

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com



December 27, 2022

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Deputy Manager

Ms. Mary Alice Evans, Director
Office of Planning and Sustainable Development
Environmental Review Program
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Evans:

SUBJECT: Honolulu Board of Water Supply Final Environmental Assessment
for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu,
Tax Map Key (1) 9-8-046:013

With this letter, the Honolulu Board of Water Supply (BWS) transmits a Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the Waimalu 217' Exploratory Well project. BWS kindly requests publication of the notice of availability for the FEA-FONSI for the subject project at 98-183 Puaalii Street in Aiea in the next edition of the periodic bulletin.

BWS kindly submits the required items for publication including a searchable pdf file of the FEA.

If there are any questions about this submittal, please contact our consultant, Ian Arakaki of The Limtiaco Consulting Group (TLCG) at 808-596-7790 or via email to ian@tlcghawaii.com.

Very truly yours,

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

cc: Erwin Kawata, Deputy Manager
Ian Arakaki, TLCG

From: webmaster@hawaii.gov
To: [DBEDT OPSD Environmental Review Program](#)
Subject: New online submission for The Environmental Notice
Date: Friday, December 30, 2022 11:05:58 AM

Action Name

Waimalu 217' Exploratory Well in Aiea

Type of Document/Determination

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

HRS §343-5(a) Trigger(s)

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

Judicial district

Honolulu, O'ahu

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

(1) 9-8-046:013

Action type

Agency

Other required permits and approvals

Numerous, identified in Final Environmental Assessment

Proposing/determining agency

Honolulu Board of Water Supply

Agency contact name

Erwin Kawata

Agency contact email (for info about the action)

ekawata@hbws.org

Agency contact phone

(808) 748-5066

Agency address

630 South Beretania Street
Honolulu, Hawaii 96843
United States
[Map It](#)

Was this submittal prepared by a consultant?

Yes

Consultant

The Limtiaco Consulting Group

Consultant contact name

Ian Arakaki

Consultant contact email

ian@tlcghawaii.com

Consultant contact phone

(808) 596-7790

Consultant address

1622 Kananui Street
Honolulu, Hawaii 96817
United States
[Map It](#)

Action summary

BWS proposes to install an exploratory well and test pump at its existing facility at 98-183 Puaalii Street in Aiea, Oahu to collect data about the quantity and quality of the underlying groundwater source. The project site involves land that was previously disturbed for the development of the Waimalu 217' Reservoir facility. The testing data will allow BWS to determine if the project site is a suitable location for a permanent groundwater well.

In early December 2021, BWS shut down its Halawa Shaft and halted pumping at the Aiea and Halawa Wells due to contamination of the groundwater aquifer by petroleum fuel releases from the Navy's Red Hill Bulk Fuel Storage Facility and Pipeline. The project is proposed at this time in response to the ongoing emergency situation and the uncertainty of returning all previously used water sources to full production. Once water testing is completed, the test pump would be removed and the well would be covered with a well cap.

Reasons supporting determination

HRS 343 significance criteria is discussed in Section 6, Determination of the Final EA

Attached documents (signed agency letter & EA/EIS)

- [Waimalu-217-agency-letter_signed.pdf](#)
- [20221230_FEA_Waimalu-217.pdf](#)

Shapefile

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

Action location map

- [Waimalu-217.zip](#)

Authorized individual

Ian Arakaki

Authorization

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

Final Environmental Assessment

for the

**Waimalu 217' Exploratory Well in Aiea
Island of Oahu, Hawaii**



Prepared For:

City and County of Honolulu
Board of Water Supply



Prepared By:



December 2022

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Final Environmental Assessment
for the
Waimalu 217' Exploratory Well in Aiea
Island of Oahu, Hawaii

Tax Map Key (1) 9-8-046:013

This environmental document has been prepared pursuant to
Chapter 343, Hawaii Revised Statutes

Prepared For:

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Prepared By:

The Limtiaco Consulting Group
Civil Engineering and Environmental Consultants
1622 Kananui Street
Honolulu, Hawaii 96817

December 2022

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Appendix D	Archaeological Literature Review and Field Inspection Report
Appendix E	Architectural Inventory Survey
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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Definition</u>
ASA	Aquifer System Area
BMPs	Best Management Practices
BWS	Honolulu Board of Water Supply
CAB	State of Hawaii, Department of Health, Clean Air Branch
City	City and County of Honolulu
CSH	Cultural Surveys Hawaii, Inc.
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
DOFAW	State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
DLNR	State of Hawaii, Department of Land and Natural Resources
DOH	State of Hawaii, Department of Health
DOT	State of Hawaii, Department of Transportation
DPP	City and County of Honolulu, Department of Planning and Permitting
DTS	City and County of Honolulu, Department of Transportation Services
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
HAR	Hawaii Administrative Rules
HECO	Hawaiian Electric Company, Inc.
HFD	City and County of Honolulu Fire Department
HLMG	Helemano silty clay, 30 to 90 percent slopes
HPD	City and County of Honolulu Police Department
HRS	Hawaii Revised Statutes
IRHB	State of Hawaii Department of Health, Indoor and Radiological Health Branch
LaC3	Lahaina silty clay, 7 to 15 percent slopes, severely eroded
LUO	(City and County of Honolulu) Land Use Ordinance

LIST OF ABBREVIATIONS (Continued)

<u>Abbreviation</u>	<u>Definition</u>
MASON	Mason Architects, Inc.
MGD	million gallons per day
msl	mean sea level
NPDES	National Pollutant Discharge Elimination System
OISC	Oahu Invasive Species Committee
OTS	Oahu Transit Services, Inc.
PUC	Primary Urban Center
sf	square foot/feet
SDWB	State of Hawaii Department of Health, Safe Drinking Water Branch
SHPD	State of Hawaii Department of Land and Natural Resources, Historic Preservation Division
SMA	Special Management Area
TMK	Tax Map Key
USFWS- PIFWO	U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

PROJECT SUMMARY

Applicant:	Honolulu Board of Water Supply (BWS) 630 South Beretania Street Honolulu, Hawaii 96843 Erwin Kawata, Deputy Manager
Proposing/Determining Agency:	BWS
Location:	Aiea, Oahu, Hawaii
Tax Map Keys:	(1) 9-8-046:013
Land Area:	0.69 acres (or 29,845 square feet)
Recorded Fee Owner:	City & County of Honolulu
Existing Use:	Waimalu 217' Reservoir (BWS facility)
Proposed Use:	Waimalu 217' Reservoir, exploratory well and support facilities (BWS facility)
Community Plan Region:	Primary Urban Center
Land Use Designations:	
State Land Use	Urban
Development Plan	Residential
County Zoning	R-5 Residential
Action Requested:	The BWS proposes to install an exploratory well at its existing facility at 98-183 Puaalii Street in Aiea, Oahu to collect data about the quantity and quality of the underlying groundwater source. The testing data will allow BWS to determine if the project site is a suitable location for a permanent groundwater well. In early December 2021, BWS shut down its Halawa Shaft and halted pumping at the Aiea and Halawa Wells due to contamination of the groundwater aquifer by petroleum fuel releases from the Navy's Red Hill Bulk Fuel Storage Facility and Pipeline. The project responds to the uncertainty of returning all previously used water sources to full production.
Agency Determination:	Finding of No Significant Impact

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1. SETTING AND PROJECT DESCRIPTION

1.1. Introduction and Background

The Honolulu Board of Water Supply (BWS) is a semi-autonomous agency of the City and County of Honolulu (hereafter the City). BWS monitors the quality of domestic water to ensure it is safe to drink, and manages the development, operation, and maintenance of Oahu's municipal water system. The agency is responsible for maintaining the water resource and distribution system throughout Oahu in order to meet the current and future water supply needs of its customers.

In early December 2021, BWS shut down its Halawa Shaft and halted pumping at the Aiea and Halawa Wells due to contamination of the groundwater aquifer by petroleum fuel releases from the Navy's Red Hill Bulk Fuel Storage Facility and Pipeline. BWS increased the pumping rate at its other wells as a short-term remedy to meet the potable water demands for Oahu (Hofschneider, 2021). The defueling plan submitted to the Department of Health (DOH) indicates petroleum fuel will continue to be stored at the Navy's facility through 2024 (Ordonio, 2022; Jedra, 2022). The emergency measures implemented by BWS were still in effect at the time of this writing, and BWS is monitoring affected locations for indications of stress (e.g., higher chloride levels which may signify saltwater intrusion) on the underlying groundwater aquifer. The time frame to reopen Halawa Shaft is unknown, according to BWS (Ibid.).

In May 2022, BWS publicly announced via a published Notice of Consultation that up to six prospective water source locations would be investigated. New water supplies would replace the water loss from the shutdown of the BWS Halawa Shaft, and the Aiea and Halawa Wells. Five sites identified in the notice are BWS facilities that contain existing water system infrastructure:

- Aiea 497' Reservoir & Booster 2
- Aiea 782' Reservoir & Booster 3
- Kaonohi 850' Reservoir
- Kaonohi 550' Reservoir & Booster
- Waimalu 217' Reservoir

In July 2022, BWS publicly announced via a published Notice of Consultation the investigation of the Newtown 550' Reservoir as a potential water source location. Site-specific testing results will be analyzed to determine the feasibility of water source development at each site. The exploratory investigations are site and time specific, and each project proposed by BWS is subject to funding opportunities and constraints. The identification of new water sources is important from the perspective of BWS due to the uncertainty of returning all previously used water sources to full production.

BWS is proposing the use of County lands and funds to develop an exploratory well at the existing Waimalu 217' Reservoir facility (hereafter Waimalu 217' facility) to assess the viability of establishing a permanent groundwater well. Consequently, the preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and associated Title 11, Chapter 200.1, Hawaii Administrative Rules (HAR) is required. This EA was prepared to examine potential project impacts and to provide for public participation as required and defined in the statutes. The project will not occur within the Special Management Area (SMA), and is not subject to the rules and regulations that apply to development in the coastal zone.

In May and June 2022, BWS shared information about its investigation of new water sources via presentations and announcements at neighborhood board meetings, and distributed letters pertaining to the exploratory well at the Waimalu 217' facility to agencies, organizations, and neighboring or nearby property owners and recorded lessees. The agencies and interested parties that provided formal comments to BWS are identified in Section 7, Public Agency Review and Consultation. Information and regulatory guidance from the formal comments is referenced throughout this EA; all of the received comments and responses are appended to this EA.

1.2. Project Need and Objectives

The proposed project involves the installation of an exploratory well and test pump at the Waimalu 217' facility to facilitate the investigation of a prospective water source. The existing BWS facility is located within a developed residential neighborhood in Aiea. The City-owned parcel identified as Tax Map Key (TMK) (1) 9-8-046:013 is hereafter referred to as the project site. The proposed exploratory well at the project site will facilitate the necessary testing and analysis that will allow BWS to determine if the location is feasible for a permanent groundwater production well. Proposed actions at the project site will involve two phases:

- Phase 1 involves drilling an exploratory well and testing the water; and
- Phase 2 would convert the exploratory well into a permanent groundwater production well if the testing results are favorable.

In Phase 1, site preparation activities such as grading would occur in the area to be utilized for the exploratory well and test pump. A retaining wall would also be constructed within the project site in Phase 1. The exploratory well will allow BWS to collect data about the quantity and quality of the underlying groundwater source. The collected information will allow BWS to determine if the project site is a suitable location for a permanent groundwater production well. This EA examines the proposed activities in Phase 1 for the exploratory well.

Phase 2 would proceed after the water testing provides sufficient information about the yield, water quality, and aquifer properties at the project site. A permanent production well requires the installation of support facilities such as a well pump, motor, and piping. The Waimalu 217' facility would need further improvements for the conversion of the exploratory well to a permanent groundwater well. BWS will conduct additional consultations and prepare a subsequent EA for the permanent well when necessary. A new production well connected to the existing BWS system is expected to improve reliability when a temporary suspension of water sources occurs from repair or periodic maintenance of BWS facilities, or sudden emergency situations.

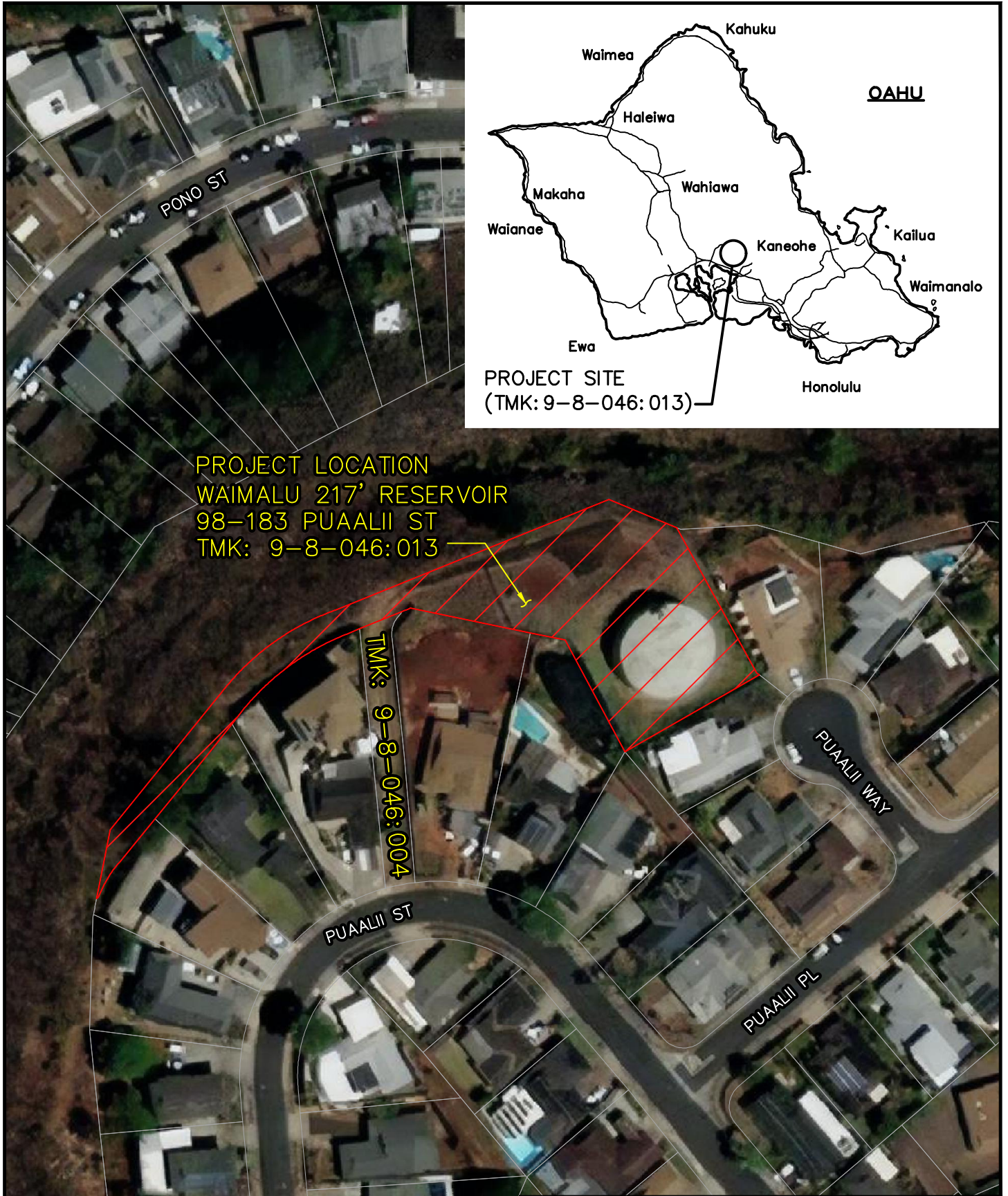
1.3. Site Location and Description

The Waimalu 217' facility is located at 98-183 Puaalii Street in Aiea, Hawaii. Access to the existing BWS facility is provided from Puaalii Street via an access road between residential parcels (see Figure 1). The access road to the project site traverses a City-owned parcel (TMK: 9-8-046:004) and has a locked chain across the entrance. The project site is surrounded by residential properties on the west, south and east sides, and undeveloped land to the north. The new well will be located within the project site, about 50 feet northwest of the existing reservoir tank.

Photographs of the project site are in Appendix A. The existing BWS facility has chain link fencing topped with barbed wire along the site boundaries and is secured with a locked access gate to deter unauthorized entry. The terrain at the project site within the fenced area ranges between approximately 185 and 200 feet above mean sea level (msl). The lowest portion of the secured BWS facility is at the gate, which can be accessed via a long driveway bordered by residential homes. A portion of the sloped driveway up to the reservoir is paved.

The 29,845 square foot (sf) project site contains existing water system infrastructure including a 500,000-gallon above-ground reservoir tank that is partially recessed into the sloping topography (see Figure 2). The reinforced concrete reservoir has a reinforced concrete cover. A cinder block retaining wall and concrete stairs are between the reservoir and the asphalt parking surface. An above-ground drainage vault is located within the secured premises of the BWS facility. Available information suggests that the reservoir was completed in 1956 (Mason Architects, Inc., 2022). The concrete steps and above-ground drainage vault appear to be original to the site design (Ibid.). Vegetation at the project site is predominately grass.

The State land use designation for the project site is Urban (see Figure 3), which is characterized by residential neighborhoods, commercial enterprises, industrial development, and community facilities including public buildings. Urban land uses are subject to the City's land use policies and controls. The project site is within the area designated as Residential in the City's Primary Urban Center Development Plan.



DRAWN BY: THE LIMTACO CONSULTING GROUP

LEGEND

-  PROJECT LOCATION
-  PROPERTY LINE

 N
 Scale:
 1" = 100' 

WAIMALU 217' EXPLORATORY WELL
 LOCATION & VICINITY MAP

FIGURE

1

TMK: 9-8-046: 059
98-433 PONO STREET

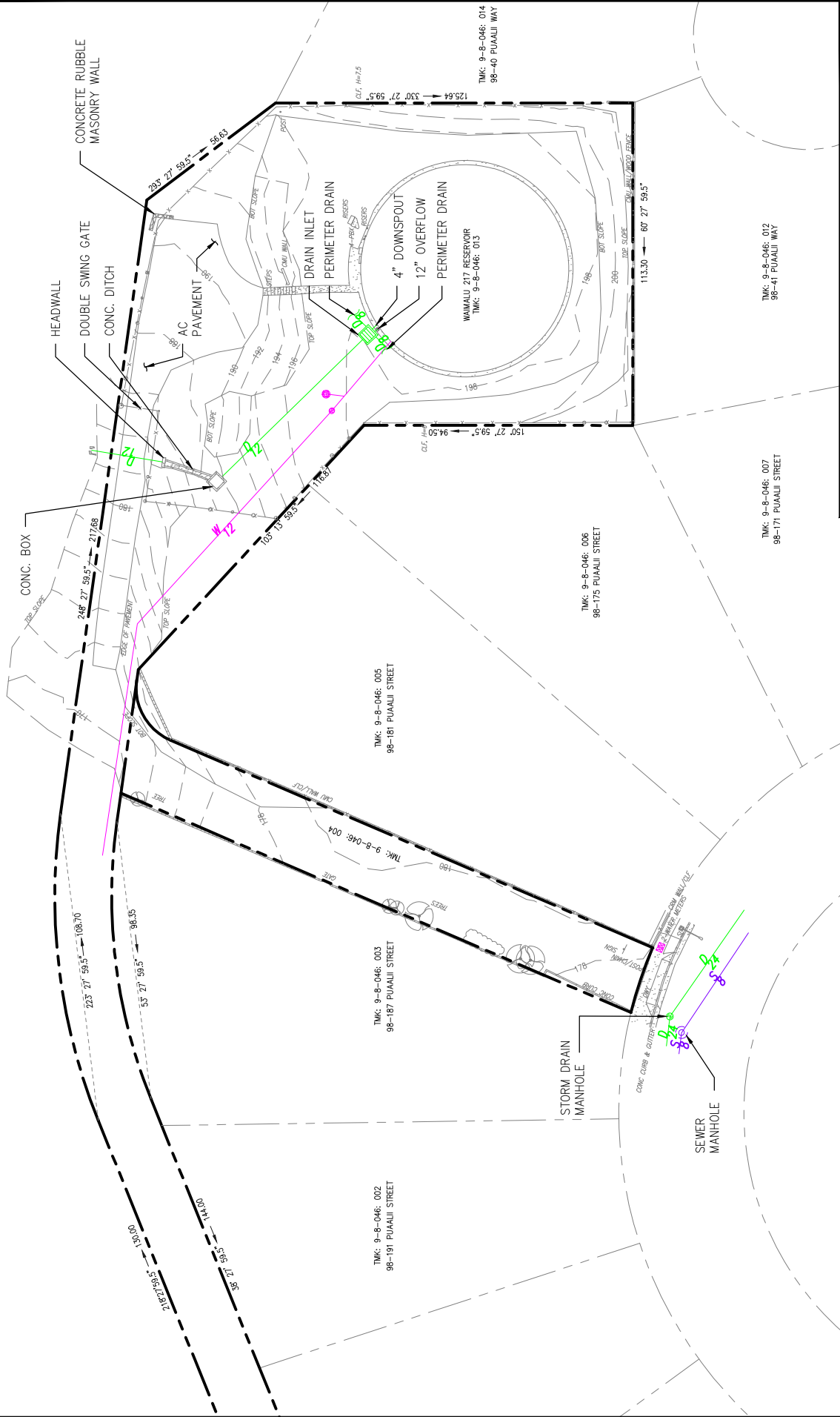
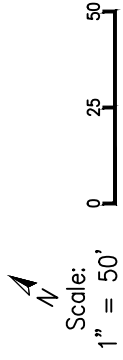


FIGURE
2

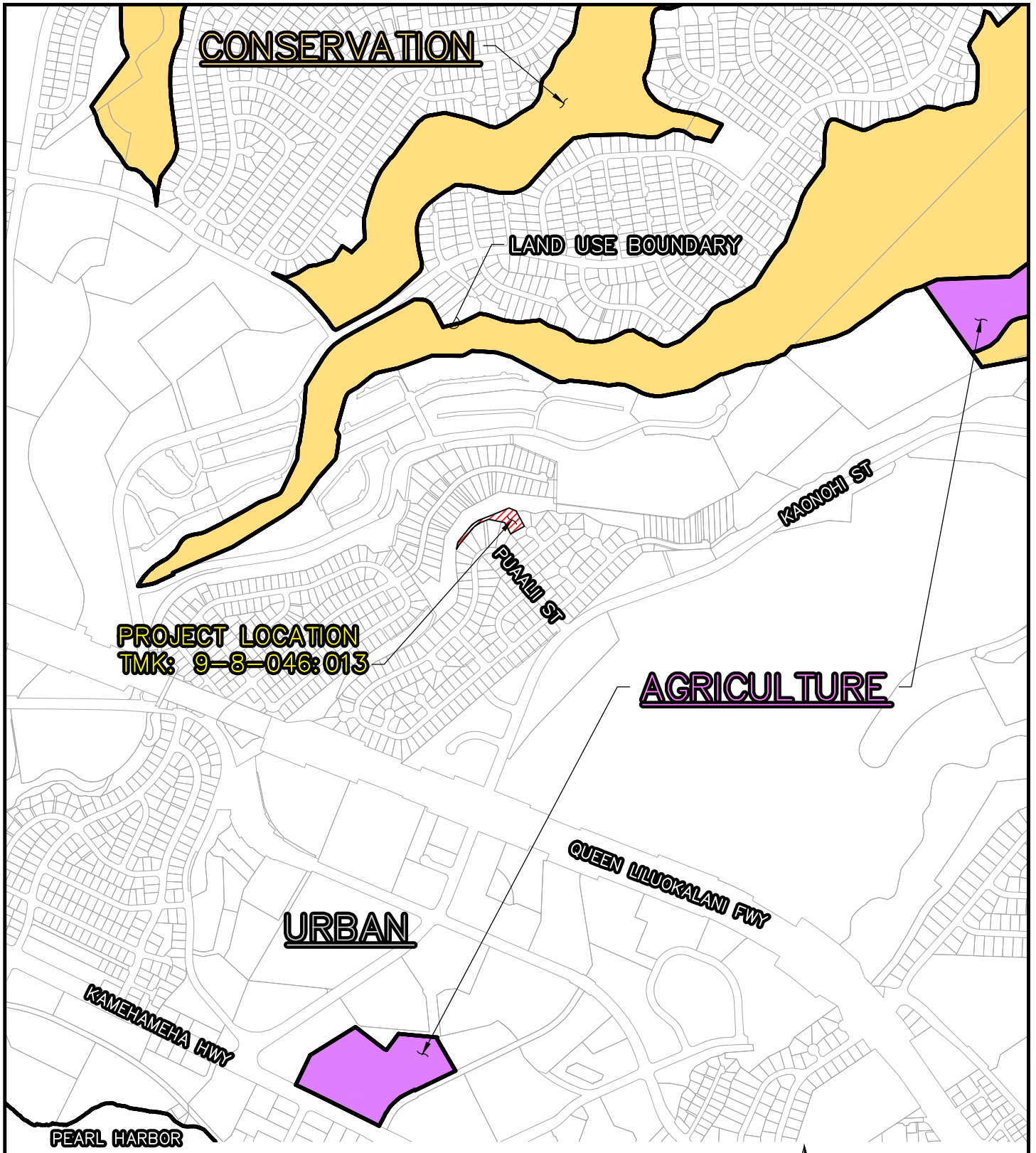
WAIMALU 217 EXPLORATORY WELL
EXISTING CONDITIONS



DRAWN BY: THE LIMITACO CONSULTING GROUP



LEGEND

	PROPERTY LINE
	EXIST. WATERLINE
	EXIST. DRAINLINE
	EXIST. SEWERLINE





DRAWN BY: THE LIMTIACO CONSULTING GROUP

SOURCE:
DEPARTMENT OF PLANNING AND PERMITTING HONOLULU LAND INFORMATION SYSTEM


 Scale:
 1" = 1000'
 

LEGEND

- | | | | |
|---|------------------|---|-------------------|
|  | PROJECT LOCATION |  | URBAN |
|  | AGRICULTURE |  | PROPERTY LINE |
|  | CONSERVATION |  | LAND USE BOUNDARY |

WAIMALU 217' EXPLORATORY WELL STATE LAND USE MAP	FIGURE 3
---	------------------------

As shown in Figure 4, the City's zoning designation for the BWS parcel is R-5 Residential District. Public uses and structures are allowed in all zoning districts including the R-5 Residential District. No discretionary land use permit is required for uses conducted by or structures owned or managed by the federal government, the State of Hawaii or the City to fulfill a governmental function, activity or service for public benefit and in accordance with public policy.

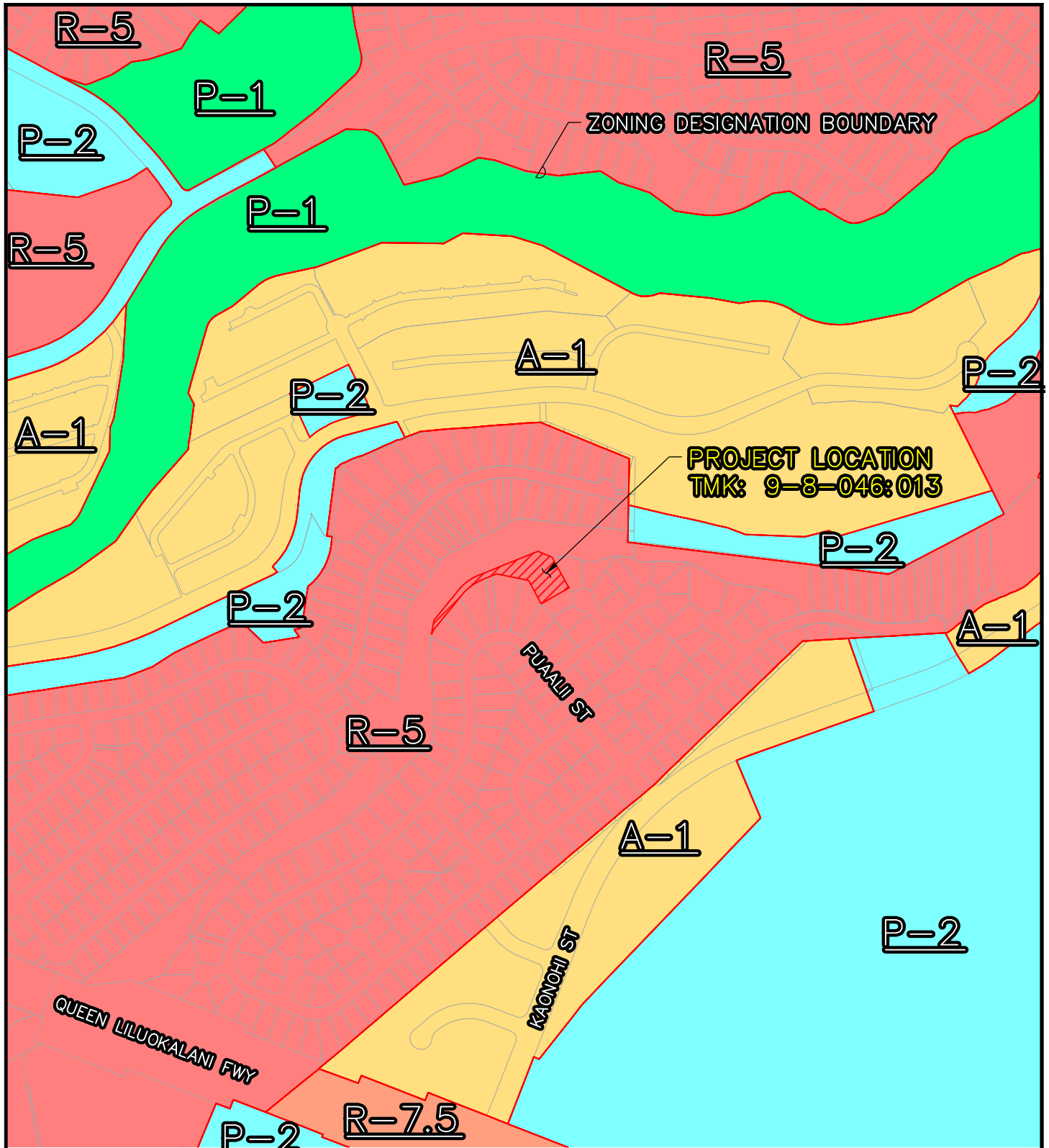
Utility installations including accessory uses and structures directly associated with the distribution of utility service are a permitted use. The definition of utility installations includes uses or structures, including all facilities, devices, equipment, or transmission lines, used directly in the distribution of utility services, such as water, gas, electricity, telecommunications other than broadcasting antennas, and refuse collection other than facilities included under waste disposal and processing. Pursuant to §21-2.130 of the City's Land Use Ordinance (LUO), the Director of DPP may waive the strict application of development or design standards for public or public/private uses and structures, and utility installations.

1.4. Technical Considerations

Construction equipment would access the project site from Puaalii Street. Site grading would be accomplished to the extent necessary to establish a level area for the drilling rig and equipment. The proposed exploratory well is expected to be sited within an approximately 55-foot by 31-foot area as depicted in the proposed site plan (see Figure 5).

A level area that is utilized for the construction of the well would be created by cutting into the existing grade. A new gravel pad would be installed in the established level area, and a new retaining wall would hold the soil and terrain in place. The retaining wall is expected to follow the existing grade and would be up to approximately 8 feet high. The wall will have guardrails for safety. Installation of the new pad and wall would be followed by drilling to the anticipated design depth and the construction of the exploratory well.

The preliminary well design is shown in Figure 6. The proposed exploratory well would consist of a 20-inch diameter (0.375-inch wall) steel casing. This casing would extend approximately 3 feet above ground surface (ground surface elevation approximately 190 feet above msl) to a depth of approximately 174 feet below ground surface (approximate elevation 16 feet above msl). An approximately 20-inch diameter bore hole would extend 145 feet to a terminal depth of approximately 319 feet below ground surface, where dike free basalt rock is expected to host the basal aquifer.



