Lua Wai southwest until it extends east and south to contain the main office building, main entrance on Kunia road, and the Kunia Store before returning west and north to run along Kunia Drive.

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Boundary Justification (Explain why the boundaries were selected.)

The proposed boundaries of the Kunia Camp Historic District incorporates the residences in the Old Camp and the New Camp, as well as other associated buildings, such as gymnasium, chapel, agricultural research building, the main office building, and the store. All of these structures contribute to the significance of the district, were built during the period of significance of the district, and they retain historic integrity in the majority of their aspects to convey that significance. The school, although historically intact and associated with the camp, is not included in the proposed district because it is not on Kunia Village Title Holding Company property.

11. Form Prepared By

name/title: Monica K. Bacon
organization: Wa Kahiko RSL, for Mason Architects, Inc.
street & number: 1620 Anapuni St.
city or town: Honolulu state: Hawaii zip code: 96822
e-mail: mbacon@hawaiiantel.net
telephone: 808-391-0381
date: 10/11/12

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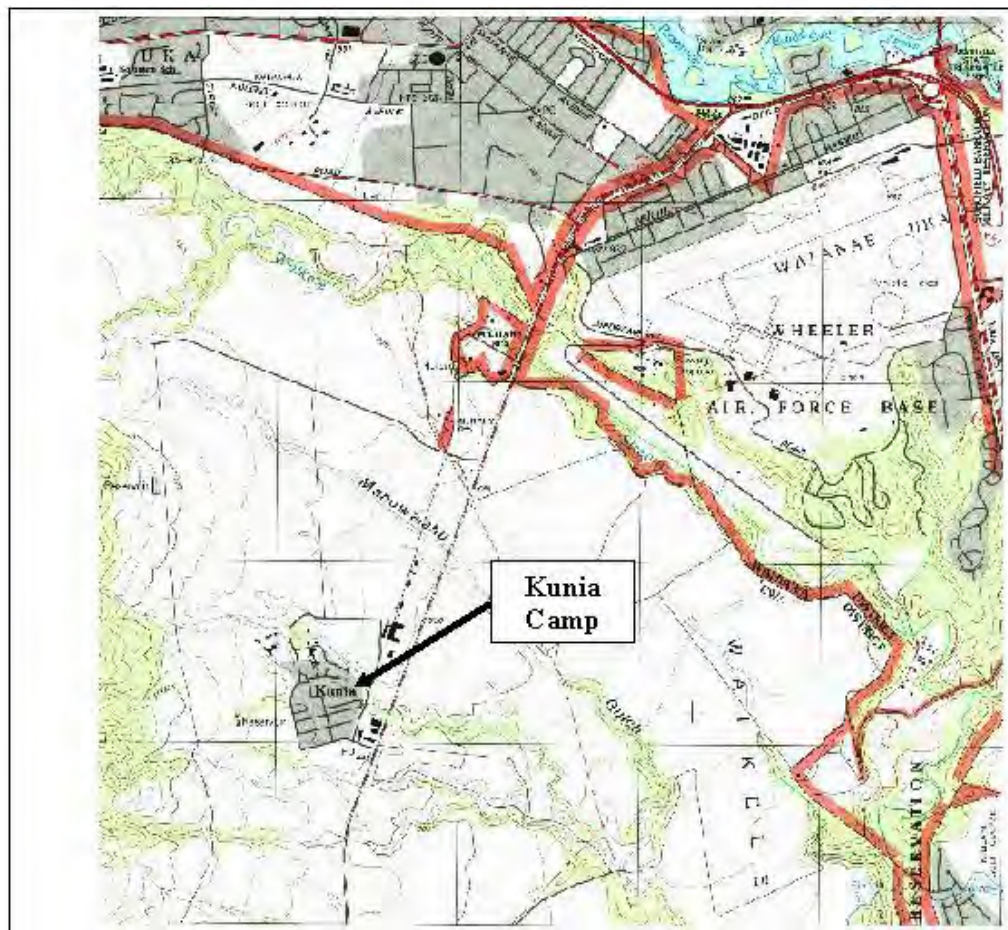
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Additional Documentation

Submit the following items with the completed form:

- **Maps:** A USGS map or equivalent (7.5 or 15 minute series) indicating the property's location.



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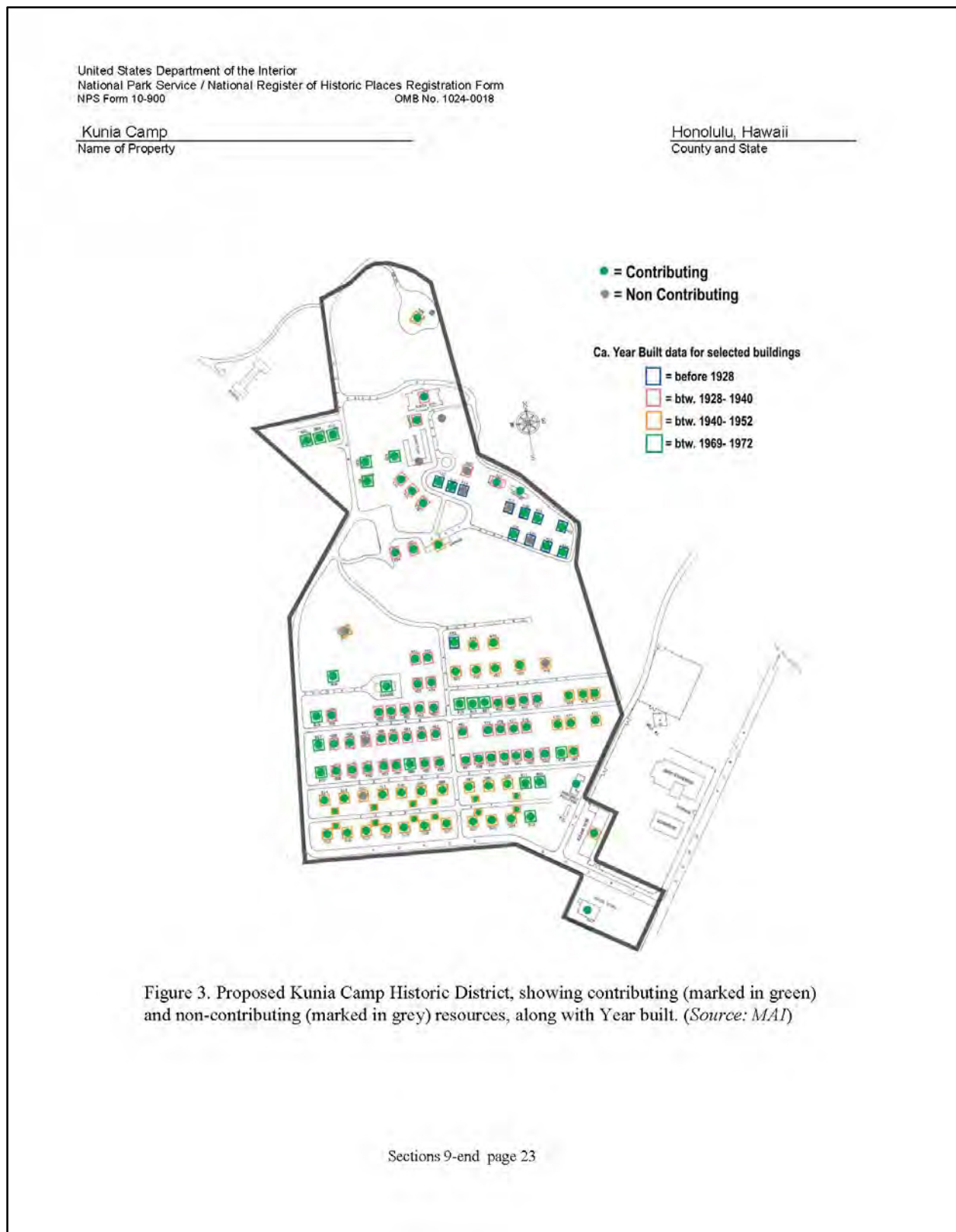
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Figure 2. Proposed Historic District Boundary for Kunia Camp. (Source:MAI)

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Figure 4. 1928 USGS topographical map showing “Kunia Camp” in what is known today as the Old Camp (Source: *Hawaii State Archives.*)

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Figure 5. Ca. 1939-40 aerial photo showing the Old Camp fully built-out, and the first phase of the New Camp completed. (Source: *Hawaii State Archives*)



Figure 6. November 18, 1952 aerial photograph showing the expanded New Camp. (Source: *Hawaii State Archives*)

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- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.



Figure 7. Sketch/Key Map by addresses for buildings within the Proposed Kunia Camp Historic District. (Source: MAI)

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- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-1

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #515 (Kunia Drive), view looking Northeast.



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C-1

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
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Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-1

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #819 (Kunia Drive), view looking North.



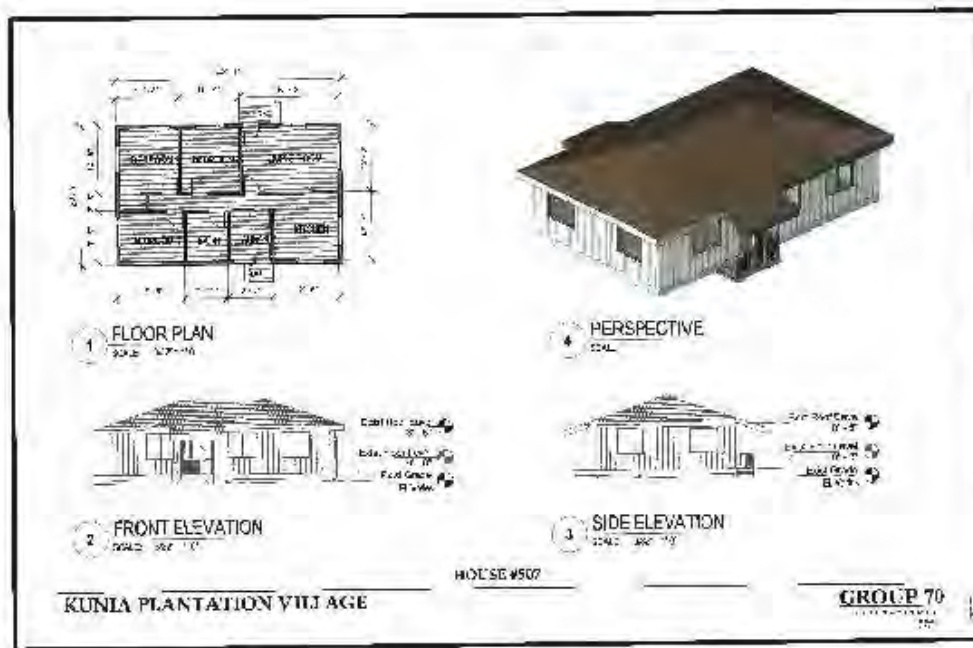
2 of 13.

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Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-1

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #508 (First Street), view looking North



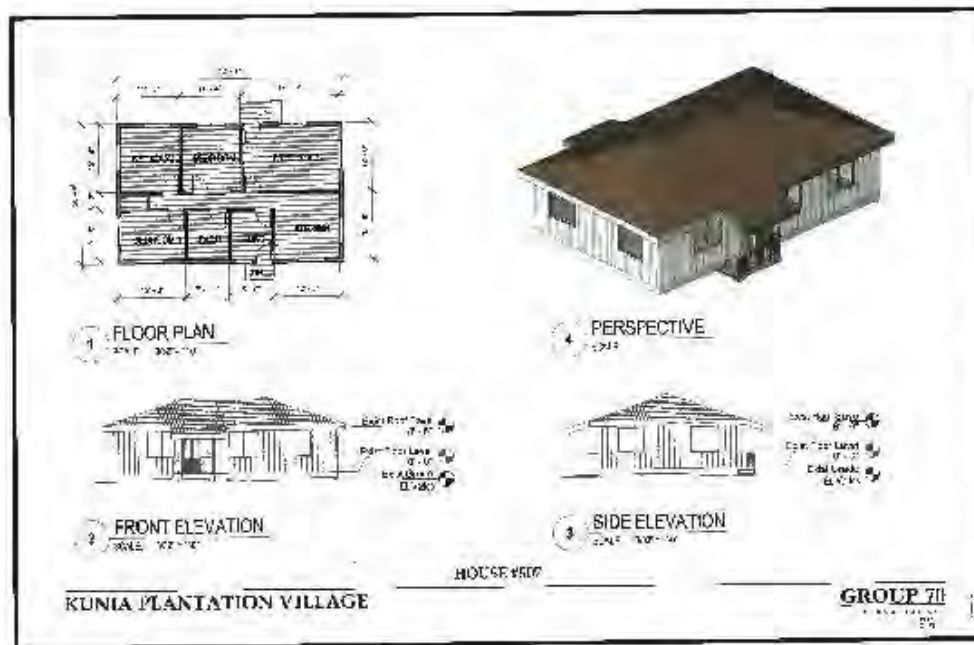
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Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-4

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #305 (First Street), view looking North



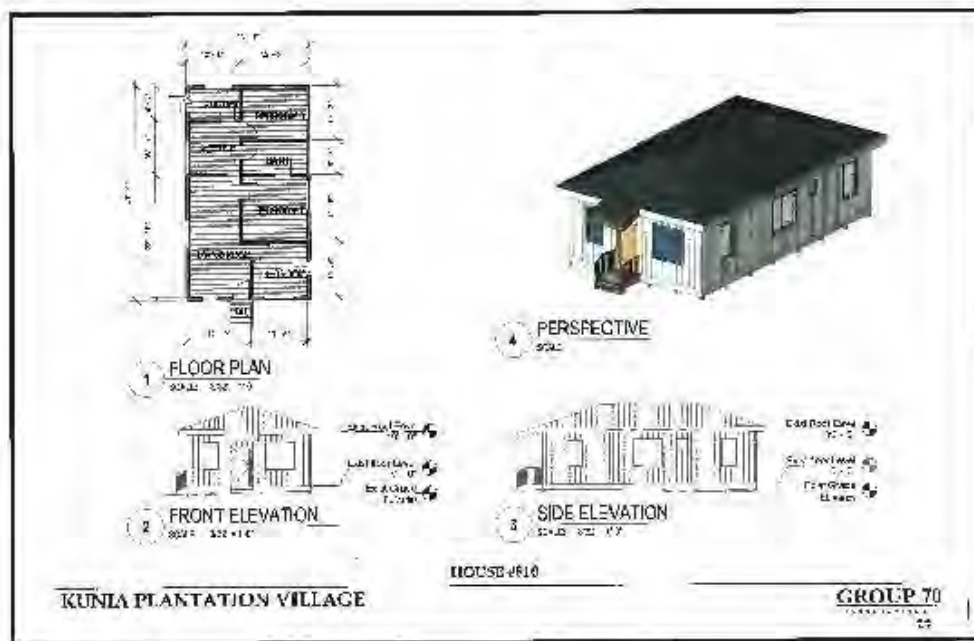
4 of 13.

Sections 9-end page 33

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-4

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design, Type C-4

Sections 9-end page 34

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-15

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #813 (Second Street), view looking North



5 of 13.

Sections 9-end page 35

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-15

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-15

Sections 9-end page 36

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-3

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #500 (Second Street), view looking North.



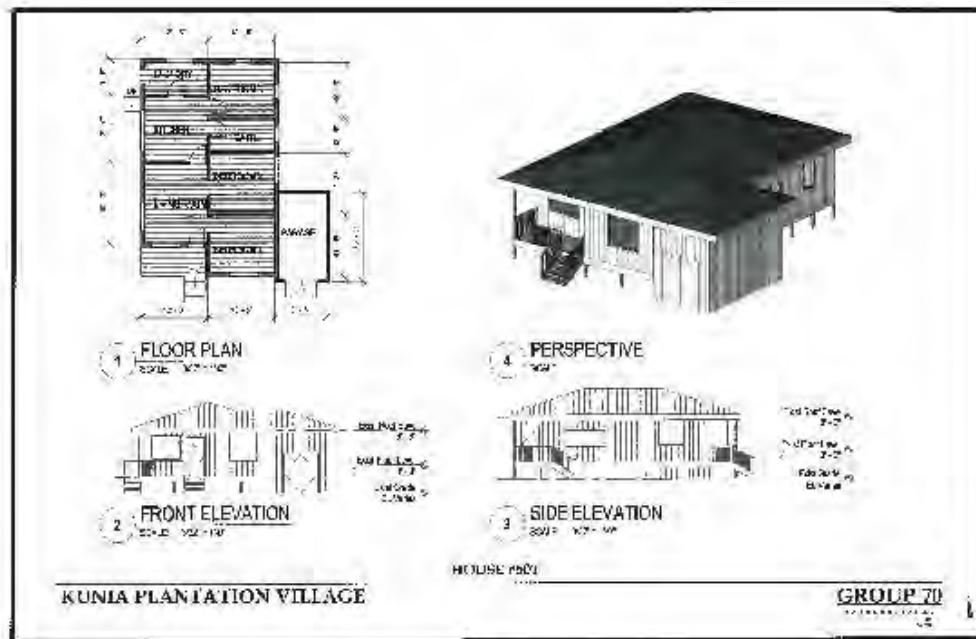
6 of 13.

Sections 9-end page 37

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-3

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-3

Sections 9-end page 38

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-3

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #481 (Third Street), view looking North.



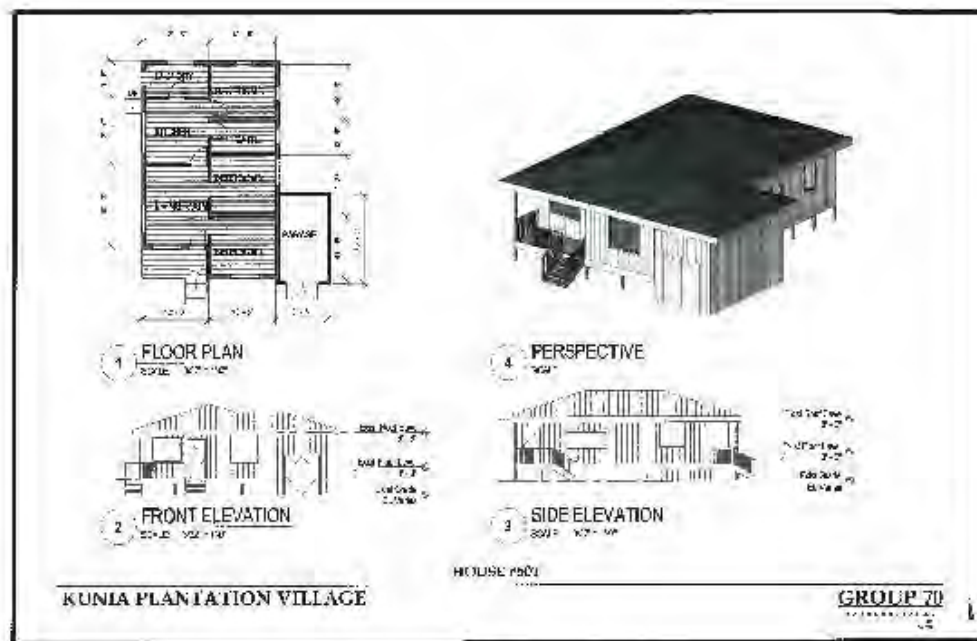
7 of 13.

Sections 9-end page 39

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-3

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-3

Sections 9-end page 40

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-14

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #443 (Hope Lane), view looking Northwest.



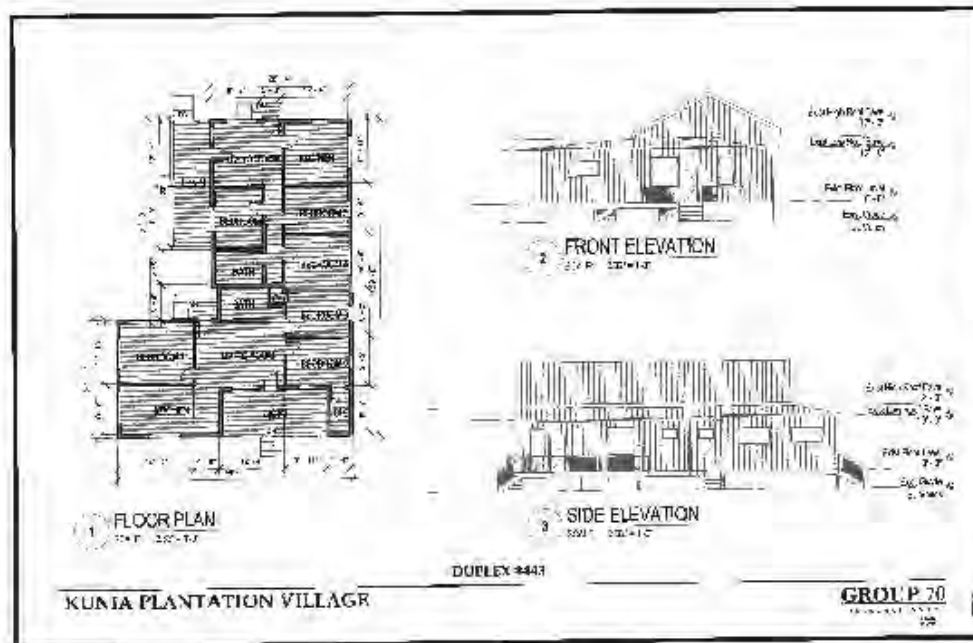
8 of 13.

Sections 9-end page 41

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-14

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-14

Sections 9-end page 42

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-13

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #434 (Kaliponi), view looking South.



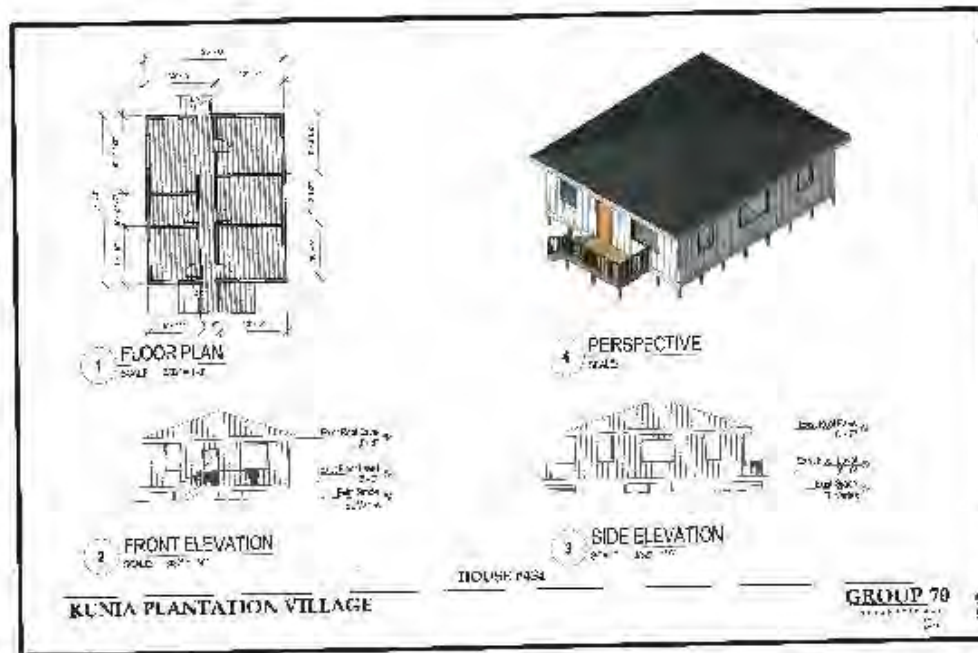
9 of 13.

Sections 9-end page 43

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-13

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-13

Sections 9-end page 44

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: B-7

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #413 (Pa'ani Street), view looking Northeast.



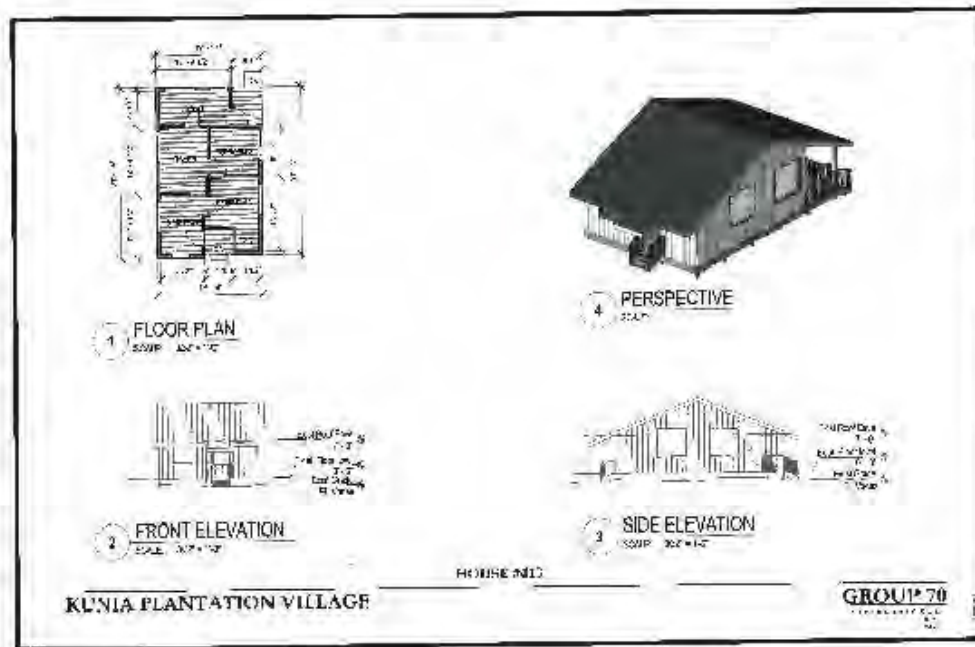
10 of 13.

Sections 9-end page 45

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



B-7

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type B-7

Sections 9-end page 46

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011 Residential Design Type: C-6

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Residence #419 (Pa'ani Street), view looking Northwest.



11 of 13.

Sections 9-end page 47

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900
OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State



C-6

Group 70 – Kunia Plantation Village Zoning Variance Application As-Built Drawing
for Residential Design Type C-6

Sections 9-end page 48

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu

State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011

Description of Photograph(s) and number, include description of view indicating direction of camera: Building/Chapel #933 (Pa'ani Street), view looking East.



12 of 13.

Sections 9-end page 49

United States Department of the Interior
National Park Service / National Register of Historic Places Registration Form
NPS Form 10-900 OMB No. 1024-0018

Kunia Camp
Name of Property

Honolulu, Hawaii
County and State

Name of Property: Kunia Camp Historic District

City or Vicinity: Kunia

County: Honolulu State: Hawaii

Photographer: Dee Ruzicka

Date Photographed: September, 2011

Description of Photograph(s) and number, include description of view indicating direction of camera: Gymnasium (Pa'ani Street), view looking South.



13 of 13.

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 460 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management, U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

Sections 9-end page 50

Appendix B Testimony of Tom Berg

On 27 August 2024 Tom Berg provided written comments via email:

Mahalo for sending-

After seeing the Red Ilima get fried in the fire the other weeks- I'm too saddened to get worked up over this....

Yes- I have comments- I have video of the pueo there but can't find it- When I found the pueo there- it was staying at one tree for a week- [...] After one week- I saw it dead on Kunia Road- that was the last time I looked for pueo.....

Please see attachment with short video file-

It shows a rock alignment there right where this project is going- This rock formation was not recorded on maps- When I took Mike Lee there- there are areas with super cold air flowing out of the earth-



Mike Lee said this rock in this video was a birthing stone - place to lay on and give birth-

LEAPING ROCK ABOVE HONOULIULI BASIN

[<https://www.youtube.com/watch?v=SyUWfNwL6Pw>]

There is a repository of obsidian there-

OBSIDIAN ON OAHU / MIKE LEE INVESTIGATES

[<https://www.youtube.com/watch?v=7LYpG5TJfDI>]

Pueo there-

The Mongoose Pueo Barn Owl Tree

[<https://www.youtube.com/watch?v=KsGbNQCq5fE>]

Barn Owls Easter 2019 Morning @ Honouliuli Gulch

[<https://www.youtube.com/watch?v=iEJqXXC6lTo>]

Honouliuli Slag vs Obsidian Magnetic Test

[<https://www.youtube.com/watch?v=UsJ3zRZ4JHs>]

Honouliuli Obsidian with Mike Lee

[<https://www.youtube.com/watch?v=wdxYt5BGIDQ>]

Mysterious rock slab- flat- and archaeological survey was done here- what happened to this?

A cave is under here- I once fell into a shaft some 15 ft down- got hurt bad.

Honouliuli Rock Slab

[<https://www.youtube.com/watch?v=tB4yBGlQIrc&rco=1>]

HONOULIULI STREAM HOME TO WHITE RUMPED SHAMA BIRD

[<https://www.youtube.com/watch?v=rj3pik2biFA>]

THE WILD GOURD OF HONOULIULI STREAM

[<https://www.youtube.com/watch?v=XT7fiTet6yE>]

Purple Organism Mystifies

[https://www.youtube.com/watch?v=U_8qCBBSu2E]

MIKE LEE and the HONOULIULI STREAM FLOATING ORGANISM

[<https://www.youtube.com/watch?v=OhRmhZuS3QU>]

Barn Owl Pair Sunrise Honouliuli Plateau 5.11.2020

[<https://www.youtube.com/watch?v=UffDdhw6dsI>]

I droned this entire area- to be destroyed-

The Taking of Pueo Country West Oahu

[<https://www.youtube.com/watch?v=SCxk6NeVbnU>]

Barn Owls 4.4.2020 @ Honouliuli Plateau

[<https://www.youtube.com/watch?v=oQq6klCOZs>]

I have hundreds of owl videos in Honouliuli Stream where the work is to be done-

I'll just put a few here-

Barn Owl Honouliuli Sept 23 2019

[<https://www.youtube.com/watch?v=XbWgTHKfem0>]

Barn Owls Hunting Morning April 5 2020 Honouliuli Plateau

[<https://www.youtube.com/watch?v=NSwtqk4hAgQ>]

Barn Owl Pair @ Honouliuli Feb 25 2020

[<https://www.youtube.com/watch?v=bnNbCUIPlIQ>]

Full Moon July 16 2019 Over Honouliuli Gulch

[<https://www.youtube.com/watch?v=PdYQgU0WOUg>]

Wildlife @ Honouliuli Gulch June 30, 2019

[<https://www.youtube.com/watch?v=jOFKet7fw98>]

A Barn Owl Perched June 2, 2019

[https://www.youtube.com/watch?v=OcZuQA_Gv6I]

Question is: Koloa or Mallards? March 21, 2019 6pm Honouliuli Stream

[<https://www.youtube.com/watch?v=GOi4txofAuU>]

Oahu, Hawaii: Barn Owl - Up Close and Personal at Hoopili

[<https://www.youtube.com/watch?v=cMAYzU356qM>]

I have hundreds - hundreds of videos on this area-

Tom Berg

[...]

On 28 August 2024 Tom Berg provided additional comments via email:

FYI-

The Hawaii State Legislature- had a bill to create a Pueo Habitat Preserve at this entire gulch area- I'll get that bill later- here was a Reso introduced by Reps Kong and Cabanilla-

HR 152

You can put in/add/publish my comments-

Do note- with everyone bonkers on wiping out all grassy areas- and fires destroying grassy areas- and solar and wind farms taking over all open space left- this Honouliuli Gulch area is THE LAST STAND FOR MANY AVIAN SPECIES- a refuge since these wild creatures have been extirpated from elsewhere- bees - damselflies- and plants thrive here found nowhere else- there is a shitload of massive humongous boulders there no crane could move- and they are sacred- no farming was ever here in many of these spots- the stream not altered- these boulders tell stories.

I myself- walked this area daily for years- and did so at night- and one night- the boulders moved on me- they were never there in the path I made- I told Mike Lee and he confirmed it can happen- the boulders actually moved not in my presence- but between visits- and no one was there but me to experience one day no boulders there- and the next day they appeared-

Also- just west of the water treatment plant facility- one night I saw “a being”- it was translucent - pure white- I shit in my pants- it moved- it was the size of a small car- I ran as fast as I could away from it- almost had a heart attack- I never went back to that spot again- it was at the bowels of the stream in thick thick forest- “the being” was “sitting” or rather floating on a huge boulder- I think it was about 2-4am. I get the chills just thinking about it.

The owls would follow me for miles- throughout the stream- at times, come so close I could feel the wind from their wings flapping - these owls are so delicate- need utmost quiet to hunt- and have so little space now to sustain themselves- it is important to quantify- these barn owls are endangered on the mainland- researches lately cannot even find any more nests- they are almost gone in many midwestern states due to rat bait poison etc- hence, DNLR [DLNR] should be teaming up with US Fish Wildlife nationally to protect these barn owls here- but DLNR treats these owls as invasive....sick.

There are bats there too-

[...]

Hawaii HR152 | TrackBill

[<https://trackbill.com/bill/hawaii-house-resolution-152-pueo-preserve-honouliuli-gulch/1722166/>]

On 17 September 2024 Mr. Berg provided additional comments via email:

[...]

Please add-

“There are old growth trees there that farmers have left alone because these trees were in or near the gulch embankment - massive Kukui Nut trees and other tree

species that provide refuge from the developed world. Everything should be done to preserve these trees. I have seen bats there, owls, and herons.

An EIS /or Biological Survey for native bees, damselflies, butterflies, snails, and moths too should be undertaken there. This gulch, specifically, gave wildlife refuge during all the intensive farming enterprises over the last couple hundred years, and now, this project proposed is poised to disrupt the last stand wildlife has.....where there was once open space, are now solar farms spreading like cancer on the landscape.

There's nowhere else to go for the voiceless creatures. This is reckless."

[...]

I would suggest this video be included-

Mike Lee talks about the Kaloi Stream/Honouliuli Stream that serves the limu at the ocean- critical.

Mike Lee at Future Solar Farm Site Kalaeloa

[https://www.youtube.com/watch?v=B1f6TA_mqPY]

Consider including this five part video as well:

Mike said what happens upstream at Honouliuli does indeed / affects the limu downstream at the ocean-

I would strongly suggest this five part informational youtube

I recorded be included-

Mike Lee Oneula Karst System/Burial Identification Part One

[<https://www.youtube.com/watch?v=t-51nDtxpLs>]

Oneula Discussion Mike Lee Part II

[https://www.youtube.com/watch?v=_Bd-Uq5XDg4]

Oneula Mike Lee Part III

[<https://www.youtube.com/watch?v=eE-vJiqiDWk>]

Part IV

[<https://www.youtube.com/watch?v=tGPYwL6FU8Q>]

Part V

Oneula Mike Lee Part V Conclusion

[<https://www.youtube.com/watch?v=oIgbFz6Pik>]

On 22 September 2024 Mr. Berg provided additional comments via email:

For the heck of it- at 14:12 minute mark in this video- Mike Lee explains - remains of ancestors washed up Honouliuli outlet / Kalo Stream - discusses Red Ilima and wildlife on Ewa Plains in general swallowed up-

There has to be consequences JUDGEMENT DAY HOOPILI

[<https://youtu.be/1RkDHNm-MUK?t=852>]

On 2 October 2024 Mr. Berg provided additional comments via email:

There are Hawaiian ducks back there in the stream too / if I forgot to list that please do - the Hawaiian coot used the Honouliuli stream as well as the white faced ibis I have videos if need be to show otherwise include on list please - where Kailo gulch and the under current of Honolulu converge is a wetland basin on mango tree boulevard in ewa –

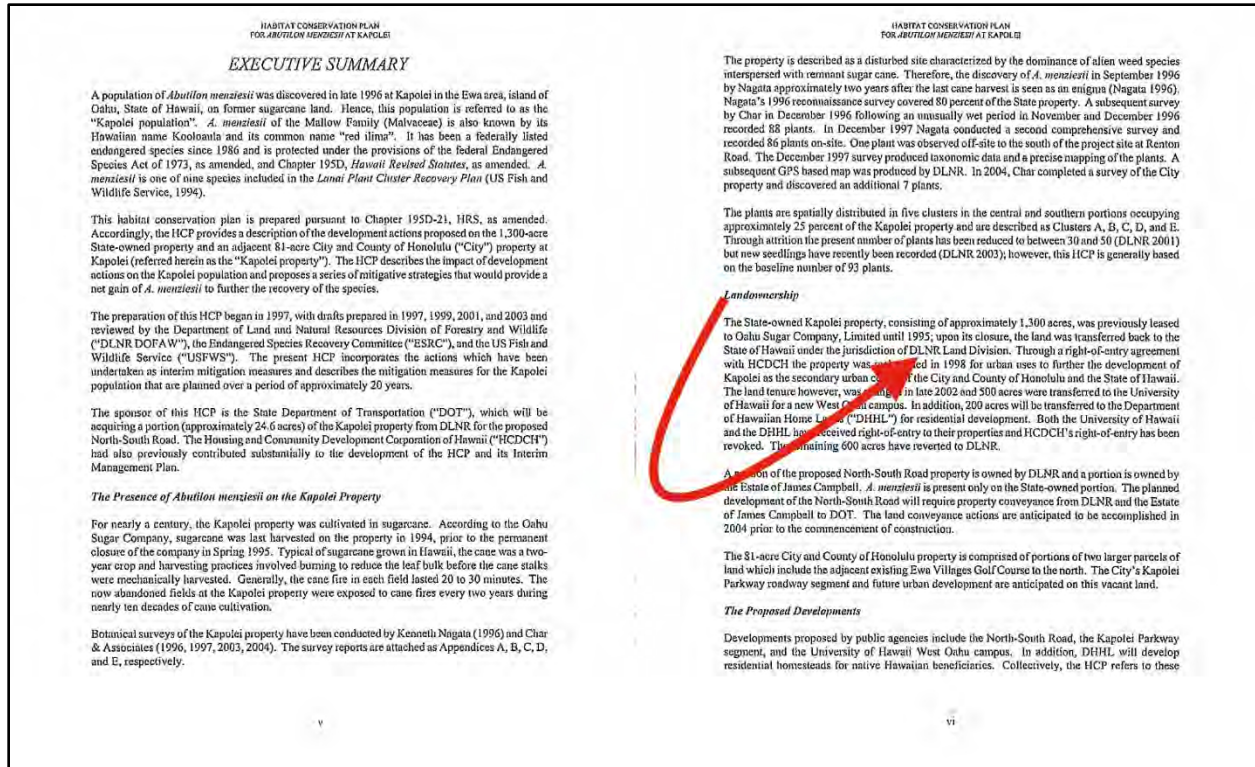
MISSING White Faced Ibis LAST SEEN 10/25/2015

[https://www.youtube.com/watch?v=9KCw_qnWU0I]

On 3 October 2024 Mr. Berg provided additional comments via email:

It is Kalo Gulch- not Kailo- Kalo and Honouliuli Gulch converge on the Ewa Plain- share same underwater lens-

Please insert for comments the entire report by Nagata- it is pertinent.



Can you find that full Nagata report- it says it all.....

Point- the area was teeming with wildlife- a biological survey by Kenneth Nagata 1996- [Habitation Conservation Plan For Abutilon Menziesii at Kapolei] Nagata stated the area of Kaloi Gulch had 17 avian species there-and the area would make an excellent wildlife refuge-

MYSTERY BIRD NESTING SIGNAGE @ DHHL / Ewa; Oahu

[<https://www.youtube.com/watch?v=n-j0ZxohbEw>]

HAWAIIAN DUCKS APRIL 9 2019 HONOULIULI STREAM

[<https://www.youtube.com/watch?v=9WLIRmcdzyQ>]

Interesting rock formation-

February 5 2019 Pre Sunrise Excursion Honouliuli Stream

[<https://www.youtube.com/watch?v=d7pP7EyUVI8>]

The Heiau of the area-

Pu'uokapolei Heiau

[<https://www.youtube.com/watch?v=pbOtUW4nqLc>]

THE CROSSING: Power Line Rail Line Death Trap

[<https://www.youtube.com/watch?v=EdZDacVbWoo>]

Ducks Being Culled @ E. Kapolei Rail Transit Station 4.17.2017

[<https://www.youtube.com/watch?v=1FgAT3pTXeY>]

HAWAIIAN COOT & Dead Duck @ E. KAPOLEI RAIL TRANSIT STATION

[<https://www.youtube.com/watch?v=4moRIGq48Qw>]

Question is: Koloa or Mallards? March 21, 2019 6pm Honouliuli Stream

[<https://www.youtube.com/watch?v=GOi4txofAuU>]

Honolulu Rail Structure Adds Demise for Bird Crossing

[<https://www.youtube.com/watch?v=ehL9qYcy1wk>]

They are HERE in EWA! a'eo, 'alae ke'oke'o, 'alae 'ula, and koloa maoli

[<https://www.youtube.com/watch?v=pOcCtC-xJA0>]

[...]

If can put the link to the report by Nagata as a reference that would be huge- Nagata found owl pellets- he turned them in to DLNR to determine if barn owl or pueo- DLNR never tested. See- Nagata was not tasked nor funded to look for pueo nesting- so when he saw the owl pellets- he did what he could-

DLNR has the report- but they don't want folks to know of it.....follow the money.

That shearwater bird nesting site- I sent you video of the sign- was another DLNR wildlife refuge habitat for the wetlands where Kaloī and Honouliuli waters converged - would seep through the soils in heavy rains and come to the surface - the ibis, coots, ducks, herons, owls, stilts- all there-

DLNR purged it- erased it to clear the way for Hoopili development....

Carroll Cox has super high resolution of photos from that area- do you know of him?

I have a synopsis of the area- in PDF- you can include that too- see attached-

Appendix C House Resolution (H.R.) 152

HOUSE OF REPRESENTATIVES
THIRTIETH LEGISLATURE, 2019
STATE OF HAWAII

H.R. NO. 152

HOUSE RESOLUTION

REQUESTING THE DEPARTMENT OF AGRICULTURE, DEPARTMENT OF LAND AND
NATURAL RESOURCES, UNIVERSITY OF HAWAII, AND ANY OTHER
RELEVANT STATE AGENCY TO DEVELOP A MAP THAT DEFINES THE
MOST SUITABLE AREA WITHIN THE HONOULIULI GULCH FOR A
DEDICATED PUEO PRESERVE AND DETERMINE THE REQUIREMENTS TO
ESTABLISH THE PRESERVE.

