BOARD OF WATER SUPPLY

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

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SEP 23 2015

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Deputy Manager and Chief Engineer

September 2, 2015

RECEIVED
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OFC. OF ENVIRONMENTAL QUALITY CONTROL

Ms. Jessica Wooley, Director
State of Hawaii
Department of Health
Office of Environmental Quality Control
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

Dear Ms. Wooley:

Subject: Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for Lualualei Line Booster System Improvements

The Board of Water Supply hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the proposed Lualualei Line Booster System Improvements, situated at TMK 8-7-007: 005, in the Waianae District on the island of Oahu for publication in the next available edition of the Environmental Notice.

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

If you have any questions, please contact Chungho Lee, Mechanical/Electrical Branch Head, at 748-5823 or via email at clee@hbws.org.

Very truly yours,

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

Attachments: Two (2) hard copies of DEA-AFONSI
One (1) electronic copy of DEA-AFONSI
One (1) hard copy of OEQC Publication Form
One (1) electronic copy of OEQC Publication Form

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

Project Name:	Lualualei Booster Line System Improvements
Island:	O‘ahu
District:	Wai‘anae
TMK:	(1) 8-7-007:005
Permits:	City & County of Honolulu Building Permit
Proposing/ Determination Agency:	Honolulu Board of Water Supply 630 South Beretania Street, Honolulu, Hawaii 96813 Contact: Chungho Lee, phone (808) 748-5823, email clee@hbws.org
Accepting Authority:	Honolulu Board of Water Supply
Consultant:	Townscape, Inc., 900 Fort Street Mall, Suite 1160, Honolulu, Hawaii 96813 Contact: Gabrielle Sham, phone (808) 536-6999, email gabrielle@townscapeinc.com

Status (check one only):

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

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

The Honolulu Board of Water Supply (BWS) is proposing to construct a new replacement pump station building including new pumps and equipment at the Lualualei Line Booster pump station located at 87-195 Hakimo Road, Wai‘anae (Tax Map Key 8-7-007: 005). The new pump station will be constructed on the same property and will replace the existing pump station which was originally constructed in 1965.

This project will increase the pumping capacity of the Lualualei Line Booster station from its current 2 million gallons per day (MGD) capacity to a new 5 MGD capacity. The new pump station building is designed as a single-story 2,100-square feet concrete structure. New underground piping and valves will be installed and connected to the existing BWS water transmission system. After the new pump station is constructed and operational, the existing 360-square feet pump station building and pumping equipment will be removed.

Project construction is tentatively scheduled for year 2017 with an estimated $2 million construction cost to be funded by BWS.

Draft Environmental Assessment for the

LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENTS

District of Wai‘anae, Island of O‘ahu, Hawai‘i

September 2015

Prepared for:
Board of Water Supply

Prepared by:
ownscape, Inc.

PROJECT SUMMARY

Project Name:	Lualualei Line Booster System Improvements
Applicant:	Board of Water Supply City and County of Honolulu 630 South Beretania Street Honolulu, HI 96843 Contact: Mr. Chungho Lee Phone: (808) 748-5823 E-mail: clee@hbws.org
Approving Agency:	Board of Water Supply City and County of Honolulu 630 South Beretania Street Honolulu, HI 96843
Consultant:	Townscape, Inc. 900 Fort Street Mall, Suite 1160 Honolulu, HI 96813 Contact: Ms. Gabrielle Sham Phone: (808) 536-6999 E-mail: gabrielle@townscapeinc.com
Project Location:	District of Waiʻanae
Tax Map Key:	(1) 8-7-007:005
Land Area:	0.33 acres
Location:	87-195 Hakimo Road
State Land Use District:	Agriculture
Existing Zoning:	AG-2
Anticipated Determination:	Finding of No Significant Impact (FONSI)

Agencies and Parties Consulted:

State
Commission on Water Resource Management
Department of Business, Economic Development & Tourism
Department of Health
Department of Land and Natural Resources
Department of Transportation
Hawaiʻi State House of Representatives, District 43
Hawaiʻi State Senate, District 21

City

Board of Water Supply
Department of Environmental Services
Department of Facility Maintenance
Department of Planning and Permitting
Department of Transportation Services
Honolulu City Council, District 1
Honolulu Police Department
Honolulu Fire Department

Other

Nānākuli/Mā‘ili Neighborhood Board No.36
Kamehameha Schools

Responses received during initial consultation:

Board of Water Supply
Department of Facility Maintenance
Department of Transportation Services
Honolulu Fire Department
Kamehameha Schools

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Appendix B: Landscape Plan

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Appendix D: Determination Letter from SHPD

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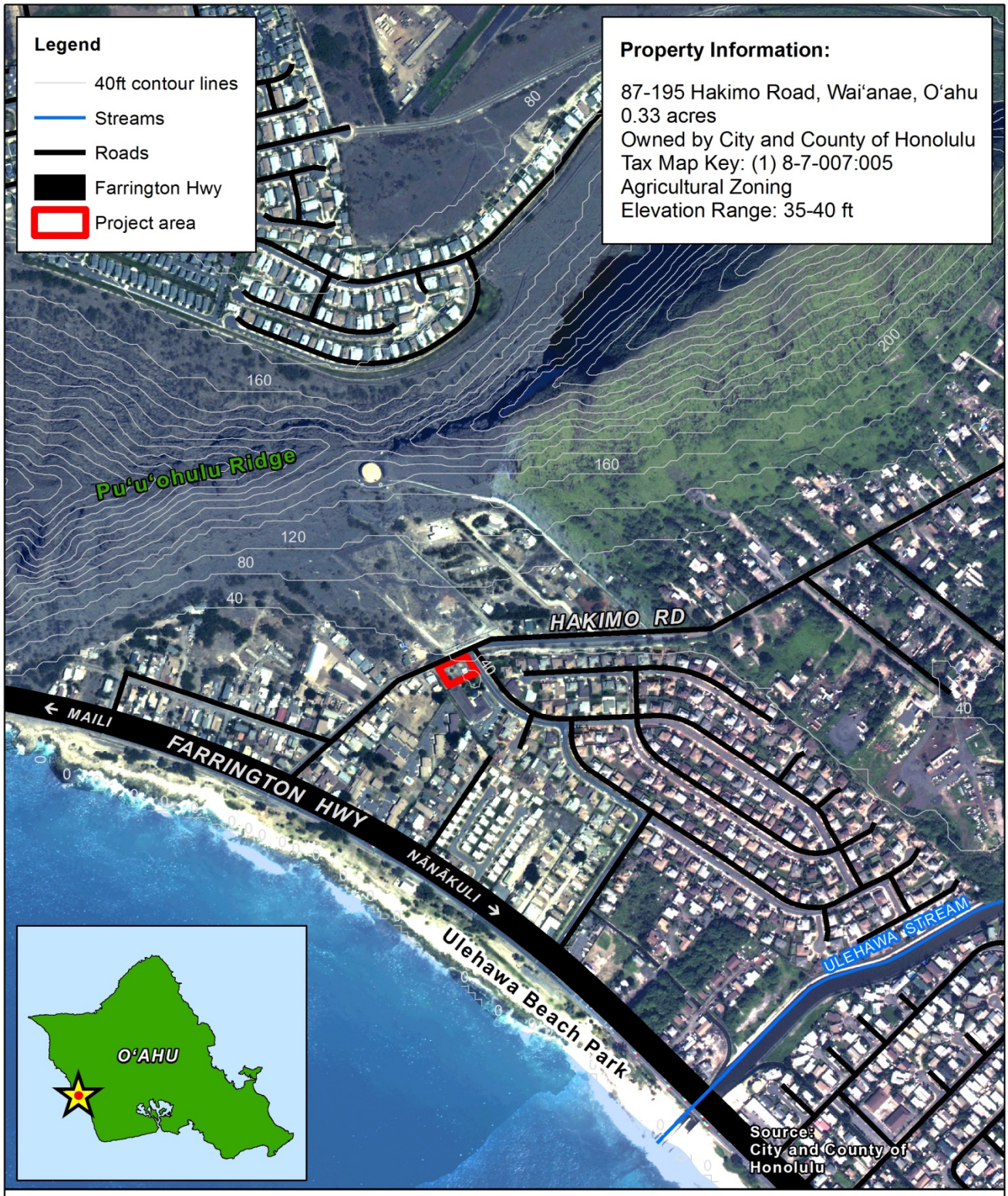
List of Acronyms

BWS	Board of Water Supply
City	City and County of Honolulu
CMU	Concrete Masonry Unit
CSH	Cultural Surveys Hawai‘i
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
DOH	Department of Health
DPP	Department of Planning and Permitting
EA	Environmental Assessment
HAR	Hawai‘i Administrative Rules
HRS	Hawai‘i Revised Statutes
mgd	million gallons per day
NPDES	National Pollutant Discharge Elimination System
SCP	Sustainable Communities Plan
SHPD	State Historic Preservation Division
SMA	Special Management Area
TMK	Tax Map Key
WWTP	Wastewater Treatment Plant
WWMP	Wai‘anae Watershed Management Plan



BWS LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENT PROJECT
Figure 1. Project Location

1. INTRODUCTION

1.1. Background

The City & County of Honolulu Board of Water Supply (BWS) is proposing to upgrade and replace an existing potable water pump station building located in the ahupuaʻa of Lualualei, District of Waiʻanae.

Pursuant to Chapter 343, Hawaiʻi Revised Statutes (HRS), an environmental review is required. This environmental review is triggered by:

- Use of City lands and funds

The BWS also recognizes the presence of many historical and cultural sites and resources in the Waiʻanae District, and therefore the importance of developing environmental assessments for the BWS projects in Waiʻanae.

The project consultants for the design team are as follows:

- Okahara and Associates, Inc.—Prime Consultant, Civil and Mechanical
- Architects Pacific, Inc.—Architectural
- Muranaka Environmental Consultants, Inc.—Environmental
- KAI Hawaii, Inc.—Structural
- Ronald N.S. Ho & Associates, Inc.—Electrical
- Y. Ebisu & Associates, Inc.—Acoustical
- Control Point Surveying, Inc.—Land Survey

1.2. Project Description

1.2.1. Project Location and Purpose

The project site is located in the ahupuaʻa of Lualualei, District of Waiʻanae (Tax Map Key 8-7-007: 005). The street address of the project site is 87-195 Hakimo Road; bordered by Hakimo Road to the northwest and Waiolu Street to the northeast. The project area is zoned for agricultural use. The immediate neighborhood consists of single family homes and the Kamehameha Schools' Hoaliku Drake Preschool.

The existing 360-square foot pump station building was constructed circa 1965.The existing building consists of concrete masonry unit (CMU) walls and a wood roof with a concrete foundation. It houses two pumps with a total pumping capacity of 2 million gallons per day (mgd) and 30-horsepower motor rating. Only one pump is used under current normal operations while the other pump serves as the back-up pump. The existing building was originally planned as a "temporary building," with a "permanent building" to be constructed in the future.

The BWS provides approximately 90 percent of the potable water in Waiʻanae. The potable water demand is projected to increase in Waiʻanae, by about 2 mgd by the year 2030 to a total of about 11 mgd. The purpose of the Lualualei Line Booster System Improvements is to increase water supply to the leeward side of Oʻahu—Lualualei, Waiʻanae and Mākaha. The

proposed project will increase pumping capacity to 5 mgd to meet current demands and anticipated water demands in the future.

1.2.2. Project Description

The project site is approximately 0.33 acres. The new pump station building will be a one-story building, approximately 2,116 square feet, with CMU walls and a concrete roof on a concrete foundation. New underground piping and valves will be connected to the exiting BWS system. The existing pump station building, pumping units, and electrical controls will be demolished and removed after the new pump station is constructed.

The new building will also house two pumps; one pump will be used while the other pump will remain as a back-up pump. However, the pumping capacity will be increased to 5 mgd, with a motor rating of 50-horsepower.

In addition to housing the pumps, the proposed building will store chemicals, such as sodium hypochlorite, used for water treatment. Approximately 50 gallons of dry chemicals will be stored. There will be a separate chlorination room with appropriate ventilation. Chemicals will be stored in double-walled containment vessels.

1.2.3. Project Schedule and Cost

The BWS will hire a contractor through a public bidding process to construct the new pumping station and to demolish the existing building after completion of the new building. Construction is anticipated to be completed in 2017.

The estimated preliminary construction cost of the project is $2,000,000. The funding will be from the BWS.

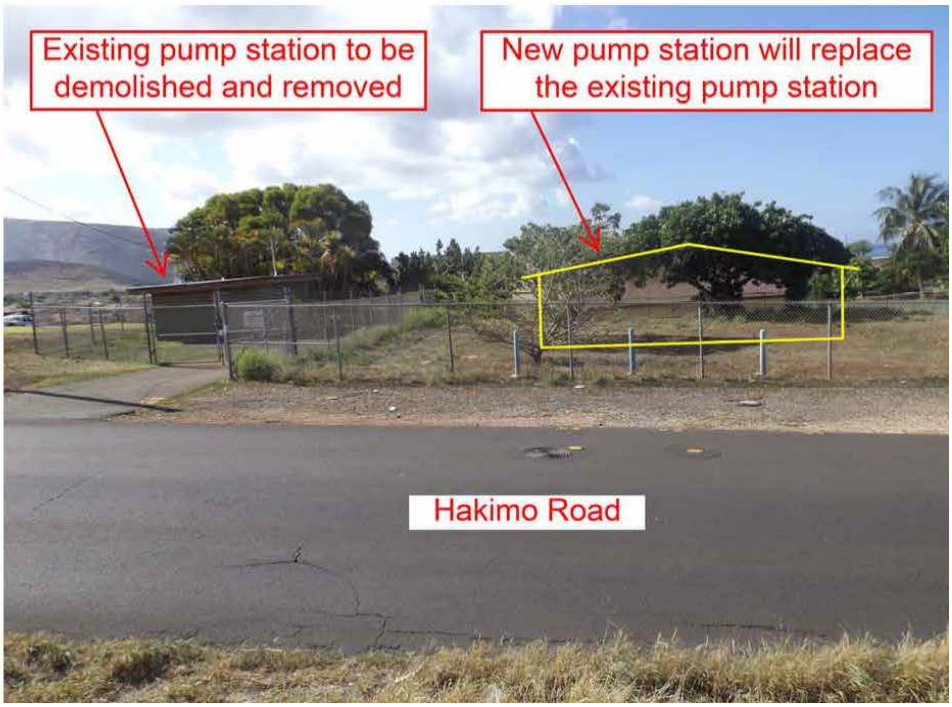


Figure 2. Street View of New Pump Station Building

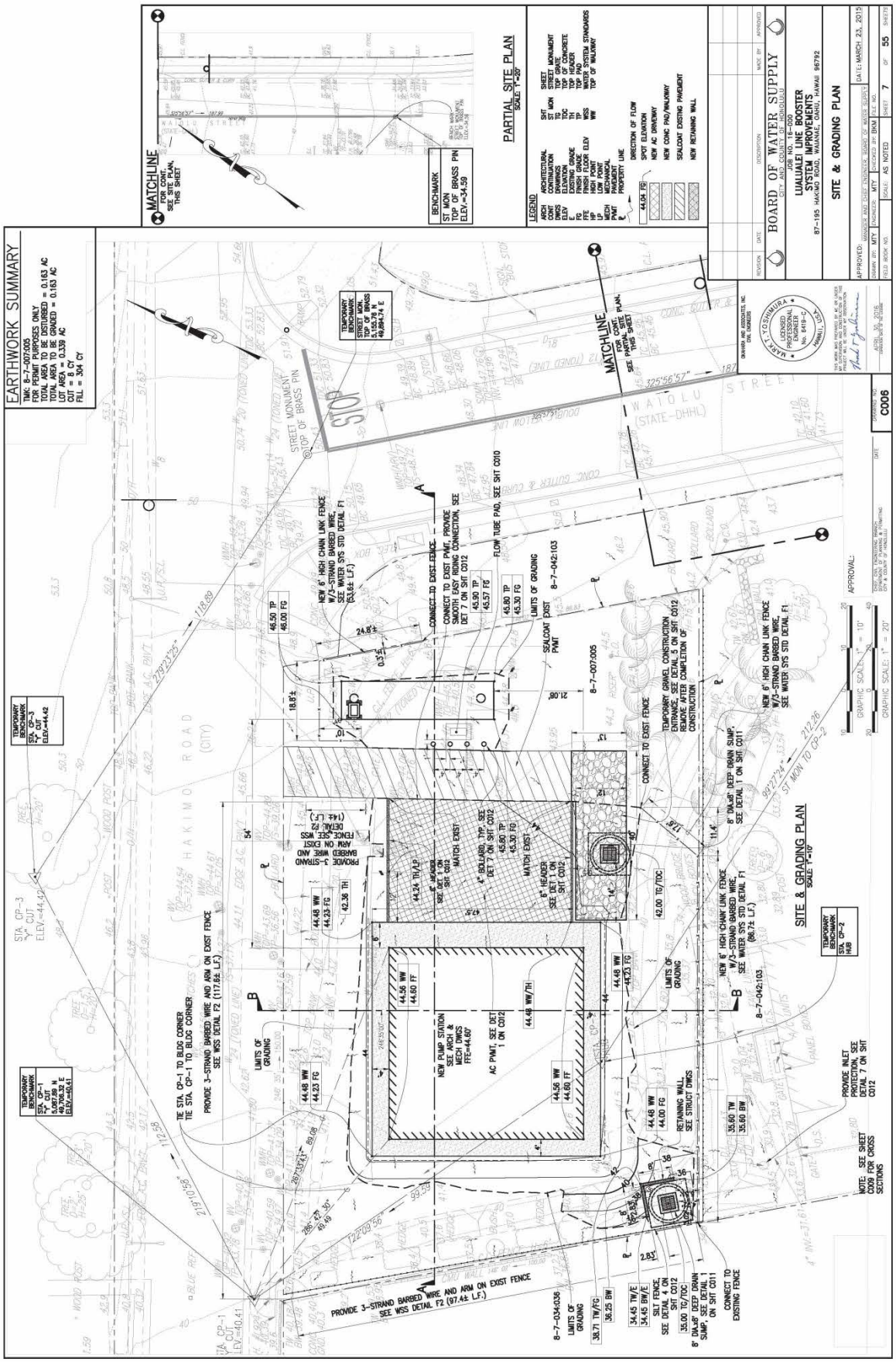


Figure 3. Site Plan and Grading

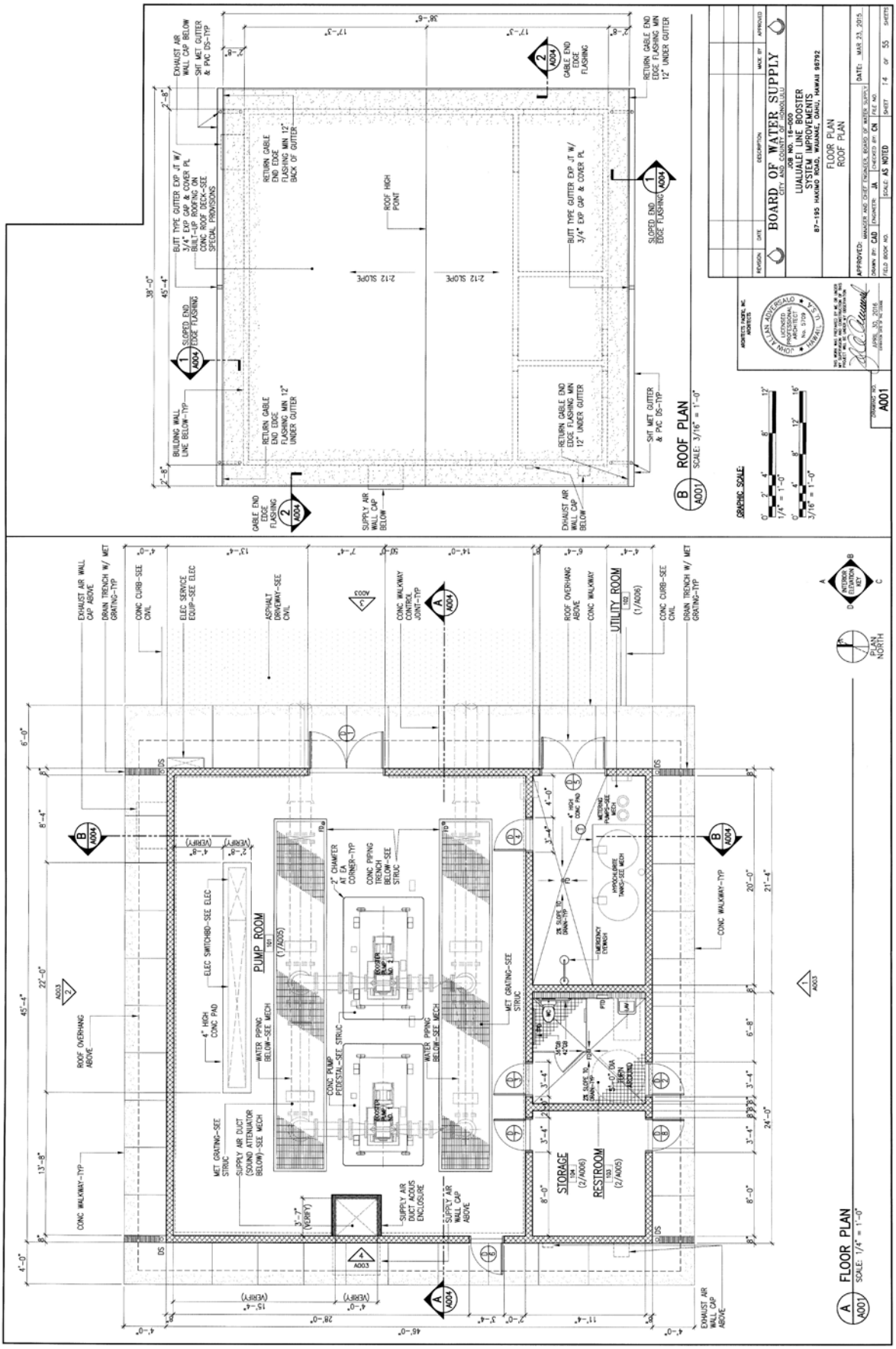
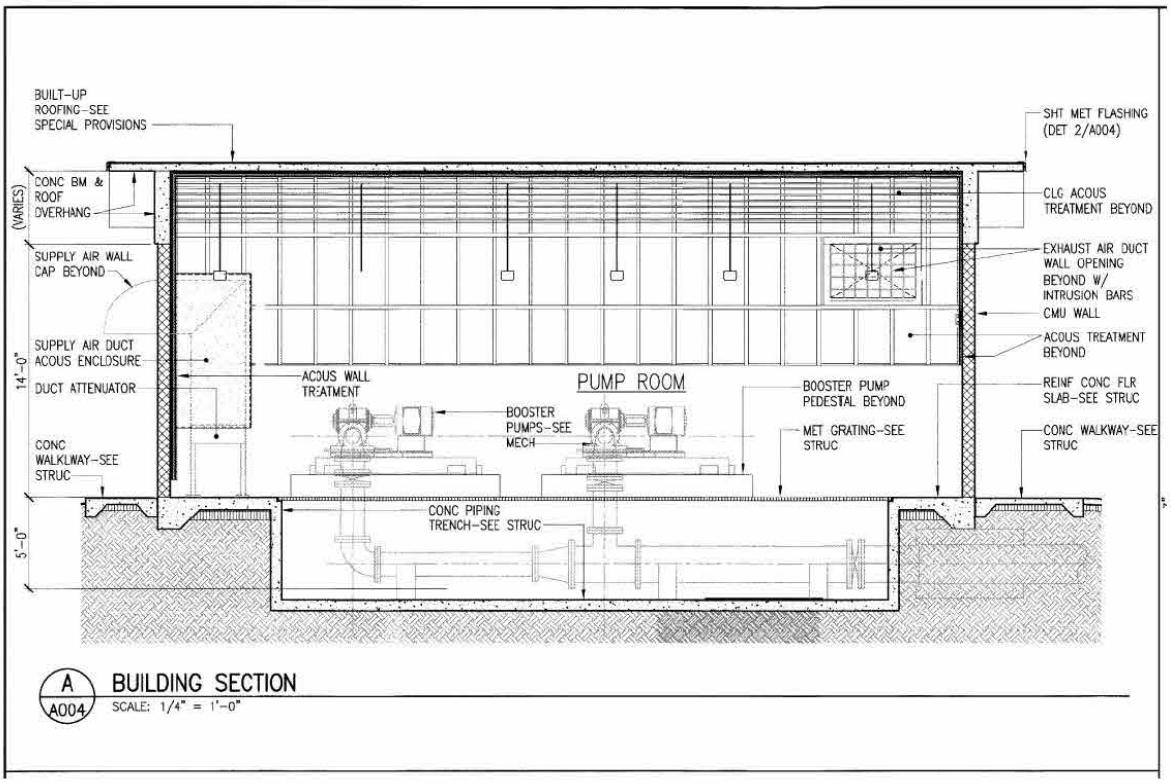
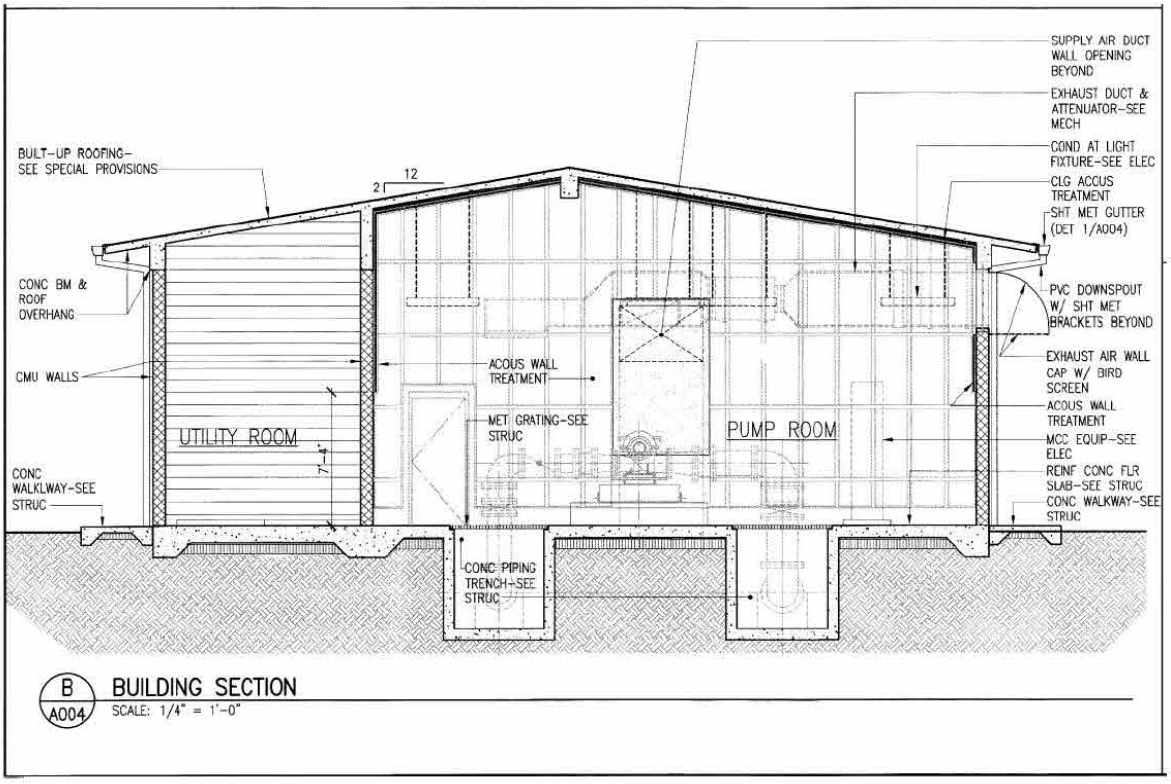


Figure 4. Floor Plan for New Pump Station Building

Figure 5. Cross Sections of the New Pump Station Building





2. RELATIONSHIP TO FEDERAL, STATE, AND COUNTY PLANS AND POLICIES

2.1. State Land Use Law

The State Land Use Law, Chapter 205 HRS, established the State Land Use Commission, which classifies all lands in Hawai‘i into four land use districts: Urban, Rural, Agricultural, and Conservation. The project area is within the Agricultural district. Structures for public water supply are a permitted use within the State Agricultural District.