DRAWN BY: THE LIMTIACO CONSULTING GROUP

SOURCE:
DEPARTMENT OF PLANNING AND PERMITTING HONOLULU LAND INFORMATION SYSTEM



LEGEND

- | | |
|-----------------------------|---|
| A-1 LOW-DENSITY APARTMENT |  PROJECT LOCATION |
| P-1 RESTRICTED PRESERVATION |  PROPERTY LINE |
| P-2 GENERAL PRESERVATION |  ZONING DESIGNATION BOUNDARY |
| R-5 RESIDENTIAL | |
| R-7.5 RESIDENTIAL | |

WAIMALU 217' EXPLORATORY WELL COUNTY ZONING MAP	FIGURE 4
--	-----------------

TMK: 9-8-046: 059
98-433 PONO STREET

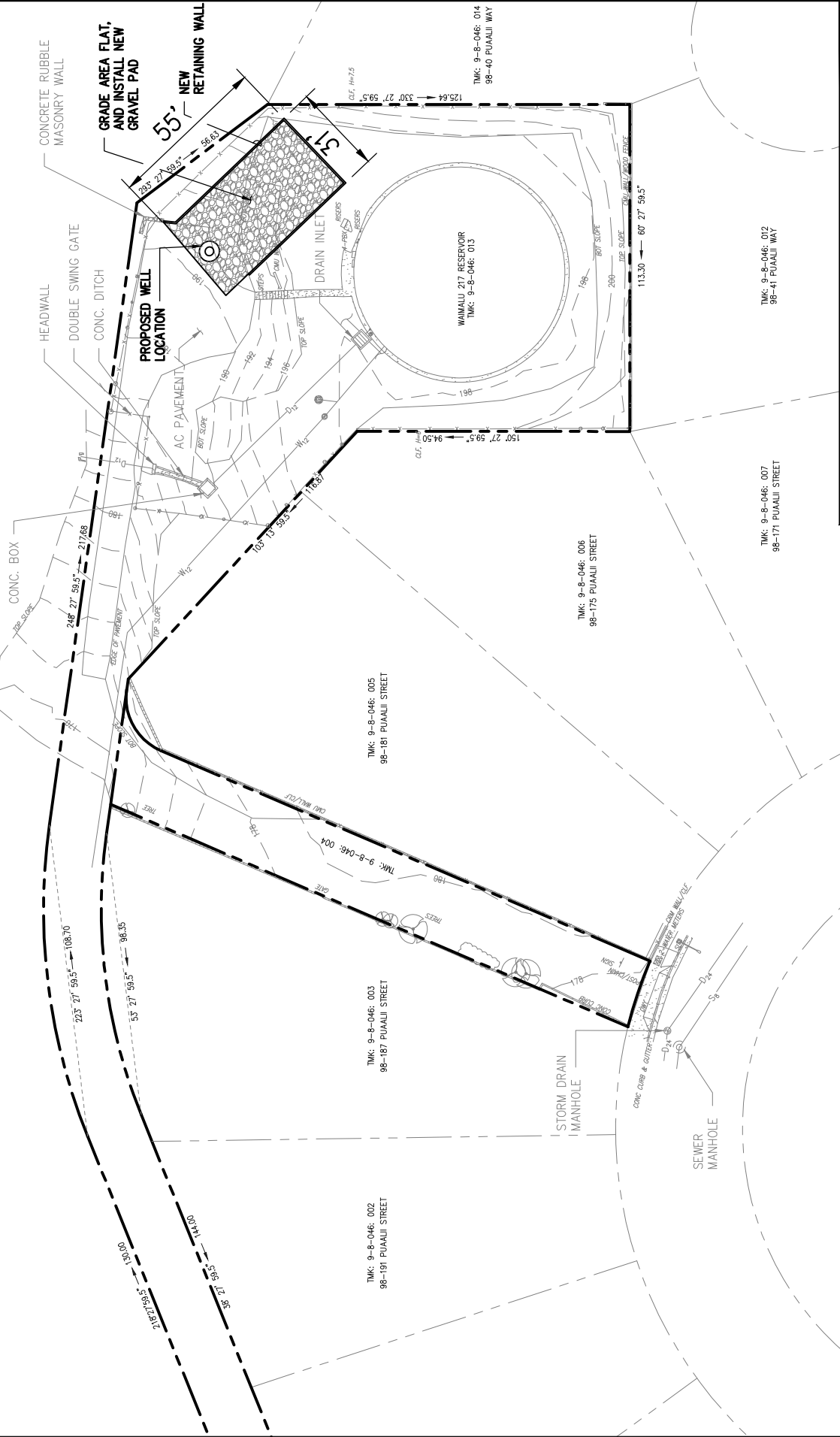
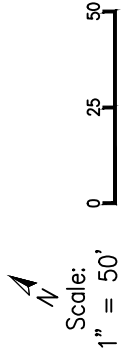


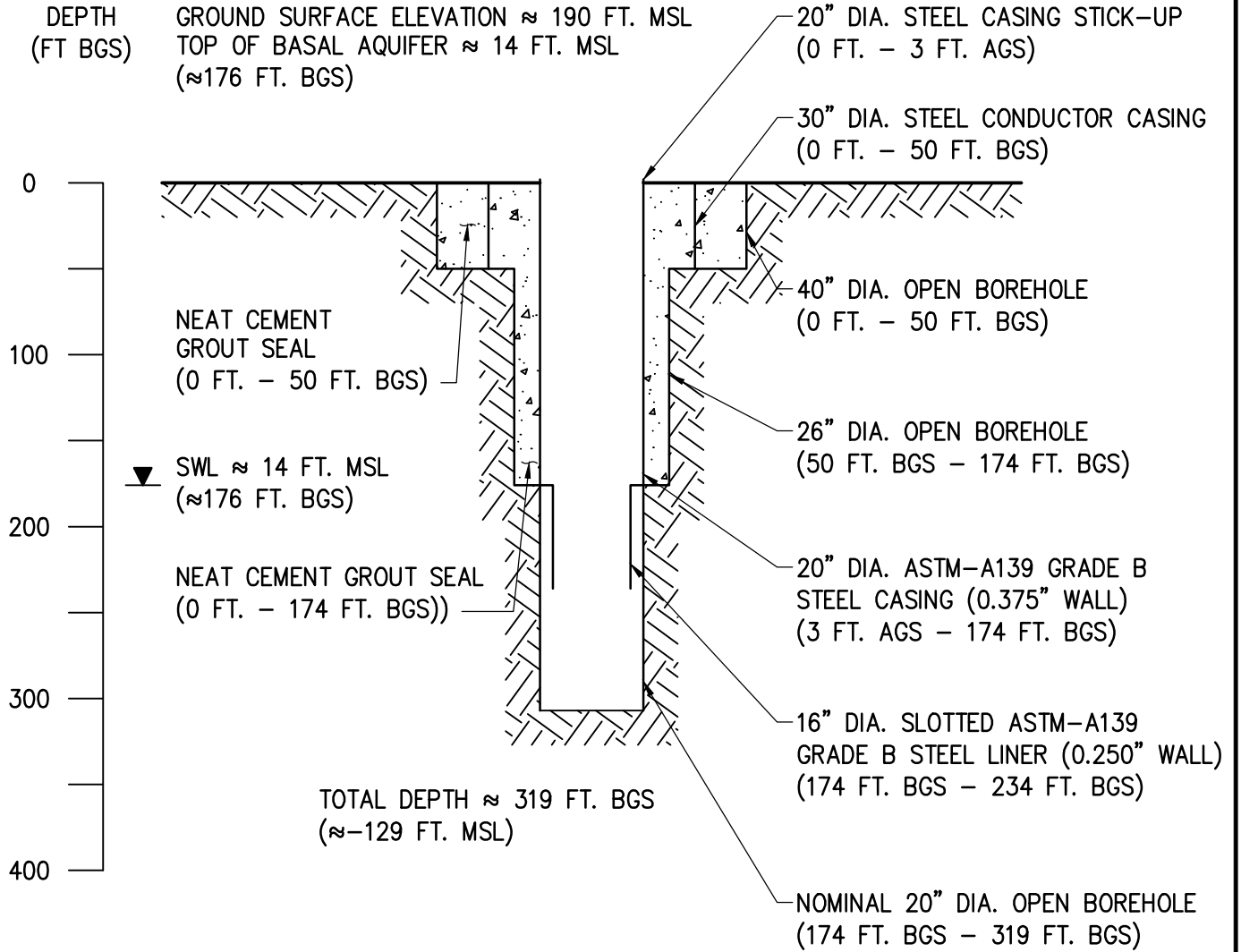
FIGURE
5

WAIMALU 217 EXPLORATORY WELL
PROPOSED SITE PLAN



LEGEND

---	PROPERTY LINE
- - -	EXIST. WATERLINE
- - -	EXIST. DRAINLINE
- - -	EXIST. SEWERLINE



SOURCE:
INTERA INCORPORATED

Scale:
1" = 100'

WAIMALU 217' EXPLORATORY WELL
PRELIMINARY WELL DESIGN

FIGURE

6

To protect the casing, a 16-inch diameter (0.250-inch wall) steel slotted liner would be installed into the bore hole and would extend approximately 60 feet below the bottom steel casing to approximately 234 feet below ground surface.

After the completion of exploratory well construction, the well would be tested to determine yield, water quality, and aquifer properties. The testing period would include step-rate and constant-rate pumping that is expected to span approximately 5 days. Once water testing is completed, the test pump would be removed and the well would be covered with a well cap. A 20-inch diameter casing that protrudes 3 feet above ground would remain in place at the Waimalu 217' facility. If the testing results indicate that the well is viable as a new water source, the exploratory well would be converted into a production well. A permanent groundwater production well requires a pump, motor, and piping. The Waimalu 217' facility would need further improvements to connect the production well to the existing water supply system. BWS will prepare a subsequent EA for the conversion of the exploratory well to a permanent well.

Anticipated short-term impacts associated with construction will be mitigated to the extent practical with the use of appropriate construction techniques and Best Management Practices (BMPs). For example, the construction contractor is expected to follow the guidelines in the City's "Rules Relating to Water Quality," which require erosion prevention and sediment control. Measures to control erosion and other pollutants are expected to be in place before any earthwork is initiated, and all disturbed areas would be permanently stabilized prior to removing the erosion and pollutant control measures. General guidance for selecting and implementing BMPs is available from the City's *Storm Water BMP Manual - Construction* (2017). All construction activities will comply with applicable Federal, State and County regulations and rules for erosion control.

Construction equipment such as the drill rig and other machinery will generate temporary noise that can be mitigated (e.g., use temporary sound wall to buffer noisy activities, monitor noise to avoid excessive levels). The construction contractor is expected to utilize BMPs such as scheduling construction activities during business hours on weekdays while many residents are away from their homes. Short-term noise would occur at the project site during the 12-hour step-rate pumping test and 96-hour constant-rate pumping test. Noise and other short-term effects such as fugitive dust, intermittent traffic, and the generation of solid waste would cease upon project completion.

1.5. Project Schedule and Cost

Construction of the exploratory well may be able to proceed in fiscal year 2023. Anticipated construction activity may span a period of approximately 9 months. The estimated cost for the proposed exploratory well is approximately \$1.5 million.

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2. DESCRIPTION OF EXISTING ENVIRONMENT, PROJECT IMPACTS, AND MITIGATION

2.1. Climate and Air Quality

The climate in the State of Hawaii is generally characterized by a two-season year: the summer period is warm and dry whereas the winter season is cool and wet. Rainfall distribution across Hawaii varies greatly according to geographic conditions, elevation, and long-term climatic cycles.

The project site in Aiea has a mild semi-tropical climate similar to the rest of the State of Hawaii. Average temperatures at the project site range from 70 degrees Fahrenheit in February to 77 degrees Fahrenheit in August (Giambelluca, 2014). The average annual rainfall at the project site is estimated to be 42 inches and the wetter months of the year are November through April (Ibid). Trade winds in the project vicinity are generally from the northeast. Strong winds are known to occur in connection with storm systems that disrupt climatic patterns.

The Waimalu 217' facility is located within a developed residential area, and ambient air quality may be influenced by nearby human activities, emissions from vehicular travel in the area, and natural pollutants such as plant pollens and spores. The prevailing northeast trade winds help to circulate and transport vehicular emissions and other airborne pollutants away from the source.

Impacts and Mitigation Measures

No measurable adverse effect on climatic conditions is anticipated from an exploratory well at the existing BWS facility that is installed and capped while BWS evaluates the potential use of the project site for a permanent well. No mitigation is warranted or proposed.

Ambient air quality will be temporarily affected by construction-related vehicles, equipment, and activities that would generate fugitive dust and emissions. Fugitive dust concerns fall within the purview of the DOH Clean Air Branch (CAB) Enforcement Section. The DOH CAB standard comments for land use reviews identifies the DOH branches and programs that administer other regulatory controls.

Airborne, visible fugitive dust during construction of the exploratory well will be controlled at the project site by the contractor in accordance with Air Pollution Control standards stated in HAR §11-60.1-33, "Fugitive dust." Reasonable measures are required to control airborne, visible fugitive dust from the road areas and during the various phases of construction. Exhaust emissions can be reduced by keeping construction equipment and vehicles properly tuned and maintained, and minimizing unnecessary idle time. The contractor will be

required to develop and submit a dust control management plan to BWS that identifies all activities that may generate airborne, visible fugitive dust and proposed mitigative measures. The measures may include and are not limited to the following:

- Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities;
- Providing an adequate water source at the site prior to start-up of construction activities;
- Landscaping and providing rapid covering of bare areas after ground disturbance;
- Providing reasonable dust control measures during work hours, weekends, after hours, and prior to daily start-up of construction activities; and
- Controlling airborne, visible fugitive dust from debris being hauled away from the project site.

No long-term adverse impacts to air quality are anticipated from a proposed exploratory well at the Waimalu 217' facility that is installed and capped. The proposed project consists of water system infrastructure that is not considered to be a major source of air pollutant emissions. Upon project completion, BWS personnel will periodically travel to the project site for routine activities, which represents a continuation of the travel patterns and activities that currently occur at the project site. No mitigation measures are warranted or proposed.

2.2. Topography, Geology and Soils

The Island of Oahu contains the Waianae and Koolau mountain ranges, which are connected by a central plateau. The older Waianae Range spans a distance of about 20 miles across the western third of Oahu and the younger Koolau Range extends approximately 37 miles in a northwest to southeast alignment across the eastern two thirds of the island. The project site is located on the leeward side of the Koolau range. Elevations within the fenced portion of the project site range between approximately 185 and 200 feet above msl. An existing driveway leads up to the flatter portions of the project site that were previously graded for the development of the existing BWS reservoir.

The Koolau Range is comprised of thin, narrow layers of basaltic lava flows. Dissected valleys were etched into the basalt range formations through weathering and natural erosion processes. Numerous dikes and small amounts of volcanic ash are present. The valley floors contain alluvium (e.g., clay, silt, sand, gravel, or similar material) and unconsolidated non-calcareous sediments transported from valley slopes by stream flows. Soils underlying Aiea belong to the Helemano-Wahiawa association, which is

characterized by deep, nearly level to moderately sloping, well-drained soils that have a fine-textured subsoil (U.S. Department of Agriculture, Soil Conservation Service, 1972).

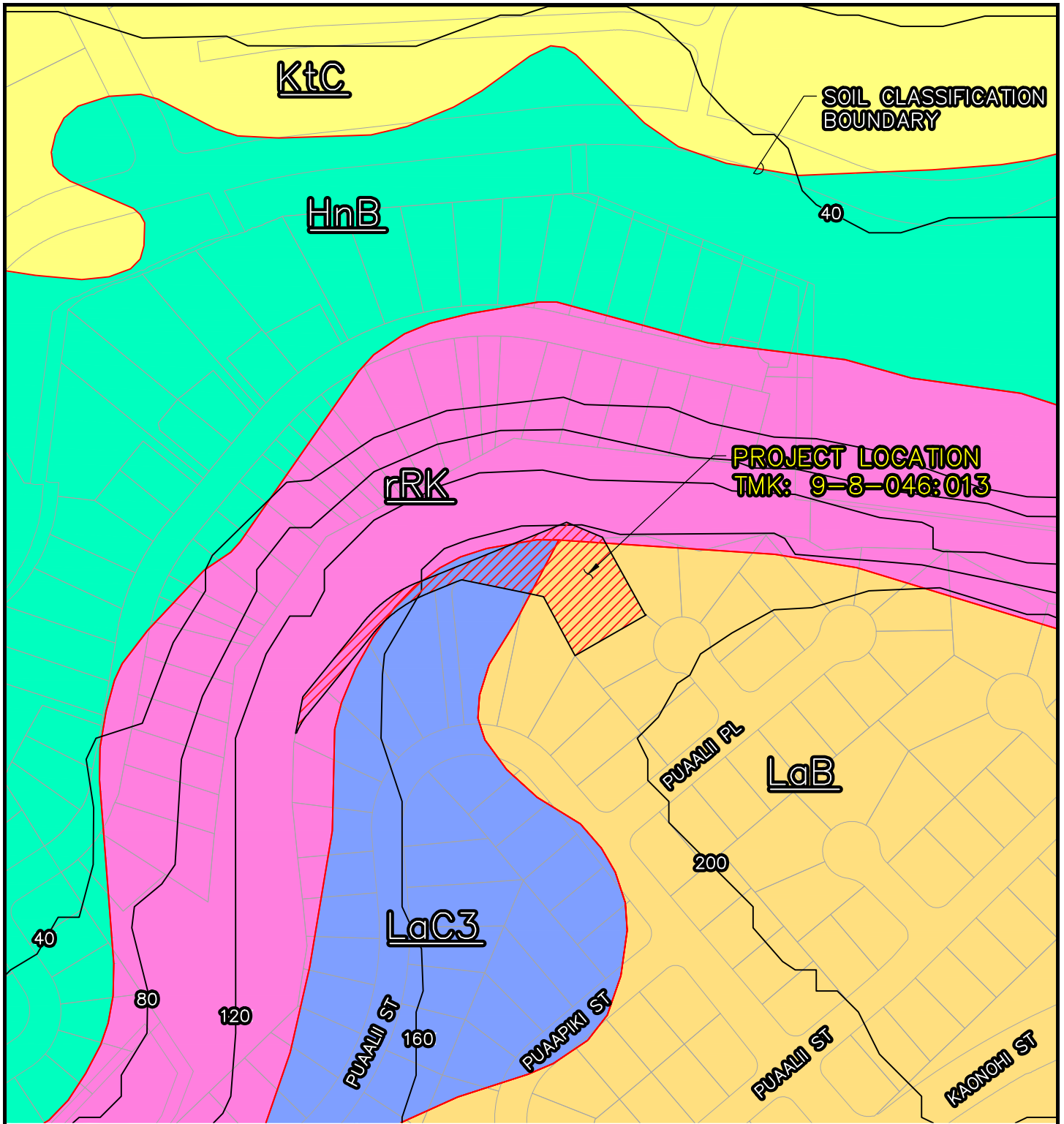
According to the *Web Soil Survey* (U.S. Department of Agriculture, Natural Resources Conservation Service, n.d.), the predominant soil type in the vicinity of the project site is classified as Lahaina silty clay, moist, 3 to 7 percent slopes (LaB) and Lahaina silty clay, 7 to 15 percent slopes, severely eroded (LaC3). The LaB soil type is a dark reddish-brown silty clay and is characterized by a slight erosion hazard. The soil profile for LaC3 is similar to LaB except that the surface layer and part of the subsoil may have been removed by erosion. The LaC3 soil type is characterized by a severe erosion hazard. LaB and LaC3 soils are well drained with medium runoff, and have moderately high to high saturated hydraulic conductivity. Soil classifications are shown in Figure 7.

Impacts and Mitigation Measures

Project actions are expected to generally retain the overall topographic profile of the site. Grading and grubbing will be accomplished to the extent necessary within the limits of the affected construction area. Site work and grading will be minimized by siting the new well and appurtenant facilities close to the reservoir as shown in Figure 5, and to utilize areas that were previously graded for the development of the Waimalu 217' facility.

Proposed infrastructure will be properly designed with respect to the low to moderate expansion potential of subsurface soil within the footprint of new construction. Project actions are expected to have no adverse impacts on the underlying geology and soils at the project site. A bulk sample of the near surface soil was analyzed (see Appendix B) and geotechnical engineers will conduct further investigations to provide recommendations for the proper design of proposed improvements such as the new gravel pad and retaining wall around it. The new retaining wall will hold the existing soil and sloping terrain in place. The gravel pad will transition to the existing asphaltic pavement driveway.




Earth disturbing activities during construction and site development may create exposed areas that are susceptible to erosion from wind and rain. Areas affected by project actions will be stabilized with gravel or landscape material, which reduces the long-term potential for erosion by water and wind. The contractor is expected to follow the City's "Rules for Soil Erosion Standards and Guidelines." Mitigation that addresses sediment-laden runoff concerns is discussed in Section 2.3, Water Resource Considerations.

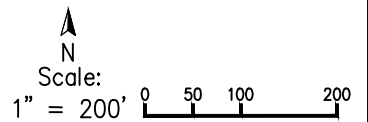


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SOURCE:
DEPARTMENT OF PLANNING AND PERMITTING HONOLULU LAND INFORMATION SYSTEM AND U.S. DEPT OF AGRICULTURE, NATURAL RESOURCE CONSERVATION SERVICE. SURVEY SEPTEMBER, 2021.

LEGEND

- | | | | |
|------|---|---|------------------------------|
| KtC | KOKOKAHI CLAY, 6 TO 12 PERCENT SLOPES |  | PROJECT LOCATION |
| HnB | HANAIE SILTY CLAY, 2 TO 6 PERCENT SLOPES |  | PROPERTY LINE |
| rRK | ROCK LAND |  | SOIL CLASSIFICATION BOUNDARY |
| LaC3 | LAHAINA SILTY CLAY, 7 TO 15 PERCENT SLOPES, SEVERELY ERODED | | |
| LaB | LAHAINA SILTY CLAY, MOIST, 3 TO 7 PERCENT SLOPES | | |



<p>WAIMALU 217' EXPLORATORY WELL</p> <p>SOIL CLASSIFICATION AND TOPOGRAPHIC MAP</p>	<p>FIGURE</p> <p style="font-size: 2em;">7</p>
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2.3. Water Resource Considerations

The proposed project will withdraw freshwater from the Waimalu Aquifer System Area (ASA) that is part of the Pearl Harbor Aquifer Sector Area. All aquifer sectors on Oahu except for the Waianae sector are designated Ground Water Management Areas under the regulatory authority of the Department of Land and Natural Resources (DLNR) Commission on Water Resource Management (CWRM). Applicants for water use permits in designated Ground Water Management Areas must demonstrate that the proposed water use is reasonable and beneficial, necessary for economic and efficient utilization, and in the public interest.

The Waimalu aquifer is the 2nd largest aquifer on Oahu with an adopted *sustainable yield* of 45 MGD. *Sustainable yield* is defined in the State Water Code (Chapter 174C HRS) as the maximum rate at which water may be withdrawn from a water source without impairing the utility or quality of the water source as determined by the commission. Water Use Permits issued to BWS total 45.86 MGD in the Waimalu ASA out of a total 46.951 MGD in 2019. Water use permits exceed sustainable yield by 1.951 MGD, however, pumpage prior to the shut down of BWS sources from the Red Hill fuel release was 35.5 MGD or approximately 10 MGD less than the sustainable yield, largely due to water conservation savings and aquifer management. The total pumpage reduction from the three BWS sources that were shut down in December 2021 is 11 MGD. BWS was able to increase pumpage from other sources in the Waimalu ASA by 2 MGD, but the loss of the three sources has impacted the available pumping capacity to meet maximum day demand in the summer months. The loss has caused an Alert Water Shortage condition in the Aiea-Halawa and Honolulu water systems with a voluntary 10 percent water conservation target during summer months until new replacement wells are on-line, which is expected to take approximately 5 to 7 years. If summer demand is not curtailed through water conservation, a Critical Water Shortage Condition could be declared resulting in mandatory water restrictions including conditions on building permit approvals.

Coordination between BWS and CWRM to install replacement wells and manage existing source pumpage within permitted uses through water conservation outreach is ongoing. The situation is influenced by the indefinite suspension of the three water sources mentioned in Section 1.1. Introduction and Background that were previously in use for the BWS water system.

Streams, wetlands, and other sensitive surface water resources are not present within the project site which is on the eastern ridge of Waimalu Valley at the 217' elevation. Waimalu Stream is a perennial stream with intentional improvements including a concrete lined flood control channel approximately 1.5 miles long north of Kamehameha Highway to the end of the Kilinoe Street public right of way. The lined channel is at least 500 feet north of the project site at its closest point. Storm water runoff from the project site enters the City's municipal storm water system and

discharges into Waimalu Stream, which flows to Pearl Harbor exiting along the eastern edge of Neil Blaisdell Park and the western edge of Pearl Kai Industrial area at Hekaha Street.

Impacts and Mitigation Measures

Waimalu Aquifer. The proposed exploratory well addressed in this EA is a part of phase 1 activities as previously discussed in Section 1.2. Project Need and Objectives. If the exploratory well is successful, it could lead to phase 2 and the installation of a production well that would replace the water loss from the shutdown of the BWS Halawa Shaft, and the Aiea and Halawa Wells. The Waimalu aquifer pumpage is approximately 26 MGD or 58 percent of the 45 MGD sustainable yield with the shut down. Prior to the shut down, BWS pumped 35 MGD or 78 percent of the 45 MGD sustainable yield due to water conservation savings and aquifer management. Aquifer heads are high at 16-feet and source chloride content is low, below 130 milligrams per liter (mg/l) because pumpage is significantly below the sustainable yield. The comments from CWRM dated June 20, 2022 indicate that a Water Use Permit is required prior to the use of water, a Well Construction Permit is required before the commencement of any well construction work, and a Pump Installation Permit is required before ground water is developed as a source of supply. CWRM would not issue the permits that pertain to water testing if the water resources would be harmed by the project. If the exploratory well testing is favorable, BWS intends to administratively transfer permitted use from the shut down wells such that no increase in BWS permitted use will occur.

Streams, nearshore water resources and traditional and customary practices. No detrimental impact to Waimalu Stream is anticipated because it is a concrete lined flood control channel 1.5 miles long in the lower to mid-reach of the stream. Waimalu Stream recharges into the aquifer *mauka* (or inland) of the lined channel as a result of stream elevation in the vicinity of the project site which is higher than the Waimalu aquifer water level.

As stated in *Geology and Ground-Water Resources of the Island of Oahu, Hawaii* (Stearns and Vaksvik, 1935), there are 5 large Pearl Harbor springs oriented east to west: Kalauao, Waiau, Waimano, Waiawa and Waikele Springs. According to BWS, Waimalu Stream is situated between Kalauao and Waiau Springs by at least 0.5 miles on either side. Submarine springs are noted in the bulletin but are difficult to measure given the extended area of the Pearl Harbor lochs and estuaries. Large springs discharge freshwater from the basalt formation at the low points in the upper boundary of the caprock, which represents overflow of the artesian basin. In other words, the naturally occurring springs provide an abundant supply of water that flows to wetland areas surrounding Pearl Harbor. BWS monitors the chloride levels in Kalauao

Spring that flow past the Sumida watercress farm. The chloride levels are stable at approximately 400 mg/l.

Approximately 20 fishponds that were once along the shoreline of Pearl Harbor have been reduced to two relatively intact fishponds as a result of sugarcane cultivation, the development of urban areas, and the expansion of military facilities (McDaniel, 2018). According to BWS, fishponds in the Aiea project area include Loko la Paaiau on the western edge of McGrew Point and a private unnamed fishpond makai of Pearl Kai Center. The effort to restore Loko la Paaiau has been underway since 2014. *Loi kalo* (or irrigated terraces for taro) cultivation is prominent at Waimano Spring west of the HECO Waiau power plant, at the Lau farm adjacent to the Sumida watercress farm makai of the Pearlridge Shopping Center and in lower Waiawa adjacent to Leeward Community College.

CWRM enhances freshwater flows to groundwater dependent ecosystems (GDE) by applying a conservative approach in selecting the lower range of groundwater sustainable yields in the State Water Resources Protection Plan. CWRM adopted the sustainable yield of the Waimalu aquifer at 45 MGD accepting the fact that 18 MGD of the USGS 2017 recharge estimate of 63 MGD will always flow into the nearshore waters supporting GDE and traditional and customary practices, if the aquifer was pumped to the full sustainable yield. Since BWS reduced pumpage below the sustainable yield through water conservation, the unused balance will continue flowing to the coast.

Should CWRM consider increasing groundwater flows to the coast to enhance GDE, sustainable yields could be decreased based upon the results of future studies. Physical restoration of coastal habitats and fishponds and removal of invasive species can enhance ecosystems, supplementing actions that increase natural groundwater flows to nearshore waters.

Project Site. No detrimental impacts to water resources are anticipated at the 29,845 sf project site because it is located on the eastern ridge of Waimalu valley at the 217' elevation. The exploratory well will allow BWS to investigate the quantity and quality of the underlying aquifer at this site. The regulatory processes that apply to public water system owners and operators are discussed in Section 2.11. Utilities (Water, Wastewater, Drainage).

Project actions are not expected to affect the water quality of any State waterbodies including surface water resources since the project site contains no wetlands, perennial streams, or other sensitive riparian habitats. Construction activities such as soil disturbance and material storage have the potential to cause short-term and temporary impacts to storm water runoff

quality; however, the construction contractor will be required by BWS to implement temporary BMPs to mitigate these impacts. Treated process wastewater from well drilling activities will be properly controlled by the construction contractor to avoid improper discharges.

A National Pollutant Discharge Elimination System (NPDES) Permit for discharges of pollutants, including storm water runoff is required for the disturbance of one acre or more of total land area pursuant to HAR §11-55, "Water Pollution Control" effective January 15, 2022. The proposed project is anticipated to disturb an area of less than one acre, and DOH will be consulted if it is determined that the NPDES Permit is necessary. The permits that may apply include the NPDES General Permit Form I - Treated Process Wastewater Associated with Well Drilling Activities and the Industrial Wastewater Discharge Permit.

Construction activities at the Waimalu 217' facility will comply with applicable Federal, State and County erosion control rules and regulations. BWS will require its contractor to follow storm water BMP strategies such as the use of an inlet protection device to protect storm drain inlets that could receive runoff from the project site. The construction contractor is expected to provide controls that minimize the movement of sediment from the project site to off-site areas. All pollutants and materials that are dropped, washed, tracked, spilled, or otherwise discharged from the project site to off-site areas must be cleaned using dry methods such as sweeping or vacuuming. Washing pollutants and materials that are discharged from the project site would be prohibited unless the material is sediment and is directed to a sediment basin or sediment trap.

In order to mitigate the cumulative effects that urbanization has on surface water quality, the City regulates new development and redevelopment projects that disturb at least one acre of land. Projects regulated under the City's storm water quality program must consider the use of Low Impact Development, source control, and retention/biofiltration in order to minimize the effects of development on storm water quality. The proposed project is expected to disturb an area of less than one acre and thus, will not be regulated under the City's storm water quality program.

2.4. Hazardous Materials and Solid Waste

There are no known threats pertaining to hazardous materials at the project site. Based on record drawings for the existing BWS facility, the presence of asbestos containing material at the project site is not anticipated.

Normal operations at the Waimalu 217' facility do not generate solid waste, and the existing BWS facility does not receive regular solid waste collection service from the City's Department of Environmental Services, Refuse Division or a private hauler.

Impacts and Mitigation Measures

If the presence of hazardous materials such as asbestos containing material is discovered, the DOH Indoor and Radiological Health Branch (IRHB) will be contacted. The exposure risks from hazardous materials such as asbestos-containing substances and lead-based paint are greatest when these materials are intentionally disturbed and handled. BWS will refer to the regulatory guidance of the DOH IRHB and the contractor will be required to comply with all applicable State regulations regarding work with hazardous materials.

Construction activities at the project site would temporarily increase the volume of solid waste including construction debris that must be transported offsite for disposal. Appropriate waste management and disposal practices are expected to be implemented by the construction contractor.

2.5. Natural Hazards

Natural hazards that may threaten life and property on Oahu include tropical cyclones, earthquakes, floods and tsunami inundation, drought, wildfires, high wind and landslides. Many tropical cyclones have passed close enough to affect the State of Hawaii since the recording of such events began in the 1950s. Hurricane Iwa in 1982 and Hurricane Iniki in 1992 both brought destructive winds and torrential rains that resulted in significant property damage. Hurricane Iniki was connected to six deaths.