1 WHEREAS, the pueo, or *Asio flammeus sandwichensis*, is a
2 subspecies of the short-eared owl that is endemic to the State
3 and known in Hawaiian culture as one of the physical forms
4 assumed by aumakua, or ancestor spirits; and
5

6 WHEREAS, the island of Oahu lacks a refuge, sanctuary,
7 preserve, park, or wildlife conservation area that is solely
8 dedicated to protecting pueo and sustaining the foraging range
9 where pueo are known to inhabit; and
10

11 WHEREAS, the State has instituted a practice to disperse
12 rat bait poison in conservation areas to eradicate vermin; and
13

14 WHEREAS, consumption of the poisoned vermin by raptors,
15 including pueo, is detrimental to the health and well-being of
16 those birds; and
17

18 WHEREAS, the pueo is listed as an endangered species of the
19 State; and
20

21 WHEREAS, the Honouliuli Ahupuaa was historically known to
22 be the location with the greatest number of pueo; and
23

24 WHEREAS, an area within Honouliuli Ahupuaa, particularly in
25 the area where the Honouliuli Stream meets the Honouliuli Gulch,
26 should be dedicated as a wildlife preserve for pueo and other
27 endangered species, including the hoary bat, and housing,
28 farming, recreational, and other types of development should be
29 prohibited in this area; and

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1

Page 2

H.R. NO. 152

1 WHEREAS, if a wildlife preserve is established in the
 2 Honouliuli Ahupuaa, then farming enterprises in the area should
 3 be permitted to use any cane roads within the preserve, and
 4 public use of any roadway or infrastructure necessary to serve
 5 the Honouliuli Internment Camp Federal Park Museum should also
 6 be permitted within the preserve; now, therefore,
 7

8 BE IT RESOLVED by the House of Representatives of the
 9 Thirtieth Legislature of the State of Hawaii, Regular Session of
 10 2019, that the Department of Agriculture, Department of Land and
 11 Natural Resources, University of Hawaii, and any other relevant
 12 state agency are requested to develop a map that defines the
 13 most suitable area within the Honouliuli Gulch for a dedicated
 14 pueo preserve, to be managed by the Department of Land and
 15 Natural Resources, and to determine the requirements to
 16 establish the preserve, including any necessary acquisitions,
 17 resources, leases, easements, or legislation; and
 18

19 BE IT FURTHER RESOLVED that the Department of Land and
 20 Natural Resources, Department of Agriculture, and University of
 21 Hawaii are requested to submit a report to the Legislature of
 22 their findings and recommendations, including a list identifying
 23 any potentially affected land owners, leases, or easements and
 24 any proposed legislation, no later than twenty days prior to the
 25 convening of the Regular Session of 2020; and
 26

27 BE IT FURTHER RESOLVED that certified copies of this
 28 Resolution be transmitted to the Governor, Chairperson of the
 29 Board of Agriculture, Chairperson of the Board of Land and
 30 Natural Resources, Director of the Office of Environmental
 31 Quality Control, Chairperson of the University of Hawaii Board
 32 of Regents, President of the University of Hawaii System, Mayor
 33 of the City and County of Honolulu, and each member of the
 34 Honolulu City Council.
 35
 36
 37

OFFERED BY:

James I. King
Lida Cabanilla-Arakawa

MAR 08 2019

HR LRB 19-2159.doc



2

Appendix C

Archaeological Inventory Survey Report for the Kunia Village Housing Development Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu

TMK: [1] 9-2-005:023 por.

Final
Archaeological Inventory Survey Report for the
Kunia Village Housing Development Project,
Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu
TMK: [1] 9-2-005:023 por.

Prepared for
Mason Architects, Inc.

Prepared by
Layne Krause, B.A.,
Scott A. Belluomini, B.A.,
David W. Shideler, M.A.,
and
Hallett H. Hammatt Ph. D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: HONOULIULI 108)

February 2015

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Fax: (808) 244-1994

Management Summary

Reference	Archaeological Inventory Survey Report for the Kunia Village Housing Development Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu TMK: [1] 9-2-005:023 por. (Krause et al. 2014)
Date	February 2015
Project Number(s)	Cultural Surveys Hawai'i, Inc. (CSH) Job Code: HONOULIULI 108
Investigation Permit Number	CSH completed the archaeological inventory survey (AIS) fieldwork under archaeological permit number 14-04, issued by the Hawai'i State Historic Preservation Division (SHPD) per Hawai'i Administrative Rules (HAR) §13-13-282.
Agencies	SHPD
Land Jurisdiction	Kunia Village Title Holding Company
Project Funding	Mason Architects Inc.
Project Location	The project area is located within TMK: [1] 9-2-005:023 in Kunia Village, Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu. This area is depicted on the 1998 Schofield Barracks U.S. Geological Survey (USGS) topographic quadrangle. Generally, this project area is located on the west side of Kunia Road Hwy 750, southeast of the Kunia School and just east of Kunia Drive.
Project Description	Mason Architects Inc. proposes to develop the 22.4-acre parcel as part of a development project for new housing and rehabilitation. Minimally, this would include grading, dwelling construction, and street and utility installation.
Project Acreage	The project area includes 22.4 acres.
Area of Potential Effect (APE)	The proposed project, based on available information, lacks potential to affect historic properties outside of the project area. As a result, the project's APE is the same as the project area.
Historic Preservation Regulatory Context	This AIS investigation fulfills the requirements of Hawai'i Revised Statutes (HRS) §6E-42 and HAR §13-13-284 and was conducted to identify, document, and assess significance of any historic properties. This document is intended to support the proposed project's historic preservation review under HRS §6E-42 and HAR §13-13-284 as well as the project's environmental review under HRS §343. This AIS has been revised to address comments on a previous (November 2014) draft received in a review dated 30 January 2015 (LOG NO.: 2014.05305, DOC NO.: 1501SL21.)

Fieldwork Effort	Fieldwork was conducted on 27 and 28 October 2014 by CSH archaeologists Scott Belluomini, B.A., Layne Krause, B.A, Richard Stark, Ph.D., and Trevor Yucha, B.S. All fieldwork was conducted under the direction of the principal investigator Hallett H. Hammatt, Ph.D. This work required approximately 7 person days to complete.
Historic Properties Identified	The project area is located within the boundaries of one historic property, Kunia Camp (SIHP # 50-80-08-7729), an architectural complex including 128 features. No architectural or archaeological features of SIHP # -7729 were newly identified during the AIS and no archaeological historic properties were identified. SIHP # -7729 is assessed as significant under Hawai'i state historic property significance criteria "a" (associated with events that have made an important contribution to the broad patterns of our history) and "c" (embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value) pursuant to HAR §13-284-6. SIHP # -7729 is evaluated as eligible to the National Register of Historic Places under Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction).
Effect Recommendation	The results of this AIS investigation support a Hawai'i State historic preservation project effect recommendation of "effect, with proposed mitigation commitments" as specified in HAR§13-284-7. The recommended mitigation measures include: 1) National Register (NR) nomination, 2) Preservation and restoration following Secretary of Interior (SOI) standards, and 3) Demolition and deconstruction including salvaging of materials for reuse within the Kunia Village Housing Development project.
Mitigation Recommendations	No further archaeological fieldwork is recommended for the current project. In 2011, Mason Architects, Inc. carried out an architectural assessment survey and subsequently completed a National Register Nomination (Appendix A). This would appear to be appropriate and sufficient mitigation to any adverse impacts to Kunia Camp (SIHP # 50-80-08-7729), an architectural complex including 128 features. Thus appropriate mitigation appears to have been concluded.

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Section 1 Introduction

1.1 Project Background

At the request of Mason Architects Inc., Cultural Surveys Hawai'i, Inc. (CSH) completed this archaeological inventory survey (AIS) investigation for the Kunia Village Housing Development Project, Honouliuli Ahupua'a, 'Ewa District, O'ahu TMK: [1] 9-2-005:023 por. The irregularly shaped project area is located on the west side of Kunia Road Hwy 750, southeast of the Kunia School and to the east of Kunia Drive (TMK: [1] 9-2-005:023). The project area is depicted on a portion of the 1998 Schofield Barracks U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2013 aerial photograph (Figure 3).

The Kunia Village Housing Development project, as proposed by Mason Architects, is designed to structurally rehabilitate existing lodgings within the Kunia Village, construct new lodgings, as well as add utility lines and reservoirs to the existing infrastructure. The project area consists of 22.4 acres of primarily residential housing (Figure 4 through Figure 7). Of the 112 habitable housing units, 82 units will be redeveloped (in this New Housing and Rehabilitation project). Thirty-seven of the houses will be demolished and replaced with 37 new units that fit the historical character of the existing units and the village at large. The remaining 45 units (of the 82) will be fully renovated. There is no intention to demolish any additional historic houses and existing houses will be renovated as necessary, in keeping with the historic character of the village. Any new housing construction will likely be infill housing. Figure 5 shows the site plan for new housing and rehabilitation units. The four highlighted units in Figure 6 are being proposed for relocation. These units are in relatively good condition and the owners are proposing to relocate these four units in the area outside of the 82-unit project area as infill housing. Figure 7 shows the demolition plan for the Kunia Camp Historic District showing 37 to-be-demolished units.

In addition to the housing rehabilitation, two new detention basins will be constructed in the northeastern portion of the project area, and two CPR lines are proposed for installation along the length of the fire lane between Second Street and Third Street, extending adjacent to the detention basins within the northeastern portion of the project area (see Figure 4). The construction of the detention basins and CPR lines will likely require extensive digging and grading within the project area.

1.2 Historic Preservation Regulatory Context

This AIS investigation fulfills the requirements of Hawai'i Administrative Rules (HAR) §13-13-276 and was conducted to identify, document, and make significance assessments of any historic properties within the project area. This document is intended to support the proposed project's historic preservation review under Hawai'i Revised Statutes (HRS) §6E-42 and HAR §13-13-284, as well as the project's environmental review under HRS §343.

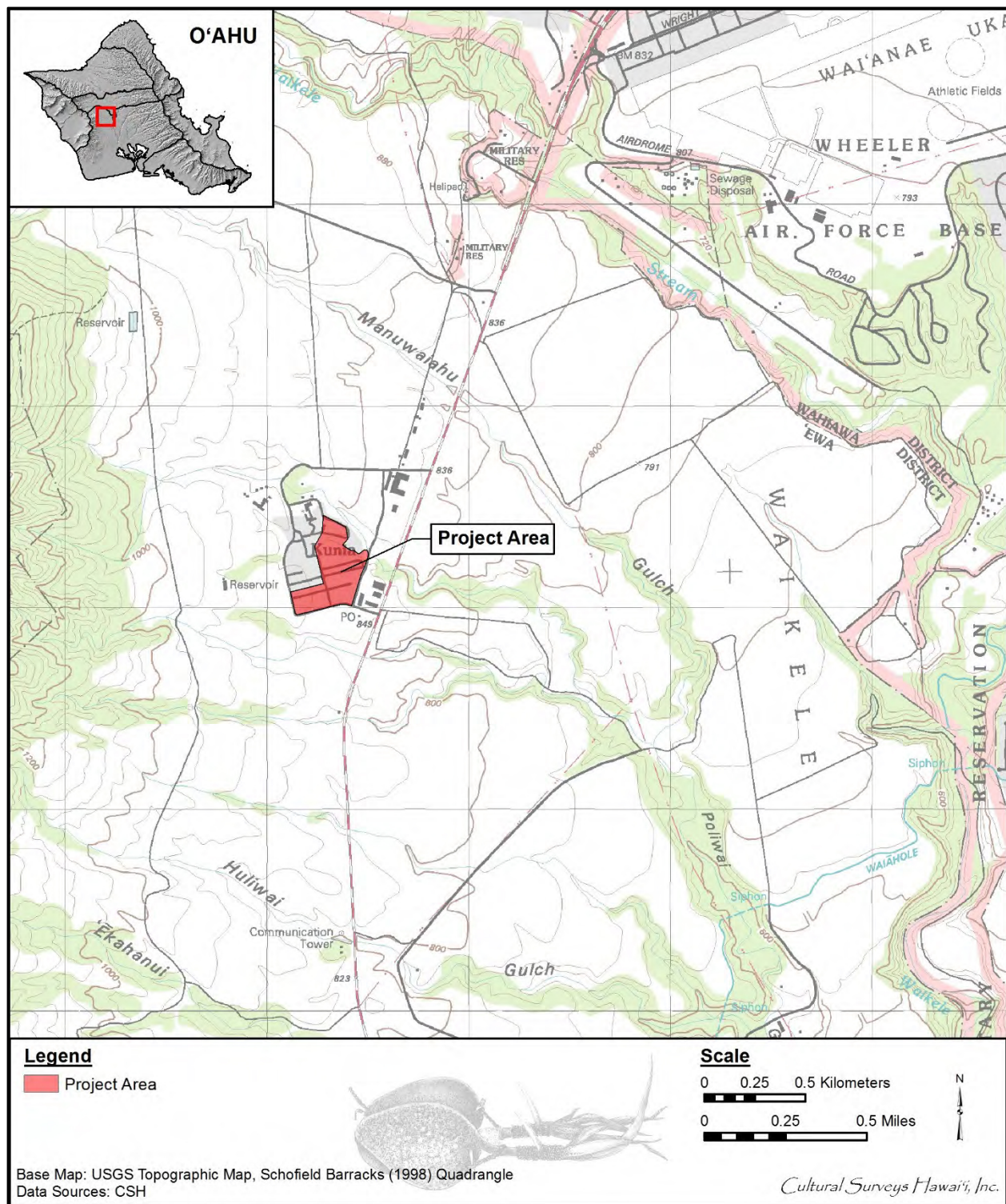
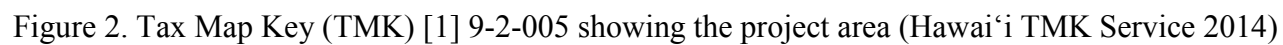


Figure 1. Portion of the 1998 USGS 7.5-minute Schofield Barracks topographic quadrangle showing the location of the project area



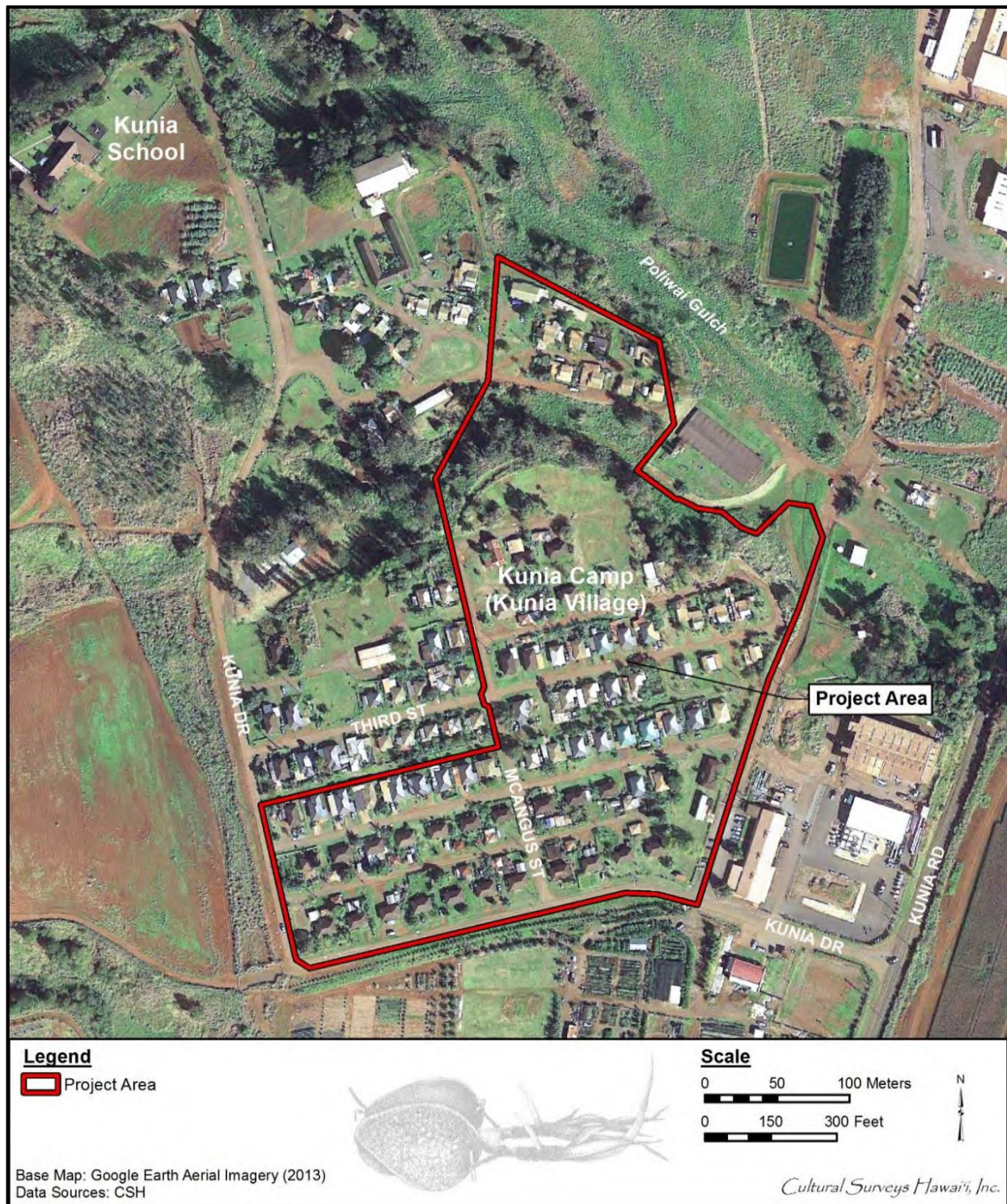


Figure 3. 2013 aerial photograph of the project area (Google Earth 2013)

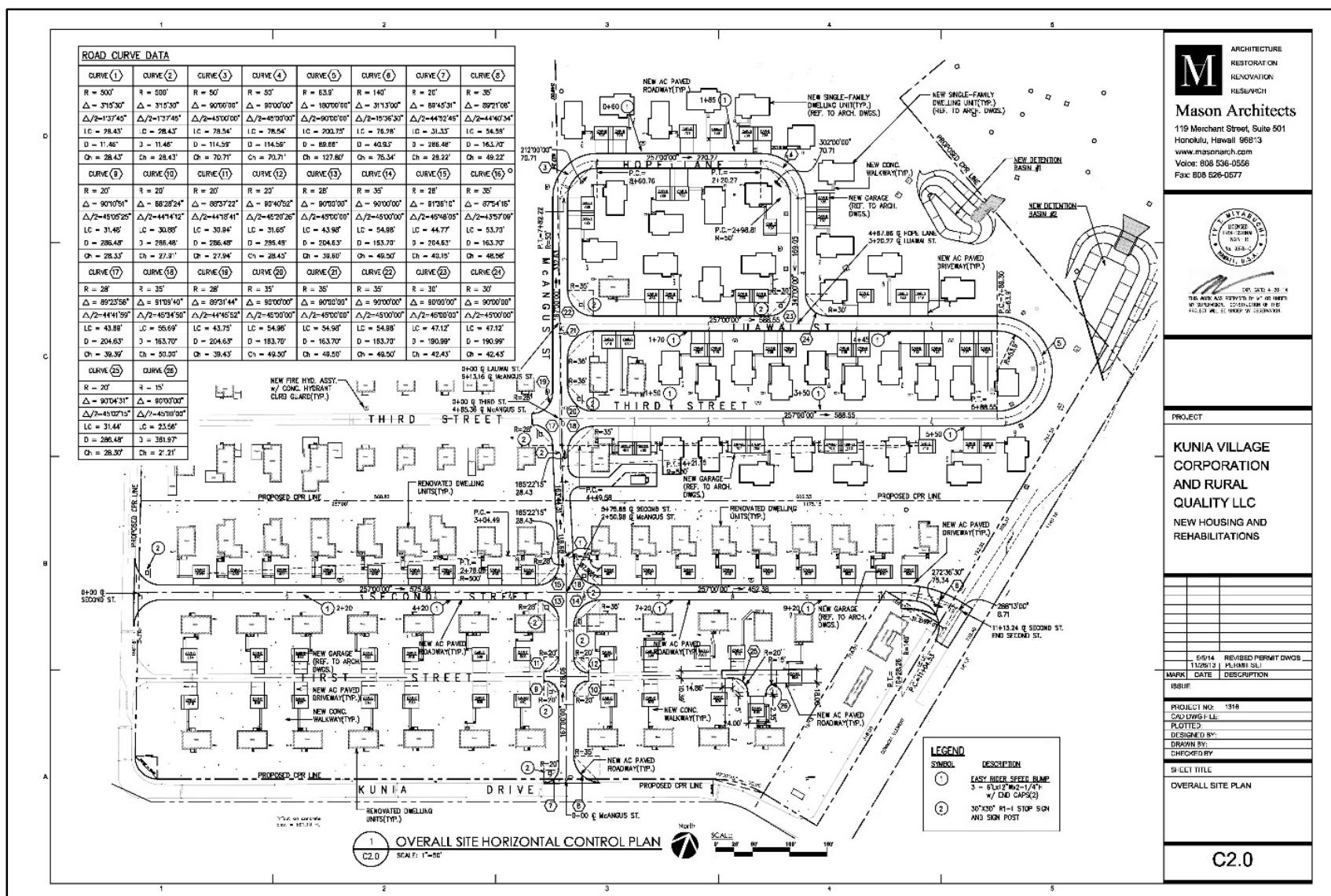


Figure 4. Development plans for the Kunia Village project area (Mason Architects 2014)

AIS for the Kunia Village Housing Development Honouliuli, 'Ewa, O'ahu

TMK: [1] 9-2-005:023 por.

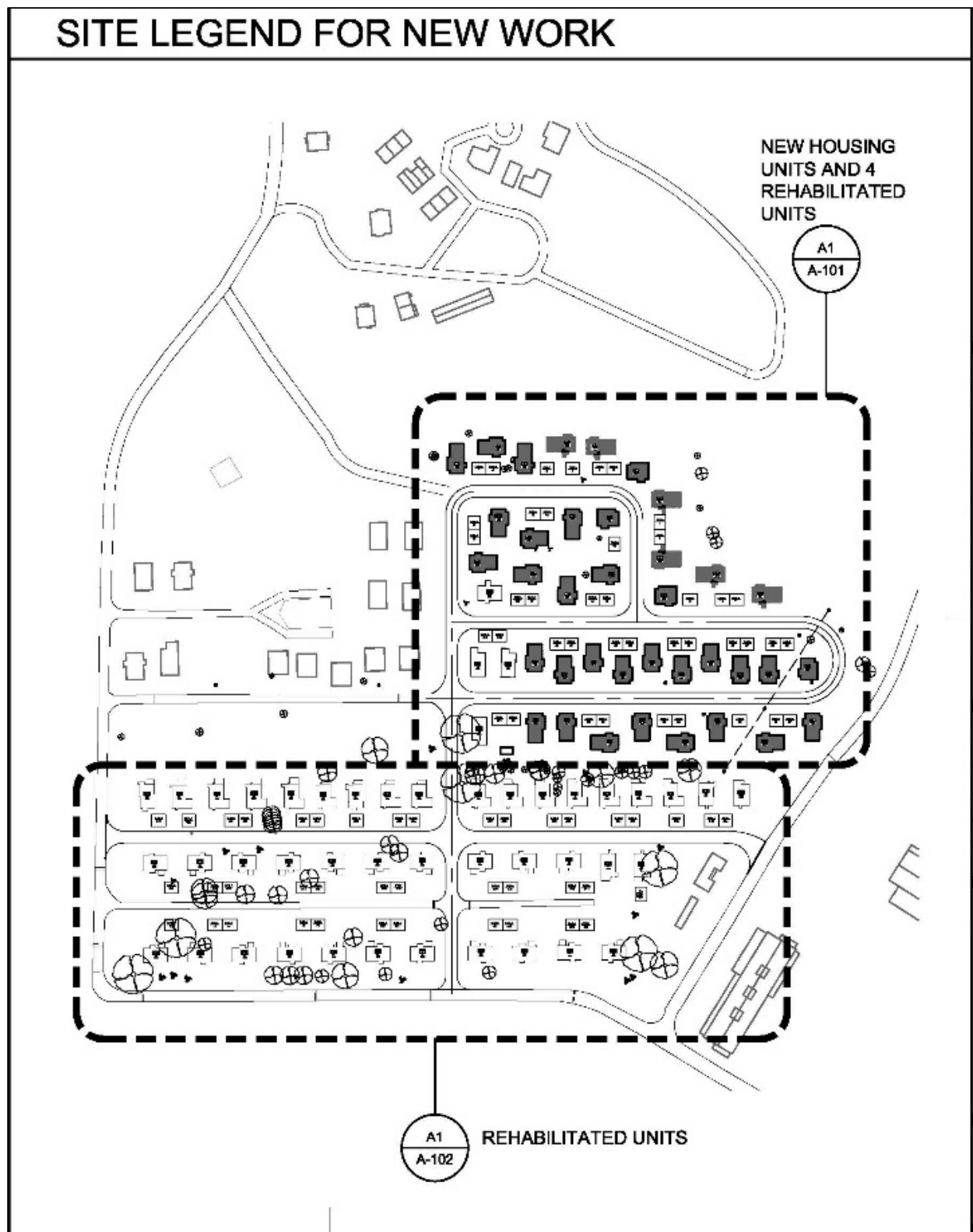


Figure 5. Site plan for new housing and rehabilitation units

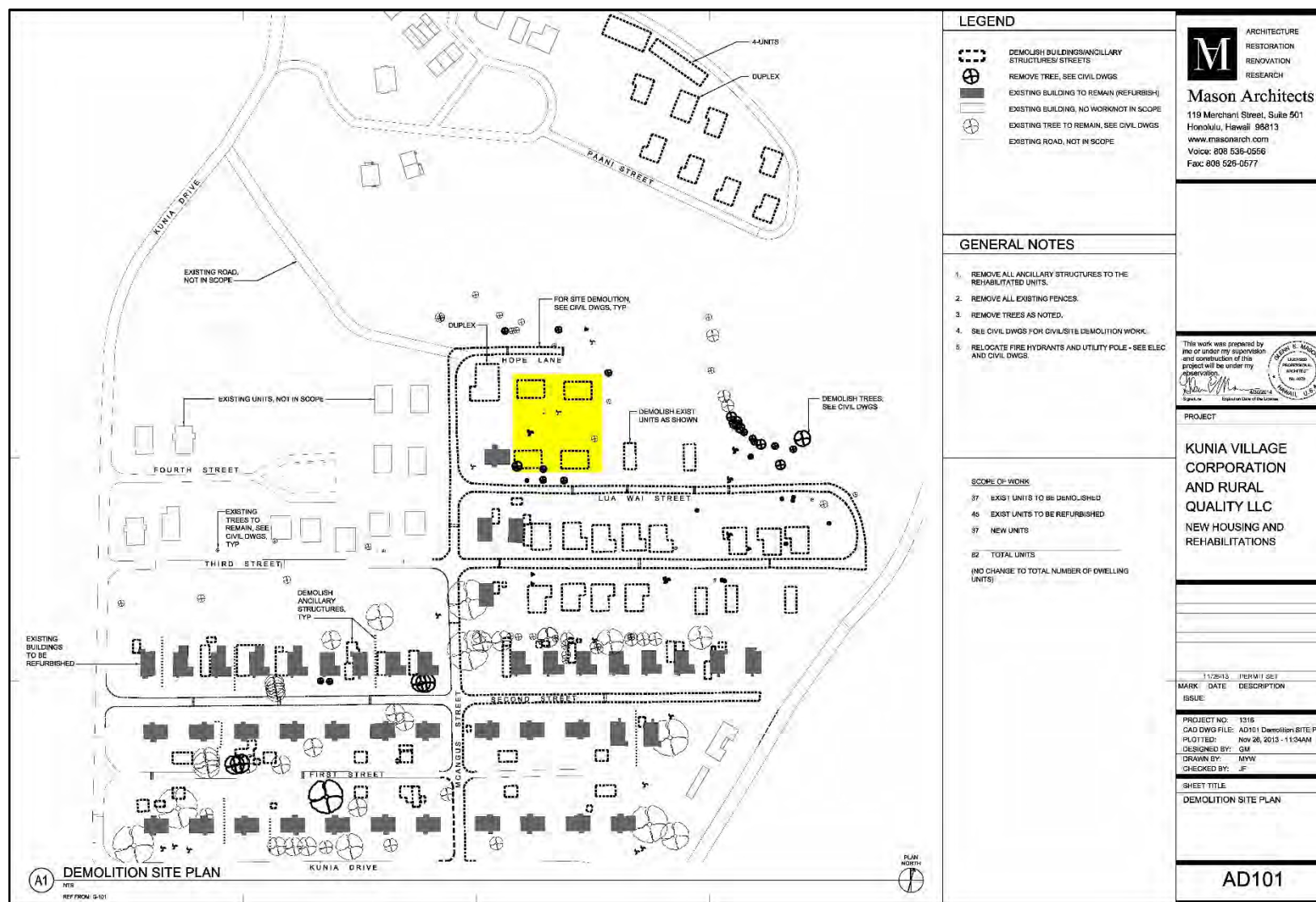


Figure 6. Demolition site plan showing the four units being proposed for relocation (highlighted in yellow)

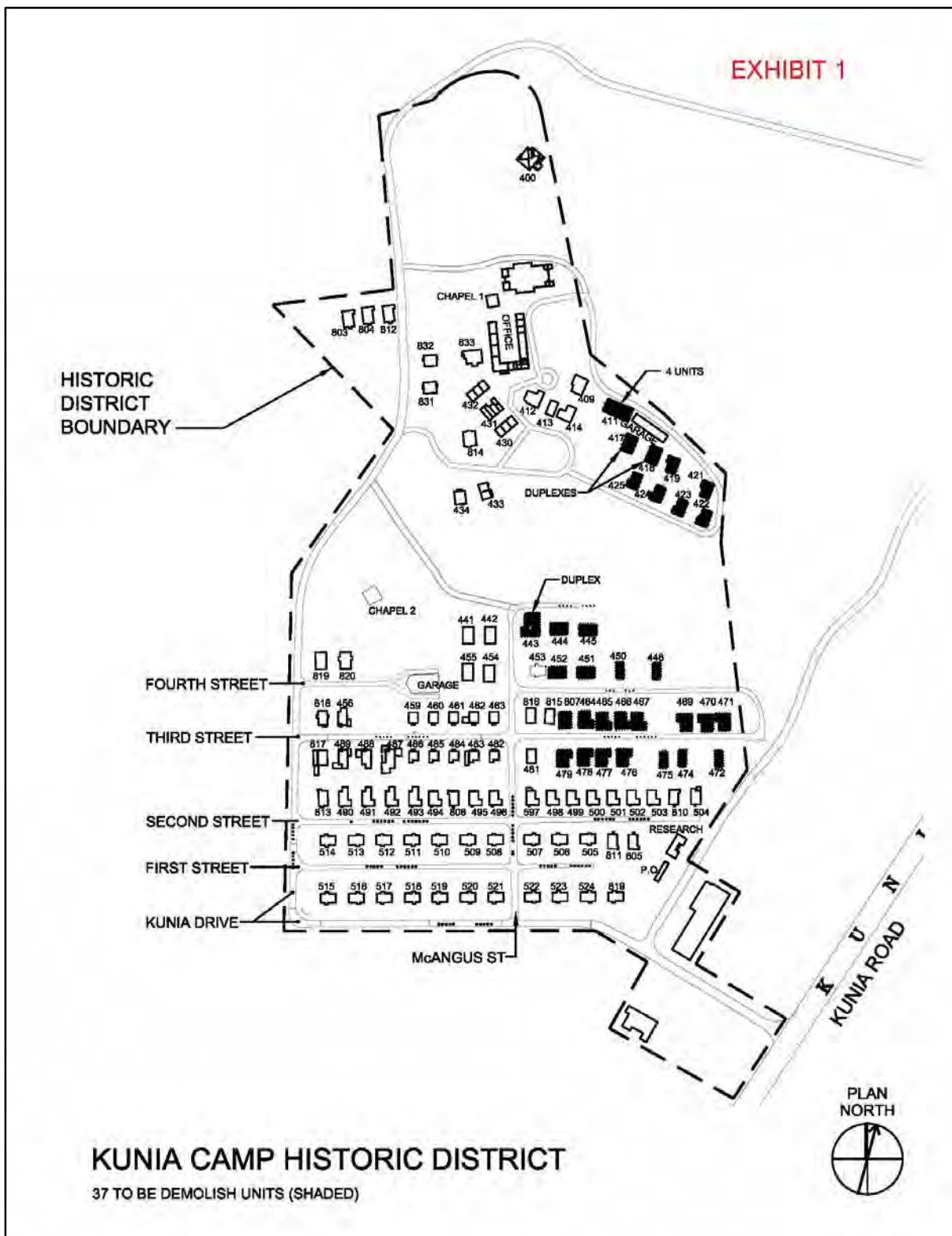


Figure 7. Demolition plan for the Kunia Camp Historic District showing 37 to-be-demolished units

1.3 Environmental Setting

1.3.1 Natural Environment

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the vast majority of the project area's soils consist of Kolekole silty clay loam, 1 to 6% slopes, (KuB), with a small area of Helemano silty clay, 30 to 90% slopes (HLMG) in the north portion of the project area, and a small area of Kunia silty clay, 0 to 3% slopes (KyA) in the southeast corner (Figure 8).

Soils on the Kolekole series are described as follows:

This series consists of well-drained soils on uplands on the island of Oahu. These soils developed in old gravelly alluvium mixed with volcanic ash. They are gently sloping to moderately steep. Elevations range from 500 to 1,200 feet. The annual rainfall amounts to 35 to 50 inches, most of which occurs between November and April. The mean annual soil temperature is 71°F. Kolekole soils occur on the windward slopes of the Waianae Range. They are geographically associated with Kunia, Mahana, and Wahiawa soils.

These soils are used for sugarcane, pineapple, and pasture. The natural vegetation consists of guava, lantana, Bermuda grass, and Natal redtop. [Foote et al. 1972:73]

The Helemano series soils are described as follows:

This series consists of well-drained soils on alluvial fans and colluvial slopes on the sides of gulches. These soils are on the island of Oahu. They developed in alluvial and colluvium derived from basic igneous rock. They are steep to extremely steep. Elevations range from 500 to 1,200 feet. The annual rainfall dominantly amounts to 30 to 60 inches but ranges to 75 inches at the highest elevations. The mean annual soil temperature is 72° F. Helemano soils are geographically associated with Lahaina, Leilehua, Manana, Molokai, and Wahiawa soils.

These soils are used for pasture, woodland, and wildlife habitat. The natural vegetation consists of Bermuda grass, Christmas berry, eucalyptus, Formosa koa, guava, Japanese tea, Java plum, and koa haole. [Foote et al. 1972:40]

The Kunia series soils are described as follows:

This series consists of well-drained soils on upland terraces and fans on the island of Oahu. These soils developed in old alluvium. They are nearly level to moderately sloping. Elevations range from 700 to 1,000 feet. The mean annual rainfall amounts to 30 to 40 inches, most of which occurs from November to April. The mean annual soil temperature is 71°F. Kunia soils occur on the foot slopes of the Waianae Range, near Schofield Barracks. They are geographically associated with Kolekole, Lahaina, and Wahiawa soils.

These soils are used for sugarcane, pineapple, home sites, and military reservations. Most areas are cultivated, and the natural vegetation is not significant. [Foote et al. 1972:77]

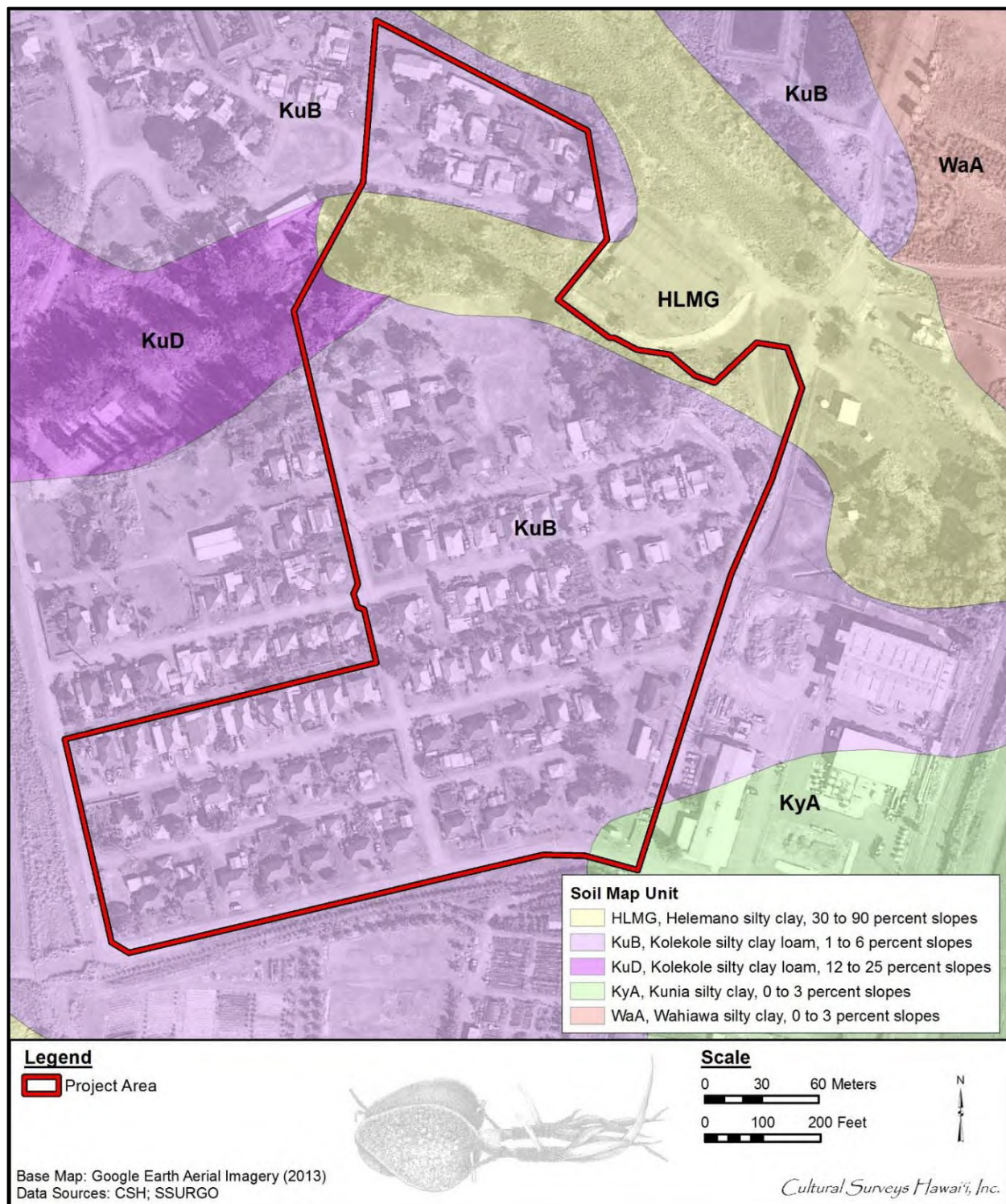


Figure 8. Overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (U.S. Department of Agriculture Soils Survey Geographic Database [SSURGO] 2001)

1.3.2 Built Environment

Kunia Camp is located in the State of Hawai'i, on the island of O'ahu, in the County of Honolulu, and lies along Hawai'i Route 750, which runs northwest of Pearl Harbor. Historically the area surrounding the village has been used for large-scale pineapple and sugar cane cultivation. The areas outside of Kunia Village that have not been impacted by agricultural activities have been utilized for ranching or historic military purposes.

Based on an architectural review in the National Register of Historic Places Registration Form for Kunia Village (Appendix A), the camp can be divided into two distinct areas, Old Camp and New Camp. The Old Camp comprises the northern portion of the project area with the New Camp to the southeast. In the Old Camp are the Kunia School and associated administrative buildings, Kunia Gymnasium, and Kunia Chapel. In the new camp are the Kunia Store, Agricultural Research Building, and the Main Office Building.

Section 2 Methods

2.1 Field Work Methods

CSH completed the fieldwork component of this AIS under archaeological permit number 14-04, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 27 and 28 October 2014 by CSH Scott Belluomini, B.A., Layne Krause, B.A., Richard Stark, Ph.D., and Trevor Yucha, B.S. All fieldwork was conducted under the direction of the principal investigator Hallett H. Hammatt, Ph. D. This work required approximately 7 person-days to complete.

Fieldwork consisted of an initial 100% coverage pedestrian survey and GPS data collection followed by a subsurface testing program.

2.1.1 Pedestrian Survey

The pedestrian survey was conducted by archaeologists on the streets of the village typically viewing private residences from the street. The survey confirmed there were no surface historic properties within the Kunia Village Housing Development project area. As there were no surface historic properties identified, the archaeological inventory survey focused on a program of subsurface testing to locate any buried cultural deposits and to facilitate a thorough examination of stratigraphy within the project area.

2.1.2 Subsurface Testing

The subsurface testing program was backhoe assisted and involved five test excavations (T-1 through T-5). In general, linear trenches measuring approximately 6 m (20 feet) long and 0.6 m (2 feet) wide were excavated within the project area. The sampling strategy was detailed in map and text to the SHPD in advance of the fieldwork (Shideler to Lebo email of 16 October 2014) with targeting of relatively large proposed excavations for two detention basins in the northeast portion of the housing redevelopment area and two connecting drain lines (30-inch and 42-inch in diameter) and a proposed pump house understood to involve grading and sewer line connections.

A stratigraphic profile of each test excavation was drawn and photographed. The observed sediments were described using standard USDA soil description observations/terminology. Sediment descriptions included Munsell color; texture; consistence; structure; plasticity; cementation; origin of sediments; descriptions of any inclusions such as cultural material and/or roots; lower boundary distinctiveness and topography; and other general observations. Where stratigraphic anomalies or potential cultural deposits were exposed, these were carefully represented on test excavation profile maps.

2.2 Laboratory Methods

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities on O'ahu. Analysis of collected materials was undertaken using standard archaeological laboratory techniques. Materials were washed, measured, weighed, described, and photographed.

2.2.1 Artifact Analysis

In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and age of manufacture. As applicable, artifacts were washed,

sorted, measured, weighed, described, photographed, and catalogued. Diagnostic (dateable or identifiable) attributes of artifacts were researched.

Historic artifacts were identified using standard reference materials (e.g., Elliott and Gould 1988; Fike 1987; Godden 1964; Kovel and Kovel 1986; Lehner 1988; Lindsey 2014; Millar 1988; Munsey 1970; Toulouse 1971; Whitten 2009; and Zumwalt 1980), as well as resources available on the internet.

2.2.2 Disposition of Materials

All project records and all non-burial materials collected during the current AIS are stored at the CSH office in Waimānalo, O‘ahu. Final disposition of the collected materials will be determined in consultation with the landowner and SHPD, in accordance with HAR §13-276-6(a).

2.3 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2000).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Traditional and Historical Background

Various Hawaiian legends and early historical accounts indicate the *ahupua'a* (large land division) of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali'i* (chiefly class). This would be attributable for the most part to the plentiful marine and estuarine resources available at the coast, where several sites interpreted as permanent habitations and fishing shrines were located. Other attractive subsistence-related features of the *ahupua'a* include irrigated lowlands suitable for wetland taro cultivation (Hammatt and Shideler 1990), as well as the lower forest area of the mountain slopes for the procurement of forest resources.