2.2. Coastal Zone Management Program

The Hawaii Coastal Zone Management (CZM) Program was created in 1977 through the enactment of Chapter 205A, Hawaii Revised Statues. The program was created to coordinate federal, state and county agency efforts in the comprehensive management of Hawaii's precious coastal resources. The Hawaii CZM Program is administered by the Office of Planning, but the four counties are responsible for administering the program locally through the Special Management Area (SMA) permits and shoreline setback provisions in their respective counties.

The proposed project will not impact coastal views as existing coastal views are limited from the project site due to existing structures in the area that are already blocking views to the ocean. Coastal recreational resources will not be impacted as a result of the proposed project. Coastal recreational activities will continue to be accessible to the public and will not be affected by the proposed actions.

2.3. Special Management Area

The SMA area is the most sensitive area of the coastal zone, and is much smaller than the CZM area. An SMA permit is required for any development within the SMA.

However, the proposed project is located inland from the boundary of the SMA. Therefore, an SMA permit will not be required.

2.4. City and County of Honolulu General Plan

The General Plan sets forth the long-range objectives and policies for the general welfare of the O‘ahu community and, together with the regional development plans and sustainable communities plans, provides a direction and framework to guide the programs and activities of the City and County of Honolulu. The original General Plan was created in 1982, and amended in 2002. The most recent update of the plan in 2013 to 2015 will be finalized as the 2035 O‘ahu General Plan.

The proposed project supports the following objectives and policies of the General Plan:

TRANSPORTATION AND UTILITIES

Objective C: To maintain a high level of service for all utilities.

Policy 1: Maintain existing utility systems in order to avoid major breakdowns

Policy 3: Plan for the timely and orderly expansion of utility systems.

The proposed project will replace the existing pump station building with a new pump station that will house pumping units with higher capacities than the existing units. The higher capacity units will serve the anticipated demand for water based on projected growth for the area.

2.5. City and County Zoning

The City's Land Use Ordinance regulates land use to encourage orderly development in accordance with adopted land use policies, including the Oahu General Plan and the City's eight Development Plans and Sustainable Communities Plans. The project area is located within the "General Agriculture" (AG-2) district. This zoning designation allows BWS to continue use of the property for public utility purposes.

2.6. City and County of Honolulu Wai‘anae Sustainable Communities Plan

O‘ahu is divided into eight planning areas, each of which has a Development Plan or Sustainable Communities Plan that provide the vision for future development, and policies and guidelines to implement that vision. The proposed project area is addressed by the Wai‘anae Sustainable Communities Plan (adopted in March 2012), which provides a vision and long-range policies for the future of the rural district of Wai‘anae.

The goals of the proposed project are consistent with the Wai‘anae SCP vision to maintain Wai‘anae's rural character and to create a community rooted in preservation and efficient use of land and natural resources in that it is designed to provide a moderate increase in capacity.

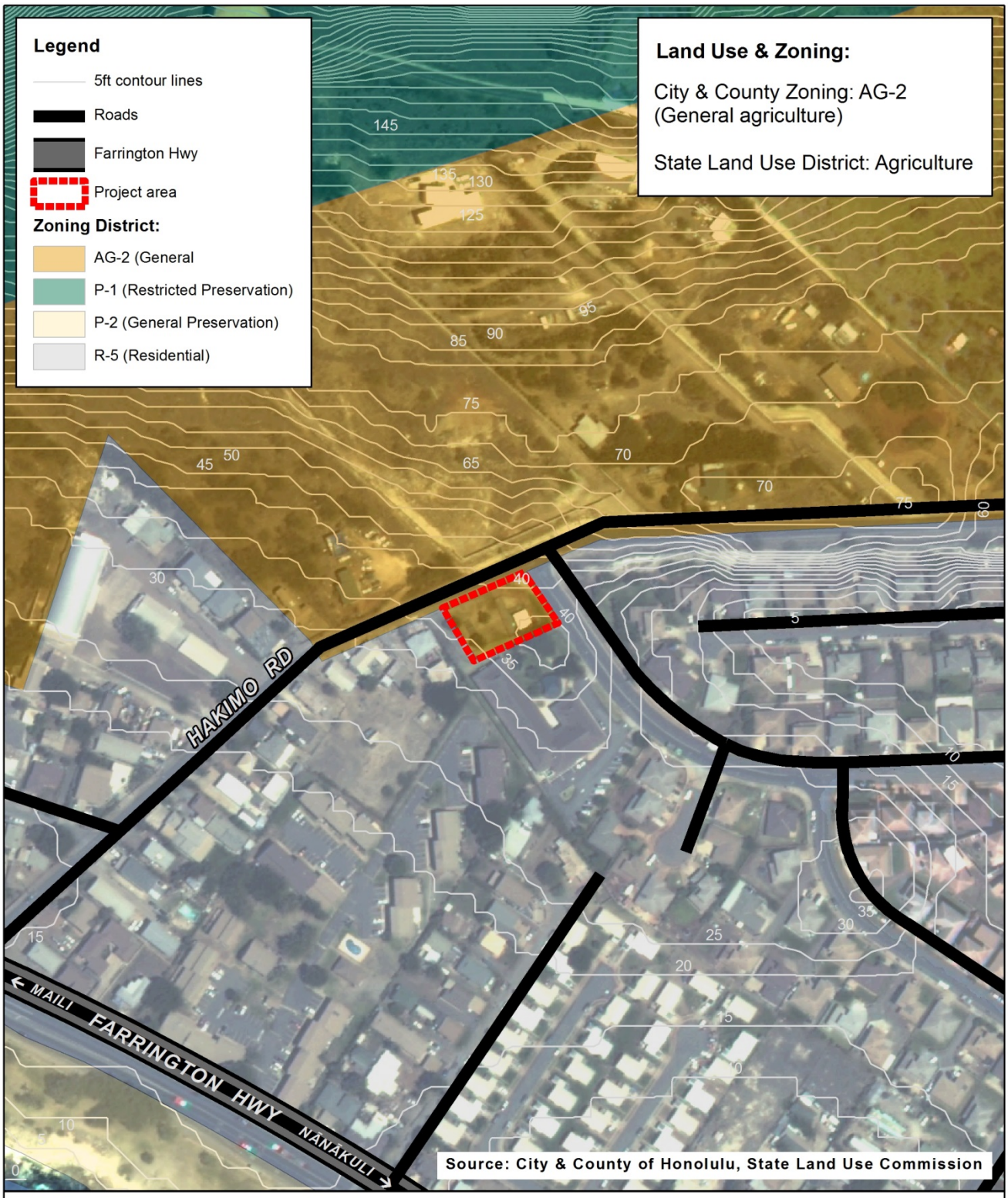
2.7. Wai‘anae Watershed Management Plan

The Wai‘anae Watershed Management Plan (WWMP) in a long-range plan ongoing until 2030 for the balanced management of watershed resources for the district of Wai‘anae. The Plan's main goal is to establish and maintain a sustainable watershed to serve present users and future generations. Together with seven other regional water use and development plans, the WWMP constitutes the O‘ahu Water Management Plan.

The proposed project supports the following objective of the WWMP:

Objective 5: Meet future water demands at reasonable costs

- Efficiently meet potable water demands.
- Improve and maintain BWS water system reliability.



BWS LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENT PROJECT

Figure 6. Project Parcel

1 inch = 200 feet

0 75 150 225 300 Feet

N

By: TOWNSCAPE INC

Date: August 2015

3. DESCRIPTION OF THE ENVIRONMENT AND ANTICIPATED IMPACTS

3.1. Climate and Hydrology

The climate in the area of the project site is similar to other coastal areas in the Wai‘anae District, which is relatively warmer and drier than the rest of the island of O‘ahu. The warmer climate is due to the trade winds that travel from east to west. Most of the moisture carried by the trade winds is released by the time the trade winds reach Wai‘anae because of its westerly location. The precipitation that does reach the high elevations decreases as elevation decreases.

Precipitation is greater during winter months (November to April) because of westerly Kona storms or cold fronts, while summer months are drier but have more northeasterly trade winds.

Temperatures along the Wai‘anae coast range from an average of 62 degrees Fahrenheit in the winter to 88 degrees Fahrenheit in the summer. Average annual rainfall in the project area is approximately 23 inches, with most of the rainfall occurring between the months of November through April.

The project area is located within the Commission on Water Resource Management (CWRM) Lualualei Aquifer System Area. The CWRM sustainable yield for the Lualualei Aquifer System Area is 4 million gallons per day. Since Wai‘anae does not have enough of its own groundwater resources to fill its demand, half of the district’s potable water is imported from the adjacent Pearl Harbor Aquifer.

There is no natural surface water flow through the project site. The nearest surface stream in the vicinity of the project area is Ulehawa Stream, located approximately 2,400 feet to the southeast.

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

The proposed project is not anticipated to have any negative impact on the climate or hydrology. Therefore, no mitigative measures are required.

No significant impacts to water quality are anticipated in the long-term as a result of the proposed project. Construction at the project site is unlikely to introduce or release into the soil any substance that could adversely affect ground water.

During the construction period, short term impacts may include an increase in the amount of sediment in storm runoff because of exposed soils. The runoff could potentially impact the water quality of nearshore waters in the area. Grading activities associated with construction of the proposed improvements will comply with the City’s grading ordinances and include appropriate erosion control measures. Project activities will comply with State Department of Health (DOH) regulations as set forth in HAR, Title, 11, Chapter 54, “Water Quality Standards” and Chapter 55, “Water Pollution Control.”

3.2. Topography and Soils

According to the U.S. Department of Agriculture Soil Conservation Service (1972), the soil throughout the project area is Mamala stony silty clay loam, 0 to 12 percent slopes (MnC). Runoff is very slow to medium, erosion hazard is slight to moderate, and permeability is moderate. Stones, mostly coral rock fragments, are commonly found in the surface layer and in the profile of this soil type.

The topography of the project area is relatively flat at approximately 35 to 40 feet above mean sea level.

Potential Impacts and Mitigation Measures

The proposed project is not anticipated to have any significant impact on soils or to ground topography. Only minor grading to the site will be required with the proposed project. No substantial fill or excavation is being proposed.

During the construction period, short term impacts may include an increase in the amount of sediment in storm runoff because of exposed soils. Construction practices will comply with the guidelines found in the following regulations:

- Revised Ordinances of Honolulu (ROH) Chapter 14, Articles 13-16, relating to Grading, Grubbing, Stockpiling, Soil Erosion, and Sediment Control
- *Rules Relating to Soil Erosion Standards and Guidelines* (April 1999), Department of Planning and Permitting, City and County of Honolulu

3.3. Hazards

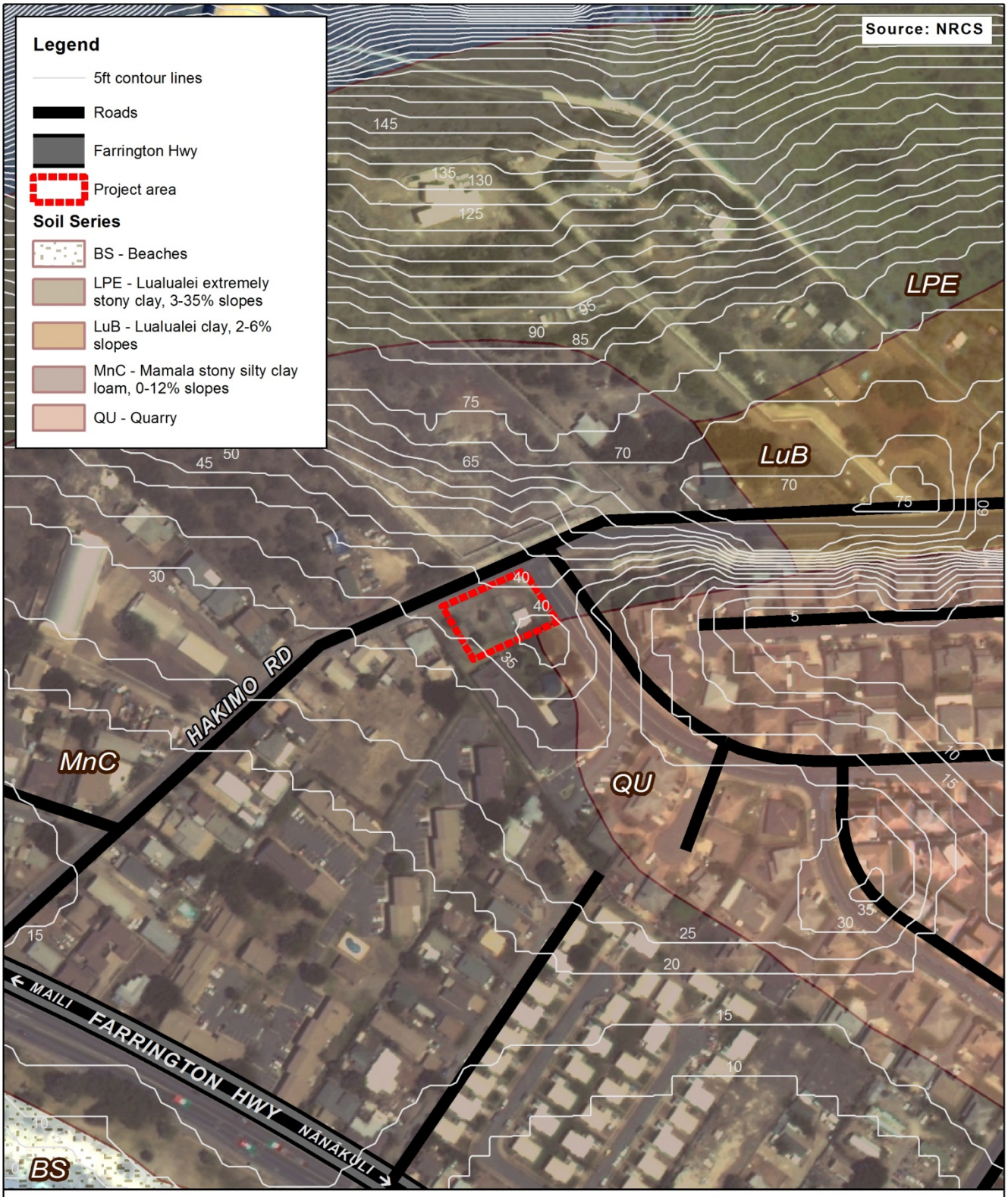
According to the Federal Emergency Management Agency's Flood Insurance Rate Map, the project area is within Zone D. Zone D is an area where flood hazards are possible but are classified as "undetermined" since these areas have not been studied.

The project site is within the tsunami evacuation zone.

The fire risk for the project area is extremely high. It is classified as the "Fire Regime Group 1" with a 35-year fire return interval for low and mixed severity fires.

Potential Impacts and Mitigation Measures

The proposed project is not anticipated to increase flood hazards or have any impacts on the tsunami zone.



BWS LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENT PROJECT

Figure 7. Soils

1 inch = 200 feet

0 75 150 225 300 Feet

N

By: TOWNSCAPE

Date: August 2015

3.4. Flora and Fauna

There are no threatened or endangered flora at the project site. Existing landscape materials at the project site are minimal, which included some milo trees and palm trees.

No threatened or endangered fauna were observed within the project area. The project site is located within a residential area.

Potential Impacts and Mitigation Measures

The proposed project is not anticipated to adversely affect any endangered or threatened flora species as none are known to exist in the project area. The project includes some landscaping around the perimeter of the property to serve as a visual buffer (see Appendix B for Landscape Plan).

3.5. Wetlands

There are no wetlands identified in the vicinity of the project site.

Potential Impacts and Mitigation Measures

None.

3.6. Air Quality

The project site is located in a rural residential area. The air quality at the project site is expected to be relatively good, but may be influenced by the vehicular traffic on Hakimo Road.

Potential Impacts and Mitigation Measures

Impacts on air quality are anticipated to be minor and short-term. Short-term effects on air quality may result from construction-related activities that may generate dust affecting the air quality in and around the project area. With the presence of normal trade wind conditions, it is anticipated that pollutants will be blown towards the ocean. However, with Kona winds, the pollutants may be blown landward, resulting in a decline in area air quality. The short-term effects on air quality will be mitigated by compliance with State DOH Administrative Rules, Title 11, Chapter 60, “Air Pollution Control.” The following are BMPs that may be implemented to control dust:

- Phase construction activities, focus on minimizing the amount of dust-generating materials and activities;
- Landscape and rapidly cover bare areas, including slopes;
- Control dust from debris being hauled away from the project site;
- Provide adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities.

No significant long-term impacts on air quality are anticipated as a result of the proposed project; therefore, no mitigative measures are proposed for the long-term.

BWS LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENT PROJECT

Figure 8. Hazards

1 inch = 200 feet

0 75 150 225 300 Feet

N

By: TOWNSCAPE

Date: August 2015

3.7. Noise

The amount of noise near the project area is minimal. The majority of the sources of noise in the vicinity of the project site are from vehicular traffic along Hakimo Road and children from the school in the adjacent property. According to HAR, Title 11, Chapter 46 “Community Noise Control,” the maximum permissible noise levels for residential and open space areas are 55 dBA during daytime hours (7 a.m. to 10 p.m.) and 45 dBA during nighttime hours (10 p.m. to 7 a.m.).

Potential Impacts and Mitigation Measures

Impacts from noise are anticipated to be short-term from construction-related activities and traffic associated with the construction activities. The construction related activities will be temporary and will occur only in the daytime during regular working hours. Should noise levels exceed the permissible noise levels noted above for more than ten percent of the time within any twenty minute period, a permit is required from the State DOH. Chapter 11-46 rules also require that construction equipment and onsite vehicles requiring an exhaust for gas or air be equipped with mufflers.

No significant long-term impacts on noise conditions are anticipated as a result of the proposed project. In the long-term, the noise associated with the operation of the pump station will be no different than the noise associated with the existing operation of the pump station. The landscaping around the pump station will serve as a noise buffer to reduce any noise emitted from the pump station. The pumps will be located within the building, which significantly reduces the noise resulting from the pump motors. The surrounding community will not be subjected to unacceptable (or additional) noise levels from the proposed project.

3.8. Socio-economic conditions

The project area is located in a rural residential area. Kamehameha Schools' preschool is located adjacent to the project area. Under an agreement with the Board of Water Supply, the area of the proposed project was formerly used by the adjacent school as a children's playground. However, the playground equipment has been removed from the project area in anticipation of the proposed project.

The as-built plans (dated 1965) show a "future pumping station" in the same location as where the playground formerly was located on the project site. Details of the agreement for the use of the playground equipment between the school and the Board of Water Supply are not known, but the playground probably served as a temporary use of the land.

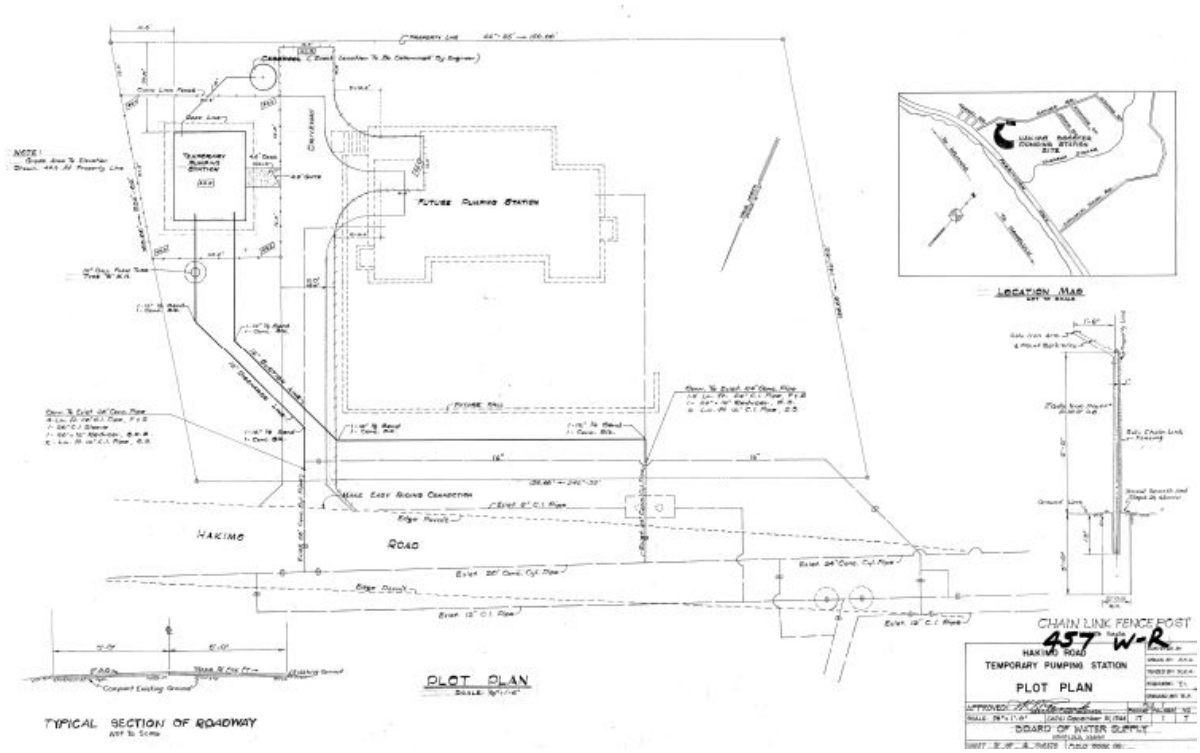


Figure 9. As-built plan from 1965

Potential Impacts and Mitigation Measures

The proposed project is not expected to have any negative socio-economic effect, but is anticipated to provide significant benefits to the surrounding community. The project will provide employment for contractors and others in the construction industry in the short-term.

In the long-term, the proposed project will have a beneficial impact on the community—increasing reliability of water service for the surrounding community. The new pumping station will provide additional pumping capacity for the community at large.

3.9. Archaeological and Cultural Resources

A report, included in Appendix C of this Environmental Assessment (EA), was prepared by Cultural Surveys Hawai‘i (CSH; August 2015) for the project area. Up to the late pre-contact/early post-contact period, the population of Lualualei has been quite low. The dry climate and low rainfall are contributing factors to the limited population in the area.

After the decline in the traditional Native Hawaiian lifestyle in Lualualei by the mid-1800s, cattle ranching began in the valley. Following the cattle ranching period, the sugar plantations and OR&L railroad brought more foreigners into Wai‘anae. By the 1930s, the central and upper parts of the valley were taken over by the U.S. Navy which retains control over most of the valley to this day. Most of the remnants of pre-contact Hawaiian culture are located on the lands owned by the U.S. Navy.

Archaeological investigations within the central section of Lualualei Valley (which includes the present project area) have indicated a minimal presence of pre-contact Hawaiian sites. Only two sites have been found in the central section, which includes a rock shelter that served as a temporary habilitation site for Native Hawaiians and a stacked mound.

Potential Impacts and Mitigation Measures

Based on the CSH report, no surface historic properties were identified or are believed to be present. The probability of subsurface historic properties being present is low. The study recommended no further archaeological study is needed.

Additionally, in a letter dated January 14, 2013, the SHPD commented that “historic reports, maps, aerial photographs maintained at the State Historic Preservation Division show no evidence of previous sites or structure at this location” and concluded that “due to past disturbances of the subject property with the initial construction of the existing facility, we determine that no historic properties will be affected by this action” (refer to Appendix D). However, if any historic resources, including human skeletal remains, sand deposits, lava tubes, and lava blisters/bubbles are identified during construction activities, all work will cease immediately and the SHPD will be contacted.

3.10. Hazardous Material

A limited asbestos and lead survey (see Appendix E) was performed for the project site in December 2007 to determine the location of asbestos-containing materials, lead-containing paints, PCBs, and mercury-containing materials on the interior and exterior surfaces of the building.

The following results were reported in the survey:

- No asbestos was found in the components tested.
- Lead was found in the paint on the exterior and interior circuit boxes and the exterior walls.
- Fluorescent lamps were found in the light fixtures.

- Ballasts did not have the “No PCBSs Present” label and therefore were assumed to contain PCBs
- Mercury ampoules were found in the meter gauges of the two pumps

Potential Impacts and Mitigation Measures

The contractor will have to comply with State of Hawaii Department of Health regulations during the demolition of the existing building.

3.11. Roadways and Traffic

The project site is bounded by Hakimo Road and Waiolu Street. No new access road will be required.

Potential Impacts and Mitigation Measures

Short-term impacts to traffic may occur during the construction phase of the project. However, these short-term impacts may be mitigated by scheduling construction vehicles and supply deliveries during off-peak hours. The contractor will be asked to schedule the movement of construction material and equipment between 8:30 a.m. and 3:30 p.m. to minimize any possible disruption to traffic. A street usage permit from the City’s Department of Transportation Services will be obtained for any construction-related work that may require the temporary closure of any traffic lane on a City street. The public, including the Neighborhood Board and adjacent neighbors, will be informed about the timing of construction work and any potential delays in and around the project area.

No long-term impacts to traffic are expected during the operation of the pumping station. The BWS personnel are not anticipated to access the site more than once a week for routine maintenance, monitoring, and inspecting the equipment and controls. However, during drier periods when public water consumption is higher and demand on the water system is greater, BWS personnel may need to access the site on a daily basis or as needed to manually adjust controls for the pumps. Since anticipated impacts of the proposed project are negligible in the long-term, no mitigative measures are proposed.

3.12. Wastewater

The proposed project includes a small restroom on the southeast part of the new pump station building. The existing wastewater infrastructure servicing the vicinity of the project site is maintained by the City’s Department of Wastewater Management. An 8-inch sewer line is located on Waiolu Street. Wastewater from this parcel will be conveyed via a major pipeline along Farrington Highway to the Waiʻanae Wastewater Treatment Plant (WWTP), which then releases its treated effluent via an ocean outfall pipe 6,184 feet offshore at an average depth of 107.5 feet. In addition to the Lualualei community, the WWTP serves the Nānākuli, Māʻili, and Waiʻanae communities.

Potential Impacts and Mitigation Measures

A sewer connection permit from the City’s Department of Planning and Permitting (DPP), Wastewater Branch will be obtained prior to connecting to the existing sewer lines. The

restroom will be used by the City's BWS personnel during their weekly routine maintenance of the pump station. The proposed project will thus require wastewater treatment and disposal, but the amount will be negligible.