Recent earthquakes that had statewide impacts occurred on October 15, 2006. The earthquakes, which occurred off the Kona coast of Hawaii, had magnitudes of 6.7 and 6.0. The event caused property damage and triggered an island-wide electrical blackout on Oahu.

Tsunami evacuation zone maps for the State of Hawaii (Hawaii State Civil Defense, n.d.) identify low lying areas where evacuation is recommended since extensive damage to life and property may occur from seismic sea waves. The project site in Aiea is away from the shoreline, beyond the reach of seismic sea waves, and outside the tsunami evacuation zone.

Climate change is expected to impact water resources. While acknowledging the uncertainty of future climate change scenarios, "researchers expect wet areas in Hawaii to get wetter and dry areas to get drier" (Townscape, Inc., 2019). Long sustained periods of drought have the potential to affect ground and surface water resources. In addition to temperature and precipitation changes, the effects of climate

change may include sea level rise, and wildfires that occur with more frequency or intensity. Climate change may also affect the frequency and intensity of severe storms that cause flooding.

Sea level rise has the potential to threaten life and property in coastal and low elevation areas. The existing BWS facility, which is located approximately 185 to 200 feet above msl, does not contain and is not adjacent to sea level rise vulnerability zones, which are areas impacted by 3.2 feet of sea level rise, according to the Hawaii Sea Level Rise Viewer (Hawaii Climate Change Mitigation and Adaptation Commission, 2021).

Most of the project site and the area around the existing reservoir is in Zone X according to the Flood Insurance Rate Map Panel No. 15003C0243H for Hawaii (effective date November 5, 2014) prepared by the Federal Emergency Management Agency. The Zone X designation refers to inundation areas of low-to-moderate risk that are outside the 0.2 percent annual chance (or 500-year) floods. Some areas along the undeveloped borders of the project site are in Zone D. The Zone D designation refers to unstudied areas where flood hazards are undetermined but flooding is possible. The Flood Hazard Assessment Report for the project site is provided in Appendix C.

Landslides have destroyed built structures and covered roads, which jeopardize access for affected communities. Steep cliffs and areas containing an abundance of dry vegetation may be more susceptible to rockfalls and wildfires, respectively. The project area is mostly developed such that the threats from wildfires are unlikely but possible, especially when vegetation is dry. Drought conditions and high winds could exacerbate the fire hazard. Many wildfires are caused by human actions of an intentional nature or as a result of negligence.

Impacts and Mitigation Measures

The threats to humans and property from unpredictable natural events will always be present. Proposed activities at the project site are not expected to affect or exacerbate the occurrence of naturally occurring hazards.

2.6. Floral and Faunal Resources

The project site was previously disturbed for the construction of the BWS facility and is within a developed urban area. Vegetation at the project site is observed to be sparse (e.g., there are no trees) and groundcover includes common grasses. The project site does not contain and is not immediately adjacent to federally designated critical habitat for state and/or federally listed endangered and threatened species.

Several state and/or federally listed endangered and threatened species may occur or transit through the vicinity of the proposed project area:

Hawaiian hoary bat (*Lasurus cinereus semotus*)

Hawaiian petrel (*Pterodroma sandwichensis*)

Hawaii Distinct Population Segment band-rumped storm-petrel
(*Oceanodroma castro*)

Newell's shearwater (*Puffinus auricularis newelli*)

The State listed Hawaiian Hoary Bat could potentially occur in the vicinity and may roost in trees along the site perimeter and outside the chain link fence. Seabirds may pass through the area at night.

Impacts and Mitigation Measures

Anticipated site preparation activities would affect the area around the existing Waimalu 217' reservoir, which contains ground cover (e.g., grasses) and no trees. The proposed project is not expected to displace federal or State of Hawaii listed species such as the Hawaiian Hoary Bat or Hawaiian seabirds from the project area.

The contractor is expected to abide by the measures listed below with regards to protecting Hawaiian seabirds. No new permanent lighting is anticipated as a part of this project. If permanent lighting at the project site is determined to be necessary, the contractor will adhere to the following guidance:

- Fully shield all outdoor lights so the bulbs can only be seen from below;
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area; and
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Soil and plant material may contain invasive fungal pathogens (e.g., Rapid Ohia Death), vertebrate and invertebrate pests (e.g., Little Fire Ants, Coconut Rhinoceros Beetle), or invasive plant parts that could harm native species and ecosystems. BWS expects its contractor to implement measures such as cleaning excess soil and debris from all equipment, materials, and personnel to minimize the risk of spreading invasive species. Gear that may contain soil, such as work boots and vehicles, should be thoroughly cleaned with water and sprayed with 70 percent alcohol solution to prevent the spread of Rapid Ohia Death and other harmful fungal pathogens.

The proposed project includes hydromulching, which stabilizes disturbed areas to prevent erosion. If additional landscaping at the project site is determined to be necessary, no invasive species will be planted.

The standard comments from DOH CAB indicate that demolition and land clearing have the potential to disperse rodents. The DOH Vector Control Branch administers the regulatory controls pursuant to HAR §11-26-35, "Rodents; Demolition of Structures and Clearing of Sites and Vacant Lots."

2.7. Archaeological, Architectural and Cultural Resources

Two archaeologists from Cultural Surveys Hawaii, Inc. (CSH) conducted a field survey of the project site in March 2022, and no historic archaeological resources were identified. The following information is summarized from the report prepared by CSH (see Appendix D) unless otherwise noted.

Specific references in traditional literature that pertain to Waimalu provide little information about lifestyles and land usage during the periods before western contact and during the early post-Contact years. The area of Waimalu extends from the East Loch of Pearl Harbor to the crest of the Koolau Range, and generally follows Waimalu Stream. The word "Waimalu" translates to "sheltered water," perhaps in reference to numerous fishponds and Puuloa, which is more often referred to in modern times as Pearl Harbor. The recorded descriptions mention extensive *loi kalo* in the lower portion of Waimalu valley.

The island of Oahu was divided in traditional times into six *moku* (a large land division) that were further subdivided into 86 *ahupuaa* (smaller land divisions within the *moku*). Hawaiian historian Samuel Kamakau wrote that the entire *moku* of Ewa including Waimalu was prosperous, productive, and densely populated. In traditional times, Ewa was a political center. Many *alii* (the ruling nobles or chiefs) resided in Ewa because of its abundant resources. In the early 1800s, Waimalu was the residence of Kinau (who was one of Kamehameha I sons), Kinau's people, and one of his chiefs. In the 1800s, western visitors traveling through Ewa described the landscape above Pearl Harbor as an extensive, fertile plain cultivated with *kalo* in irrigated areas. Lands without water were cultivated with yams, and sweet potatoes. A western visitor's description from 1831 characterizes the area as exceedingly fertile and cultivated like nowhere else on the island of Oahu. Cultivated areas contained *loi kalo*, banana plantations and sugarcane plantations. The description mentions small but deep tidal lakes that enabled long boats from the ocean to travel far upstream. The Ewa area was also described by others as a fertile, irrigated plain with hardly any habitation.

The first Chinese laborers arrived in Hawaii under contract in 1852 to work on sugar plantations. As the demand for *kalo* declined, irrigated terraces were transformed into rice fields and later used for banana cultivation. Historic maps depict plantation lands

and the railroad extending through the project area in the early 1900s. Virtually all of the Ewa plain was planted in sugarcane by the early 1900s. The *makai* (seaward) portion of Waimalu Ahupuaa was leased to the Honolulu Plantation Company (formerly the Honolulu Sugar Company), and by the mid-1930s, the company was leasing more than 23,000 acres of land from Aiea to the inshore and upland areas of Pearl Harbor, and westward to the Manana and Waiawa streams.

Early maps depict the project area in Waimalu valley as undeveloped with unimproved roads extending into the valley. Previous archaeological research in the project vicinity indicates that this portion of Waimalu was part of the densely populated region before Western Contact. In recent history, the area surrounding the project site was used for sugar cane, and the lowland plains and shoreline around Pearl Harbor were ultimately transformed by the U.S. Navy. The U.S. Army War Department map produced in 1919 shows the lower portions of Aiea Ahupuaa as being part of the U.S. Military Reservation. The Waimalu Ahupuaa and the valley around the current project area was an agricultural area. The original plans for the Waimalu 217' facility are dated 1952 and were prepared by the Department of Public Works, City and County of Honolulu (Mason Architects, Inc., 2022). According to articles in the *Honolulu Advertiser*, Waimalu Development Corporation, Ltd. began single-family residential development in the project area in 1954 and the reservoir was completed in 1956 (*ibid.*). The Waimalu 217' reservoir and residential development to the southwest are visible in the 1968 USGS aerial photograph. The 1983 USGS topographic map shows residential development around the Waimalu 217' facility.

Items such as remnants of the Honolulu Plantation railroad, terraces, historic artifact scatters, and water control features related to agricultural and ranching activities have the potential to be found in the project area. No modern archaeological studies have been previously conducted within the current project area. The literature research by CSH identified no documented historic properties or burial sites in the project area. The archaeologists documented the features associated with the BWS facility and found no apparent evidence of prior land use during their survey of the project site. Pre-Contact cultural deposits such as sediments related to agriculture, evidence of habitation, and midden remains may have been destroyed by commercial ranching and agricultural activities or construction of the Waimalu 217' facility and the later development of the surrounding residential neighborhood.

The project site is not listed on the State or National Register of Historic Places and is within a geographic area that has experienced a long history of land disturbance and changes in land usage. No listed historic properties are immediately adjacent to the project site.

The Waimalu 217' facility is more than 50 years old and was surveyed in August 2022 by Mason Architects, Inc. (hereafter MASON) for historical significance. The Suburban

Water System (not BWS) is the entity responsible for the design and construction of the Waimalu 217' facility. A *Honolulu Advertiser* article from April 1957 mentions the completion of the reservoir in 1956. BWS acquired the Suburban Water System in 1959, thereby consolidating all water works on Oahu into an island-wide operation. According to MASON, the concrete steps leading up to the reservoir and an above-ground drainage vault near the western boundary appear to be original to the site design; a cinder block retaining wall, utility boxes and conduit were added later. The following excerpt is from the report by MASON (2022), which is included with this EA as Appendix E:

- *The Waimalu 217 Reservoir property does not individually meet HAR §13-275-6 Criterion a significance requirements. Functionally, it is a smaller component of a much broader network.*
- *Currently, as a stand-alone site, or even in tandem with the 1950's rural BWS Waimalu water supply infrastructure, the property does not rise to the level of significance required for Criterion a. (It is also doubtful this property could be individually listed on the Hawaii or National Registers of Historic Places.)*
- *Under HAR §13-275-6 significance Criterion b, it is not significant, having no known association with the lives of persons important in our past.*
- *Under HAR §13-275-6 significance Criterion c, it is a relatively mundane utilitarian structure, with few notable details or landscape characteristics.*
- *Under HAR §13-275-6 significance Criterion d, it is not significant for being likely to yield information important in history.*

Traditional and cultural practices are not known to have occurred at the project site within recent times because access to the premises is restricted to authorized BWS personnel via padlocked gates. As previously stated in this EA, the construction of the Waimalu 217' reservoir was completed in 1956, chain link fencing topped with barbed wire creates a secured area around the reservoir and deters unauthorized access, and the project site has a history of restricted access during its use as a BWS facility.

Impacts and Mitigation Measures

There are no known archaeological and cultural resources at the project site that would be endangered by project actions. The presence of subsurface remnants of pre-Contact and post-Contact agricultural or ranching deposits is evaluated by CSH as unlikely.

The Waimalu 217' facility is greater than 50 years old but does not meet significance criteria under HAR §13-275-6 according to MASON. The reservoir at the project site is evaluated as not historically significant. No alterations to

the existing reservoir are anticipated from the proposed project. MASON states that the proposed action will result in a “No historic properties affected” finding under HAR §13-275-7.

Traditional gathering rights, access, or other customary activities by native Hawaiians or other ethnic groups would not be disrupted by the proposed project because site access is restricted to authorized BWS personnel via padlocked gates. BWS will continue to restrict access to the Waimalu 217' facility.

In the event that any unexpected historic remains or other potentially significant subsurface resources are encountered during the various phases of construction (e.g., excavation and trenching), the contractor will be required to halt construction activities and to immediately notify the State Historic Preservation Division (SHPD) of the discovery. BWS will prevent the disturbance or taking of any discovered archaeological, historic, or cultural resources to the extent possible by instituting the described mitigation measures (i.e., halt construction and immediately notify SHPD) and enforcing their implementation by its contractors.

2.8. Visual Resources

The visual character of Waimalu in Aiea is dominated by single-family homes, churches, parks, and public use facilities. Some municipal and institutional land uses (e.g., parks, libraries, schools, and churches) and commercial establishments are in lower Aiea. Single-family residences in the project vicinity have been modified and expanded over time. Urban landforms in the immediate vicinity of the project site include single-family homes, local roadways, and utility infrastructure.

Views of the BWS facility are generally obscured by single-family homes along Puaalii Street. An access driveway to the project site is between residential parcels along Puaalii Street (refer to site photographs in Appendix A). The facility is distinguished by perimeter fencing topped with barbed wire and a gated entry at the end of the long access driveway. The Waimalu 217' reservoir is partially visible from areas in the vicinity of the Puaalii Place and Puaalii Way intersection. The reservoir is visible as an urban form that is behind and between two single-family homes along the Puaalii Way cul-de-sac. The reservoir is painted green, which is the typical color currently used for BWS buildings.

Impacts and Mitigation Measures

The proposed project represents a continuation of existing water system infrastructure that would not significantly alter the visual character along Puaalii Street. The proposed exploratory well is primarily underground. Other

necessary facilities such as the test pump would be removed after the completion of water testing. A 20-inch diameter casing that protrudes 3 feet above ground would add a minor visual element around the much larger 500,000-gallon above-ground reservoir tank at the project site. The gravel pad and retaining wall with guardrails would also be minor visual elements at the Waimalu 217' facility. No adverse impacts to scenic vistas or view planes are anticipated from the proposed project.

2.9. Noise

The project site is located in a developed residential area where the primary noise source is related to vehicular traffic along Puaalii Street, which is a two-lane residential roadway owned by the City. In general, there is low background noise in the vicinity of the Waimalu 217' facility.

Impacts and Mitigation Measures

Audible noise from demolition and construction activity is expected to be intermittent and unavoidable since construction vehicles, heavy equipment and impact tools generate noise as part of normal operations. The mitigation of noisy activities to inaudible levels will not be practical in all cases due to the intensity and exterior nature of the work. Ambient noise levels in the vicinity of the project site will therefore increase from the operation of construction equipment (e.g., trucks, grading equipment, drilling compressor, rig motor, and generator) during the construction period. Quieter construction activities, such as equipment installation, may not be audible. Construction noise is temporary in nature and will cease upon completion of the different phases of the project.

The maximum permissible day and night noise levels assigned to zoning districts are expressed in the Hawaii Administrative Rules Title 11, Chapter 46 "Community Noise Control" in measurements of dBA. For lands zoned residential, the maximum permissible noise level that may be emitted beyond the property line is 55 dBA during the day (7:00 a.m. to 10:00 p.m.) and 45 dBA at night (10:00 p.m. to 7:00 a.m.). The regulations require a permit for excessive noise (e.g., noise that exceeds allowable levels stated in the administrative rules for more than 10 percent of the time within any 20-minute period).

Project activities shall comply with the provisions of HAR §11-46, "Community Noise Control" which are administered by the DOH IRHB. The construction contractor will be responsible for minimizing noise by properly maintaining noise mufflers and other noise-attenuating equipment and for maintaining noise levels within regulatory limits. If construction activities occur outside of the allowable timeframes designated for the noise permit (i.e., nighttime, Sunday, holiday) and exceed allowable noise levels, a noise variance must be obtained

prior to commencement of construction activities, as required. The construction contractor will obtain the appropriate permit or approvals (e.g., Notice of Intent to Construct, Community Noise Permit, or Noise Variance). Portable generators and currently available testing equipment used for the Step-Rate Pumping Test and 96-hour Constant-Rate Pumping Test are expected to generate noise that exceeds the maximum permissible sound levels found in Table 1 of HAR §11-46-4. A noise variance will be needed for the pumping tests, which are performed after well installation is largely completed.

Anticipated noise will be mitigated by performing the majority of construction work during daytime hours (as opposed to night work), thereby avoiding the creation of construction noise impacts during nighttime hours. Daytime work will ensure minimal impacts to existing users adjacent to and in the vicinity of the project site. The 96-hour Constant-Rate Pumping Test needs to be conducted for a continuous 96-hour time period in order to ensure proper, accurate data is collected. Besides the 96-hour Constant-Rate Pumping Test, construction operations will not be allowed at night. The contractor will be required to follow BMPs to control noise levels at all times. Temporary noise reduction measures during construction may include but are not limited to the use of sound-walls, sound blankets and curtains, equipment mufflers and low-noise generators.

An exploratory well at the existing BWS facility that is capped until the conversion to a permanent well will not produce noise. The potential noise from the normal operation of a permanent production well that requires a pump, motor, and piping will be considered in a subsequent EA.

2.10. Site Access, Circulation and Traffic

Vehicular access to the project site is via a 12-foot-wide concrete driveway with a padlock-secured gate along Puaalii Street. Perimeter chain link fencing topped with barbed wire provides an additional deterrent to unauthorized entry. BWS personnel in BWS vehicles infrequently access the project site as part of normal operations since existing water system infrastructure does not require manual operation.

Queen Liliuokalani Freeway (Interstate H-1) is roughly one mile south of the project site. This freeway is the primary arterial route connecting Waimalu to downtown Honolulu. Residential roadways provide access from Interstate H-1 to the project site. There are no known traffic concerns in the vicinity of the project site and residential traffic in the surrounding area is observed to be low.

Municipal bus and paratransit services on Oahu are under the purview of the City's Department of Transportation Services (DTS) and Oahu Transit Services, Inc. (OTS). There is bus service to the area via Kaonohi Street.

Impacts and Mitigation Measures

No offsite road improvements are required as part of the proposed project and the existing driveway along Puaalii Street will remain unchanged. The transportation of equipment and material to the site along with the removal of debris and construction waste from the site may cause intermittent and temporary inconveniences to residents who live in the immediate vicinity. The construction contractor shall not close, block, or otherwise obstruct streets, parking lots, or other occupied facilities without prior acceptance by authorities having jurisdiction. Acceptable alternate routes around work that obstructs the existing pedestrian and vehicular traffic ways will be provided by the contractor.

Construction-related traffic will be restricted to only stabilized construction areas. Construction work and the moving of heavy equipment or construction-related supplies is expected to occur during daytime hours (as opposed to night work). At night and when work is not occurring, all associated construction equipment will be secured and appropriately sited to prevent obstructions to traffic.

The transport of oversized and/or overweight materials and equipment on State highway facilities requires a permit from the State of Hawaii, Department of Transportation (DOT). The construction contractor is expected to apply for the permit if the operation or transportation of any oversized and/or overweight vehicles and loads is required during construction.

Bus routes, bus stops and paratransit operations are not expected to be impacted by project actions. The temporary increase in traffic due to vehicles and equipment accessing the project site will cease upon the completion of construction activities. An exploratory well at the existing BWS facility that is capped until the conversion to a permanent well will not increase vehicular traffic or affect site access and circulation patterns such that no mitigation is warranted or proposed. BWS personnel will continue to infrequently access the project site for monitoring and maintenance purposes as part of normal operations.

2.11. Utilities (Water, Wastewater, Drainage)

The project site is developed and contains a 500,000-gallon reservoir that was completed in 1956. The existing facility is connected to the BWS water system and the City's municipal separate storm sewer system (MS4). Drainage system infrastructure at the project site includes aboveground drainage channels and underground drain lines. The *Water System Standards* of the BWS require washout and overflow drainage lines for reservoirs. Stormwater runoff and discharges associated with current operations are conveyed to the City's MS4.

Impacts and Mitigation Measures

The contractor shall utilize electro-magnetic location, often referred to as toning, to locate existing underground utilities wherever excavation work will occur. Electro-magnetic location works by sending a signal along a metal line that is tracked using a receiver. Modern equipment provides a tone, but also provides visual cues as to the strength of the signal. This type of equipment is used to estimate approximate depths for utilities to avoid any damage during site work and construction. Any damaged utilities shall be promptly repaired by the contractor to the satisfaction of the utility owner. No long-term impacts are anticipated from establishing necessary utility connections for a new well and support facilities.

A short-term and temporary impact of the project would occur from the generation of sediment-laden surface runoff during construction. BMPs will be incorporated into a storm water management plan. Appropriate erosion control BMPs will be used to minimize the amount of soil transported in storm water runoff during construction activities. All construction activities will comply with applicable Federal, State and County regulations and rules for erosion control as previously discussed in Section 2.3, Water Resource Considerations.

The following list encapsulates the comments provided by the DOH Safe Drinking Water Branch (SDWB) in its letter dated June 20, 2022 (Ref. SDWB Kawata02.docx). The comments from SDWB are expected to be addressed after water testing is complete. BWS will determine whether or not the project site is a suitable location for a permanent production well after sufficient information is available.

1. The new well qualifies as a source that serves a regulated public water supply;
2. A satisfactory engineering report must be submitted to obtain approval from the Director of Health to use a new source of drinking water that serves a public water system;
3. Laboratory analyses of water quality is required content for the engineering report; and
4. A source water assessment and the delineation of a source water protection area is required.

BWS operates a “public water system” as defined in HAR §11-20-1 and is required to comply with the “Rules Relating to Public Water Systems” as outlined in HAR §11-20. BWS will consult with the regulatory agencies such as CWRM and DOH SDWB to obtain required approvals and permits for the use

of a new water source if a drinking water well is eventually put into production at the site.

2.12. Power and Communications

Electrical power is provided by Hawaiian Electric Company, Inc. (HECO) via overhead lines along roadways in Waimalu. Hawaiian Telcom and Charter Communications provide communications service via overhead lines in the project area.

The BWS facility receives power and communications service from existing service providers. A HECO transformer is located near the existing reservoir. Electrical power to the reservoir is provided via underground distribution lines. Hawaiian Telcom communications infrastructure to the reservoir is via underground duct lines. Control and monitoring systems are located at the project site.

Impacts and Mitigation Measures

The construction contractor is expected to follow standard procedures such as providing its own power for construction equipment and avoiding the disruption of existing HECO services to the project site and to the surrounding residential community. Greenhouse gas emissions from diesel-power construction equipment and generators would occur during the temporary period of construction and during a short-term data collection period. The contractor shall protect existing surface and subsurface utilities and poles within and abutting the project site, excavations, and other work areas. Disruptions to communications service during construction would also be avoided. Any damaged utilities shall be promptly repaired by the contractor to the satisfaction of the utility owner. No mitigation is proposed for short-term and temporary impacts.

The Waimalu 217' facility already receives power and communications service for current operations. An exploratory well at the existing BWS facility that is capped until the conversion to a permanent well does not require new service connections for power and communications service, and does not represent an increase in energy consumption.

2.13. Socio-Economic Characteristics

The project site is located within the City's Primary Urban Center planning region, which was forecasted to accommodate a significant portion of Oahu's projected growth in residential population and jobs for the considered 20-year period from 2004 through 2025. The Primary Urban Center functions as an economic center of importance to both Oahu and the State of Hawaii. Honolulu is a leading city and travel destination in the Pacific region.

The census tract area of Aiea Heights has a median household and family income of \$130,060. In 2019, the same census tract area had a resident population of 5,564 inhabitants and 1,605 households (U.S. Census Bureau, 2019). Single-family homes in the Waimalu project area were mostly built between the late 1950s through the early 1980s. Schools in the project area include Pearl Ridge Elementary School, Waimalu Elementary School, Highlands Intermediate, and Aiea High School.

Impacts and Mitigation Measures

The proposed installation of a new well at an existing BWS facility involves construction activities that will create short-term jobs in design and construction. A capped exploratory well will not affect population levels, housing, or schools. No staffing increase is expected from the proposed project because maintenance and monitoring activities at the BWS facility are currently conducted as needed by BWS staff. An exploratory well at the Waimalu 217' facility would not help sustain the municipal water system until it is converted to a production well. Reliable water supplies support the economic and social welfare of the communities served by the BWS water system.

2.14. Emergency Service Facilities and Shelters

Law enforcement services are provided by the Honolulu Police Department (HPD). The nearest HPD police station to the project site is approximately three miles away and located along Waimano Home Road in Pearl City.

The Honolulu Fire Department (HFD) provides fire protection and first responder emergency services. HFD's Station 38 is located on Komo Mai Drive approximately two miles northwest of the project site.

Emergency service providers include critical care providers such as hospitals and clinics. The Longs MinuteClinic is approximately one mile south of the project site.

Highlands Intermediate and Aiea High School are designated hurricane evacuation shelters. The schools are all located approximately one mile west and east of the project site, respectively. People who have special health needs will be accommodated and provided limited support at active shelters during or in response to emergency situations.

Impacts and Mitigation Measures

No significant adverse impacts to police, fire, medical or emergency shelter services will occur from the installation of water system infrastructure at an existing BWS facility. The project will be designed in consideration of fire department access and required fire flow for fire protection as stated in the

letter from HFD dated June 7, 2022. Upon further discussion with HFD in August 2022, it was clarified that the civil drawings do not need to be submitted to HFD for review or approval since no occupiable structures will be developed as a result of the proposed project.

2.15. Recreational Resources

The City's Department of Parks and Recreation operates and maintains County Park facilities including Pearl Ridge Community Park and Kaonohi Park, which are both less than a mile from the project site. Other recreational resources in the Waimalu project area include the Newtown Park and Pearl Country Club. There are no recreational resources adjacent to the project site.

Impacts and Mitigation Measures

The proposed project is the installation of water system infrastructure at an existing BWS facility, which creates no additional demand for recreational facilities. No mitigation is warranted or proposed.

3. RELATIONSHIP TO PLANS, POLICIES, AND CONTROLS

3.1. State Land Use District

The State Land Use Law (Chapter 205, HRS) is intended to preserve, protect, and encourage the development of lands in the State for uses which are best suited to the public health and welfare for Hawaii's people. All lands in the State are classified by the State of Hawaii, Land Use Commission into four land use districts: Urban, Rural, Agricultural, and Conservation. The project site is entirely located within the Urban District, which is regulated by county zoning (see Section 3.6. City and County of Honolulu Land Use Ordinance). The proposed project is a permissible public use and structure within the Urban District, which has residential neighborhoods, commercial enterprises, industrial development, and community facilities such as public buildings.

3.2. State Coastal Zone Management Program

Hawaii's Coastal Zone Management (CZM) program, established pursuant to Chapter 205A, HRS, as amended, is administered by the State of Hawaii, Office of Planning and Sustainable Development. The CZM program provides for the beneficial use, protection, and development of the State's coastal zone. The CZM area consists of the entire state of Hawaii since there is no point of land more than 30 miles from the ocean. The objective of the act is to protect, preserve, and restore recreational, historic, and scenic resources as well as implement the state's ocean resources management plan and protect coastal ecosystems. The CZM Act involves a system of permits, including the SMA use permit, to manage development within coastal areas and encourage public participation. Any significant development within the SMA requires a permit from the appropriate County. On Oahu, the SMA permit is administered by DPP. The project area is inland and outside the SMA. No SMA permit is required for the project, which supports the following policies and objectives of the CZM program from HRS §205A-2.

1. Recreational Resources

Objectives. Provide coastal recreational opportunities accessible to the public.

Policies. Improve coordination and funding of coastal recreational planning and management; and

Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

- (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
- (ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*

- (iii) *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*
- (iv) *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*
- (v) *Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*
- (vi) *Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*
- (vii) *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*
- (viii) *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.*

The project is located away from the coast and outside the SMA. Coastal water quality will be protected since appropriate erosion control BMPs will be used to minimize the amount of soil transported in storm water during construction.

2. *Historic Resources*

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

Policies. *Identify and analyze significant archaeological resources;*

Maximize information retention through preservation of remains and artifacts or salvage operations; and

Support state goals for protection, restoration, interpretation, and display of historic resources.

No known historic resources would be endangered by the project. Concurrence from SHPD with regards to a “no historic properties affected” determination will be requested by BWS. The construction contractor will be required by BWS to comply with all State and County rules and laws pertaining to historic preservation. Construction activities will be halted and SHPD will be notified in the event any unanticipated archaeological or historic sites are encountered.

3. *Scenic and Open Space Resources*

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

Policies. Identify valued scenic resources in the coastal zone management area; Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline; Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and Encourage those developments that are not coastal dependent to locate in inland areas.

The project is located inland and is not expected to diminish coastal scenic view areas or open space resources.

4. Coastal Ecosystems

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

Policies. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

Improve the technical basis for natural resource management;

Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

The project is sited away from the shoreline and is not expected to disrupt or degrade coastal water ecosystems. The construction contractor will be responsible for following the City's "Rules Relating to Water Quality" by implementing a storm water management plan and controlling runoff that can transport loose soil, excess nutrients and other pollutants. Construction activities will comply with applicable Federal, State and County regulations and rules for erosion control.

5. Economic Uses

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

Policies. Concentrate coastal dependent development in appropriate areas;

Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

- (i) Use of presently designated locations is not feasible;*
- (ii) Adverse environmental effects are minimized; and*
- (iii) The development is important to the State's economy.*

The project does not involve coastal development; therefore, the policies pertaining to coastal economic development do not apply.

6. Coastal Hazards

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

Policies. *Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*

Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

Prevent coastal flooding from inland projects.

Coastal hazards are not expected to be exacerbated by the project, which is located inland and away from the coastline. BWS is expected to ensure that its construction contractor utilizes BMPs to address erosion prevention and sediment control. Treated process wastewater from well drilling activities will be properly controlled by the construction contractor to avoid improper discharges. Storm water BMP strategies would also be implemented at the project site.

7. Managing Development

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

Policies. *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*

Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and

Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

The project does not impact or influence the development review process pertaining to the management of coastal resources and hazards. The environmental review process includes opportunities for public participation and comments pertaining to a variety of issues and topics including coastal resources and hazards.

8. Public Participation

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

Policies. Promote public involvement in coastal zone management processes; Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

The environmental review process provides public participation opportunities. A description of the outreach and consultation for the proposed project is described in Section 7, Public Agency Review and Consultation.

9. Beach Protection

Objectives. Protect beaches for public use and recreation.

Policies. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

Minimize the construction of public erosion-protection structures seaward of the shoreline.

Public access to beach areas will not be affected by the project, which is located inland and away from beaches and the shoreline. The project does not involve the construction of erosion-protection structures seaward of the shoreline.

10. Marine Resources

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

Policies. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

The project is located inland and does not involve the use or development of marine and coastal resources.

3.3. Hawaii State Plan

The Hawaii State Plan (Chapter 226, HRS) outlines broad goals, policies, and objectives to serve as guidelines for the future growth and development of the State. The excerpts below are Hawaii State Plan objectives, policies, and priority guidelines that pertain to the proposed project in Honolulu, Oahu.

§226-5 Objectives and policies for population.

(b) To achieve population objective, it shall be policy of the state to:

(7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:

(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.

(2) Effective protection of Hawaii's unique and fragile environmental resources.

- (b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:*
- (3) Take into account the physical attributes of areas when planning and designing activities and facilities.*
- (8) Pursue compatible relationships among activities, facilities, and natural resources.*

§226-12 Objectives and policies for the physical environment – scenic, natural beauty, and historic resources.

- (a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historic resources.*
- (b) To achieve scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:*
 - (1) Promote the preservation and restoration of significant natural and historic resources.*
 - (4) Protect those special areas, structures, and elements that are integral and functional part of Hawaii's ethnic and cultural heritage.*

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

- (a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:*
 - (1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.*
 - (b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:*
 - (2) Promote the proper management of Hawaii's land and water resources.*
 - (3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.*
 - (4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.*
 - (5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*

§226-14 Objective and policies for facility systems--in general.

- (a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.*

- (b) *To achieve the general facility systems objective, it shall be the policy of this State to:*
- (1) *Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*
 - (2) *Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*
 - (3) *Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.*

§226-16 Objectives and policies for facility systems - water.