Exploitation of the forest resources along the slopes of the Wai'anae Range—as suggested by E.S. and E.G. Handy—probably acted as a viable subsistence alternative during times of famine:

The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the wao, or upland jungle, than was the case on the windward coast. Yet the wao here was more extensive, giving greater opportunity to forage for wild foods during famine time. [Handy and Handy 1972:469-470]

These upper valley slopes may have also been a significant resource for sporadic quarrying of basalt for the manufacturing of stone tools. This is evidenced in part by the existence of a probable quarrying site (SIHP # 50-80-12-4322) in Makaiwa Gulch at 152 m. (500 feet) AMSL (Hammatt et al. 1991).

The Hawaiian *ali'i* were also attracted to the region, which is steeped in myth. An extensive summary of various legends and historical accounts of Honouliuli can be found in Sterling and Summers (1978:31-44).

John Papa Hōkile'i describes a network of *ā'ā* and O'ahu trails (Figure 9) which in later historic times encircled and crossed the Wai'anae Range, allowing passage from Lualualei to Honouliuli via Pōhākea Pass (Hōkile'i 1959:96-98). A map with an overlay of traditional Hawaiian place names for Honouliuli Ahupua'a and the McAllister archaeological sites (Figure 10) also shows these trails. Following Hōkile'i's description, the trail to Pōhākea Pass would have passed through the present project area. An account of the use of the trail through Pōhākea Pass is described in Hōkile'i's *Fragments of Hawaiian History*:

It was at this time that the king, chiefs, and court members left Honolulu and sailed by canoe to Waianae. Liholiho, the heir to the kingdom, went overland with Papa and others from Honolulu and spent the night at Kumelewai in Ewa . . . The travelers stopped only one night and spent the following night on the other (Wai'anae) side of Pohakea. The elders and the children who went with them slept above Kunia, on the other side of Pohakea. [Hōkile'i 1959:23]

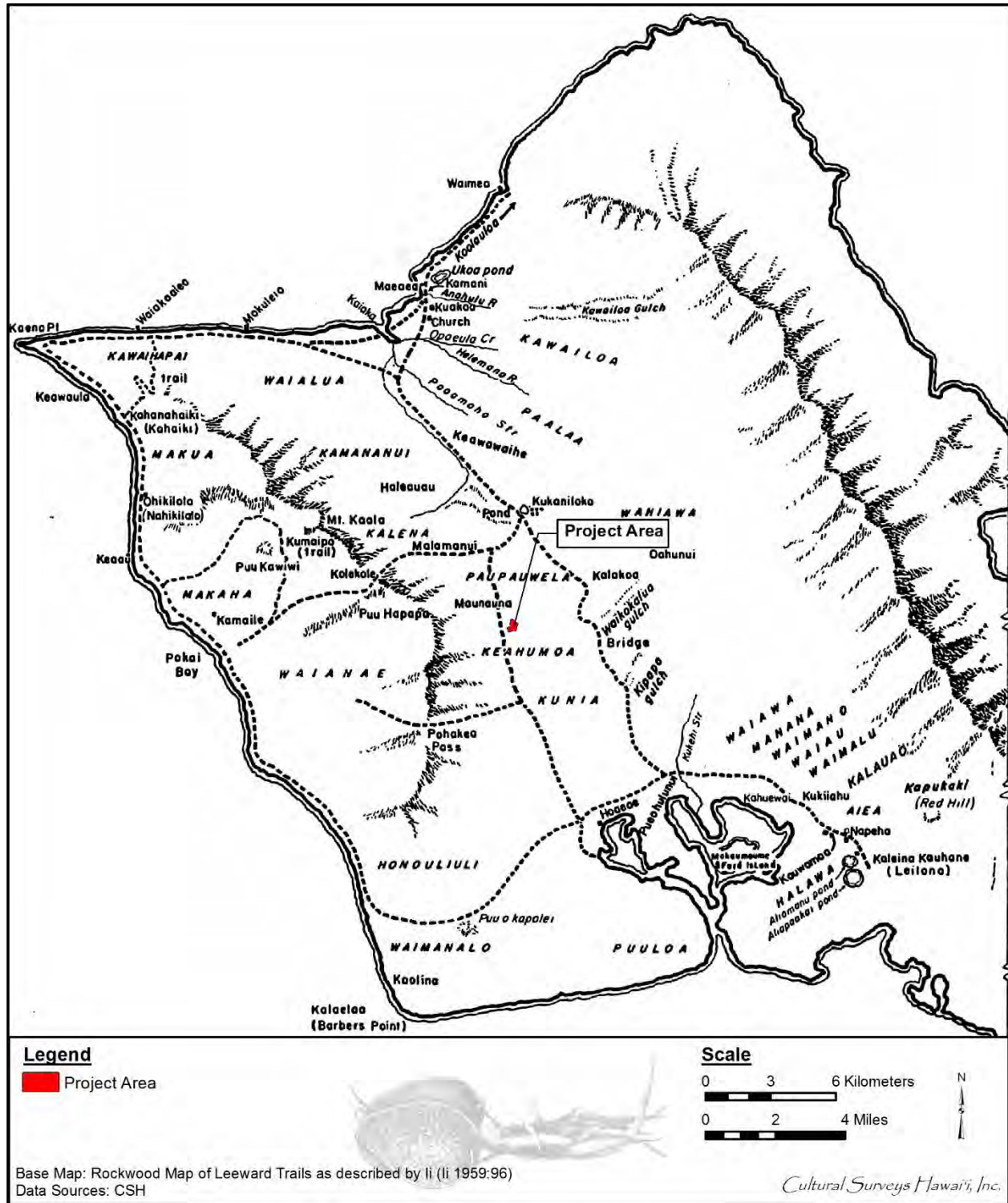


Figure 9. Overlay of the Kunia Village project area on the Rockwood map of leeward trails as described by li (li 1959:96)

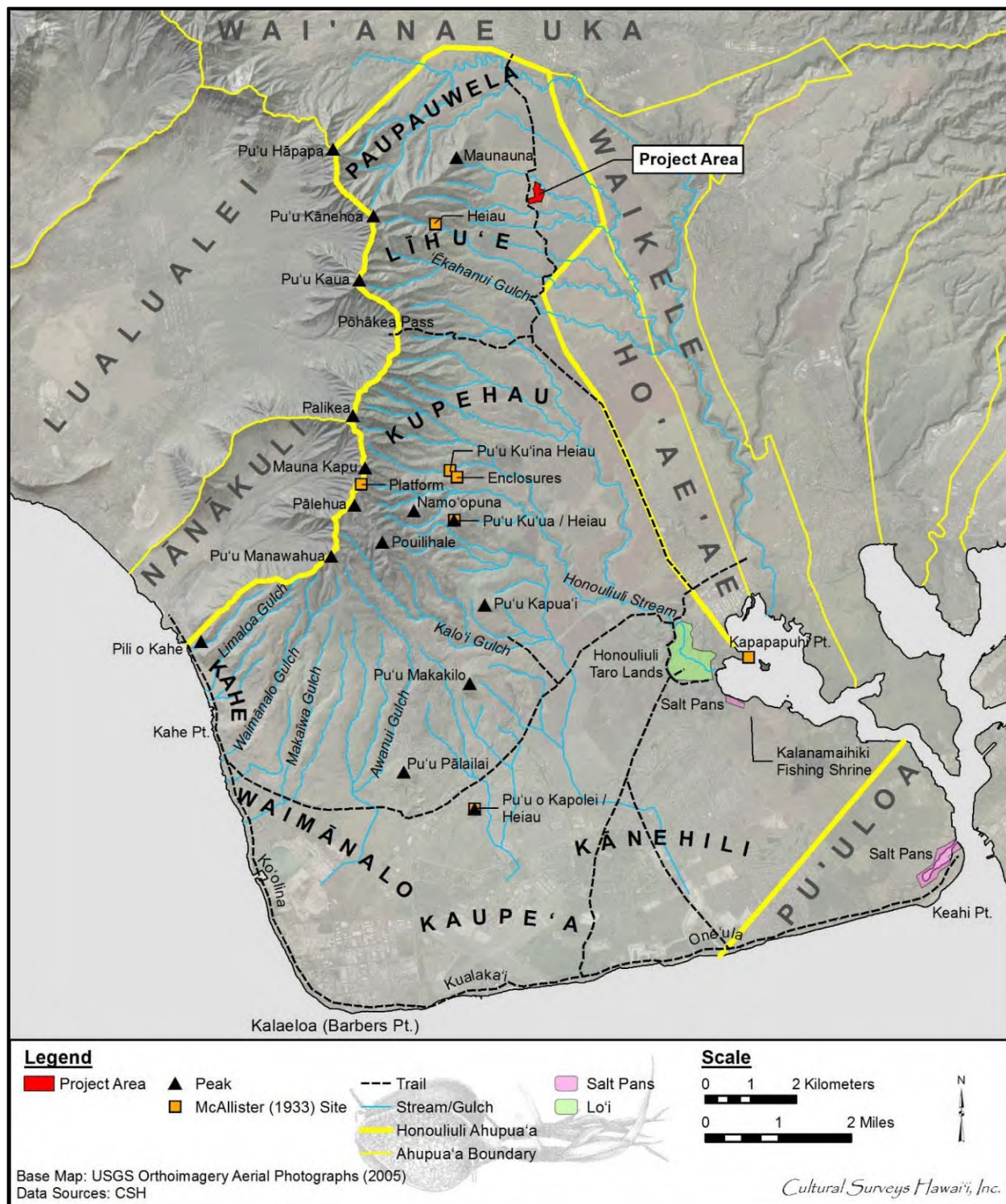


Figure 10. Overlay of traditional Hawaiian place names for Honouliuli Ahupua'a, McAllister archaeological sites, and the Kunia Village project area on a (2005) USGS orthoimagery aerial photograph

Other early historical accounts of the general region typically refer to the more populated areas of the 'Ewa district, where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli Ahupua'a, indicates prehistoric (pre-Contact) and early historic populations also adapted to less inviting areas, despite the environmental hardships.

Barbers Point is named after Captain Henry Barber whose vessel ran aground on 31 October 1796. Subsequent to Western Contact in the area, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals including goats, sheep, and cattle were brought to the Hawaiian Islands by Vancouver in the early 1790s, and allowed to graze freely on the land for some time after. It is unclear when domesticated animals were brought to O'ahu. However, L.A. Henke reports the existence of a longhorn cattle ranch in Wai'anae prior to 1840 (Frierson 1972:10). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing. The following dates of specific vegetation introduced to Hawai'i are given by R. Smith and outlined by Frierson (1972:10-11):

- 1) "early", c. 1790:
 Prickly pear cactus, *Opuntia tuna*
 Haole koa, *Leucaena glauca*
 Guava, *Psidium guajava*
- 2) 1835-1840
 Burmuda [sic] grass, *Cynodon dactylon*
 Wire grass, *Eleusine indica*
- 3) 1858
 Lantana, *Lantana camara*

The *kiawe* tree was also introduced during this period, either in 1828 or 1837 (Frierson 1972:11).

3.1.2 Mid- to Late 1800s

During the 1840s, 99 individual land claims in the *ahupua'a* of Honouliuli were registered and awarded by King Kamehameha III. Within the project area, however, it is important to note there were no *kuleana* (native) land claims awarded to commoners. Most of the commoner *kuleana* claims were in the lower portions of Honouliuli Ahupua'a near Pearl Harbor. Kekau'onohi acquired a deed to all unclaimed land within the *ahupua'a* (including the current project area) which totaled 43,250 acres.

Kekau'onohi was one of Liholiho's (Kamehameha II's) wives, and after his death she lived with her half-brother, Luanu'u Kahala'i'a, who was governor of Kaua'i (Hammatt and Shideler 1990:19-20). Subsequently, Kekau'onohi ran away with Queen Ka'ahumanu's stepson, Keli'i-ahonui, and then became the wife of Chief Levi Ha'alelea. Upon her death on 2 June 1851, all her property passed on to her husband and his heirs. When Levi Ha'alelea died, the property (including the current project area) went to his surviving wife, who in turn leased it to James Dowsett and

John Meek in 1871 for stock running and grazing. The location of the cattle ranch is within the vicinity of the project area as seen on a 1873 W.D. Alexander map (Figure 11).

In 1877, James Campbell purchased most of Honouliuli Ahupua'a, including the current project area, for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). In 1879, Campbell brought in a well-driller from California to search the 'Ewa plains for water, and a "vast pure water reserve" was discovered (Armstrong 1983). Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource. By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with "abundant pasturage of various kinds" (Briggs in Haun and Kelly 1984:45). Within ten years of the first drilled well in 'Ewa, the addition of a series of artesian wells throughout the island was supplying most of Honolulu's water needs (Armstrong 1983).

In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway and Land Company (OR&L) in 1890. To attract business to his new railroad system, Dillingham subleased all land below 200 feet elevation to William Castle who in turn sublet the area to the Ewa Plantation Company for sugar cane cultivation (Frierson 1972:15). Dillingham's Honouliuli lands above 200 feet elevation suitable for sugar cane cultivation were sublet to the Oahu Sugar Company.

Ewa Plantation Company was incorporated in 1890 and continued in full operation up into modern times. The plantation grew quickly with the abundant artesian water. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

The Oahu Sugar Company was incorporated in 1897, and included lands in the foothills above the 'Ewa plain and Pearl Harbor. The sprawling plantation "covered some 20 square miles . . . ranging in elevation from 10 feet at the Waipio Peninsula . . . to 700 feet at the Waiahole Ditch" (Condé and Best 1973:313). Prior to commercial sugar cultivation, the lands occupied by the Oahu Sugar Company were described as being "of near desert proportion until water was supplied from drilled artesian wells and the Waiahole Water project" (Condé and Best 1973:313). The Oahu Sugar Company took control over the Ewa Plantation lands in 1970 and continued operations into the 1990s.

Around 1896, Harry Von Holt, Superintendent of the OR&L Ranch Department, was actively constructing a fence around the *mauka* (inland, toward the mountains) Honouliuli lands. This established the Honouliuli Forest Reserve, within which Von Holt planted "experimental trees" to reforest areas damaged by sandalwood harvesting and livestock grazing (Von Holt 1985:142). During this time, Von Holt set up a camp for his family at Akupu, approximately 3 km southwest of the current project area. The camp site and forest reserve were accessed by a horse trail which began near the mouth of Kalo'i Gulch. Several additional trails were constructed in the Honouliuli uplands, as mentioned in the following account:

New trails were built—"Over the Hills and Far Away," "Punahuna" to the tunnel, where one went in a long way with a candle, and where we all hunted for small

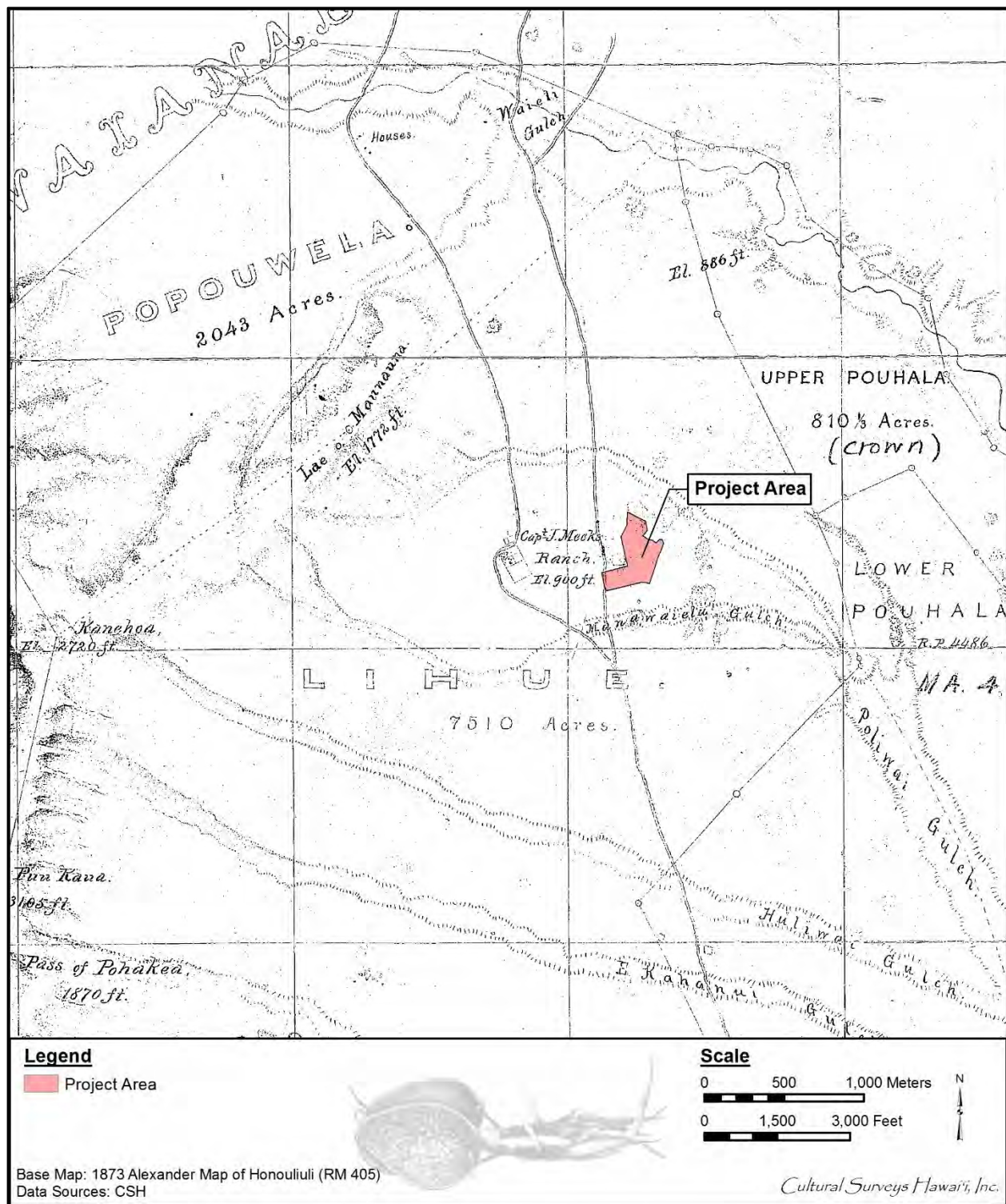


Figure 11. 1873 Alexander map of Honouliuli with an overlay of the Kunia Village project area

kukui nuts; “Glen Ida” trail to Akupu, the “Golden Stairs” joining Glen Ida to the ridge trail, and the “Hog Back” trail where we went to watch the hunters . . . Later on the Schuyler Trail was built . . . The Schuyler Trail connected our mountains with Schofield . . . [Von Holt 1985:150]

3.1.3 1900s

Located on O‘ahu’s central plain along Hawai‘i Route 750, amidst some 3,000 acres of farmland leased and cultivated by Del Monte Fresh Produce, Kunia Camp was the last village in O‘ahu designated exclusively for Del Monte Corporation’s workers who processed pineapples from the adjacent pineapple fields. The father of the corporation, “Pineapple King” James Dole, initially began planting pineapples in 1903, after paying \$4,000 for just over 60 acres of homestead land in Wahiawā in 1900 (Arsen and Marks 2010:168). Such was Dole’s success that by the late 1950s, Hapco (Hawaiian Pineapple Company), had so grown in size and scope that it could boast production of 80% of the pineapple bought by consumers world-wide (Bolante 2006).

At the time, prior to commercial and residential development, towns such as ‘Ewa, ‘Aiea, and Waipahu were company towns, encompassing the plantations that the workers farmed and the camps where they and their families resided (Bolante 2006). As of 2006, the small agricultural community of Kunia Camp was comprised of 200 pineapple workers and their families, living on 119 acres in cottages that numbered close to 120.

According to United States Department of the Interior (Mason Architects 2014:7:5), all the residential houses in the Kunia Camp “have the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes walls a single board thick, . . . set against a backdrop of pineapple fields, and provided housing . . . for pineapple field workers . . . from the years 1928 until 2007.”

The 1916 Harrison map of the Hawaii Preserving Company shows the outline of the project area in its original position in 1916, centered in a pasture (Figure 12). The 1919 U.S. Army War Department fire control map (Figure 13) shows the same area, only slightly more developed. Newly built roads, dwellings, and a section of railway are shown running near the current project area. The 1928 Schofield Barracks USGS topographic quadrangle (Figure 14) shows Kunia Camp a bit later in development. This map again shows the Oahu Railroad running through the vicinity. The 1935 and 1943 U.S. Army War Department terrain maps, Schofield Barracks quadrangle, both show the same area, only slightly further along in development, with access and country roads now surrounding the camp (Figure 15 and Figure 16). A 1951 USGS aerial photograph, 1953 USGS topographic map, 1969 USGS topographic map, and 1977 USGS orthophotograph all show Kunia Village more or less in its modern state (Figure 17 through Figure 20).

Beyond residential housing, the Kunia Camp was in actuality a small town. With a chapel, gymnasium and store all patronized by the resident workers and their families. The atmosphere of Kunia Camp was that of a tight-knit community, with most homes housing family members from multiple generations. The links among families and the surrounding neighbors of the camp forged a strong sense of community-inspired trust, where people seldom locked the doors to their homes, and where residents were generally familiar with one another, “Everybody know each other. No one complain if you cook and get any kine smell. Get plenty parties at the gym, . . . graduation, birthday, baptismal. You invite the whole camp” (Bolante, 2006).

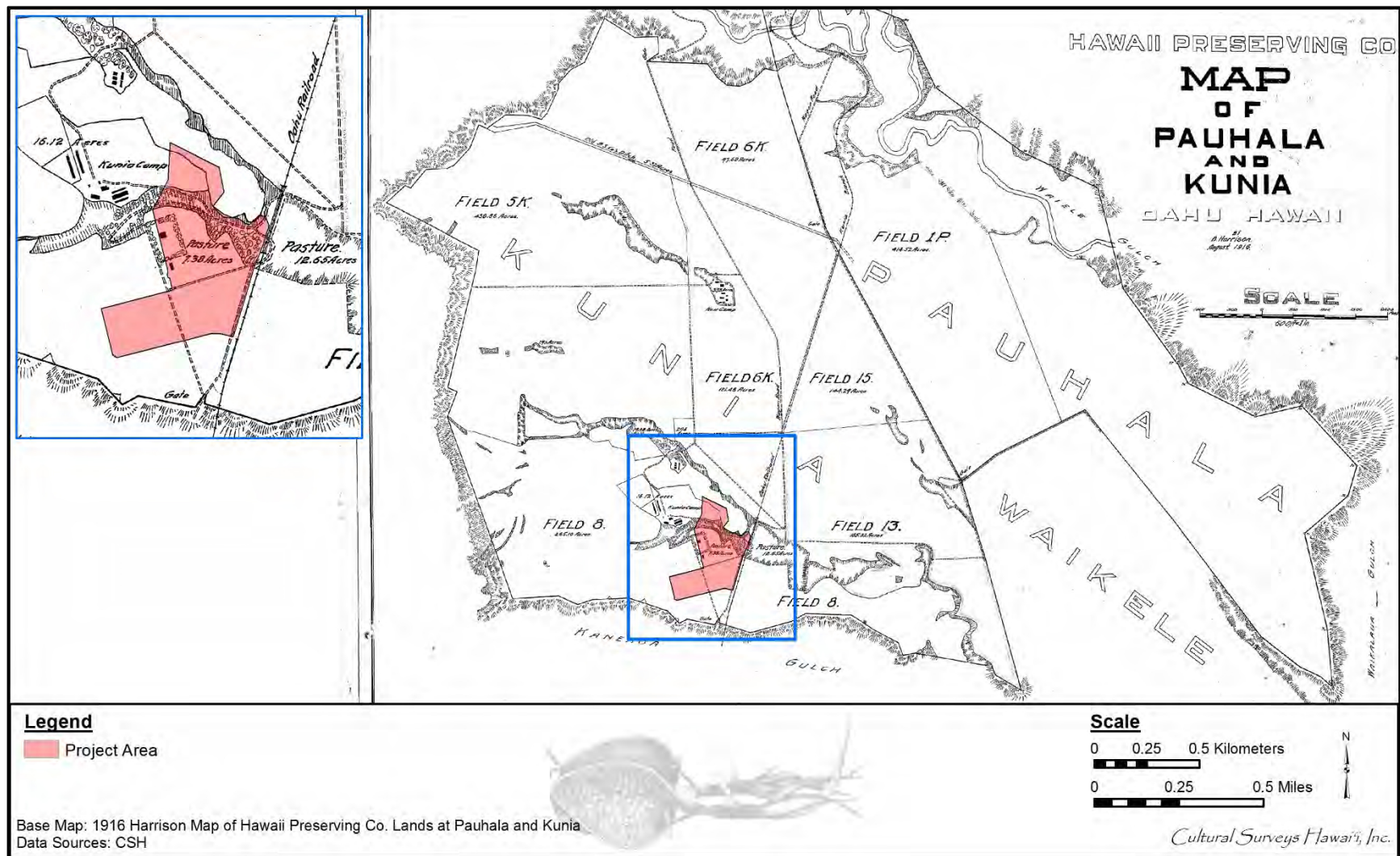


Figure 12. 1916 Harrison map of Hawaii Preserving Company Lands at Pauhala and Kunia

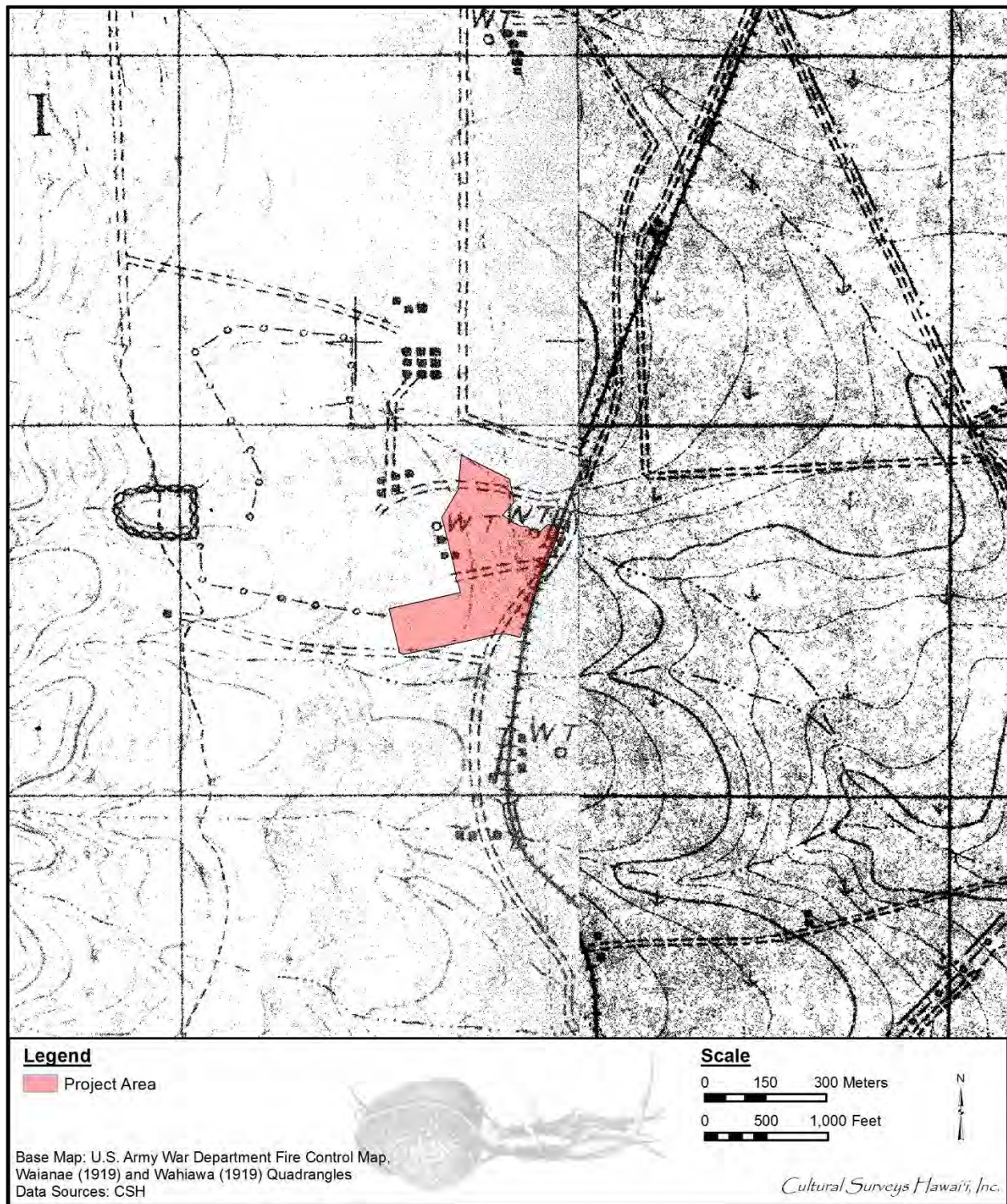


Figure 13. 1919 U.S. Army War Department fire control maps, Waianae (1919) and Wahiawa (1919) quadrangles showing the Kunia Village project area and vicinity

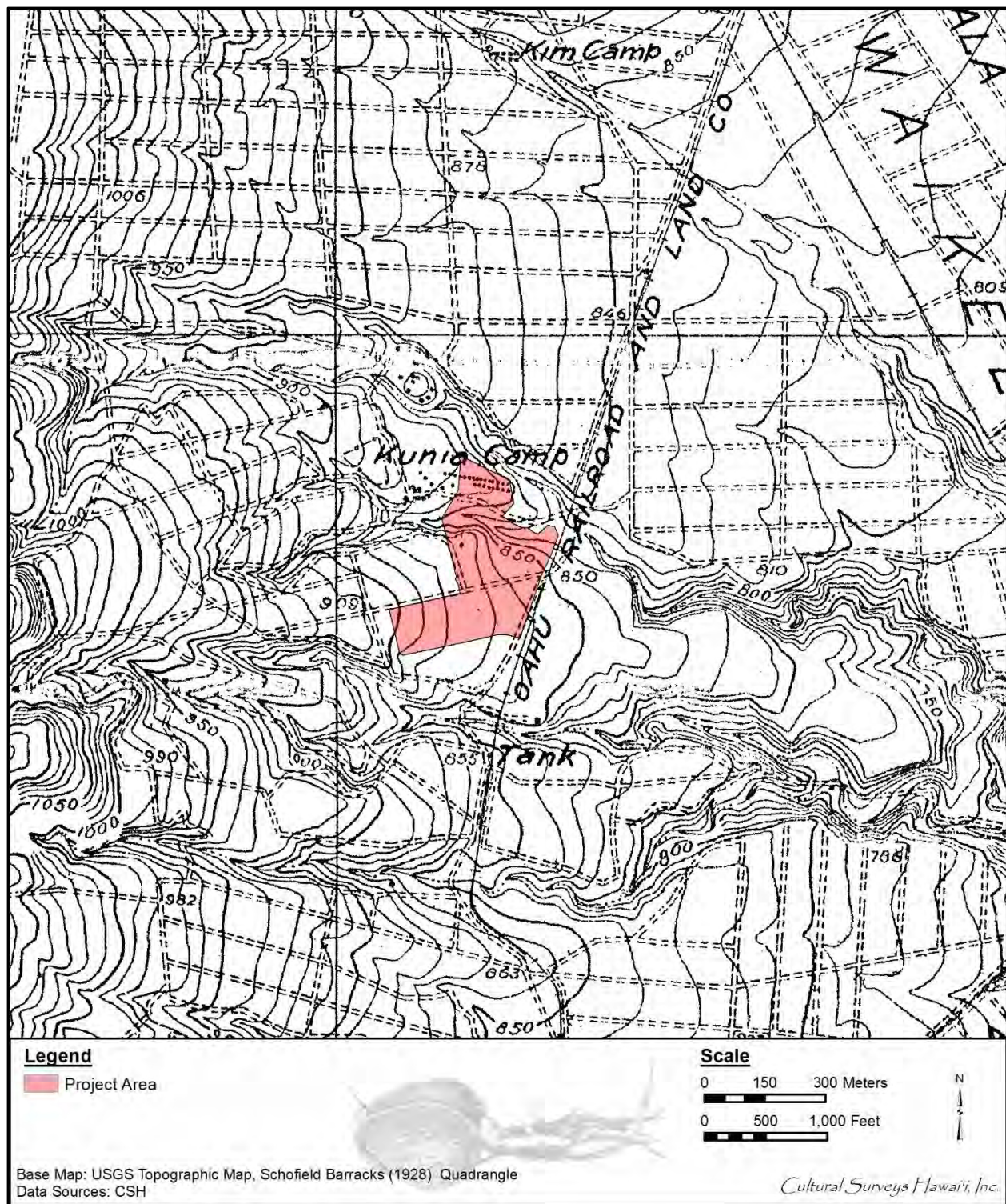


Figure 14. Portion of 1928 Schofield Barracks USGS topographic quadrangle showing the Kunia Village project area and vicinity

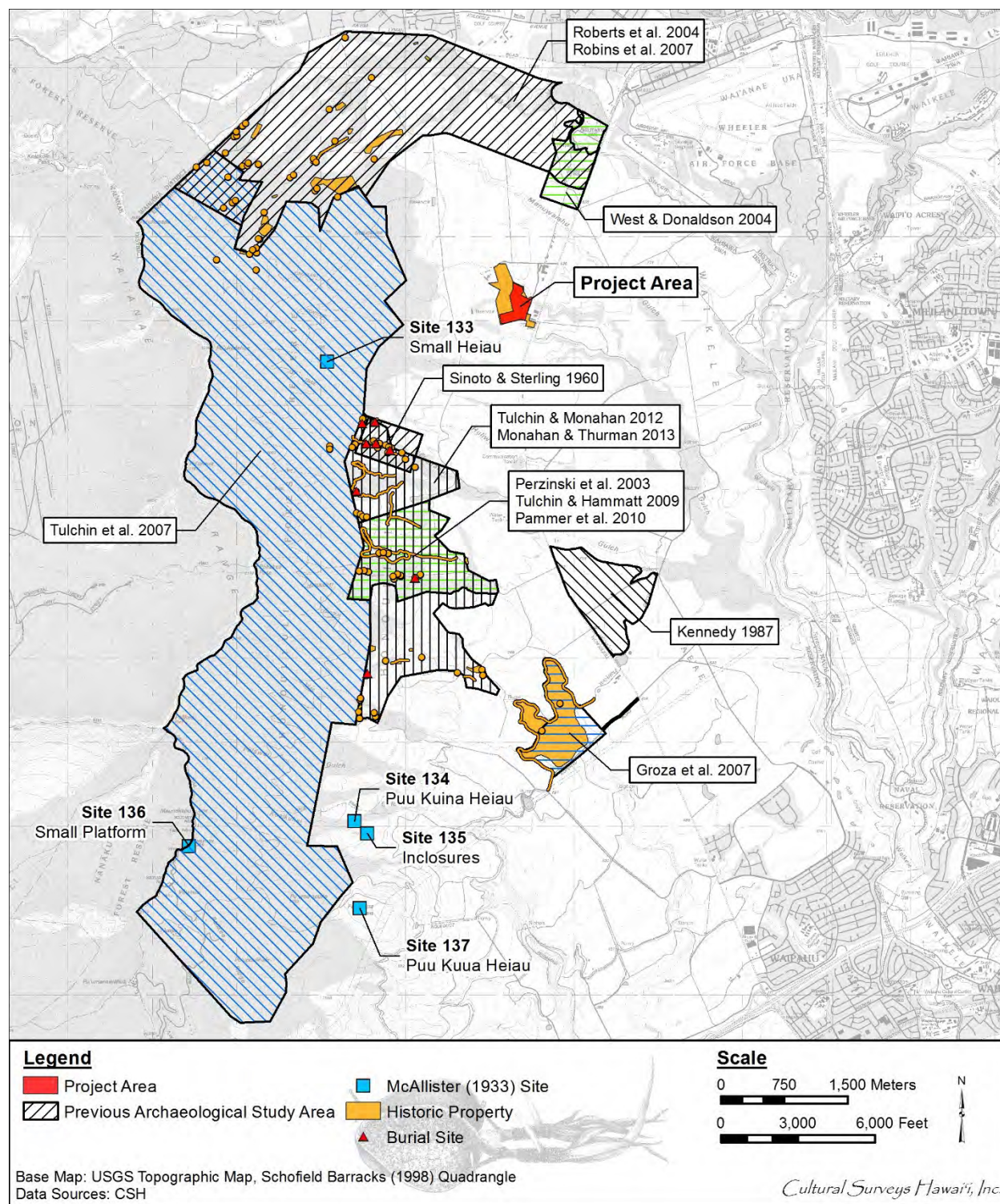


Figure 21. 1998 Schofield Barracks USGS topographic map showing the locations of previous archaeological studies in the vicinity of the project area as well as nearby historic properties

Table 1. Previous Archaeological Studies in the Vicinity of the Project Area

Reference	Type of Study	Location	Results
McAllister 1933	Reconnaissance survey	Island-wide	Documented sites in general vicinity include Site 133, a small <i>heiau</i> ; Site 134, Pu'u Kuina Heiau; Site 135 Inclosures; Site 136 a small platform; and Site 137 Pu'u Ku'ua Heiau
Kennedy 1987	Archaeological reconnaissance survey	203.171-acre area in Hō'ae'ae Ahupua'a, TMK: [1]-9-4-004	No historic properties or cultural materials identified
Sinoto and Sterling 1960 cited in Sterling and Summers (1978:37)	Archaeological literature review/site review	'Ēkaha Nui Gulch area, approx. 2 km SW of project area	Agricultural terraces, house sites along the sides of the stream, pavings, platforms, a burial platform and a possible <i>heiau</i> (non-Christian place of worship) (No SIHP #s believed to have been assigned)
Perzinski et al. 2003	Archaeological inventory survey	Approx. 250-acre parcel for proposed Kunia Land Fill, TMK: [1] 9-2-004: 5 por.	Six archaeological sites documented that represent habitation, transportation, and storage activities as well as religious/ceremonial practices (SIHP #s 50-80-12-6456 through -6461)
Roberts et al. 2004	Archaeological reconnaissance survey	U.S. Army Schofield Barracks Military Reservation, South Range Land acquisition	43 sites comprised of 129 features, some with pre-Contact components as well as historic sites, related to military and plantation activities (see following Table 2 for SIHP #s)
West and Donaldson 2004	Archaeological inventory survey	Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC) and vicinity, Wahiawa, TMK: [1] 7-1-002:007	No historic properties or cultural materials identified
Groza et al. 2007	Pedestrian survey	143-acre Mauka Detention Basin located west of Kunia Rd, TMK: [1] 9-2-001:001	Three sites documented, SIHP #s 50-80-06-6892 a historic bridge, -6893 a historic bridge, and -6894 a plantation agricultural complex

Reference	Type of Study	Location	Results
Robins et al. 2007	GPS relocation report/pedestrian survey	Northern portion of Honouliuli Ahupua'a bounded by Schofield Barracks west of Kunia Rd, TMK: [1] 9-2-005	28 archaeological sites, with habitation, ceremonial, and possible burial components were documented (see following Table 2 for SIHP #s)
Tulchin et al. 2007	Archaeological literature review and field inspection	Approx. 4,600-acre property at Honouliuli Forest Reserve, TMKs: [1] 9-2-004:001 por., 005 por.; 9-2-005:013 por., 016, 018	8 historic properties were identified including mounds and platforms of a SIHP # 50-80-08-6497 a traditional Hawaiian agricultural complex, a possible grinding stone, an airplane crash site, a terrace, a wall, and a mound.
Tulchin and Hammatt 2009	GPS relocation survey of three sites (total approximately 1 acre)	Kunia Loa Ridge Farmlands, TMK: [1]-9-2-004:005 por.	SIHP #s 50-80-12-6457, -6458, and -6461 confirmed; new features of SIHP #6461 documented
Pammer et al. 2010	Archaeological inventory survey	Approx. 294-acre parcel for proposed Kunia Loa Ridge Farmlands, TMK: [1] 9-2-004:005 por.	Eight historic properties identified: SIHP #s 50-80-12-6456 terrace, mound, and trail; -6457 enclosure and associated terraces; -6458 cobble filled crevices; -6459 U-shaped structure and alignment; -6460 leveled cobbles; -6461 historic road improvements; -7125 petroglyph; and -7126 mound
Tulchin and Monahan 2012	Archaeological reconnaissance survey	162-acre project area on eastern side of Wai'anae Mountain Range, approx. 1.5 km east of Hawai'i Country Club, TMK: [1] 9-2-004:013 por.	Documented SIHP #s 50-80-08-7328, -7339, -7340, -7341 and -7344, associated with traditional Hawaiian land use
Monahan and Thurman 2013	Archaeological inventory survey	854-acre Kunia Mauka Loa Ridge project area on east side of southern Wai'anae Range	23 new historic properties identified including a platform <i>heiau</i> , a lithic scatter, plantation infrastructure, and a burial (see following Table 2 for SIHP #s)

Table 2. Designated State Inventory of Historic Properties (SIHP) Sites in the Vicinity

SIHP #	Site Type	Site Age	Source
50-80-09-02268	Improved irrigation ditch (Waiahole Ditch)	Post- Contact	Groza et al. 2007
50-80-08-05436	Agricultural/habitation complex	Pre- Contact	Robins et al. 2007
50-80-08-05437	Mound	Pre- Contact	Robins et al. 2007
50-80-08-05438	Irrigation ditch	Pre- Contact	Robins et al. 2007
50-80-08-05439	Mound	Pre- Contact	Robins et al. 2007
50-80-08-05440	Mound	Pre- Contact	Robins et al. 2007
50-80-08-05441	Mound	Post- Contact	Robins et al. 2007
50-80-08-06456	Terrace and alignment	Both	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-06457	Enclosure (possible <i>heiau</i>) complex	Both	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-06458	Filled crevices and alignment	Both	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-06459	Enclosures and alignment	Post- Contact	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-06459	Alignment	Post- Contact	Tulchin and Monahan 2012
50-80-08-06460	Cobble paving	Unknown	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-6461	Historic road and appurtenances	Post- Contact	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-06462	Earthen dam complex	Post- Contact	Robins et al. 2007
50-80-08-06463	Historic structure complex	Post- Contact	Robins et al. 2007
50-80-08-06464	Historic structure foundation	Post-Contact	Robins et al. 2007
50-80-08-06465	Plantation dump	Post- Contact	Robins et al. 2007
50-80-08-06466	Road/retaining wall	Post- Contact	Robins et al. 2007
50-80-08-06467	Military-related complex	Post- Contact	Robins et al. 2007
50-80-08-06468	Historic structure foundation	Post- Contact	Robins et al. 2007
50-80-08-06469	Agricultural complex	Both	Robins et al. 2007
50-80-08-06470	Road/culvert system	Post- Contact	Robins et al. 2007
50-80-08-06471	Historic road	Post- Contact	Robins et al. 2007
50-80-08-06472	Agricultural/habitation complex	Pre- Contact	Robins et al. 2007
50-80-08-06473	Agricultural complex	Pre- Contact	Robins et al. 2007
50-80-08-06474	Historic structure foundation	Post- Contact	Robins et al. 2007