3.13. Water System and Electrical Service

The water lines in the vicinity of the project are maintained and serviced by the City's BWS. The new pumping units will be connected to the existing BWS water system within Hakimo Road. The proposed project will allow the BWS to increase its pumping capacity at this facility.

Power and communication systems are currently provided by Hawaiian Electric Company, Inc., Hawaiian Telecom and Oceanic Cablevision.

Potential Impacts and Mitigation Measures

No negative impacts are anticipated to result from the proposed project in the long-term. Prior to the beginning of any waterline work, the contractor will inform the BWS 72 hours in advance of any connection, chlorination, shut-off or relocation work. Any scheduled shut downs of the existing pumps required for the proposed project will be approved by the BWS. The existing pump station will be demolished only after the new building is constructed.

No negative impacts are anticipated to result from the provision of electrical and communication services to the project site since electrical demands will not be negligible.

3.14. Police, Fire and Medical Services

The fire station serving the project site is the Nānākuli Fire Station approximately 2.37 mile south of the site at 89-334 Nānākuli Avenue. The police station servicing the project site is the Waiʻanae Substation. The major health care facility closest to the project site is the Waiʻanae Coast Comprehensive Health Care Center.

Potential Impacts and Mitigation Measures

The proposed project is not anticipated to result in an increase in calls for police, fire, or medical services; therefore, no mitigative measures are proposed.

4. Required Permits and Approvals

Permit	Oversight Agency
Building Permit	Department of Planning and Permitting
Grubbing and Grading	Department of Planning and Permitting
Sewer Connection	Department of Planning and Permitting, Wastewater Branch
Street Usage Permit	Department of Transportation Services
Noise Permit for Construction	State Department of Health

5. Alternatives to Proposed Action

5.1. No Action

Under the No Action alternative, the existing pump station will remain and would result in no improvements to the existing water system. Without the proposed improvements, the existing pump station would not be able to serve the projected growing population for Wai‘anae. The No Action alternative is not desirable because the pumping capacity would not be increased and would preclude all benefits described in this EA.

5.2. Alternative Location for Pumping Station

An alternative action to the proposed project is to find another location for the pumping station. However, the existing pumping station was intended to serve as a temporary pumping station (as shown in the 1965 drawing), and the proposed pumping station as the future permanent pumping station. An alternative location for the pumping station is not desirable because it would be cost prohibitive to invest in another location.

6. Determination

6.1 Cumulative Impacts

Based on the analysis of information in this EA, the proposed project is not anticipated to have significant impacts to the natural, built, or social environment. The proposed project is not expected to have a significant cumulative effect upon the environment. The new pumping station will provide additional pumping capacity to supply water to the community at large. The project will provide employment for contractors and others in the construction industry in the short-term. In the long-term, the community will increase its reliability of water service for the surrounding community

The proposed actions are consistent with the vision expressed by the City’s General Plan, the Wai‘anae Sustainable Communities Plan, and the Wai‘anae Watershed Management Plan to efficiently meet potable water demands at reasonable costs and to improve and maintain the BWS water system reliability.

The primary impacts of the proposed actions would result from construction activities, such as dust, noise, traffic, and erosion. These short-term impacts will be mitigated though use of BMPs to minimize and mitigate potential negative impacts.

6.2 Findings and Reasons Supporting the Determination

The potential effects of the proposed project are evaluated based on the significance criteria identified in the HAR, Section 11-200-12. The following is a summary of the potential effects of the project.

1. Irrevocable commitment to loss or destruction of any natural or cultural resource

The proposed project is not expected to adversely impact any natural or cultural resources. It is located on land which has been previously disturbed. There is no evidence of previous sites or structures at the project site and it is unlikely any subsurface cultural deposits are present. Should any resources be discovered during construction, all work will cease immediately and SHPD will be contacted.

2. Curtailment of the range of beneficial uses of the environment.

The proposed project is not expected to curtail the range of beneficial use of the environment since the proposed project involves the use of previously disturbed areas of land. The pump station improvements will happen within an existing City property.

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

The proposed project is consistent with the environmental policies, goals, and guidelines expressed in HRS Chapter 344. The proposed project will increase pumping capacity to meet current demands and anticipated potable water demands in the future.

4. Substantially affects the economic or social welfare of the community or State.

The proposed project is not expected to have any negative socio-economic effect, but is anticipated to provide significant benefits to the surrounding community. The new pumping station will provide additional pumping capacity for the community at large. Construction activities will mobilize existing labor and generate income and secondary effects in the local economy.

5. Substantially affects public health.

The proposed project is not anticipated to substantially affect public health.

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

The proposed project is not anticipated to have secondary impacts such as population changes or effects on public facilities. The proposed project will provide for short-term employment opportunities during the construction phase. The proposed

project will not encourage changes in population size, but it is designed to accommodate the modest population increase projected for Wai‘anae.

7. Involves substantial degradation of environmental quality.

No substantial degradation of environmental quality is expected as a result of the proposed project.

8. Is individually limited but cumulatively has considerable effects on the environment, or involves a commitment for larger actions.

The proposed project is not expected to have a significant cumulative effect upon the environment.

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

No rare, threatened, or endangered species or its habitat has been identified within the project site.

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

The proposed project is not anticipated to have any long-term impacts on air or water quality or noise conditions. Impacts on air and water quality and noise conditions are anticipated to be minor and short-term resulting from construction-related activities, and will cease upon project completion. Short-term impacts may include an increase in dust generating around the project area affecting air quality; increase in the amount of sediment in storm runoff because of exposed soils and potentially impacting the water quality of nearshore waters in the area; and increase in noise levels from construction equipment and onsite vehicles. However, these short-term impacts will be mitigated though use of BMPs to minimize and mitigate potential negative impacts. Appropriate mitigation measures will be implemented as described in its respective section of this EA.

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

The project site is located in Zone D of the FEMA’s Flood Insurance Rate Map. Zone D is an area where flood hazards are possible but are classified as “undetermined” since these areas have not been studied. The project is located in the outer perimeter of the tsunami zone.

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

The proposed project will not adversely affect the public’s enjoyment of scenic vistas and view planes. The proposed project will not impact coastal views as existing coastal views are limited from the project site due to existing structures in the area that are already blocking views to the ocean.

13. Requires substantial energy consumption.

The proposed project is not anticipated to consume a substantial amount of energy. A slight increase in energy use for the new pumps will be easy to accommodate by the existing HECO system.

Based on the evaluation of the significant criteria and the information contained in this Draft Environmental Assessment, an Environmental Impact Statement will not be required and a Finding of No Significant Impact has been determined for this project.

APPENDIX A

AGENCY COMMENTS FROM INITIAL CONSULTATION

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP8/15-620259R

August 26, 2015

Ms. Katie Franklin Peters
Staff Planner
Townscape, Inc.
900 Fort Street Mall, Suite 1160
Honolulu, Hawaii 96813

Dear Ms. Peters:

SUBJECT: Initial Consultation for an Environmental Assessment (EA), Board of Water Supply Lualualei Line Booster System Improvements, Waianae, Oahu, Hawaii

In response to your letter dated August 6, 2015, we have the following comments:

1. The EA should discuss any short term traffic impacts the project may have on any surrounding City roadways and measures to mitigate these impacts.

2. A street usage permit from the City's Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane on a City street.

3. The area Neighborhood Board, as well as the area residents, businesses, emergency personnel, Oahu Transit Services, Inc. (TheBus), etc., should be kept apprised of the details of the proposed project and the impacts, particularly during construction, the project may have on the adjoining local street area network.

4. Any construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

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

Very truly yours,

Michael D. Formby
Director

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

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

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

August 19, 2015

Ms. Katie Franklin Peters
Staff Planner
Townscape, Inc.
900 Fort Street Mall, Suite 1160
Honolulu, Hawaii 96813

Dear Ms. Peters:

Subject: Initial Consultation for the Preparation of an Environmental Assessment for the Proposed Board of Water Supply Lualualei Line Booster System Improvements

In response to your letter dated August 6, 2015, regarding the above-mentioned subject, the Honolulu Fire Department determined that there will be no significant impact to fire department services.

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

Sincerely,

Keith Yasui

KEITH YASUI
Acting Assistant Chief

KY/SY:bh

KAMEHAMEHA SCHOOLS®

August 31, 2015

Ms. Katie Franklin Peters
Townscape, INC
900 Fort Street Mall, Suite 1160
Honolulu, HI 96813

Subject: Environmental Assessment for the Lualualei Line Booster System

Dear Ms. Peters:

Thank for your inquiry on comments from Kamehameha Schools on the initial consultation for the preparation of the Environmental Assessment for the Lualualei Booster pump on the Waianae Coast.

Kamehameha Schools currently holds the lease on DHHL land for 40 acres of property in Maili. In 2014, an educational facility was opened on 10 acres of the site. Although KS currently has no active plans to expand the site, we may consider expanding the educational component as opportunities arise in the future. KS currently leases land from DHHL to operate four preschools and one learning center on the Waianae Coast. These educational locations are referred to as Nanakuli I, Nanakuli II, Pu'ukahea, Hoaliku Drake, and the Nanakuli Community Learning Center. Kamehameha Schools is currently working with DHHL and the Nanakuli Homestead Association to potentially develop a new 15,000 sqft. educational/community center in Nanakuli. Planning is in the early stages and entitlements are projected to begin by the end of the calendar year. Other than the sites mentioned, KS does not own or lease any other property along the Waianae Coast at this time.

If you have any additional questions during this process, please contact Therese Rosier, Director of Facilities Development & Support Division. She can be reached at telephone (808)534-8585 or email: **throsier@ksbe.edu**.

Sincerely,

Therese H. Rosier

Therese H. Rosier

THR/cnn

567 SOUTH KING STREET, HONOLULU, HAWAI'I 96813-3036
PHONE (808)523-6200

Founded and Endowed by the Legacy of Princess Bernice Pauahi Bishop

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 15-608

August 25, 2015

Ms. Katie Franklin Peters, Staff Planner
Townscape, Inc.
900 Fort Street Mall Suite 1160
Honolulu, Hawaii 96813

Dear Ms. Peters:

SUBJECT: Initial Consultation for the Preparation of an Environmental Assessment for the Proposed Board of Water Supply Lualualei Line Booster System Improvements

Thank you for allowing the Department of Facility Maintenance, Division of Road Maintenance (DRM) the opportunity to review and to give our input regarding the above-subject Environmental Assessment for the proposed Board of Water Supply Lualualei Line Booster System Improvements dated August 6, 2015.

DRM has no comments or objections at this time, as we do not have any facilities or easements on the subject property.

If you have any questions, please contact Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

BOARD OF WATER SUPPLY

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

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
THERESIA C. McMURDO
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KAPUA SPROAT

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

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

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

August 31, 2015

Ms. Katie Franklin Peters
Townscape, Inc.
900 Fort Street Mall, Suite 1160
Honolulu, Hawaii 96813

Dear Ms. Peters:

Subject: Your Letter of August 6, 2015 Regarding the Pre-Assessment Notice for the Lualualei Line Booster Improvements Environmental Assessment

Thank you for the opportunity to provide pre-assessment comments on the Board of Water Supply's Lualualei Line Booster Improvements Environmental Assessment.

The line booster improvements will provide a vital upgrade to an existing booster station that will be replaced. As your client for this project, my staff will work directly with you as the environmental assessment is developed.

We look forward to reviewing the forthcoming preliminary draft environmental assessment.

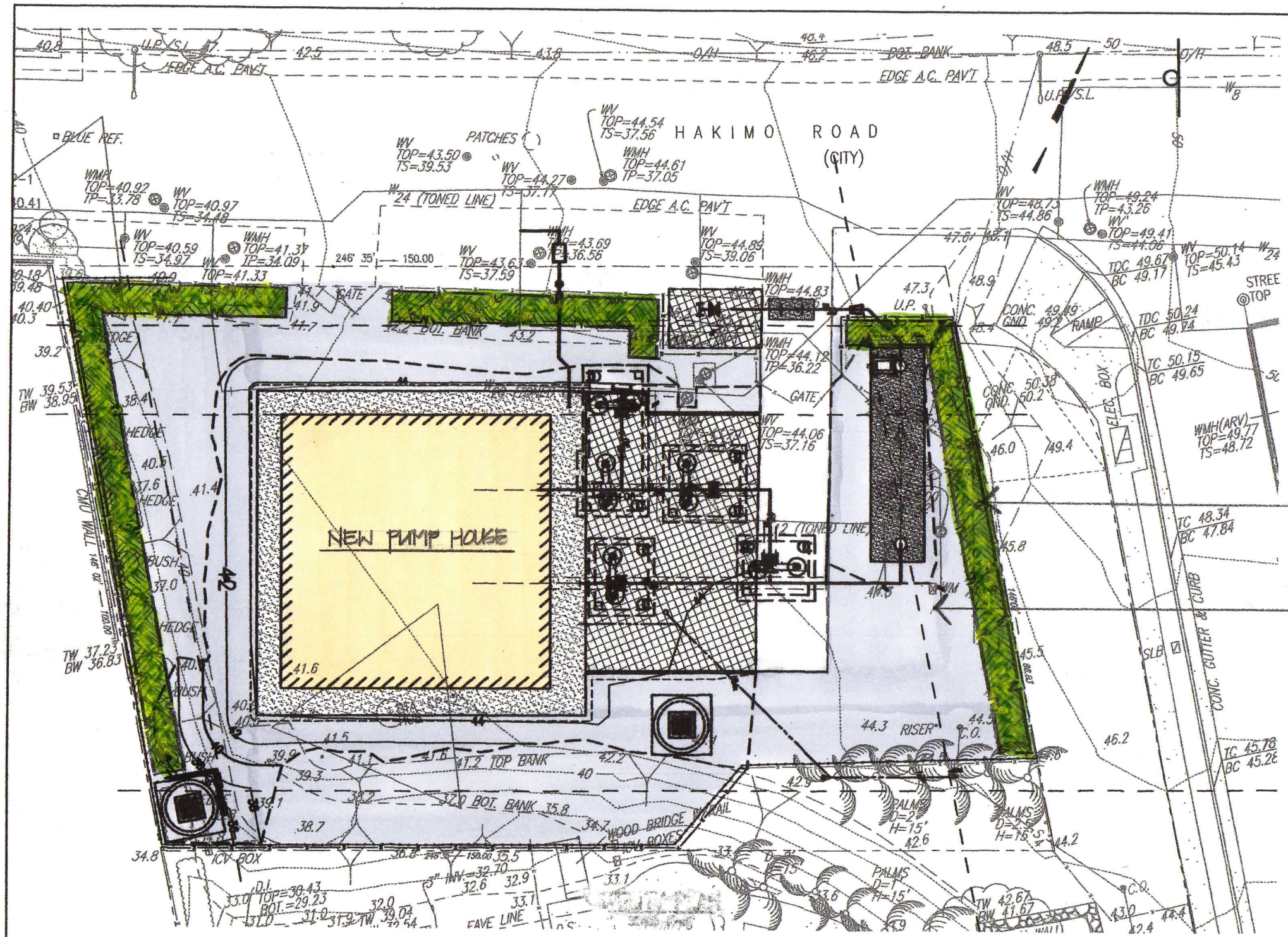
If you have any questions, please contact Scot Muraoka, Long-Range Planning Branch of our Water Resources Division, at 748-5942.

Very truly yours,

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

APPENDIX B

LANDSCAPE PLAN



98 EA. 'HULA GIRL' HIBISCUS (YELLOW FLOWER)
2 G.C. @ 2'-6" O.C. SPACING, SINGLE ROW
WITH 5'-0" WIDE RED CINDER MULCH BELOW,
WASHED, 1½" SIZE - 3" LAYER (1,225 S.F. = 11 C.Y.)

GRADE 'B' BASALT GRAVEL (3" MINUS SIZE)
12" LAYER, SPREAD, ROLL AND COMPACT TO 90%
WHERE FEASABLE

LANDSCAPE PLAN
SCALE: 1" = 10'

1" = 10' 10 5 0 10 20'

REVISION	DATE	DESCRIPTION	MADE BY	APPROVED

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

JOB NO. 16-000
LUALUALEI LINE BOOSTER SYSTEM IMPROVEMENTS
87-195 HAKIMO ROAD, WAIANAE, OAHU, HAWAII 96792

LANDSCAPE PLAN

APPROVED: MANAGER AND CHIEF ENGINEER, BOARD OF WATER SUPPLY — DATE:
DRAWN BY: — ENGINEER: — CHECKED BY: — FILE NO.
FIELD BOOK NO. — SCALE: AS NOTED — SHEET OF SHEETS

OKAMOTO AND ASSOCIATES, INC.
CIVIL ENGINEERS

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION

APRIL 30, 2016
EXPIRATION DATE OF THE LICENSE

DRAWING NO. L001

APPENDIX C

ARCHAEOLOGICAL LITERATURE REVIEW AND FIELD INSPECTION REPORT

Archaeological Literature Review and Field Inspection Report for the Lualualei Line Booster Systems Improvement Lualualei Ahupuaʻa, Waiʻanae District, Oʻahu TMK: [1] 8-7-007:005

Prepared for
Honolulu Board of Water Supply

Prepared by
Hallett H. Hammatt, Ph.D.
and
David W. Shideler, M.A.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: LUALUALEI 25)

August 2015

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Management Summary

Reference	Archaeological Literature Review and Field Inspection for the Lualualei Line Booster System Improvements, Lualualei Ahupua‘a, Wai‘anae District, O‘ahu TMK: [1] 8-7-007:005 (Hammatt and Shideler 2015)
Date	August 2015
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: LUALUALEI 25
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological permit number 15-03, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	Honolulu Board of Water Supply, City & County of Honolulu, and SHPD
Land Jurisdiction	Honolulu Board of Water Supply
Project Proponent	Honolulu Board of Water Supply
Project Funding	Honolulu Board of Water Supply
Project Location	The Lualualei Booster System Improvements project is located in Lualualei Ahupua‘a, Wai‘anae District, central west coast of O‘ahu, TMK: [1] 8-7-007:005. The project is on the south corner of Hakimo Road and Waiolu Street.
Project Description	This project will replace the existing pump station building including the two existing pumping units, valves, piping, and electrical controls, which are housed within the existing pump station building. The new replacement pumping units will be higher capacity units than the existing units. A new pump station building will be constructed within the same property to replace the existing pump station building. The new pump station building will be a new one-story concrete structure, which will house the two new pumping units, valves, piping, and electrical controls. New underground piping and valves will be installed to connect the new pumping units to the existing BWS water system within Hakimo Road. The existing pump station building, pumping units, and electrical controls will be demolished and removed upon the completion of the new pump station building.
Project Acreage	0.13 hectares (0.3307 acres)
Area of Potential Effect (APE)[i] and Inspection Area Acreage	The APE in this case is regarded as co-equal with the survey area (0.13 hectares or 0.3307 acres])

Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project, and based on findings, consider cultural resource management recommendations in support of project planning.
Fieldwork Effort	Fieldwork was accomplished on 7 August 2015 by David W. Shideler, M.A. under the general supervision of Principal Investigator, Hallett H. Hammatt Ph.D. This work required approximately 1/4 person-days to complete.
Results Summary	Based on the research into the cultural history and previous archaeological work in the vicinity and the results of the field inspection, no surface historic properties were identified or are believed to be present. The probability of subsurface historic properties being present is evaluated as quite low.
Regulatory Context	This project has previously been subject to an SHPD Chapter 6E-8 Historic Preservation Review dated January 14, 2013 (Log No. 2012.3809, Doc. No. 1301NN01, included as present Appendix A) that has determined that "… no historic properties will be affected by this action."
Recommendations	No further archaeological study is recommended.

[i] "Project Area" is defined (HAR §13-284-2) as "the area the proposed project may potentially affect, either directly or indirectly. It includes not only the area where the proposed project will take place, but also the proposed project's area of potential effect." "Effects include, but are not limited to, partial or total destruction or alteration of the historic property, detrimental alteration of the properties' surrounding environment, detrimental visual, spatial, noise or atmospheric impingement, increasing access with the chances of resulting damage, and neglect resulting in deterioration" (HAR §13-284-7(b). Based on these definitions of "project area" and "effects" there is potential for project effects to historic properties to extend outside the footprint of project construction. Accordingly a definition and justification of the "project area" and "area of potential effect" employed in the AIS study is required.

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Section 1 Introduction

1.1 Project Background

At the request of Townscape and on behalf of the Honolulu Board of Water Supply, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection report (LRFI) for the Lualualei Line Booster System Improvements, Lualualei Ahupua‘a, Wai‘anae District, O‘ahu, TMK: [1] 8-7-007:005. The project area is located at the corner of Hakimo Road and Waiolu Street in southwestern Lualualei approximately 350 meters (m) inland from Farrington Highway and the coast. The project area is depicted on a portion of the 1998 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).

This project will replace the existing pump station building including the two existing pumping units, valves, piping, and electrical controls, which are housed within the existing pump station building. The new replacement pumping units will be higher capacity units than the existing units. A new pump station building will be constructed within the same property to replace the existing pump station building. The new pump station building will be a new one-story concrete structure, which will house the two new pumping units, valves, piping, and electrical controls. New underground piping and valves will be installed to connect the new pumping units to the existing Board of Water Supply (BWS) water system within Hakimo Road. The existing pump station building, pumping units, and electrical controls will be demolished and removed upon the completion of the new pump station building.

1.2 Historic Preservation Context of Study

This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project, and based on findings, consider cultural resource management recommendations in support of project planning. This project has previously been subject to an SHPD Chapter 6E-8 Historic Preservation Review dated January 14, 2013 (Log No. 2012.3809, Doc. No. 1301NN01, included as present Appendix A) that has determined that "… no historic properties will be affected by this action."

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located within the traditional Hawaiian land division (*ahupua‘a*) of Lualualei in the district (*moku*) of Wai‘anae on the leeward coast of O‘ahu. Generally, the lower areas of Lualualei are characterized as a flat, broad valley with two small streams (Mā‘ili‘ili Stream along the northwest side of the valley and Ulehawa Stream along the southeast side). The present project area is approximately 700 m northwest of Ulehawa Stream. The narrower, steeper upper valleys often have one or multiple tributaries or feeder stream drainages. Much of the lower valley area has been disturbed due to historic and modern development.

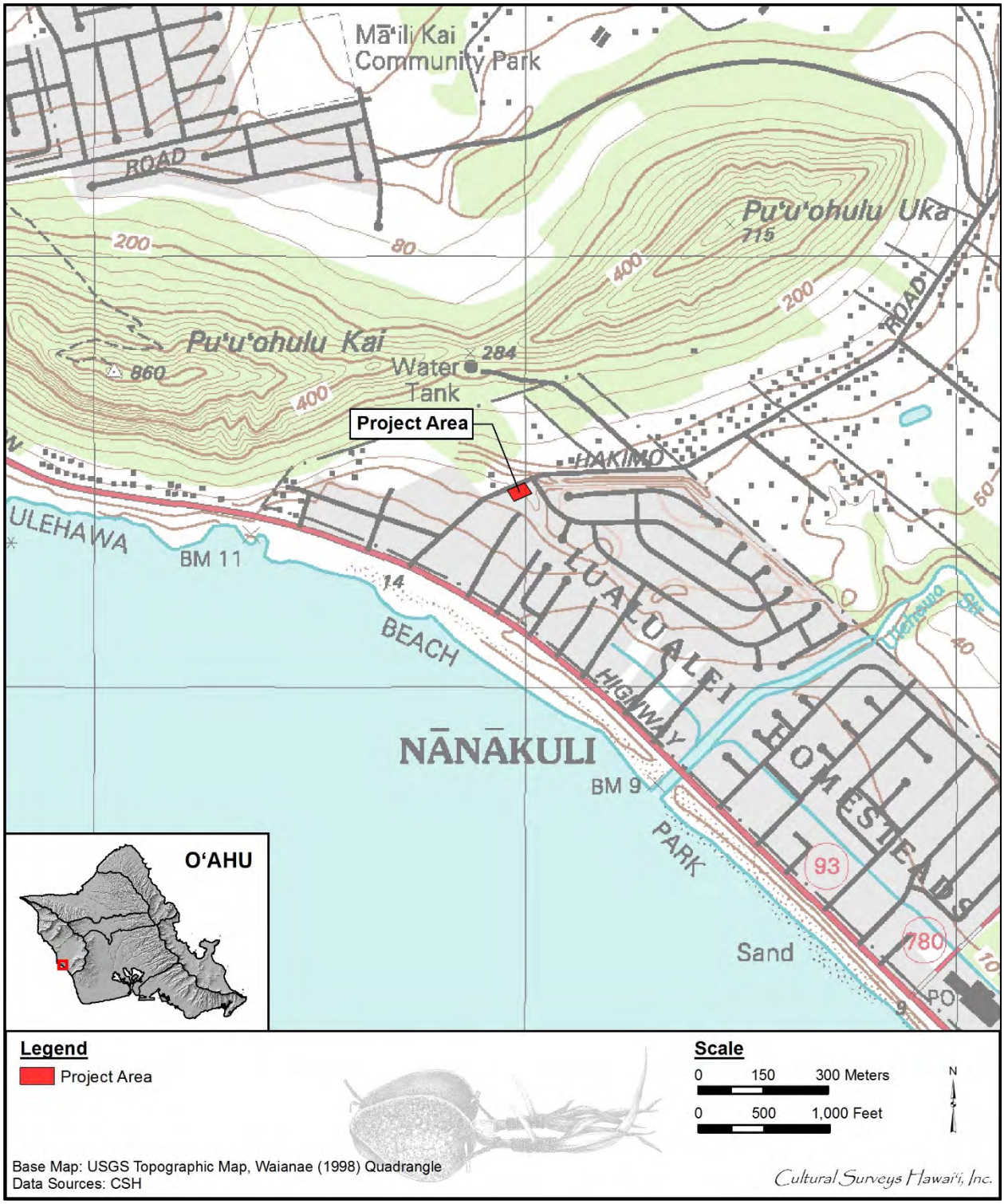

Figure 1. Portion of the 1998 USGS 7.5-minute topographic quadrangle showing the project area

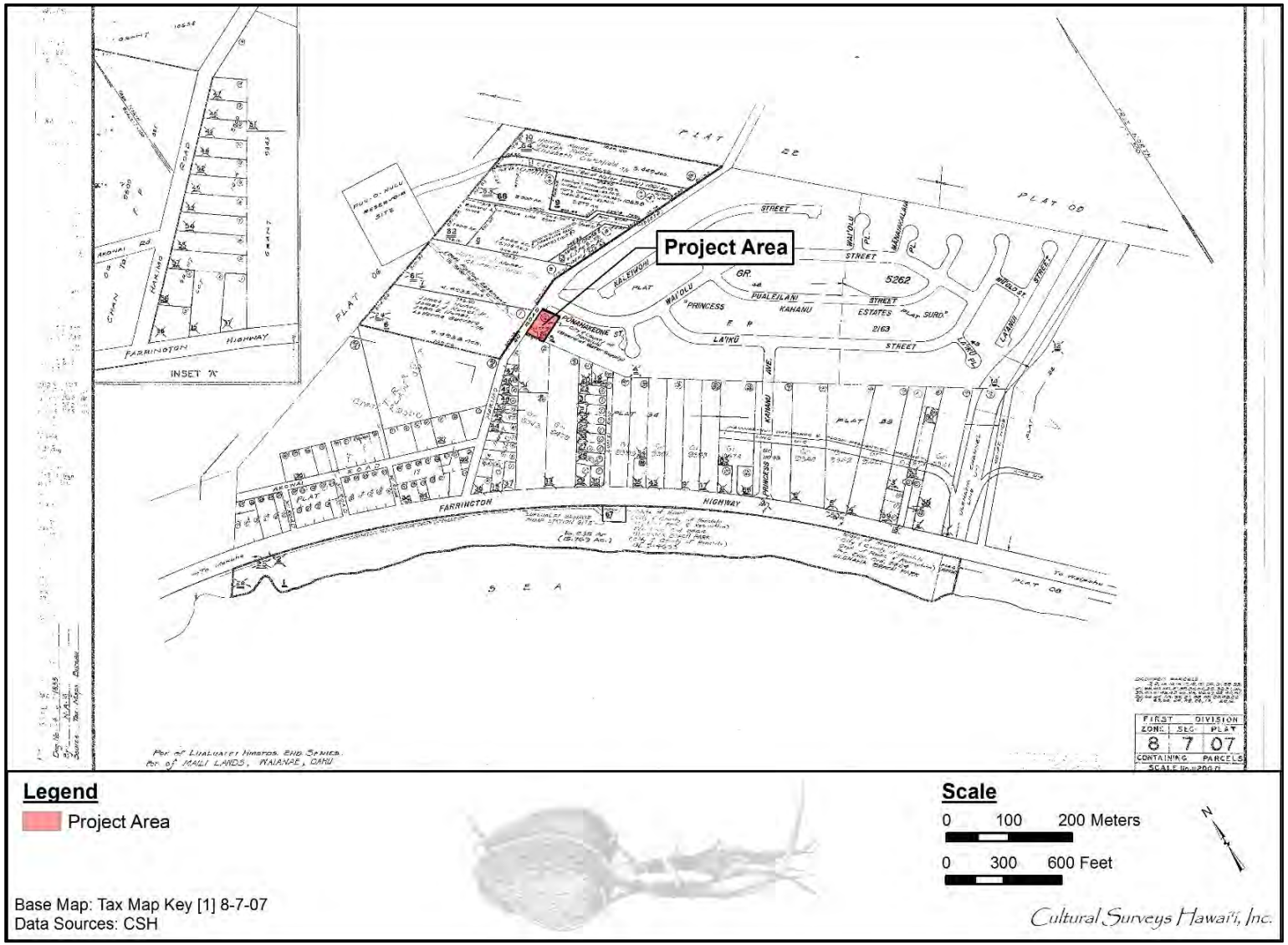

Figure 2. Tax Map Key (TMK) [1] 8-7-007 showing the project area (Hawai‘i TMK Service 2014)

Figure 3. Aerial photograph showing the project area (Google Earth 2013)

Rainfall for the project area is less than 750 millimeters (mm) (less than 29.5 inches) annually (Giambelluca et al. 1986). The vegetation is typical of lower valley environments in Hawai‘i and is dominated by alien species. Indigenous species in such environs include *a‘ali‘i* (*Dodonaea eriocarpa*), *wiliwili* (*Erythrina sandwicensis*), *naio* (*Myoporum sandwicense*), *loulu* palms (*Pritchardia* sp.), *ilima* (*Sida cordifolia*), *‘aheahea* (*Chenopodium oahuense*), *ma‘o* (*Gossypium sandvicense*), *pili* grass (*Heteropogon contortus*), and *kawelu* (*Eragrostis variabilis*). Introduced species found bordering the project areas include *kiawe* trees (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*).