- (a) *Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.*
- (b) *To achieve the facility systems water objective, it shall be the policy of this State to:*
- (4) *Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.*

§226-26 Objectives and policies for socio cultural advancement – public safety.

- (a) *Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:*
- (1) *Assurance of public safety and adequate protection of life and property for all people.*
- (2) *Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic wellbeing of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.*

§226-27 Objectives and policies for socio cultural advancement – government.

- (a) *Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:*
- (1) *Efficient, effective, and responsive government services at all levels in the State.*
- (b) *To achieve the government objectives, it shall be the policy of this State to:*

- (1) *Provide for necessary public goods and services not assumed by the private sector.*
- (5) *Assure that government attitudes, actions, and services are sensitive to community needs and concerns.*

BWS is a semi-autonomous government agency that manages Oahu's municipal water resources and distribution system to meet the needs of customers now and in the future. The proposed project responds to the objectives and policies of the Hawaii State Plan with regards to water systems. Reliable water supplies support the economic and social welfare of the communities served by the BWS water system. The new exploratory well and test pump would be sited adjacent to the existing 500,000-gallon reservoir at the project site in Aiea. BWS has considered the importance of collecting data about the quantity and quality of the underlying groundwater source along with the impacts of the proposed project on the surrounding community and the physical environment.

3.4. City and County of Honolulu General Plan

The *Oahu General Plan* (2021, Resolution 21-23, CD1) contains aspirational objectives and policies that address the physical, social, cultural, economic, and environmental concerns affecting the City. The Honolulu City Council adopted the General Plan on December 1, 2021 and the Mayor signed it on January 14, 2022.

I. Population

Objective A: To plan for anticipated population in a manner that acknowledges the limits of Oahu's natural resources, protects the environment, and minimizes social, cultural, and economic disruptions.

Policy 1: Allocate efficiently the money and resources of the City in order to meet the needs of Oahu's current and future population.

III. Natural Environment and Resource Stewardship

Objective A: To protect and preserve the natural environment.

Policy 1: Protect Oahu's natural environment, especially the shoreline, valleys, and ridges, from incompatible development.

Policy 2: Seek the restoration of environmentally damaged areas and natural resources.

Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.

Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Policy 3: Locate roads, highways, and other public facilities and utilities in areas where they will least obstruct important views of the mountains and the sea.

V. Transportation and Utilities

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

Policy 1: Maintain and upgrade utility systems in order to avoid major breakdowns and service interruptions.

Policy 2: Provide improvements to utilities in existing neighborhoods to reduce substandard conditions, and increase resilience to fluctuations, natural hazards, extreme weather, and other climate impacts.

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

Objective D: To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.

Policy 1: Give primary emphasis in the capital-improvement program to the maintenance and improvement of existing roads and utilities.

Policy 4: Evaluate the social, economic, and environmental impact of additions to the transportation and utility systems before they are constructed.

VII. Physical Development and Urban Design

Objective A: To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

Policy 7: Encourage the clustering of developments to reduce the cost of providing utilities and other public services.

Policy 9: Locate community facilities on sites that will be convenient to the people they are intended to serve.

Objective F: To create and maintain attractive, meaningful, and stimulating environments throughout Oahu.

Policy 3: Require new developments in stable, established communities and rural areas to be compatible with the existing communities and areas.

IX. Health and Education

Objective A: To protect the health and well-being of residents and visitors.

Policy 3: Coordinate City and County health codes and other regulations with State and Federal health codes to facilitate the enforcement of air-, water-, and noise-pollution controls.

The proposed exploratory well at the Waimalu 217' facility will facilitate the necessary testing and analysis that will allow BWS to determine if the location is feasible for a permanent groundwater well. BWS has considered the social, economic, and environmental impacts of proposed water system improvements that respond to the uncertainty of returning all previously used water sources to full production.

3.5. Primary Urban Center Development Plan

Eight community-oriented plans are intended to help guide land use planning and development on Oahu. The Primary Urban Center (PUC) encompasses the area from Pearl City to Waialae-Kahala and from the shoreline to the westerly slopes of the Koolau Range. The key elements of the vision for the City's Primary Urban Center Development Plan are summarized below:

Protecting and Enhancing Natural, Cultural and Scenic Resources;
Cultivating Livable Neighborhoods;
In-town Housing Choices of all Ages and Incomes;
The Pacific's Leading City and Travel Destination;
Develop a Balanced Transport System.

The City's Plan that was adopted in June 2004 recognizes that the PUC is where major growth in population and economic activity will occur over the twenty-year time period of the plan (i.e., 2004 to 2025). The following excerpts are from the 2004 Plan:

The Primary Urban Center is a lively, metropolitan city that is home to almost half the island's population and three-quarters of Oahu's jobs.

The East and Central sections of the Primary Urban Center overlie the Honolulu aquifer. The western Primary Urban Center area overlies the Pearl Harbor aquifer, the largest supplier of groundwater on Oahu and the source of most of the PUC's municipal supply.

The project site is within the Urban Community Boundary, which represents the extent of urbanized areas within the PUC. The project area is representative of a typical urbanized area within the PUC. The proposed project will facilitate the necessary testing and analysis that will allow BWS to determine if the location is feasible for a permanent groundwater well. The project supports the established community and the long-term commitment by BWS to provide municipal water and distribution services to the community it serves. A safe, dependable, and affordable water supply meets key vision elements of the City's 2004 Plan.

3.6. City and County of Honolulu Land Use Ordinance

The LUO regulates land use in accordance with adopted land use policies, including the City's General Plan and the Development/Sustainable Community Plans. The zoning for the project site is R-5 Residential District. The site is currently considered a public use and structure in the R-5 Residential District. The installation of an exploratory well would also be considered a public use/structure and is a permitted principal use in the R-5 District. No discretionary land use permit is required for uses conducted by or structures owned or managed by the federal government, the State

of Hawaii or the city to fulfill a governmental function, activity or service for public benefit and in accordance with public policy.

Water system infrastructure is a utility installation that is a permitted use. The definition of utility installations includes uses or structures, including all facilities, devices, equipment, or transmission lines, used directly in the distribution of utility services, such as water, gas, electricity, telecommunications other than broadcasting antennas, and refuse collection other than facilities included under waste disposal and processing. Pursuant to §21-2.130 of the City's LUO, the Director of DPP may waive the strict application of development or design standards for public or public/private uses and structures, and utility installations.

4. POSSIBLE ALTERNATIVES

4.1. No Action

No action implies that there would be no funding or capital expenditures for an exploratory well and test pump, which are needed to collect data about the quantity and quality of the underlying groundwater source at the project site. As a result of no action, BWS would be unable to determine if the Waimalu 217' facility is a suitable location for a permanent groundwater production well. The area around the existing reservoir would remain as is for the foreseeable future. Existing BWS water system infrastructure located at the project site would remain unchanged as a result of maintaining status quo.

The project is proposed by BWS at this time due to the emergency shut down of several water sources (i.e., Halawa Shaft and the Aiea and Halawa wells) that were in use prior to December 2021. BWS has increased the pumping rates at other water supply sources to maintain municipal water service; however, the higher pumping rates at other wells is a short-term measure. The investigation of a new water source at the project site is proposed by BWS in response to the emergency situation. The installation of a new exploratory well that may be converted to a permanent groundwater production well at the Waimalu 217' facility is proposed by BWS due to the uncertainty of returning all previously used water sources to full production. The no action alternative is unacceptable from the perspective of BWS, which has a commitment to sustain the performance and reliability of its water supply system in Honolulu.

4.2. Delayed Action

A delayed action implies that a project of similar scope and size to the proposed action would occur at an unspecified future date. The environmental impacts resulting from a delayed action are generally expected to be the same as the proposed action so long as environmental conditions remain similar to the evaluated conditions described in this EA. The delay of the proposed project would postpone and does not avoid anticipated environmental impacts associated with the installation of a new exploratory well and test pump at the Waimalu 217' facility.

The initiation of the proposed project at a later date may result in increased construction costs due to inflation, changes in economic conditions or the labor supply. Building materials and labor costs tend to increase with time. A delayed action may therefore necessitate a greater funding commitment and capital expenditures as compared to the project that is proposed to occur at this time.

Project delay implies that BWS would be unable to collect data about the quantity and quality of the underlying groundwater source until an unspecified time in the future.

The emergency situation is ongoing as of this writing, and the Navy has indicated that petroleum fuel will continue to be stored at its Red Hill facility through 2024 (Ordonio, 2022; Jedra, 2022). BWS was striving for a 10 percent voluntary reduction in water use by the public to lower the water demand while this emergency situation is in effect (Bodon, 2022). While it is possible to delay the proposed project until an unspecified future date, this would presumably extend emergency measures (e.g., higher pumping rates at other wells) for a longer period of time. A delayed action is not favored by BWS.

4.3. Alternate Location

A similar environmental review process would be required for the installation of an exploratory well and test pump at an alternate location instead of at the project site in Aiea if state or county lands will be utilized. A site that requires additional processes to acquire or transfer land, or to negotiate access or easements may require a greater funding commitment and may result in increased construction costs as previously discussed for a delayed action. An alternate location with no developed infrastructure may require more land disturbance and further delay for site development, which increases the impacts on the environment as compared to the proposed installation of a well and test pump at the Waimalu 217' facility.

The option to utilize an alternate location implies that BWS would not consider the Waimalu 217' facility as a possible location for a permanent groundwater production well. The inability to conduct necessary water testing due to the absence of an exploratory well and test pump means BWS would be unable to sufficiently investigate the yield, water quality, and aquifer properties at the project site. The Waimalu 217' facility has several favorable characteristics from the perspective of BWS such as available space that can accommodate an exploratory well and test pump, existing water system infrastructure, and no land ownership, easement or access concerns. For all of these reasons, an alternate unspecified location is less desirable than the proposed action described in this EA.

4.4. Construct New Well at Project Site (Preferred Alternative)

The proposed action is the installation of a new exploratory well and test pump at an existing BWS facility in Aiea. The project site involves land that was previously disturbed for the development of the Waimalu 217' facility. The reservoir was completed in 1956, is well maintained, and will remain in service after the construction of the new well. The Waimalu 217' facility has no land ownership, easement or access concerns, and the project site contains available space that can accommodate an exploratory well, test pump and other support facilities for a production well if the testing results are favorable.

Water testing at the Waimalu 217' facility will be possible once the exploratory well and test pump are installed. Collected data about the yield, water quality, and aquifer properties at the project site will allow BWS to determine if the location in Aiea is feasible for use as a permanent groundwater production well. The conversion of the exploratory well into a permanent groundwater well would only occur if the collected data indicates favorable conditions. Support facilities (e.g., a well pump, motor, and piping) and further improvements at the Waimalu 217' facility would be needed if the exploratory well is converted for use as a permanent groundwater production well. A permanent well located close to existing BWS facilities at the project site may reduce the time, resources, and environmental impacts of the project by avoiding the need for new water conveyance infrastructure.

The project is proposed at this time in response to the ongoing emergency, well closures, and the uncertainty of returning all previously used water sources to full production. More data about underlying aquifer conditions is expected to better inform BWS as it continues to manage its water system while the Navy resolves the fuel contamination concerns. In the long-term, a production well at the Waimalu 217' facility is expected to provide water system reliability when water sources are temporarily suspended due to the repair or periodic maintenance of BWS facilities, or due to sudden emergency situations. For all these reasons, the proposed action is the preferred alternative at this time from the perspective of BWS.

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5. PERMITS AND APPROVALS

The exact permitting and approval requirements will be determined during the design phase, and the following list contains permits and approvals that may be required for the proposed project.

State of Hawaii

- Well Construction Permit
- Pump Installation Permit
- Water Use Permit
- National Pollutant Discharge Elimination System Permit including
General Permit Form I - Treated Process Wastewater
Associated with Drilling Activities
- Community Noise Permit
- Community Noise Variance
- Non-Covered and/or Covered Source Permit (Air Quality)
- Oversized and Overweight Vehicles on State Highways Permit
- Disability and Communication Access Board Review
- State Historic Preservation Division Review

City and County of Honolulu

- Building Permit
- Grubbing, Grading, and Stockpiling Permit
- Erosion Control Plan/Best Management Practices
- Indirect Drain Connection License
- Industrial Wastewater Discharge Permit
- Street Usage Permit for Construction

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6. DETERMINATION

The proposed project is not likely to have a significant impact on the physical or human environment based on the analysis presented in this document. In consideration of the potential environmental effects and consultations with governmental agencies and interested parties, a Finding of No Significant Impact (FONSI) has been determined for the project by BWS. The supporting rationale for the FONSI as set forth in HAR §11-200.1-13 is discussed below.

(1) Irrevocably commit a natural, cultural, or historic resource;

The proposed investigation of the Waimalu 217' facility as a prospective water source will not endanger any natural, cultural, or historic resource. BWS is proposing the project at this time due to the uncertainty of returning all previously used water sources to full production. The proposed exploratory well will facilitate the necessary testing and analysis that will allow BWS to determine if the project site is feasible for a permanent groundwater production well. The construction contractor shall stop work and contact SHPD immediately in the event any unanticipated buried archaeological or cultural resources are encountered.

(2) Curtail the range of beneficial uses of the environment;

No beneficial uses of the environment will be curtailed as a result of the proposed project, which involves the installation of water system infrastructure at an existing BWS facility. The installation of an exploratory well that may be converted into a permanent groundwater production well at the Waimalu 217' facility is a continuation of the beneficial use of the project site for a public purpose.

(3) Conflicts with the State's environmental policies or long-term environmental goals established by law;

The proposed project would be in conformance with State Environmental Policy, inclusive of its individual policies, goals, and guidelines for population growth; natural resources; biological resources; transportation; energy; and culture, as discussed in the individual resource categories throughout this EA.

(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community or State;

The proposed project does not substantially or negatively affect the economic or social welfare and cultural practices of the community or State. The project creates short-term jobs for the design and installation of the exploratory well. The proposed project at the Waimalu 217' facility may ultimately contribute to more

reliable water supplies that support the economic and social welfare of the communities served by the BWS water system.

(5) Have a substantial adverse effect on public health;

Public health will not be adversely affected by the proposed project. Short-term and temporary effects such as surface runoff, fugitive dust, noise, intermittent traffic, and solid waste are expected to cease upon project completion. The implementation of mitigation measures will minimize temporary impacts. Completion of the project will facilitate the necessary water testing and analysis that will allow BWS to determine if the project site is feasible for a permanent groundwater production well.

(6) Involve adverse secondary impacts, such as population changes or effects on public facilities;

No substantial secondary impacts such as population shifts are anticipated from the proposed project, which involves the installation of water system infrastructure at the Waimalu 217' facility. The exploratory well will allow BWS to collect data about the quantity and quality of the underlying groundwater source. The collected information will allow BWS to determine if the project site is a suitable location for a permanent groundwater production well. Reliable water supplies support the current urban population that is served by the BWS water system.

(7) Involves a substantial degradation of environmental quality;

The proposed project is not expected to degrade environmental quality. Environmental impacts that may occur during the various phases of construction will be mitigated through the implementation of mitigation measures, as appropriate. Appropriate mitigation measures have been identified throughout this EA.

(8) Be individually limited but cumulatively has substantial adverse effect upon the environment or involves a commitment for larger actions;

The proposed project, which involves the installation of water system infrastructure at the Waimalu 217' facility, would not result in adverse cumulative effects and represents a continuation of the long-term commitment by BWS to provide municipal water and distribution services to the community it serves.

(9) Have a substantial effect on rare, threatened, or endangered species, or its habitat;

There is no federally designated critical habitat within the immediate vicinity of the project site. Endangered and threatened species may occur or transit through the vicinity of the proposed project area. The proposed project is not anticipated to displace or have a substantial effect on protected federal or State of Hawaii listed species.

(10) Have a substantial adverse effect on air or water quality or ambient noise levels;

Short-term impacts to air quality, water quality or ambient noise levels may occur during construction and demolition. The implementation of mitigation measures is expected to avoid the exceedance of Federal or State air quality, noise and water quality standards. Environmental impacts will be mitigated through proper construction techniques and compliance with permits and applicable administrative rules and regulations.

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

The project site is not situated within an environmentally sensitive area and is not anticipated to affect such areas.

(12) Have a substantial adverse effect on scenic vistas and view planes identified in county or state plans or studies; or

Proposed water system infrastructure will not obstruct or affect scenic vistas and view planes. The proposed exploratory well is primarily underground. A 20-inch diameter casing that protrudes 3 feet above ground would add a minor visual element around the much larger 500,000-gallon above-ground reservoir tank at the project site. The proposed project adds other minor visual elements at the Waimalu 217' facility such as a gravel pad and retaining wall with guardrails.

(13) Require substantial energy consumption or emit substantial greenhouse gas.

The exploratory well and test pump would operate during a short-term period and would not require substantial energy consumption. Greenhouse gas emissions from diesel-power construction equipment and generators would occur during the temporary period of construction and during a short-term data collection period. No mitigation is proposed for temporary impacts. In the long-

term, permanent water system infrastructure represents a continuation of current BWS operations that already receive power and communications service.

7. PUBLIC AGENCY REVIEW AND CONSULTATION

7.1. Pre-Assessment Consultation

The consulted agencies, organizations, and individuals are listed below. There were 8 formal responses to the pre-assessment consultation letter, as indicated by the ✓ below. Comments and responses are included in Appendix F.

Federal Agencies

U.S. Fish and Wildlife Service

State of Hawaii

Department of Land and Natural Resources

- ✓ Commission on Water Resource Management
- State Historic Preservation Division
- Oahu Island Burial Council
- Division of Aquatic Resources
- Division of Forestry and Wildlife
- ✓ Land Division
- ✓ Engineering Division
- Office of Planning and Sustainable Development

Department of Health

- ✓ Safe Drinking Water Branch
- Clean Air Branch
- Clean Water Branch
- Environmental Management Division
- ✓ Indoor and Radiological Health Branch

Office of Hawaiian Affairs

Department of Hawaiian Home Lands

Department of Education

Honolulu District Office

House District 33 – Representative Sam Satouru King

House District 31- Representative Aaron Ling Johnson

Senate District 16 – Senator Bennette E. Misalucha

City and County of Honolulu

Department of Design and Construction

Department of Environmental Services

- ✓ Department of Planning & Permitting
- Department of Transportation Services

City and County of Honolulu (continued)

- ✓ Honolulu Fire Department
- Honolulu Police Department
- Honolulu City District 6 – Councilmember Carol Fukunaga
- Neighborhood Commission Office
- Aiea Neighborhood Board No. 20

Utilities

Hawaiian Electric Company

Organizations and Associations

Aiea Community Association
Association of Hawaiian Civic Clubs
Royal Hawaiian Academy of Traditional Arts

Neighboring or Nearby Property Owners and Recorded Lessees

- ✓ 9-8-046:003
- 9-8-046:005
- 9-8-046:006
- 9-8-046:007
- 9-8-046:008
- 9-8-046:009
- 9-8-046:012
- 9-8-046:014
- 9-8-046:015
- 9-8-046:016
- 9-8-045:113
- 9-8-045:114
- 9-8-045:115
- 9-8-045:116

There were several opportunities during the EA process to participate and provide input to BWS with regards to the exploratory well at the Waimalu 217' facility. A Notice of Consultation was published in May 2022 to announce the investigation of up to six prospective water source locations. At the request of the Aliamanu/Salt Lake/Foster Village Neighborhood Board No. 18, a presentation occurred on May 12, 2022.

In May 2022, BWS distributed letters pertaining to the proposed project to agencies, organizations, and neighboring or nearby property owners and recorded lessees.

BWS provided information about its proposed investigation of up to six prospective water source locations to the Aiea Neighborhood Board No. 20 on June 13, 2022. In July 2022, a Notice of Consultation was published to announce the investigation of the Newtown 550' Reservoir as a potential water source location. Information and regulatory guidance from the formal comments is included throughout this EA. All of the received comments and responses are included in Appendix F.

7.2. Public Review

A notice of availability for the Draft EA and Anticipated Finding of No Significant Impact (DEA-AFONSI) was published in *The Environmental Notice* by the Environmental Review Program. The published notice issued on November 8, 2022 initiated the statutory 30-day public review and comment period. Copies of the DEA-AFONSI were available at the Aiea and Hawaii State public libraries during the review and comment period, which ended on December 8, 2022.

No comments were received during the public review and comment period. Consequently, Appendix F contains no new public comments or response letters.

Most occurrences of “groundwater well” have been clarified to “groundwater production well” throughout this EA (e.g., Sections 1.2 Project Need and Objectives, 1.3 Site Location and Description, 2.3. Water Resource Considerations, 2.9. Noise, 4.1. No Action, 4.3. Alternate Location, 4.4. Construct New Well at Project Site, and 6. Determination). Revisions in Section 2.3. Water Resource Considerations, Impacts and Mitigation Measures also state that the exploratory well described in this EA is in phase 1 whereas the installation of a production well may occur in phase 2.

The citation in Section 2.5. Natural Hazards for the Hawaii Sea Level Rise Viewer that was inadvertently omitted in the Draft EA was added to Section 8.0 References. The discussion of impacts and mitigation in Section 2.6. Floral and Faunal Resources with regards to no permanent lighting and hydromulching was updated. Section 2.10. Site Access, Circulation and Traffic, Impacts and Mitigation Measures was revised to reflect that the exploratory well would be capped until the conversion to a permanent groundwater production well. Electro-magnetic location (or toning) was described in Section 2.11. Utilities (Water, Wastewater, Drainage), Impacts and Mitigation Measures.

Minor revisions were made that do not change the discussions in Sections 3.1. State Land Use District, 3.3. Hawaii State Plan, and 3.4. City and County of Honolulu General Plan of this EA. A new citation and statement about the 10 percent voluntary reduction in water use was added to Section 4.2 Delayed Action. The Water Use Permit was added to Section 5.0 Permits and Approvals and two citations were added to Section 8.0 References.

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Appendix A

Site Photographs

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Photo #1. View looking north of the access road to the Waimalu 217' facility from Puaalii Street. A locked chain is across the entrance, which is between residential properties.



Photo #2. View looking south from the access road towards Puaalii Street. The concrete block walls are located along the boundaries of the residential parcels.



Photo #3. View from the end of the sloped, paved driveway that leads to the existing BWS facility. Access to the facility is restricted by a gated entry and chain link fencing topped with barbed wire.



Photo #4. View of the existing above-ground reservoir tank from within the fenced area and near the gated entry. Vegetation within the fenced area is sparse.



Photo #5. View looking west towards the gated entry from within the secured portion of the project site. Perimeter fencing and a single-family residence are visible in the distant background.



Photo #6. View towards the unpaved access road from the area near the gated entry. A portion of the sloped, paved driveway is paved. Single-family residences located along the access road are visible in the background.



Photo #7. View at the intersection of Puaalii Place and Puaalii Way from Google Street View (July 2011). The Waimalu 217' Reservoir is partially visible in the distance.



Photo #8. View along Puaalii Way from Google Street View (July 2011). The Waimalu 217' Reservoir is visible as an urban form that is behind and between two single-family homes along the Puaalii Way cul-de-sac.

Appendix B

Preliminary Geotechnical Engineering Study

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MEMORANDUM

August 9, 2022
W.O. 22-6765

TO: Jennifer Lim
The Limtiaco Consulting Group
via email: jen@tqthawaii.com

FROM: Barron Leu

RE: Preliminary Recommendations
BWS Waimalu 217 Reservoir
Exploratory Well and Site Improvements

As requested, preliminary recommendations are being provided prior to performing the fieldwork for our geotechnical investigation. The preliminary recommendations will either be confirmed or revised in our geotechnical investigation report upon completion of the fieldwork, laboratory testing, and analyses.

Project Considerations

The proposed project will consist of a new exploratory well in the northern portion of the site which will include a concrete slab-on-grade, with plan dimensions of about 7 by 7 feet, around the top of the exploratory well.

The project will also include grading of the area, approximately 1,600 square feet, on the southeast side of the proposed exploratory well. Finish grades for the proposed exploratory well slab-on-grade are generally expected to match that of the existing. Grading will primarily consist of cuts with maximum cut depths of about 7 feet. A new U-shaped retaining wall with a length of about 120 lineal feet will retain the cuts. The area within the retaining wall will be a gravel pad that transitions to the existing asphaltic pavement driveway.

Site Visit

A preliminary site visit was made on June 16, 2022, to observe the existing conditions of the project site. A bulk sample of the near surface soil was also obtained from near the area of the proposed exploratory well concrete slab-on-grade for selected laboratory testing.

Soil Conditions

Based on the bulk sample obtained during our site visit, our visual observations, the Soil Survey (prepared by the U.S. Soil Conservation Service), and our past experience in the project area, we anticipate that the soil in the project area will generally consist of dark reddish brown clayey silt. Preliminary laboratory tests indicate that the clayey silt has a low expansion potential. The Soil Survey, prepared by the U.S. Soil Conservation Service, also describes the soil in the project area as having a low to moderate expansion potential.

Preliminary Recommendations

Retaining Wall

Conventional spread footings may be used to support the proposed retaining wall. However, due to the low to moderate expansion potential of the onsite clayey silt, we recommend that the retaining wall footings be underlain by a minimum 12 inches of granular structural fill. For



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Geotechnical
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foundations founded on a slope, footings should be embedded such that a minimum horizontal distance of 5 feet is maintained between the bottom of footing and slope face.

The following parameters may be used for design of retaining wall foundations.

- Allowable bearing value = 3,000 psf
- Coefficient of friction = 0.4
- Passive earth pressure = 300 pcf
- Active earth pressure = 45 and 55 pcf for level and sloping backfill conditions, respectively.

To prevent the buildup of hydrostatic pressures, retaining structures should be well-drained. The standard of practice consists of placing a minimum 12-inch thick layer of free-draining gravel at the back of the wall. The gravel should extend from the base of the wall, around subdrains and/or weepholes, and up to within 12 inches of finish grade. Alternatively, prefabricated drainage geocomposites, such as Miradrain or J-drain, may be used in lieu of the free-draining gravel. As with the free-draining gravel, the drainage geocomposites should be placed at the back of the wall, be connected with the weepholes and/or subdrains (in accordance with manufacturer's specifications), and extend to within 12 inches of finish grade. For freestanding walls, the drainage system should be covered by at least 12 inches of low permeability soil, such as the onsite clayey silt.

Concrete Slab-On-Grade

The exploratory well concrete slab-on-grade should be underlain by a minimum 12 inches of granular fill with the upper six inches consisting of aggregate base course. The remainder of the fill should consist of granular structural fill. Overexcavation of the onsite clayey silt may be required for the placement of the granular fill section.

Prior to placement of the granular structural fill, the exposed subgrade should be sacrificed to a minimum depth of 6 inches, moisture conditioned to about 2 percent above optimum moisture content, and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557. The base course and structural fill should also be compacted to a minimum 95 percent compaction as determined as ASTM D 1557.

Gravel Pad

The gravel pad area should consist of a minimum 6 inches of base course underlain by a Tensar InterAx NX650 geogrid or approved equivalent may be used. The base course should also be compacted to a minimum 95 percent compaction as determined as ASTM D 1557.

Site Grading

Site Preparation - The project site should be cleared of all vegetation and other deleterious material. Prior to placement of fill, the exposed subgrade should be scarified to a minimum depth of 6 inches, moisture conditioned to about 2 percent above optimum moisture content, and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557.

Onsite Fill Material - The onsite clayey silt will be acceptable for use in compacted fills and backfills. Rock fragments larger than 3 inches in maximum dimension should be removed prior to reuse.

Hirata & Associates, Inc.

Import Fill Material – Imported structural fill should be well-graded, non-expansive granular material. Specifications for imported granular structural fill should indicate a maximum particle size of 3 inches, and state that between 8 and 20 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Granular structural fill should also have a minimum CBR value of 15 and a CBR expansion value less than 1.0 percent when tested in accordance with ASTM D 1883.

Compaction – Backfill consisting of cohesive soils, such as the onsite clayey silt, should be placed in horizontal lifts restricted to eight inches in loose thickness, and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557. Backfill consisting of cohesionless soils, such as the imported granular structural fill should be placed in horizontal lifts restricted to eight inches in loose thickness, and compacted to at least 95 percent compaction as determined by ASTM D 1557.

Fill placed in areas which slope steeper than 5H:1V should be continually keyed and benched as the fill is brought up in lifts.

Structural Excavations - Based on the bulk sample obtained during our site visit, our visual observations, and our past experience in the project area, we believe that excavations into the onsite soils can generally be accomplished using conventional excavating equipment.

Slope Gradients – All permanent cut and fill slopes should be constructed at gradients no greater than 2H:1V. Fill placed on slopes should be continually keyed and benched into the existing slope to provide stability for the new fill against sliding. Sliver fills placed on slopes should be avoided. Fill slopes should be constructed by overfilling and cutting back to the design slope gradient to obtain a well-compacted slope face.

We hope that the above is sufficient for your work at this time. Feel free to call us if you have any questions or need additional information.

6765.M01

Appendix C

Flood Hazard Assessment Report

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Flood Hazard Assessment Report

www.hawaiiinfip.org

Waimalu 217'

Property Information

COUNTY: HONOLULU
 TMK NO: (1) 9-8-046:013
 WATERSHED: WAIMALU
 PARCEL ADDRESS: 98-183 PUAALII STREET
 AIEA, HI 96701

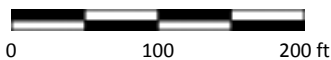
Notes:

Flood Hazard Information

FIRM INDEX DATE: NOVEMBER 05, 2014
 LETTER OF MAP CHANGE(S): NONE
 FEMA FIRM PANEL: 15003C0243H
 PANEL EFFECTIVE DATE: NOVEMBER 05, 2014

THIS PROPERTY IS WITHIN A TSUNAMI EVACUATION ZONE: NO
 FOR MORE INFO, VISIT: <http://www.scd.hawaii.gov/>

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
 FOR MORE INFO, VISIT: <http://dlnreng.hawaii.gov/dam/>



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

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

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND

(Note: legend does not correspond with NFHL)

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

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

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

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

OTHER FLOOD AREAS

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

Archaeological Literature Review and Field Inspection Report

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Draft
Archaeological Literature Review and Field Inspection
Report for the BWS Waimalu 217 Project,
Waimalu Ahupua'a, 'Ewa District, O'ahu
TMK: [1] 9-8-046:013

Prepared for
 The Limtiaco Consulting Group
 on behalf of the
 Honolulu Board of Water Supply

Prepared by
 Katherine I. Placher, Ph.D.,
 Scott A. Belluomini, B.A.,
 and
 Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai'i, Inc.
 Kailua, Hawai'i
 (Job Code: WAIMALU 4)

May 2022

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Management Summary

Reference	Archaeological Literature Review and Field Inspection Report for the BWS Waimalu 217 Project, Waimalu Ahupua'a, 'Ewa District, O'ahu, TMK: [1] 9-8-046:013 (Placher et al. 2022)
Date	May 2022
Project Number	Cultural Surveys Hawai'i, Inc. (CSH) Job Code: WAIMALU 4
Investigation Permit Number	CSH conducted the archaeological monitoring fieldwork under archaeological fieldwork permit number 22-02, issued by the Hawai'i State Historic Preservation Division (SHPD) per Hawai'i Administrative Rules (HAR) §13-13-282.
Agencies	SHPD; Honolulu Board of Water Supply (BWS)
Project Proponent	BWS
Project Funding	BWS
Land Jurisdiction	City and County of Honolulu (C&C)
Project Location	The project area is located at tax map key (TMK) [1] 9-8-046:013, which is the BWS Waimalu 217 facility at 98-183 Puaali'i Street. It is generally surrounded by residential neighborhoods with a natural drainage to the north. The project area is depicted on a portion of the 1998 Waipahu U.S. Geological Survey (USGS) topographic quadrangle.
Project Description	The BWS is evaluating an exploratory well at the existing Waimalu 217 reservoir facility.
Project Acreage	The project area comprises approximately 0.48 acres (0.19 hectares).
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. This document is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276.
Fieldwork Effort	Archaeological fieldwork was conducted on 17 March 2022 by CSH archaeologists Brittany Enanoria, B.A., and Lisa Manirath, M.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 1 person-day to complete.
Results Summary	Background research and previous archaeological studies in the project area vicinity indicate this portion of Waimalu was sparsely populated before Western Contact. Typically on upland tablelands, possible deposits associated with pre-Contact culture include sediments related

	<p>to dryland agriculture, temporary habitation, and midden remains. However, it is likely that any pre-Contact cultural deposits were destroyed by almost a century of commercial agricultural and ranching activities that affected the general vicinity, as well as the mid-twentieth century construction and development of the BWS reservoir and pumping station within the project area.</p> <p>There is an asphalt driveway leading into the BWS Waimalu 217 facility and a parking lot in the northern portion of the project area. In the central-southeast portion of the project area is the BWS reservoir well. There are a cinderblock retaining wall and concrete stairs on the northwest side of the reservoir well, and an electrical box is located on the north side. In the western portion of the parcel are a concrete and mortared basalt drainage culvert and concrete drain box which appear to be in disuse. All of the documented parcel elements are associated with the BWS Waimalu 217 facility. The facility is older than 50 years old and is thus a potential architectural historic property.</p>
<p>Recommendations</p>	<p>No modern archaeological studies have been previously conducted within the project area. Based on the results of the background research and field inspection, it is unlikely archaeological properties are present within the project area due to development of the BWS reservoir and pumping station in the mid-twentieth century. There is a low likelihood of subsurface remnants of pre-Contact and post-Contact agricultural or ranching deposits being present. The existing facility structures are older than 50 years old and potentially an architectural historic property.</p> <p>If no work is to be conducted on the present structures, then a determination (as per HAR §13-275-7) of “No historic properties affected” and no further historic preservation work is recommended. If the existing structures will be modified, then it is recommended that the BWS consult with the SHPD Architecture Branch regarding the project’s potential effect on architectural historic properties.</p>

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Section 1 Introduction

At the request of The Limtiaco Consulting Group on behalf of the Honolulu Board of Water Supply (BWS), Cultural Surveys Hawaii, Inc. (CSH) has prepared this archaeological literature review and field inspection (LRFI) report for the BWS Waimalu 217 Project, Waimalu Ahupua'a, Ewa District, O'ahu, TMK: [1] 9-8-046:013. The project area is located at the BWS Waimalu 217 facility at 98-183 Puaali'i Street. It is generally surrounded by residential neighborhoods with a natural drainage to the north. The 0.48-acre (0.19-hectare) project area is depicted on a portion of a 1998 Waipahu U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2019 aerial photograph (Figure 3).