SIHP #	Site Type	Site Age	Source
50-80-08-06475	Agricultural/habitation complex	Pre-Contact	Robins et al. 2007
50-80-08-06477	Agricultural/habitation complex	Both	Robins et al. 2007
50-80-08-06478	Japanese homestead	Post-Contact	Robins et al. 2007
50-80-08-06479	Platform complex	Both	Robins et al. 2007
50-80-08-06480	Cistern	Post-Contact	Robins et al. 2007
50-80-08-06481	Agricultural/ceremonial complex	Both	Robins et al. 2007
50-80-08-06482	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06483	Clearing mounds	Post-Contact	Robins et al. 2007
50-80-08-06484	Agricultural complex	Both	Robins et al. 2007
50-80-08-06485	Possible burial complex	Pre-Contact	Robins et al. 2007
50-80-08-06486	Agricultural/habitation complex	Both	Robins et al. 2007
50-80-08-06487	Enclosure	Pre-Contact	Robins et al. 2007
50-80-08-06488	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06489	Wall	Post-Contact	Robins et al. 2007
50-80-08-06490	Wall segment	Post-Contact	Robins et al. 2007
50-80-08-06491	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06492	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06493	Mound	Unknown	Robins et al. 2007
50-80-08-06494	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06495	Historic building foundation	Post-Contact	Robins et al. 2007
50-80-08-06496	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06497	Agricultural/ceremonial complex	Both	Robins et al. 2007
50-80-08-06498	Terrace	Pre-Contact	Robins et al. 2007
50-80-08-06651	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-08-06652	Agricultural complex	Pre-Contact	Robins et al. 2007
50-80-02-06653	Habitation/agricultural complex	Pre-Contact	Robins et al. 2007
50-80-06-06892	Historic bridge	Post-Contact	Groza et al. 2007
50-80-06-06893	Historic bridge	Post-Contact	Groza et al. 2007
50-80-06-06894	Plantation agricultural complex	Post-Contact	Groza et al. 2007

SIHP #	Site Type	Site Age	Source
50-80-08-07125	Petroglyph	Post-Contact	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-07126	Mound	Unknown	Pammer et al. 2010, Monahan and Thurman 2013
50-80-08-07323	Mound and wall	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07324 A	Wall	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07324 B	Wall	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07325	Terraces and mound	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07326	Wall	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07327	Terrace	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07328	Cobble pavement	Both	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07329	Enclosure	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07330	Wall and modified outcrops	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07331	Enclosure	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07332	Wall	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07333	Terrace	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07334	Historic road	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07335	Historic road	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07336	Mound complex	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07337	Petroglyphs	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07338 A	Culvert	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013

SIHP #	Site Type	Site Age	Source
50-80-08-7338 B	Mound	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07339	Agricultural complex	Pre-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07340	Platform	Pre-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07341	Platform	Pre-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07341	Terrace complex	Pre-Contact	Tulchin and Monahan 2012
50-80-08-07342	Terrace/trail	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07343	Terrace	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07344	Modified outcrops	Pre-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07345	Mound	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07346 A	Irrigation ditch	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07346 B	Irrigation siphon	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07347	Wall	Post-Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07348 A	Mound	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07348 B	Mound	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07349	Wall	Post- Contact	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07350	Alignment	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07351	Rock shelter	Unknown	Tulchin and Monahan 2012, Monahan and Thurman 2013
50-80-08-07437	Possible small rock shelter	Unknown	Monahan and Thurman 2013
50-80-08-07438	Possible rock shelter	Unknown	Monahan and Thurman 2013
50-80-08-07439	Lithic scatter and core tools (basalt)	Pre-Contact	Monahan and Thurman 2013
50-80-08-07440	Bulldozed dirt road	Post-Contact	Monahan and Thurman 2013
50-80-08-07441	Dry-stacked boulder culvert	Post-Contact	Monahan and Thurman 2013

SIHP #	Site Type	Site Age	Source
50-80-08-07442	Concrete flume section	Post-Contact	Monahan and Thurman 2013
50-80-08-07443	Irrigation complex	Post-Contact	Monahan and Thurman 2013
50-80-08-07444	Concrete and mortared rock sluice gate complex	Post-Contact	Monahan and Thurman 2013
50-80-08-07445	Concrete flume section	Post-Contact	Monahan and Thurman 2013
50-80-08-07446	Mortared rock sluice gate	Post-Contact	Monahan and Thurman 2013
50-80-08-07447	Platform <i>heiau</i> and associated features	Pre-Contact	Monahan and Thurman 2013
50-80-08-07448	Dirt road	Post-Contact	Monahan and Thurman 2013
50-80-08-07449	Modified outcrops	Both ?	Monahan and Thurman 2013
50-80-08-07450	Concrete flume section	Post-Contact	Monahan and Thurman 2013
50-80-08-07451	Bulldozed dirt road	Post-Contact	Monahan and Thurman 2013
50-80-08-07452	Concrete flume section	Post-Contact	Monahan and Thurman 2013
50-80-08-07453	Ditch with natural spring and associated features	Post-Contact	Monahan and Thurman 2013
50-80-08-07454	Modified outcrops, terraces, alignments	Both ?	Monahan and Thurman 2013
50-80-08-07455	Massive clearing pile	Post-Contact	Monahan and Thurman 2013
50-80-08-07456	Terrace	Unknown	Monahan and Thurman 2013
50-80-08-07457	Modified outcrops	Both ?	Monahan and Thurman 2013
50-80-08-07458	Wall remnant	Post-Contact	Monahan and Thurman 2013
50-80-08-07459	Modified outcrop/ mound	Both ?	Monahan and Thurman 2013
No SIHP (CSH 3)	Possible grinding stone	Unknown	Tulchin et al. 2007
No SIHP (CSH 4)	Historic plane wreckage	Post- Contact	Tulchin et al. 2007
No SIHP (CSH 7)	Terrace	Unknown	Tulchin et al. 2007
No SIHP (CSH 8)	Agricultural complex	Unknown	Tulchin et al. 2007

In 1899, the Hawaiian language Newspaper *Ka Loea Kālai ʻāina* relates a story of Puʻu Kuʻua as “a place where chiefs lived in ancient times” and a “battle field,” “thickly populated.” The article summarizes,

- 1) This place was entirely deserted and left uninhabited and it seems that this happened before the coming of righteousness to Hawaiʻi Nei. Not an inhabitant is left.
- 2) The descendants of the people of this place were so mixed that they were all of one class. Here the gods became tired and returned to Kahiki. [Sterling and Summers 1978:33]

McAllister recorded three sites in this area, two *heiau* (Site 134 [Puʻu Kuina] and Site 137 [Puʻukuʻua]; both destroyed) and a series of enclosures in Kukuilua which he calls “*kuleana* sites” (McAllister 1933). Cordy states that on the opposite side of the Waiʻanae Range along the trail to Pōhākea Pass “Kākuhihewa \$ as said to have built (or rebuilt) Nīoiʻula, also *ʻokanaka heiau* (1,300 sq. m!) in Hālonā in upper *ʻāualua*, along the trail to Pōhākea Pass leading to *ʻŌkēwa, ka kahi* k 1640-1660” (Cordy 2002:36). To the authors’ knowledge, there is no direct archaeological evidence available that intensive Hawaiian settlement occurred along the Pōhākea Pass trail but it is considered as a place of higher probability for traditional Hawaiian sites, based on the above indications. John Papa (1959) described a journey that Liholiho took which led him and an entourage through inland Honouliuli and over Pōhākea Pass. Geographically, the area receives sufficient quantities of water and would have had abundant locally available forest resources.

3.3.1 McAllister’s Sites

In his surface survey of 1930, archaeologist J. Gilbert McAllister recorded the specific locations of important sites, and the general locations of less important sites (at least at Honouliuli). Archaeological investigations by McAllister along the slopes of the Waiʻanae Range identified a number of sites west and southwest of the current project area (see Figure 21). Although the sites are well outside the bounds of the project area, they are described here for the purposes of supplementing the archaeological context for Kunia Village.

McAllister’s Site 133 is the nearest of his sites to the current project area. Site 133 is described as a small enclosure reported to be a *heiau*. The site is within Huliwai Gulch, below Puʻu Kānehōa, southwest of the current project area. McAllister records the following:

My informant, Reiney, recalls the respect the old Hawaiians had for the place when he was punching cattle with them in his youth. It is a walled inclosure 25 by 30 feet. On the inside the walls are between 2 and 3 feet high, and on the outside they range from 2 to 5 feet, depending upon the slope of the land. On three sides the walls are 2 feet wide, but the fourth is 3 feet wide. The walls are evenly faced with a fill of smaller stones. At present the site is surrounded with a heavy growth of Lantana; but only a thick growth of grass and two small guava bushes are in the interior, which is most unusual unless human hands keep the interior clear. Possibly this is not a *heiau* but a small inclosure considered sacred for some reason. [McAllister 1933:107]

McAllister’s Site 134 is in Kaʻaikukui Gulch, below Mauna Kapu, roughly 5 km south of the of the current project area. The site is described as Puʻu Kuina Heiau, which was apparently

destroyed prior to McAllister's visit to the site. McAllister explains that "the suggestion of a terrace is about all that remains, and no idea of the size of the heiau or the number of terraces can be obtained" (McAllister 1933:107).

McAllister's Site 135 is described as a series of enclosures in the Kukuilua area near Site 134. The site was described as leveled areas with low enclosing walls, with the largest measuring 100 by 85 feet, and suggested the features were "probably *kuleana* sites" (McAllister 1933:107).

McAllister's Site 136 is near Mauna Kapu, approximately 6 km southwest of the current project area. The site is described as a small platform on the ridge dividing the 'Ewa and Wai'anae districts. The 4 to 6 square foot platform was constructed of coral and basalt stones, was believed to be an altar, and was considered to be sacred by Hawaiians (McAllister 1933:107). It had been destroyed by the time of Sterling and Summers' work in the late 1950s (Sterling and Summers 1978:32).

McAllister's Site 137 is at Pu'u Ku'ua, a prominent landmark approximately 6 km south of the current project area. Pu'u Ku'ua Heiau is described by McAllister as follows:

The heiau was located on the ridge overlooking Nanakuli, as well as Honouliuli, at the approximate height of 1800 feet. Most of the stones of the heiau were used for a cattle pen located on the sea side of the site. That portion of the heiau which has not been cleared for pineapples has been planted in ironwoods. [McAllister 1933:108]

3.3.2 Previous Archaeological Research in Upland Honouliuli

3.3.2.1 Pōhā?ʻa Passland?ʻa ʻĒkaha Nui Gulch (Sinoto and Sterling 1960)

Sterling and Summers (1978:37) provide an account that in 1960, Sinoto and Sterling visited traditional Hawaiian agricultural and habitation sites in the 'Ēkaha Nui Gulch area, approximately 2 km southwest of the project area. It was noted that at approximately the 1,200 ft elevation, the remains of agricultural terraces and house sites were present along the sides of the stream. Additional features included pavings, platforms, and a burial platform. Also described was a platform measuring 9 by 15 ft, interpreted to be a possible *heiau* (Sinoto and Sterling 1960 in Sterling and Summers 1978:37).

3.3.2.2 Kūwakaʻi Survey of the Hōʻaeʻae Ahupuaʻa (Kennedy 1987)

A brief archaeological survey was conducted to cross-examine information found on three documents relating to the Hōʻaeʻae Ahupuaʻa in the 'Ewa district. The documents, the W.H. Pease map (1850), the Alexander map of Honouliuli (1873), and the Pearl Lochs map (1897), showed symbols indicating cultivation and some human activity (Kennedy 1987). The survey coincided with the cultivation of a sugar cane field which overlay the project area, thus there was no ground vegetation to inhibit the archaeological survey.

The results of the survey were that no above ground archaeological features were observed and the area was determined to offer little to no chance of any subsurface recovery.

3.3.2.3 Kunia Landfill Project (Perzinski et al. 2003; Tulchin and Hammatt 2009)

In October 2002, CSH was contracted by DRS Corporation to provide an archaeological inventory survey of approximately 250 acres for a proposed landfill project in Kunia, at Honouliuli

(TMK: [1] 9-2-004). The project was located in western O'ahu on the southeastern flank of the Wai'anae Range. The archaeological inventory survey included a complete surface survey, site identification, mapping, and limited subsurface testing of select archaeological sites.

The project area was situated on the eastern side of the Wai'anae Mountains in the Palikea Deeply Dissected Uplands and extended up to the Honouliuli Forest Reserve boundary just downslope of Pohakea Pass. (Perzinski et al. 2003)

Six archaeological sites (SIHP #s 50-80-12-6456 through -6461) were discovered in this area as a result of the survey, all of varied archaeological significance. Of the six, two were recommended to undergo a process for data recovery (SIHP #s -6458 and -6461). SIHP # -6458 consisted of filled crevices, and SIHP # -6461 consisted of a series of historic roads and bunkers.

Only one site was recommended for preservation, a possible *heiau* (SIHP # -6457) located in the central gulch directly downslope from Pohakea Pass (Perzinski et al. 2003). The site consisted of an enclosure with a three-tiered retaining terrace and ramp leading into the interior of the enclosure. The walls of the structure were documented to have been up to 2 m in thickness and were well built with chinking, facing, and core filling.

At the request of the James Campbell Company, CSH conducted GPS relocation of three previously identified archaeological sites (SIHP #s 50-80-12-6457, -6458, and -6461) located within Honouliuli Ahupua'a, TMK: [1] 9-2-004:005 por. (reported in Tulchin and Hammatt 2009.)

In 2003, CSH was hired by URS Corporation to prepare an archaeological inventory survey of an approximately 250-acre parcel for the proposed Kunia Landfill project (this Perzinski et al. 2003 AIS was never completed as the project died). The study identified six sites. Three of the sites were recommended for "no further work." CSH recommended preservation for SIHP # 50-80-12-6457, a *heiau*. Data recovery was recommended for SIHP #s -6458, indeterminate filled crevices, and -6461, historic military roads and storage bays. The purpose of the (Tulchin and Hammatt 2009) archaeological site relocation was to accurately locate specific areas of archaeological concern within the former study area.

During the site relocation, some ten additional features associated with SIHP # -6461 were identified. No new archaeological sites or historical properties were discovered.

3.3.2.4 Schofield Barracks (Roberts et al. 2004)

An archaeological reconnaissance survey was conducted on an approximately 1,400-acre area for proposed expansion of the Schofield Barracks South Range (Roberts et al. 2004). The study area included the lower slopes of the Wai'anae Range, approximately 2 km north of the northern boundary of the current project area. The reconnaissance survey identified 43 sites comprised of 129 features. Twenty-nine sites were interpreted to have pre-Contact components. Traditional Hawaiian feature types included walls, alignments, terraces, irrigation ditches, platforms, mounds, enclosures, and possible burial mounds. Historic sites, related to military and plantation activities, included building foundations, historic roads, cisterns, a reservoir complex, and a plantation camp. It was noted that all sites were within gulches, and "It is likely that historic and modern land alterations have contributed to increases in slope erosion, accelerated siltation and downcutting of stream channels that have affected site formation processes and integrity within the valleys" (Roberts et al. 2004:85).

At the request of the U.S. Army Corps of Engineers, Garcia and Associates conducted an archaeological survey to document and evaluate 45 previously identified sites (Robins et al. 2007) within the 1,400-acre South Range Land Acquisition (SRLA) project area. The project area is located in the northern portion of Honouliuli Ahupua'a, bounded by Schofield Barracks west of Kunia Road. The survey skirts the lower elevations of the eastern flank of the Wai'anae Range and extends into the former Kunia pineapple fields.

Twenty-eight of the project sites were evaluated as having been traditional Hawaiian in origin. Twenty-six of these were designated as agricultural features. The sites showed signs of habitation, ceremonial, and possible burial components (Robins et al. 2007).

It was also noted that pineapple plantation activities had deeply scarred the landscape in these areas, likely disturbing other archaeological sites.

3.3.2.5 Hawaii Regional Security Operations Center (HRSOC) and Access Road (West and Donaldson 2004)

Department of the Navy, Naval Facilities Engineering Command, Pacific (NAVFAC PACIFIC) conducted an archaeological survey of a project area located at Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC) and vicinity, Wahiawa (TMK: [1] 7-1-002:007). The survey was conducted in preparation for the construction of a proposed Hawaii Regional Security Operations Center (HRSOC) and a new access road.

The archaeological investigations included both surface surveys and test pit excavations. Test units at two of the proposed construction sites confirmed the project area had been previously graded and most of the area was likely disturbed. Modern refuse and old abandoned cars were also found in select trenches (West and Donaldson 2004).

No traditional Hawaiian archaeological resources were located during the course of this fieldwork. The survey found that much of the area had been and/or continues to be disturbed by agricultural or landscaping activities.

3.3.2.6 Ho'opili Project, Mauka Detention Basin (Groza et al. 2007)

In 2006, at the request of PBR Hawai'i, Inc. CSH completed an archeological inventory survey for the Ho'opili project, Mauka Detention Basin, Honouliuli Ahupua'a, TMK: [1] 9-2-001:001 (Groza et al. 2007). The proposed project area is west of Kunia Road and was generally bound on the north and west by the Waiahole Ditch, and on the south by Kupehau Road (an unpaved road).

During the project, the entire 143-acre Mauka Detention Basin was surveyed on foot. The pedestrian survey revealed three historic properties, one of which consisted of 31 features. All three sites were associated with water control, the Waiahole Ditch, and the Oahu Sugar Company. Two concrete slab bridges (SIHP #s 50-80-06-6892 and -6893) with four to six courses of dressed, faced, rectangular stone were identified. One of the bridges, SIHP # -6892, was inscribed with the date 9.27.1929; the other bridge, SIHP # -6893, was similar in appearance. SIHP # -6894 (plantation infrastructure) is associated with the Waiahole Ditch and consisted of scattered plantation infrastructure features. No artifacts were found in the vicinity of the recorded sites and the only artifacts found within the project area consisted of modern trash.

3.3.2.7 Honouliuli Forest Reserve (Tulchin et al. 2007)

An archaeological literature review and limited field inspection was conducted for the entire 4,600-acre Honouliuli Forest Reserve to develop data on the nature, density, and distribution of archaeological resources and to make cultural resource management recommendations (Tulchin et al. 2007). The Honouliuli Forest Reserve lies roughly 2 km west of the current project area. Based on the settlement pattern developed from background research, the eastern slope of the Wai'anae Range was determined to be rich forest land utilized for seasonal dryland planting and foraging for wood, birds, feathers, etc. In addition, because of the suitable topography (i.e., broad and gently sloping ridges) and geographic location at the tip of the Wai'anae Range, the ridge areas along the southern slope provide excellent views of the surrounding area. Along with available spring water, the southern slope would have been an attractive area for upland settlement.

Brief pedestrian inspections were conducted at Kalua'a Gulch and 'Ēkaha Nui Gulch. These areas were selected based on previous archaeological research and historical documentation indicating they were likely to contain archaeological sites. Archaeological sites observed within Kalua'a Gulch were stone mounds and platforms likely of pre-Contact origin with agriculture and burial being possible functions. Historic plane wreckage was also observed. Archaeological sites observed within 'Ēkaha Nui Gulch were agricultural mounds and terraces of both pre-Contact and historic origin. A stacked stone wall, possibly a traditional boundary marker, was also observed.

3.3.2.8 Kunia Mauka Loa Ridge Farmlands Project (Pammer et al. 2010; Tulchin and Monahan 2012; Monahan and Thurman 2013)

An archaeological inventory survey was conducted on an approximately 294-acre parcel for a proposed agricultural subdivision (Pammer et al. 2010). The study area included the ridges and gulches from 800-1,200' elevation in the Qcinitwof = ōhākea Pass, approximately 3 km southwest of the project area. Eight historic properties were identified: SIHP #s 50-80-12-6456, terrace, mound, and trail; -6457, enclosure and associated terraces; -6458, cobble-filled crevices; -6459, U-shaped structure and alignment; -6460, leveled cobbles; -6461 historic road improvements; -7125, petroglyph; and -7126, mound.

Functional types included temporary habitation, agriculture, and transportation. In addition, SIHP # -6457 was interpreted to be a heiau. Radiocarbon dating from samples recovered from the site yielded date ranges of AD 1290-1420 and AD 1510-1810. It was also noted that, with the exception of SIHP #s -6459, -7125, and -7126, all sites were within the gulches in the upslope portion of the study area (Pammer et al. 2010).

In 2012, at the request of C&C Farmlands, LLC, CSH conducted an archaeological reconnaissance survey for the Kunia Mauka Loa Ridge Farmlands project (Tulchin and Monahan 2012). The project area was on the eastern side of the Wai'anae Mountain Range and abutted the eastern edge of the Honouliuli Forest Reserve. Kunia Road ran roughly parallel to the project area's eastern boundary.

Most of the identified archaeological sites were in the northern portion of the project area within and between 'Ēkaha Nui and Huliwai gulches. The relative absence of sites south of 'Ēkaha Nui Gulch was attributed to pineapple cultivation which involved extensive grading of ridge tops.

A majority of the historic properties identified within 'Ēkaha Nui Gulch were of historic ranching origin. Archaeological sites associated with traditional Hawaiian land use included SIHP #s 50-80-08-7328, -7339, -7340, -7341 and -7344.

TCP Hawaii, LLC (Monahan and Thurman 2013) completed an archaeological inventory survey of the entire 854-acre C&C Farmlands LLC project lands. This study identified new and additional features at many of the previously identified sites and identified another 23 new historic properties for a grand total of 60 historic properties in the C&C Farmlands LLC project lands.

While

... many of the 23 new sites are less than spectacular plantation infrastructure, dirt roads and remnant features of relatively little value. However, several new finds of major significance were made:

1. First, the Kāne heiau (Site 7447) on a prominent ridge in the south-central portion of the project area has produced a lot of interest and excitement from the consulting parties,
2. Second, Site 7457, a nearly two-acre area of relatively undisturbed landscape near the west (mauka) boundary of the project area (Lot 1), appears to contain numerous burials in modified outcrops.
3. Third, archaeological work with lithics, bones and tools in 'Ēkaha Nui Gulch firmly establishes a pre-Contact presence in this important landscape feature.
4. Fourth, at the top of this gulch, closer inspection of the large agricultural complex, Site 7326, yielded a traditional petroglyph, firmly establishing the antiquity of this site as well.
5. Fifth, a rockshelter (Site 7438) just south of 'Ēkaha Nui Gulch likely contains important subsurface evidence of human occupation of the upper project area.
6. Sixth, the discovery of human skeletal remains at Site 7331—which does not resemble a burial site, and likely was not constructed for the purpose of burial—helped focus attention on the possibility that other features require a closer consideration of their potential for representing burials as well. Based on this find, a more careful and cautious appraisal of all sites in the project area has led to an expansion of the list of possible burials.
7. Finally, on this list of exciting new finds, the agricultural complex at the bottom of a unique little drainage in Lot 7 (Site 7449) illustrates a very subtle and sustainable traditional use of the land. [Monahan and Thurman 2013:383]

3.4 Architectural Documentation

Mason Architects was hired by the owners of Kunia Village in August 2011 at the request of SHPD to do two tasks: first, to conduct an historic inventory survey, and secondly to have the rehabilitation cost of the houses studied by a preservation professional. Mason Architects conducted that survey and did that evaluation.

In summary, it was found that most of the houses did retain sufficient integrity to qualify as contributing features to a historic district. Exceptions to that finding were those homes that had received major additions to the front of the homes, generally obscuring their original design. These homes were primarily in the Old Camp area (upper north area of site). The structural survey done by Mason Architects provided support for the fact that many of the homes could be adequately rehabilitated.

This architectural survey and evaluation formed the basis for the National Register of Historic Places nomination form prepared by Mason Architects. Kunia Village was listed on the National Register of Historic Places in Hawaii on 1 December 2014 by the National Park Service. The Historic Preservation Tax Credit application was also based on the above information and the application was accepted by the National Park Service on 11 July 2014.

3.5 Background Summary and Predictive Model

In general, the distribution of traditional Hawaiian archaeological sites near the project area is likely concentrated at the base on the eastern side of the Wai'anāe Mountain Range, where suitable arable land and adequate rainfall could support seasonal dryland agriculture. It is likely the intensity of traditional agricultural development, and therefore density of archaeological features, increases with higher precipitation rates in the northernmost portions of the Wai'anāe Mountain Range. Research into previous archaeological studies revealed that many sites in this region contain agricultural features with associated habitation as well as religious/ceremonial features.

Additionally, historic ranching and military archaeological sites may be present throughout the gulches to the west of the project area, as both feature types were previously identified during former inventory surveys (Pammer et al. 2010). However, the likelihood of similar features and archaeological evidence being found near the Kunia Camp itself are very slim. Of note is the likely absence of historic agricultural features near or within the project area, as the primary cultivated crop of the region was pineapple, which typically did not require intensive agricultural infrastructure (i.e., ditches, flumes, siphons). However, it should be noted that pineapple cultivation does require extensive grading of ridge tops, which would have removed any surface or subsurface archaeological sites that may have been present.

Section 4 Results of Fieldwork

The fieldwork component of this archaeological inventory survey was conducted on 27 and 28 October 2014. CSH archaeological field personnel consisted of Scott Belluomini, B.A., Layne Krause, B.A., Richard Stark, Ph.D., and Trevor Yucha, B.S. All fieldwork was conducted under the direction of the principal investigator Hallett H. Hammatt, Ph.D.

Surface architectural features of Kunia Camp (SIHP # 50-80-08-7729) were observed throughout the project area. These features are thoroughly documented in the Kunia Camp National Register Nomination form (see Appendix A). As there were no surface archaeological historic properties identified, the archaeological inventory survey focused on a program of subsurface testing to locate any potential buried cultural deposits and to facilitate a thorough examination of stratigraphy within the project area.

4.1 Pedestrian survey results

A 100%-coverage pedestrian survey of the project area was undertaken for the purpose of archaeological historic property identification and documentation. CSH archaeologists surveyed the Kunia Camp with transects spaced approximately 5.0 m apart. No subsurface archaeological historic properties were identified in the project area. Accordingly, fieldwork focused on a program of subsurface testing.

4.2 Subsurface Testing Results

Five backhoe (T-1 through T-5) were trenches excavated in locations of proposed detention basins and new utility lines (Figure 22). Each test trench measured 1.8 m long by 0.6 m wide, and reached a depth of 2 m below surface. In T-5, active utility lines prohibited the complete excavation of the trench. In addition, T-5 could not be shifted due to the several utility lines within the fire lane proximate to the original test location. All unexcavated areas beneath utility lines or utility jackets are accurately represented in the trench profiles.

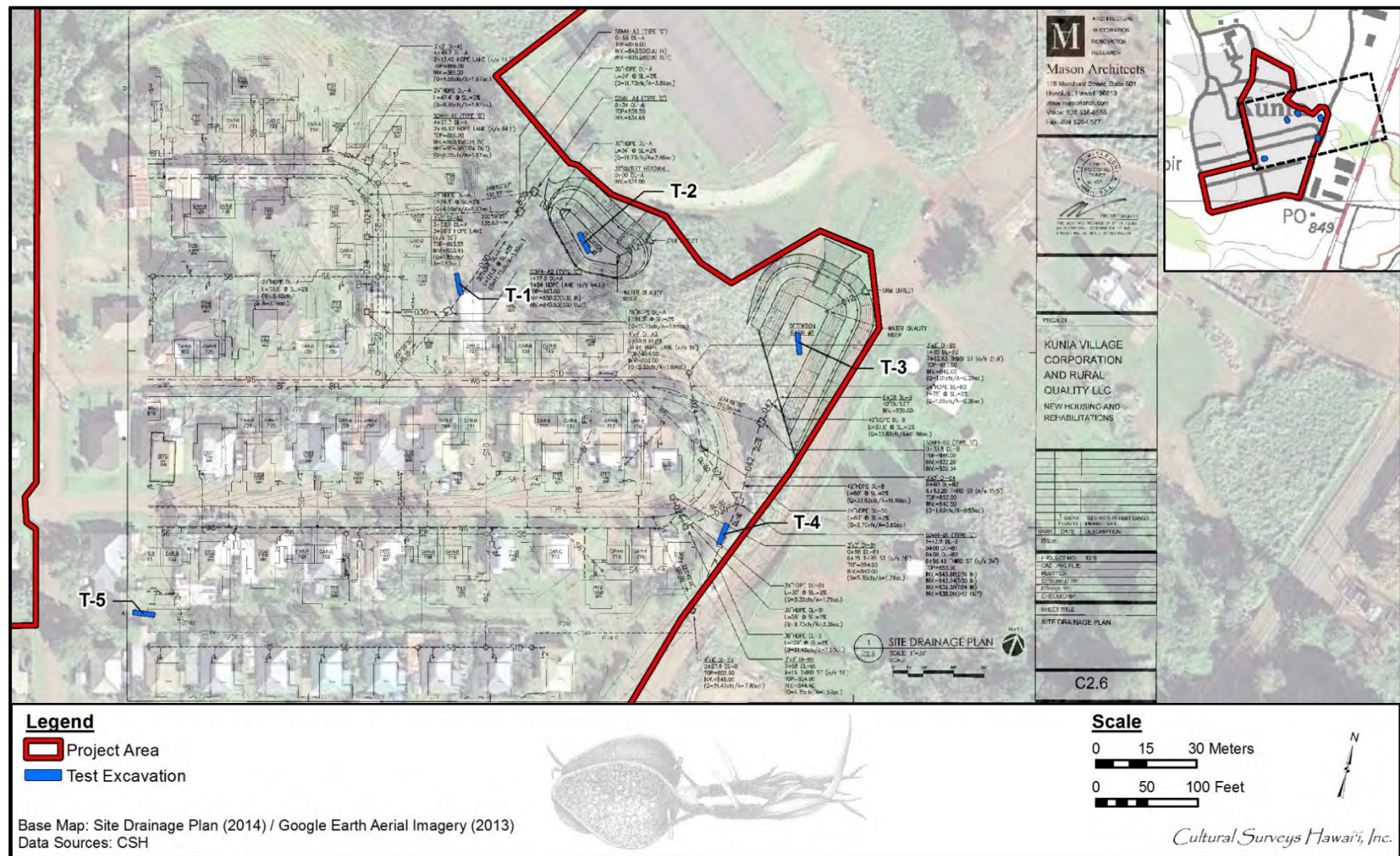


Figure 22. 2013 aerial photograph (2013) with an overlay of the site drainage plan showing the locations of T-1 through T-5

4.2.1 Test Excavation 1 (T-1)

T-1 is located in the central portion of the project area north of Luawai Street. The test excavation is located along a proposed utility line. T-1 measured 6.5 m long by 0.7 m wide and was oriented in a northwest-southeast direction. The base of excavation was determined to be at 2 m below surface. No water table was observed. The stratigraphic profile of T-1 consists of a naturally deposited silty clay loam alluvium (Stratum I), overlying a layer of oxidized silt loam (Stratum II), and decomposing basalt (Stratum III) (Figure 23, Figure 24, and Table 3). No cultural material was observed.



Figure 23. T-1, oblique view, southwest sidewall; view to southeast

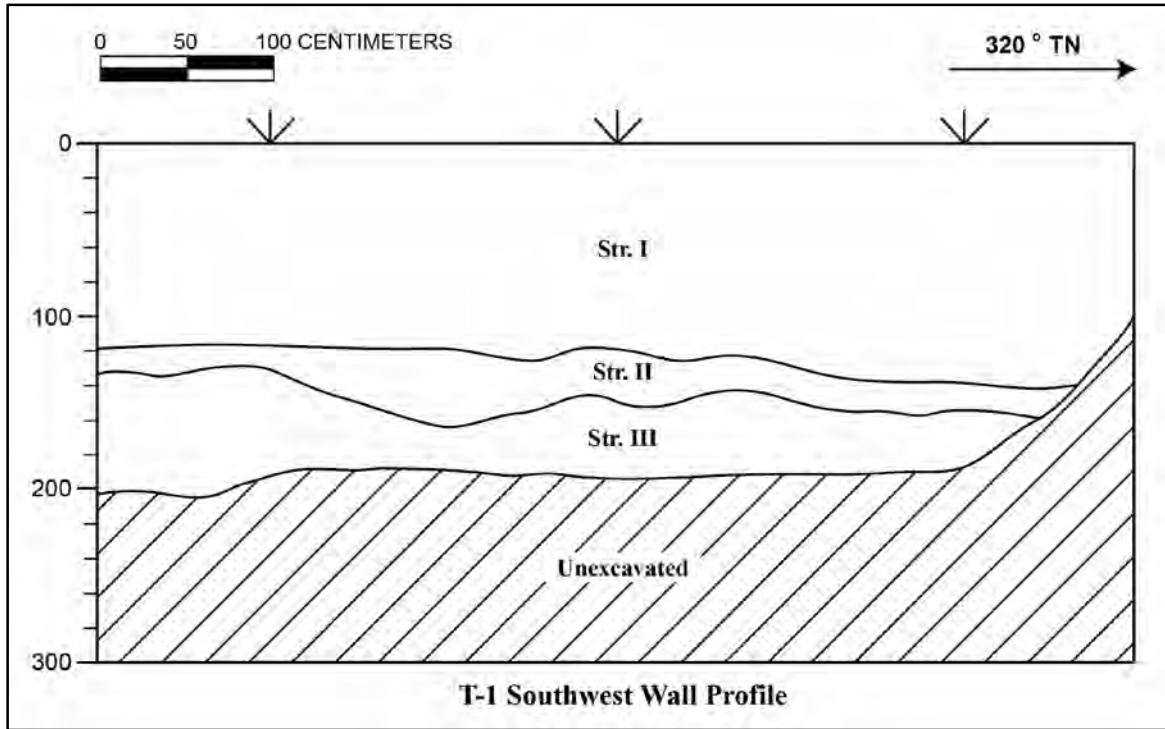


Figure 24. T-1 southwest sidewall profile

Table 3. Stratigraphic Description of T-1

Stratum	Depth (cmbs)	Description of Sediment
I	0–140	Natural; 2.5YR 2.5/4, dark reddish brown; silty clay loam; moderate, medium, granular structure; moist, friable consistence; no cementation; non-plastic; terrigenous origin; clear, wavy lower boundary; naturally deposited silty clay loam alluvium
II	120–160	Natural; 2.5YR 4/6, red; silt loam; weak, very fine, granular structure; moist, friable consistence; no cementation; slightly plastic; terrigenous origin; diffuse, wavy lower boundary; layer of oxidized silt loam
III	150–210 (BOE)	Natural; 2.5YR 3/3, dark reddish brown; silty clay; strong, coarse, blocky structure; moist, extremely firm consistence; strong cementation; plastic; terrigenous origin; lower boundary not visible; naturally deposited decomposing basalt

4.2.2 Test Excavation 2 (T-2)

Test Excavation 2 (T-2) is located in the northeast portion of the project in a gulch, east of the current wastewater treatment center. The test excavation is located within a proposed drainage basin. T-2 measured 5.8 m long by 0.8 m wide and was oriented in a northwest-southeast direction. The base of excavation was determined to be at 2.1 m below surface. No water table was observed. The stratigraphic profile of Test Excavation 2 consists of naturally deposited loamy sand alluvium (Stratum I) overlying two layers of naturally deposited sandy loam alluvium (Strata II and III) (Figure 25, Figure 26, and Table 4). No cultural material was observed.



Figure 25. T-2, oblique view, northeast sidewall; view to north

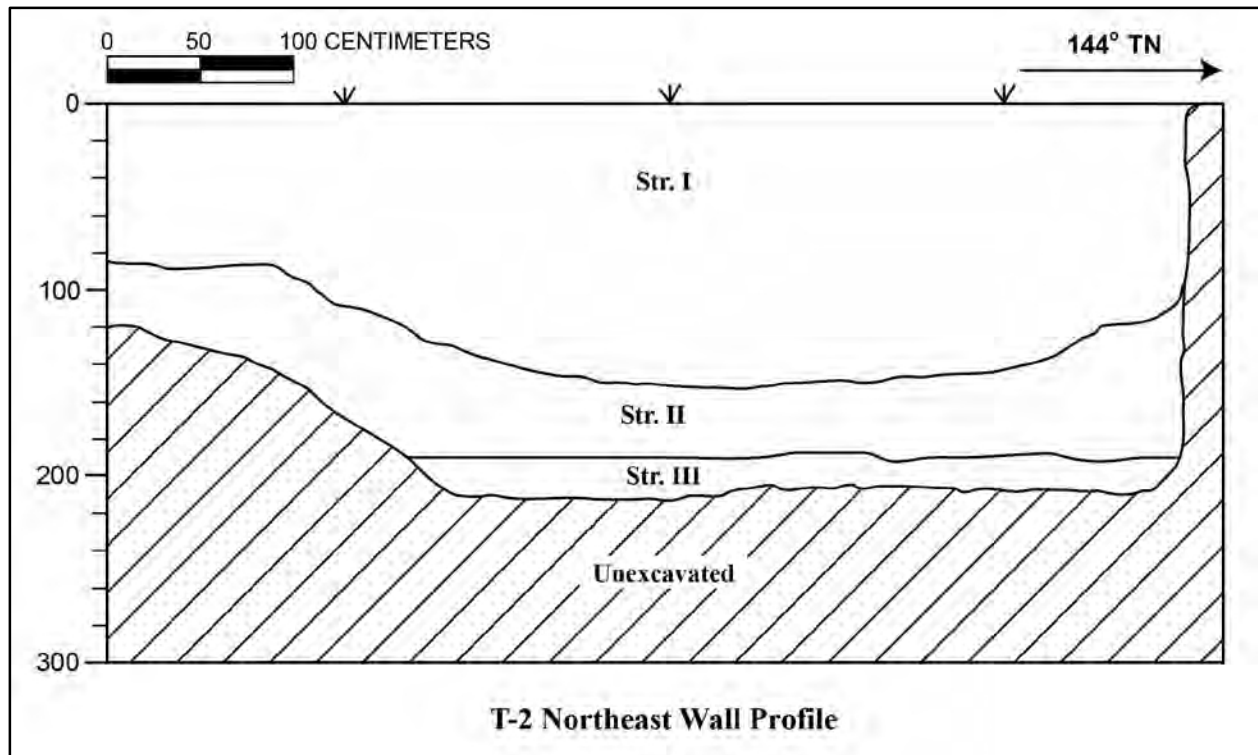


Figure 26. T-2 northeast sidewall profile

Table 4. Stratigraphic Description of T-2

Stratum	Depth (cmbs)	Description of Sediment
I	0–150	Natural; 2.5YR 3/3, dark reddish brown; loamy sand; weak, fine, granular structure; moist, loose consistence; no cementation; non-plastic; terrigenous origin; clear, smooth lower boundary; naturally deposited loamy sand alluvium
II	90–150	Natural; 2.5YR 3/6, dark red; sandy loam; weak, fine, granular structure; moist, loose consistence; no cementation; non-plastic; terrigenous origin; clear, smooth lower boundary; naturally deposited sandy loam alluvium
III	90–210 (BOE)	Natural; 7.5YR 4/6, strong brown; sandy loam; weak, fine, granular structure; moist, loose consistence; no cementation; non-plastic; terrigenous origin; lower boundary not visible; naturally deposited sandy loam alluvium

4.2.3 Test Excavation 3 (T-3)

Test Excavation 3 (T-3) is located in the northeast portion of the project in a gulch, between the current wastewater treatment center and Luawai Street. T-3 measured 6.5 m long by 0.7 m wide and was oriented in a northwest-southeast direction. The test excavation was located within a proposed drainage basin. The base of excavation was determined to be at 2.0 m below surface. No water table was observed. The stratigraphic profile of T-3 consists of naturally deposited loamy sand alluvium (Stratum I) (Figure 27, Figure 28, and Table 5). A metal can (Acc. #1) was observed and collected in Stratum I at a depth of approximately 200 cm. For more detailed information regarding (Acc. #1), refer to Section 5.1.



Figure 27. T-3, oblique view, northeast sidewall; view to north

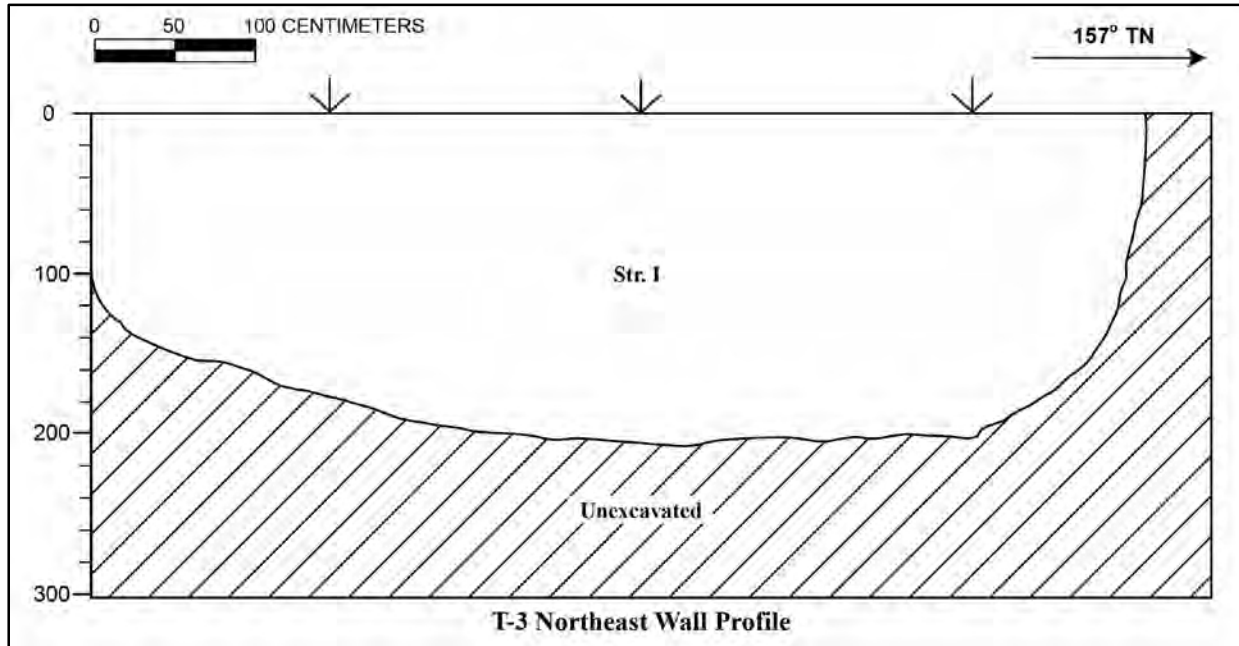


Figure 28. T-3 northeast sidewall profile

Table 5. Stratigraphic Description of T-3

Stratum	Depth (cmbs)	Description of Sediment
I	0–200 (BOE)	A horizon; 2.5YR 3/3, dark reddish brown; loamy sand; weak, fine, granular structure; moist, friable consistence; no cementation; non-plastic; terrigenous origin; lower boundary not visible; naturally deposited loamy sand alluvium; contains metal can (Acc. #1)

4.2.4 Test Excavation 4 (T-4)

Test Excavation 4 (T-4) is located in the northeast portion of the project along Luawai Street. T-4 measured at 6.0 m long by 0.5 m wide and was oriented in a north-south direction. The test excavation was located along a proposed utility line. The base of excavation was determined to be at 1.5 m below surface. No water table was observed. The stratigraphic profile of T-4 consists of naturally deposited silty clay loam alluvium (Stratum I) (Figure 29, Figure 30, and Table 6). No cultural material was observed.