The project area lies in the central coast of Wai‘anae and is underlain by the karstic flats of an emerged limestone reef (Stearns 1939). This emerged reef is often overlain by a number of soil types. According to the USDA Soil Survey of Hawaii sediment types, the project area is comprised of Mamala stony clay loam (MnC), 0 to 12% slopes (Figure 4).

Soils of the Mamala Series are described as follows:

> The series consist of shallow, well drained soils, along the coastal plains on the islands of Oahu and Kauai. These soils formed in alluvium deposited over coral limestone and consolidated calcareous sand. They are nearly level to moderately sloping. Elevations range from nearly sea level to 100 feet on Oahu...The annual rainfall amounts to 18 to 25 inches . . . Mamala soils are geographically associated with Ewa, Honouliuli, and Lualualei soils on Oahu. These soils are soils are used for sugar cane, truck crops orchards and pastures. The natural vegetation consists of *kiawe*, *koa haole*, bristly foxtail, and swollen fingergrass. Mostly coral rock fragments are common in the surface layer [Foote et al. 1972:93].

1.3.2 Built Environment

Lualualei Ahupua‘a is comprised of agricultural, residential, and commercial developments including the farm-lot communities along Hakimo Road and Lualualei Valley Road, the village of Mā‘ili, and two large U.S. Navy installations, one of which occupies approximately 7,498 acres of land in the Lualualei Valley. Residential houses lie to the east, west, and south of the project area. Immediately to the southeast of the project area is the Princess Kahanu Estates subdivision, a Hawaiian Homestead community.

The current day building within the project area (Figure 5) was intended as temporary pumping station to be replaced with a future permanent pumping station. The permanent pumping station is the subject of the current Honolulu Board of Water Supply design that will be is occupying that similar land area as shown in this 1965 drawing.

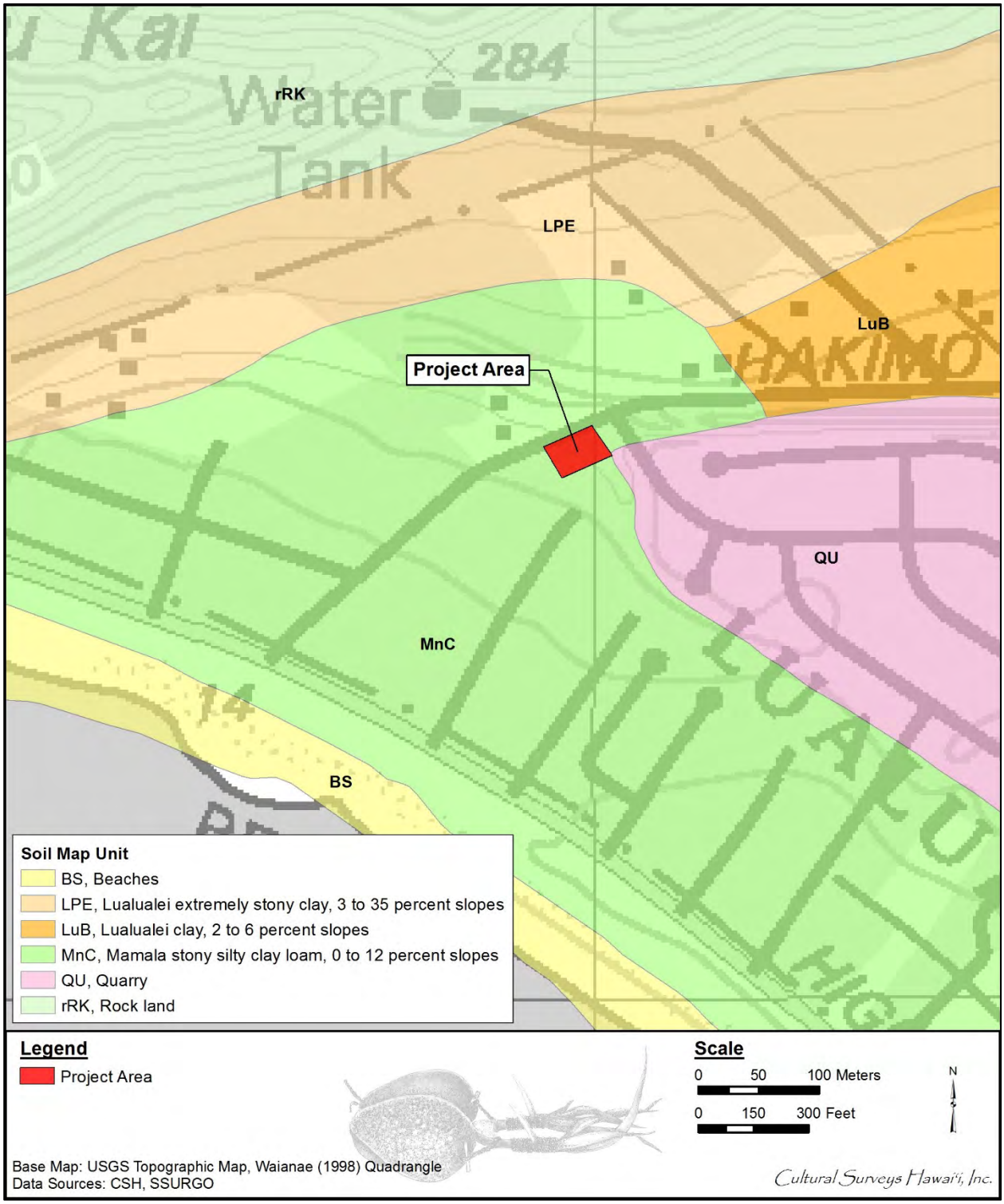

Figure 4. Overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (U.S. Department of Agriculture Soils Survey Geographic Database [SSURGO] 2001)

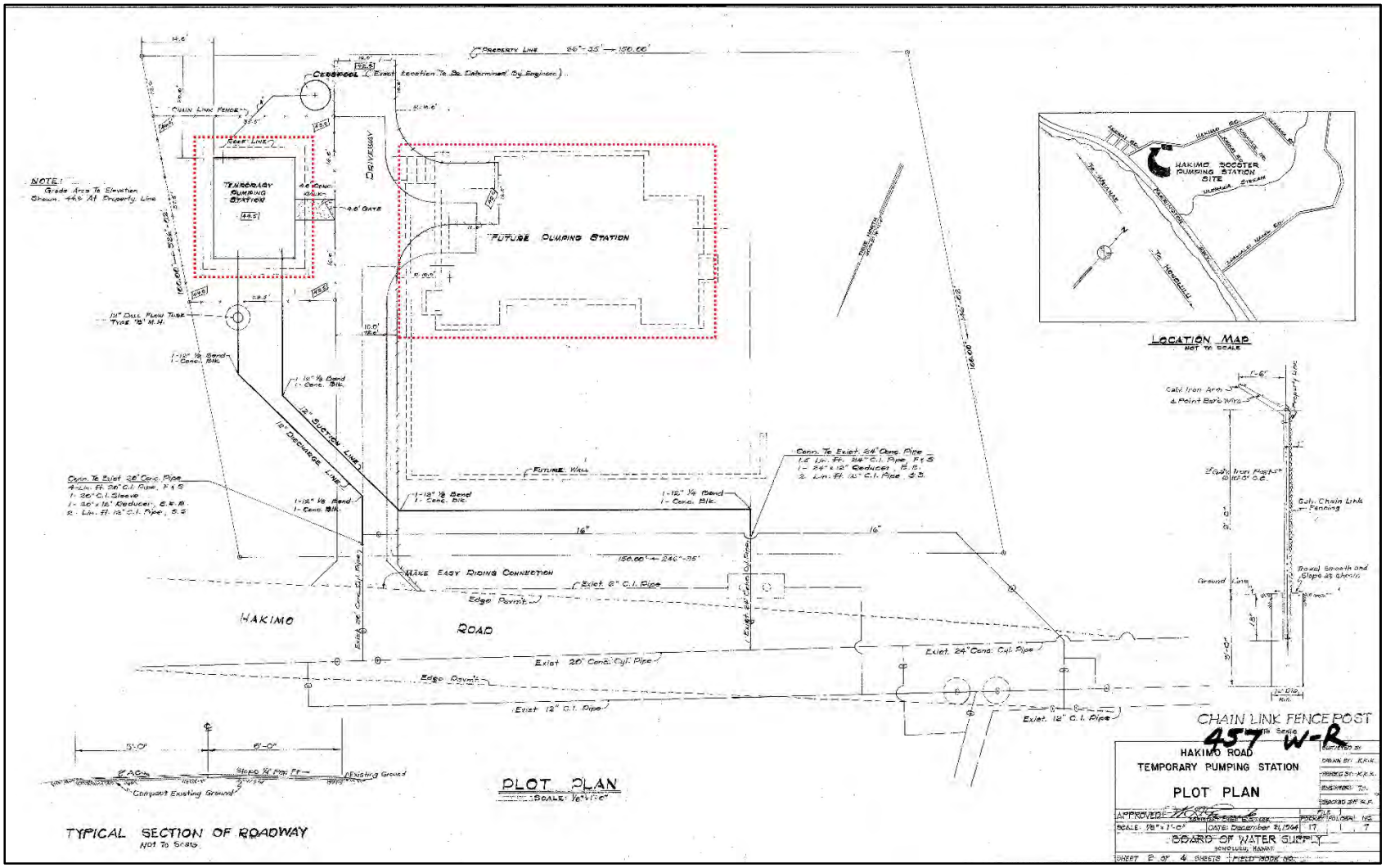

Figure 5. These 1965 drawings show the current day building was intended as temporary pumping station to be replaced with a future permanent pumping station. The permanent pumping station is the subject of the current Honolulu Board of Water Supply design that will be is occupying that similar land area as shown in this 1965 drawing.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological permit number 15-03, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on 7 August 2015 by David W. Shideler, M.A. under the general supervision of Principal Investigator, Hallett H. Hammatt Ph.D. This work required approximately 1/4 person-days to complete.

2.2 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 Mythological and Traditional Accounts

Lualualei in pre-Contact times, as today, was a part of the District of Wai‘anae. In ancient times, the District of Wai‘anae was known for its multitude of fish, and especially for deep sea fishing off Ka‘ena Point where the ocean currents meet. The meaning of Wai‘anae (mullet water) also implies an abundance of fish with the word "*‘anae*," referring to full-grown mullet (Pukui et al. 1974). Handy and Handy (1972) attribute the naming of Wai‘anae to a large freshwater pond for mullet called Pueha [*sic*] (Puehu). Today, Wai‘anae is still considered one of the best fishing grounds on O‘ahu.

Wai‘anae was also known for the independent lifestyle and attitudes of its inhabitants, another trend that continues into the modern day. This independence was a factor in many of the political struggles of the pre-Contact and early historic period when the district was the scene of battles and rebellions and often the refuge of dissident and/or contentious factions. This independent spirit is often attributed to the conditioning of generations having to cope with marginal environments, as many areas of Wai‘anae were notorious for their inhospitable climate. The lack of water for cultivation and consumption was precariously balanced by the productivity of the marine resources available off-shore.

In January 1778, Captain James Cook sighted Wai‘anae from a distance, but chose to continue his journey and first landed off Waimea, Kaua‘i instead. Fifteen years later, Captain George Vancouver approached the coast of Wai‘anae from Pu‘uloa and wrote in his log:

> The few inhabitants who visited us [in canoes] from the village earnestly entreated our anchoring . . . And [they] told us that, if we would stay until morning, their chief would be on board with a number of hogs and a great quantity of vegetables; but that he would not visit us then because the day was taboo poory [a kapu day]. The face of the country did not however, promise an abundant supply [of water]; the situation was exposed." [Vancouver in McGrath et al. 1973:17]

Vancouver was not impressed with what he saw of the Wai‘anae coastline, stating in his log that the entire coast was "one barren, rocky, waste nearly destitute of verdure, cultivation or inhabitants" (Vancouver in McGrath et al. 1973:17).

Vancouver did not anchor at Wai‘anae. But had he done so, he would have been pleasantly surprised, at least by portions of the coastline. Even though the dry, arid coast presented a dismal forecast, the ocean provided an abundant supply of fish, the lowlands provided *‘uala* (*Ipomoea batatas*, sweet potato) and *niu* (*Cocos nucifera*, coconut), and the inland valley areas were planted in *kalo* (*Colocasia esculenta*) and *wauke* (*Broussonetia papyrifera*). The upland forest regions provided various woods needed for weapons and canoes. By this time, there was probably a good variety of introduced vegetables being planted in the valley as well.

Lualualei (Figure 6) comprises approximately 15,000 acres and is the largest valley in the Wai‘anae District. There are two traditional meanings given to the name Lualualei. One meaning, "flexible wreath," is attributed to a battle formation used by Mā‘ilikūkahi against four invading armies in the battle of Kīpapa in the early fifteenth century (Sterling and Summers 1978:68). A

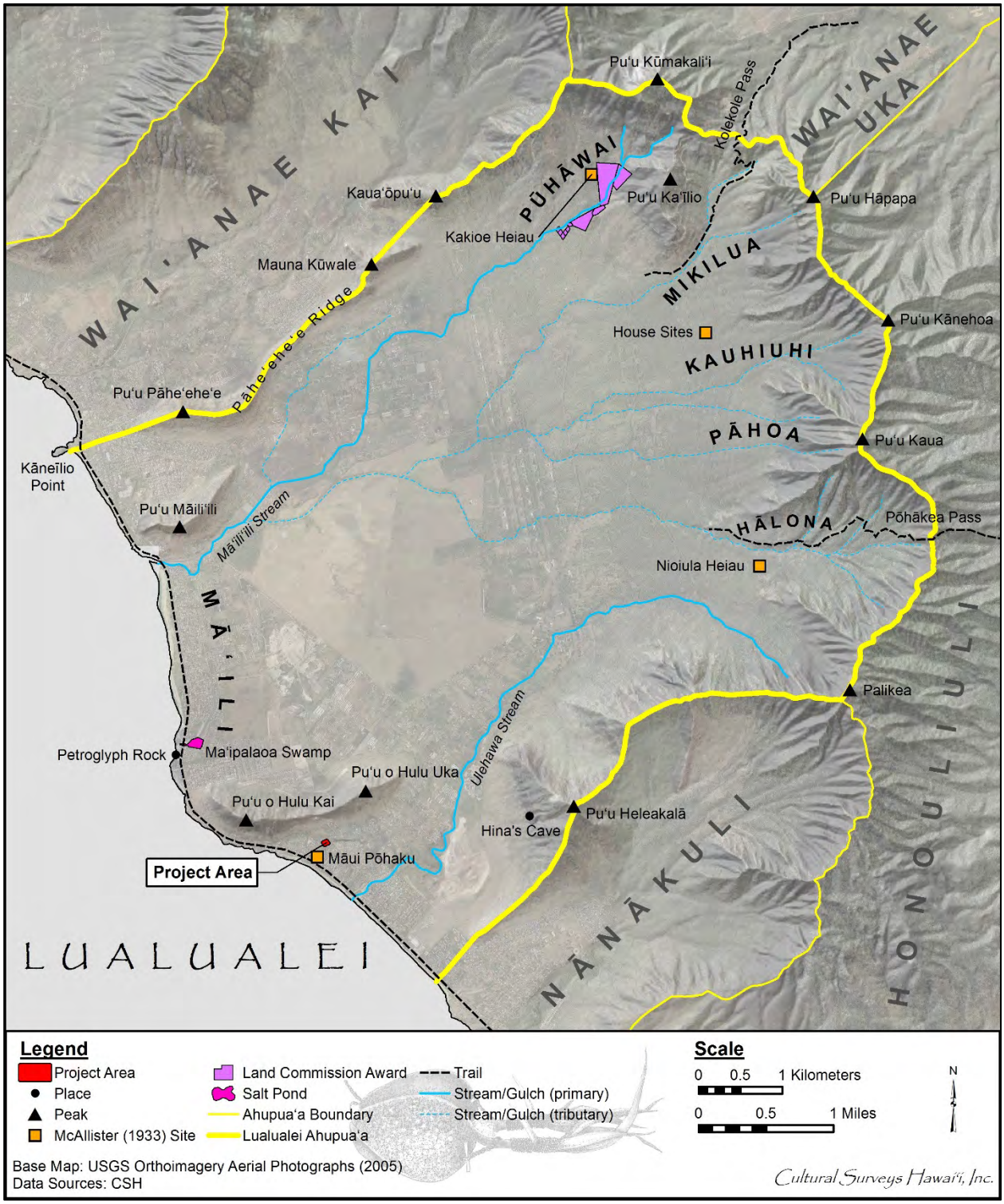

Figure 6. Map showing the project area within the cultural landscape of Lualualei (USGS orthoimagery aerial photograph base map)

second, and perhaps more recent, meaning offered by John Papa ‘Ī‘ī is “beloved one spared.” This meaning relates to a story of a relative who was suspected of wearing the king’s *malo* (loincloth). The punishment was death by fire. ‘Ī‘ī writes,

> The company, somewhat in the nature of prisoners, spent a night at Lualualei. There was a fishpond there on the plain and that was where the night was spent. After several days had passed, the proclamation from the king was given by Kula‘inamoku, that there was no death and that Kalakua did not wear the king’s loincloth. Thus was the family of Luluku spared a cruel death. For that reason, a child born in the family later was named Lualualei [‘Ī‘ī 1959:23].

Mary Pukui believed the first meaning, “flexible wreath” to be the more appropriate one for Lualualei (Sterling and Summers 1978:63). According to Marion Kelly, the fishpond on the plain is Puehu fishpond which is actually located just over the border in Wai‘anae (Kelly in Haun 1991:317). The fishpond no longer exists today and was probably destroyed during the sugar plantation era. Perhaps a third association with the name Lualualei is an older reference to one of Māui’s sisters who went by the same name.

Numerous Hawaiian legends, in addition to archaeological evidence, reveal the Wai‘anae coast and *mauka* (inland, toward the mountains) interior to be an important center of Hawaiian history. It is here in Wai‘anae that the famous exploits of Māuiakalana (Māui) are said to have originated. Traditional accounts of Lualualei focus on the mischievous adventures of the demi-god Māui. Pu‘u Haleakalā is the ridge that separates Nānākuli from Lualualei. It was at Pu‘u Haleakalā where Hina, Māui’s mother, lived in a cave and made her *kapa* (Sterling and Summers 1978:62).

Samuel M. Kamakau tells us that Māui’s genealogy can be traced from the ‘Ulu line through Nana‘ie:

> . . . Wawena lived with Hina-mahuia, and Akalana, a male, was born; Akalana lived with Hina-kawea, and Māui-mua, Māui-waena, Māui-ki‘iki‘i, and Māui-akalana, all males, were born.
>
> Ulehawa and Kaolae, on the south side of Wai‘anae, O‘ahu, was their birthplace. There may be seen the things left by Māui-akalana and other famous things: the tapa-beating cave of Hina, the fishhook called Manai-a-kalani, the snare for catching the sun, and the places where Māui’s adzes were made and where he did his deeds. However, Māui-akalana went to Kahiki after the birth of his children in Hawai‘i. [Kamakau 1991:135]

The Māui Pōhaku (rock), McAllister Site 148 in McAllister’s *Archaeology of O‘ahu*, is located within the Garden Grove complex at 87-1550 Farrington Highway in Lualualei, a couple of hundred meters south of the project area (see Figure 6). In the 1930s when McAllister conducted his fieldwork he noted,

> . . . it was here that Māui reposed and sunned himself . . . The large rock is now split in half and adorned with many small, oddly shaped rocks. It is said to be bad fortune to build one’s house across a line drawn directly from the rock to the shore. [McAllister 1933:110]

The “small, oddly shaped rocks” McAllister speaks of are no longer present. The Māui rock is currently overgrown with young Chinese banyan saplings (*Ficus retusa*), grasses, and weeds.

An interview with Fred Cachola (McGuire and Hammatt 2000) offers another explanation of the Māui rock, a tale told to him by a Hawaiian *kūpuna* (elder). At sunrise, from the location of this rock, one can see the profile of Māui reposing in the mountain range behind. As Mr. Cachola tells it, “It’s a composition of different mountain ranges. But when the sun is coming up in the back of that, it looks like one silhouette. And it’s just beautiful. But when the sun rises, then it disappears. You only see it early in the morning when you see that silhouette.”

The Cachola interview also revealed a known “night marchers” path leading to the beach close by the Garden Grove residential complex. The same *kūpuna* indicated to Mr. Cachola that he was the seventh watchman to be hired on the job because the previous six night watchmen all quit in the middle of the night due to “strange” occurrences: “. . . things start flying around and things start moving and all this unusual events going on. And they see things too” (McGuire and Hammatt 2000:16).

3.2 Early Historic Period

Lualualei appears up to late pre-Contact/early historic times to have sustained a very sparse population that was largely limited to isolated, perhaps temporary, habitations near the coast and supported by marine resources. Environmental components including the dry climate—less than 20 inches of rainfall on the coast—and geologic limitations—“much of the seaward portion of the valley is uplifted coral limestone that in some areas is thinly disguised with a shallow layer of soil” (Kelly in Haun 1991:310)—were likely determinative constraints on population density along the Lualualei coast. There is also evidence of an upland settlement near a small stream at Pūhāwai fed by underground springs; this area located approximately 7.5 km north of the present project area in extreme northern Lualualei (see Figure 6). Extensive remnants of *lo‘i* (pond field) terraces have been recorded at Pūhāwai (Kelly in Haun 1991:310). Handy notes,

> According to Mrs. Hanakahi, living on a Nānākuli Homestead, there is a place far up in Lualualei, ‘the Navy place,’ called Kapuhawai, where the sacred spring was used to water carefully tended terraces; she says that in these neglected terraces, taro still grows wild from the ancient plantings, thriving in the rainfall as there is, and people go up into the hills to gather it, as it is regarded as ‘fine eating.’ [Handy 1940:83]

One or more springs at Pūhāwai supported a small area of permanent habitation and agriculture. It is unclear if there was sufficient water anywhere else in Lualualei to support permanent habitation.

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—which introduced private property into Hawaiian society. In 1848, the crown and the *ali‘i* (chiefs) received their land titles. Lualualei only had about four commoner Land Commissioner Award claims, all located in the Pūhāwai area in extreme northern Lualualei (see Figure 6).

During the Māhele, with the exception of the *kuleana* lands, Kamehameha III retained all the land in the *ahupua‘a* of Wai‘anae, Lualualei, and Nānākuli as personal property (Hawaii Board of

Commissioners 1929). After the overthrow of the Hawaiian kingdom, these lands were called Crown Lands. As such, the land was under the control of the king, who leased much of it to high chiefs and foreigners for use in ranching. In many cases, commoners were denied access to the land, upland agriculture ended, and traditional life was greatly altered.

In 1855, nine taxpayers were recorded for Mā‘ili (McGrath et al. 1973:29). All are understood as resident in the Pūhāwai area (see Figure 6).

3.3 Mid- to Late 1800s

As the land was being divided onto parsed allotments, the old trails were being improved to accommodate travel across the *ahupua‘a*. Kepā Maly (2012) documented these new improvements, known as Government Roads:

> In traditional times, *ala hele* and *ala loa* (trails and major thoroughfares) were accessed by foot. The arrival of westerners and introduction of hooved animals led to developing new modes of travel and transporting of goods. By 1847, King Kamehameha III enacted the laws of the *Alanui Aupuni* (Government Roads). Many of these *Alanui Aupuni* were laid over the ancient system of trails. [Maly 2012:152]

In his youth, John Papa ‘Ī‘ī visited the Wai‘anae coast by way of these old trails. ‘Ī‘ī noted that there were “three such journeys, one by way of Pohakea, one through Kolekoke, and one by a route below Puu O Kapolei” (‘Ī‘ī 1959:27).

> Ii was eight or nine years old when he was again seized by a desire to go to visit his aunt Kaneiakama, and he was given permission to do so. He had heard that his aunt was at Nanakuli, so he and his attendant departed by way of Puu O Kapolei to Waimanalo and on to Nanakuli. [‘Ī‘ī 1959:29]

This route along the coast “by way of Puu O Kapolei” later received improvements and became the Government Road.