The BWS is evaluating an exploratory well at the existing Waimalu 217 reservoir facility.

1.1 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. This document is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per Hawaii Administrative Rules (HAR) §13-13-276.

1.2 Environmental Setting

1.2.1 Natural Environment

The project area elevation is 55 meters (m) above mean sea level and is approximately 1.55 kilometers (km) northeast of Pearl Harbor East Loch. The hydrological features in the vicinity of the project area consist of the Waimalu Stream 200 m to the northwest. The annual rainfall in the vicinity averages 944.3 millimeters (mm) (37.2 inches) (Giambelluca et al. 2013). The annual mean temperature is 23.3°C (73.9°F) (Giambelluca et al. 2014).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area's soils consist of Lahaina silty clay, 3 to 7% slopes (LaB) and Lahaina silty clay, 7 to 15% slopes, severely eroded (LaC3) (Figure 4).

Lahaina soils are described as follows:

This series consists of well-drained soils on uplands on the islands of Lanai, Maui, Molokai, and Oahu. These soils developed in material weathered from basic igneous rock. They are nearly level to steep. [...] These soils are used for sugarcane and pineapple. Small acreages are used for truck crops, pasture, homesites, and wildlife habitat. The natural vegetation consists of bermudagrass, feather fingergrass, ilima, kiawe, lantana, oi, and uhaloa. [Foote et al. 1972:78]

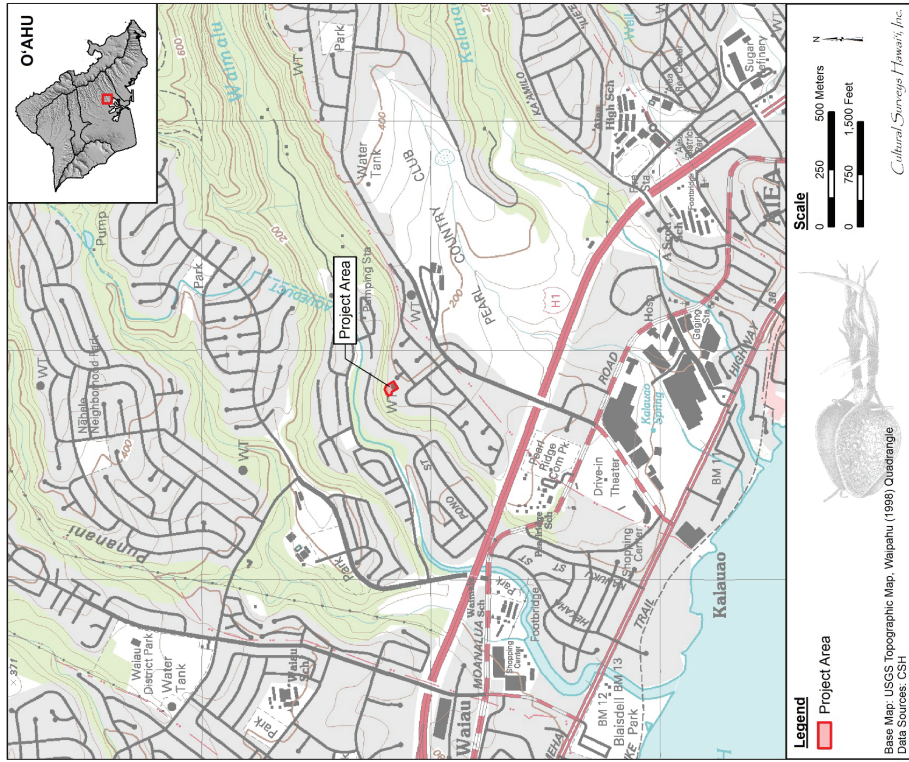


Figure 1. Portion of a 1998 Waipahu USGS 7.5-minute topographic quadrangle showing the location of the project area

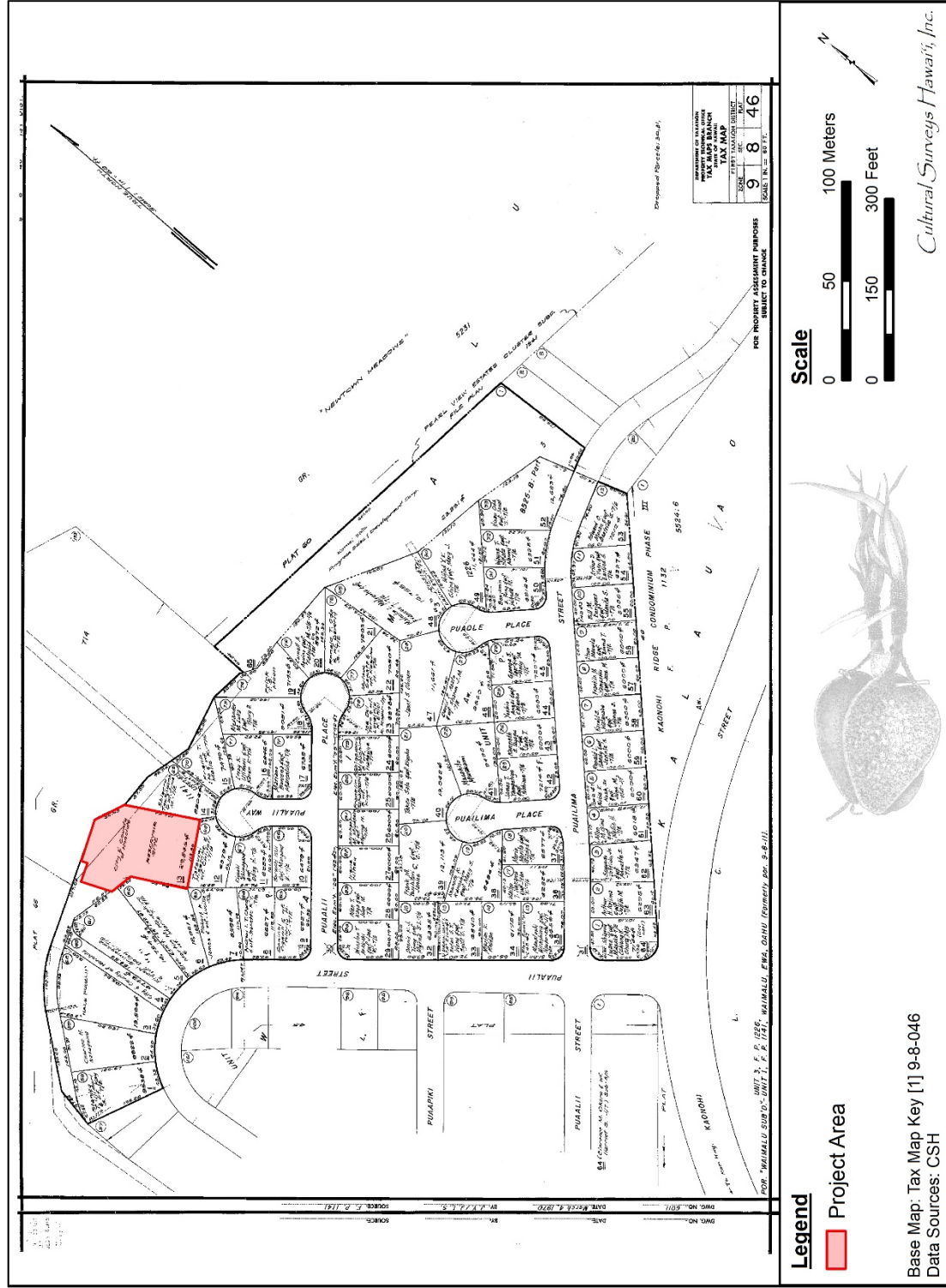


Figure 2. TMK: [1] 9-8-046 showing the location of the project area (Hawai'i TMK Service 2021)

LRFI for the BWS Waimalu 217 Project, Waimalu, 'Ewa, O'ahu

TMK: [1] 9-8-046:013



Figure 3. Aerial photograph of the project area (ESRI 2019)

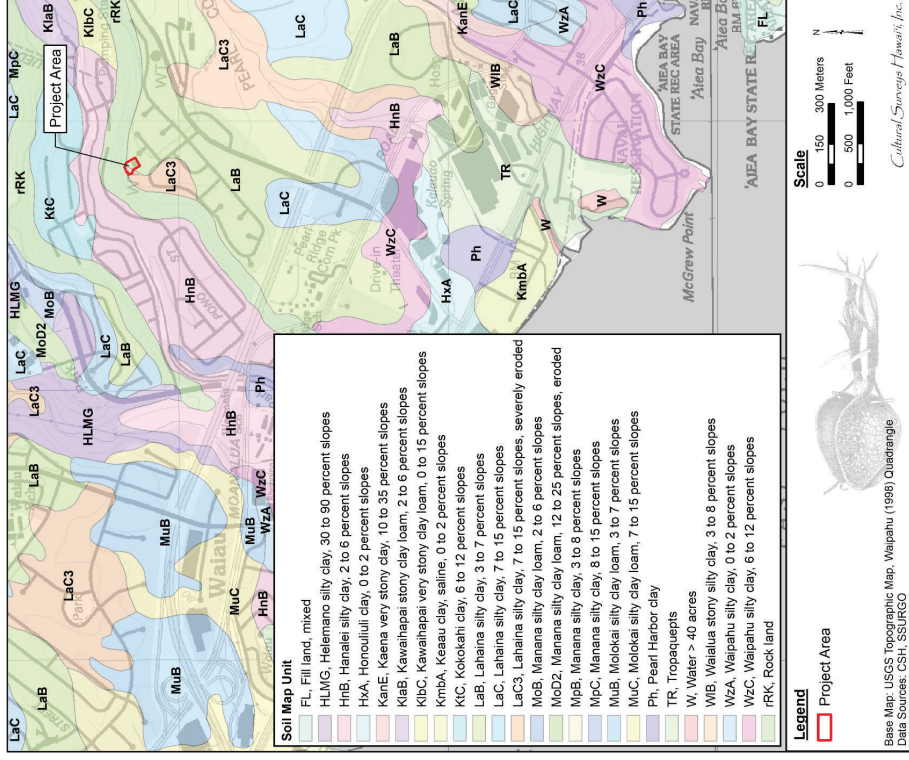


Figure 4. Portion of the 1998 Waipahu USGS topographic quadrangle with overlay of Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the project area

The vegetation in the vicinity of the project area consists primarily of landscaped green space associated with the residential development of the surrounding neighborhood and a variety of trees and undergrowth of the natural drainage to the north. Within the project area, the vegetation consists of grasses.

1.2.2 Built Environment

The built environment of the project area consists of the BWS reservoir well and its facilities. In the surrounding vicinity, the built environment consists of residential neighborhoods, streets, and utility infrastructure (see Figure 3).

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 22-02, issued by the State Historic Preservation Division (SHPD) pursuant to HAR §13-282. Fieldwork was conducted on 17 March 2022 by CSH archaeologists Britiany Enanoria, B.A., and Lisa Manirath, M.A., under the general supervision of Principal Investigator Hallett H. Hamnett, Ph.D. This work required approximately 1 person-day to complete.

In general, fieldwork included 100% pedestrian inspection of the project area, and GPS data collection.

2.1.1 Pedestrian Survey

A 100%-coverage pedestrian inspection of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps of two CSH archaeologists spaced 5 m apart. Archaeologists recorded the general characteristics of the project area, including vegetation, and took general photographs of the project area.

2.1.2 GPS Data Collection

Hand-held Garmin GPSMAP 64s were used to record the pedestrian survey transects. These handheld units provide horizontal accuracy between 3 and 5 m. GPS field data was post-processed, yielding horizontal accuracy between 0.5 and 0.1 m. GPS location information was converted into GIS shape files using Trimble's Pathfinder Office software, version 5.85, and graphically displayed using ESRI's ArcGIS 10.5. CSH utilizes the NAD83 HARN datum and UTM Zone 4N coordinate system.

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 Hawaii, the Hawaii State Archives, the Mission Houses Museum Library, the Hawaii Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawaii 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 Waihoia Aina database (2021).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Mythological and Traditional Accounts

The project area is located within the lower valley of Waimalu Ahupua'a, which is between the ahupua'a (traditional land divisions) of Kaluaao and Waiau in the traditional 'Ewa District ('Ewa Moku). In 1873, S.K. Kūhano wrote about ancient O'ahu land divisions, describing how the island was divided into six *moku*: Kona (present-day Honolulu), 'Ewa, Waia'anae, Waialua, Ko'olaupua, and Ko'olaupoko. These were further divided into 86 ahupua'a. Within 'Ewa, there were 12 ahupua'a: Hālawā, 'Aiea, Kaluaao, Waimalu, Waiau, Waimano, Mānana, Waiaua, Waipi'o, Waialele, Hō'ā'e, and Honouliuli (Kame'elehiniwa 1992:330). Modern maps and land divisions still generally follow the ancient system and use the same land divisions.

3.1.2 Nā Mo'olelo o 'Ewa: 'Ewa Traditions

Much about early Hawaiian life can be learned by examining the many *mo'olelo* (stories), both oral and written, which have been passed down through time. From *mo'olelo* come the names of places where events took place, as well as the people involved. A sense of environment and land use can also be learned from these *mo'olelo*, which can provide details about the past. The following are accounts of traditional references to the greater 'Ewa area. These accounts provide a sense of pre-Contact life in the vicinity of the current project area.

3.1.2.1 How 'Ewa Was Named

'Ewa literally means "crooked" or "unequal" (Pukui and Elbert 1986:42). Others interpret it as "strayed" in association with a story about the gods Kāne and Kamaloa, who threw a stone to determine the boundary of the district. The following account of the naming of 'Ewa comes from *Sires of O'ahu*:

When Kane and Kamaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waiaanae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by that name. The stone that strayed. [Sterling and Summers 1978:1]

There is an *ōlelo no'ea* (saying or proverb), 'Ewa: *'Āina koi 'ūla i ka lepo* ('Ewa, land reddened by the rising dust) (Pukui 1943:O.N. 2357). This refers to 'Ewa's reputation for being very dusty; during rainy seasons, the sea would be colored red from the red dirt and mud. 'Ewa, which means crooked or unequal (Pukui and Elbert 1986:42), was at one time the political center for O'ahu chiefs. An endearing name for 'Ewa was *'Ewa, ka āina o nā ali'i* or 'Ewa, land of chiefs, because it was a favorite residence of theirs (Sterling and Summers 1978:1). This was most likely due to its abundant resources that supported the households of the chiefs; in particular, this likely refers to the many fishponds around the lochs of Pu'uloa (Handy and Handy 1972:470).

3.1.2.2 Descriptions of 'Ewa

Handy and Handy (1972) relate the following about 'Ewa:

The salient feature of 'Ewa, and perhaps its most notable difference, is its spacious coastal plain, surrounding the deep bays ('lochs') of Pearl Harbor, which are actually the drowned seaward valleys of 'Ewa's main streams, Waialele and Waipi'o [...] The lowlands, bisected by ample streams, were ideal terrain for the cultivation of irrigated taro. The hinterland consisted of deep valleys running far back into the Ko'olaupua range. Between the valleys were ridges, with steep sides, but a very gradual increase of altitude. The lower parts of the valley sides were excellent for the culture of yams and bananas. Farther inland grew the 'awa for which the area was famous. The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the *wao*, or upland jungle, than was the case on the windward coast. Yet the *wao* here was more extensive, giving greater opportunity to forage for wild foods in famine time. [Handy and Handy 1972:469]

Except for the numerous varieties of shellfish and abundance of mullet, Handy and Handy describe 'Ewa as being similar to the rest of O'ahu:

In the interior was the same avifauna, including the birds whose feathers were prized for feather capes, helmets, and lei making. In fact this, with its spacious *wao* inland, was the region where these birds were most numerous. There were more extensive areas also where *wauke* and *mamaki*, which supplied bast for the making of tapa, grew in abundance. In fact, 'Ewa was famous for its *mamaki*. There was, too, much *olona* grown in the interior, and wild bananas and yams flourished. [Handy and Handy 1972:470]

'Ewa was also known for a special and tasty variety of *kalo* (taro, *Colocasia esculenta*) called *kāī* which was native to the district. In 1931, Handy collected four varieties: the *kāī 'ūla 'ūla* (red *kāī*), *kāī koi* (*kāī* that pierces), *kāī kea* or *kāī ke'oke'o* (white *kāī*), and *kāī uluili* (dark *kāī*). A *kama āina* (native) of 'Ewa described the *kāī kea* as being very fragrant. The *kāī ke'oke'o* made an exceptionally good *poi* and was said to be reserved for the *ali'i* (chiefs). An 1899 newspaper account said of the *kāī koi* that it "is the taro that visitors gnaw on and find it so good that they want to live until they die in 'Ewa. The *poi* of *kāī koi* is so delicious" (*Ka Loea Kāī āina* 3 June 1899). So famous was the *kāī* variety that 'Ewa was sometimes affectionately called *Kāī o 'Ewa* (Handy and Handy 1972:471).

3.1.2.3 Ke'awa Iau o Pu'uloa: The Many Harbors of Pu'uloa

Pu'uloa is the Hawaiian name for the area presently known as Pearl Harbor. Pu'uloa means "long hill" (Pukui et al. 1974:201) and specifically refers to "the rounded area projecting into the sea at the long narrow entrance of the harbor" (Handy and Handy 1972:469). Early nineteenth century visitors often referred to Pu'uloa as the "Pearl" or the "Pearl River" in reference to the pearl oysters that were so abundant there. Another poetic Hawaiian reference to the area is Awāwa Lei or "garland of harbors" (Pukui et al. 1974:201). In Hawaiian lore, Pu'uloa is where human beings are said to have landed first on the island of O'ahu. It is also said that there were many caves (*ka lua 'ōlohe*) of the *ōlohe* (warriors who plucked their hairs and greased their bodies and

were skilled in the art of *lua*, or bone-breaking and wrestling) in the surrounding area (Beckwith 1970:343).

Pu'uloa is also the home of the shark goddess, Ka'ahupahau, the sister of Kānehumamoku, Kamohoali'i, and Kahi'ukā, said to live in an underwater cave at the entrance to Pu'uloa Harbor. She was born of human parents, with light hair, and had the ability to change into shark form. Along with her brother, Kahi'ukā, they were both friendly to man and were not known as man-eating sharks. Their *kahu* (guardian) fed them daily and kept their backs scraped clean from barnacles. It is said that the chiefess Papiro proached the *kahu* for wearing a beautiful *lei pāpāhi* (wreath of flowers with a pattern of alternating groups of flowers and foliage in a repetitive design) of *'ilima* (*Sida fallax*), because the *'ilima* blossoms were sacred to Ka'ahupahau. Papiro wanted the *lei*, but the *kahu* refused to relinquish it. Papiro threatened the *kahu* with death, and Ka'ahupahau retaliated by killing Papiro. For this crime, Ka'ahupahau was tried and punished. Years later, when Ka'ahupahau got into some trouble, she received help from Kupiapiia and Laukahi'u, the sons of Kuhaimoana. Since that time, a *kaniwai* (law) was established that the waters of O'ahu from Pu'uloa to 'Ewa were protected from man-eating sharks by Ka'ahupahau and her brother, Kahi'ukā (Kamakau 1964:73; Beckwith 1970:138–139).

J. Gilbert McAllister (1933), who conducted an island-wide archaeological survey, noted fishponds were more numerous along the shore of Pearl Harbor than at any other location on O'ahu. Most of these ponds have since been destroyed. Pearl Harbor was also famous for the *pipi*, or pearl oysters, which were eaten raw. Along with being a popular delicacy, the *pipi* shells were also used as shanks for fishhooks. Some of the varieties of *pipi*, which were once abundant there, are *pāpaua*, *owā owāka*, *nahawele*, *kupakala*, *mahamoe*, *ōkaue*, and *ōlepe* (Handy and Handy 1972:470). The following passage tells the story of why the *pipi* of 'Ewa vanished and can no longer be found at Pearl Harbor:

The kahu of the sea and pipi lived at Palea. One day, a woman from Manana [Pearl City] went crabbing in the sea of Kaholona. The pipi were thick and plentiful there. As she thought no one was watching, she grabbed some pipi at the same time as she reached for crabs. She was found out and her hūlilau gourd container was broken and thrown into the sea. The kahu also fined her 25 cents. The woman consented to pay the fine saying, 'The money is at home.' So the kahu went home with her to get the quarter. He knotted it in a flap of his malo and returned to Palea. When he reached his home, he discovered that he had lost the quarter and he was very disappointed.

Kanekuana was the famous mo'ō [lizard] god of 'Ewa and it was Kanekuana who was credited with bringing the pipi to Puuloa from Kahiki. Continuing the story, the kahu, after returning to Palea, became possessed by Kanekuana. The mo'ō god said to those in the house, 'I am returning to Kahiki and am taking all the pipi with me. They will not return until all the descendants of this woman are dead. Only then shall the pipi be returned. I go to sleep. Do not awaken my medium until he wakes up of his own accord.' The kahu slept for four days and four nights. During that time, the pipi vanished from all the places where they were once so abundantly found. To this day, they have not returned to the shores of Puuloa. [Ka *Loea Kāla'i* 'Aina 3 June 1899]

In 1870, the *pipi* could still be found at Pu'uloa (Handy and Handy 1972:471); therefore, it was sometime between 1870 and 1899, when the above story was published, that the *pipi* disappeared from Pu'uloa.

3.1.2.4 'Ewa as a Political Center

There are many documented references to the chiefs of 'Ewa that support Handy's statement (Handy and Handy 1972:470) regarding 'Ewa as a former political center on O'ahu. Oral accounts of chiefs and chiefesses recorded by noted Hawaiian historian Samuel Kamakau date back to at least the twelfth century. He related the following:

The chiefs of Lihū'e, Wahiawā, and Halemano on O'ahu were called *lō ali'i*. Because the chiefs at these places lived there continually and guarded their kapu, they were called *lō ali'i* [from whom a "guaranteed" chief might be obtained, *lōa'i*]. They were like gods, unseen, resembling men. [Kamakau 1991:40]

Kalani-mauiā, an *ali'i kapu* chiefess (one with sacred taboos attached) who lived *māzika* (inland) at Wahiawā, was born at Kūkamilo, at Kapu'ahu'awa in AD 1100. It is recorded that her *piko* (navel cord) was cut at Ho'olomo-pahu Heiau. When she was grown, she was taken to Kalaualo, where she made her home at Kūki'i'ahu, and where she continued to live even after becoming ruler of the kingdom. She was well-loved by the people, chiefs, and commoners alike, and hers was a reign of peace. She did not levy taxes upon the people, and the island of O'ahu was made productive through cultivation (Kamakau 1991:57).

Another account speaks of the reign of Mā'ili-kūkahi, an *ali'i kapu* who was born at Kūkamilo in Wahiawā around the fourteenth century (Pukui et al. 1974:113). Upon consenting to become *mō'ī* (king) at the age of 29, he was taken to Kapukapu-ākea Heiau at Pa'ala'a-kai in Waialua to be consecrated. Soon after becoming king, Mā'ili-kūkahi was taken by the chiefs to live at Wai'iki'i. The story tells us he was probably one of the first chiefs to live there. Up until this time the chiefs had always lived at Waialua and 'Ewa. Under his reign, the land divisions were reorganized and redefined. In reference to the productivity of the land and the population during Mā'ili-kūkahi's reign, Kamakau writes the following:

In the time of Mā'ili-kūkahi, the land was full of people. From the brow, lae, of Kūlihemō to the brow of Maunama in 'Ewa, from the brow of Maunama to the brow of Pu'ukea [Pu'u Ku'ua] the land was full of chiefs and people. From Kānewai to Halemano in Wai'aluā, from Halemano to Paupali, from Paupali to Hālawā in 'Ewa the land was filled with chiefs and people. [Kamakau 1991:55]

The picture presented here is that the entire *moku* of 'Ewa, including Waimalu, was prosperous, productive, and densely populated.

'Ewa continued to be a political center until the eighteenth century, when Kahahana, a Maui chief, was chosen by the O'ahu chiefs to rule over the island. Somewhere between 1783 and 1785, Kahahana was killed by Kahekili of Maui. Kahahana's father 'Elani, along with other O'ahu chiefs, plotted to kill Kahekili and his chiefs who were residing at Kailua, O'ahu, as well as at 'Ewa and Waialua. The plot was discovered by Kahekili and a messenger was sent to warn Hū'eu at Waialua. For some reason, the messenger never reached Hū'eu and he and his retinue were killed. This slaughter became known as the *Waipi'o Kūmopō*, or the Waipi'o assassination, because it originated there. Kahekili avenged the death of Hū'eu by pillaging and destroying the districts

of Kona and 'Ewa. It is said that the streams of Makaho and Niuhelewai in Kona, as well as Hō'ae'ae in 'Ewa, were choked with the bodies of the slain. It was during this time that the O'ahu chiefly lines were nearly exterminated. It is said that one of the Maui chiefs, Kalaikoa, used the bones of the slain to build a wall around his house at Lapakea in Moanalua. The house was known as Kauwailua and could be seen as one passed by the "old upper road to 'Ewa" (Fomander 1996:226).

With the introduction of trade and foreign goods, along with Kamehameha's unification of the islands, attention shifted to Kou (old name for Homolūlu, used until about 1800) (Pukui et al. 1974:117), which had a deep enough harbor for ships to pull in and anchor. Kou became the center of activity as royalty moved away from the outer districts toward the center of commerce. The general populace also moved away from the rural areas as they, too, became dependent on a cash economy.

3.1.2.5 Waimalu Ahupua'a

Waimalu Ahupua'a extends from the East Loch of Pearl Harbor to the crest of the Ko'olau Range, generally following Waimalu Stream. The word "Waimalu" literally translates to "sheltered water" (Pukui 1974:225), likely in reference to the numerous fishponds as well as Pearl Harbor. The offshore island of Mokū'ume'ume (Ford Island) was considered part of Waimalu Ahupua'a. McAllister (1933:102) indicates the place name means "Isle of Strife" from the fact that among former chiefs, it was the center of contention over certain fishing rights. Pukui et al. (1974:156) state that the island was named for the *'ūme*, a sexual game that was once played on the island.

There are a few legendary accounts that reference or are situated in Waimalu Ahupua'a. The legend of Māihea tells of a visit by the gods Kāne and Kāmaloa, where the gifts of abundant natural resources and spiritual knowledge were given to the people of Waiawa and Waimalu:

Māihea, a man, resided at Waimalu at a place called Pūnalo. He cultivated sweet potatoes, taros and planted awa. The place where he planted the awa was on a hill in the upland of Waiawa. This is what he did up to the time when the gods [Kane and Kāmaloa] came to earth. He chewed the awa, cooked young taro leaves and strained the awa into coconut shells that had been polished till they shone. With the awa in cups, the taro greens in a dish made of gourd, and sweet potatoes in a shallow calabash, he called on the gods whose names he did not know, "O unknown gods of mine, here is awa, taro greens and sweet potatoes raised by me, Māihea, the great farmer. Grant health to me, to my wife, and to my son. Grant us mana, knowledge and skill. Amama, it is freed." The he drank the awa. He did this a long time without knowing of the gods upon whom he called. This was the result he received without others knowing because of this prayer of his to be granted mana and knowledge. The two gods sent a large fish, a whale, which came up at the sea of Waimalu, below Paākea [...]. As Ula-a-Māihea, the son went down to the beach, he came to where the beach was covered with children and adults. Because he saw the children climb up on the fish, he did likewise, but when he got onto it, it began to move. It had waited for him for about four weeks and when the person it was sent to fetch was on it, it moved out slowly [...]. The children cried out, "Ula-a-Māihea is taken away!" The fish and the burden it bore passed on to Kahiki. There Ula-a-Māihea

was trained in priestly lore and all of its arts through the instructions of these gods, Kane and Kāmaloa. [*Ka Loea Kālai'āina* 1 July 1899 in Sterling and Summers 1978:5]

The legend continues with the gods Kāne and Kāmaloa revealing themselves to Māihea: [...]. 'The gods to whom you pray are ourselves and none else.' Māihea heard this, was startled at these words, but Kane continued, 'We are they upon whom you call and in the future call us by name. I am Kane and this is Kāmaloa. Call us by these names after this.' This was the beginning of the travels of these gods on earth and this was also the time when the boundaries of 'Ewa were made as I told you when I mentioned Pohaku-pili. On their return after dividing the land, they came to the top of Hauupu (that is the present site of the Kahikouanani Church at Waiawa), they turned to look at 'Ewa and when they saw the fish ponds at Waiawa, they said, 'May the fish ponds down at Waiawa be as the stars in the sky above. May there be mullets a Kuhia-loko, fine sea weeds at Kuhia-waho, salt at Nīnauēle, the single fruited coconut at Hapenui, the taro greens at Mokaalika and the water of Kaaimalu, to remove the bitterness of the awa of Kalahikuola.' This was the last thing they did before returning to Māihea's house. They drank awa again that afternoon. They spent the remainder of the day going to Puuloa. The result of this was that Māihea obtained the knowledge of the priesthood, oratory and so on. This was the first time that these arts were practiced here in Hawaii. [*Ka Loea Kālai'āina* 1 July 1899 in Sterling and Summers 1978:5-6]

Another account situated in Waimalu Ahupua'a is told by King Kalākaua who relates a story of Naulu-a-Māihea, a well-known prophet who resided in Waimalu:

At that time there lived at Waimalu, in the district of 'Ewa, the celebrated priest and prophet Naulu-a-Māihea. No one in the Hawaiian priesthood of the past was ever more feared or respected. It was thought by some that he had visited the shadowy realms of Mīlu, and from Paliuli had brought back the waters of life. He must have been well on in years, for, as already mentioned, he is credited with having been the priest of Laa-mai-kahiki on the romantic journey of that prince from the southern islands.