Figure 29. T-4, oblique view, south sidewall; view to southeast

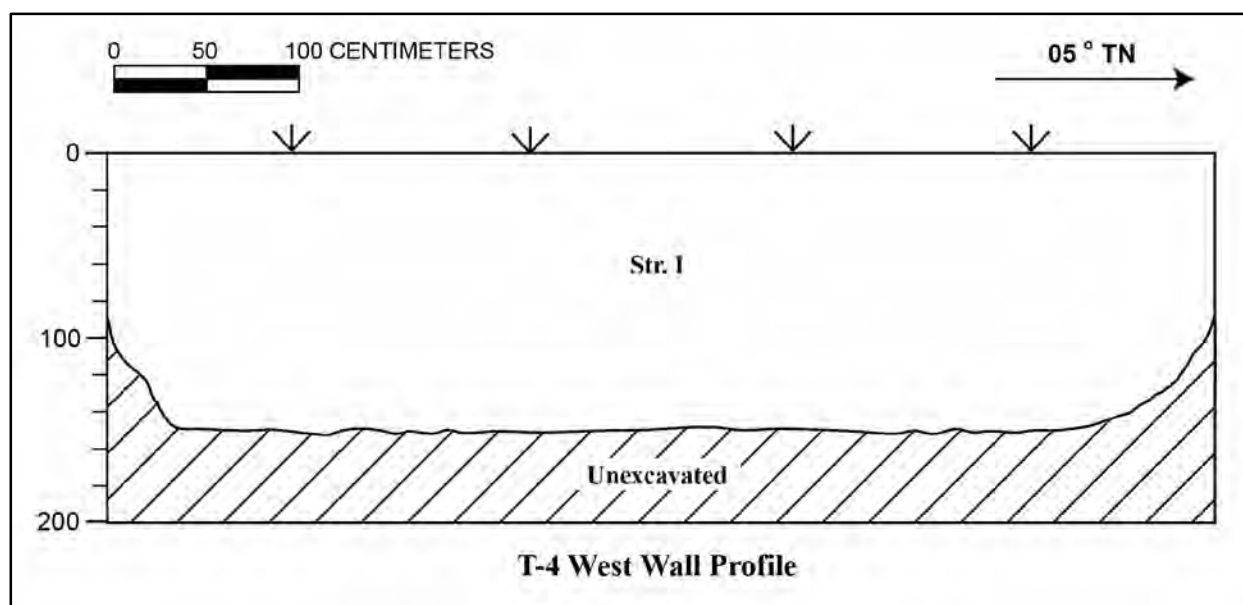


Figure 30. T-4 west wall profile

Table 6. Stratigraphic Description of T-4

Stratum	Depth (cmbs)	Description of Sediment
I	0–130 (BOE)	A horizon; 2.5YR 2.5/3, dark reddish brown; silty clay loam; moderate, medium, granular structure; moist, firm consistence; no cementation; slightly plastic; terrigenous origin; lower boundary not visible

4.2.5 Test Excavation 5 (T-5)

Test Excavation 5 (T-5) is located in the west portion of the project within a fire lane between 2nd Street and 3rd Street. T-5 measured 6.6 m long by 1.2 m wide and was oriented in an east-west direction. The test excavation was located along a proposed utility line. A water utility line was encountered along the entire extent of the original test excavation approximately 63 cm below surface. Thus, T-5 was relocated to the southwest. A large PVC utility pipe was encountered 1 m below surface along the entire extent of the new trench. According to the groundskeeper, several additional utility lines run along the fire lane, prohibiting further relocation of the test excavation to a nearby location (Figure 31 and Figure 32). The base of excavation was 1.0 m below surface. No water table was observed. The stratigraphic profile of T-5 consists only of locally procured silty clay loam fill (Stratum I) associated with the installation of the modern utility pipes (Figure 33, Figure 34, and Table 7). No cultural material was observed.



Figure 31. T-5, overview of utilities; view to east

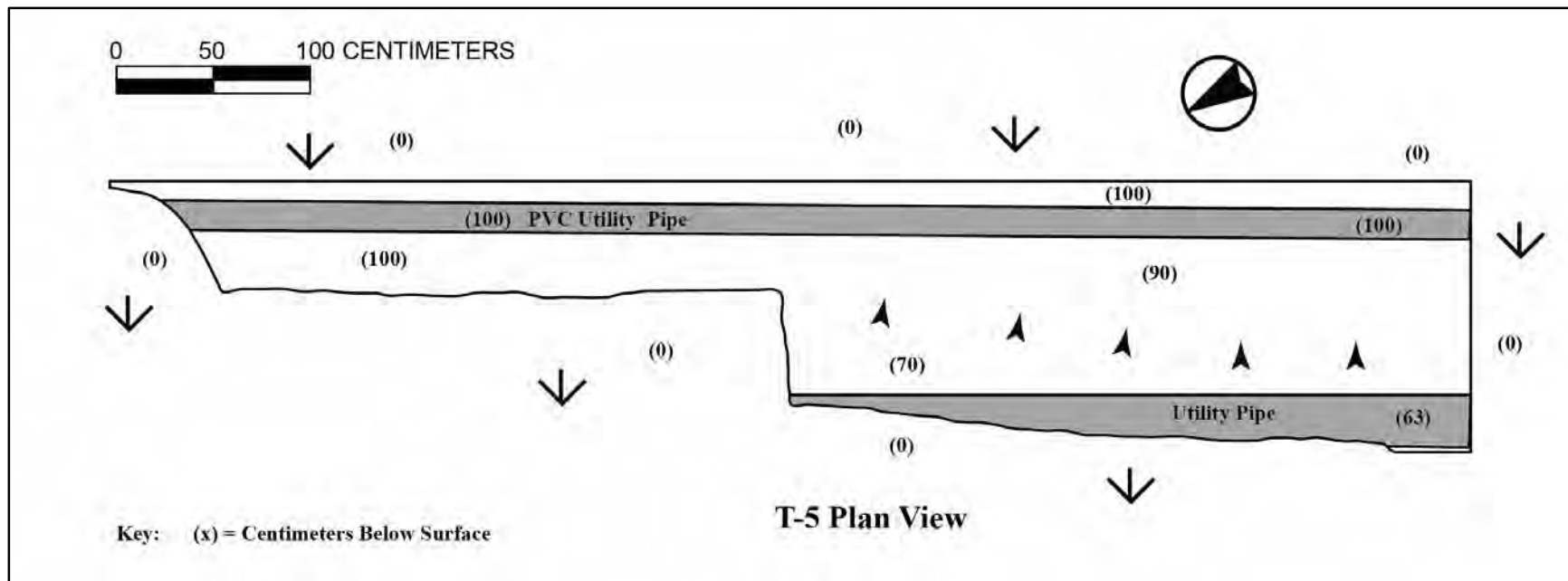


Figure 32. Plan view of T-5 showing utilities running through the extent of the test excavation



Figure 33. T-5, oblique view, south sidewall; view to southwest

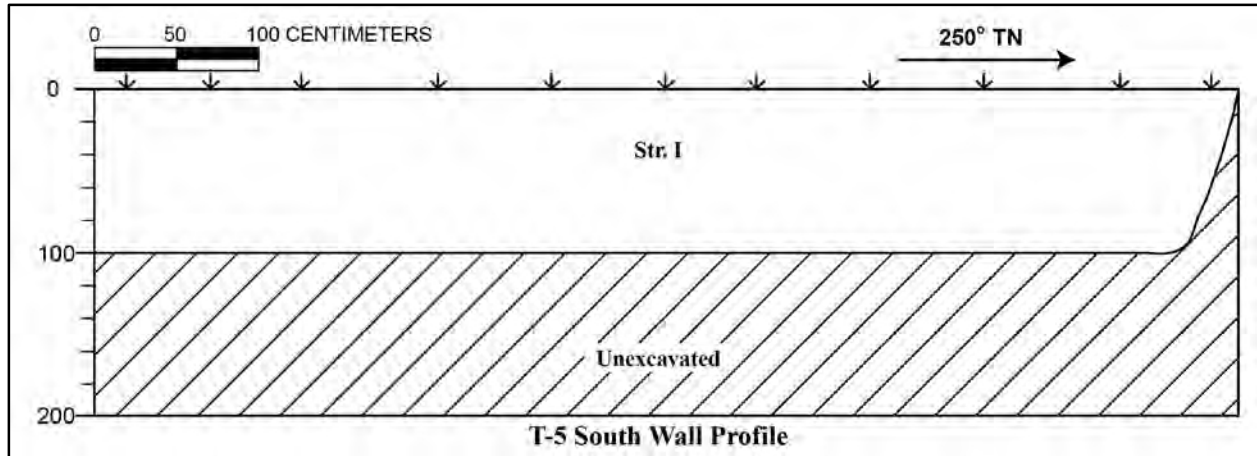


Figure 34. T- 5 south sidewall profile

Table 7. Stratigraphic Description of T-5

Stratum	Depth (cmbs)	Description of Sediment
I	0–100 (BOE)	Locally procured fill; 2.5YR 2.5/3, dark reddish brown; silty clay loam; moderate, medium, granular structure; moist, loose consistence; no cementation; slightly plastic; terrigenous origin; lower boundary not visible; locally procured silty clay loam fill associated with installation of utilities

Section 5 Results of Laboratory Analysis

5.1 Artifact Analysis

A single artifact was collected (Acc. # 1) during the AIS. It was found at the base of T-3 which was excavated at the base of a steep gulch in the northeastern portion of the project area. T-3 was placed to test between the current wastewater treatment center and Luawai Street. The artifact is a metal can (Figure 35, through Figure 37), likely associated with the modern occupation of the Kunia Camp settlement.

The can is approximately 57 mm (2.24 inches) in diameter at its base and 58 mm (2.28 inches) tall. The measurements may not reflect the original dimensions of the can, as it is slightly dented. The can is made of aluminum, which sheds some light on the possible date of manufacture. Aluminum cans were first manufactured in 1957 (IMACS User's Guide 2001).

The can consists of a single walled band of aluminum, now minus its original label. The top of the can is not cut, suggesting the lid was opened by either a key, tab, or similar mechanism. A pressed groove around the opening also reflects this. This is typical of cans containing foodstuffs. There is also a black stamp on the base of the can which reads B4, E8, 1 (Figure 38).



Figure 35. Lateral view of can (Acc. #1) collected from Str. I in T-3 showing glue residue on the can's surface where the label once adhered



Figure 36. Lateral view of can (Acc. #1) collected from Str. I in T-3 showing dent in aluminum wall

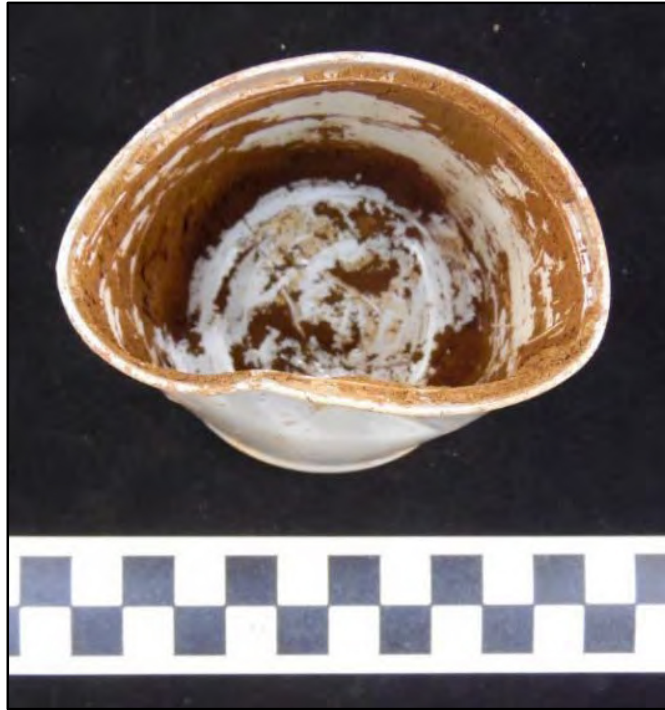


Figure 37. Superior view of can showing a grooved aperture, typical of cans with keys or tabs for opening



Figure 38. Inferior view of can (Acc. #1) showing stamp which reads B4, E8, 1

Section 6 Historic Property Descriptions

6.1 SIHP # 50-80-08-7729

FORMAL TYPE:	Kunia Camp
FUNCTION:	Habitation
NUMBER OF FEATURES:	128
AGE:	Historic to modern (1928-present)
TAX MAP KEY:	TMK: [1] 9-2-005:023 por.
LAND JURISDICTION:	Kunia Village Title Holding Company
PREVIOUS DOCUMENTATION:	N/A

SIHP # -7729 is Kunia Camp, the last pineapple plantation housing community still intact on O'ahu. Kunia Camp is located along Hawai'i Route 750 and is surrounded by former pineapple farmland that is now utilized to grow a variety of crops. The 119-acre property contains 153 structures; however, only approximately 50 acres and 128 structures are considered part of the Kunia Camp Historic District. The present project area of 22.4 acres lies in the southern and eastern portions of the 50-acre Kunia Camp (Figure 39).

The Kunia Camp Historic District's 128 contributing resources include 106 residences (single family homes, duplexes, and a four-plex) in the Old Camp (early historic period) and the New Camp (later historic period) areas; 15 associated residential garages in both camps (two in Old Camp and 13 in New Camp); as well as seven non-residential resources, including Kunia Gymnasium and Kunia Chapel (within Old Camp), and the Agricultural Research Building, the Main Office Building, the Kunia Store, a flagpole, and an open-sided, flat-roofed structure on a concrete slab that may have served as a Refueling Station (New Camp).

The boundary of the Kunia Camp Historic District is based on the boundaries of the camp's historic period and does not conform to present day property lines. The boundaries are based on contributing resources within the camp that support Criteria A and C of the NRHP as a historic district with a residential community/camp theme. The residences and community buildings within the camp are united by their physical development as a village for plantation workers provided by the California Packing Company for its employees. The relationship of the homes and associated buildings, the scale and materials of the buildings, and layout of the houses provides an intact, accurate example of a pineapple plantation camp.

Other buildings on the Kunia Village Title Holding Company property were evaluated and are not included in the historic district. The group of industrial buildings along Kunia Road at the east side of the property was an integral part of the functioning plantation. These include a Well, Shop/Storeroom, Storage, Warehouse, Juice, Fresh Fruit Packing, and Waste Water Treatment Buildings. However, these buildings have been altered, and a few recently demolished, rendering this area insufficient integrity for inclusion in the District. The school and its associated administration building are not part of the district because they are not on Kunia Village Title

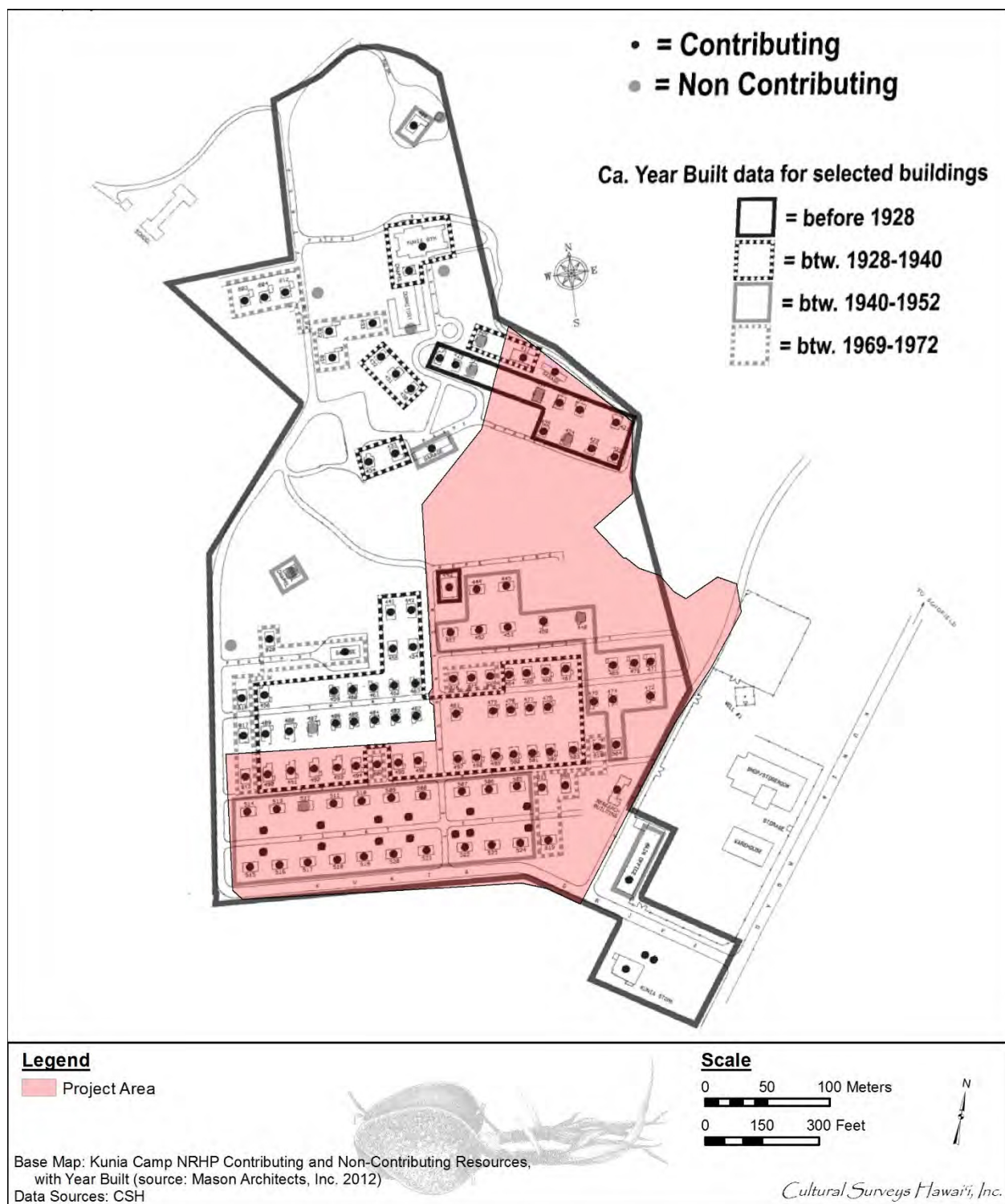


Figure 39. Map of SIHP # -7729 is Kunia Camp showing contributing and non-contributing elements in relationship to the present project area (shown in red)

Holding Company property. These buildings retain integrity and could be added to the District in the future.

The vast majority of the buildings within the proposed Historic District are residences. The 113 residences (106 contributing residences) have the distinctive characteristics of the Hawaiian Plantation Style of architecture, which includes walls a single board thick, (either board-and-batten, or tongue-and-groove with horizontal girts), and roofs, often hipped, with wide, overhanging eaves. These residences, community buildings/structures, and industrial/agricultural buildings were set against a backdrop of pineapple fields and provided housing and other amenities for pineapple field workers (the majority of the time for the California Packing Company [CPC]) from the years 1928 until 2007.

Seven non-residential resources contribute to the District. They are the Kunia Gymnasium, Kunia Chapel, Kunia Store, a flagpole, an open-sided, flat-roofed structure on a concrete slab (that possibly served as a refueling station), the Agricultural Research Building, and the Main Office Building. Two of these fall under the category of community/amenity buildings/resources (gymnasium and the chapel); two are Industrial/Agricultural (the agricultural and main office buildings); one is both a community/amenity and an Industrial/Agricultural type of building (Kunia Store); and two of the non-residential resources fall outside of these areas (the flagpole and the possible refueling station).

The camp was initially constructed in 1928 to house the workforce for the California Packing Company, later known as Del Monte, which operated within Kunia from 1916 to 2007. The Kunia Camp is characterized by its single wall structures situated on lots within grid-patterned streets. The camp itself has gone through many different changes over time. The area of the camp which was constructed between 1928 and 1940 is considered Old Camp while the expanded portion built after 1940 is called New Camp (Figure 39).

SIHP # -7729, Kunia Camp, is a habitation complex consisting of 128 architectural features. This archaeological inventory survey provides no new data pertinent to the assessment of significance for SIHP # -7729 which is understood as significant for a district nomination primarily for its extant architecture (including 126 contributing buildings). The National Register Nomination for Kunia Camp (see Appendix A) recommended eligibility to the National Register of Historic Places under Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction). By inference and on the basis of the data supplied in the National Register Nomination, SIHP # -7729 is assessed here as significant under Hawai'i state historic property significance criteria "a" (associated with events that have made an important contribution to the broad patterns of our history) and "c" (embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value) pursuant to HAR §13-13-284-6. SIHP # -7729 is significant under criteria "a" for its historic association with the development of the pineapple industry in Hawai'i. SIHP # -7729 is significant under criteria "c" as a concentration of Plantation Style residences displaying the distinctive characteristics of the Hawaiian Plantation Style (see Appendix A).

Section 7 Summary and Interpretation

CSH completed the fieldwork component of this AIS under archaeological permit number 14-04, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 27 and 28 October 2014 by CSH archaeologists Scott Belluomini, B.A., Layne Krause, B.A., Richard Stark, Ph.D., and Trevor Yucha, B.S. and included a pedestrian survey and archaeological excavation and documentation of five backhoe trenches within the project area.

A 100%-coverage pedestrian survey of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey confirmed there were no surface archaeological historic properties within the Kunia Village Housing Development project area. Surface architectural features of Kunia Camp (SIHP # -7729) were observed throughout the project area. These features are thoroughly documented on the Kunia Camp National Register Nomination form (see Appendix A).

A 50-acre portion of the 119-acre Kunia Camp property was nominated for the National Register of Historic Places. Kunia Camp (SIHP # -7729) is the last pineapple plantation housing community still intact. The camp was initially constructed in 1928 to house the workforce for the California Packing Company, later known as Del Monte, which operated within the Kunia area from 1916 to 2007. The Kunia Camp is characterized by many single wall structures situated on lots within grid-patterned streets. Some larger community structures, as well as main office buildings and a store are located within the Kunia Camp Historic District.

CSH conducted backhoe trench test excavations (T-1 through T-5) to investigate the subsurface deposits within the locations of several planned detention basins and new utility lines. These five locations correlate with where significant subsurface disturbance is expected to occur as part of the project development activities. Each excavation exposed the same locally procured alluvial sediment (Stratum I) that consists of a reddish brown clay loam. Stratum I extended to the base of excavation in three test excavations (T-3 through T-5). However, the stratigraphy within T-1 and T-2 was slightly more complex. T-1 contained below the Stratum I alluvial layer a thin layer of weaker red silt loam that appeared to be oxidized (Stratum II), below which occurred a dark reddish brown silty clay (Stratum III). This lower deposit extended to the base of excavation. Similarly, T-2 contained below the Stratum I alluvial layer a band of dark red sandy loam (Stratum II) that overlay a strong brown sandy loam that extended to the base of excavation. No imported fill layers were identified. Also not identified were any cultural layers, features, or artifact assemblages. The single buried artifact consisted of a modern aluminum food can collected from T-3.

The stratigraphy and absence of cultural deposits in the five test excavations (T-1 through T-5) confirmed the background research findings that indicate low potential existed for encountering traditional Hawaiian archaeological historic properties within the project area. This research indicated that such sites likely were concentrated at the base of the eastern side of the Waianae Mountain Range, as this is where suitable arable land and adequate rainfall could support seasonal dryland agriculture and, in consequence, support Hawaiian settlement. Kunia Camp is quite far from the eastern side of this range and would not have been as attractive for settlement.

Section 8 Significance Assessments

Historic property significance is evaluated and assessed based on the five State of Hawai‘i historic property significance criteria. To be considered significant, a historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and/or association and meet one or more of the following broad cultural/historic significance criteria (in accordance with HAR §13-13-284-6):

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

SIHP # -7729, Kunia Camp, is a habitation complex consisting of 128 features. This archaeological inventory survey provides no new data pertinent to the assessment of significance for SIHP # -7729 which is understood as significant for a district nomination primarily for its extant architecture (including 126 contributing buildings). The National Register Nomination for Kunia Camp (see Appendix A) recommended eligibility to the National Register of Historic Places under Criteria A (associated with events that have made a significant contribution to the broad patterns of our history) and C (embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction). By inference and on the basis of the data supplied in the National Register Nomination, SIHP # -7729 is assessed here as significant under Hawai‘i state historic property significance criteria “a” (associated with events that have made an important contribution to the broad patterns of our history) and “c” (embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value) pursuant to HAR §13-13-284-6. SIHP # -7729 is significant under criteria “a” for its historic association with the development of the pineapple industry in Hawai‘i. SIHP # -7729 is significant under criteria “c” as a concentration of Plantation Style residences displaying the distinctive characteristics of the Hawaiian Plantation Style (see Appendix A).

Section 9 Project Effect and Mitigation

9.1 Project Effect

The results of this AIS investigation support a Hawai'i State historic preservation project effect of "effect, with proposed mitigation commitments" as specified in HAR §13-284-7. The recommended mitigation measures will reduce the project's potential effect on significant historic properties.

9.2 Mitigation Recommendations

In 2011 Mason Architects, Inc. carried out an architectural assessment survey and subsequently completed a National Register Nomination. (included here as Appendix A).

An approach to saving the neighborhood while allowing for some redevelopment was arrived at through negotiations with SHPD, particularly with Angie Westfall, who was the head of the Architectural Branch in that office. The overall approach required, wherever possible, saving historic houses along primary roadways (Kunia Drive and McAngus Street), from the entry to the site all the way to the Gymnasium in the Old Camp area. Any new housing was to be built in areas away from those streets. In discussions with SHPD, houses in the Old Camp and New Camp were chosen to be demolished in order to make room for new housing.

It was understood that the remaining historic houses and all other historic buildings in the neighborhood, including the Gymnasium, the Chapel, former store, and the administration building are to be rehabilitated. The Owner is looking at the possibility of adding infill units to the neighborhood to more closely approximate the original number of housing units on the site. However, this will require the approval of both the County Planning and Permitting Department and SHPD.

The new housing units are designed with many of the characteristics that define the Hawaiian Plantation Style of architecture in this district. The new houses are all single story construction on raised post and pier foundations, with board and batten as the exterior siding. All the houses have hipped asphalt shingle roofs with wide overhanging eaves that match the existing plantation houses. Both front and rear door entries have small wood porches and the floor plan of these new houses are similar to the rehabilitated homes—a rectangular floor plan with the living room and kitchen located at the front end of the house with the bedrooms and bathrooms in the rear. All the new and rehabilitated homes will be painted in the same color scheme.

The units in the New Camp area slated for demolition were primarily selected for their location away from the visibility of the main roadways in Kunia Village. The condition of these units vary from severe damage (not suitable for occupation) to relatively decent conditions. Because there was a higher concentration of poor units in this area the decision was made, with SHPD concurrence, to concentrate demolitions in this area and preserve more visible areas in their entirety. Historic features from the demolished units such as doors and windows will be salvaged for reuse in the rehabilitation of other buildings in this project.

The remaining buildings in the district outside the scope of this project will remain—currently there is no work planned for those buildings; these residential units are currently occupied by agricultural workers. No plans for the commercial buildings have been discussed. Currently, there

is no significant rehabilitation work planned for the other historic buildings in the district in the immediate future. However, all work on the other historic buildings will be reviewed by SHPD in accordance with State law.

This would appear to be appropriate and sufficient mitigation to any adverse impacts to Kunia Camp (SIHP # 50-80-08-7729), an architectural complex including 128 features.

No further archaeological fieldwork is recommended for the current project. Thus appropriate mitigation appears to have been concluded.

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Appendix D

EPA Groundwater Hydrologic Model for Kunia Village

DRAFT- For Discussion Purposes Only.
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with EPA Region 9 Superfund and Emergency Management Division.**

Del Monte Corporation (O'ahu Plantation) Superfund Site

Numerical Flow Model Analysis



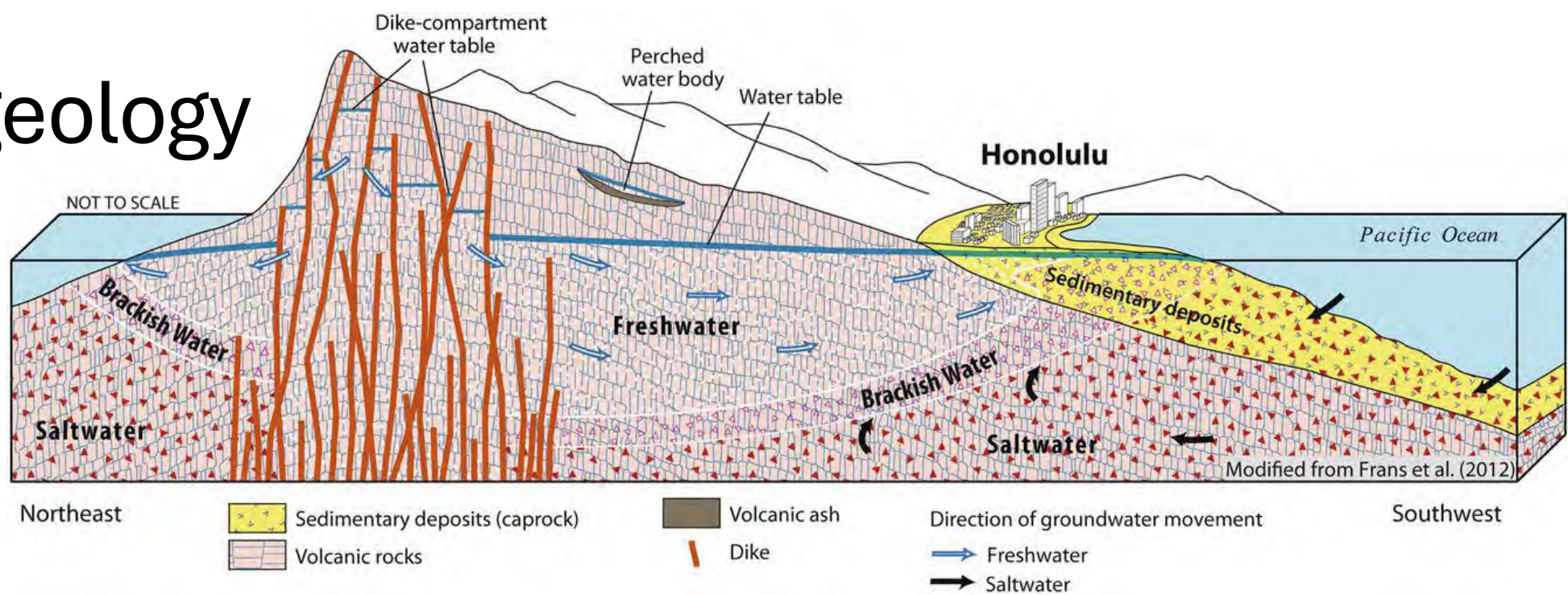
April 29, 2025

**Patrick J Kelly
Hydrogeologist
US EPA R9**

**Superfund and Emergency Management Division
Technical Support Section - Hydrogeology**

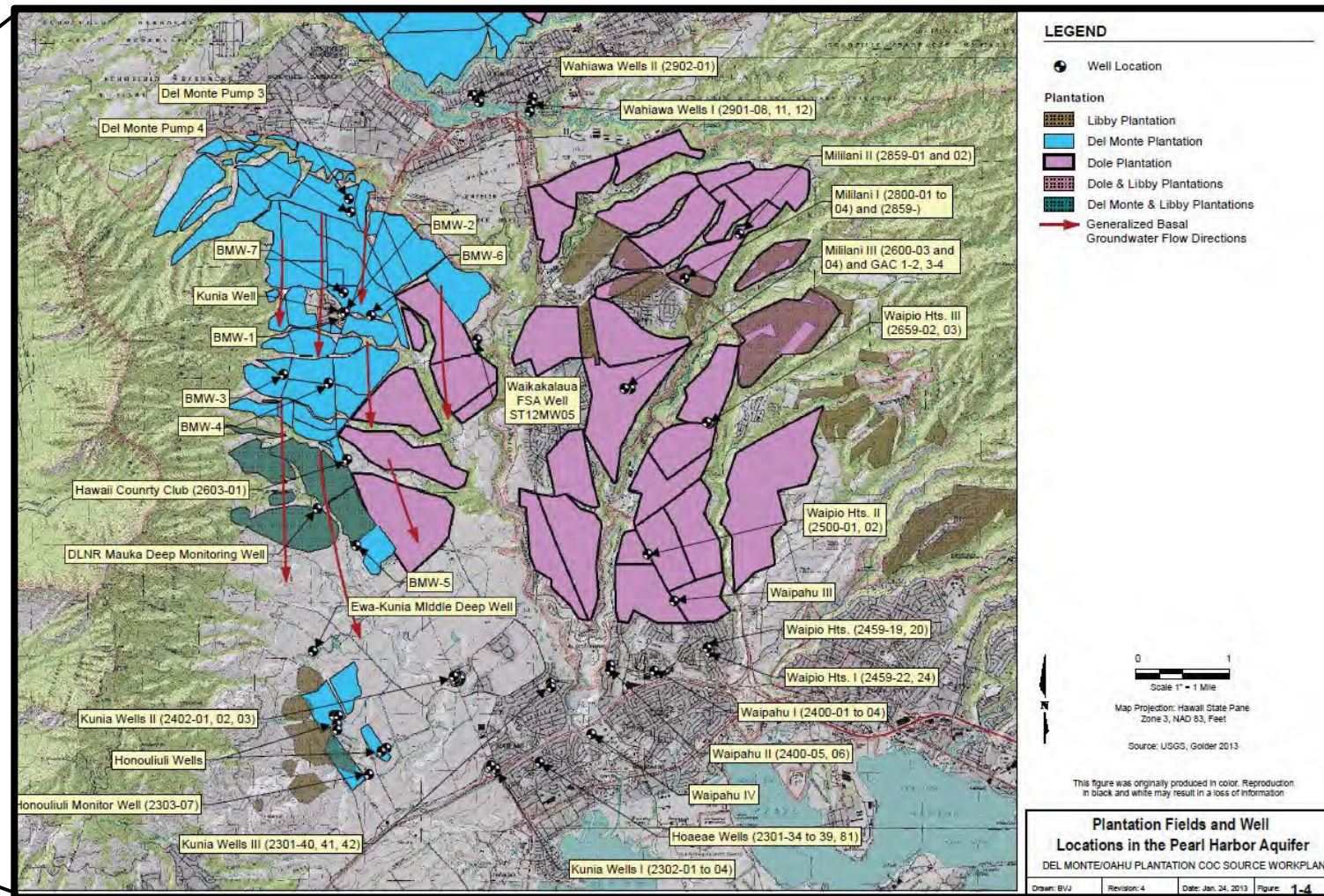
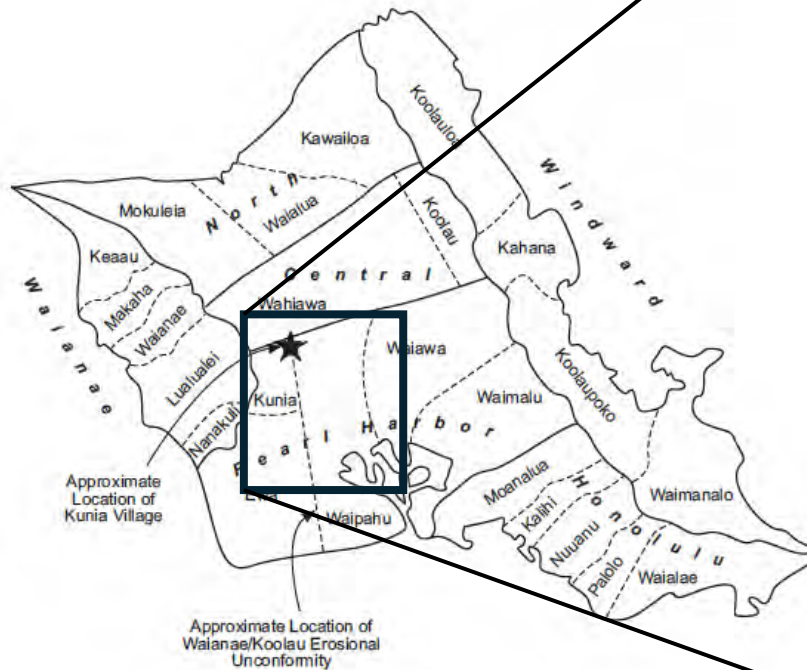
Hydrogeology

Basal groundwater occurs when freshwater percolates into the saturated zone and displaces the underlying seawater.