In the latter half of the nineteenth century, ranching dominated the history of Lualualei; it was one of the first areas to be utilized for raising cattle on O‘ahu. Bureau of Conveyance records indicate William Jarrett leased approximately 17,000 acres of land, mostly in Lualualei, from Kamehameha III in 1851 (Bureau of Conveyances:Liber 4:616–618). This was the beginning of Lualualei Ranch. In 1864, Jarrett took on George Galbraith as a partner. Five years later, he sold his son’s half-interest in the ranch to James Dowsett. During the time that Jarrett was involved with the ranch, a race track for horses was built on the Mā‘ili plains (McGrath et al. 1973:31).

In 1880, George Bowser traveled through Wai‘anae and wrote about Lualualei in his journal:

> Leaving Wai‘anae, a ride of about two miles brought me to the Lualualei Valley, another romantic place opening to the sea and surrounded in every direction by high mountains. This valley is occupied as a grazing farm by Messrs, Dowsett & Galbraith, who lease some sixteen thousand acres from the Crown. Its dimensions do not differ materially from those of the Wai‘anae Valley, except that it is broader—say, two miles in width by a length of six or seven miles. The hills which enclose it, however, are not so precipitous as those at Wai‘anae, and have, therefore,

> more grazing land on their lower slopes, a circumstance which adds greatly to the value of the property as a stock farm. Although only occupied for grazing purposes at present, there is nothing in the nature of the soil to prevent the cultivation of the sugar cane, Indian corn, etc. Arrangements for irrigation, however, will be a necessary preliminary to cultivation. [Bowser 1880:493–494]

Bowser’s comments imply that though water was still a problem, Lualualei seemed to have some potential for development.

An 1894 description of Lualualei by the Commissioner of Crown Lands described the land as “one of the best and most valuable of the Crown lands on the Island of Oahu . . . surpassing any of the other lands for richness and great fertility of the soil” (DLNR 1894:36). By this time, Link McCandless had entered the scene and was ranching 4,000 acres at Lualualei (McGrath et al. 1973:31).

By 1892, at least 300 acres of sugar cane were planted in Lualualei. In addition to the cultivated lands, a railroad, irrigation ditches and flumes, reservoirs, and plantation housing were constructed to support the sugar industry. The 1919 Fire Control map series shows the extensive sugar cane fields in seaward Wai‘anae Valley and south and central Lualualei (see Figure 10). Although the quantity of sugar planted was small compared to Wai‘anae and Mākaha, the development of infrastructure required for such an operation would have altered much of Lualualei’s central and lower valley landscapes.

3.3.1 Oahu Railway and Land Company

Benjamin Dillingham, a prominent businessman and developer, envisioned populating the western side of O‘ahu by introducing agriculture; however, the lack of water proved to be an obstacle until the discovery of artesian water solved the issue in the early 1880s. Dillingham foresaw an economic opportunity in providing reliable transportation to move crops from the west side of the island into Honolulu. The railway was a means to provide transportation to the country and promote development of unoccupied lands, as well as connect with the sugar plantations in ‘Ewa, Wai‘anae, Waialua, and Kahuku. With the help of several other businessmen and the legislature, Dillingham formed the Oahu Railway and Land Company (OR&L) in February 1889. The first few miles of track were laid and functional by the end of that year and the first length of the railway was completed and opened to the public by 1 January 1890. Along with James Castle and others, Dillingham had invested in large tracts of land for speculation and resale, but the idea was slow to catch on because “the land lay too far from Honolulu, at least 12 miles” (McGrath et al. 1973:54). Five years later, on 4 July 1895, the railway finally reached Wai‘anae. The OR&L stretched as far as Kahuku by 1899 and agricultural interests were using the rail to ship produce to Honolulu for the benefit of all. By 1914, track had been laid to Wahiāwa to ship pineapple from the Dole Plantation.

The military also used the rail system during development of Pearl Harbor and Schofield Barracks, and during World War II the OR&L carried ammunition, supplies, troops, and defense workers. Passenger fares also added to the profitability of the rail in the early part of the twentieth century. After World War II the railroad was utilized less as motorized vehicles became more economical. The 1946 tsunami destroyed long sections of track on the cliffs near Ka‘ena Point and along the Wai‘anae Coast. The lines were not rebuilt and by 1947 all rail operations ceased outside

Honolulu. The Department of the Navy assumed control of the tracks from the Lualualei ammunition depot to Pearl Harbor (Chiddix and Simpson 2004:270). In 1970, the Hawaiian Railway Society formed “to save what remained of Hawai‘i’s railroad history.” The group has restored some 6.5 miles of track and placed the intact portion of the system, extending from Nānākuli to ‘Ewa, on the National and State Registers of Historic Places (Chiddix and Simpson 2004:273).

3.4 **1900s**

By 1901, the Wai‘anae Sugar Company had obtained a five-year lease on 3,332 acres of land at Lualualei, to be used for raising cane as well as for ranching (DLNR 1902). Sugar and ranching continued to dominate the Lualualei landscape during the early years of the twentieth century. The determining factor in the success of Lualualei for sugar production was always water.

After the overthrow of the Hawaiian monarchy in 1893, the Government Lands and Crown Lands including Lualualei were combined to become Public Lands. The Crown Lands were no longer indistinguishable and inalienable. In 1895, the Republic of Hawaii decided to open up lands for homesteading in the hopes of attracting a “desirable class of immigrants”—Americans and those of Caucasian descent (Kuykendall and Day 1961:204).

In 1902, the Government ran ads in the local newspapers stating their intent to open up Public Lands in Lualualei for homesteads (Kelly in Haun 1991:328) (Figure 7). The lots were sold between 1903 and 1912 (see Figure 7, Figure 9 and Figure 11). Due to the lack of water, the lots were classified as second class pastoral land, rather than agricultural land. By the early 1920s, about 40 families had settled on homestead lots in Lualualei (Kelly in Haun 1991:331–332) (Figure 11). Substantial infrastructure was built in northwest Lualualei in the early twentieth century, including a plantation railroad (Lualualei Homestead Road) on the south side of Pu‘u Mā‘ili‘ili and Lualualei Reservoir just to the east.

Another major influence in Lualualei, during the first half of the twentieth century, was the military. By 1929, over 8,184 acres of the McCandless Cattle Ranch had been condemned and purchased by the U.S. Navy for the construction of a Naval Ammunition Depot for the ships of Pearl Harbor Naval Base. The construction of Naval Magazine–LLL and Radio Transmission Facility (RTF) took place in Lualualei between 1930 and 1935 (Kelly in Haun 1991:339–341). Neither the 1936 (Figure 12) nor the 1943 (Figure 13) War Department map series, however, show any military infrastructure developed in the project area.

World War II and the introduction of the military into the area helped to deplete the workforce and increased wages while competing for scarce land and water resources. Following the news that the OR&L rail line service was to be discontinued, on 17 October 1946, Wai‘anae Sugar Plantation went out of business and its assets, including the rail system, were sold. By the late 1940s the railways in Wai‘anae were discontinued and by the early 1950s they no longer appeared on maps (Figure 15). In 1971, the Navy began sub-leasing some of their lands for agricultural uses, mainly for grazing and bee keeping. The presence of the military at Lualualei has boosted the economy of Lualualei by providing jobs to residents over the years. The lower portions of Lualualei Valley were developed into residential lots after World War II.

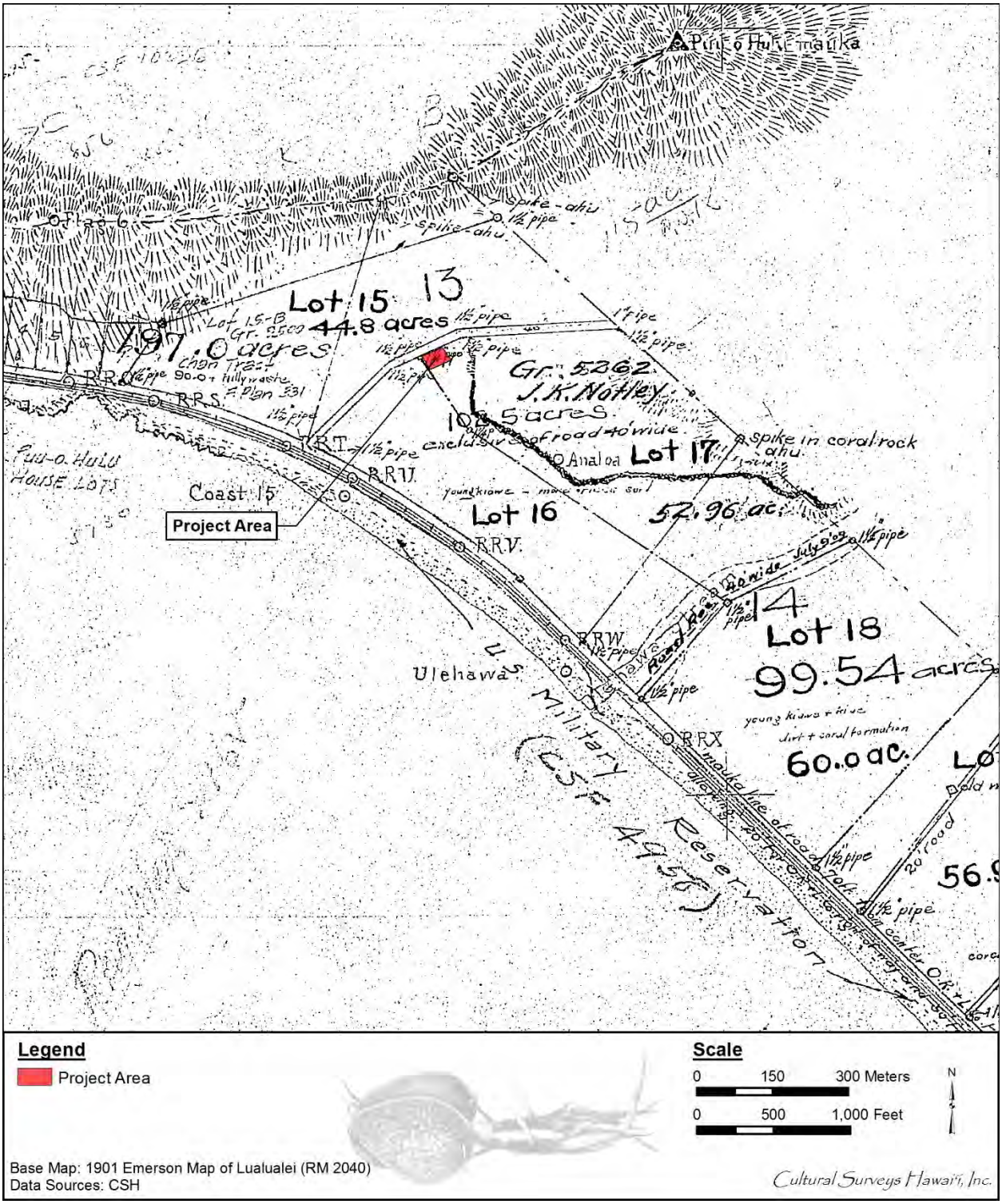

Figure 7. 1901 Emerson map of Lualualei showing the project area

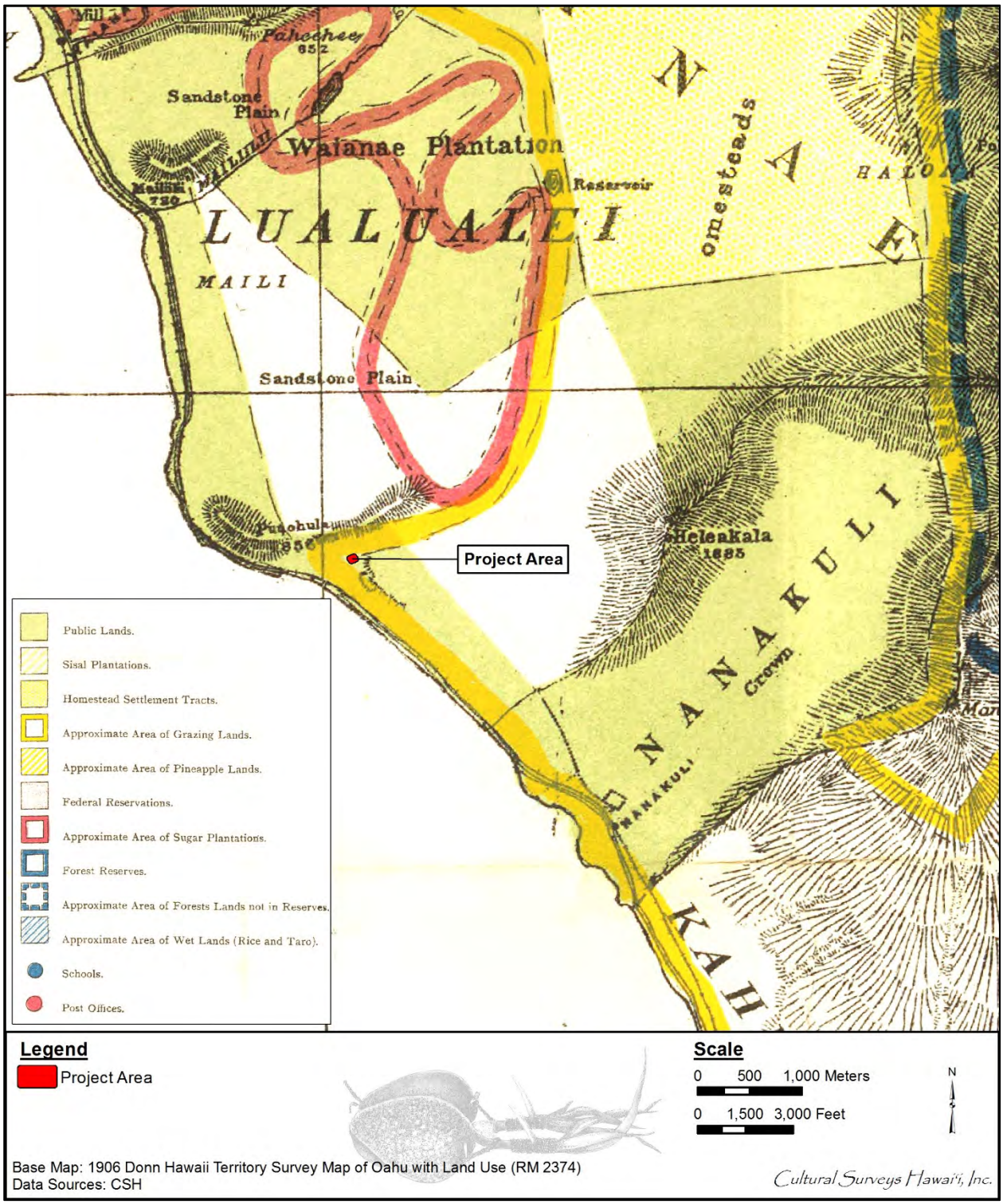

Figure 8. 1906 Donn Hawaii Territory map of O‘ahu land use showing the project area

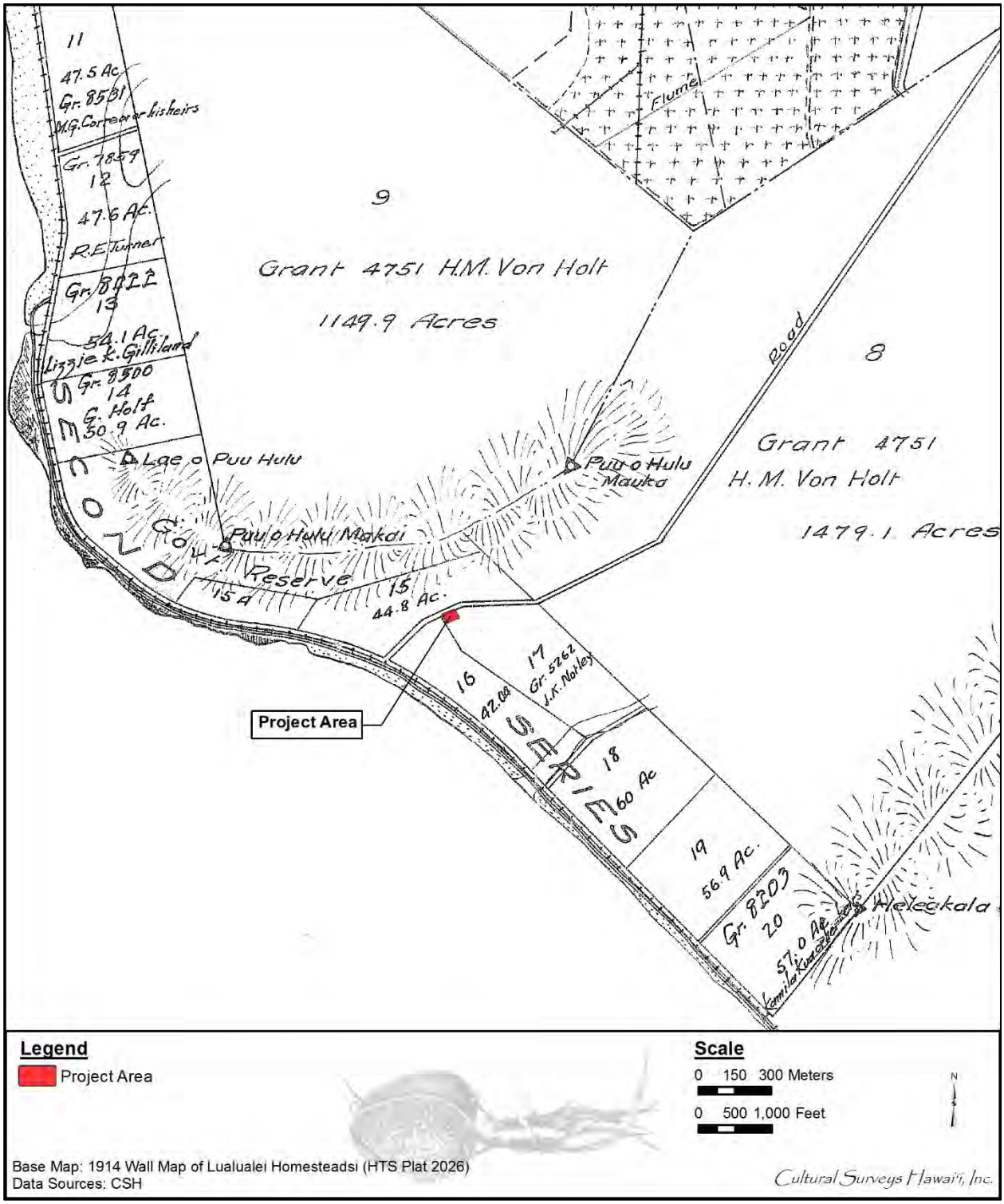

Figure 9. 1914 Wall map of Lualualei Homesteads showing the project area

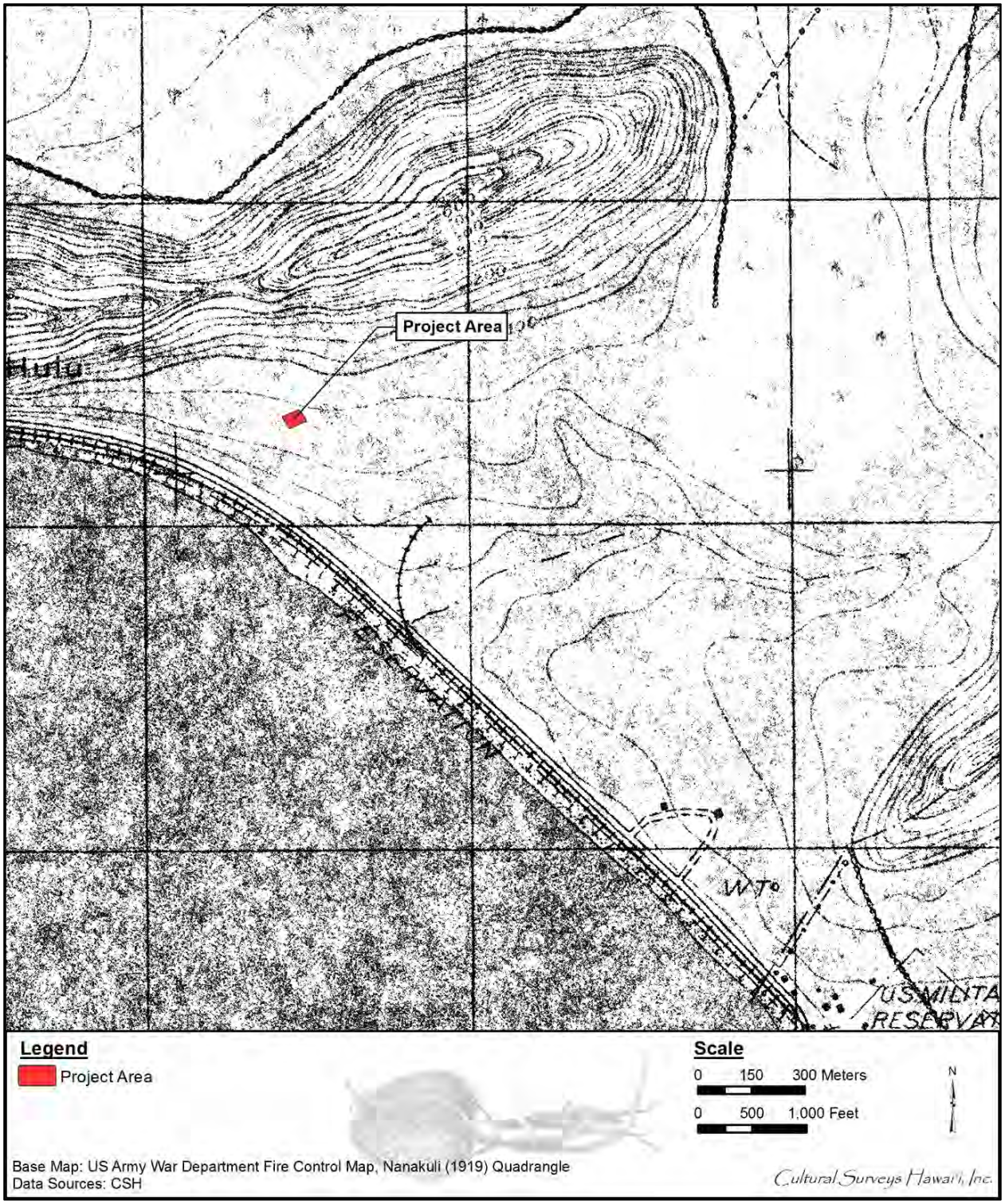

Figure 10. 1919 U.S. Army War Department Fire Control map, Nanakuli Quadrangle showing the project area

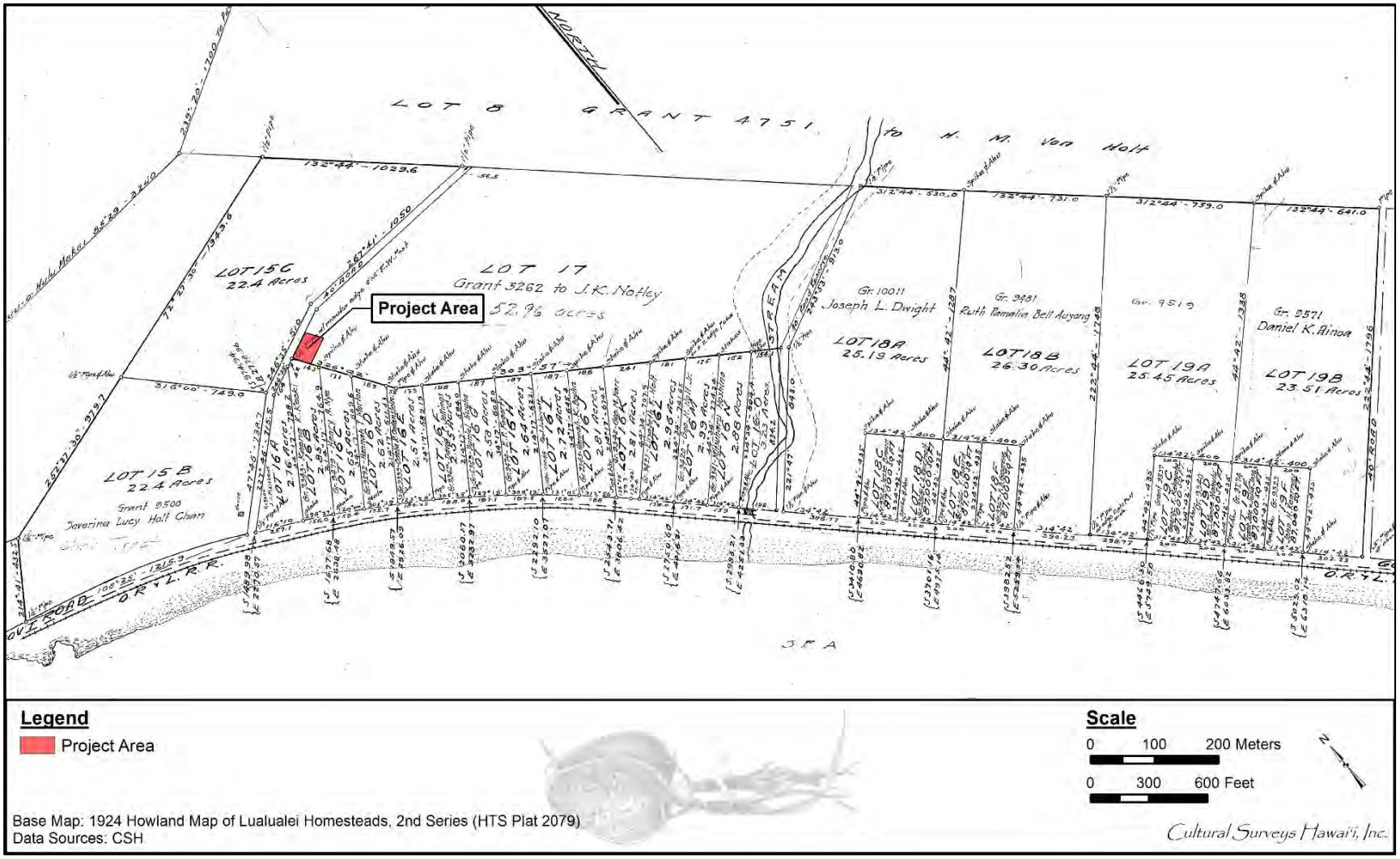

Figure 11. 1924 Howland map of Lualualei Homesteads showing the project area

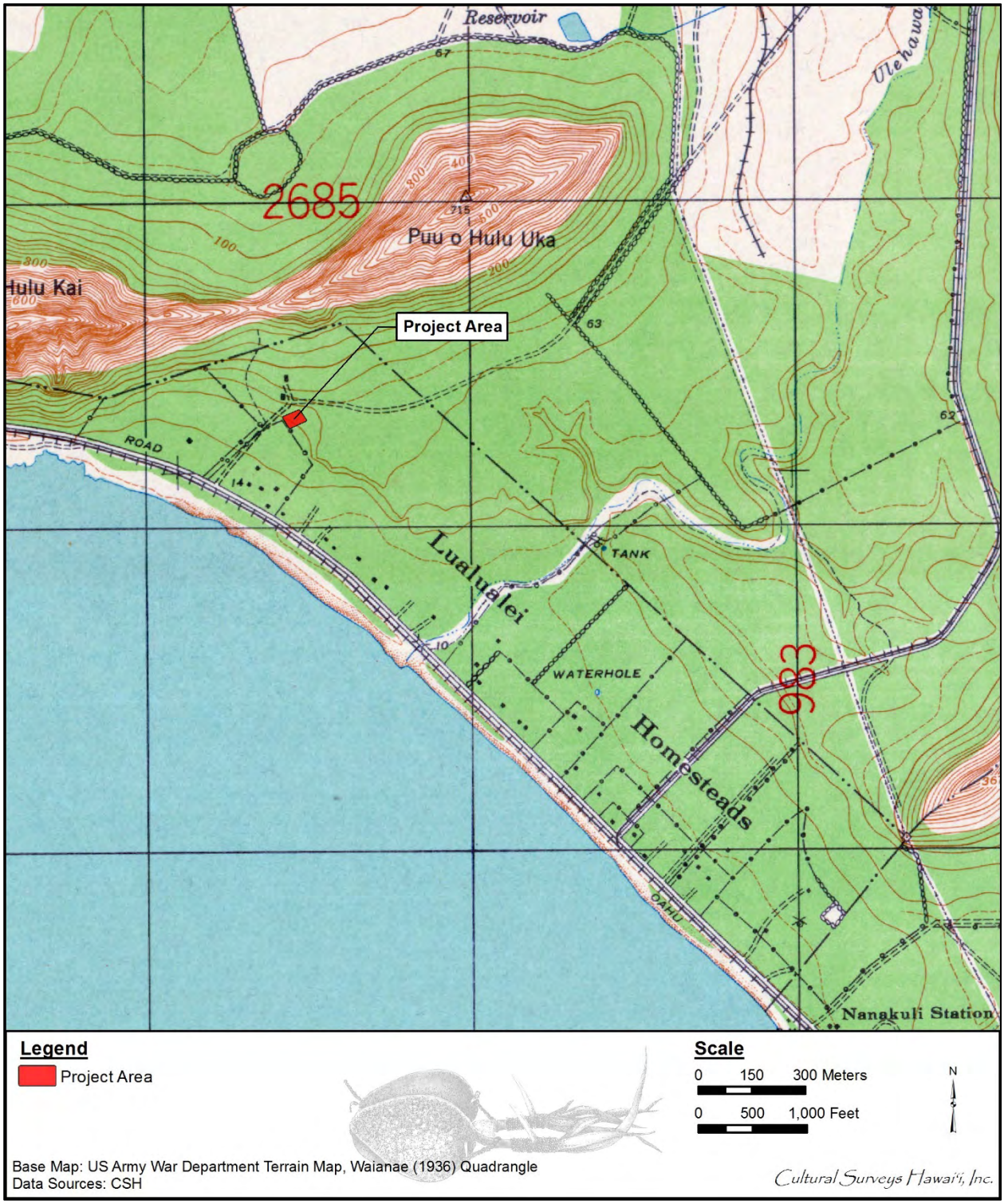

Figure 12. 1936 U.S. Army War Department Terrain map, Waianae Quadrangle showing the project area