In evidence of the great sanctity of Naulu, tradition relates that his canoe was upset during a journey from Waianae, Oahu, to Kauai. He was swallowed by a whale, in whose stomach he remained without inconvenience until the monster crossed the channel and vomited him up alive on the beach at Waiāluā, Kauai, the precise place of his destination. At another time, when crossing to Hawaii, and beset with adverse winds, two huge black sharks, sent by Mōoatini, the shark-god of Molokai, towed him to Kohala so swiftly that the sea-birds could scarcely keep him company.

He built a heiau at Waimalu, the foundations of which may still be traced, and in the inner temple of the enclosure it is asserted that Lono conversed with him freely; and at his bidding the spirits of the living (kahaoka) as well as the shades of the dead (unihipihi) made their appearance; for it was believed by the ancient Hawaiians that the spirits or souls of the living sometimes separated themselves from the body

during slumber or while in a condition of trance, and became visible in distant places to priests of especial sanctity. [Kalākaua 1990:169–170]

According to ʻĪʻĪ, Waimalu was also the residence of one of Kamehameha I sons, Kīnaʻu, as well as Kīnaʻu's people and one of his chiefs: "In late 1803 or early 1804, while he was living with the chiefs at Halaalāni, Waipio, ʻEwa, the king became ill. At this time, Kīnaʻu, his people, and one of the chiefs—either Kelīmaikai or Kalāimamalu— were residing at Wamalu" (ʻĪʻĪ 1959:33).

A few descriptions of the lands and agricultural practices of Waimalu are provided by historic accounts. One vivid description of the lowland section of Waimalu Ahupuaʻa was recorded by E.S. Handy in *The Hawaiian Planter*:

The extensive flats between East Loch of Pearl Harbor and the present highway were formerly developed in terraces irrigated from Waimalu Stream and Waipi spring, which is east of Waiau Pond. There are banana groves here now. Terraces also covered the flats extending three quarters of a mile above the highway into Waimalu Valley, and there were small terrace areas several miles upstream beyond these flats. [Handy 1940:81]

The extensive taro flats of Waimalu and the adjoining *ahupuaʻa* of Waiau and Kalāuau are also mentioned in John Papa ʻĪʻĪ's *Fragments of Hawaiian History*. In it he describes a trail passing through this area. This trail was just *matika* of the floodplains near Pearl Harbor, skirting the inland edges of the productive taro fields.

There the trail led to the taro patches in ʻAiea and up the plain of Kīkīʻiahu. Just below the trail was the spot where Kāʻeo, chief of Kāuaʻi, was killed by Kalanikūpule. From there the trail went along the taro patches to the upper part of Kohokohe and on to Kahuewai, a small waterfall. On the high ground above, a little way on, was a spring, also a favorite gathering place for travelers. From there it continued over a small plain down the small hill of Waimalu, and along the taro patches that lay in the center of the land. [ʻĪʻĪ 1959:95]

3.1.3 Early Historic Period

During the first decades of the nineteenth century, western visitors begin to describe the ʻEwa landscape above Pearl Harbor as it had been developed by the Hawaiians by the early decades of Western Contact. Archibald Campbell, travelling through ʻEwa in 1809, recorded the following:

We passed by footpaths winding through an extensive and fertile plain, the whole of which is in the highest state of cultivation. Every stream was carefully embanked, to supply water for taro beds. Where there was no water, the land was under crops of yams and sweet potatoes. The roads and numerous houses are shaded by cocconut trees, and the sides of the mountains are covered with wood to a great height. [Campbell 1967:103]

The botanist F.J.F. Meyen, visiting in 1831, confirms the profusion described by Campbell:

At the mouth of the Pearl River the ground has such a slight elevation that at high tide the ocean encroaches far into the river, helping to form small lakes which are so deep, that the long boats from the ocean can penetrate far upstream. All around these water basins the land is extraordinarily low but also exceedingly fertile and

nowhere else on the whole island of Oʻahu are such large and continuous stretches of land cultivated. The taro fields, the banana plantations, the plantations of sugar cane are immeasurable. [Meyen 1981:63]

A contrasting picture of ʻEwa is recorded in the missionary William Ellis' description from 1823–1824 of the ʻEwa lands away from the coast:

The plain of Ewa is nearly twenty miles in length, from the Pearl River to Waiaua, and in some parts nine or ten miles across. The soil is fertile, and watered by a number of rivulets, which wind their way along the deep water-courses that intersect its surface, and empty themselves into the sea. Though capable of a high state of improvement, a very small portion of it is enclosed or under any kind of culture, and in travelling across it, scarce a habitation is to be seen. [Ellis 1963:7]

3.1.4 The Māhele and the Kuleana Act

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 *aliʻi* received their land titles. *Kuleana* awards for individual parcels within the *ahupuaʻa* were subsequently granted in 1850. These awards were presented to tenants comprising Native Hawaiians, naturalized foreigners, non-Hawaiians born in the Islands, or long-term resident foreigners who could prove occupancy on the parcels before 1845. Waimalu was awarded to the *aliʻi* Miriam Kekauʻōnohi in the Māhele (LCA 11216) (Figure 5). Fifteen other *ʻili* (or half an *ʻili*) were awarded to *aliʻi* as *konoʻihiki* awards, but only ten were retained.

In all, 93 people claimed land in Waimalu, and 63 claims were awarded. Of these awards, most were within 500 m of the coast and only two were within the valley: LCA 70 located 250 m to the southwest of the current project area and LCA 8525B in the upper valley (Figure 6). LCA 70 was awarded to Waiaha and the records indicate the land was used for a house lot. According to the Waiohona ʻAina database (2021), LCA 8525B was not awarded and there is no land use information for this record. While no LCAs are located within the current project area, a Land Grant (Grant 714) that partially encompasses the project area was awarded to Kuohao. According to the 1899 Monsarrat map (Figure 7), the parcel's land use included banana cultivation.

3.1.5 Mid- to Late 1800s

Coulter (1931) provides a general visual estimation of the native population of Oʻahu and its distribution on an 1853 map of Oʻahu (Figure 8). The ʻEwa District is shown to have a sizeable population, primarily concentrated along the coastline. The current project area is located amongst the population clusters depicted on this map and there are no clusters shown in the upper portion of the valley. While this map provides a generalized depiction of the Oʻahu population in the mid-1800s, it does not give a sense of the population decline that had been occurring since Western Contact.

Censuses taken by Protestant missionaries throughout the Hawaiian Islands beginning in 1831 provide the earliest record of the size of the native population after the first decades of Western Contact. In the 1831–1832 census of Oʻahu, a population of 4,015 was recorded within the ʻEwa district. Four years later, in 1836, the ʻEwa population had dropped to 3,423 (Schmitt 1973:9, 36).

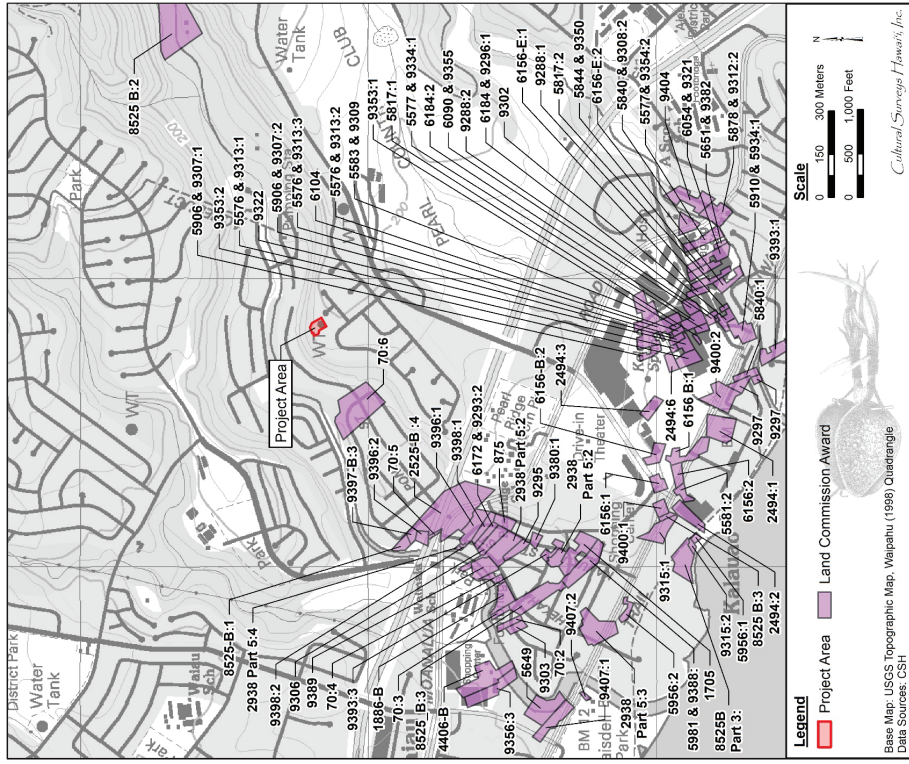


Figure 5. Portion of the 1894 Kanakanui map (RM 1739) showing the location of the project area within LCA 11216

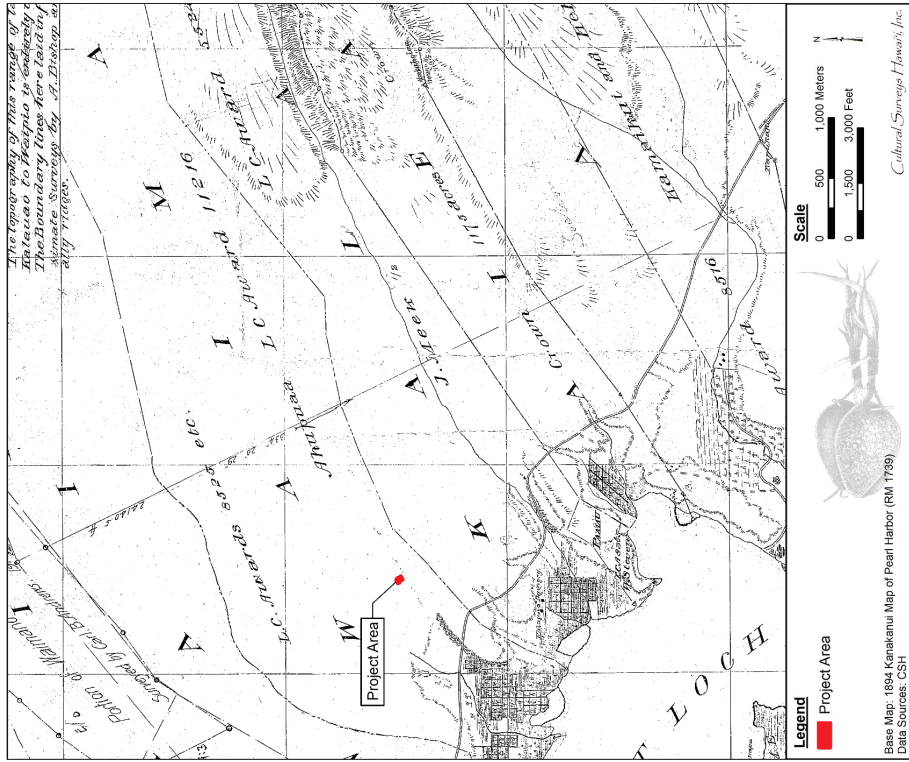


Figure 6. Portion of the 1998 Waipahu USGS topographic quadrangle showing the location of LCAs in the general vicinity of the project area

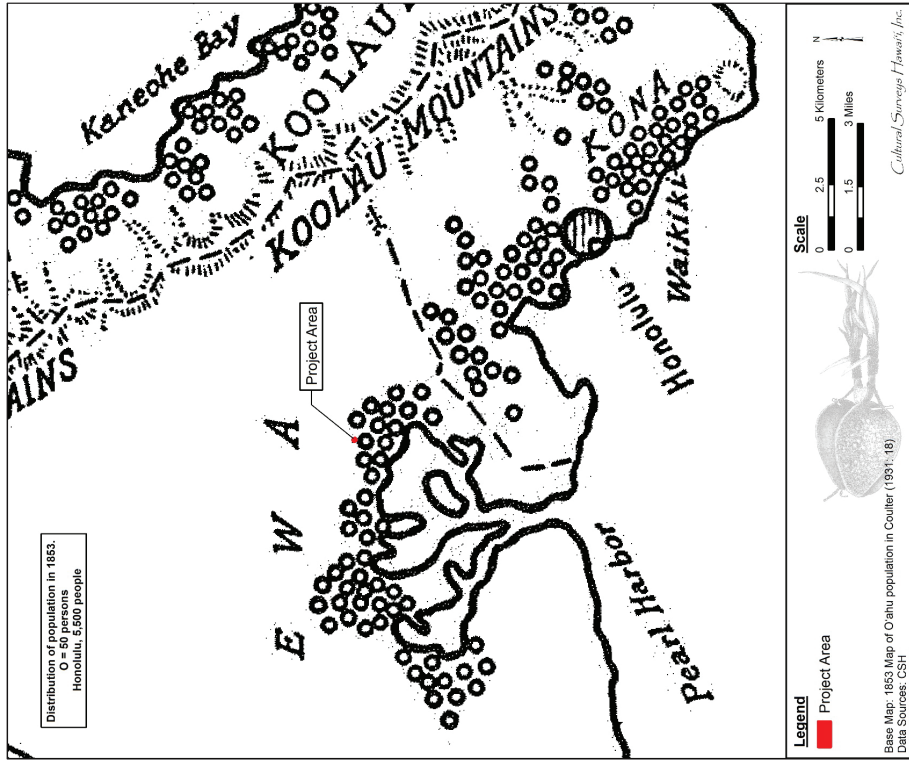


Figure 8. Portion of an 1853 map showing the distribution of O'ahu's population (in Coulter 1931:18)

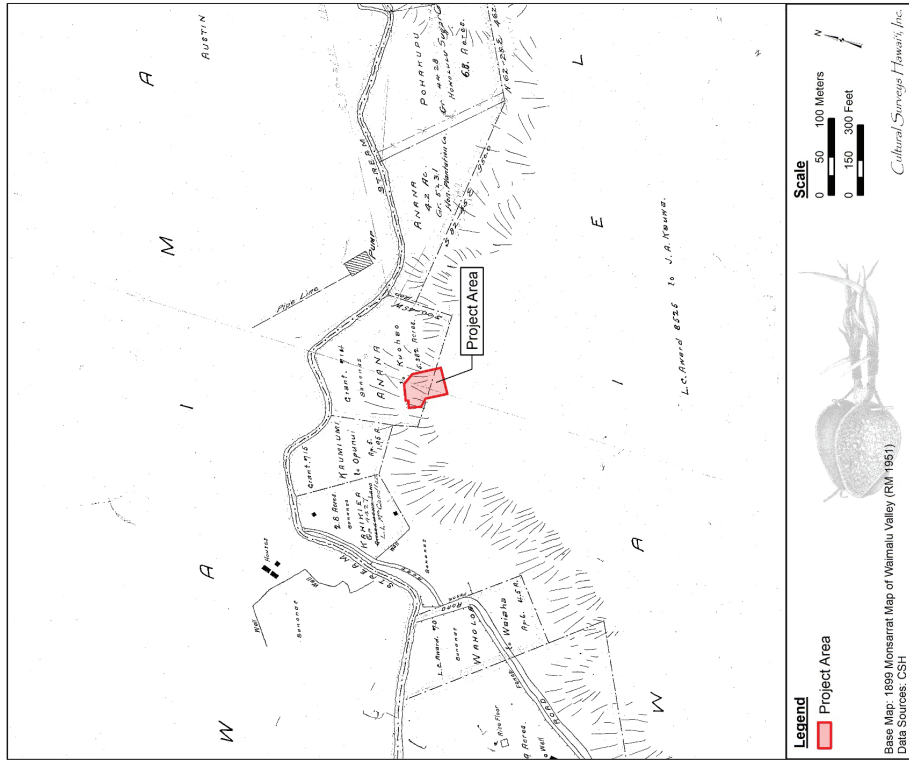


Figure 7. Portion of the 1899 Monsarrat map (RM 1951) showing the location of the project area within Land Grant 714; note the parcel is labeled as being used for banana cultivation

The census for O'ahu in 1850 was 25,440, which shows a decline of 14.5% over 18 years. These population declines have been attributed to several factors, including disease, high infant mortality, and low fertility rates due to sexually transmitted diseases (Schmitt 1973:15). The decline observed in individual districts is also probably due to people moving away from rural areas closer to Kou (Honolulu), which was the center of trade and economic activity. On the island of O'ahu, a decrease in the population statistics is seen almost yearly until 1884 when the figures show an increase from then on into the twentieth century (Schmitt 1977:11). The increase is probably related in part to the growth of the sugar industry and the imported labor that was needed to work the plantations.

In many *ahupua'a*, the lands that were not claimed by *kuleana* claimants were leased out to entrepreneurs who started ranching and sugar plantations on a large scale (Condé and Best 1973). As the sugar industry throughout the Hawaiian kingdom expanded in the second half of the nineteenth century, the need for increased numbers of field laborers prompted passage of contract labor laws. The first Chinese laborers arrived in Hawai'i in 1852 under contract to work on sugar plantations. As the demand for *kalo* declined and the importation of Chinese laborers to the west coast of California and Hawai'i increased, a market for rice developed. *Lo'i* lands were ideal for growing rice and as these lands lay in disuse and became more available, the Chinese farmers snatched them up. Most of the land was "near sea level—undrained areas at the mouths of streams; lowlands, which could be reclaimed without great expense" (Coulter and Chun 1937:11). The Royal Hawaiian Agricultural Society encouraged rice as a new crop, and the first rice harvest occurred in 1862. By the mid-1860s many of the *lo'i* on O'ahu had been transformed into rice fields. By 1892, there were approximately 76 acres of land planted in rice in the lowlands of 'Aiea and Kalaeloa (Coulter and Chun 1937:21).

3.1.6 1900s and Contemporary Land Use

By the early 1900s, the *makai* (seaward) portion of Waimalu Ahupua'a was leased to the Honolulu Plantation Company (formerly the Honolulu Sugar Company). The plantation lands can be seen on early historic maps such as the 1906 Donn map (Figure 9). Several historic maps show the plantation's railroad extending up through the current project area in the early 1900s (Figure 10 through Figure 12); some of the later maps show the railroad extending along the northwest side of the project area (Figure 13 through Figure 15). The plantation's railroad ran roughly parallel to the coast approximately in the location of the Interstate H-1. The plantation expanded along the northern inshore and upland areas of Pearl Harbor. The expanse of the Honolulu Plantation Company lands extended from 'Aiea westward as far as Mānana and Waiawa streams. Additionally, several land sections lay southeast of Pearl Harbor, where the present Honolulu International Airport and Hickam Air Force Base are located (Klieger 1995).

By the early 1900s, virtually all of the 'Ewa plains had been transformed and planted in sugarcane. In spite of this, the Honolulu Plantation Company kept expanding until the sugar harvest peaked in 1920 (Klieger 1995:93). By the mid-1930s, the Honolulu Plantation Company had more than 23,000 acres of land leased in and around 'Aiea. Sugarcane planting also extended seaward and a sugar plantation community developed at Pu'uloa Camp ca. 1930. In 1935, the U.S. government acquired 625 acres of cane fields in order to build Hikeam Field. With the onset of World War II, the company lost more lands to military operations, roads, and developing

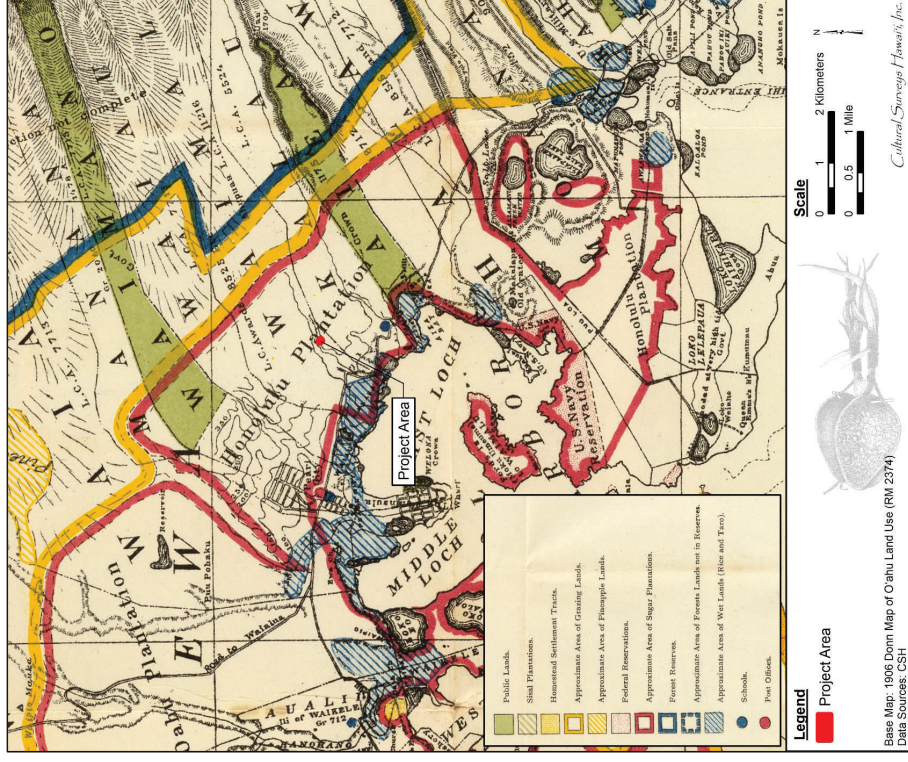


Figure 9. Portion of the 1906 Donn map (RM 2374) showing the location of the project area within the Honolulu Plantation lands

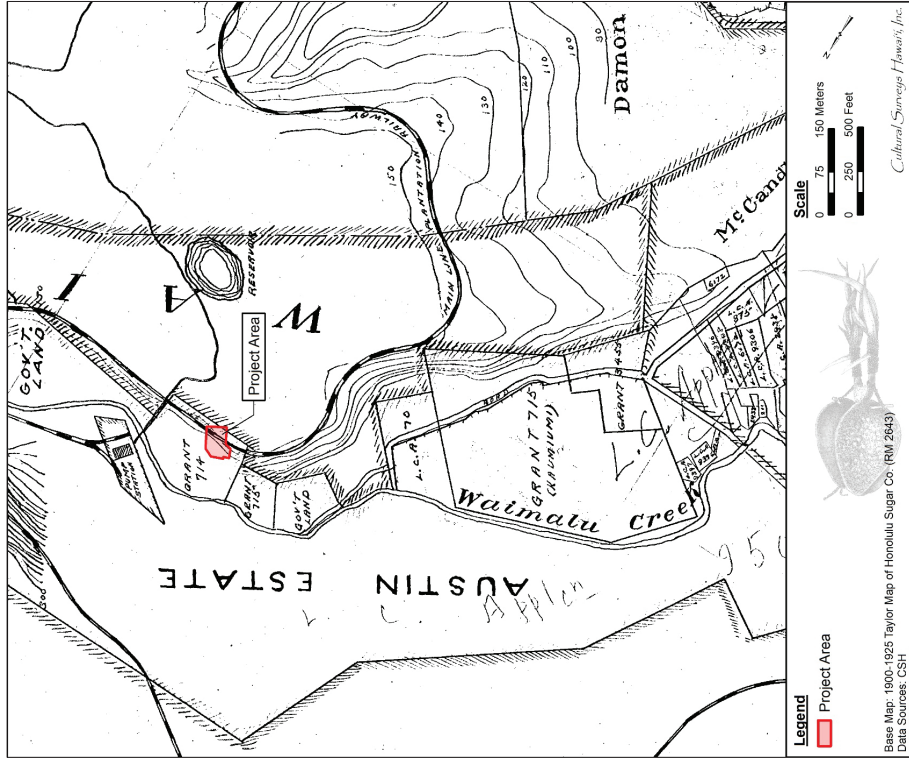


Figure 10. Portion of the 1900–1925 Taylor map (RM 2643) showing the location of the project area within Land Grant 714; note the plantation railroad extending through the project area

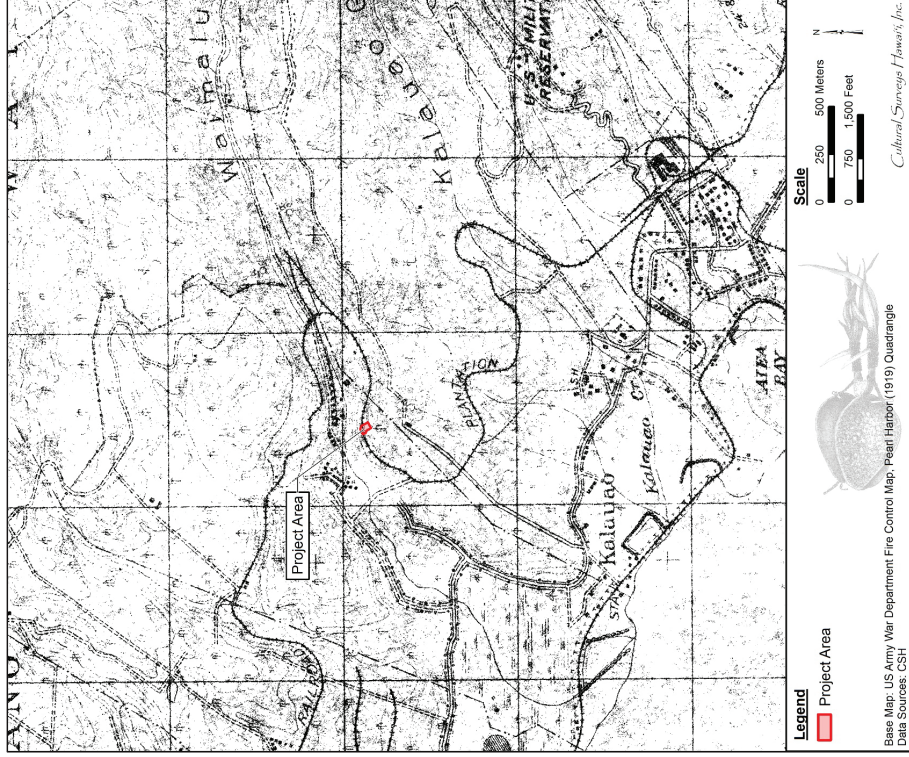


Figure 11. Portion of the 1919 U.S. Army War Department fire control map, Pearl Harbor quadrangle showing the location of the current project area; note the plantation railroad extending through the project area

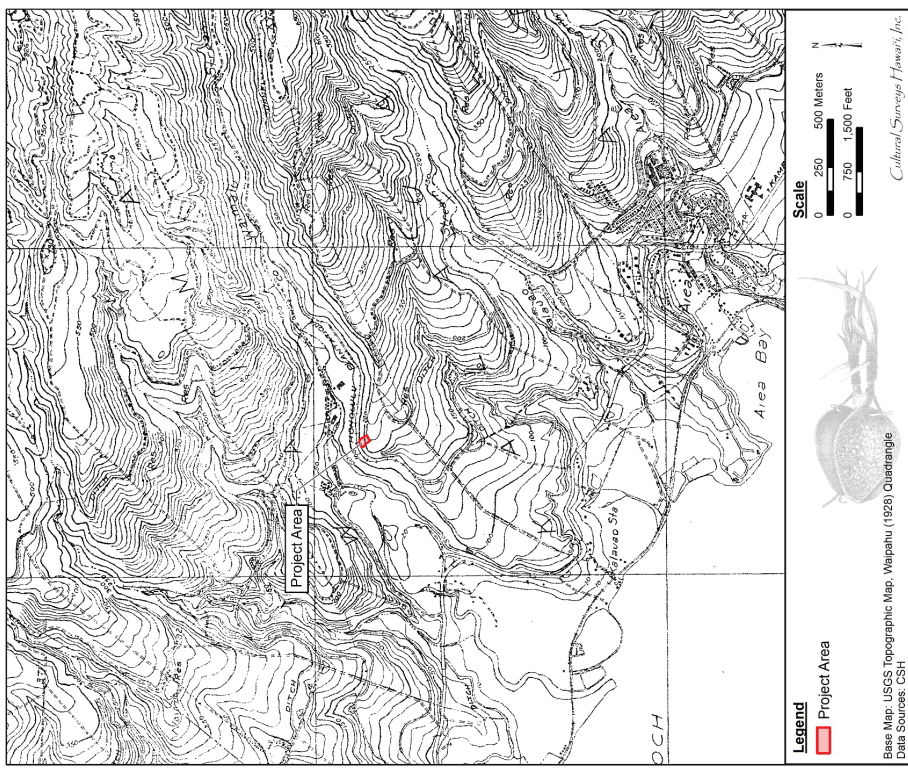


Figure 13. Portion of the 1928 Waipahu USGS topographic quadrangle showing the development of the current project area; note the plantation railroad is now depicted to the northwest of the project area

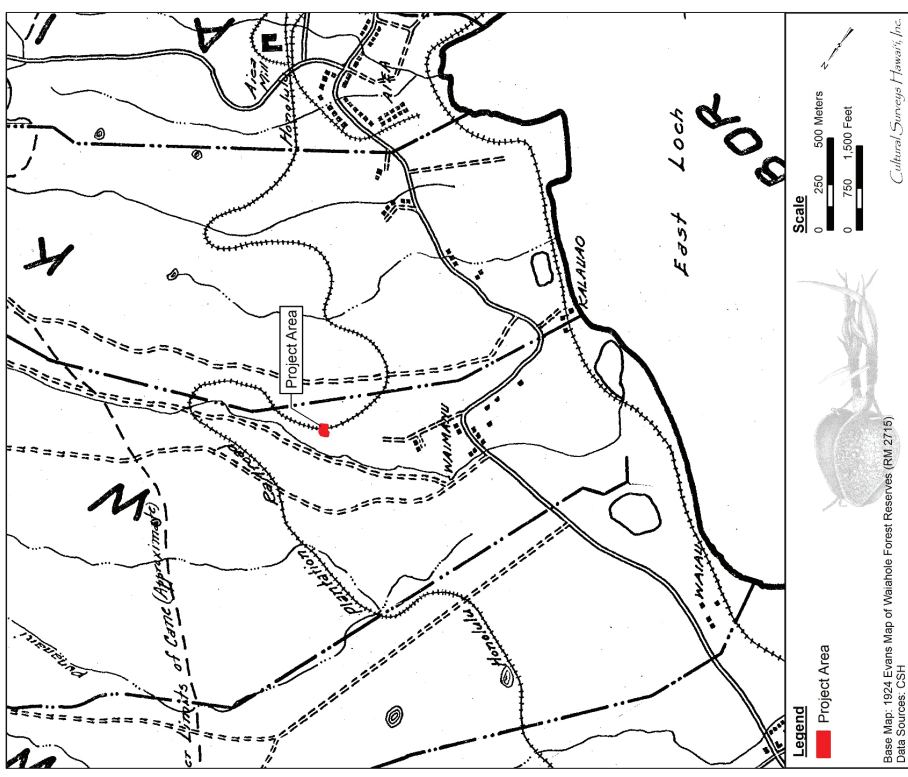


Figure 12. Portion of the 1924 Evans map (RM 2715) showing the location of the project area within the Honolulu Plantation lands; note the plantation railroad extending through the project area

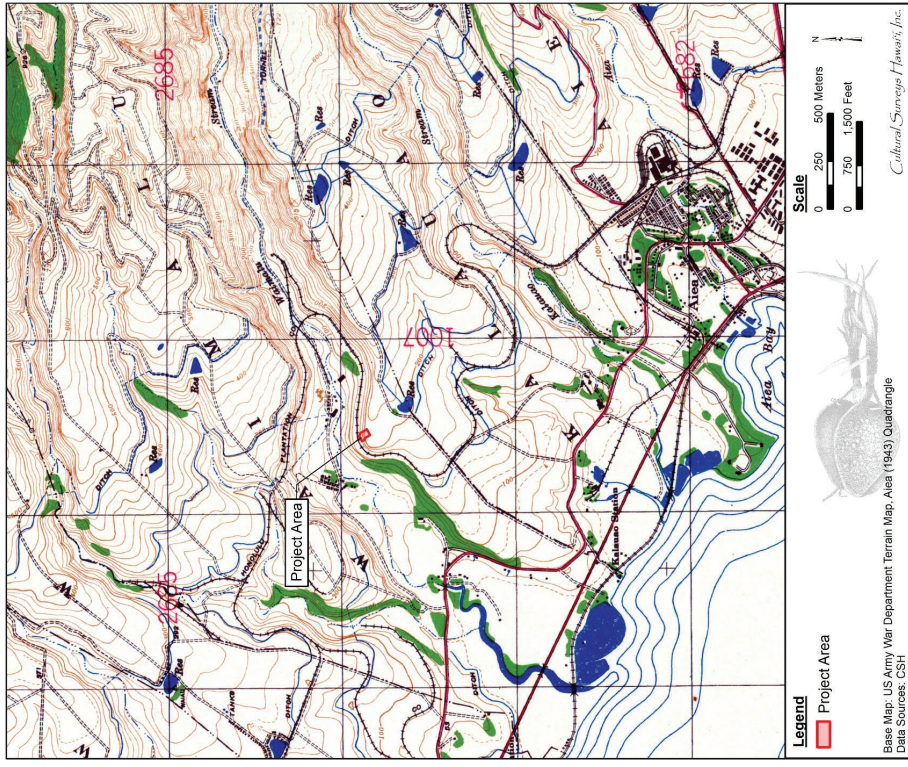


Figure 15. Portion of the 1943 Aiea U.S. Army War Department terrain map showing the development of the vicinity of the current project area; note the plantation railroad to the northwest of the project area

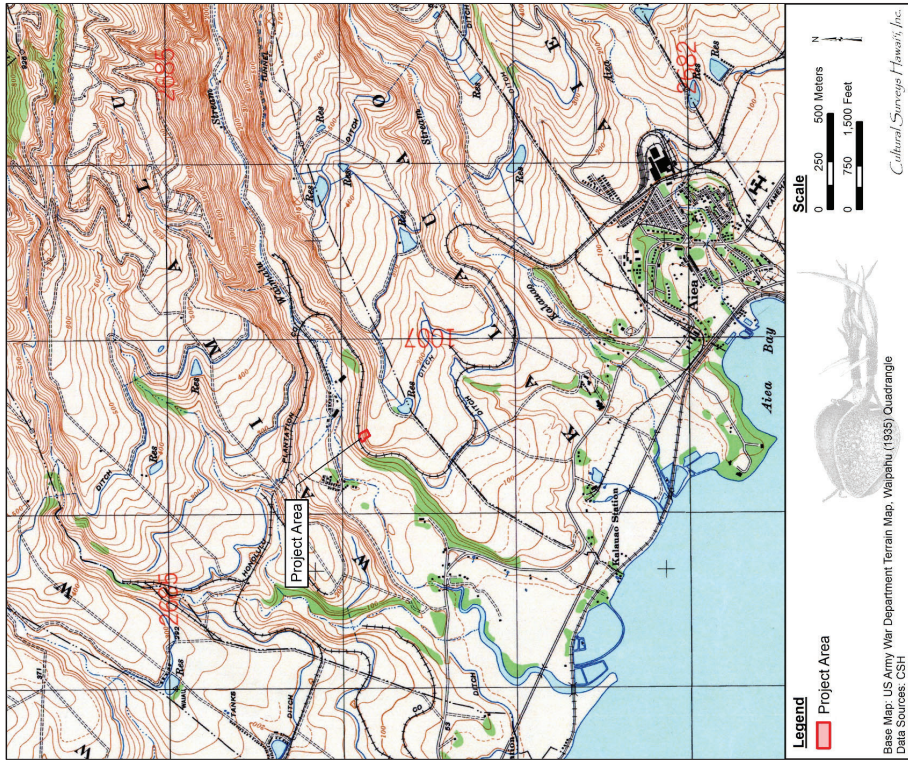


Figure 14. Portion of the 1935 Waipahu U.S. Army War Department terrain map showing the development of the vicinity of the current project area; note the plantation railroad to the northwest of the project area

commercial and housing areas. In 1942, the army built a lookout tower atop the sugar refinery, which it manned for the next three years. In 1944 and 1945, despite having lost nearly 50% of its land, the company supplied the mid-Pacific area with 70,000 tons of white sugar. Two years after the war, plantation operations were discontinued. The Honolulu Plantation went bankrupt and the plantation was sold to the Oahu Sugar Company.