“Lavas of the Waianae and Koolau volcanoes comprise separate sections, or hydrologic units, of the Pearl Harbor Basal Aquifer, informally termed the Waianae aquifer (or Ewa-Kunia Aquifer System) and Koolau aquifer (or Waiawa–Waipahu Aquifer System). The presence of these separate areas has been **inferred by observed head drops across the erosional unconformity between the two lavas, and differing water level trend patterns in wells installed in the two lavas. The barrier is comprised of a weathered zone and accumulations of alluvium, separating the lower, older Waianae lavas from the younger Koolau lavas. **Head drop across the unconformity is about 2 to 3 feet** with heads in the Koolau being higher (Mink and Lau 1990). Therefore, **flow across the contact is always from the Koolau to the Waianae sections**. This flow may be a major source of recharge to the Ewa-Kunia Aquifer (Golder 1998).”**

Release History and Background

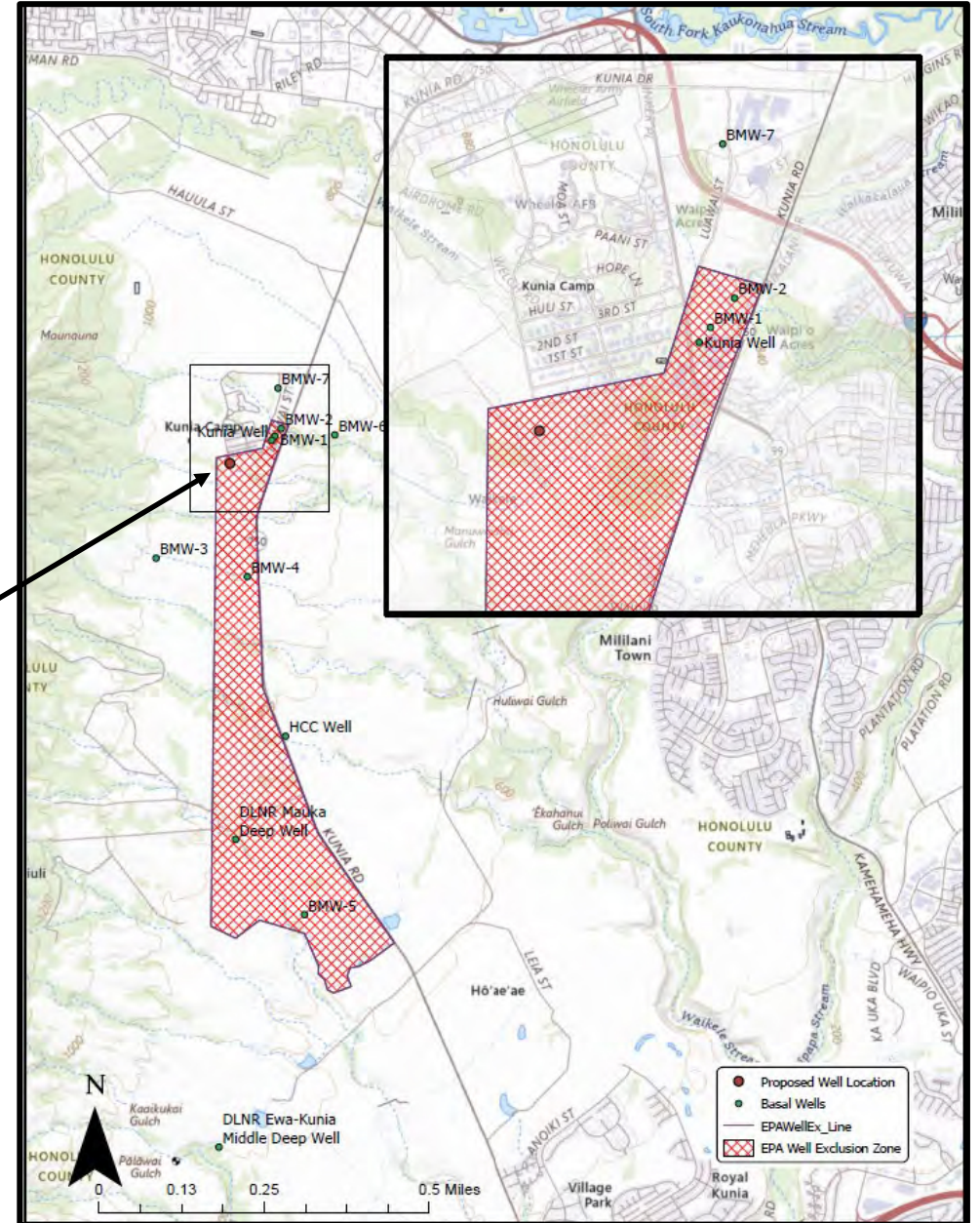


“In 1977, an accidental spill involving approximately 495 gallons of the previously registered soil fumigant ethylene dibromide (EDB), containing 0.25 percent of dibromochloropropane (DBCP), occurred within approximately 60 feet of the Kunia Well (State Well No. 2703-01). In response to the detection of the compounds in the Kunia Well (which at that time supplied domestic water to the Kunia Village), Del Monte Corporation initiated soil and groundwater investigations and remedial cleanup efforts near the Kunia Well. As a result of these activities, **other areas impacted by fumigants near the well were identified in addition to the Kunia Well spill area.**”



Objectives

1. Replicate (to the extent practicable) previous numerical flow model - *not* a fate and transport model
 - CAPTURE ZONE ANALYSIS REPORT FROM THE KUNIA WELL BASAL GROUNDWATER EXTRACTION DEL MONTE CORPORATION (OAHU PLANTATION) SUPERFUND SITE (2007, Golder Associates Inc.)
2. Model the effects of the proposed Kunia Village drinking water well on the aquifer
3. Make inferences about potential influent water quality based on modeled drawdown

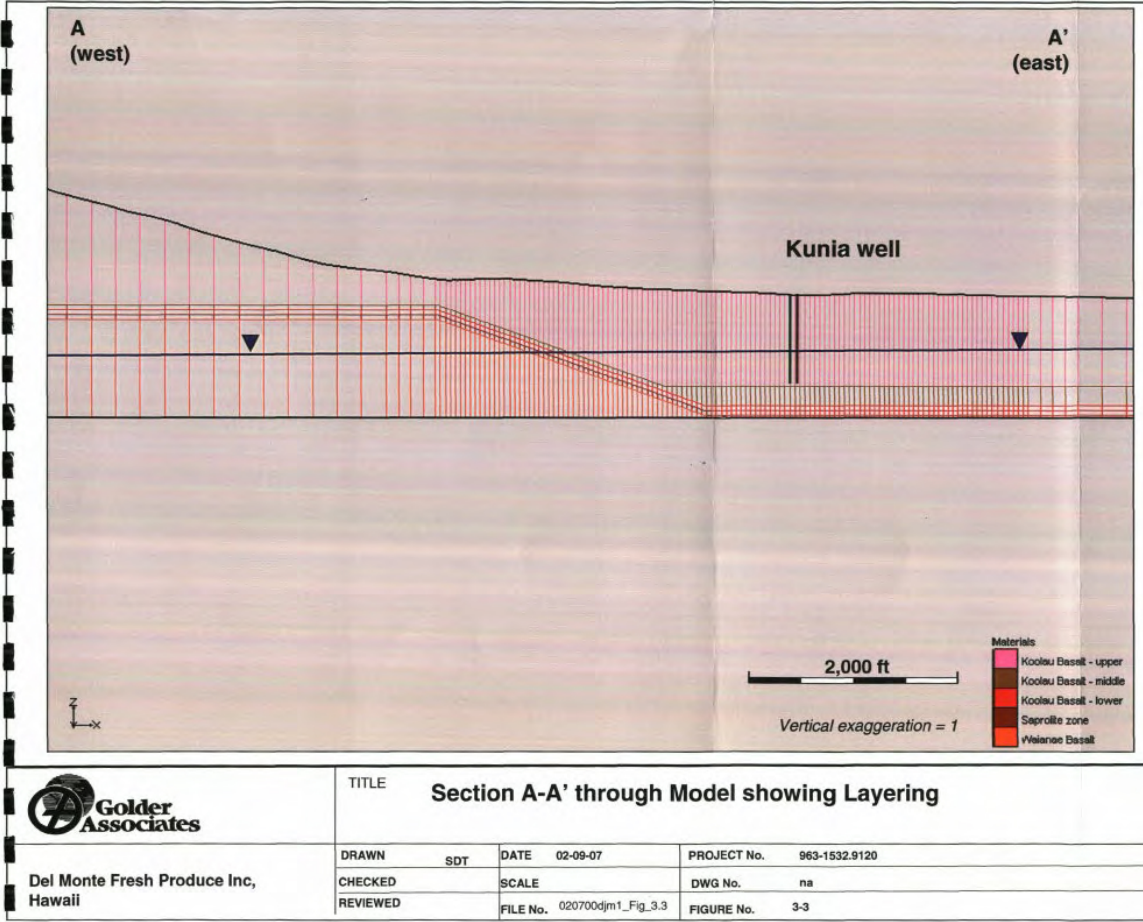
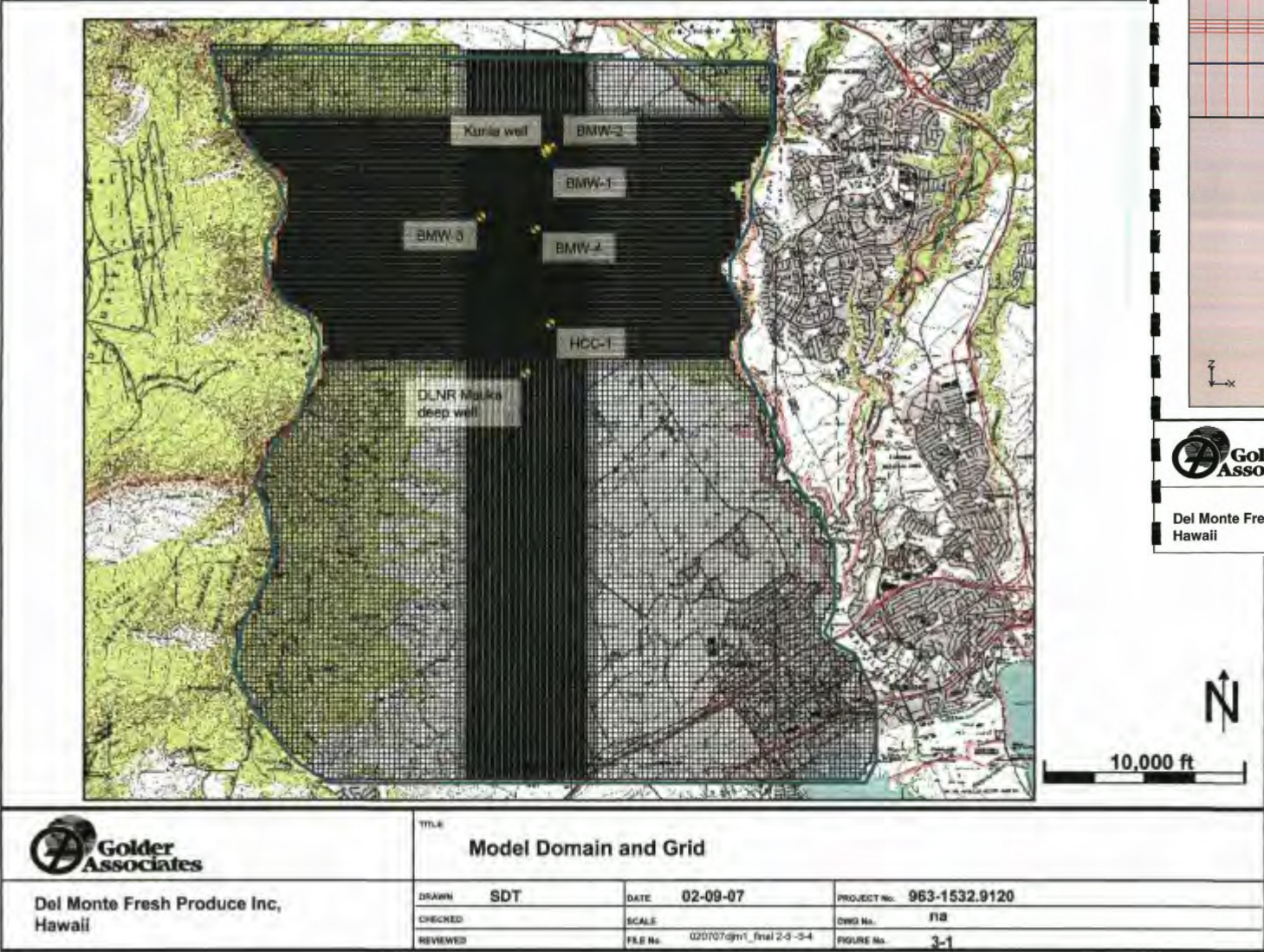


Modeling Approach

1. Steady-state run (20 years)
 - No recalibration – parameters from 2007 Golder model
 - Residuals calculated relative to entire period of record for site monitoring wells
2. Transient runs for new well pumping scenarios
 - 20 years total, 10-year stress (pumping) period
 - 250 gpm (anticipated) and 500 gpm design stresses
 - Steady-state .HDS file for initial condition
3. Analyze drawdown from the proposed well



Golder Model Structure



MODFLOW-2000

Finite Difference Grid

Five Layers

1,2,3 - Koolau Basalt

4 - Saprolite

5 - Waianae Basalt



EPA Model Structure

MODFLOW-USG

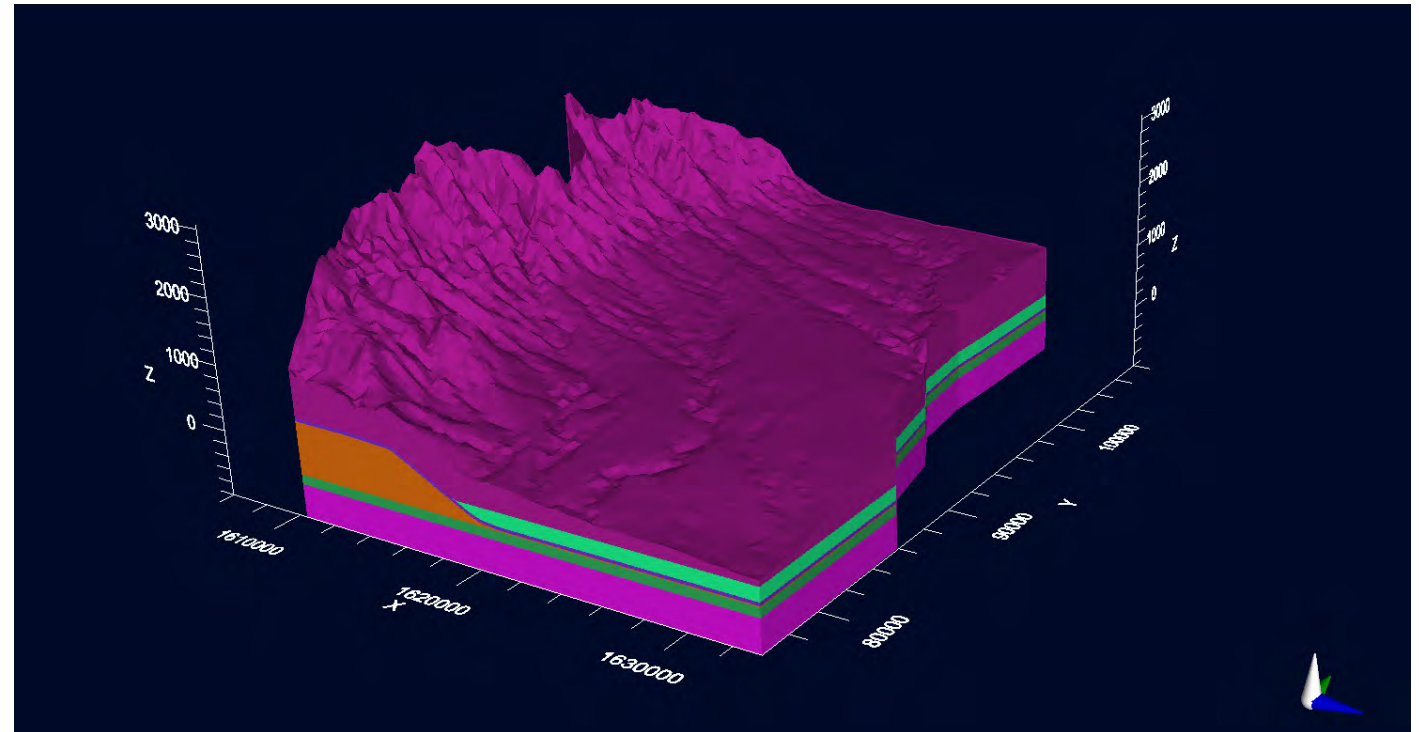
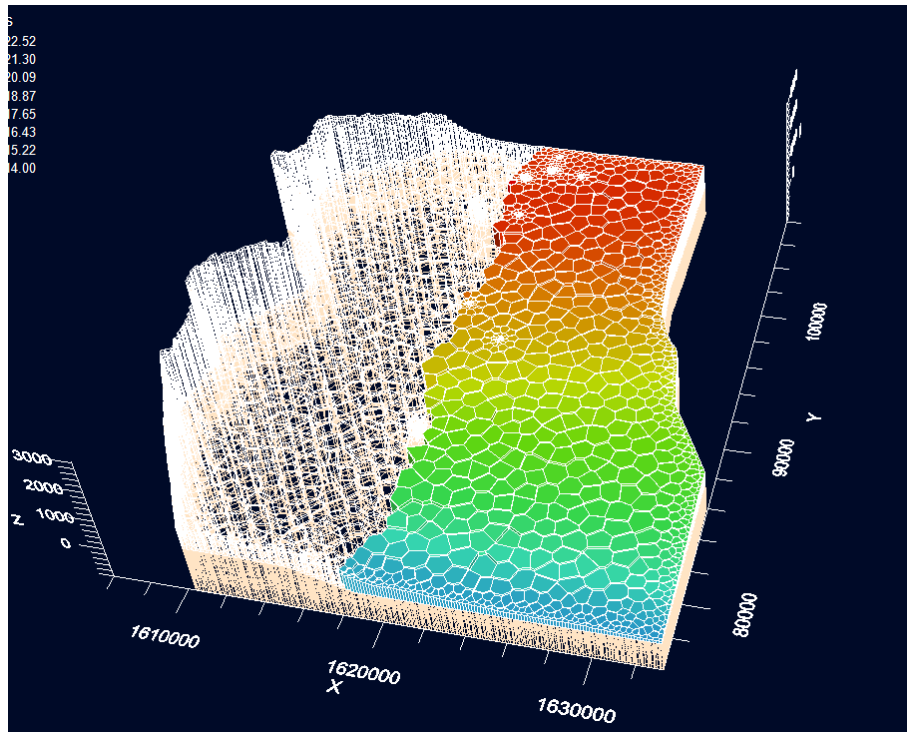
Voronoi Grid

Six Layers:

1,2 – Koolau Basalt

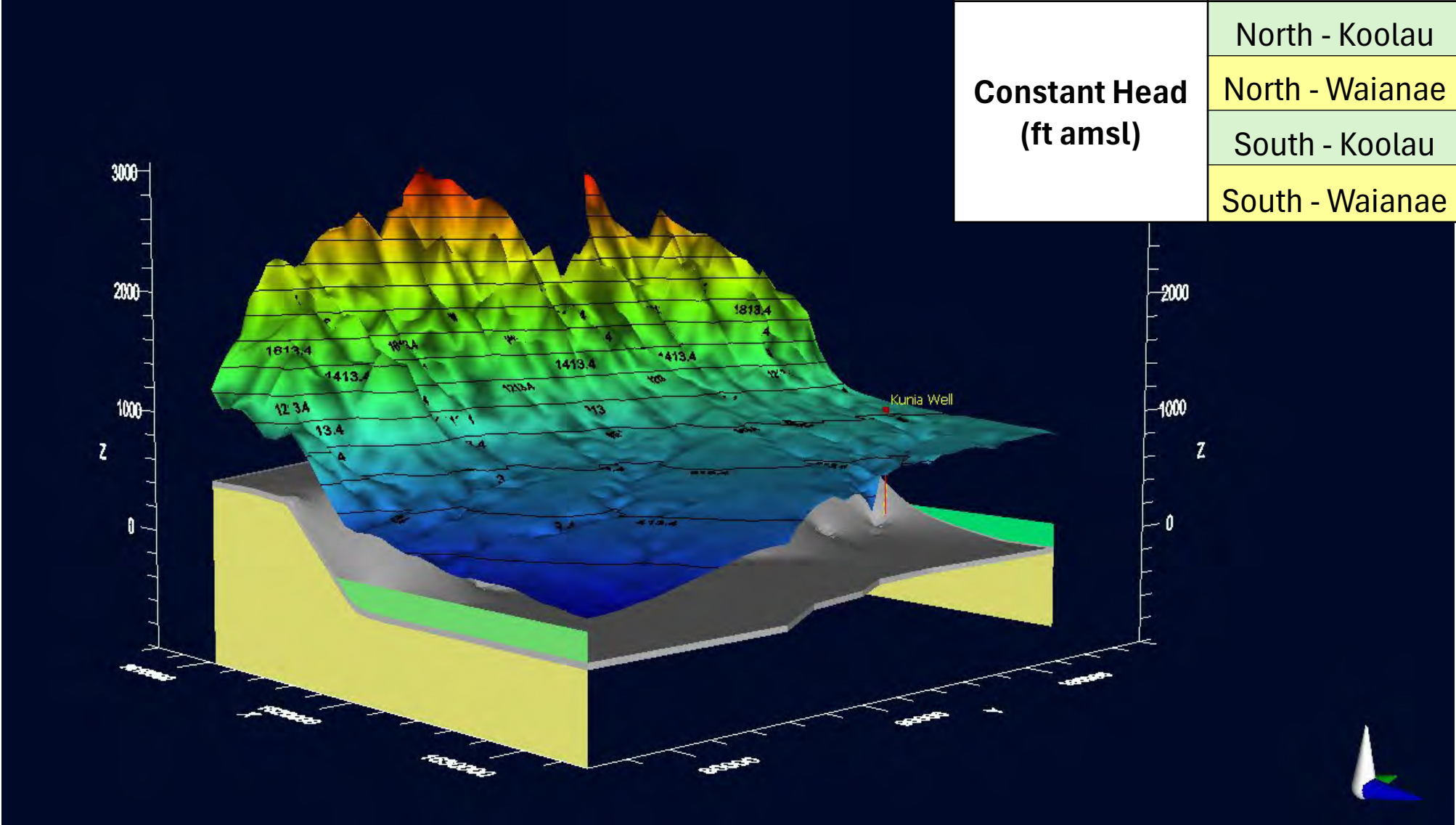
3 – Saprolite

4,5,6 – Waianae Basalt



Boundary Conditions

		Goldier	EPA
Aerial Recharge (in/year)		25	25
Constant Head (ft amsl)	North - Koolau	22-23.5	23
	North - Waianae	19.5	19
	South - Koolau	15	15
	South - Waianae	8	13



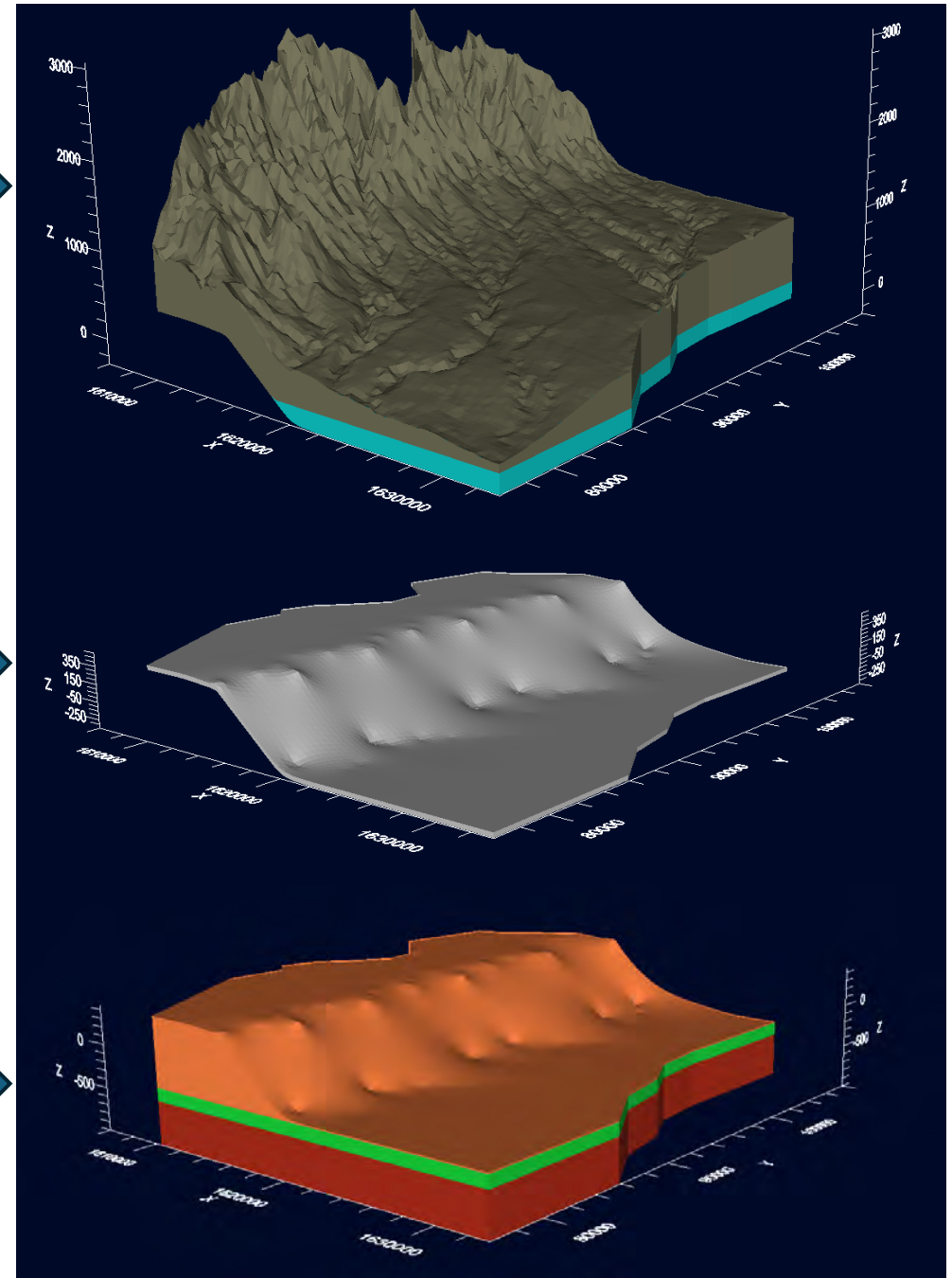
Conductivity Zones

Lithologic Unit		K_h (ft/day)	K_v (ft/day)	Gold Layer	EPA Layer
Koolau	Upper zone	1,367	27.3	1	1
	Middle zone	1,000	20	2	2
	Lower zone	750	15	3 (& 4 and 5 east of saprolite)	Eliminated in EPA Model
Saprolite		0.05	0.005	4	3
Waianae		2,500	50	5	4,5,6

Koolau

Saprolite

Waianae



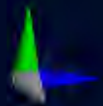
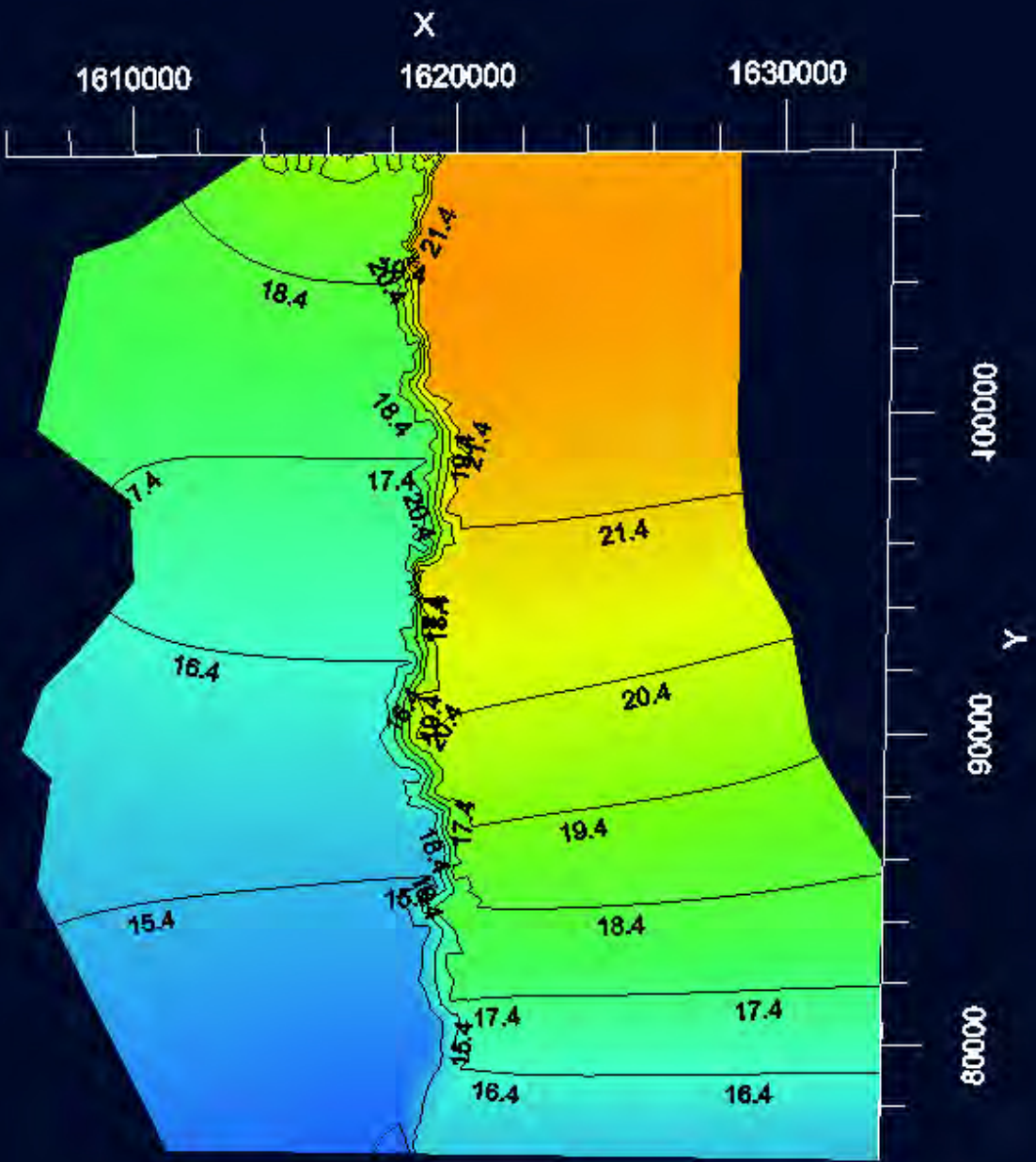
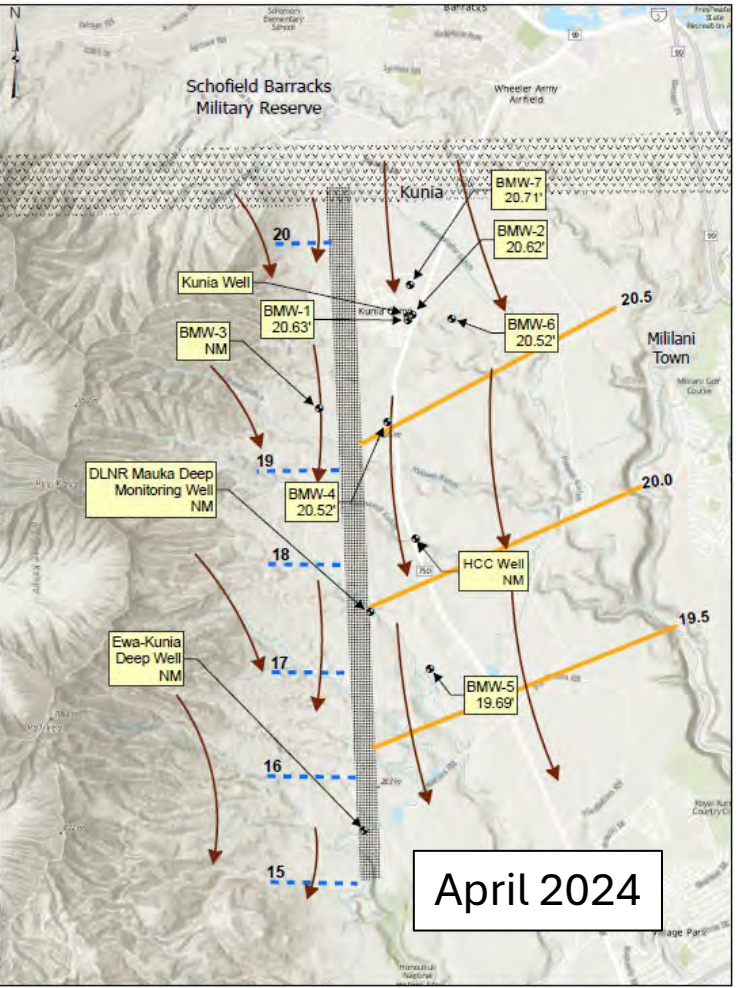
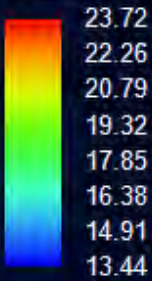
OBJECTIVE 1

Replicate (to the extent practicable) previous numerical flow model



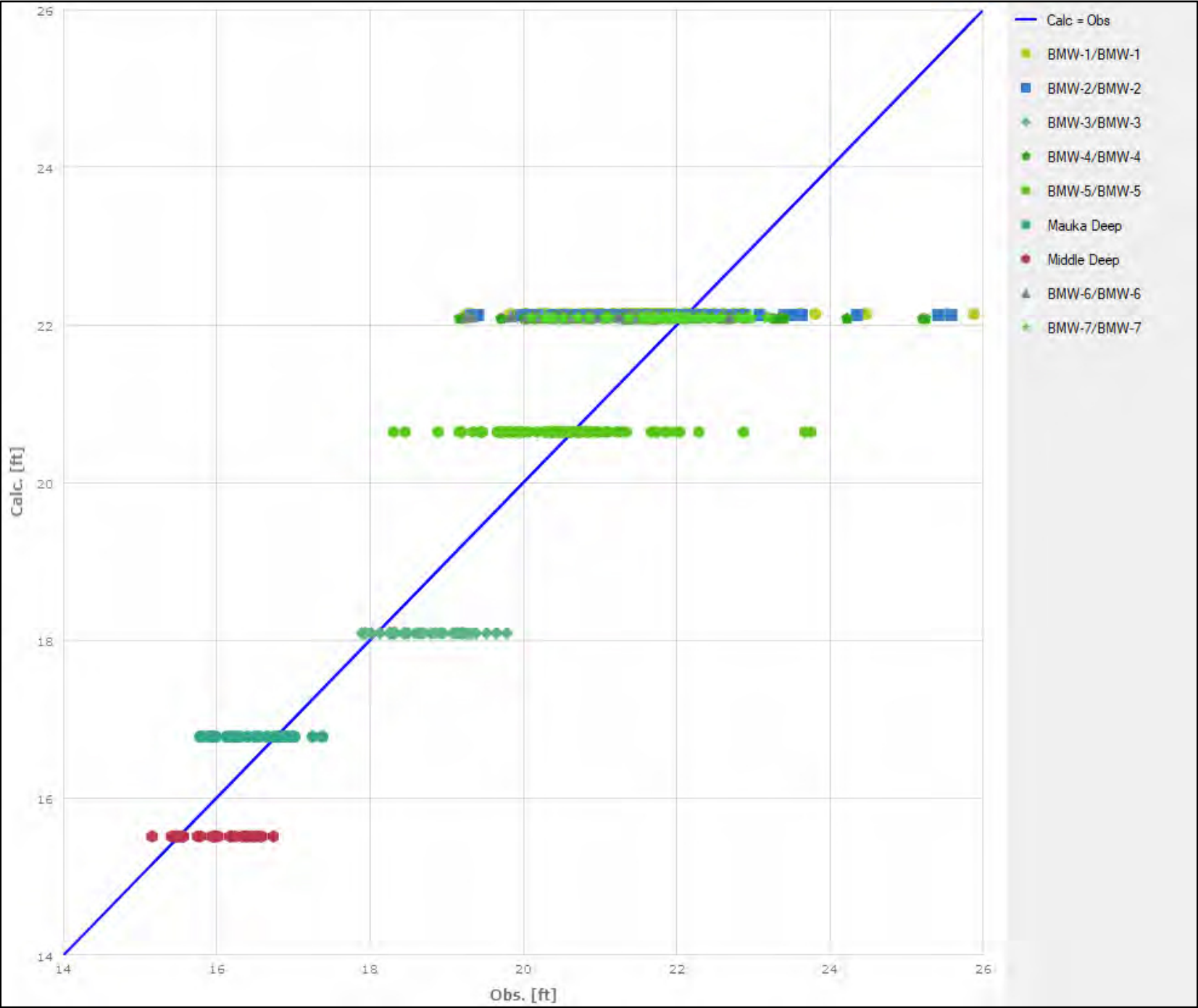
Steady State WLs (ft amsl)

Water Table Elevation



Steady State Model Fit

Min residual	0	at BMW-7
Max residual	-3.75	at BMW-1
Residual mean	0.3	
Abs. residual mean	0.84	
Standard error of the estimate	0.05	
Root mean squared	1.09	
Normalized root mean squared	10.2	(%)
Correlation coefficient	0.87	



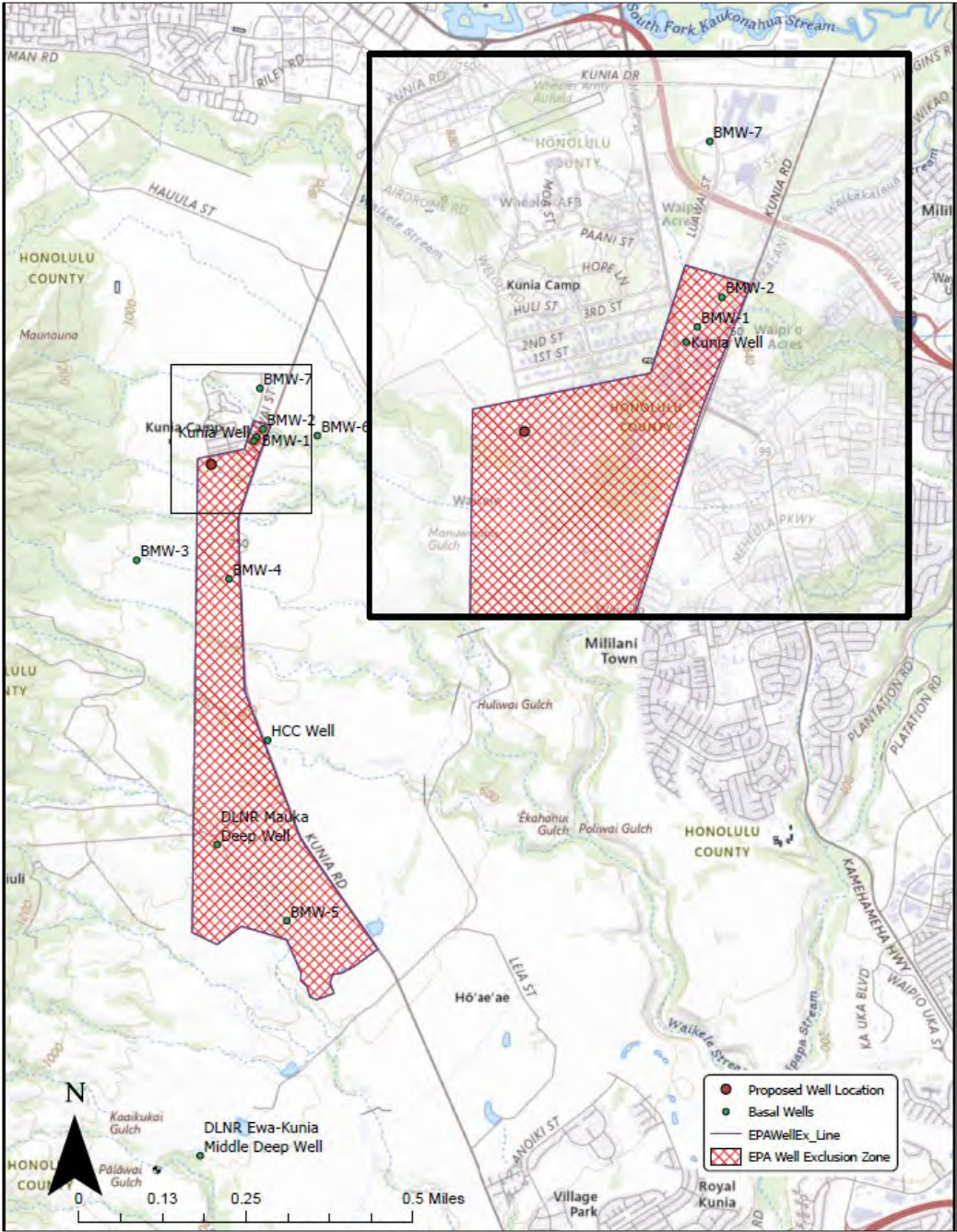
Transient Modeling Scenarios

Well at proposed location (1619188, 105135)

Scenario	Total Depth	Screen Bottom	Screen Top	Pump Rate	Pump Duration
A	-45	-40	0	-250	10 years
B				-500	
C	-375	-370	-350	-250	
D				-500	

Koolau

Waianae (below saprolite)



OBJECTIVE 2

Model the effects of the proposed Kunia Village drinking water well on the aquifer



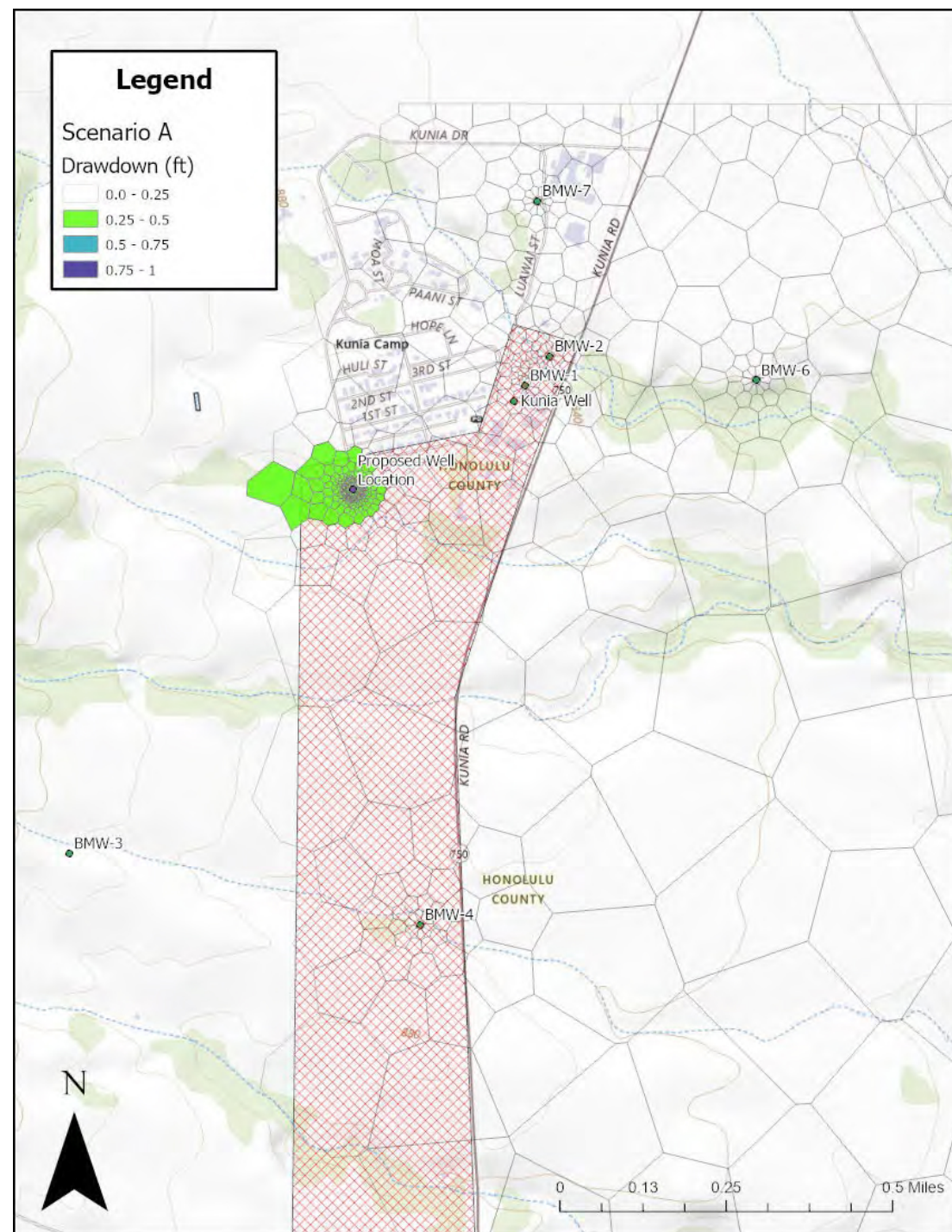
Predicted Drawdown from Proposed Well

Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
A	-45	-40	0	-250	0.49 ft	1
B	-45	-40	0	-500	1.02 ft	1
C	-375	-370	-350	-250	0.12 ft	5
D	-375	-370	-350	-500	0.23 ft	5



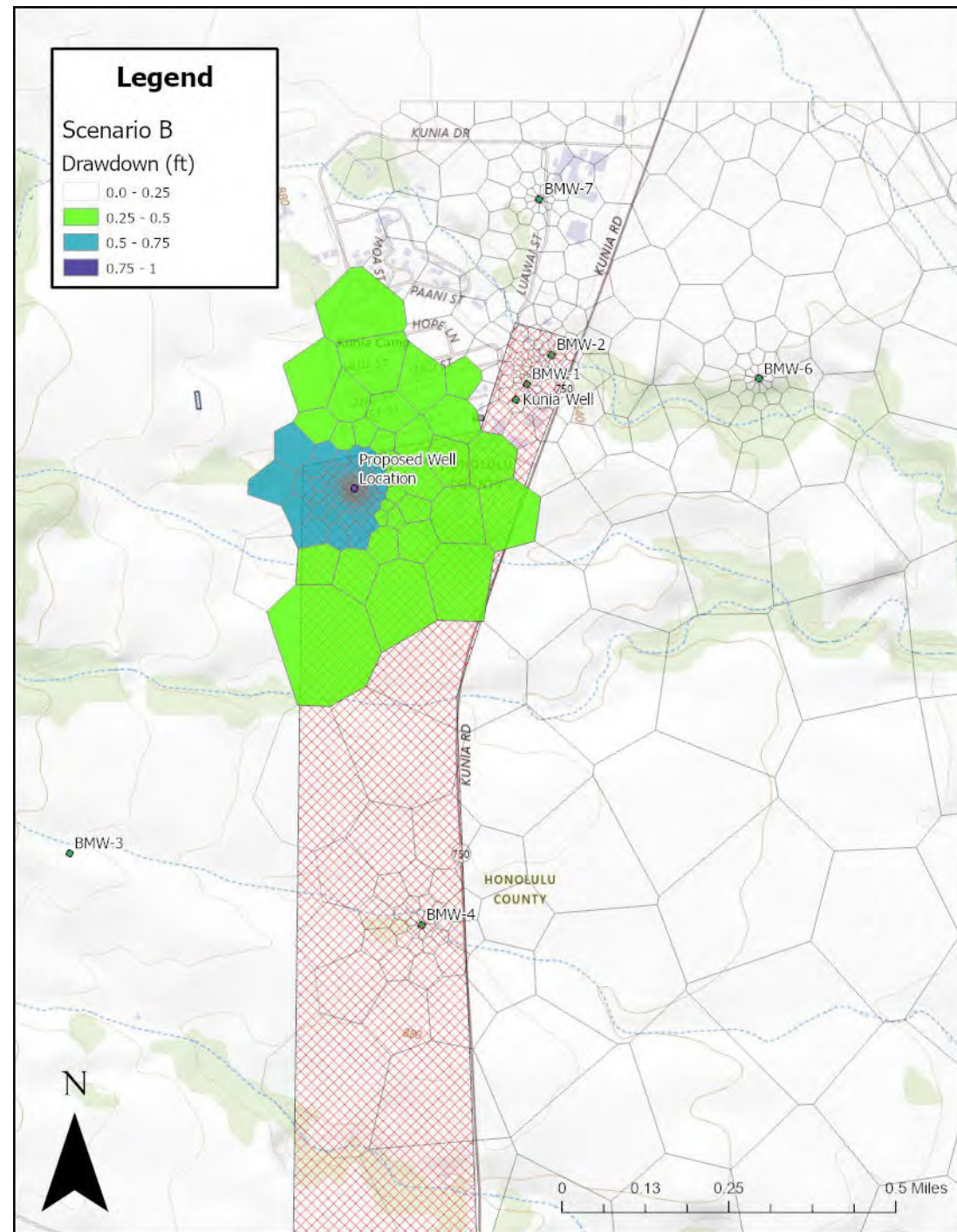
Scenario A (250 gpm)