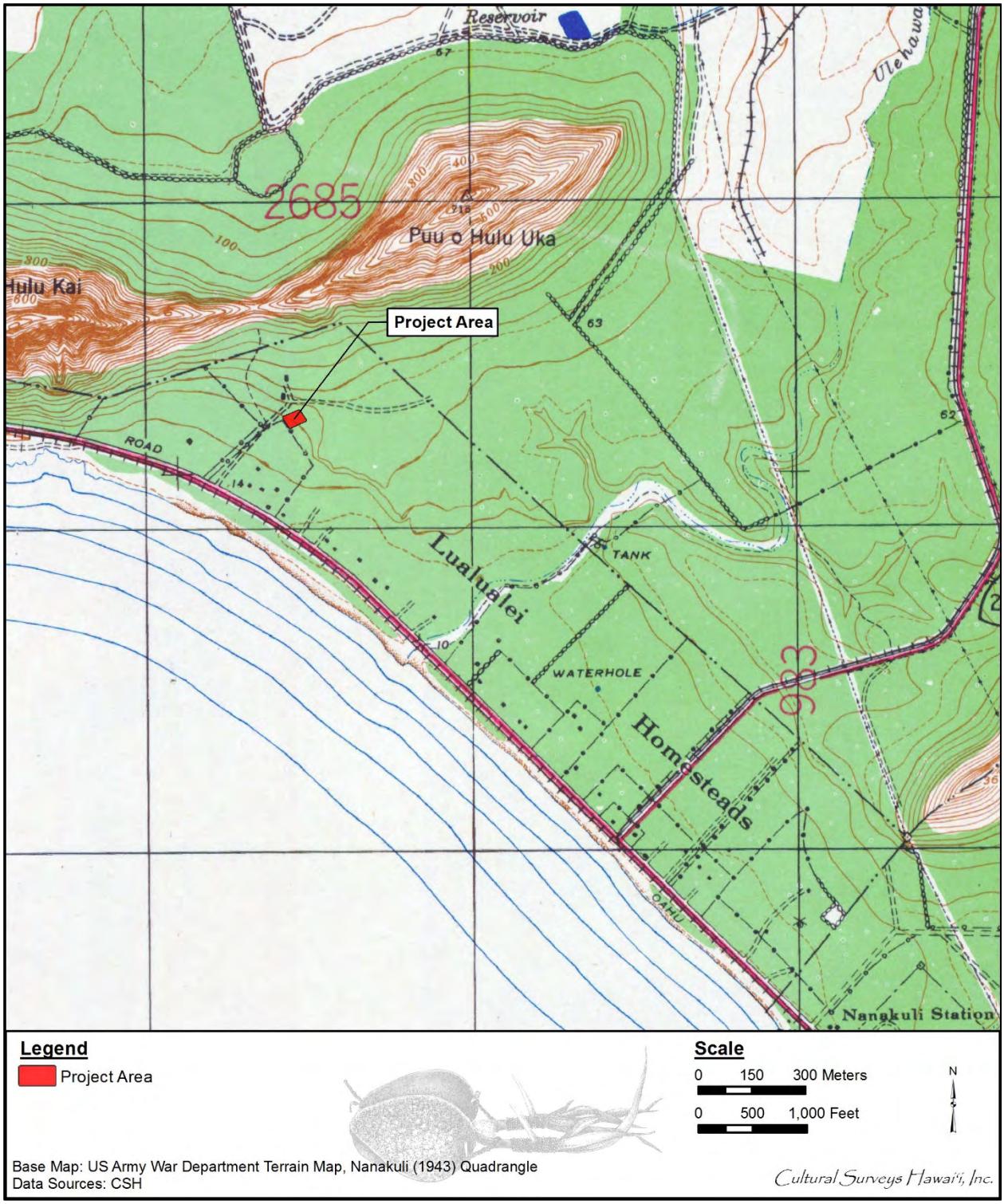

Figure 13. 1943 U.S. Army War Department Terrain map, Nanakuli Quadrangle showing the project area

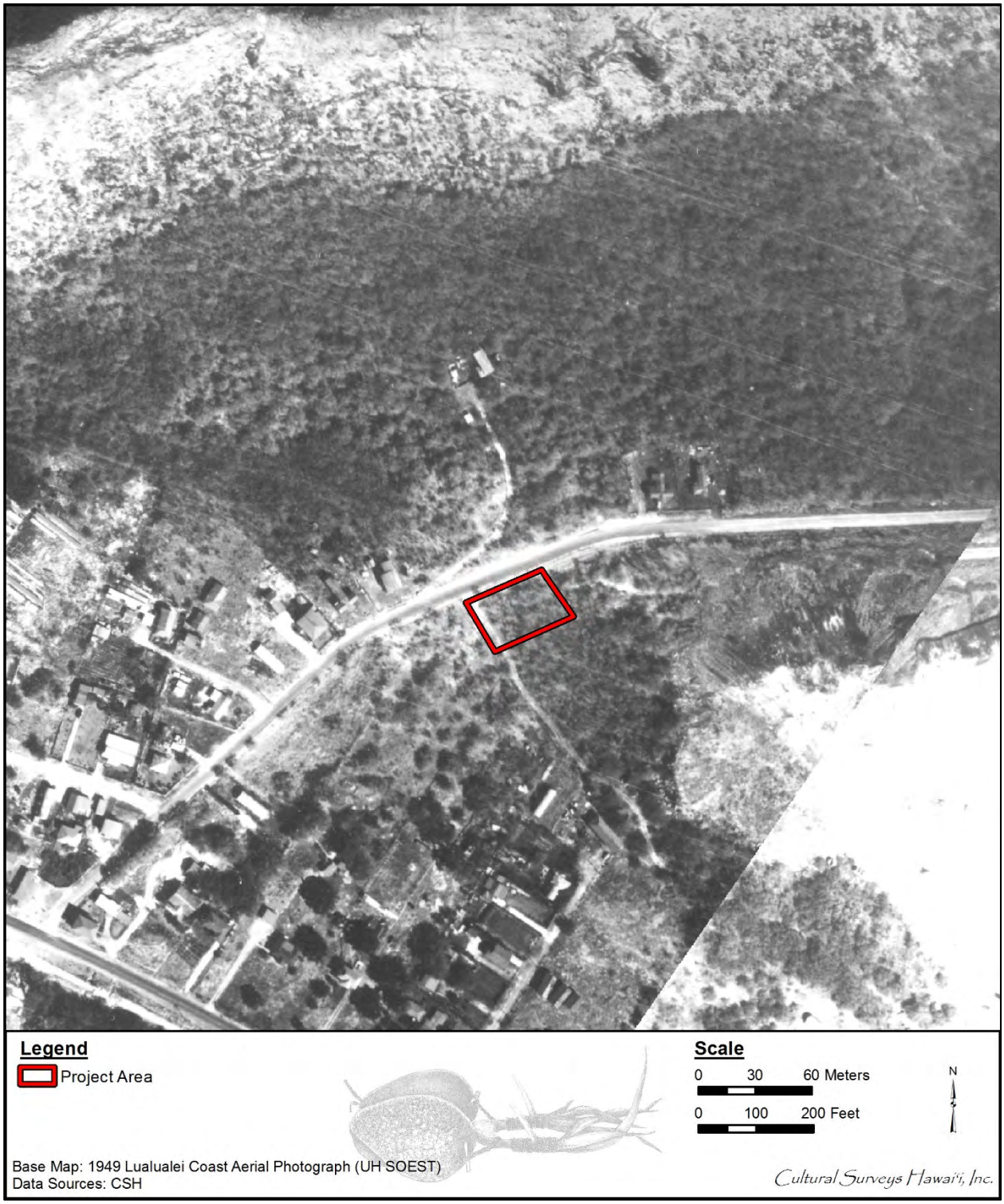

Figure 14. 1949 Lualualei Coast aerial photograph (UH SOEST) showing the project area

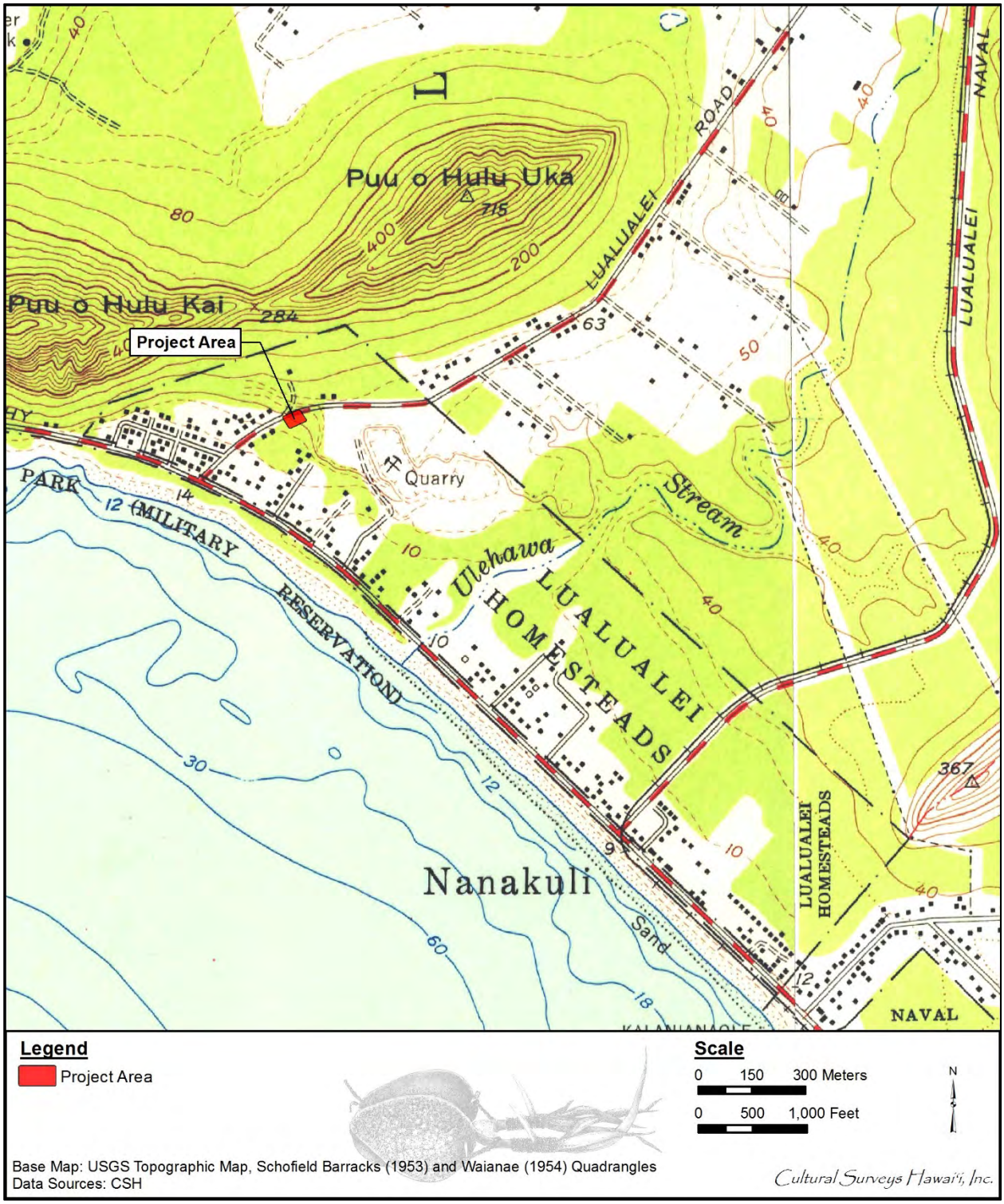

Figure 15. Portion of 1953 Schofield Barracks and 1954 Waianae USGS Topographic Quadrangles showing the project area

3.4.1 Modern Land Use

Today Wai‘anae and Lualualei Ahupua‘a are both occupied by homes and gardens, mainly situated near the shorelines and further inland. The project area itself had little development except for the areas *makai* (seaward, to the west) of the study area as shown in the 1949 and 1958 aerial photos (see Figure 14 and Figure 16). By the early 1970s, the number of residential homes west of the project area increased (Figure 17 and Figure 18). The vast majority of inland Lualualei Valley is still used today by the military for the storage of ammunition for Pearl Harbor.

3.4.2 Historic Maps

1901 Emerson Map of Lualualei

The 1901 Emerson map of Lualualei (see Figure 7) shows the alignment of Hakimo Road as already in place as a major access road into the valley bounding the project area on the northwest side. The project area is shown as a portion of a 102.5-acre Grant 5262 to a J.K. Notley. Almost no data has been identified regarding this J.K. Noley. He may have been the same J.K. Notley who was a polling place inspector at A‘ala Park in 1905 (The Hawaiian Star June 20, 1905) which suggests he was a man of some civic responsibility who lived in Honolulu. A meandering wall to the southeast indicates ranching. Coral rock and young *kiawe* are noted in the vicinity but other than the Hakimo Road alignment and the cattle wall there is very little indication of land development.

1906 Donn Hawaii Territory Map of Oahu Land Use

The 1906 Donn Hawaii Territory map of O‘ahu land use (see Figure 8) appears to show the project area as within “Grazing Lands” which is commensurate with the suggested cattle wall depicted in the 1901 Emerson map (see Figure 7).

1914 Wall Map of Lualualei Homesteads

The 1914 Wall map of Lualualei Homesteads (see Figure 9) shows the Hakimo Road alignment bounding the project area on the northwest side as the only major access road into the valley. The project area is still shown as a portion of a 102.5-acre Grant 5262 to J.K. Notley. The huge land grant 4571 to H.M. von Holt of 1,149.9 acres dominates the landscape to the northwest, north, and east.

1919 Army War Department Map

The 1919 Army War Department map (see Figure 10) shows no development in the vicinity of the present project area (it seems odd that the Hakimo Road alignment depicted on earlier maps is not shown). A railroad spur heading inland curves off the coast 400 m to the southeast and is understood as a spur to access sugar cane fields. Sugar cane symbols are prominent 800 m further back into the valley from the project area but no sugar cane cultivation appears close to the project area. An extensive rock wall wrapping around the Pu‘u o Hulu Kai/Pu‘u o Hulu Uka landform is understood to keep grazing animals on the hills and out of the sugar cane. No development is indicated near the project area. The distribution of sugar cane indicates the poor agricultural potential near the project area owing to both poor soil and a lack of water.

1924 Howland Map of Lualualei Homesteads

The 1924 Howland map of Lualualei Homesteads (see Figure 11) shows the Hakimo Road alignment bounding the project area on the northwest side; the project area is still shown as a portion of a 102.5-acre Grant 5262 to J.K. Notley. The area southeast of Hakimo Road abutting the Farrington Highway alignment has been subdivided into a number of homestead lots.

1936 U.S. Army War Department Terrain Map

The 1936 U.S. Army War Department Terrain map (see Figure 12) shows a number of houses arrayed inland of the Farrington Highway alignment within the new Lualualei Homesteads. Ranching fence lines are shown to the northwest and southwest of the project area. A new railroad spur is shown inland to access the sugar cane fields there. Two houses now appear north of the project area across Hakimo Road.

1943 Army War Department Wai‘anae Quadrangle Map

The 1943 Army War Department map (see Figure 13) appears almost identical to the 1936 map (see Figure 12) with some further ranch wall development well inland from the project area.

1949 Lualualei Coast Aerial Photograph

The 1949 Lualualei Coast aerial photograph (see Figure 14) shows extensive development *makai* of the project area along Farrington Highway. The only development within the project is an unimproved road along the southwest side. Quarrying activity is evident to the southeast with the freshly exposed raised reef limestone showing bright white.

1953/1954 USGS Topographic Map

The 1953/1954 USGS topographic map (see Figure 15) shows increasing residential development *makai* and calls out the quarrying operation to the southeast. Hakimo Road (labeled as Lualualei Road) appears to have been much improved, probably indicating an asphalt surface. The project area per se remains undeveloped.

1958 Lualualei Coast Aerial Photograph

The 1958 Lualualei Coast aerial photograph (Figure 16) shows some ground clearing activity adjacent to the southwest side of the project area and in the northwest corner of the project area. The uncleared areas appear surprisingly bushy. The quarry to the southeast is expanding and approaching closer.

1971 Lualualei Coast Aerial Photograph

The 1971 Lualualei Coast aerial photograph (Figure 17) appears to show the quarry operation as abandoned with vegetation growing back. The present booster station appears in place.

1975 Lualualei Coast Aerial Photograph

The 1975 Lualualei Coast aerial photograph (Figure 18) shows a surprising amount of development in just 4 years in the adjacent areas with the quarry now seemingly redeveloped as a subdivision. The project area appears much the same as in 1971 and at present but with seemingly no trees.

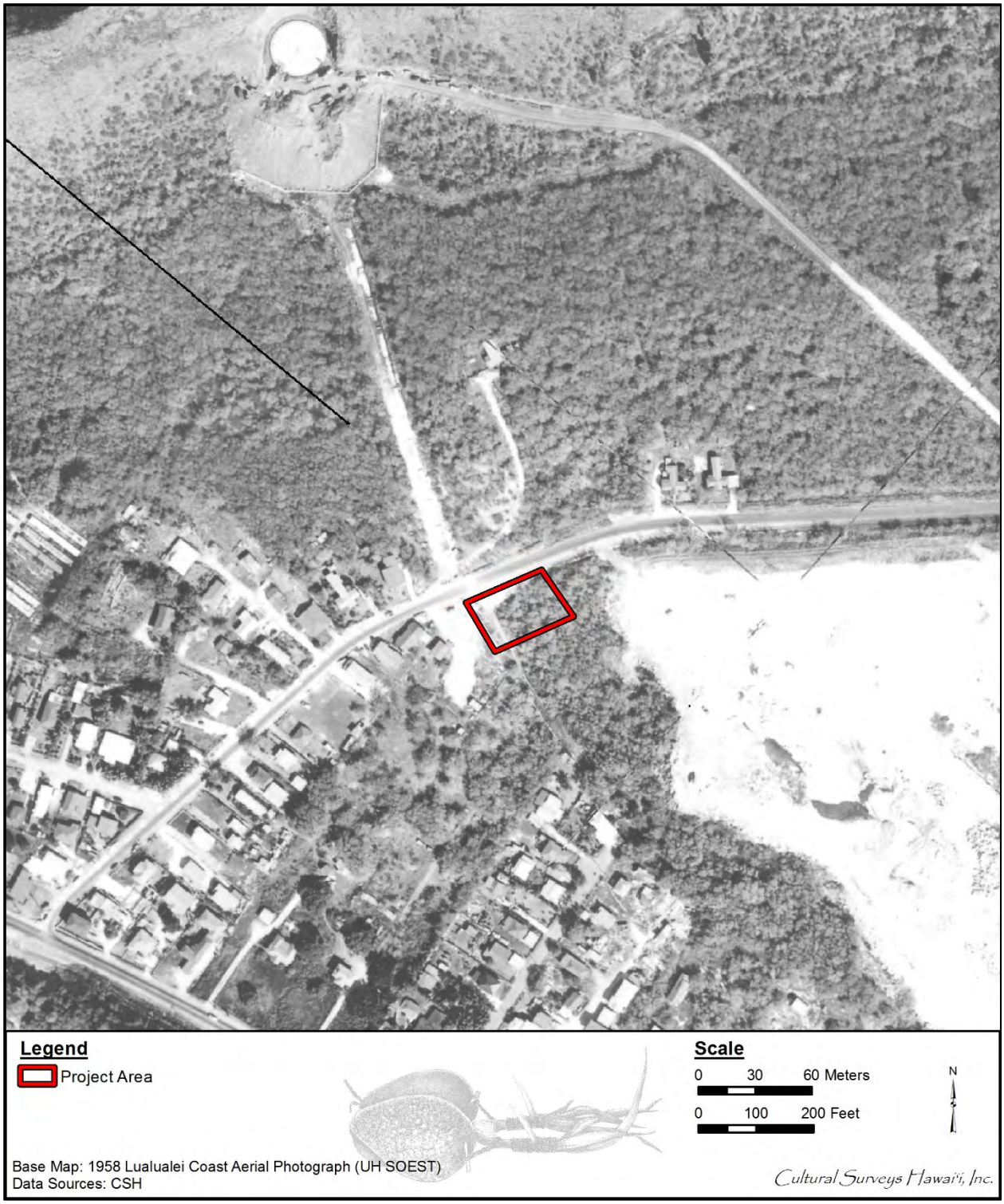

Figure 16. 1958 Lualualei Coast aerial photograph (UH SOEST) showing the project area

Figure 17. 1971 Lualualei Coast aerial photograph (UH SOEST) showing the project area

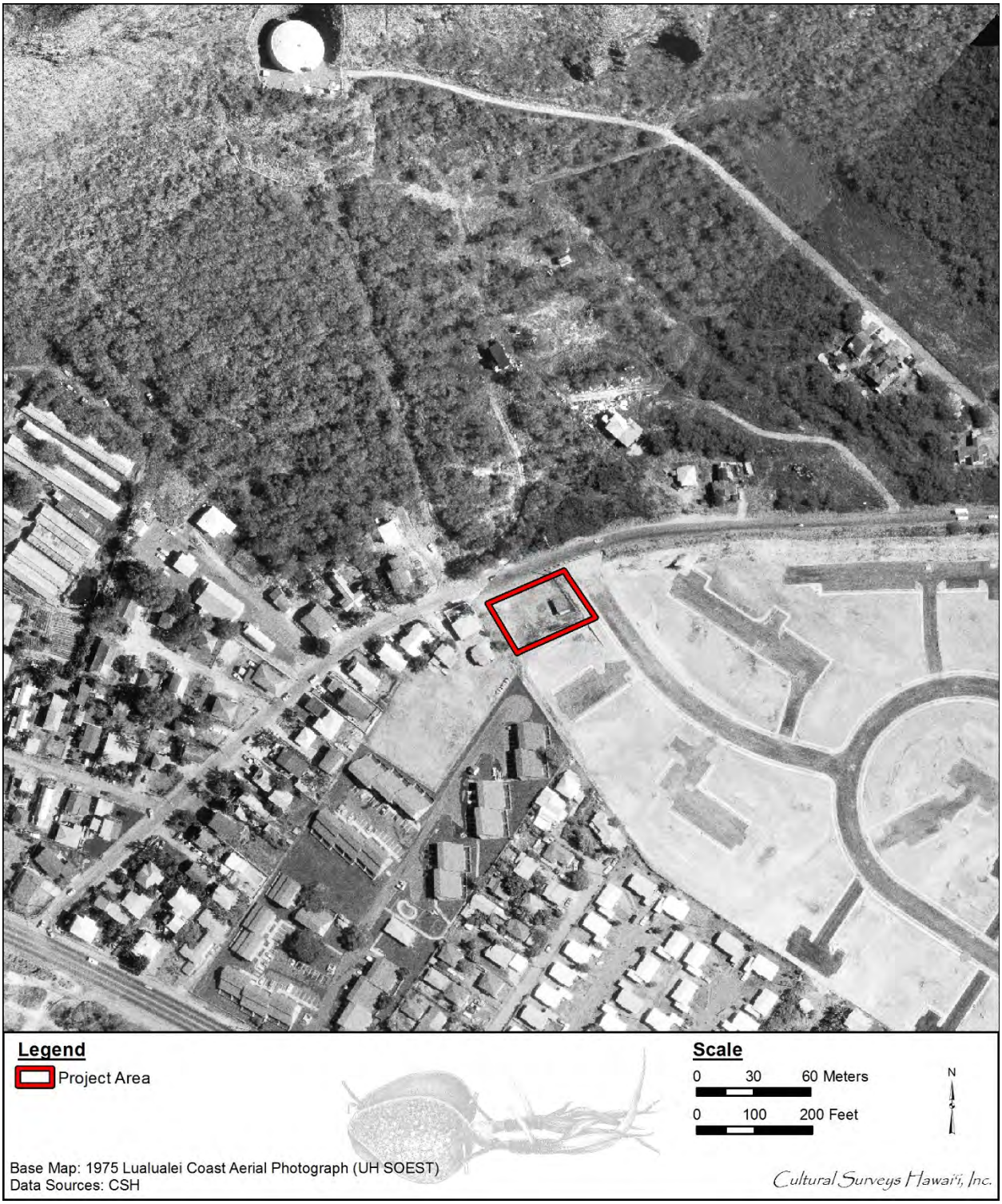

Figure 18. 1975 Lualualei Coast aerial photograph (UH SOEST) showing the project area

Section 4 Previous Archaeological Research

4.1 Previous Archaeology

Archaeological investigations in the adjacent area of Lualualei Ahupua‘a are summarized in Table 1; locations of previous archaeological studies are depicted in Figure 19. Recorded sites in the area are listed in Table 2 and are located on Figure 20. The earliest attempt to record archaeological sites in the nearby regions of Lualualei was done by Gilbert McAllister in the 1930s. The closest site to the present study area recorded by McAllister is Maui Rock, Site 148. Below is a summary of Site 148 as well as other archaeological studies located near the vicinity of the project area.