In 1901, the U.S. Navy had begun condemning the Hālaawa lowlands in order to build the naval base at Pearl Harbor. Pearl Harbor had been the focus of American interests in the Hawaiian Islands for many decades prior to annexation. Following annexation in 1898, and with an eye on the need to establish a coaling station for American warships running to the Philippines and beyond, improvements at the Pearl Harbor entrance were a major concern. Some 429 acres purchased from Queen Emma Kaleleonalani for \$28,285 were developed as Fort Upton (changed to Fort Kamehameha in 1909). An additional 400 acres were purchased from the Daimons in 1911. In 1908, the Navy undertook the dredging of the Pearl Harbor channel, blocked by a shallow sand bar that had greatly restricted earlier development efforts. Much of the material from this and later dredging efforts was used to fill in low-lying lands. Five separate coastal defense batteries were built (including Battery Selfridge and Battery Hawkins). The Fort Kamehameha post housed Hawaii's first aviation unit in 1917–1918. The population of the base remained at about 1,800 until World War II. The 1919 U.S. Army War Department map (see Figure 11) depicts the lower portions of 'Aiea Ahupua'a as being part of the U.S. Military Reservation; however, the Waimalu Ahupua'a and the valley around the current project area remain unchanged.

Historic maps and an aerial photograph show there was little to no development in Waimalu Ahupua'a, especially in the valley (see Figure 13 through Figure 20). The maps, however, do show unimproved roads extending up the valley with one running up to the current project area. The historic aerial photographs show the project area is situated among agricultural fields (see Figure 16, Figure 18, and Figure 19). The unimproved roads within and in the vicinity of the project area can be seen on these aerial photographs as well.

The BWS Waimalu 217 facility was constructed between 1954 and 1959 as the facility does not appear on the 1954 USGS topographic map but is visible on the 1959 aerial photograph (see Figure 17 and Figure 18). The 1959 aerial photograph also shows residential development to the southwest of the current project area. The BWS Waimalu 217 facility is labeled as "Water" on the 1968 USGS topographic map and as "WT," the abbreviation for water tank, on the 1983 USGS topographic map (see Figure 20 and Figure 21). The 1983 also shows increased residential development in the vicinity of the current project area, including the neighborhood in which the BWS Waimalu 217 facility is located (see Figure 21).

3.2 Previous Archaeological Research

There are no previously conducted archaeological studies within the current project area, and few in surrounding vicinity. An overview of archaeological studies conducted in the general vicinity (within 2.3 km) of the project area is summarized in Table 1 and indicated on Figure 22. Figure 23 shows the location of documented historic properties and burial sites. The following discussion summarizes these studies and their components.

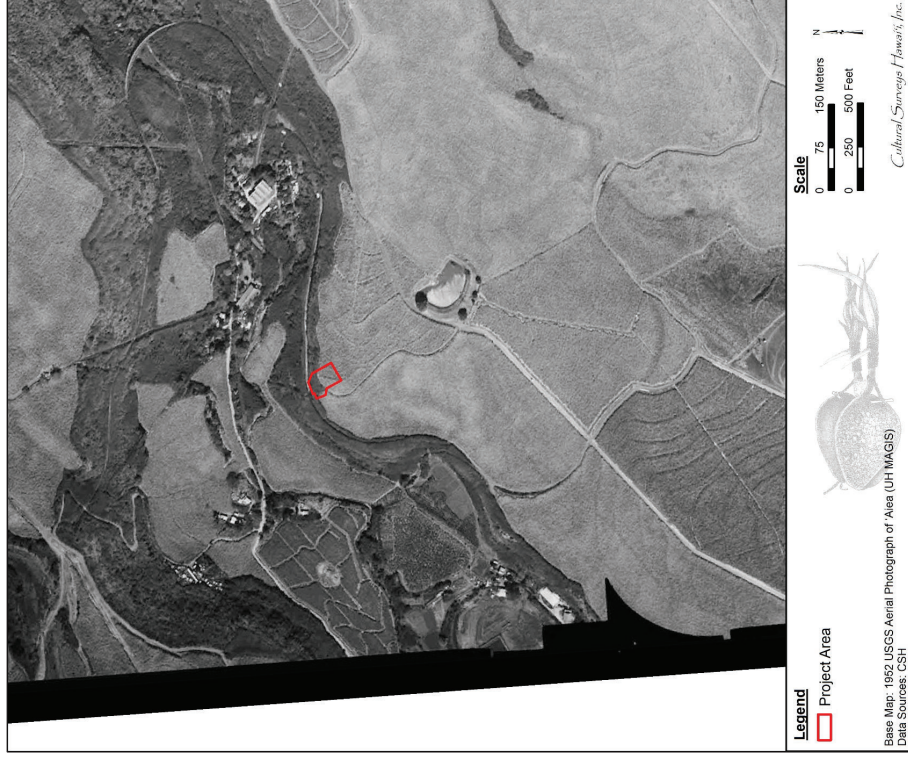


Figure 16. 1952 USGS aerial photograph (UH MAGIS) showing the development of the vicinity of the current project area; note the project area is within agricultural fields

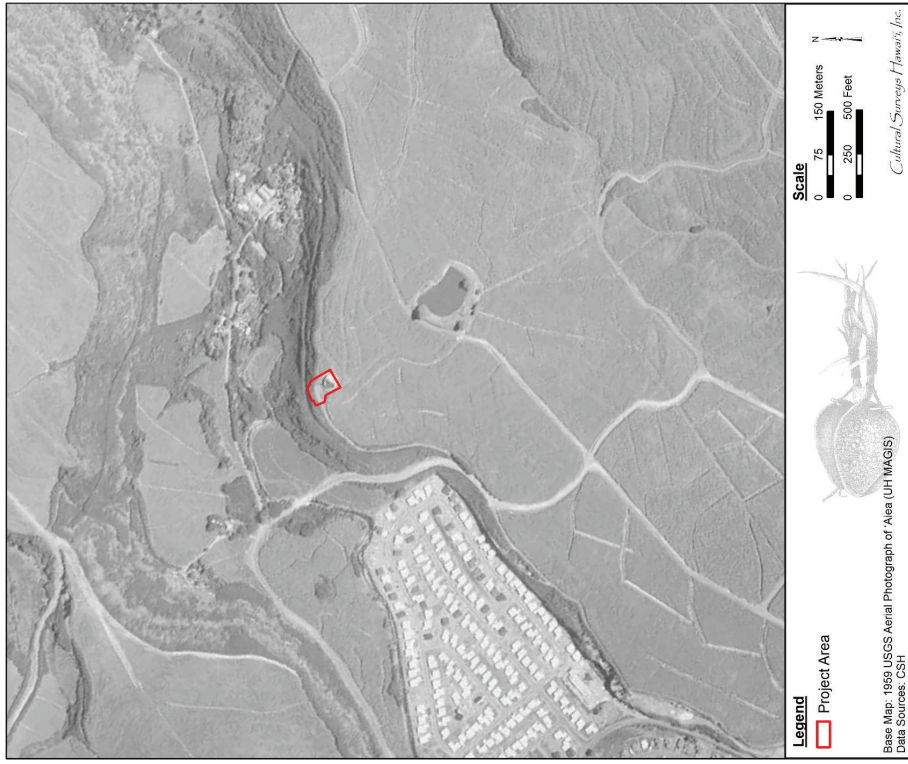


Figure 18. 1959 USGS aerial photograph (UH MAGIS) showing the development of the vicinity of the current project area; note the presence of the BWS Waimalu 217 facility within the project area and the surrounding agricultural fields

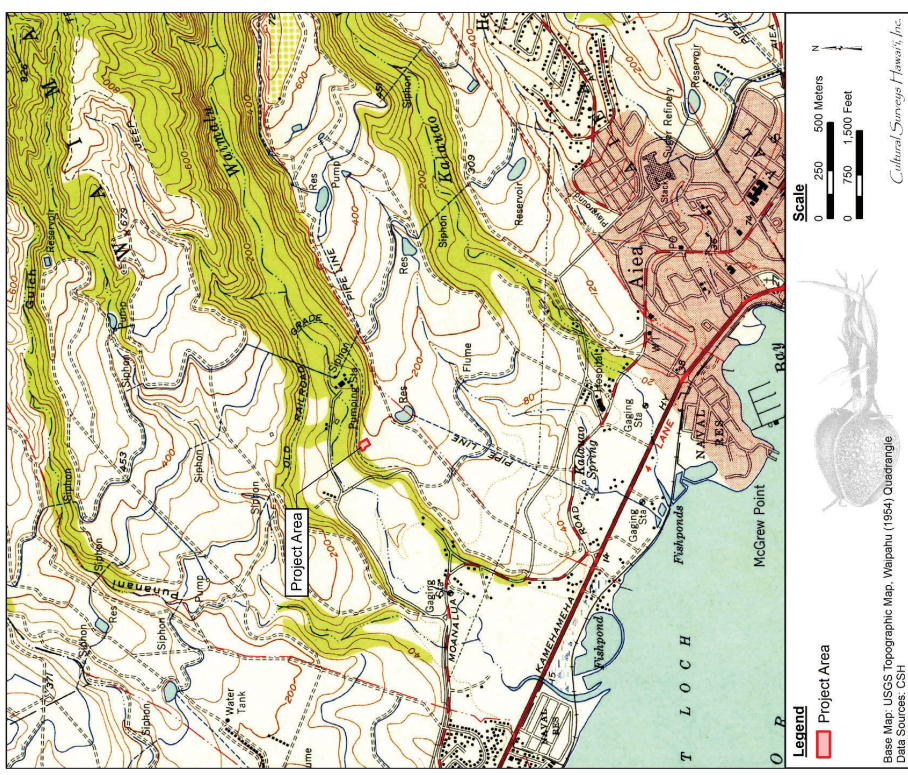


Figure 17. Portion of the 1954 Waipahu USGS topographic quadrangle showing the development of the vicinity of the current project area

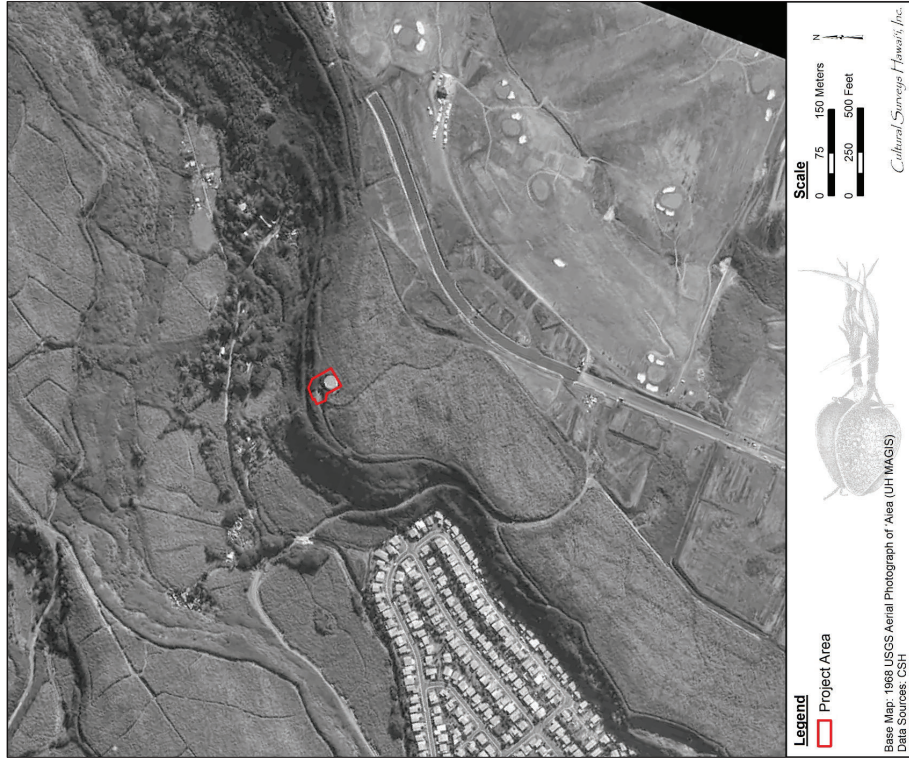


Figure 19. 1968 USGS aerial photograph (UH MAGIS) showing the development of the vicinity of the current project area; note the new residential development southwest of the project area

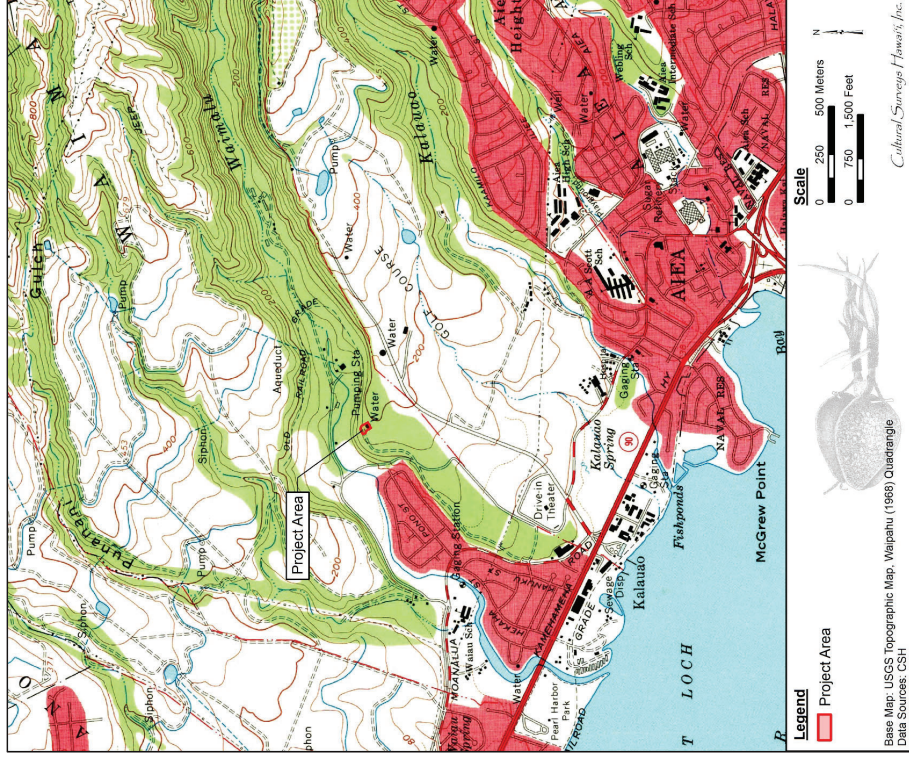


Figure 20. Portion of the 1968 Waipahu USGS topographic quadrangle showing the development of the vicinity of the current project area

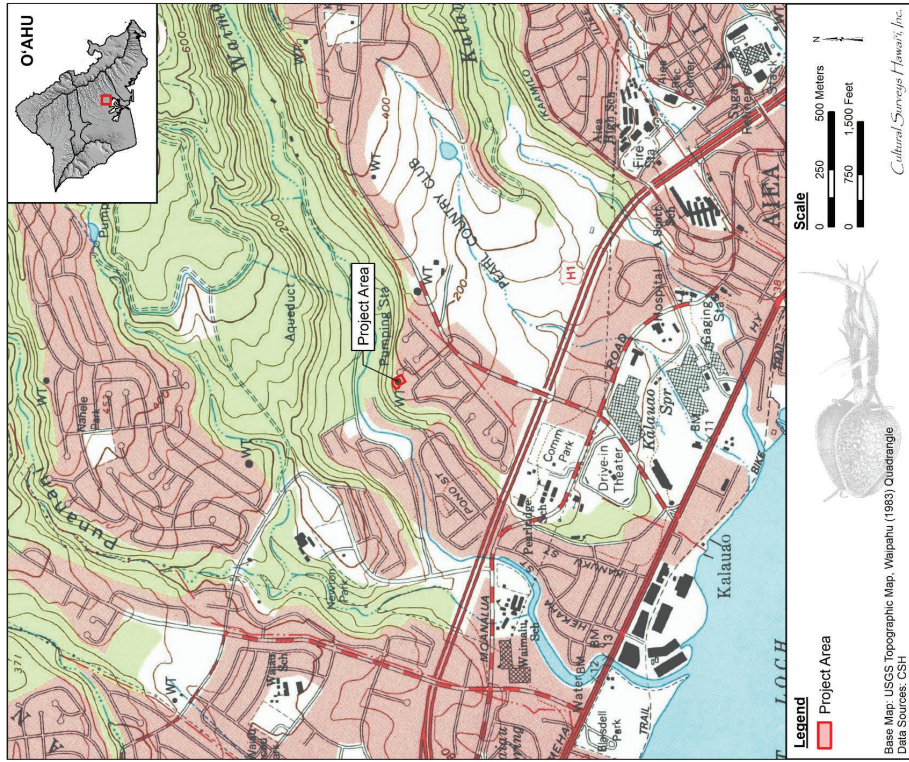


Figure 21. Portion of the 1983 Waipahu USGS topographic quadrangle showing the development of the vicinity of the current project area; note the new residential developments adjacent to the project area

Table 1. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-80-09)
Emory 1957	Archaeological site survey	Waimalu Burial Cave; TMK: [1] 9-8-011:014	SIHP # -2311, Waimalu Burial Cave with disturbed human burials and wooden bowl
Frost 1976	Archaeological reconnaissance	Waimalu rock shelter; TMK: [1] 9-8-002:003	SIHP # -1169, rock shelter
Simoto 1986	Archaeological surface survey	Pear Promenade; TMKs: 9-8-014:003, 006, 007, and 9-8-015:044, 045	No historic properties identified
Yamauchi 1987	Archaeological reconnaissance	Wailuna Subdivision; TMK: [1] 9-8-002:003	No historic properties identified
Kawachi and McEldowney 1990	Burials letter report	TMKs: [1] 9-8-016:053, 054	SIHP # -3713, pre-Contact habitation site and historic burials
Kawachi 1991	Memorandum	Pearl Country Club; TMK: [1] 9-8-011:048	SIHP # -4732, inadvertent discovery of human skeletal remains
Dunn and Haun 1992	Archaeological inventory survey	Waimalu Golf Course; TMK: [1] 9-8	SIHP #s -4205, subsurface concrete structure for water containment; -4206, excavated pit; -4207, excavated pit; and -4208, subsurface concrete structure for water containment
Napoka 1994	Historic significance determination	Pohaku o Ki'i; TMK: [1] 9-9-040:060	SIHP # -4892, Pohaku o Ki'i
Hammatt 1996	Archaeological reconnaissance	TMK: [1] 9-8-011:001 por.	Cattle wall, no site number assigned
Hammatt and Chigiogji 1998	Archaeological assessment	Interstate H-1 from Hālawā to HI-H2 interchange	Historic structures identified in Pearl City, no site numbers assigned
Collins 2000	Burial report (in Dega and O'Rourke 2003)	Blaisdell Park	SIHP # 50-80-12-6383, human burials

Reference	Type of Study	Location	Results (SIHP # 50-80-09)
Hammatt et al. 2001	Archaeological assessment (no finds AIS)	Proposed reservoir sites; TMKs: [1] 9-8-002:002, 003, 009, 021, 033	A 1936 reservoir and associated I-shaped spillway identified, no site numbers assigned
Bush and Hammatt 2003	Archaeological inventory survey	2-acre parcel; TMK: [1] 9-8-073:002	No historic properties identified
Fong et al. 2006	Archaeological assessment	BWS Waimalu Wells Site 1; TMK: [1] 9-8-026:072 (por.)	No historic properties identified
Alizer et al. 2009	Literature review and field inspection	'Aiea Intermediate School; TMK: [1] 9-9-005:001	No historic properties identified
Mintnier and Collins 2009	Archaeological assessment	Interstate H-1 intersections with Liliha and Ka'amilo streets; TMKs: [1] 9-8-024, 036, 1-7-018, 022, 023, 033, 034	No historic properties identified
Tulchin and Hammatt 2009	Archaeological assessment	LDS Meetinghouse; TMK: [1] 9-8-060:009	No historic properties identified
Sroat et al. 2012	Archaeological inventory survey	Honolulu High-Capacity Transit Corridor; TMKs: [1] 9-7, 9-8, 9-9 (various plats and parcels)	SIHP # -7150, subsurface cultural deposit
Sroat et al. 2013	Supplemental archaeological inventory survey	Honolulu High-Capacity Transit Corridor; TMKs: [1] 9-8-009:017, and 9-8-010:002	No historic properties identified
Walden and Collins 2014	Archaeological inventory survey	Moanalua Loop; TMKs: [1] 9-8-013:032 por., 033	SIHP # -5767, historic drainage culverts

Reference	Type of Study	Location	Results (SIHP # 50-80-09)
DeMaio Stamm et al. 2016	Archaeological inventory survey	Live Work Play 'Aiea; TMKs: [1] 9-8-013:013, 015	SIHP # -7811, Kam Hi-Way Drive-In
Raff-Tierney et al. 2018	Archaeological monitoring	Waimalu Wastewater Pump Station Force Main; TMKs: [1] 9-8-005 through 9-8-007 (various parcels and Kamehameha Hwy Right-of-Way)	SIHP #s -8144, historic trash deposit; and -7150, subsurface cultural deposit

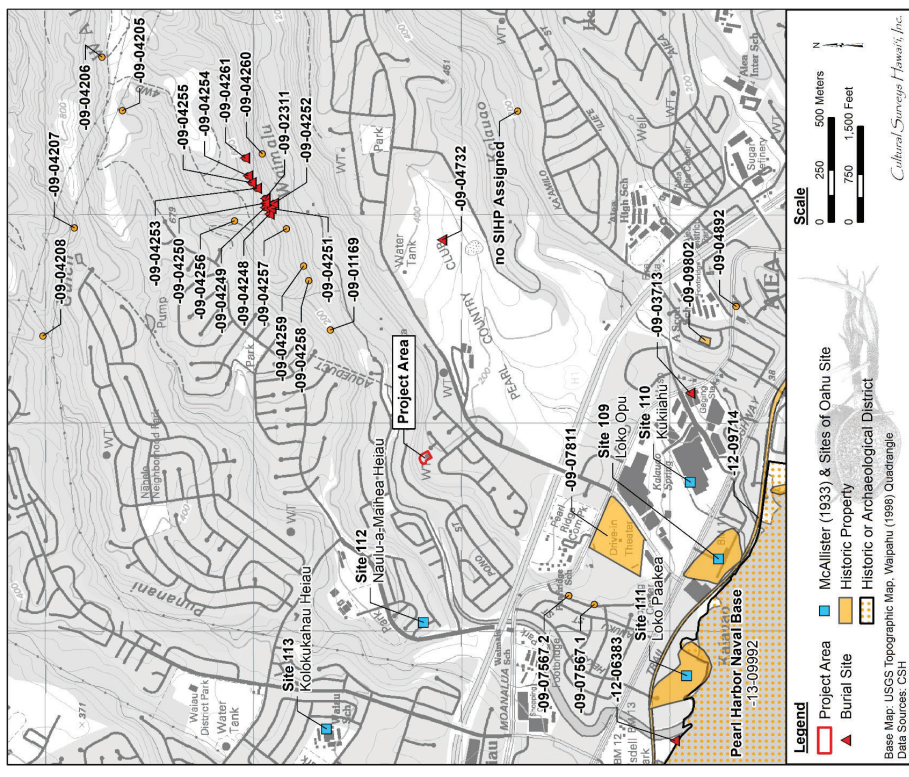


Figure 23. Portion of a 1998 Waipahu USGS topographic quadrangle showing the previously identified historic properties within the vicinity of the project area

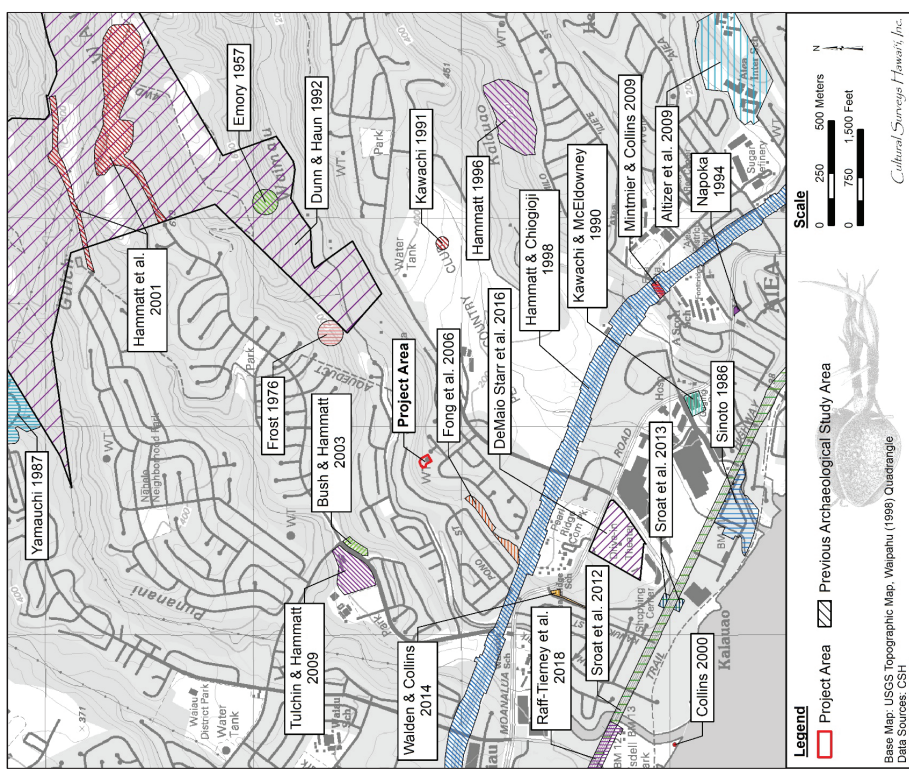


Figure 22. Portion of a 1998 Waipahu USGS topographic quadrangle showing the previous archaeological studies within the vicinity of the project area

3.2.1 Emory 1957

In 1953, the BPBM conducted an archaeological reconnaissance survey for the Waimalu Burial Cave (Emory 1957). The cave was described as having been previously disturbed with many of the skeletal remains being moved and broken. A carved wooden bowl was recovered from the cave and taken to the BPBM. The BPBM Site No. (BPBM #) B2-7 and State Inventory of Historic Places (SIHP) # 50-80-09-2311 were assigned to the cave.

3.2.2 Frost 1976

In 1976, Frost excavated in a rock shelter on the southern slope of the Waimalu gulch (in Yamauchi 1987). The rock shelter was assigned SIHP # -1169. No written report was produced, and no additional information is available.

3.2.3 Sinoto 1986

In 1986, the BPBM conducted an archaeological surface survey for the Pearl Promenade project (Sinoto 1986). The survey noted evidence of modern disturbance in the form of bulldozer-push piles and modern trash within the project area. Marine shells were observed throughout the project area, but these were interpreted as the result of the close proximity of Pearl Harbor and thus a natural deposition. No historic properties were identified during the survey.

3.2.4 Yamauchi 1987

In 1987, the BPBM conducted an archaeological reconnaissance survey for the Wailua Subdivision Expansion project (Yamauchi 1987). The survey consisted of a pedestrian survey of the project area. The project area was noted to have been previously disturbed and there were several bulldozer-push piles and modern trash throughout the area. A concrete cistern (Feature A) and a collapsed wooden structure (Feature B) were documented along the northwest side of the parcel. These were interpreted as being recent features and thus not historic properties.

3.2.5 Kawachi and McEldowney 1990

In 1990, the SHPD investigated the inadvertent discovery of two coffin burials near the Moanalua and Pali Momi roads intersection (Kawachi and McEldowney 1990). The burials were encountered during a foundation excavation. The burials were designated as SIHP # -3713 Burial A and Burial B. Burial A's coffin sides were still present and visible in the wall of the excavation, but the coffin of Burial B was only visible as a faint line underneath the skeletal remains. The burials were disinterred. The skeletal remains represented a probable female adult (Burial A) and a male adult (Burial B). Burial A contained a man's ring and Burial B included a pair of dentures. In addition to the burials, SHPD identified two trash pits, an *imu* (earth oven) pit, a charcoal flecked lens, and a shell-midden concentration. These were designated as components of SIHP # -3713. The historic property was interpreted as a pre-Contact habitation site and historic burial ground.