0.49 ft - Layer 1



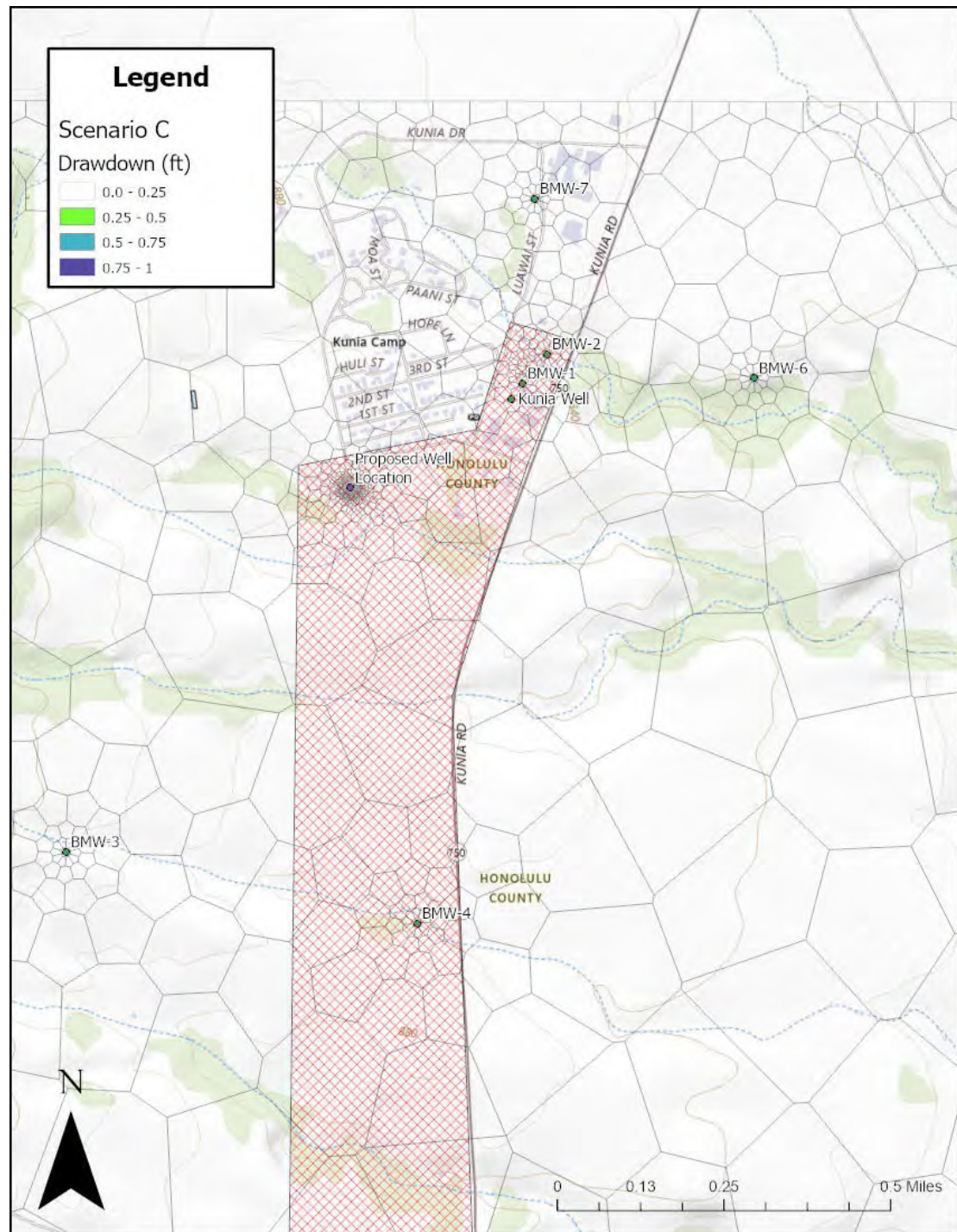
Scenario B (500 gpm)

1.02 ft - Layer 1



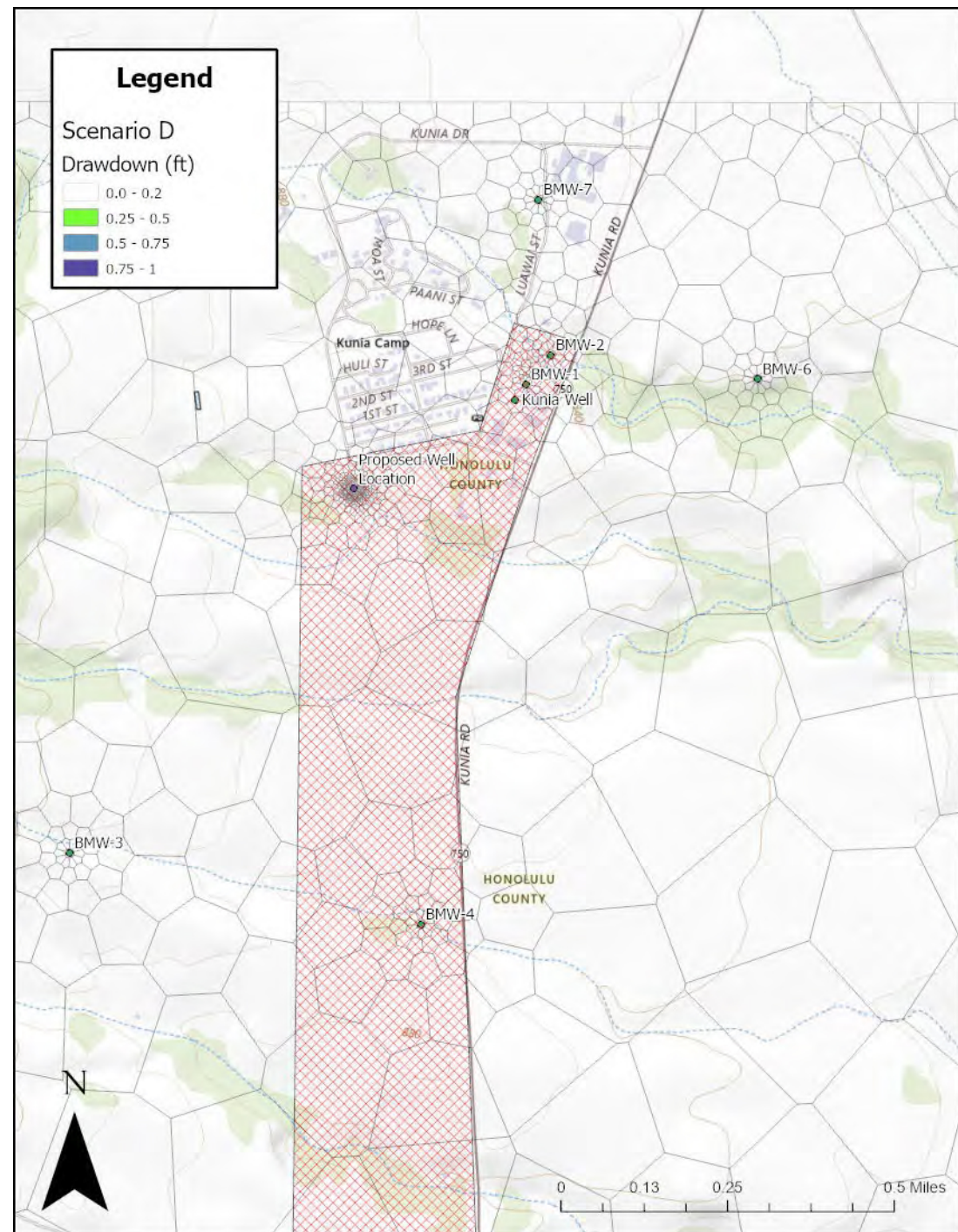
Scenario C (250 gpm)

0.12 ft - Layer 5



Scenario D (500 gpm)

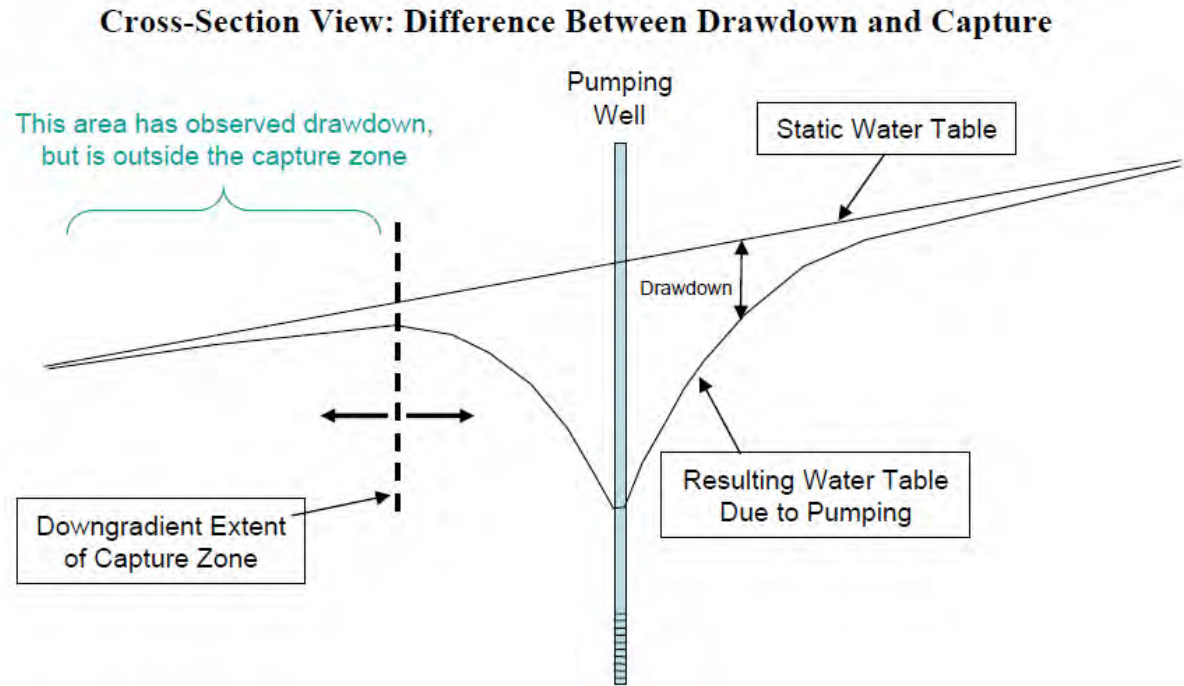
0.23 ft - Layer 5



*A note on this analysis...

Drawdown is not capture →

However, in this case, gradients are shallow and presenting modeled drawdown overlaid upon interpolated COCs is conservative (larger area)



Drawdown is the change of water level due to pumping. It is calculated by subtracting water level under pumping conditions from the water level without pumping.

Cone of Depression is the region where drawdown due to pumping is observed.

Capture Zone is the region that contributes the ground water extracted by the extraction well(s). It is a function of the drawdown due to pumping and the background (i.e., without remedy pumping) hydraulic gradient. The capture zone will only coincide with the cone of depression if there is zero background hydraulic gradient.

Capture Zone Geometry Cross-Check: 500 gpm scenarios

Golder Model: 1,050'
EPA Model (0.25'): 1,100'
EPA Analytical Calculation*: 1,260'

* A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, January 2008 (EPA 600/R-08/003)

TABLE 5-1

Predicted Drawdown Distances and Capture Zone Diameters –
Model and Sensitivity Cases

	Pumping Rate (gpm)	Model	Case A: High T/Low Kh/Kv	Case B: Low T/High Kh/Kv
Distance to 0.1-ft drawdown (ft)	500	1,050 - 2,150	950 - 1,600	1,300 - 2,450
	750	1,750 - 4,000	1,700 - 3,700	2,050 - 4,300
Width of capture zone (ft) ⁽¹⁾	500	1,050	925	1,250
	750	1,500	1,275	1,750

Note: (1) – measured through Kunia well

From: CAPTURE ZONE ANALYSIS REPORT FROM THE KUNIA WELL BASAL
 GROUNDWATER EXTRACTION DEL MONTE CORPORATION (OAHU PLANTATION)
 SUPERFUND SITE (2007, Golder Associates Inc.)

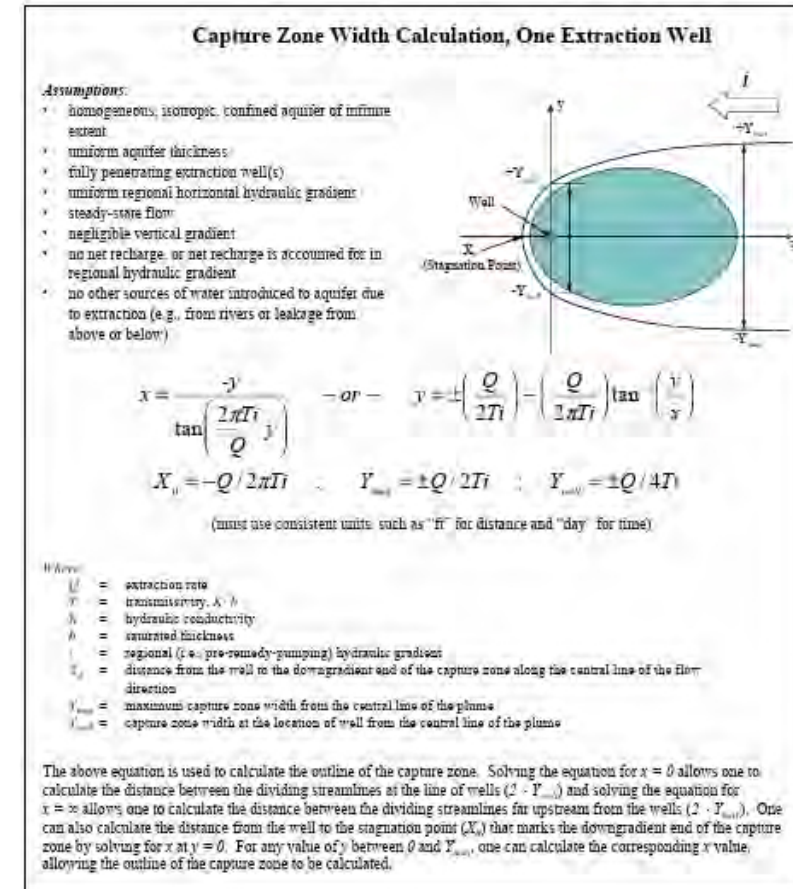


Figure 14. Capture zone width calculation, one extraction well



OBJECTIVE 3

Make inferences about potential influent water quality based on modeled drawdown and kriged COC distribution



COC Distribution in Groundwater

- The following figures present kriged COC data for DBCP and 1,2,3-TCP from the April 2024 sampling event.
- The MCL exceedances are limited to areas east of the saprolite (Koolau, Model Layer 1)

June 2024

9631532002.001

Table 3-2: Concentrations of COCs Detected during the April 2024 Basal Groundwater Sampling

Sample ID	Well	Sample Date	EDB/DBCP by 504.1 (µg/L)		VOLATILE ORGANICS by 8260B (µg/L)				
			EDB	DBCP	1,2-DCP	1,2,3-TCP	TCE	EDB	DBCP
			Cleanup Level =		0.04 HI MCL	0.04 HI MCL	5 MCL	0.6 HI MCL	5 MCL
DM02987	BMW-1	4/15/2024	0.01 U	0.02	0.38 J	0.36 J	0.4 J	0.5 U	1 U
DM02989	BMW-2	4/15/2024	0.01 U	0.17	0.33 J	1.1	0.39 J	0.5 U	1 U
DM02993	BMW-4	4/15/2024	0.01 U	0.01 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
DM02994	BMW-5	4/15/2024	0.01 U	0.18	0.5 U	0.7	0.5 U	0.5 U	1 U
DM02991	BMW-6	4/15/2024	0.0099 U	0.03	0.39 J	0.8	0.57	0.5 U	1 U
DM02992	BMW-6 Dup	4/15/2024	0.01 U	0.03	0.37 J	0.8	0.62	0.5 U	1 U
DM02990	BMW-7	4/15/2024	0.007 J	0.11	0.27 J	1.2	0.27 J	0.5 U	1 U
DM02988	HCC	4/15/2024	0.01 U	0.06	0.5 U	0.5 U	0.5 U	0.5 U	1 U
DM02995	Field Blank	4/15/2024	0.01 U	0.01 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
DM02996	Trip Blank	4/15/2024	0.01 U	0.01 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U

Notes:

"U" Indicates the compound was not detected, followed by the laboratory reporting limit.

"J" Estimated Value. The detected concentration was below the Reporting Limit and above the Method Detection Limit, or was qualified during data validation.

EDB = 1,2-Dibromomethane

1,2-DCP = 1,2-Dichloropropane

DBCP = 1,2-Dibromo-3-chloropropane

1,2,3-TCP = 1,2,3-Trichloropropane

TCE = Trichloroethene

Dup = duplicate sample

HI MCL - State of Hawaii Administrative Rule Title 11, Chapter 11-20

MCL - Maximum Contaminant Level (EPA 1996)

Shading indicates compound was detected in excess of Cleanup Level.



Legend

Scenario A

Drawdown (ft)

0.0 - 0.25

0.25 - 0.5

0.5 - 0.75

0.75 - 1

● DBCP (April 2024)

DBCP (ug/L)

VALUE

0.069 - 0.073

0.074 - 0.076

0.077 - 0.078

0.079 - 0.079

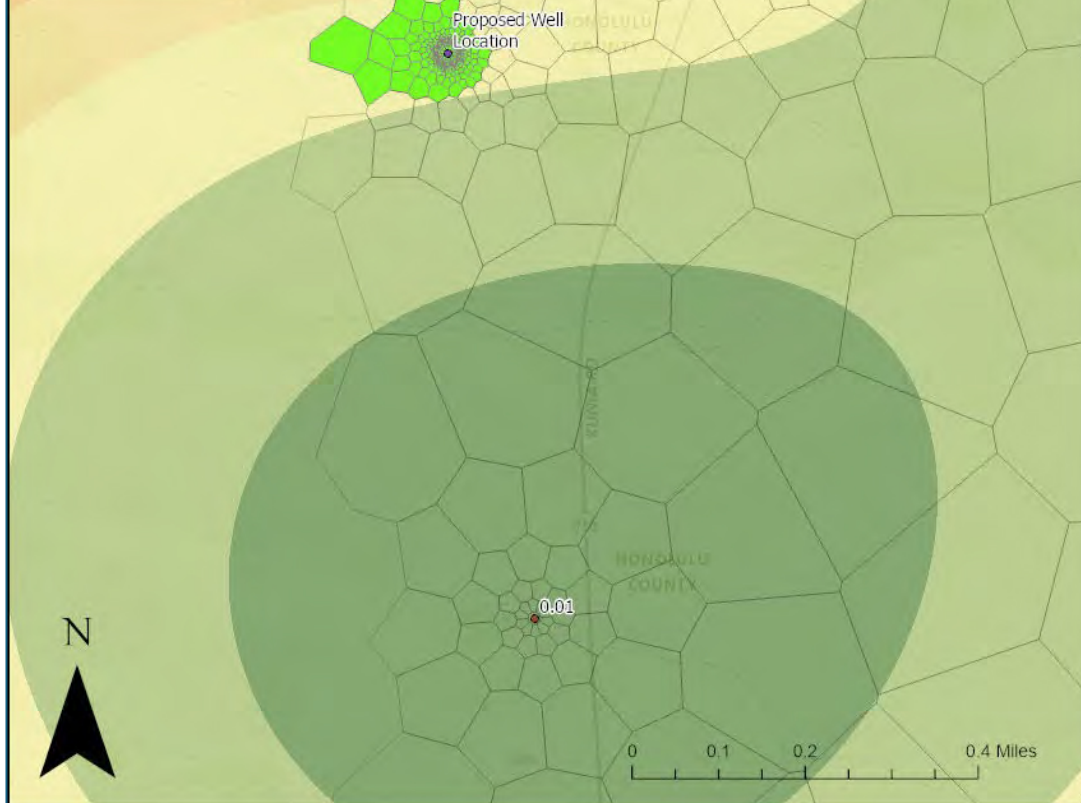
0.08 - 0.081

0.082 - 0.083

0.084 - 0.088

0.089 - 0.097

0.098 - 0.11



Kriged DBCP Concentrations (April 2024) and Modeled Drawdown

Layer 1

MCL: 0.04 ug/L



Legend

Scenario B

Drawdown (ft)

0.0 - 0.25

0.25 - 0.5

0.5 - 0.75

0.75 - 1

● DBCP (April 2024)

DBCP (ug/L)

VALUE

0.069 - 0.073

0.074 - 0.076

0.077 - 0.078

0.079 - 0.079

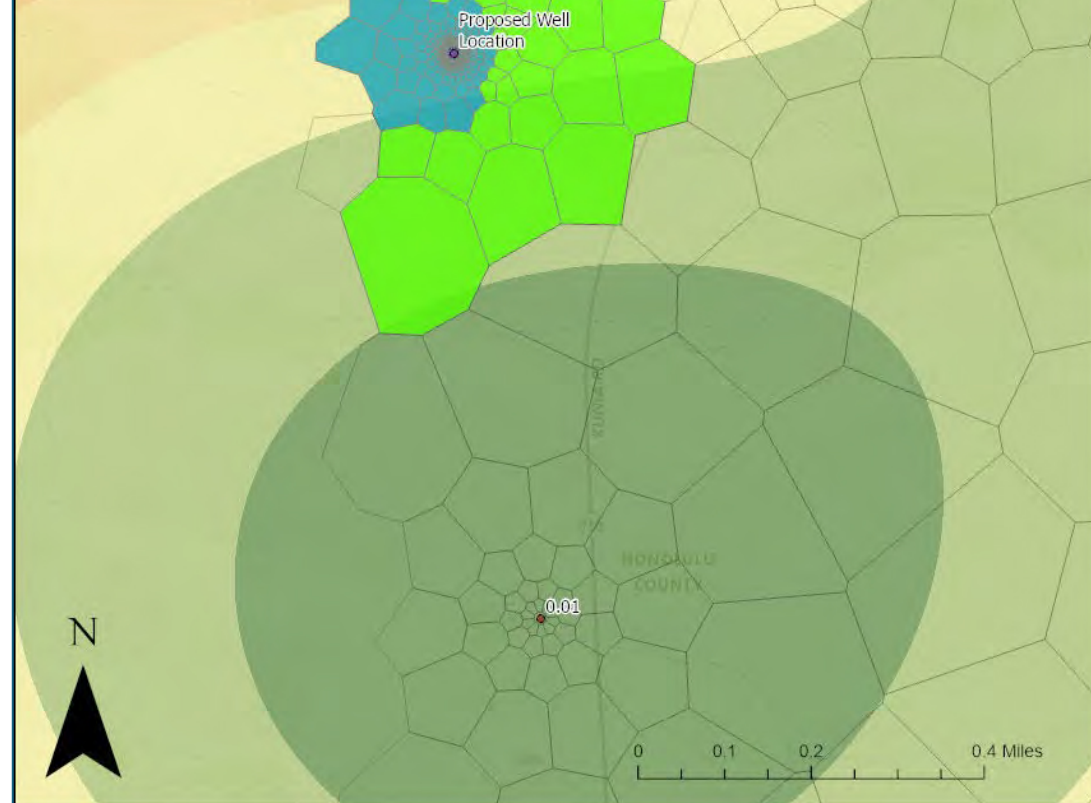
0.08 - 0.081

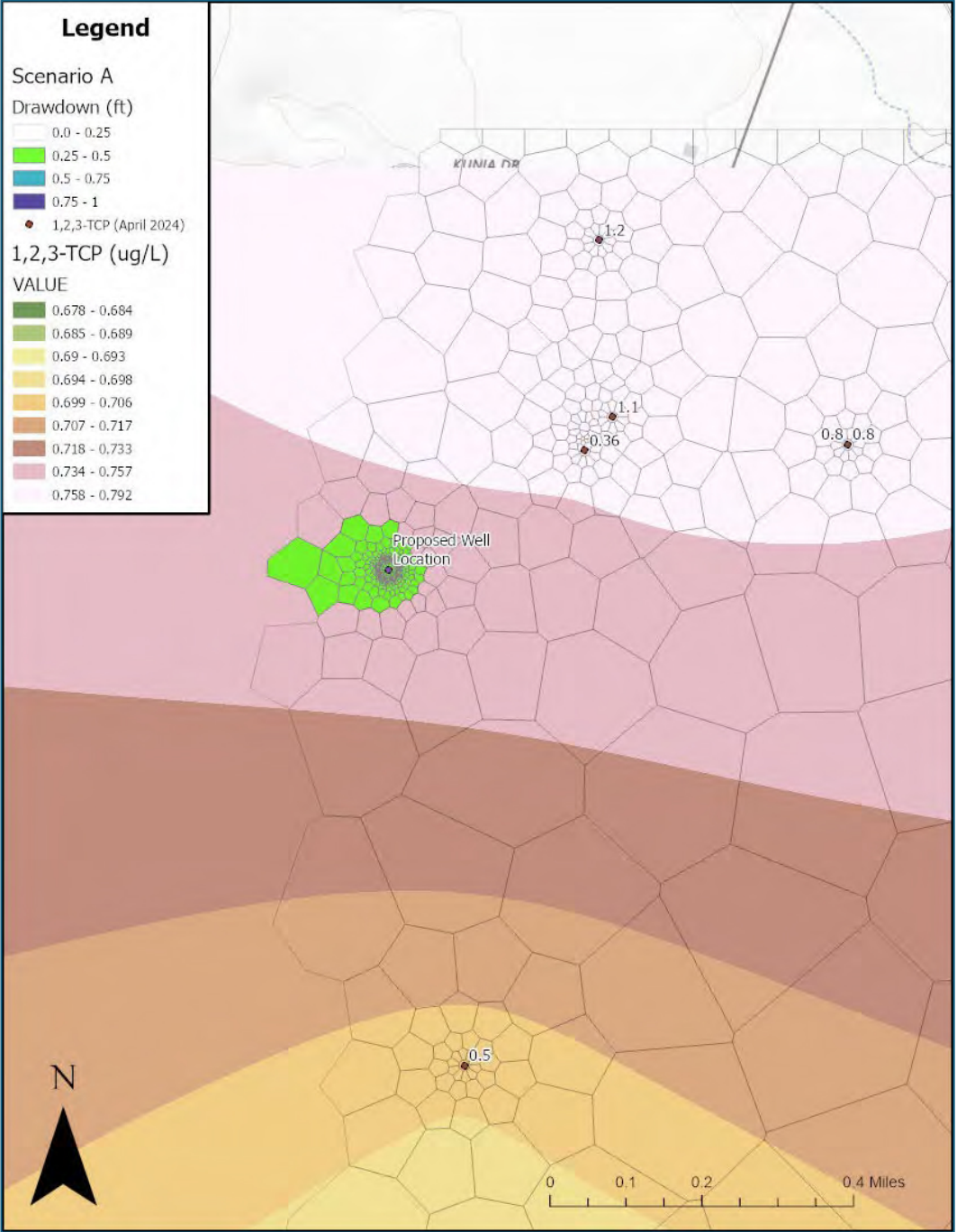
0.082 - 0.083

0.084 - 0.088

0.089 - 0.097

0.098 - 0.11

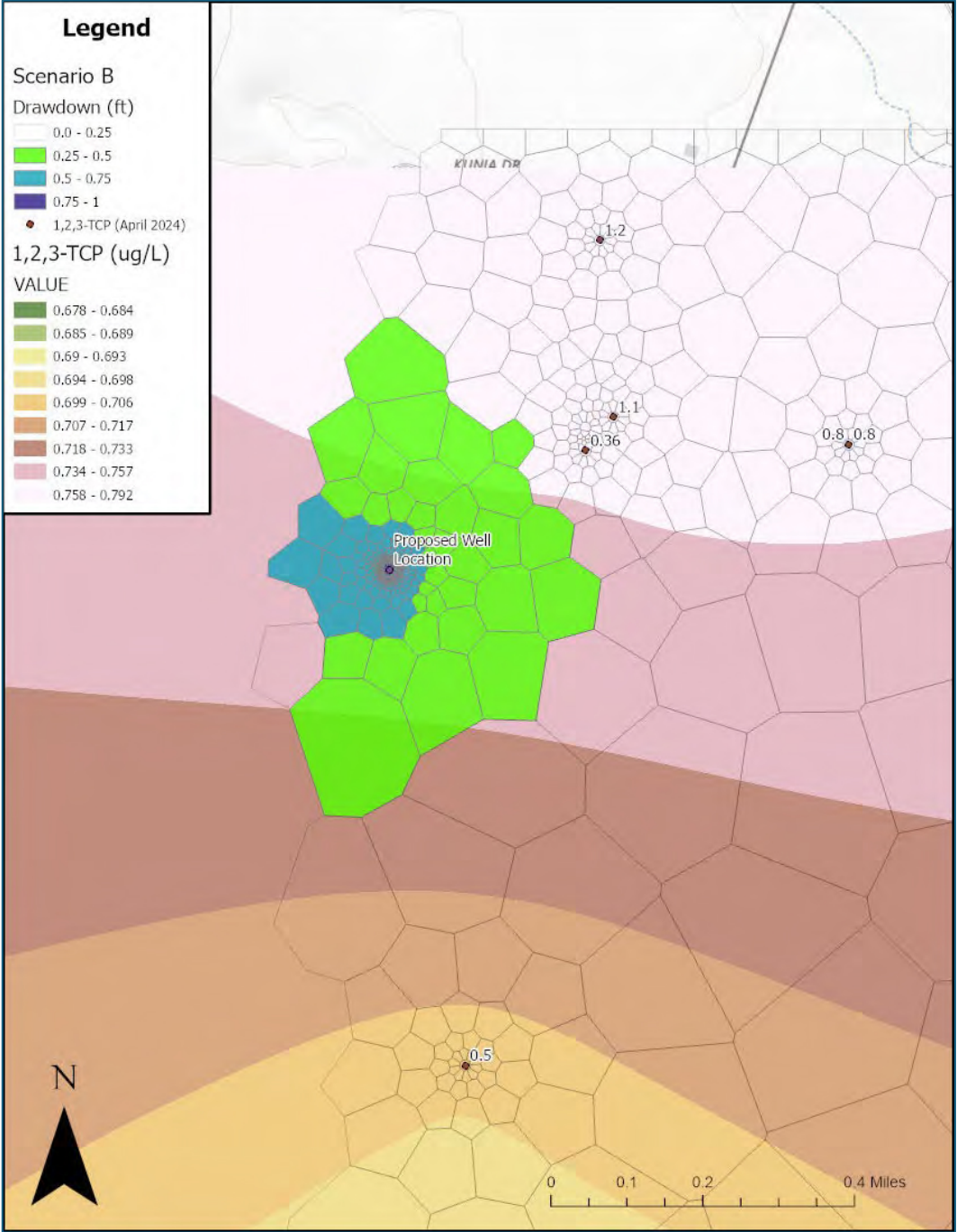




Kriged 1,2,3-TCP
Concentrations
(April 2024)
and
Modeled
Drawdown

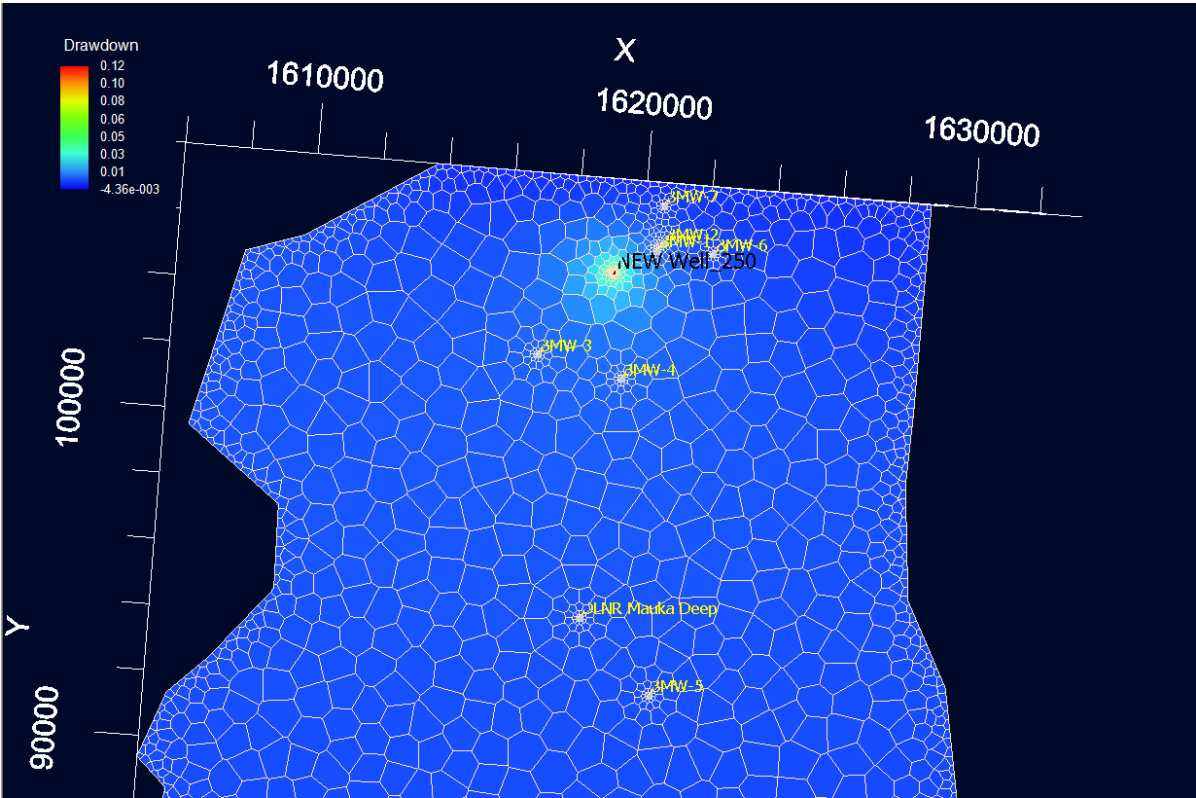
Layer 1

MCL: 0.6 ug/L

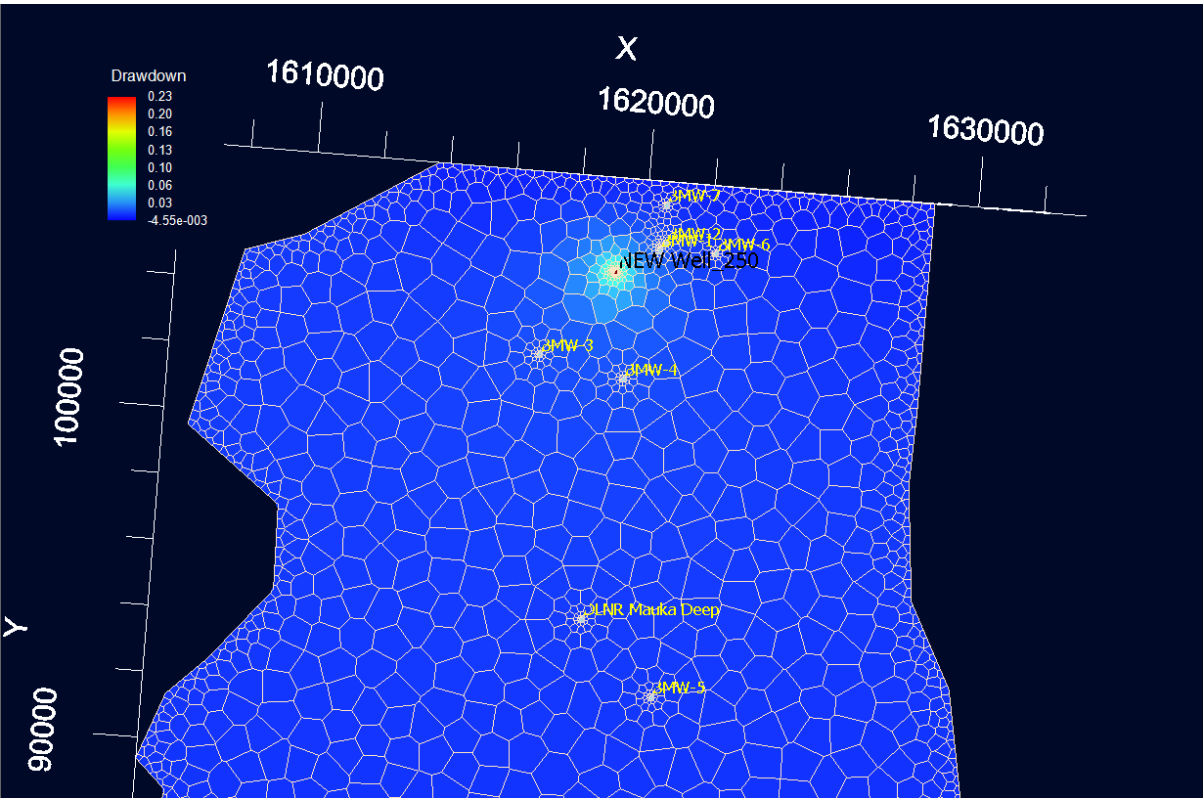


There are no COC detections to compare against modeled drawdown in the Waianae

Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
C	-375	-370	-350	-250	0.12 ft	5



Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
D	-375	-370	-350	-500	0.23 ft	5



NOTE THAT THE LEGEND/COLORMAP IS NOT THE SAME IN THESE TWO PANELS – See tables for maximum drawdown value at the pumping well



Key Takeaways*

*predictions limited to
the modeling objectives

- EPA's model generally agrees with previous analysis
- The saprolite effectively partitions flow between the Koolau and Waianae basalts under modeled pumping stress
- Modeled drawdown is relatively low in all cases, but ~4x higher if the well is completed in the Koolau
- Modeled drawdown (as a proxy for capture) overlaps with interpolated COCs above their respective MCL in the Koolau basalt below the site.
 - We do not have COC data for the drawdown area in the Waianae, but the only well, MW-3, was below MCLs (ND) during the last sampling event for all COCs

Recommendation: Complete the well below the saprolite and seal the borehole across the hydrostratigraphic units. This minimizes drawdown and the potential to capture site COCs—reducing treatment O&M costs and maximizing GAC longevity.



Considerations

- Flow partitioning depends on the saprolite being continuous, which may not be the case...
- Additionally, it's possible that there are wells, improperly abandoned or with long screens, that could act as conduits that would compromise the modeled flow field predictions.
- The well completion requirements for contaminated sites are not fully considered here – EPA would rely on State partners for specific recommendations on sealing across the two aquifer units
- For PFAS, GAC isn't going to remove the full range of the PFAS present. The current GAC system will be good enough for PFAS with MCLs, but not for all PFAS. Even so the operation and maintenance cost for the community will be significant.
- If the deeper well is drilled, the GAC, and possibly air stripper, can be used as an additional treatment buffer in case some contaminants reach the new well.
- Also, the GAC will last much longer due to the lower contaminant concentrations – lowering operation and maintenance costs.