Site 148 is a large rock said to be named Maui (or Māui). McAllister states the rock is about 1.1 miles from Nānākuli station toward Pu‘u o Hulu. He also states,

> Northeast of the road on the property of E.P. Fogarty is a rock said to be named after the Hawaiian hero, Maui, who is said to have landed here when he first came to the Hawaiian Islands from the south. This stone at the time was surrounded by water and it was here that Maui reposed and sunned himself. In the bluff just northeast of the rock is a shelter in which he lived, and in the vicinity was a spring where he obtained water. The large rock is now split in half and adorned with many small, oddly shaped rocks. It is said to be bad fortune to build one’s house across a line drawn directly from the rock to the shore. J.J. Mathews is said to have collected detailed information in regard to this site. [McAllister 1933:110]

4.1.1 Bordner 1977

Archaeological Research Center Hawai‘i conducted an archaeological reconnaissance survey for the proposed landfill developments on both sides of Lualualei Naval Road in Nānākuli. The survey investigation revealed the area had been modified previously by quarrying activities and bulldozing, leaving no trace of archaeological and cultural remains. The areas that were unmodified also showed no evidence for archaeological remains (Bordner 1977).

4.1.2 Chiogioji and Hammatt 1993

In 1992, CSH conducted archaeological investigations of a 5-acre parcel that lies 900 m inland from the Ulehawa Beach Park shoreline, on moderately sloping land between Pu‘u o Hulu to the northwest and Ulehawa Stream to the southeast. The archaeological survey and subsurface testing indicated the area was void of archaeological remains. Chiogioji and Hammatt (1993) also stated the area was an unlikely location for Hawaiian traditional burials considering the soil was difficult to excavate and the limestone bedrock occurred at shallow levels (Chiogioji and Hammatt 1993: 25).

4.1.3 Sinoto and Pantaleo 1994

In 1944, Aki Sinoto Consulting conducted an archaeological assessment of six candidate sites for the proposed Nānākuli III Elementary School. Sinoto and Pantaleo (1994) reported that no surface archaeological resources were found, and the candidate sites had undergone extensive land clearing and land modifications. Candidate Site 1 was a former limestone quarry. Candidate Site 2 had one occupied house, abandoned vehicles and a pig farm. Candidate Site 3 consisted of open

Table 1. Previous Archaeological Studies in the Vicinity of the Project Area

Reference	Type of Study	Location	Results
Bordner 1977	Archaeological reconnaissance survey	Nānākuli landfill; included land on both sides of Lualualei Naval Rd; TMK: [1] 8-7-009	No historic properties observed
Chiogioji and Hammatt 1993	Archaeological assessment	900 m inland from shoreline at Ulehawa Beach Park	No significant finds
Sinoto and Pantaleo 1994	Archaeological assessment	Nānākuli III Elementary School	No significant finds
Dega 1998	Archaeological reconnaissance survey	Ulehawa Beach Park	Found cultural horizon 8-10 centimeters (cm) thick and WWII bunkers; observed remnants of OR&L railroad line (SIHP # 50-80-12-9714)
McDermott and Hammatt 2000	Archaeological inventory survey	Ulehawa Beach Park	Documented three sites, including features of WWII-era bunker (SIHP # 50-80-07-5761) and two subsurface cultural layers (SIHP #s 50-80-07-5762 and -5763); deposits consisted of midden (e.g., marine shell, fish bone) and both indigenous (fishhooks, volcanic glass, basalt flakes) and historic (glass, metal, and concrete fragments) artifacts; both layers appeared to date to late pre-Contact or very early post-Contact periods
Ostroff and Desilets 2005	Archaeological monitoring	Farrington Hwy	Identified five charcoal-enriched sand deposits including BWS-5 in current project area with a date range of AD 1640 to 1960; no cultural materials identified
Jones and Hammatt 2006	Archaeological field check and literature review	La‘ikū, Wai‘olu, and Princess Kahanu streets, Lualualei, TMKs: [1] 8-7-007:033, 042, and 043	No historic properties identified; recommended no further work for TMK: [1] 8-4-016:008, conducting an AIS for the “Government Reservation” parcel, archaeological monitoring for two parcels, and additional survey of fifth parcel

Reference	Type of Study	Location	Results
O’Leary and McDermott 2006	Archaeological inventory survey	SW slopes of Pu‘u Heleakalā	Identified pre-Contact rock shelter (SIHP # 50-80-08-6699) and WWII concrete bunker (SIHP # -6681)
Souza and Hammatt 2006	Archaeological monitoring	Fiber optic installation, Farrington Hwy	No historic properties observed
Hammermeister and McDermott 2007	Addendum to archaeological inventory survey	SW slopes of Pu‘u Heleakalā	Identified possible pre-Contact marker (SIHP # 50-80-08-6920)
McElroy 2008	Archaeological monitoring	Farrington Hwy, portions of TMKs: [1] 8-7, 8-6, 8-5, 8-4, 8-3, and 8-2	Found one glass bottle dating to ca. 1950s; no traditional Hawaiian artifacts, cultural deposits or surface features identified
Dagher and Spear 2011	Cultural resource review and field inspection	Pacific Mall, TMK: [1] 8-7-008:012	No significant finds
Mierzejewski et al. 2014a	Archaeological monitoring	Ulehawa Beach Park Wastewater Treatment Reconstruction project	No historic properties or subsurface cultural deposits observed
Mierzejewski et al. 2014b	Archaeological monitoring	Lualualei Wastewater Pump Station Force Main system project, TMKs: [1] 8-7-006:003, 8-7-007:001, 067	No historic properties or subsurface cultural deposits observed

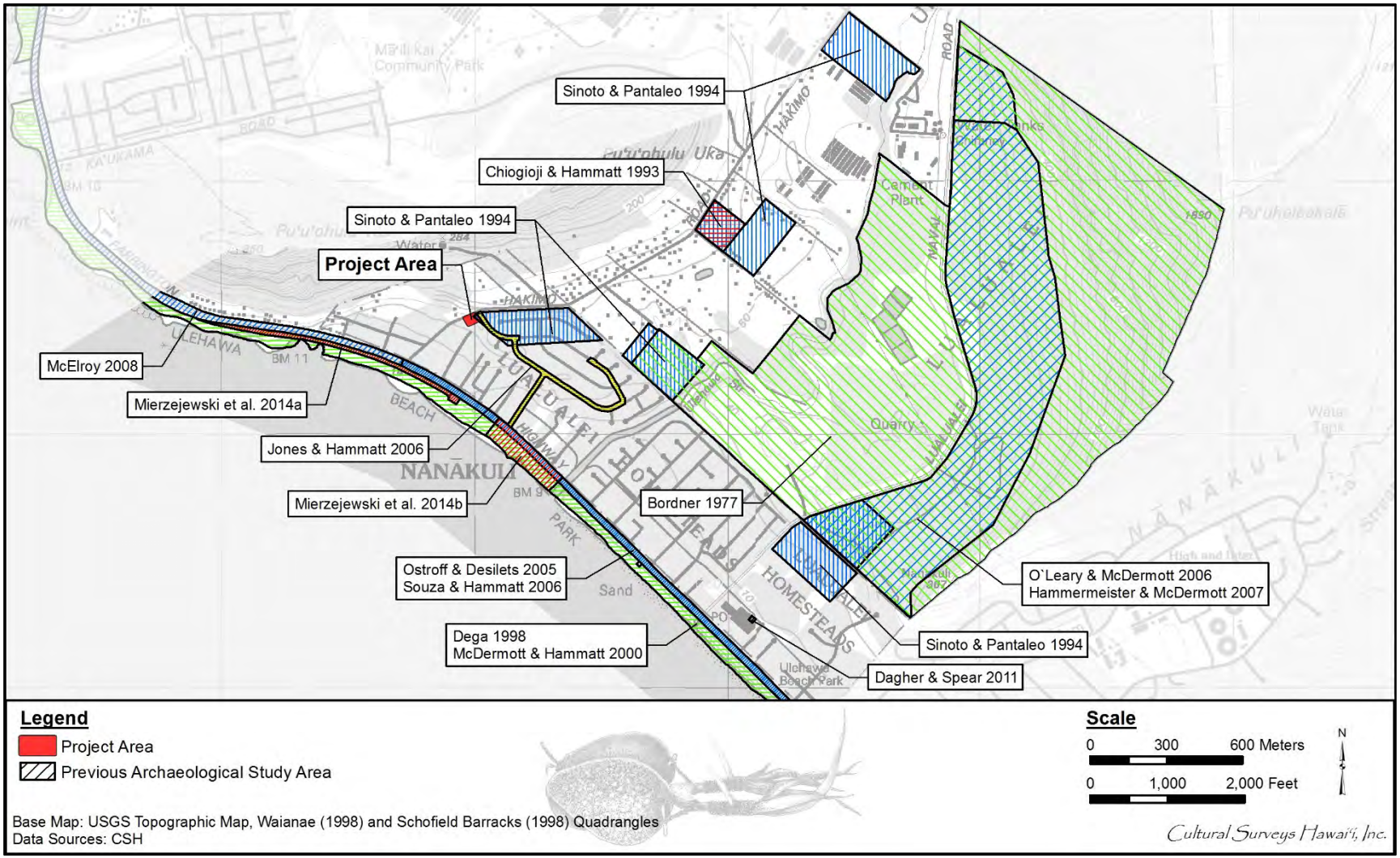

Figure 19. Previous archaeological studies in the vicinity of the project area

Table 2. Previously Recorded Sites in the Vicinity of the Project Area

SIHP #	Site Type/ Name	Source
Site 148	Maui Rock	McAllister 1933
50-80-07-05761A	WWII bunker	McDermott and Hammatt 2000
50-80-07-05761B	WWII bunker	McDermott and Hammatt 2000
50-80-07-05762	Subsurface cultural deposit	McDermott and Hammatt 2000
50-80-07-05763	Subsurface cultural deposit	McDermott and Hammatt 2000
50-80-08-06681	WWII bunker	O’Leary and McDermott 2006
50-80-08-06699	Rock shelter	O’Leary and McDermott 2006
50-80-08-06920	Mound	Hammermeister and McDermott 2007
50-80-12-9714	OR&L railroad	Dega 1998

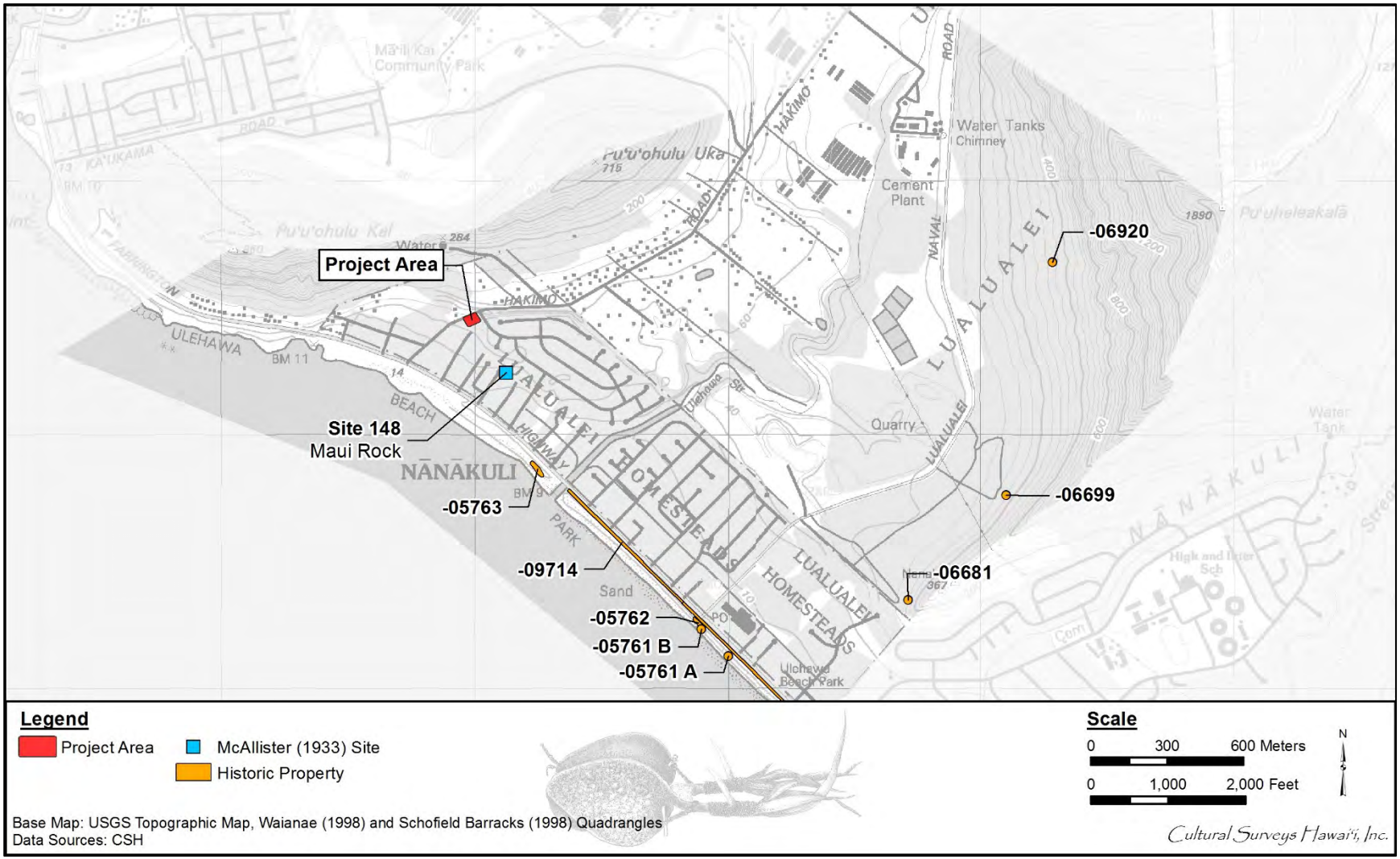

Figure 20. Previously recorded archaeological sites in the vicinity of the project area

land with nine residential houses, and the land had been altered previously from farming activities. Candidate Site 3 also coincides with the area investigated by Chiogioji and Hammatt (1993). Sinoto and Pantaleo's assessment of Candidate Site 3 is consistent with Chiogioji and Hammatt's observations that there were no significant cultural remains. Candidate Site 4 was under cultivation for truck crops. Candidate Site 5 was extensively disturbed. Candidate Site 6 had been extensively cleared (Sinoto and Pantaleo 1994:7). Based on the findings from the archaeological assessment, they determined that no significant archaeological remains were expected to be discovered in these candidate sites.

4.1.4 Dega 1998; McDermott and Hammatt 2000

In 1998, Scientific Consulting Services conducted an archaeological field reconnaissance survey for improvements to Ulehawa Beach Park (Dega 1998). The previous archaeological and archival studies revealed one historical site had been previously identified within the boundaries of the Ulehawa Beach Park project, which was identified as the OR&L railroad line (SIHP # 50-80-12-9714), which ran parallel to Farrington Highway. The railroad tracks were visible along the northern boundary of the project area, from the eastern project boundary to the Auyoung Homestead Road (Dega 1998:1). One significant find during the reconnaissance survey was an extensive cultural horizon 8 to 10 cm thick consisting of charcoal flecking along the eastern portion of the project area. Several fragments of bird and bone were also found (Dega 1998:4). Historic structures including World War II bunkers were noted within the project area (Dega 1998:5). Based on the results of the fieldwork, Dega (1998) recommended an archaeological inventory survey be conducted in order to determine the presence of cultural deposits and burials within the sand dunes near the coastlines and to gather further information on the World War II bunkers (Dega 1998:5).

In 1999, CSH was contracted to complete the archaeological inventory survey for the improvements to Ulehawa Beach Park (McDermott and Hammatt 2000). Two subsurface cultural layers (SIHP #s 50-80-07-5762 and -5763) were found. Two charcoal samples from SIHP # -5762 were sent to Beta Analytic Inc. for radiocarbon analysis. One result was a modern date. The second result had a conventional date of 230±60 BP and a calibrated date of AD 1490-1890. The cultural deposits consisted of midden (marine shell, fish bone, charcoal) and both indigenous (fishhooks, volcanic glass, and basalt flakes) and historic (glass, metal, and concrete fragments) artifacts. Of particular interest was a nearly complete, barbless pearl shell fishhook with an unusually deep V-bend reminiscent of Marquesan or Tahitian hooks. This type of fishhook is considered atypical for Hawaiian fishhooks. Both cultural layers appeared to date to the late pre-Contact or very early post-Contact period. Also, remnants of World War II-era concrete bunkers (SIHP # -5761) were found. The scant midden and artifact assemblage recovered indicates there is little evidence of permanent or recurrent habitation along the coastal area and supports the hypothesis that traditional Hawaiian settlement was concentrated inland (McDermott and Hammatt 2000).

4.1.5 Ostroff and Desilets 2005

Between 2002 and 2005, Garcia and Associates conducted archaeological monitoring for the Farrington Highway Water Main Replacement project (Ostroff and Desilets 2005). The project area and monitoring extended between Hakimo and Haleakala roads on Farrington Highway. Stratigraphy at Princess Kahanu Avenue was described as "mostly fill soils directly over coral outcrop" that appeared "to have been scraped clean of all in situ sand or soil" with "beach sands .

. . just before the north side of Ulehawa Channel" (Ostroff and Desilets 2005:21, 22). SIHP # -5763, previously identified by McDermott and Hammatt (2000) "may have been observed . . . in the southbound (*makai*) lanes and within the park itself" (Ostroff and Desilets 2005:22). The cultural layer is referred to as Deposit BWS-5 in the report and is described as follows:

> . . . a relatively thick layer of charcoal-enriched sand observed within Ulehawa Beach Park . . . [with] a diffuse lower boundary. It is in the general area of previously recorded Site 50-80-07-5763. The deposit may be an extension of site, although the site boundaries are not well enough defined to make a definitive judgment.
>
> AMS dating was completed on a sample of the charcoal-impregnated BWS-5 sands (Beta-203915). This sample yielded a Conventional Radiocarbon age of 180±40BP and a 2 [sigma] calibrated date range of AD 1640 to 1960. [Ostroff and Desilets 2005:32]

The highest probability (77.6%) calibrated date range provided by Beta Analytic is AD 1640 to 1890, which overlaps with the McDermott and Hammatt (2000) findings. Deposit BWS-5 was also observed "under the south-bound (*makai*) lanes of Farrington Highway, just north of Ulehawa Channel" (Ostroff and Desilets 2005:38).

Petroglyphs were also identified outside the project area and adjacent to SIHP # -5763. Cultural monitors, who were aware of the petroglyphs' location, pointed out three different figures visible on the reef only during the summer months. These included two human figures, one of which was in poor condition, and a "fish or turtle" that was also in poor condition (Ostroff and Desilets 2005:19).

No evidence of SIHP # 50-80-07-148, the Maui *pōhaku*, was found during excavations "in the Garden Grove Apartment's parking lot within 40 meters" of the site (Ostroff and Desilets 2005:19). *Mauka* lanes of the highway contained evidence of the 1920s two-lane Farrington Highway between Hakimo Road and Lualualei Naval Road. Approximately 25-50 cm below surface, basalt curbing was occasionally visible. Basalt cobbles and basalt base course stones were also encountered (Ostroff and Desilets 2005:19).

4.1.6 Jones and Hammatt 2006

From 2003 to 2004, CSH conducted archaeological monitoring for water line improvements. The improvements consisted of the installation of a new 8-inch water line on Princess Kahanu Street, La‘iku Street, and the eastern end of Wai‘olu Street, and the installation of a 12-inch water line on the west end of Waiolu Street (Jones and Hammatt 2006). On-site monitoring was conducted on Princess Kahanu Avenue between Farrington Highway and La‘ikū Street, due to a possibility of sand deposits. The remainder of the project was switched to on-call monitoring. No cultural materials or deposits were found during monitoring. The stratigraphy for Princess Kahanu Avenue consisted of fill sediments overlying the coral reef.

4.1.7 Souza and Hammatt 2006

In 2005, CSH conducted archaeological monitoring for the Fiber Optics Duct Line from Nānākuli Avenue to Hakimo Road within the Farrington Highway right-of-way (ROW) (Souza and Hammatt 2006). The fiber optics were laid within Board of Water Supply abandoned water

lines. In consultation with SHPD, on-site monitoring was changed to on-call monitoring based on the presence of fill sediments within the abandoned water lines and a lack of findings. Weekly field checks were also conducted. No historic properties or cultural materials were encountered during excavations, a portion of which extended through the current project area.

4.1.8 O'Leary and McDermott 2006; Hammermeister and McDermott 2007

CSH conducted an archaeological inventory survey between 2004 and 2005 at the site of the Nānākuli B Site Materials Recovery Facility and Landfill. O'Leary and McDermott (2006) noted there was little development in the area, and that large portions of the land had been modified by bulldozing activities. In addition, they found a World War II concrete bunker (SIHP # 50-50-08-6681) and an abandoned road that was used to install the bunker. One historic property (SIHP # -6699) was identified, which was a pre-Contact rock shelter on the slopes of the southwest ridge of Pu‘u Heleakalā. Based on the radiocarbon dating, the shelter mostly likely dates to the late prehistoric period (O'Leary and McDermott 2006: 66). The rock shelter served as a temporary habitation site for Native Hawaiians who sought refuge from the heat or shelter while traveling for resources (O'Leary and McDermott 2006: 66).

In 2007, CSH visited the site once more to prepare a cultural impact assessment, and during the site visit, a stacked stone mound (SIHP # 50-80-18-6920) was discovered at the eastern end of the project area. The find was documented and reported as an addendum to the existing Nānākuli B Site archaeological inventory survey report (Hammermeister and McDermott 2007). No surface cultural materials or artifacts were observed on the mound or the surrounding vicinity. In addition, no cultural materials were found during the test excavations. Hammermeister and McDermott (2007) suggest the stacked mound is a pre-Contact marker (Hammermeister and McDermott 2007:9).

4.1.9 McElroy 2008

Garcia and Associates conducted archaeological monitoring between 2007 and 2009 for the installation of a fiber optic cable from Lualualei to Mākaha along Farrington Highway (McElroy 2008). The general stratigraphy of the area consisted of a modern asphalt road surface, multiple fill layers beneath the asphalt and natural sand or solid coral shelf at the base of excavation. One glass bottle dating to ca. 1950s was collected, and no traditional Hawaiian artifacts, cultural deposits or surface features were identified (McElroy 2008).

4.1.10 Dagher and Spear 2011

In 2011, Scientific Consultant Services conducted a cultural resources review and field inspection for the AT&T Cellular Communication Facility at the Pacific Mall in Nānākuli. Dagher and Spear (2011) found no archaeological sites in close proximity to the telecommunication cell tower site.

4.1.11 Mierzejewski et al. 2014a

In 2013, CSH conducted archeological monitoring for the Ulehawa Beach Park Wastewater Treatment Reconstruction project (Mierzejewski et al. 2014a). Project related ground disturbance included excavations for abandoning the existing cesspool, the installation of the new sewer, and associated surface restoration. In general, the observed stratigraphy within the project area consisted of reworked (i.e., graded and compacted) natural sediment overlying naturally deposited

sediments (alluvium and marine sand) formed atop the coral shelf (i.e., limestone bedrock). No historic properties or cultural materials were encountered during excavations.

4.1.12 Mierzejewski et al. 2014b

In 2014, CSH conducted archaeological monitoring for the Lualualei Wastewater Pump Station Force Main System project (Mierzejewski et al. 2014b). The project involved a 20-inch main, which measured 1,019 linear m (3,344 ft) in length and is on the east side of Farrington Highway. The project extended from the Lualualei Wastewater Pump Station on the south to a new manhole toward Mā‘ili Point on the north, within an existing non-exclusive perpetual easement that lies in the City and County of Honolulu Ulehawa Beach Park. No historic properties or cultural materials were encountered during excavations.

4.2 Background Summary and Predictive Model

The population of Lualualei up to the late pre-Contact/early post-Contact period had always been quite low. The dry climate and low rainfall limited the population density in the area.

By the mid-1800s the traditional Native Hawaiian lifestyle in the valley of Lualualei was in decline. The sandalwood trade, which ended ca. 1829, undoubtedly had a negative effect on the Native Hawaiian population. Lualualei began its cattle ranching period about this time. The introduction of sugar plantations brought more foreigners, and the OR&L railroad was linked to Wai‘anae in 1895. Based on the paucity of Land Commission Awards (LCAs) claimed within the area and the early population figures, it appears the Native Hawaiian population was quite low in the latter half of the nineteenth century. Population numbers slowly increased when homesteading was instituted in the early 1900s. Military use of the land began in 1917, and World War II greatly affected the landscape of the Wai‘anae coast by placing bunkers, gun emplacements, and barbed wire along the waterfront.

Archaeological investigations within Lualualei have documented evidence of pre-Contact Native Hawaiian activity in the *makai* sections of the *ahupua‘a*, immediately adjacent to the ocean. For example, cultural layers containing charcoal deposits, pit hearths, midden, and artifacts associated with pre-Contact occupation were documented during archaeological investigations at Ulehawa Beach Park (Dega 1998; McDermott and Hammatt 2000). Cultural layers, basalt cobbles and basalt base course stones suggesting traditional Hawaiian occupation were also encountered during archaeological monitoring on Farrington Highway between Hakimo and Heleakalā roads (Ostroff and Desilets 2005).

In contrast to the traditional Hawaiian sites, artifacts and features encountered in the *makai* portions of Lualualei Valley, the central section of Lualualei Valley, including the present project area, is indicated to have a minimal presence of pre-Contact Hawaiian sites. Only two pre-Contact sites were found in this central area, which included a rock shelter that served as a temporary habitation site for Native Hawaiians (SIHP # -6699) (O’Leary and McDermott 2006) and a stacked mound (SIHP # -6920). The paucity of traditional Hawaiian sites in this central area may reflect not only a less intensive use during the pre-Contact period, but also the extensive disturbance of this area by historic ranching, sugar agriculture, bulldozing, quarrying, and U.S. military occupation.

Based on background research and previous archaeological studies in and near the subject project area, there is a very low probability for uncovering evidence of pre-Contact or post-Contact utilization of the landscape prior to Board of Water Supply utilization during the proposed construction activities.

Section 5 Results of Fieldwork

The property gave every indication of having been previously graded flat (Figure 21 through Figure 25). Ground visibility was good with a mowed lawn of short grass. Landscaping was fairly minimal with a clump of exotic palm trees at the east corner and a few scattered *milo* trees in the southwest central portion of the project area.

The raised reef coral limestone gravel near the entrance driveway (Figure 23) was understood to be the native parent material with the brown terrigenous soil (Figure 25) visible on the surface of the property understood as a thin layer of imported topsoil. An exposure of stratigraphy just to the northeast across Waiolu Street at what is understood as a former quarry showed very thick raised reef limestone deposits at, or just below the ground surface (Figure 26).