BONUS SLIDES

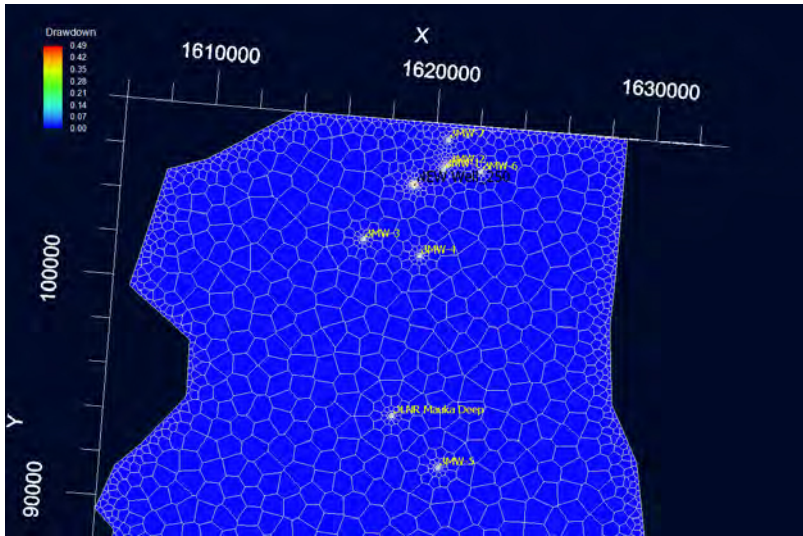
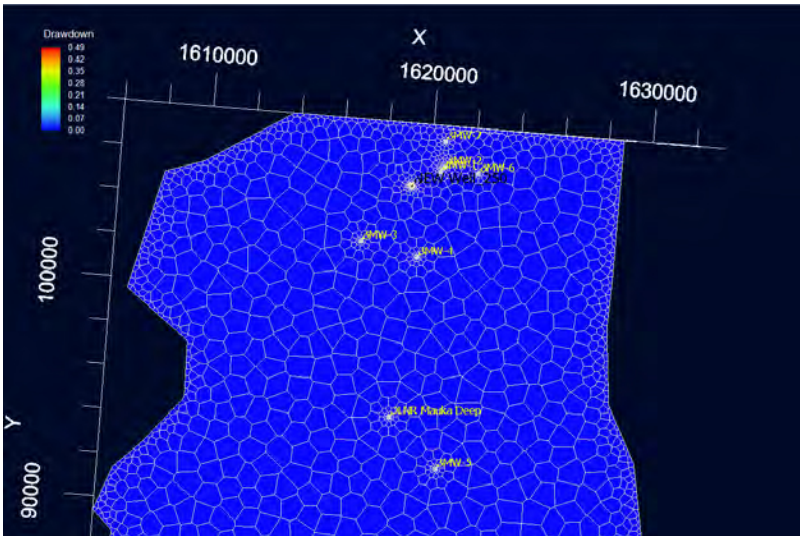
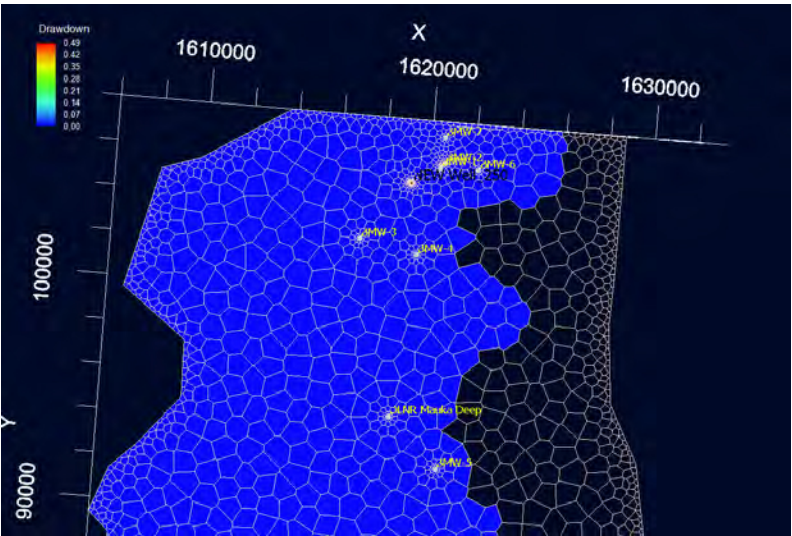
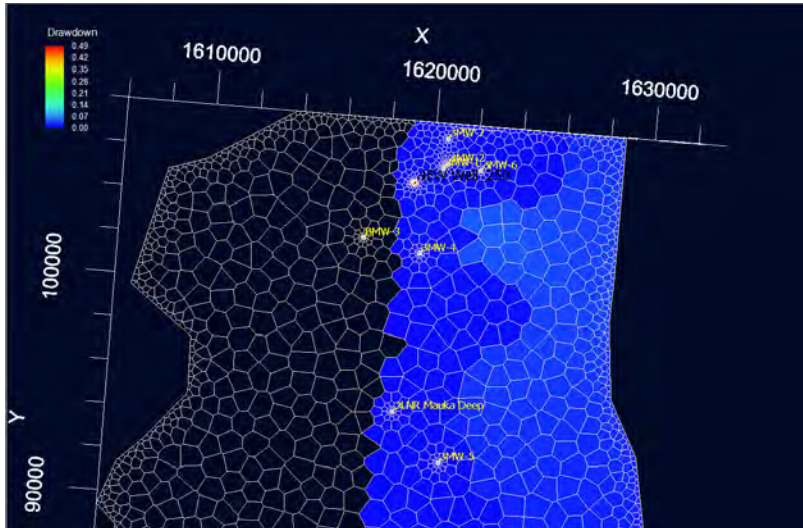
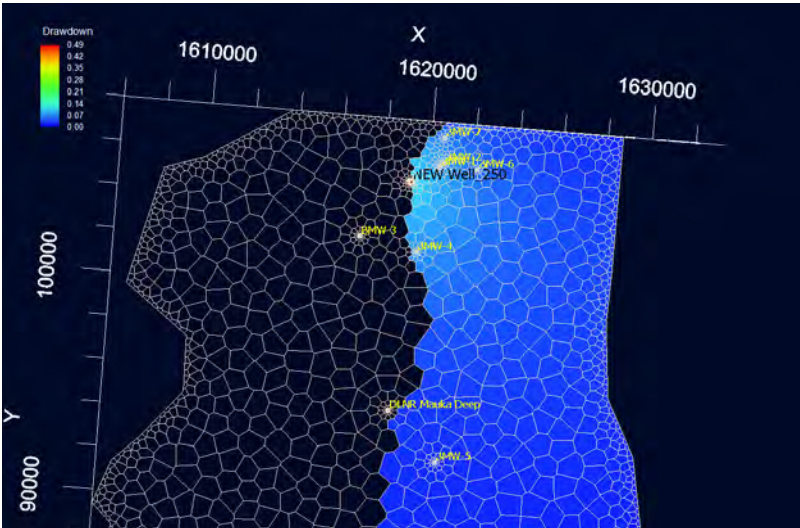
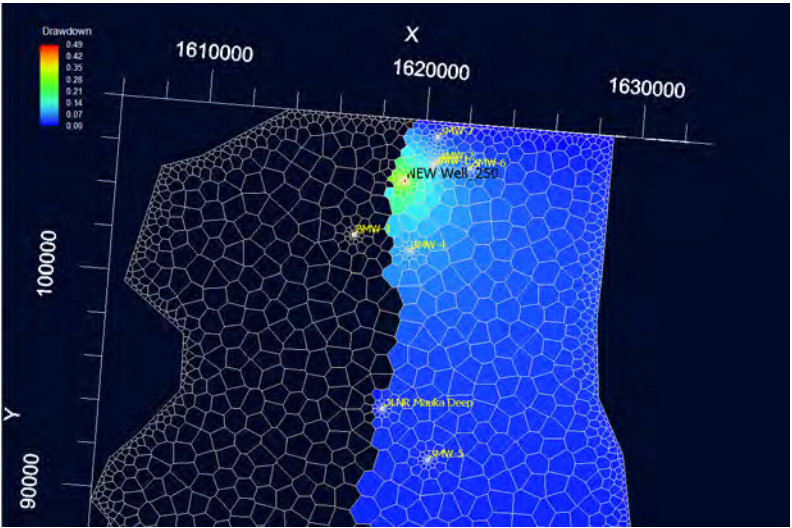
Layer by Layer Drawdown

(NOTE: non-uniform colormap/legend)





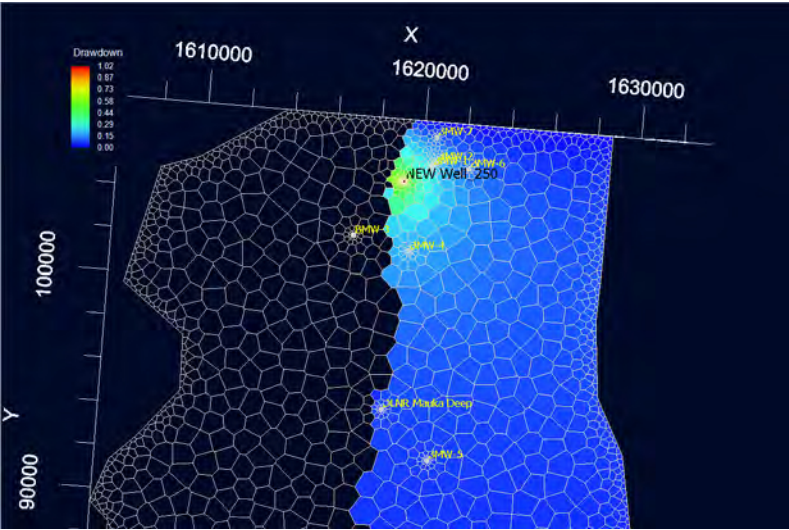
Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
A	-45	-40	0	-250	0.49 ft	1



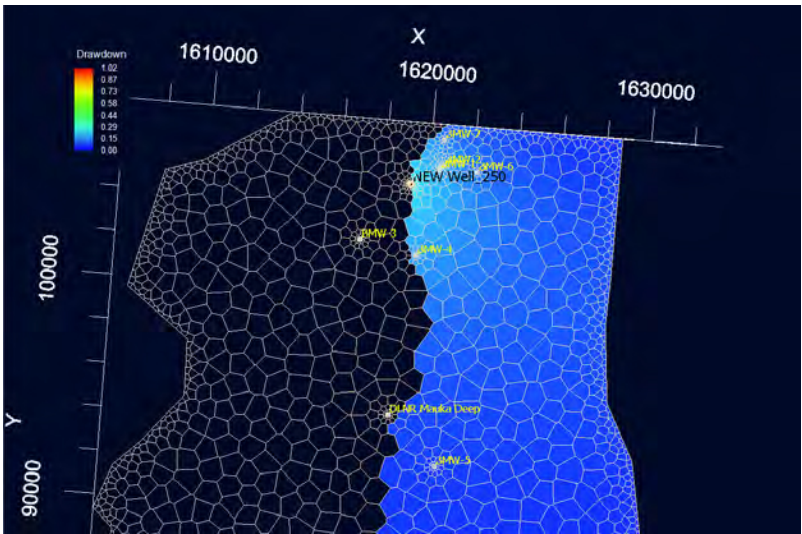


Modeled Drawdown (ft)

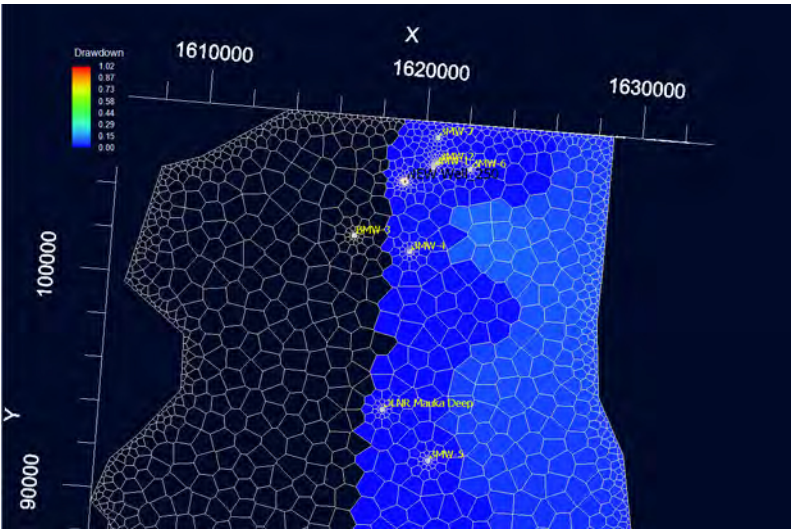
Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
B	-45	-40	0	-500	1.02 ft	1



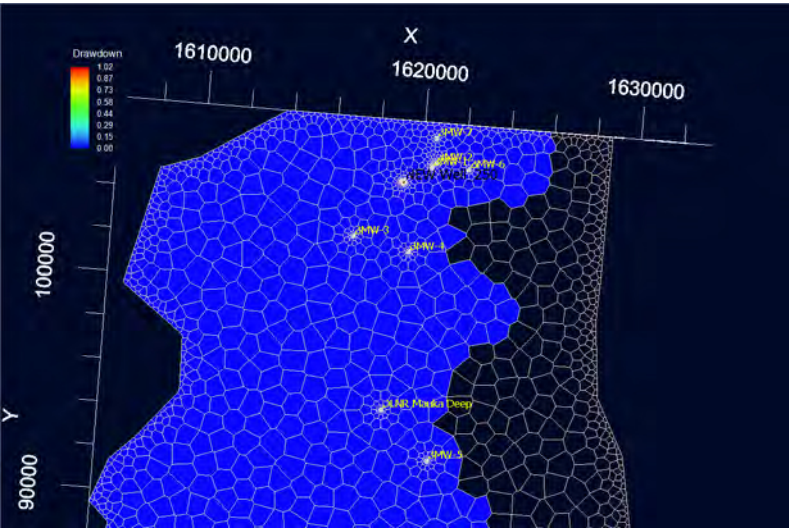
Layer 1 – Upper Koolau



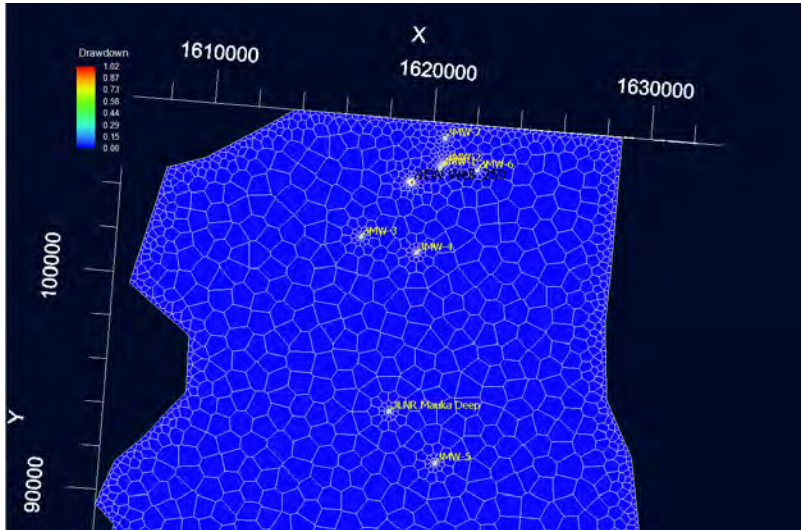
Layer 2 – Lower Koolau



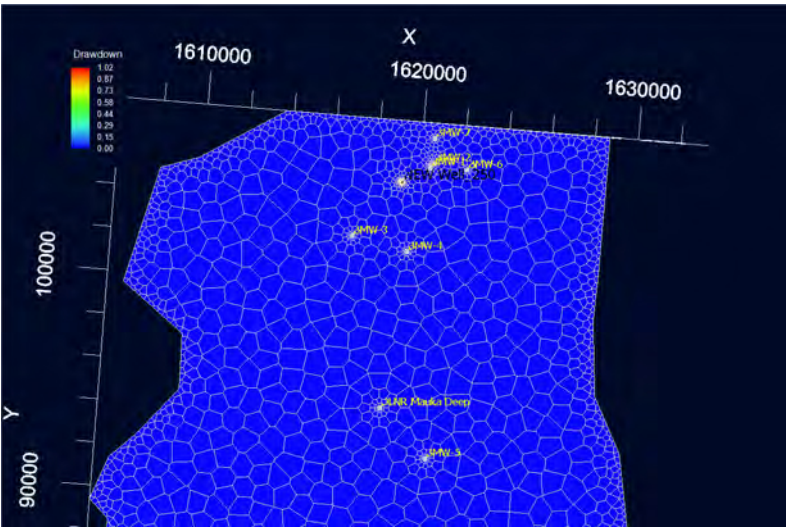
Layer 3 – Saprolite



Layer 4 – Upper Waianae



Layer 5 – Mid Waianae

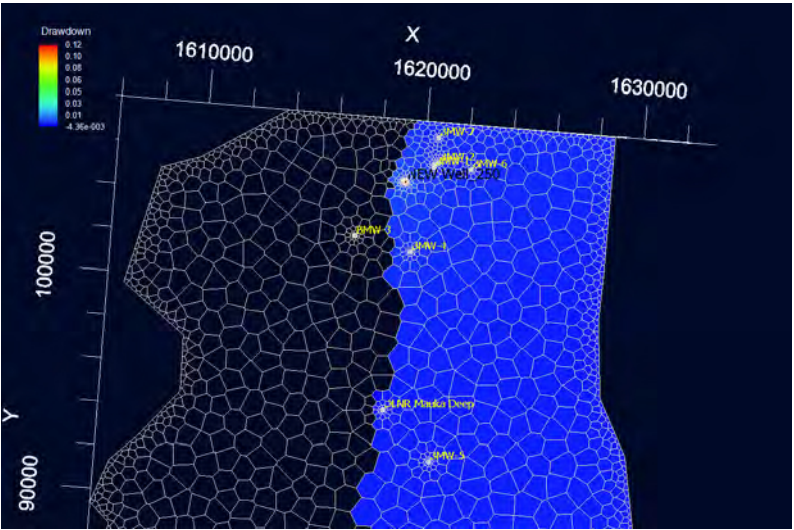


Layer 6 – Lower Waianae

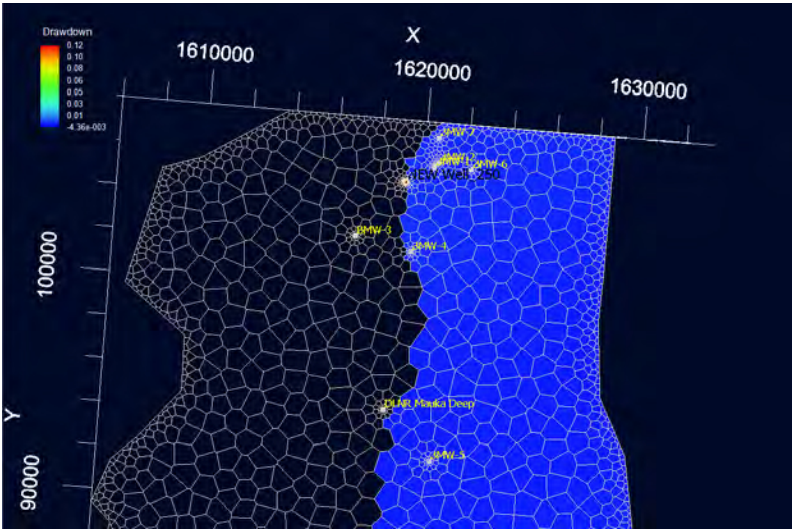


Modeled Drawdown (ft)

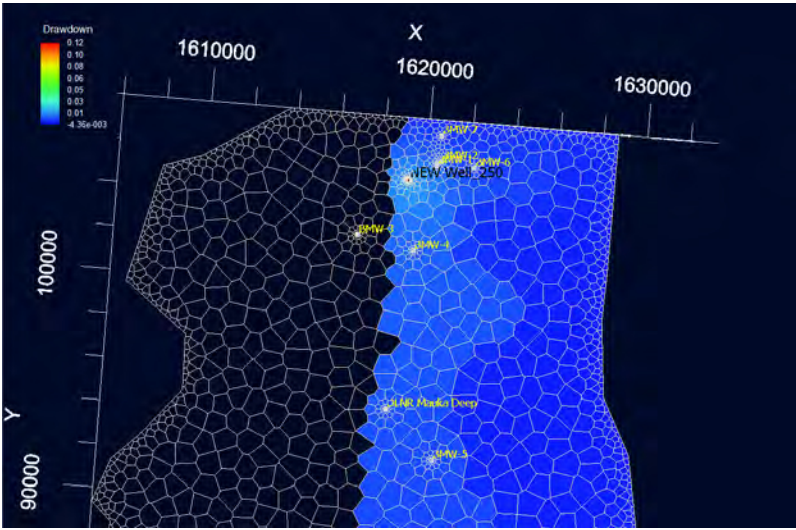
Scenario	Well Total Depth	Screen Bottom	Screen Top	Pump Rate	Max Drawdown	Max DD Layer
C	-375	-370	-350	-250	0.12 ft	5



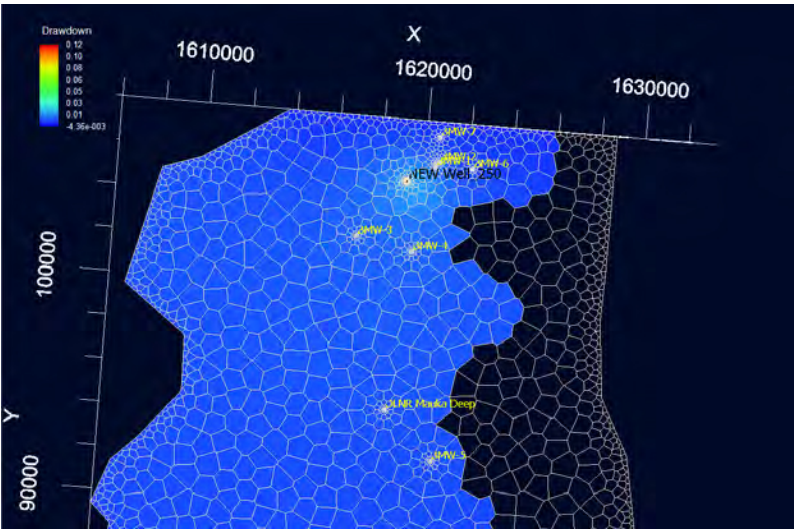
Layer 1 – Upper Koolau



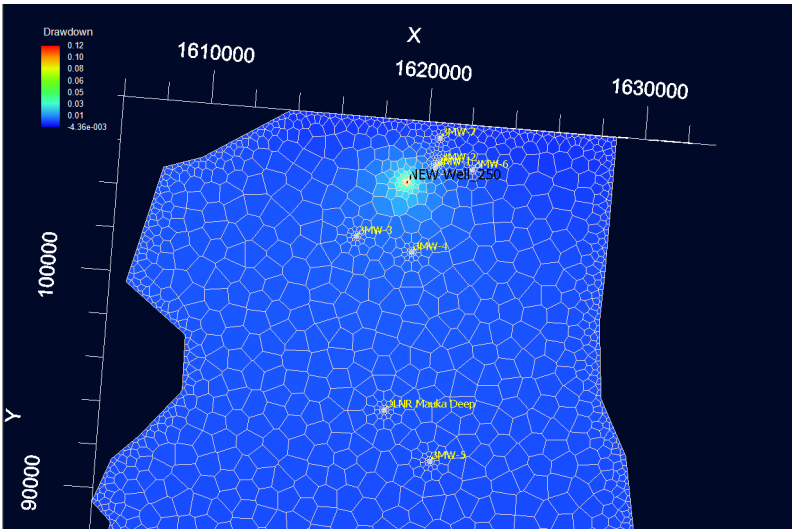
Layer 2 – Lower Koolau



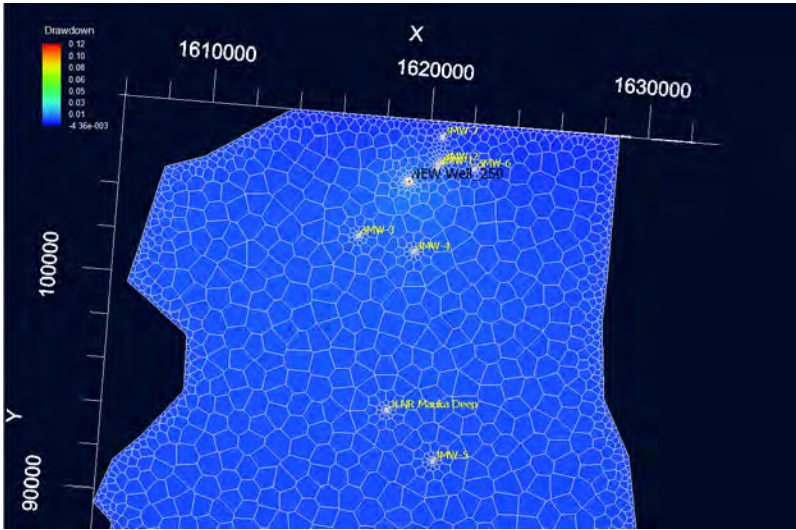
Layer 3 – Saprolite



Layer 4 – Upper Waianae



Layer 5 – Mid Waianae



Layer 6 – Lower Waianae



Layer 6 – Lower Waianae

Appendix E: US FWS Special Status Species List



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580



In Reply Refer To:

08/08/2024 19:13:23 UTC

Project Code: 2024-0127999

Project Name: Drinking water well Kunia Village, Oahu

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: <https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library>.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: <http://www.fws.gov/endangered/esa-library/index>.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at <https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf>.

Please be aware that wind energy projects should follow the Service's wind energy guidelines (<http://www.fws.gov/windenergy>) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers>
- <http://www.towerkill.com>
- <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow>

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0127999

Project Name: Drinking water well Kunia Village, Oahu

Project Type: Utility Infrastructure Maintenance

Project Description: A new source of potable water is required for Affordable housing at Kunia Village (96759). A 24" borehole will be made to a depth of 950 ft. below ground surface. Following construction the well will be sealed at ground level. A small removable equipment shed will cover the well.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@21.46237895,-158.06395062617167,14z>



Counties: Honolulu County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 37 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
<p>Hawaiian Hoary Bat <i>Lasiurus cinereus semotus</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/770</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6477.pdf</p>	Endangered

BIRDS

NAME	STATUS
<p>Band-rumped Storm-petrel <i>Hydrobates castro</i></p> <p>Population: USA (HI)</p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/1226</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6939.pdf</p>	Endangered
<p>Hawaiian Common Gallinule <i>Gallinula galeata sandvicensis</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/6612</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6934.pdf</p>	Endangered
<p>Hawaiian Coot (alae Ke`oke`o) <i>Fulica alai</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/7233</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6934.pdf</p>	Endangered
<p>Hawaiian Duck <i>Anas wyvilliana</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/7712</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6934.pdf</p>	Endangered
<p>Hawaiian Petrel <i>Pterodroma sandwichensis</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: https://ecos.fws.gov/ecp/species/6746</p> <p>General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6939.pdf</p>	Endangered
<p>Hawaiian Stilt <i>Himantopus mexicanus knudseni</i></p> <p>No critical habitat has been designated for this species.</p>	Endangered

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/2082 General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6934.pdf	
Newell's Shearwater <i>Puffinus newelli</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2048 General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/6939.pdf	Threatened

REPTILES

NAME	STATUS
Hawksbill Sea Turtle <i>Eretmochelys imbricata</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered

FLOWERING PLANTS

NAME	STATUS
(=native Yellow Hibiscus) Ma`o Hau Hele <i>Hibiscus brackenridgei</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4075	Endangered
`aiea <i>Nothocestrum latifolium</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1061	Endangered
`akoko <i>Euphorbia celastroides</i> var. <i>kaenana</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3842	Endangered
`akoko <i>Euphorbia kuwaleana</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6308	Endangered
`anaunau <i>Lepidium arbuscula</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2670	Endangered
`ena`ena <i>Pseudognaphalium sandwicensium</i> var. <i>molokaiense</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5993	Endangered
Bonamia <i>menziesii</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2503	Endangered
Hala Pepe <i>Dracaena forbesii</i>	Endangered

NAME	STATUS
There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5965	
Hawaiian Gardenia <i>Gardenia brighamii</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6853	Endangered
Ihi <i>Portulaca villosa</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4886	Endangered
Kamanomano <i>Cenchrus agrimonioides</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2928	Endangered
Kauila <i>Colubrina oppositifolia</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/850	Endangered
Ko'oko'olau <i>Bidens amplexans</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6313	Endangered
Kulu'i <i>Nototrichium humile</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1001	Endangered
Lobelia niuhauensis There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2278	Endangered
Makou <i>Peucedanum sandwicense</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5579	Threatened
Mehamehame <i>Flueggea neowawraea</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/109	Endangered
Nehe <i>Lipochaeta lobata</i> var. <i>leptophylla</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5211	Endangered
Nehe <i>Melanthera tenuifolia</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2407	Endangered
Neraudia angulata There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2750	Endangered
Nioi <i>Eugenia koolauensis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat.	Endangered

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/742	
Ohai <i>Sesbania tomentosa</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8453 General project design guidelines: https://ipac.ecosphere.fws.gov/project/YG24IPP7YRBCNKA2MKK7EV37IE/documents/generated/7050.pdf	Endangered
Round-leaved Chaff-flower <i>Achyranthes splendens</i> var. <i>rotundata</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4709	Endangered
Silene lanceolata There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5746	Endangered
Spermolepis hawaiiensis There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1670	Endangered
Uhiuhi <i>Mezoneuron kavaense</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7129	Endangered
Vigna o-wahuensis There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8445	Endangered

FERNS AND ALLIES

NAME	STATUS
Microlepis strigosa var. <i>mauiensis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4737	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "[Supplemental Information on Migratory Birds and Eagles](#)".

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "[Supplemental Information on Migratory Birds and Eagles](#)".

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
O'ahu 'amakihi <i>Chlorodrepanis flava</i> This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9592	Breeds Apr 1 to Jul 1

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

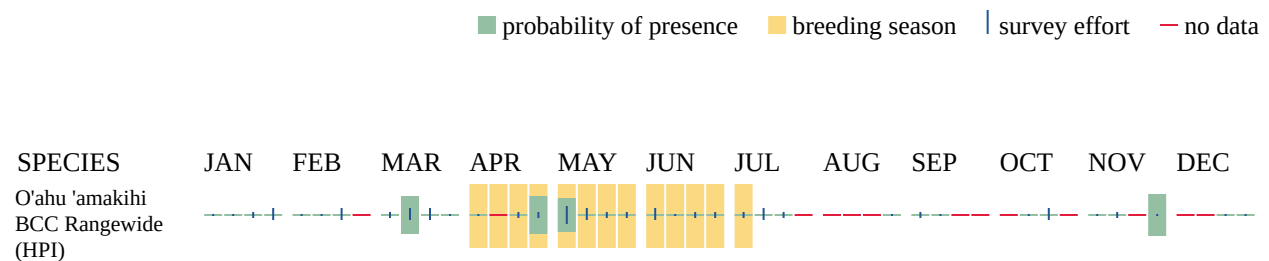
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND

- PEM1C

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: David Robichaux
Address: 66 031 Mahaulu Lane
City: Haleiwa
State: HI
Zip: 96712
Email: robichaud001@hawaii.rr.com
Phone: 8083685352

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Environmental Protection Agency
Name: Judy Hayducsko
Email: judy.hayducsko@doh.hawaii.gov
Phone: 8085864267

You have indicated that your project falls under or receives funding through the following special project authorities:

- BIPARTISAN INFRASTRUCTURE LAW (BIL) (OTHER)

APPENDIX F

MATERIAL SAFETY DATA SHEETS FOR POTENTIAL FOAMING AGENTS

**Material Safety Data Sheet
FOAMER ES**

Material Identification and Use

MANUFACTURER'S NAME CONTROL CHEMICAL (1989) CORPORATION
MANUFACTURER'S ADDRESS 7016 30 Street SE Calgary, Alberta T2C 1N9
EMERGENCY PHONE NUMBER (403) 720-7044
SUPPLIER IDENTIFIER
SUPPLIER'S ADDRESS
SUPPLIER EMERGENCY PHONE NUMBER
PRODUCT IDENTIFIER FOAMER ES
PRODUCT USE

Hazardous Ingredients of Materials

Chemical Identity	Concentration	CAS#/NA#/UN#	LD(50)	LC(50)
Sodium Olefin Sulphonate	30-40%	CAS 68439-57-6	3,900 mg/kg (Oral, Rabbit)	

Physical Data For Product

PHYSICAL STATE Liquid
ODOUR AND APPEARANCE Clear, pale yellow liquid, bland odour.
ODOUR THRESHOLD Not Available
SPECIFIC GRAVITY 1.05
VAPOUR PRESSURE Same as water
VAPOUR DENSITY (air=1) same as water
EVAPORATION RATE same as water
BOILING POINT 106 degrees C
FREEZING POINT -3 degrees C
pH 8.0 (10% in D.W.)
DENSITY (g/ml) 1.05
COEFFICIENT OF WATER/OIL DISTRIBUTION

Fire and Explosion Hazard of Product

CONDITIONS OF FLAMMABILITY Will burn after drying
MEANS OF EXTINCTION Water fog, Foam, CO₂, Dry Chemical
FLASHPOINT AND METHOD OF DETERMINATION >93.3 degrees C (PM/CC)
UPPER EXPLOSION LIMIT(% BY VOL) Not Applicable
LOWER EXPLOSION LIMIT(% BY VOL) Not Applicable
AUTO-IGNITION TEMPERATURE Not Applicable
FLAMMABILITY CLASSIFICATION
HAZARDOUS COMBUSTION PRODUCTS Oxides of carbon and sulphur and products of incomplete combustion
EXPLOSION DATA Not sensitive.
SENSITIVITY TO STATIC DISCHARGE Not sensitive.

Reactivity Data

CHEMICAL STABILITY Stable under normal conditions. Hazardous polymerization will not occur.
INCOMPATIBLE MATERIALS Avoid strong oxidizing and reducing agents.

Material Safety Data Sheet
FOAMER ES

CONDITIONS OF REACTIVITY Avoid contamination with reactive substances.
HAZARDOUS DECOMPOSITION PRODUCTS Not available.

Toxicological Properties of Product

ROUTES OF ENTRY
SKIN CONTACT No effects of exposure expected due to contact.
Prolonged contact may cause skin irritation or dermatitis
in some individuals.
SKIN ABSORPTION Not available
EYE Will cause painful burning or stinging of eyes and lids,
watering of eyes, and inflammation of conjunctiva.
INHALATION Not available
INGESTION May cause nausea and vomiting.
ACUTE OVER EXPOSURE EFFECTS
CHRONIC OVER EXPOSURE EFFECTS Skin irritation or dermatitis may occur upon frequent or
prolonged contact.
EXPOSURE LIMITS Not established.
IRRITANCY OF PRODUCT Skin: mild irritant Eye: severe irritant.
SENSITIZATION TO MATERIAL Repeated or prolonged contact may cause sensitization in
some individuals.
CARCINOGENICITY, REPRODUCTIVE EFFECTS Product has not been listed as a carcinogen or potential
carcinogen by either the ACGIH or the IARC.
TERATOGENICITY, MUTAGENICITY Possible teratogen, Mutagenicity: Not available
TOXICOLOGICALLY SYNERGISTIC PRODUCTS Chlorosultones

Preventive Measures

PERSONAL PROTECTIVE EQUIPMENT Chemical goggles, rubber or plastic gloves, and clothing
as required to protect against contact. If mist and/or hot
vapors are present, use air-purifying respirator or self-
contained breathing apparatus as required.
SPECIFIC ENGINEERING CONTROLS Use with adequate ventilation for misting operations.
LEAK AND SPILL PROCEDURES Small amounts - Flush with water. Large amounts -
contain spill and collect into waste container. Absorb
remaining product with earth or sand and dispose of with
solid waste. Flush area with water.
WASTE DISPOSAL Dispose of waste according to federal, provincial, and
local regulations.
HANDLING PROCEDURES AND EQUIPMENT Avoid prolonged or frequent contact when handling
material. Avoid breathing mists or vapor. Handle only
in adequately ventilated areas.
STORAGE REQUIREMENTS Store at room temperature 20 - 30 degrees C.
SPECIAL SHIPPING INFORMATION Not Regulated.

First Aid Measures

SPECIFIC FIRST AID PROCEDURES Flush eyes with abundant water. Wash skin with soap
and water. If ingested, give water. DO NOT induce
vomiting. Call a physician.

Preparation Date of Material Safety Data Sheet

Material Safety Data Sheet
FOAMER ES

PREPARED BY Safety Committee
PHONE NUMBER OF PREPARER..... (403) 720-7044
DATE PREPARED.....January 2, 2010

The information contained herein is based on data believed to be reliable, but is presented without guarantee or warranty and Control Chemical (1989) Corporation disclaims any liability incurred from the use thereof.

Alpha Olefin Sulfonate

Safety Data Sheet according to Federal Register / Vol. 77, No. 58 /
March 26, 2012 / Rules and Regulation

Revision Date: 14-Oct-2021
Supersedes: 30-Aug-2018

1 PRODUCT & COMPANY IDENTIFICATION

Product Name: Alpha Olefin Sulfonate
Synonyms: Not available
INCI Name: Sodium C14-16 Alpha Olefin Sulfonate
CAS Number: 68439-57-6
Formula: $\text{RCH=CH(CH}_2\text{)}_n\text{SO}_3\text{Na}$ n: 14-16 or 14-18
Product Form: Liquid
Product Use: Cosmetic use

Distributor: MakingCosmetics.com Inc.
Address: 10800 231st Way NE
Redmond, WA 9853 (USA)
Phone / Fax: 425-292-9502 / 425-292-9601
Web: www.makingcosmetics.com

Emergency Telephone Number: 1-800-424-9300 (Chemtrec)

2 HAZARDS IDENTIFICATION

GHS Classification: Skin Irritation - Category 2
Eye Irritation - Category 2
Aquatic Chronic Toxicity- Category 2
Eye Damage - Category 1
Acute Toxicity - Category 4

GHS Signal Word:

WARNING!

GHS Hazard Pictograms:



GHS Hazard Statements:

H315: Causes skin irritation
H318: Causes serious eye damage
H319: Causes serious eye irritation
H411: Toxic to aquatic life with long-lasting effects
P281: Use personal protective equipment as required
P273: Avoid release to the environment.

GHS Precautionary Statements:

Potential Health Hazards:

Eyes: Irritant.
Inhalation: May be irritant, but no data available.
Skin: May be irritant.
Ingestion: May be irritant, but no data available.

NFPA Ratings (704):

Health	0	Minimal
Flammability	0	Minimal
Reactivity	0	Minimal
Specific Hazard	N/A	

3 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Weight %	Molecular Weight
Sulfonic Acids, C14-16-Alkane Hydroxy and C14-16 Alkene, Sodium Salts	68439-57-6	36-42%	Not available
Sodium Chloride	7647-14-5	0-1%	Not available
Sodium Sulfate (Solution)	7757-82-6	0-1%	Not available
Water	7732-18-5	56-64%	Not available

4 FIRST AID MEASURES

Eyes: In case of eye contact, rinse with plenty of water and seek medical attention if necessary.
Inhalation: Move casualty to fresh air and keep at rest. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention if necessary.
Skin: Flush with plenty of water and wash using soap. Remove all contaminated clothes and shoes. Get medical attention if necessary.

Ingestion: Drink plenty of water. Do Not Induce Vomiting! Never give anything by mouth to an unconscious person. Get medical attention if necessary.

5 FIRE-FIGHTING MEASURES

Suitable (and unsuitable) extinguishing media: May be combustible at high temperature. Use appropriate media (water spray, foam, carbon dioxide, dry chemical) for adjacent fire. Do not use direct water jet.

Special protective equipment & precautions for firefighters: Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots.

Flash Points: No data available

Specific hazards arising from the chemical: May emit toxic fumes under fire conditions. See also Stability and Reactivity section.

6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment & emergency procedures: Do not try to clean up the leak without proper protective equipment. See section 8 for recommendations on the use of personal protective equipment.

Environmental precautions: Avoid liquid release into sewers/public water. Notify environmental authorities in case of large leaks.

Methods and material for containment and cleaning up: Sweep up and place in suitable, closed containers for disposal. Clean surfaces thoroughly with water to remove residual contamination. Dispose of all waste and cleanup materials in accordance with regulations.

7 HANDLING & STORAGE

Precautions for safe handling: See section 8 for recommendations on the use of personal protective equipment. Keep container closed when not in use.

Conditions for safe storage, incl. any incompatibilities: Store in cool, dry well-ventilated area. Keep away from heat and incompatible materials (see section 10 for incompatibilities).

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	Exposure Limits	Basis	Entity
Alpha Olefin Sulfonate	Not available		

TWA: Time Weighted Average over 8 hours of work.
 TLV: Threshold Limit Value over 8 hours of work.
 REL: Recommended Exposure Limit
 PEL: Permissible Exposure Limit

STEL: Short Term Exposure Limit during x minutes.
 IDLH: Immediately Dangerous to Life or Health
 WEEL: Workplace Environmental Exposure Levels
 CEIL: Ceiling

Personal Protection:

Eyes: Wear chemical safety glasses or goggles, if splashes are likely to occur wear a face shield.

Inhalation: Not needed under normal conditions of use. Ensure adequate ventilation, especially in confined areas.

Body: Slip proof shoes may be worn where spills may occur. Suitable protective clothing should be worn.

Other: Use good personal hygiene practices. Provide eyewash stations, quick-drench showers and washing facilities accessible to areas of use and handling

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Liquid	Vapor Pressure:	25 mm HG @ 25°C
Odor:	Slight	Vapor Density:	No data available
Odor Threshold:	No data available	Evaporation Rate:	Not available
Color:	Amber to yellow	Flammability:	May be combustible
Molecular Weight:	No data available	Upper/lower Explosive Limit:	No data available
pH (1% sol. in water):	7.0-9.0	Flash Point:	No data available
Boiling Point:	>100°C (212°F)	Specific Gravity:	1.05 (water = 1)
Melting Point:	No data available	Solubility:	Soluble in all proportions of water

Relative Density:	No data available	Auto-Ignition Temperature:	No data available
Partition Coefficient: n-octanol/water:	No data available	Decomposition Temperature:	No data available
Viscosity:	No data available	Explosive Properties:	No data available
Oxidizing Properties:	No data available	Freezing Point:	No data available
Volatile Weight %:	56.0-64.0%		

10 STABILITY AND REACTIVITY

Reactivity:	Product is stable.
Chemical Stability:	Product is stable.
Hazardous Polymerization:	No data available
Conditions to Avoid:	Avoid strong oxidizers.
Incompatible Materials:	Strong oxidizing agents.
Hazardous Decomposition Products:	None known.

11 TOXICOLOGICAL INFORMATION

Acute Toxicity:	No data available
Skin:	LD50: Sulfonic Acids, C14-16-Alkane hydroxy and C14-16 Alkene, Sodium Salts: 6300 mg/kg
Eyes:	Irritant
Respiratory:	No data available
Ingestion:	LD50: Sulfonic Acids, C14-16-Alkane hydroxy and C14-16 Alkene, Sodium Salts: 2310 mg/kg LD50: Sodium Sulfate: 10000 mg/kg
Carcinogenicity:	No data available
Teratogenicity:	No data available
Germ Cell Mutagenicity:	No data available
Embryotoxicity:	No data available
Specific Target Organ Toxicity:	No data available
Reproductive Toxicity:	No data available
Respiratory/Skin Sensitization:	No data available
Corrosivity:	No data available
Sensitization:	No data available
Irritation:	No data available
Repeated Dose Toxicity:	No data available

12 ECOLOGICAL INFORMATION

Ecotoxicity:	
Aquatic Vertebrate:	Sodium Chloride: 1000 mg/L (48h) (water flea) Sodium Sulfate (solution): 2564 mg/L (48h) (water flea) Sodium Sulfate (solution): 4547 mg/L (96h) (water flea)
Aquatic Invertebrate:	No data available
Terrestrial:	No data available
Persistence and Degradability:	Readily biodegradable. Complies with the biodegradability criteria as laid down in regulation (EC) No. 648/2004
Bioaccumulative Potential:	No data available
Mobility in Soil:	No data available
PBT and vPvB Assessment:	No data available
Other Adverse Effects:	No data available

13 DISPOSAL CONSIDERATIONS

Waste Residues:	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies, if necessary, before disposing of waste product container.
Product Containers:	Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies, if necessary, before disposing of waste product container.

The information in section 13 is for the product as shipped. Use and/or alterations to the product may change the characteristics of

the material and alter the waste classification and proper disposal methods

14 TRANSPORT INFORMATION

DOT (Dept. of Transportation, USA):	Not regulated
TDG (Transportation of Dangerous Goods, Canada):	Not regulated
IMDG (International Maritime Dangerous Goods):	Not regulated
IATA (International Air Transport Association):	Not regulated
ICAO (International Civil Aviation Organization):	Not regulated

15 REGULATORY INFORMATION

TSCA Inventory Status:	No data available
DSCL (EEC):	No data available
WHMIS (Canada):	No data available
DSL (Canada):	No data available
EU EINECS/ELINCS/NLP:	No data available
China IECSC:	No data available
China IECIC (06.30.2014):	No data available
Australia AICS:	No data available
Japan ENCS:	No data available
Philippines PICCS:	No data available
Korea KECI:	No data available
New Zealand NZIoC:	No data available
SARA 313:	Sections 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.
SARA 311/312 Hazardous Categorization:	Acute Health Hazard: Yes Chronic Health Hazard: No Fire Hazard: No Sudden Release of Pressure Hazard: No Reactive Hazard: No
Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61):	This product does not contain any HAPs.
CA Prop 65:	This is to certify that this product complies with Proposition 65 regulations. No additional labeling and/or warnings are required.

16 OTHER INFORMATION

Revision Date:	14-Oct-2021
Compliance:	This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200
Disclaimer:	This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. Such information is to be the best of the company's knowledge and believed accurate and reliable as of the date indicated. However, no representation, warranty or guarantee of any kind, express or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitability & completeness of such information for his own particular use.