No historic properties were observed on the surface and none are believed to be present.

Because of the general dryness, distance from the coast, less fertile limestone substrate, and the distance from known habitation areas, the probability of subsurface historic properties was evaluated as quite low.

Figure 21. General view of existing facility in northeast side of the project area, view from Hakimo Road and Waiolu Street, view to south

Figure 22. General view of the east corner of the existing facility, from Waiolu Street, view to southwest

Figure 23. General view of existing facility and access driveway from Hakimo Road (note raised reef limestone gravel in foreground), view to southeast

Figure 24. General view of undeveloped west side of facility, Hakimo Road at right, view to southwest

Figure 25. General view of west portion of the facility, view to southeast

Figure 26. General view of a former quarry area just northeast of the project area across Waiolu Street showing very thick raised reef limestone deposit, view to northeast

Section 6 Summary and Recommendations

The historic evidence supports that Lualualei was so remarkably dry as to have supported one of the lowest population densities of coastal O‘ahu. The only LCAs were in one small area (Pūhāwai) in the extreme northeast portion of the valley (see Figure 6) many kilometers from the project area. The project area lies approximately 700 m from the nearest known freshwater (Ulehawa Stream) and is several hundred meters back from the coast.

Previous archaeological studies have only identified one historic property within 600 m (a unique land form, the Maui Rock) to the southeast (see Figure 20). This supports the understanding that this was a very sparsely settled area.

Field inspection confirmed that the entire project area facility appeared to have been previously graded, the absence of any surface architectural features, the dry nature of the project vicinity and noted the presence of raised reef limestone close to or at the surface which is thought to be less fertile ground.

No further archaeological study is recommended. This is in keeping with the SHPD Chapter 6E-8 Historic Preservation Review dated January 14, 2013 (Log No. 2012.3809, Doc. No. 1301NN01, included as present Appendix A) that has determined that “… no historic properties will be affected by this action.”

The existing building within the project area was intended and built as a "temporary" pump station with the future permanent pump station to be built in the location also shown in the 1965 drawing (see Figure 5).

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Appendix A SHPD Project Review

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

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

ESTHER KIA'AINA
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

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

HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

601 Kamokila Boulevard, Suite 555
Kapolei, HI 96806

January 14, 2013

Bruce Meyers
Okahara and Associates
677 Ala Moana Blvd Suite 703
Honolulu, Hawaii 96813

LOG NO: 2012.3809
DOC NO: 1301NN01
Archaeology

Dear Mr. Meyers:

SUBJECT: **Chapter 6E-8 Historic Preservation Review -**
Board of Water Supply: Lualualei Line Booster System Improvements Job 13-034
Lualualei Ahupua'a, Wai'anae District, Island of O'ahu
TMK: (1) 8-7-007:005

Thank you for the opportunity to review the proposed project located at 87-Hakimo Road, Waianae; we received the submittal December 26, 2012. According to the documents, Honolulu Board of Water Supply proposes to demolish an existing pump control building, and construct a new pump control building and booster pump system within the existing BWS Lualeualei Pump Station Facility. Associated with the proposed project will be some minor grading, trenching and paving work. You have requested SHPD to write a determination letter for this project.

In an email sent to staff archaeologist D. Naboa, you have indicated that maximum depth of the excavation for a trench and drain sump is less than 8 feet. Shallower trenching and minor excavation for a new building of the pad will also occur. Approximately 0.182 acres will be disturbed during this project.

We have no records of known historic properties within or near the proposed project. Historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division show no evidence of previous sites or structures at this location. Due to past disturbances of the subject property with the initial construction of the existing facility, we determine that **no historic properties will be affected** by this action.

In the event that historic resources, including human skeletal remains, sand deposits, lava tubes, and lava blisters/bubbles are identified during construction activities, please cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division at (808) 692-8015.

Please contact Deona Naboa at (808) 692-8015 or Deona.Naboa@Hawaii.gov if you have any questions regarding this letter.

Aloha,

Theresa K. Donham
Archaeology Branch Chief

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JAN 17 2013
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OKAHARA & ASSOC., INC.
OAHU OFFICE

APPENDIX D

DETERMINATION LETTER FROM SHPD

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

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

ESTHER KIA'AINA
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WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

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Aloha,

Theresa K. Donham
Archaeology Branch Chief

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OAHU OFFICE

APPENDIX E

HAZARDOUS MATERIALS SURVEY

HAZARDOUS MATERIALS SURVEY

Lualualei Line Booster Station
Nanakuli, Hawaii

Prepared For:

Okahara and Associates
200 Kohola Street
Hilo, HI
96730

Prepared by:

MURANAKA ENVIRONMENTAL CONSULTANTS, INC.
2850 PAA STREET SUITE 200
HONOLULU, HAWAII 96819
(808) 836-8822

Project No. 2007-0188

January 17, 2008

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1.0 Introduction

Muranaka Environmental Consultants Inc. (MEC) conducted a limited asbestos and lead survey on December 4, 2007 at Lualualei Line Booster Station. The purpose of the survey was to determine the location of asbestos-containing materials, lead-containing paints, PCBs and mercury-containing materials on the interior and exterior surfaces of the building for the replacement of the line booster pumps.

2.0 Methodology

2.1 Asbestos

MEC collected samples in accordance with the requirements of the State of Hawaii Administrative Rules (HAR) Chapter 11-501, HAR 11-502, HAR 11-504 and the Environmental Protection Agency (EPA) publication, *560 / 5-85-030a, Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials.*

Polarized-light microscopy and the method outlined in 40 CFR 763, Appendix to Subpart F, *Interim Method for the Determination of Asbestos in Bulk Insulation Samples.* (EPA-6000/M4-82-020) was used to determine the amount of asbestos in each sample. When asbestos is not detected in a sample or contains asbestos in sizes smaller than the detection limits of the polarized light microscope (PLM), it will be reported as "No Asbestos Detected" (NAD). Vinyl floor tiles have been found to contain asbestos in smaller than detectable sizes and EPA therefore recommends reanalyzing vinyl floor tiles using transmission electron microscopy techniques (TEM) if the results are NAD. When trace amounts of asbestos (<1%) are detected, that sample shall be reported as having greater than one (1) percent asbestos (ACM) unless point counting is conducted. MEC shall assume that building components resulting in trace amounts of asbestos is ACM (>1%) unless the client desires to "point count".

The inspector wore a half-face, dual cartridge, air-purifying respirator with P-100 filters whenever friable suspect asbestos material was sampled. Each suspect asbestos-containing material was first wet with water then carefully removed from the building component and placed in a sealed container. The sampling tools were cleaned after each use to avoid cross contamination between samples. Each sample location was logged on a field data sheet with a description of the sample. Samples were then recorded onto a chain-of-custody form, properly signed, and sent to Scientific Laboratories of California Inc. in California for analysis.

2.2 Lead Paint

Paint film sampling was conducted in accordance with the U.S. Department of Housing and Urban Development's "Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing". Locations of paint samples were selected based on the building component type and homogenous paint film.

Each sample was placed into a labeled, re-sealable plastic container. Paint samples were analyzed using flame atomic absorption (EPA method7420) to determine the amount of lead in each sample.

2.3 Mercury

Light fixtures were examined for the presence of mercury lamps. If the fixture contained a fluorescent light bulb it was assumed to contain mercury. The quantity of mercury lamps were counted and noted. In addition, other possible mercury-containing equipment was inspected such as pump switches. MEC inspected the site for the presence of mercury ampoules. The quantity of ampoules were counted and noted.

2.4 PCB Ballasts

Fluorescent light ballasts were examined for the presence of PCB-containing fluids. The inspector looked for a label on the ballast that stated "No PCBs present". If no label was present then the ballast was assumed to contain PCBs. MEC inspector counted the number of PCB ballasts.

3.0 Observations and Results

The booster station consisted of a 20' x 20' building with pumps inside. The building was in good condition.

No asbestos was found in the components tested.

Lead was found in the grey paint on the exterior circuit box, the green paint on the interior circuit box and the brown painted exterior walls. See tables 2 and 3 for results, section 7.0 for laboratory data and section 8.0 for photos.

Fluorescent lamps were observed in the light fixtures. There were a total of sixteen (16) fluorescent lamps.

The ballasts were checked for PCBs. None of them had the "No PCBs Present" label and therefore were assumed to contain PCBs. There was one ballast in each of four light fixtures for a total of four (4) ballasts.

Mercury ampoules were found in the meter gauges of two (2) pumps for a total of two (2) mercury ampoules.

Table 1
Summary of Asbestos and Lead-Containing Building Components
Lualualei Line Booster Station
Honolulu, Hawaii

Hazardous Material	Building Component Type	Location	Quantity ft^2
Asbestos	No asbestos was found	----------	----------
Lead	Grey paint	Exterior circuit box	1
	Brown paint	Exterior walls	1600
	Green paint	Interior circuit box	4

3.1 Asbestos

Table 2
Asbestos Sampling Results
Lualualei Line Booster Station
Honolulu, Hawaii

Sample Number	Location	Sample Description	Type (1)	Friability	Asbestos % and Type (2)	Asbestos Containing
A-1	East side of pump	Gasket	M	Non-friable	NAD	No
A-2	West side of pump	Gasket	M	Non-friable	NAD	No
A-3	North side of pump	Gasket	M	Non-friable	NAD	No
A-4	South east side of booster station	Acoustical ceiling tile	M	Non-friable	NAD	No
A-5	Middle of booster station	Acoustical ceiling tile	M	Non-friable	NAD	No
A-6	North west side of booster station	Acoustical ceiling tile	M	Non-friable	NAD	No

1 Type of material: surfacing (S), thermal system insulation (TSI), miscellaneous (M)
2 NAD = No asbestos detected

3.2 Lead Paint

Table 3
Lead Paint Film Summary
Lualualei Line Booster Station
Honolulu, Hawaii

Paint Chip Sample Number	Paint Chip %	Location	Paint Description	Substrate	Lead Containing?
P-1	0.096	Exterior box	Grey paint	Metal	Yes
P-2	0.015	Exterior wall	Brown paint	Concrete	Yes
P-3	<0.01	Exterior trim	Tan paint	Wood	No
P-4	0.024	Interior box	Green paint	Metal	Yes
P-5	<0.01	Pump	Green paint	Metal	No
P-6	<0.01	Ceiling	White paint	Fiber board	No
P-7	<0.01	Fascia	Brown paint	Wood	No

4.0 Discussion

4.1 Asbestos

When asbestos containing materials are disturbed during demolition or renovation, compliance with EPA, OSHA, State of Hawaii-Department of Health, and HIOSH State of Hawaii-Department of Labor, Division of Occupational Safety and Health regulations, is required..

4.2 Lead Paint

When affected surfaces are disturbed during demolition or renovation, compliance with EPA, OSHA, State of Hawaii-Department of Health, and HIOSH State of Hawaii-Department of Labor, Division of Occupational Safety and Health regulations, is required.

4.3 Mercury-Containing Lamps

When mercury-containing lamps are disturbed during demolition or renovation, compliance with EPA, OSHA, State of Hawaii-Department of Health, and HIOSH State of Hawaii-Department of Labor, Division of Occupational Safety and Health regulations, is required.

4.4 PCB Ballasts

When ballasts containing PCBs are disturbed during demolition or renovation, compliance with EPA, OSHA, State of Hawaii-Department of Health, and HIOSH State of Hawaii-Department of Labor, Division of Occupational Safety and Health regulations, is required.

4.5 Mercury Ampoules

When mercury ampoules are disturbed during demolition or renovation, compliance with EPA, OSHA, State of Hawaii-Department of Health, and HIOSH State of Hawaii-Department of Labor, Division of Occupational Safety and Health regulations, is required.

5.0 Limitations

The conclusions, observations and recommendations made in this report are based on the limitations of the contract and the condition o the property at the time of the sampling and inspection was conducted. MEC accepts no responsibility for the inaccuracy or inapplicability of any part of this report that may be attributable to a change in the condition of the property after the survey was conducted or attributable to property conditions that were not readily accessible or observable at the time of the survey. In addition, we accept no responsibility for inaccurate or missing information provided by existing documents.

MURANAKA ENVIRONMENTAL CONSULTANTS, INC.

Maureen T. Gouveia
Environmental Specialist
Certification # - HIASB-2409

6.0 References

Code of Federal Regulations. Occupational Safety and Health Standards. Title 29, Part 1910. Washington DC. US Government Printing Office, 1989.

Code of Federal Regulations. Occupational Safety and Health Standards. Title 29, Part 1926.62. Washington DC. US Government Printing Office, 1993.

Code of Federal Regulations. Occupational Safety and Health Standards. Title 29, Part 1926.1101. Washington DC. US Government Printing Office, 1986.

Code of Federal Regulations. Occupational Safety and Health Standards. Protection of Environment. Title 40, Part 761. Washington DC: US Government Printing Office, 1989.

Code of Federal Regulations. National Emission Standard for Hazardous Air Pollutants (NESHAP), Asbestos Regulations. Title 40, Part 61 Subpart M. Washington DC: US Government Printing Office, July 1991.

State of Hawaii, Occupational Safety and Health Administration, Title 12, Subtitle 8, Part 8, Section 12-145.1,Asbestos.

State of Hawaii, Title 11, Hawaii Administrative Rules, Department of Health, Chapter 58.1. Solid Waste Management Control

State of Hawaii, Title 11, Hawaii Administrative Rules, Department of Health, Chapter 501, Asbestos Requirements.

State of Hawaii, Title 11, Hawaii Administrative Rules, Department of Health, Chapter 502, Asbestos-Containing Materials in Schools.

State of Hawaii, Title 11, Hawaii Administrative Rules, Department of Health, Chapter 504, Asbestos Abatement Certification Program.

State of Hawaii, Occupational Safety and Health Administration, Title 12, Subtitle 8, Part 8, Section 12-148.1, Lead.

US Department of Housing and Urban Development. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in housing. May 1996.

Section 7.0
Laboratory Reports

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Muranaka Environmental Consultants, I
Attn: Mark Muranaka
2850 Paa Street
#200
Honolulu, HI 96819

Date Received 12/10/07
Date Examined 12/10/07

RE: 2007-0188; Lualualei LB

AmeriSci Job # 907121140
P.O. #

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
A-1	907121140-01	*No*	NAD (by CVES) by John A. Lopez on 12/10/07
Location:			
Analyst Description: Black/Green, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Synthetic fibers 5 %, Non-fibrous 95 %			
A-2	907121140-02	*No*	NAD (by CVES) by John A. Lopez on 12/10/07
Location:			
Analyst Description: Black/Green, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Synthetic fibers 4 %, Non-fibrous 96 %			
A-3	907121140-03	*No*	NAD (by CVES) by John A. Lopez on 12/10/07
Location:			
Analyst Description: Black/Green, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Synthetic fibers 5 %, Non-fibrous 95 %			
A-4	907121140-04	*No*	NAD (by CVES) by John A. Lopez on 12/10/07
Location:			
Analyst Description: Brown/White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 70 %, Wollastonite 5 %, Non-fibrous 25 %			
A-5	907121140-05	*No*	NAD (by CVES) by John A. Lopez on 12/10/07
Location:			
Analyst Description: Brown/White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 70 %, Non-fibrous 30 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

2007-0188; Lualualei LB

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
A-6	907121140-06	*No*	NAD
Location:			(by CVES) by John A. Lopez on 12/10/07

Analyst Description: Brown/White, Homogeneous, Fibrous, Bulk Material
Asbestos Types:
Other Material: Cellulose 80 %, Non-fibrous 20 %

Reporting Notes:
Analyzed By: John A. Lopez; Date Analyzed: 12/10/2007 12-10-07
*NAD = no asbestos detected; Detection Limit <1%; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322). Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.
Reviewed By: 12/10/07

AMERISCI
www.amerisci.com

AMERISCI JOB #: 907121140

AMERISCI LOS ANGELI
24416 S Main St. Suite 3
Carson, CA 907
Phone (310) 834-48
Fax (310) 834-47

COMPANY: Murakami Environmental Consultants

ADDRESS: P.O. BOX 4341 HONO. HI 96812

P.O.#:

PROJECT INFORMATION

JOB NAME: Waikiki LB

JOB NUMBER: 2007-0188

JOB MANAGER: Maureen

JOB DESCRIPTION: asbestos survey

ANALYSIS TYPE	RUSH	24 HR	48 HR	72 HR	5 DAY
ASBESTOS TEM AHERA					
ASBESTOS PLM BULK	X				
ASBESTOS PCM AIR					
ASBESTOS PLM 1000 P.C.					
LEAD AIR BY FLAA					
LEAD WIPE BY FLAA					
LEAD PAINT / SOLID BY FLAA					
OTHER:					

TURNAROUND TIME

AIR FILTER INFORMATION:

MCE	
PC	
25 mm	
37 mm	
0.45 um	
0.80 um	
TEMP:	
OTHER:	

INITIAL RESULTS DELIVERY: ☐ FAX ☒ EMAIL ☐ VERBAL ☐ MAIL ONLY

REPORTS TO: Maureen

INVOICE TO: Mark Murakami

COMMENTS:

RETURN SAMPLES YES ___ NO X

PHONE: 808-836-8822

FAX: 808-836-8833

EMAIL: Maureen@murakamien

PAGER/CELL:

SAMPLE ID	SAMPLE LOCATION	START TIME	STOP TIME	TOTAL TIME	X	LITERS /MIN.	=	TOTAL VOLUME	AREA SQ FT	DATE COLLECTED
A-1										12/4/07
A-2										
A-3										
A-4										
A-5										
A-6										

SAMPLED BY: C. Bergantinos DATE/TIME: 12/4/07

RELINQUISHED BY: Maureen DATE/TIME: 12/7/07 8:26am

RECEIVED BY: DATE/TIME:

RECEIVED BY: DATE/TIME: 12/10/07 @ 0855

RELINQUISHED BY: DATE/TIME:

RECEIVED IN LAB BY: DATE/TIME:

Asbestos, Environmental Chemistry and Microbiology Analysis
Boston Los Angeles New York Richmond

Page ____ of ____

Please Reply To:

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

FACSIMILE TELECOPY TRANSMISSION

To:	Mark Muranaka Muranaka Environmental Consultants, Inc.	**From:**	John A. Lopez
		AmeriSci Job #:	907121140
Fax #:		**Subject:**	PLM rush Results
		Client Project:	2007-0188; Lualualei LB
Email:	mark.muranaka@muranakaenv.com,maureen@muranakaenv.com		

Date: Monday, December 10, 2007
Time: 11:29:34
Comments:

Number of Pages: 4 (including cover sheet)

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Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

AmeriSci Job #: 407121113

Date Received: 12/10/07
Date Analyzed: 12/10/07

Lead Analysis Results

Paint

EPA Method 3050/7420

Muranaka Environmental Consultants, Inc.

Honolulu, HI

Job Site: 2007-0188; Lualualei LB; Lead Survey

AmeriSci # 407121113	Client Number	Sample Location	% Lead (w/w)	Lead (mg/kg = ppm)
01	P-1		0.096	960
02	P-2		0.015	150
03	P-3		<0.01	<100
04	P-4		0.024	240
05	P-5		<0.01	<100
06	P-6		<0.01	<100
07	P-7		<0.01	<100

AmeriSci Reporting Limit is 0.01%, or 100mg/kg prior to any dilutions due to high analyte concentrations or matrix interferences. AmeriSci does not correct sample results by the blank value. All analytical batch data met quality control criteria unless otherwise noted. CA ELAP No. 2322. AIHA Lab No. 100530.

Reviewed by: _____

Analyzed by: Soheir Galess
Soheir Galess, Chemist

ELAP No: CA 2322

AMERISCI
www.amerisci.com

AMERISCI JOB #: 407 121113

AMERISCI LOS ANGELES
24416 S Main St. Suite 3
Carson, CA 907
Phone (310) 834-48
Fax (310) 834-47

COMPANY: Muranaka Environmental Consultants

ADDRESS: P.O. BOX 4341 HON. HI 96812

P.O.#:

PROJECT INFORMATION	ANALYSIS TYPE	TURNAROUND TIME: RUSH	24 HR	48 HR	72 HR	5 DAY
JOB NAME: Leadwater LB	ASBESTOS TEM AHERA					
JOB NUMBER: 2007-0188	ASBESTOS PLM BULK					
JOB MANAGER: Maureen	ASBESTOS PCM AIR					
JOB DESCRIPTION: lead survey	ASBESTOS PLM 1000 P.C.					
	LEAD AIR BY FLAA					
	LEAD WIPE BY FLAA					
	LEAD PAINT / SOLID BY FLAA	X				
	OTHER:					

AIR FILTER INFORMATION:

MCE	
PC	
25 mm	
37 mm	
0.45 um	
0.80 um	
TEMP:	
OTHER:	

INITIAL RESULTS DELIVERY: ☐ FAX ☒ EMAIL ☐ VERBAL ☐ MAIL ONLY

REPORTS TO: Maureen

INVOICE TO: Mark Muranaka

COMMENTS:

RETURN SAMPLES YES ___ NO X

PHONE: 808-876-8822

FAX: 808-836-8833

EMAIL: Maureen@Muranaka

PAGER/CELL:

um

SAMPLE ID	SAMPLE LOCATION	START TIME	STOP TIME	TOTAL TIME	X	LITERS /MIN.	=	TOTAL VOLUME	AREA SQ FT	DATE COLLECTED
P-1										12/4/07
P-2										↓
P-3										↓
P-4										↓
P-5										↓
P-6										↓
P-7										↓

SAMPLED BY: C. Bergantinos DATE/TIME: 12/4/07

RECEIVED BY: DATE/TIME:

RELINQUISHED BY: Mbourei DATE/TIME: 12/7/07 8:29am

RECEIVED BY: 08855 DATE/TIME: 12/10/07

RELINQUISHED BY: DATE/TIME:

RECEIVED IN LAB BY: DATE/TIME:

Section 8.0
Photo Log

Photo Log

Lualualei Line Booster Station
Nanakuli, Hawaii
December, 2007

Photo No. 1: View of the exterior of the booster station. The brown exterior walls contained lead.

Photo No. 2: View of exterior tan painted circuit box. The tan paint contained lead.

Photo No. 3: View of the green painted circuit box in the interior of the building. The green paint contained lead.

Photo No. 4: View of the pump inside the building. The gaskets did not contain asbestos. The green paint did not contain lead.

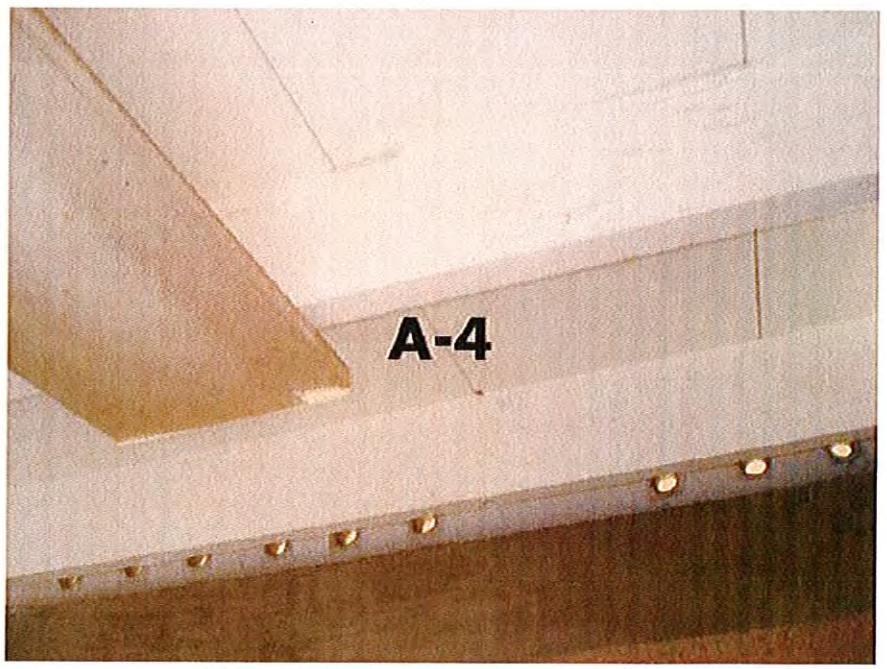

Photo No. 5: View of the fiber board ceiling. The fiber board did not contain asbestos. The white paint did not contain lead.

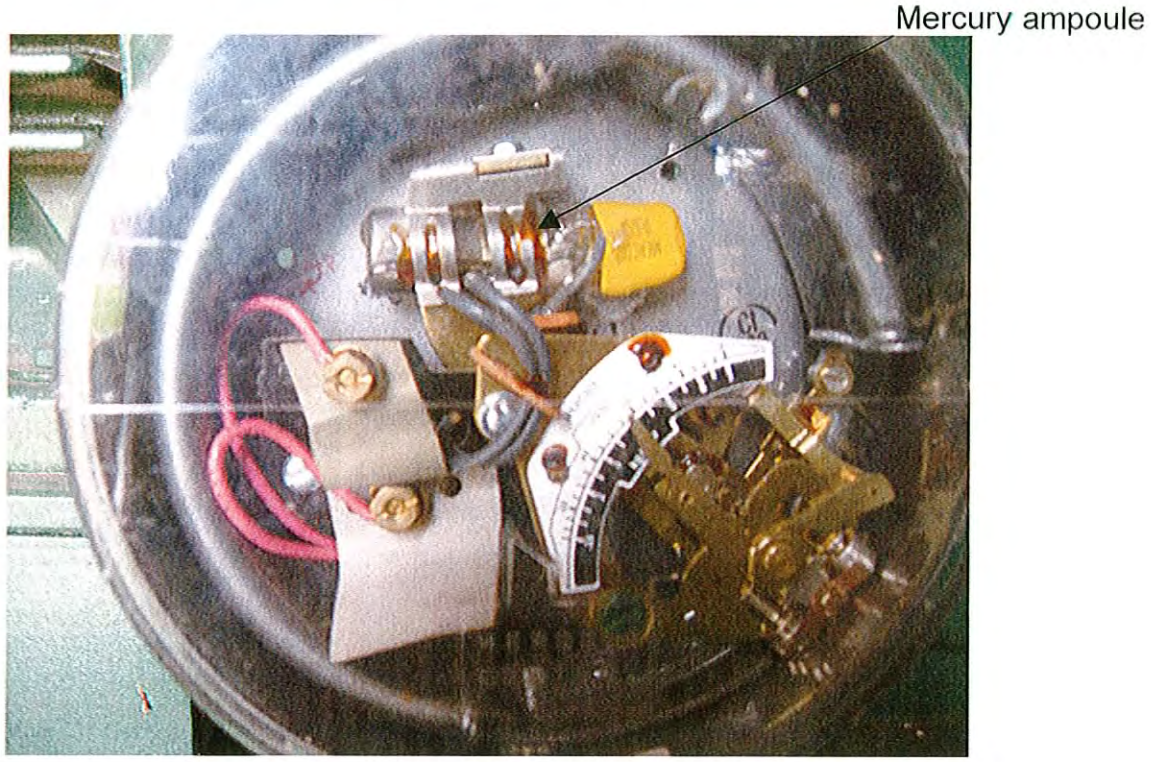

Photo No. 6: View of gauge on one of the pumps with mercury ampoule.