3.2.6 Kawachi 1991

In 1991, the SHPD conducted an investigation at the Pearl Country Club where human skeletal remains were encountered during an excavation for a new sandtrap on the 12th green (Kawachi 1991). The remains consisted of a broken jawbone. By the time SHPD was able to investigate the area, the sandtrap had already been infilled. No other human skeletal remains were identified. It is

believed that the jawbone originated from a fill deposit based on its reddish-brown discoloration. The remains were assigned SIHP # -4732.

3.2.7 Dunn and Haun 1992

In 1989, Paul H. Rosendahl, Ph.D., Inc. conducted an archaeological inventory survey for the Waimalu Golf Course project (Dunn and Haun 1992). The survey consisted of a pedestrian survey of the project area and excavation of one test unit. Four historic properties were identified during the survey: SIHP #s -4205 through -4208. SIHP #s -4205 and -4208 consisted of subsurface, cylindrical, concrete structures that functioned as water containment structures. SIHP # -4205 was inscribed with "1924." SIHP #s -4206 and -4207 are circular excavated pits whose functions are indeterminate. The excavation test unit was placed within SIHP # -4206. Two carbon samples collected from the unit were sent for radiocarbon analysis, yielding date ranges of AD 1490-1950 for the first sample, and AD 1684-1738, 1810-1930, and 1955 for the second sample. Based on these results, the SIHP # -4206 excavated pit was interpreted as being historic.

3.2.8 Napoka 1994

In 1994, the SHPD conducted an investigation for the determination of historic significance of the Pohaku o Ki'i, SIHP # -4892 (Napoka 1994). During the Moanalua Road improvements project, the SHPD was contacted about the potential significance of the Pohaku o Ki'i, a large boulder at Nalopaka Place and Moanalua Road. After reviewing interviews from 1989 with informant Mr. Kaimikaua about the legend of the Pohaku o Ki'i, the SHPD determined the traditional legend held integrity and that the Pohaku o Ki'i is a significant site.

3.2.9 Hammatt 1996

In 1996, CSH completed an archaeological reconnaissance of a 4-acre parcel in Kalaauo Ahupua'a (Hammatt 1996). The reconnaissance consisted of a pedestrian survey of the parcel. During the survey, they identified a discontinuous, stacked boulder wall that served as a cattle wall along the edge of a cliff; no site number was assigned. They concluded the proposed agricultural development of the parcel would not affect the wall and that no historic properties were identified.

3.2.10 Hammatt and Chiogoji 1998

In 1998, CSH completed an archaeological assessment of the Interstate H-1 corridor from Hālawā to the H-1/H-2 interchange. The assessment consisted of a reconnaissance survey of the project area. Historic structures were identified in Pearl City that are along or within the proposed H-1 corridor at First and Second streets; no site numbers were assigned to these structures. The authors concluded that no archaeological historic properties were identified, and no further archaeological investigation was needed.

3.2.11 Collins 2000

In 2000, the SHPD investigated the inadvertent discovery of human skeletal remains at the Blaisdell Park (in Dega and O'Rourke 2003). The skeletal remains were determined to represent a minimum of two individuals, both incomplete. They appeared to have been previously disturbed and reburied, possibly during the World War II military activities in the area or during the earlier nineteenth century railroad construction at this location. SHPD designated the remains as SIHP # 50-80-12-6383.

3.2.12 Hammatt et al. 2001

In 2001, CSH completed an archaeological assessment (no finds AIS) of two proposed reservoir locations in Waimalu (Hammatt et al. 2001). The AIS consisted of a pedestrian survey of both project locations, the Hapaki Street location and Kaahele Street location. During the survey of the Hapaki Street project location, a historic 1936 concrete reservoir was identified adjacent to the project location and an associated I-shaped spillway was identified within the project location. The spillway was comprised of mortared, roughly dressed, tabular basalt blocks. These were not assigned site numbers. The authors recommended that the reservoir and spillway be avoided for the proposed new reservoir project. No historic properties were identified in the Kaahele Street project location.

3.2.13 Bush and Hammatt 2003

In 2003, CSH completed an archaeological inventory survey at a 2-acre parcel for a subdivision development (Bush and Hammatt 2003). The survey included a pedestrian survey of the parcel. During the fieldwork, several rock outcrops were noted, but none exhibited modifications. Modern trash was observed throughout the project area and there were bulldozer-push piles from the ridge at the top portion of the parcel. As no potential historic properties were identified during the pedestrian survey, no subsurface excavations were conducted.

3.2.14 Fong et al. 2006

In 2005, CSH completed an archaeological assessment for the BWS Waimalu Wells Site 1 project (Fong et al. 2006). The archaeological fieldwork consisted of a pedestrian survey of the project area. The parcel was noted to have steep to vertical slopes and contained overgrown exotic grasses, shrubbery, and vines. There was a moderate to pronounced level of erosion in the area with fallen rocks and boulders at the bottom of the slopes. A few rock outcrops were noted, but these lacked evidence of any modifications. No historic properties were identified during the survey.

3.2.15 Altizer et al. 2009

In 2009, CSH completed a literature review and field inspection for the 'Aiea Intermediate School (Altizer et al. 2009). The literature review indicated that any pre-Contact cultural deposits related to agricultural practices and habitation were likely disturbed and/or destroyed by post-Contact commercial agricultural and ranching activities. They note the potential for post-Contact agricultural and ranching remnants to be encountered during fieldwork. The field inspection did not identify any historic properties.

3.2.16 Mintnier and Collins 2009

In 2009, Pacific Consulting Services, Inc. completed an archaeological assessment for the dynamic message signs at the Interstate H-1 intersections with Ka'amilo Street and Liliha Street (Mintnier and Collins 2009). The archaeological assessment consisted of a visual inspection of the two intersections. No historic properties were identified during the fieldwork. A recommendation of no further archaeological was made.

3.2.17 Tulchin and Hammatt 2009

In 2009, CSH completed an archaeological assessment for the LDS Meetinghouse project (Tulchin and Hammatt 2009). The archaeological fieldwork consisted of a pedestrian survey of the project area. The parcel exhibited extensive land modifications in the form of grading activities and the parcel consisted of manicured lawns, an asphalt parking lot, and existing LDS meeting house structures. No historic properties were identified during the survey.

3.2.18 Sroat et al. 2012

In 2011, CSH completed an archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Sroat et al. 2012). Fieldwork included pedestrian inspections, ground penetrating radar (GPR) surveys, and 31 backhoe-assisted subsurface test trench excavations. During the survey, SIHP # -7150 was documented in Trench E7. SIHP # -7150 consists of subsurface cultural deposits, including *kalo* and *lo'i* sediments. The SIHP # -7150 deposits were present as two substrata (Strata IIIa and IIIb). Samples from the SIHP # -7150 deposits were collected and they yielded pollen from taro (*Colocasia*) in Stratum IIIa and sweet potato (*Ipomoea batatas*), *kiawe* (*Prosopis*), and *koa haole* (*Leucaena*) in Stratum IIIb. Radiocarbon dating analysis of charcoal samples yielded date ranges of A.D. 1450–1530 and AD 1540–1635 for Stratum IIIa, and AD 1414–1480 for Stratum IIIb. However, the presence of *kiawe* and *koa haole* in Stratum IIIb indicates this stratum was used during the post-Contact period. Additionally, historic maps and an aerial photograph were noted to depict wetland taro cultivation in the area from the mid-1800s up through 1945. Therefore, the age of SIHP # -7150 was interpreted as being the nineteenth century, twentieth century, and likely the pre-Contact period.

3.2.19 Sroat et al. 2013

In 2012, CSH completed a supplemental archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Sroat et al. 2013). The supplemental survey was conducted to complete the documentation of the parcel at the proposed Pearlfridge Station location where previously permitted access was limited; only three of the six test trench excavations were able to be completed during the original Sroat et al. (2012) survey. The supplemental survey included a pedestrian survey, GPR surveys, and the remaining three backhoe-assisted subsurface test excavations. The observed stratigraphy generally consisted of various modern and historic fill deposits overlying the natural alluvium. No historic properties were identified during the supplemental survey.

3.2.20 Walden and Collins 2014

In 2013, Pacific Consulting Services, Inc. completed an archaeological inventory survey at the Moanalua Loop for the rockslide potential inspection, mitigation, and improvements project (Walden and Collins 2014). The survey consisted of a pedestrian survey of the parcel. During the survey, two concrete drain culverts were documented. Both culverts consist of U-shaped concrete structures open on one end for drainage. The culverts were clogged with rocks and debris and were non-functional at the time of the survey. They were interpreted as being associated with the construction of the Moanalua Loop and date to the early to mid-1950s. The two drain culverts were designated as SIHP # -7567 Features 1 and 2.

3.2.21 DeMaio Starr et al. 2016

In 2014, CSH completed an archaeological inventory survey for the Live Work Play 'Aiea project (DeMaio Starr et al. 2016). The survey included a pedestrian survey and ten backhoe-assisted test excavations. During the pedestrian survey, one previously identified historic property, SHIP # -7811 (Kam Hi-Way Drive-In), was further documented. While portions of the drive-in had been previously demolished, several elements remained: the concession stand (Feature 1), the tower footings for one screen (Feature 2), and three ticket booths (Features 3-5). The test excavations yielded no cultural materials, and no additional historic properties were identified. The observed stratigraphy generally consisted of various fill deposits overlying the natural sediments.

3.2.22 Raff-Tierney et al. 2018

From 2014 to 2016, CSH conducted archaeological monitoring for the Waimalu Wastewater Pump Station Force Main and Waiau Area Sewer Rehabilitation/Reconstruction project (Raff-Tierney et al. 2018). The observed stratigraphy generally consisted of various fill deposits overlying the natural alluvium and bedrock. Additional components of the previously identified SHIP # -7150, subsurface cultural deposit, were documented during the monitoring program. The newly documented portion of SHIP # -7150 consisted of buried *lo'i* sediments underlying various fill deposits. A new historic property was also identified during the archaeological monitoring: SHIP # -8144, historic trash deposit. The trash deposit was observed underlying a culturally sterile fill deposit and overlying the natural alluvium. It contained historic glass, ceramic, and metal artifacts dating from the late nineteenth century to the late twentieth century. The SHIP # -8144 trash deposit is interpreted as representing historic open-air burning of trash.

3.3 Background Summary and Predictive Model

Though Waimalu is a rich and varied *ahupua'a* with coastal resources, rich central plains, and upland forest regions, little information is available regarding pre-Contact and early historic land use. Early descriptions of 'Ewa document it as a large coastal plain with deep bays around Pearl Harbor. Deep valleys and steep ridges were in abundance and flowed back into the Ko'olau Range. The lowlands were characterized by smaller drainages and plains ideal for agricultural use. In Waimalu Ahupua'a, the lowlands in the lower portion of the valley were known to have been terraced for *lo'i*, and later used for banana cultivation.

Traditionally, 'Ewa was a political center and many *ali'i* resided there because of its abundant resources. There are many traditional stories of 'Ewa as a land well-populated and rich in natural resources. In the eighteenth century, attention shifted to Honolulu and Waikiki after the battle between the O'ahu chiefs and Kahekili of Maui, which resulted in the near extermination of the O'ahu chiefly lines. After Kamehameha united the islands, the center of commerce shifted to Honolulu, and the population gravitated toward the city in response to the shift from an agricultural to cash economy. There is little documentation between the conquest of Kamehameha in 1795 and the division of Hawaiian lands in 1845 and 1846. Within Waimalu Ahupua'a, 63 LCAs were granted; all but two are within 500 m of the coast. The closest award is LCA 70, which is located 250 m to the southwest of the project area and was used for a house lot.

Previous archaeological research in the project area vicinity indicates this portion of Waimalu was part of the densely populated region before Western Contact. Possible deposits associated with

pre-Contact culture include sediments related to agriculture, evidence of habitation, and midden remains. However, it is likely that any pre-Contact cultural deposits were destroyed by almost a century of commercial agricultural and ranching activities that affected the general vicinity, as well as the 1950s construction of the BWS Waimalu 217 facility and the later development of the surrounding neighborhood. It is possible infrastructure related to agricultural and ranching activities could be encountered in the project area; this could include remnants of the Honolulu Plantation railroad, terraces, historic artifact scatters, and water control features.

Section 4 Results of Fieldwork

The fieldwork component of this field inspection was completed on 17 March 2022 by CSH archaeologists Britany Enanoria, B.A., and Lisa Manirath, M.A. This work required approximately 1 person-day to complete. The 100% pedestrian inspection of the parcel was tracked with handheld GPS units. Photographic documentation was conducted of the parcel showing the existing above-ground conditions; Figure 24 depicts the locations and direction of the photos discussed below. No archaeological historic properties were identified, and the results of the field inspection are discussed below. The parcel elements present within the project area and discussed below are all associated with the original development of the BWS Waimalu 217 facility.

The project area is comprised of the BWS Waimalu 217 parcel which is accessed via a corridor off of Puaali'i Street. The access corridor extends north between two houses and bends northeast to the BWS facility. The access corridor has an asphalt-paved driveway leading into the project area. The access gate to the parcel is located on the northwest side of the property and leads to an asphalt parking lot in the northern portion of the project area. Views from the parking lot in the northwest portion, and the northeast, southeast, and southwest corners of the project area give a general overview of the parcel (Figure 25 through Figure 29). The parking lot is at a lower elevation than the rest of the parcel. There are concrete stairs and a cinderblock retaining wall on the southeast side of the parking lot cut into the slope and leading up the reservoir well (Figure 30). The reservoir well is located in the central-southeast portion of the project area (see Figure 25 through Figure 30). There is an electrical box on a concrete pad on the north side of the reservoir well (see Figure 25 and Figure 30).

In the western portion of the project area, a drainage culvert extends north-south with a concrete drain box in the middle (Figure 31 through Figure 33). The drainage culvert is composed of concrete with sections of mortared basalt in the northern half of the culvert (see Figure 31 and Figure 33). The mortared basalt section of the culvert against the drain box is partially collapsed and loose basalt blocks are laying on the ground (see Figure 33). The culvert measures 5.4 m long on the north side of the drain box and 4 m long on the south side. The culvert varies in width between 50–80 cm wide; the original height of the culvert walls could not be determined as the culvert is filled with debris and sediment to varying levels. The concrete drain box measures 5.5 m by 5.5 m and is 1.15 m tall. It has three openings on the northeast, southeast, and southwest sides. It appears that the culvert extends under the driveway and connects with a mortared basalt culvert outside the project area (Figure 34 and Figure 35).

The unpaved areas of the project area are covered with grasses. The project area appears to have been altered during the construction of the facility and no evidence of prior land use was visible. All of the documented parcel elements discussed above are associated with the facility itself. The facility is older than 50 years old and is thus a potential architectural historic property.



Figure 24. 2019 ESRI Aerial image showing the photograph locations and directions



Figure 25. Photo A. Overview of the project area from the parking lot; view to southeast



Figure 26. Photo B. Overview of the north portion of the project area and the parking lot; view to northeast



Figure 27. Photo C. Overview of the northeast side of the project area; view to southeast



Figure 28. Photo D. Overview of the southeast side of the project area; view to southwest



Figure 29. Photo E. Overview of the southwest side of the project area; view to northwest



Figure 30. Photo F. Photograph showing the concrete steps and cinderblock retaining wall on the northwest side of the reservoir well; view to southeast



Figure 31. Photo G. Overview of the concrete drainage culvert and drain box; view to north



Figure 32. Photo H. Overview of the drainage culvert and drain box; view to south



Figure 33. Photo I. Overview of the northern portion of the drainage culvert; note the mortared basalt sections of the culvert; view to north



Figure 34. Photo J. Overview of the location of the drainage culvert outside the project area; view to northeast



Figure 35. Photo K. Photograph showing the drainage culvert outside the project area; view to southeast

Section 5 Summary and Recommendations

5.1 Summary

At the request of the BWS, CSH has prepared this archaeological LRFI report for the BWS Waimalu 217 project. The project area is located within the lower valley of Waimalu Ahupua'a, which is one of the land divisions of the *moku* of 'Ewa. Though Waimalu is a rich and varied ahupua'a with coastal resources, rich central plains, and upland forest regions, little information is available regarding pre-Contact and early historic land use. Early descriptions of 'Ewa document it as a large coastal plain with deep bays around Pearl Harbor. Deep valleys and steep ridges were in abundance and flowed back into the Ko'olau Range. The lowlands were characterized by smaller drainages and plains ideal for agricultural use. In Waimalu Ahupua'a, the lowlands in the lower portion of the valley were known to have been terraced for *lo'i*, and later used for banana cultivation.

Traditionally, 'Ewa was a political center and many *ali'i* resided there because of its abundant resources. There are many traditional stories of 'Ewa as a land well-populated and rich in natural resources. In the eighteenth century, attention shifted to Honolulu and Waikiki after the battle between the O'ahu chiefs and Kahakili of Maui, which resulted in the near extermination of the O'ahu chiefly lines. After Kamehameha united the islands, the center of commerce shifted to Honolulu, and the population gravitated toward the city, in response to the shift from an agricultural to cash economy. There is little documentation between the conquest of Kamehameha in 1795 and the division of Hawaiian lands in 1845 and 1846. Within Waimalu Ahupua'a, 63 LCAs were granted; all but two are within 500 m of the coast. The closest award is LCA 70, which is located 250 m to the southwest of the project area and was used for a house lot.

Previous archaeological research in the project area vicinity indicates this portion of Waimalu was part of the densely populated region before Western Contact. Possible deposits associated with pre-Contact culture include sediments related to agriculture, evidence of habitation, and midden remains. However, it is likely that any pre-Contact cultural deposits were destroyed by almost a century of commercial agricultural and ranching activities that affected the general vicinity, as well as the 1950s construction of the BWS Waimalu 217 facility and the later development of the surrounding neighborhood.

There is an asphalt driveway leading into the BWS Waimalu 217 facility and a parking lot in the northern portion of the project area. In the central-southeast portion of the project area is the BWS reservoir well. There are a cinderblock retaining wall and concrete stairs on the northwest side of the reservoir well, and an electrical box is located on the north side. In the western portion of the parcel are a concrete and mortared basalt drainage culvert and concrete drain box which appear to be in disuse. All of the documented parcel elements are associated with the BWS Waimalu 217 facility. The facility is older than 50 years old and is thus a potential architectural historic property.

5.2 Recommendations

No modern archaeological studies have been previously conducted within the project area. Based on the results of the background research and field inspection, it is unlikely archaeological

properties are present within the project area due to development of the BWS reservoir and pumping station in the mid-twentieth century. There is a low likelihood of subsurface remnants of pre-Contact and post-Contact agricultural or ranching deposits being present. The existing facility structures are older than 50 years old and potentially an architectural historic property.

If no work is to be conducted on the present structures, then a determination (as per HAR §13-275-7) of "No historic properties affected" and no further historic preservation work is recommended. If the existing structures will be modified, then it is recommended that the BWS consult with the SHPD Architecture Branch regarding the project's potential effect on architectural historic properties.

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Appendix E

Architectural Inventory Survey

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Architectural Inventory Survey, Waimalu 217 Reservoir,
Honolulu, Hawai'i

Prepared by MASON under contract to
Limitaco Consulting Group for
Board of Water Supply

September 2022

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Introduction

Mason Architects, Inc. (MASON) was hired by Limitiaco Consulting Group to develop an Architectural Inventory Survey of the Waimalu 217 Reservoir. This survey was prepared in support of the Board of Water Supply's (BWS) Environmental Assessment (EA) for the Red Hill Groundwater Monitoring project. MASON surveyed the buildings on the site for historical significance and effects evaluation. The property was evaluated as not meeting HAR §13-275-6 significance criteria, and the proposed project was evaluated as having "No effect to historic properties" per HAR §13-275-7.

Project Objectives

This survey is intended to fulfill historic property identification, significance evaluation, and evaluation of effect requirements for the project's EA being prepared in accordance with Chapter 343, HRS, and in support of an HRS §6E-8 review by the State Historic Preservation Division (SHPD).

Methodology

MASON visited the property on August 16, 2022, to digitally photograph and record the structures, and undertook historical research on the structures and their historical context. MASON evaluated the properties for significance under HAR §13-275-6 Criteria a-d, but did not evaluate the resources for Criterion e ("having important value to the native Hawaiian people or to other ethnic group") as MASON is not qualified or scoped to undertake this work. Referencing the proposed work schematics (Figures 1 and 6) as the basis of work, MASON also evaluated effects to historic properties.

This report preparation was prepared by Polly Tice, Principal and Research Section Director at MASON. Ms. Tice meets the Secretary of the Interior's Professional Qualification Standards for Architectural History.

Project Area (Boundary Explanation and Justification)

The project area is the BWS Red Hill Waimalu 217 Reservoir property. See the site plan in Figure 1.

Setting

The project area is located within a residential area of Waimalu, Honolulu, O'ahu. Immediately to the north of the reservoir is a swath of woods and Waimalu Stream. Two architectural structures are found on the site which faces Puuall'i Street and Puuall'i Way: a 500,000-gallon above-ground reservoir tank and an above ground drainage vault. On the northwest side of the reservoir is a cinder block retaining wall, concrete stairs leading to the reservoir, and a concrete pathway that accesses the base of the reservoir.

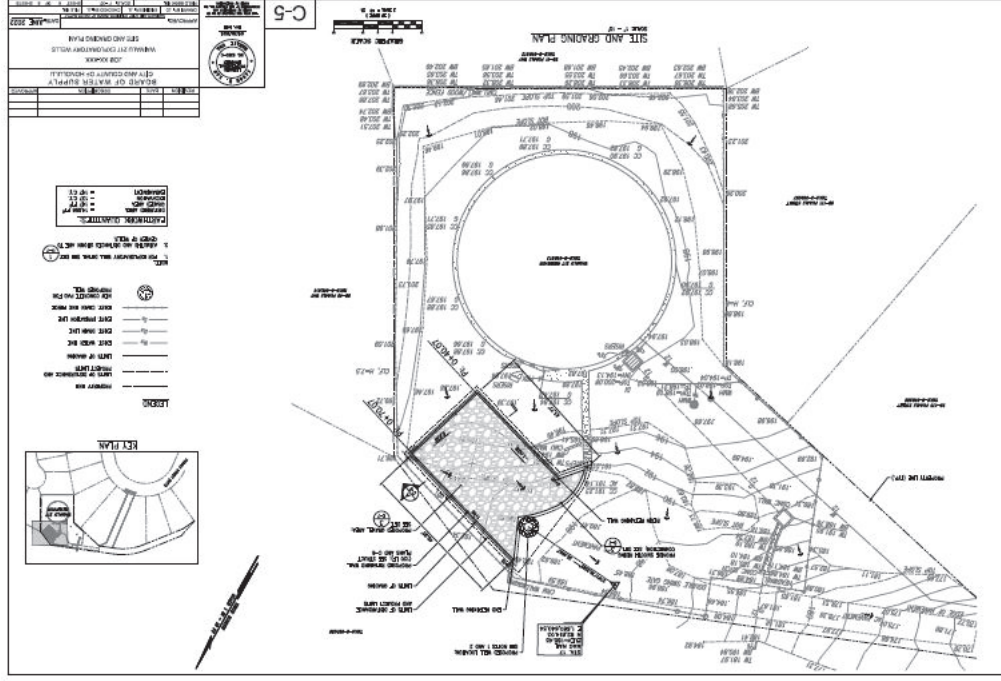


Figure 1: Site Plan map. Source: Limitiaco Consulting Group 2022.

Architectural Description and Character Defining Features

Reservoir



Figure 2: Reservoir, cinder block retaining wall, and stairs. View looking southeast. Source: MASON 2022.

Description

The 500,000-gallon reservoir tank structure is constructed of reinforced concrete, with a reinforced concrete cover with a very low parapet wall. The reservoir is circular in plan; 72' in diameter, and approximately 20' high, partly recessed into the sloping topography. A narrow concrete walkway from the stair extends to a concrete ramp with curbs on either side, that provides pedestrian access to the top of the reservoir. Atop the reservoir is a small hatch for equipment with a bronze door, a louvered vent, and a low sloped gable roof. The reservoir is painted the same green that is typical of BWS buildings today. Also on the site is a concrete above ground drainage vault.

Alterations

The reservoir and above ground drainage vault appear unaltered.

Character Defining Features of the Reservoir

- Circular in plan
- Partly recessed into topography
- Reinforced concrete cover with a parapet wall
- Curbed pedestrian ramp to top of reservoir
- Hatch shelter atop the reservoir tank with louvered vent and a low sloped gable roof
- Painted green (typical of BWS buildings today)



Figure 3: Above ground drainage vault near western property boundary. Source: Limitaco Consulting Group 2022.



Figures 4 and 5: Reservoir with concrete pathway (above), detail of cinder block wall and stairs to the reservoir (right). Source: MASON 2022.

Historical Overview

Oahu's Water System

Prior to BWS' management of the supply of water on Oahu, which began in 1929, Honolulu's drinking water was managed by Honolulu Water Works. This agency was a highly politicized organization fraught with corruption. Under its mismanagement, the city suffered with reduced aquifer levels and water shortages for decades. Honolulu's drinking water (from Nuuanu's four reservoirs) caused outbreaks of typhoid fever and other water-borne diseases. The agency did manage to chlorinate Honolulu's reservoir water system and put into service circular covered concrete tanks to hold the flow from water development tunnels in the mountains in 1917. By early 1923, Honolulu Water Works supplied all of Honolulu's water from groundwater sources.

In 1929, the BWS was created in response to public outcry for better water management. The board was formed by the territorial legislature as a semi-autonomous agency, free from political influence. The first manager and Chief Engineer of the BWS was Frederick Ohrt, who successfully ran the Board until 1952. "Ohrt established the principle that the construction necessary to support a utility need not spoil the landscape!"¹

Beginning in the 1930s, Honolulu architect Hart Wood began working with BWS, and formed a partnership of sorts with Frederick Ohrt. BWS projects were partly funded by the Works Progress Administration at that time. Wood argued for the privatization of public design work, as an advocate of good design for public projects, and collaborated with renowned landscape architects Robert O. Thompson and Catherine Richards Thompson. In the 1930s, they conceived thoughtful building designs and landscapes for pumping stations at Pacific Heights Reservoir, Makiki-Manoa Pumping Station, the Kalihi Uka Pumping Station and the Nuuanu Aerator. Later, Wood designed the lauded BWS Administration Building (1957) on Beretania Street, and an addition to the adjacent BWS Engineering Building (ca. 1950).² Wood's early work for BWS often incorporated regional materials and forms, such as lava rock and double-pitched roof lines, and later, more Modern forms.

Suburban Water System (SWS), the entity responsible for the design and construction of the Waimalu 217 Reservoir, was established in 1941 under Bill 35 to replace the agency formerly known as "rural waterworks of Department of Public Works." SWS was a division of Honolulu's municipal government directly controlled by the Mayor and Board of Supervisors that supplied water to rural areas outside Honolulu. Hart Wood did not design facilities for SWS; his work was for BWS. However, in 1959, the BWS acquired the SWS, thereby incorporating all water works on Oahu into an island-wide operation.

¹ Engineers and Architects of Hawaii. EAH History. <https://sites.google.com/site/eahawaii2/eahistory>, accessed on February 10, 2015.

² Don Hibbard, Glenn Mason, and Karen Weitzel. *Hart Wood Architectural Regionalism in Hawaii*. University of Hawaii Press. Honolulu, HI. 2010.

History and Development of Waimalu 217 Reservoir

In the late nineteenth century the land that later became the Waimalu Reservoir 217 site was part of the McCandless Cattle Company, which constructed a ditch system in Waimalu Valley. Waimalu means "shaded water" and the Waimalu area was known for its abundance of water and agriculture. In the early 1950s the land was leased for use as a cane field by the Honolulu Plantation Company. The Waimalu 217 Reservoir land was held in trust by the McCandless Family (over 1,100 acres) and sold to the Waimalu Development Corporation (WDC), Ltd. in April 1954. The WDC constructed fifty-five homes by 1956 and another ninety-five homes were scheduled to be built by 1957, according to a *Honolulu Advertiser* article dated August 19, 1956.

The original plans for the Waimalu 217 Reservoir are dated 1952 and were prepared by the Department of Public Works, City and County of Honolulu. A handwritten title "Waimalu Tract," is on the drawing. The reservoir was completed in 1956 as noted in a *Honolulu Advertiser* article from April 1957:

Suburban Water System:

The phenomenal growth of this department continued through 1956 with additions of the Waimalu and Punaluu systems bringing the total number of water systems under the direction of the Suburban Water System to 15.³

The Waimalu System is described in this same article:

The Waimalu System consists of a 500,000 gallon concrete reservoir, two deepwell pumps, transmission mains, distribution mains and was turned over to the city in October.⁴

A much larger water infrastructure project was developed for the Waimalu system. In a January 1955 *Honolulu Advertiser* article the BWS announced this project:

Acquisition of some 263.75 acres of land in Waimalu Valley back of Pearl Harbor was announced yesterday by Edward J. Morgan, chief engineer of the board of water supply. Acquisition of the land, Mr. Morgan said, was the first step in what ultimately will be an estimated \$6,000,000 installation of an underground pumping station. The station will convey through large transmission main some 20 more million gallons of water per day to Honolulu.⁵

The Waimalu aquifer was an important water source for the residential development of the rural areas north of Honolulu, and for the city itself. Hart Wood, a prolific designer at the time for the BWS, was not responsible for the Waimalu 217 Reservoir design, as it was conceived by the SWS.

³ "City and County Public Works Busy-5 Flood Control Projects Planned." *Honolulu Advertiser*, April 7, 1957. Page 6.

⁴ "City and County Public Works Busy-5 Flood Control Projects Planned." *Honolulu Advertiser*, April 7, 1957. Page 6.

⁵ "Water Board Acquires Waimalu Land." *Honolulu Advertiser*, January, 29, 1955. Page 9.

Evaluation of Significance and Integrity

Both of the architectural resources located at the Waimalu 217 Reservoir site (the reservoir and above ground drainage vault) are identified as historic properties since they exceed fifty years in age. Both were assessed for significance in keeping with HAR §13-275-6 Criteria a-d. (MASON is not a qualified ethnographer that meets the qualifications in Chapter §13-281, and did not evaluate this property for Criterion e significance.) Note that in 2016, MASON undertook a Reconnaissance Level Survey (RLS) of 58 BWS properties on Oahu, but that survey did not include the Waimalu 217 Reservoir property.

MASON's evaluation for the Waimalu 217 Reservoir property is as follows:

- The Waimalu 217 Reservoir property does not individually meet HAR §13-275-6 Criterion a significance requirements. Functionally, it is a smaller component of a much broader network. While it is now understood to be support a component of the Mid-20th century development era of Oahu's rural water supply system by SWS, it alone does not tell its history; the history can only be illustrated by a much broader group of facilities.
- Currently, as a stand-alone site, or even in tandem with the 1950's rural BWS Waimalu water supply infrastructure, the property does not rise to the level of significance required for Criterion a. (It is also doubtful this property could be individually listed on the Hawaii or National Registers of Historic Places.)
- Under HAR §13-275-6 significance Criterion b, it is not significant, having no known association with the lives of persons important in our past. For example, Hart Wood was not involved in the design of this property.
- Under HAR §13-275-6 significance Criterion c, it is a relatively mundane utilitarian structure, with few notable details or landscape characteristics. Honolulu's renowned architect Hart Wood, who prepared many thoughtful designs for BWS, was not involved in the design of this property, and the property does not compare aesthetically to HART's BWS work.
- Under HAR §13-275-6 significance Criterion d, it is not significant for being likely to yield information important in history.

The property retains its integrity in keeping with HAR §13-275-6 integrity requirements. There are small changes noted below that slightly detract from the integrity of design, workmanship, materials, and feeling of the building as discussed below:

Location – The Waimalu 217 Reservoir property retains integrity of location; the resources have not been moved.

Design – The Waimalu 217 Reservoir's integrity of design appears original, as do the concrete steps leading to the reservoir. A cinder block retaining wall was added later by the concrete steps, and utility boxes and conduit were added. A solar panel was added to the hatch shelter. Despite these additions; the reservoir's design appears intact.

Setting – Generally, the setting for the Waimalu 217 Reservoir and above ground drainage vault is intact. The facilities were built to support the surrounding residential housing areas. While residences have been modified and expanded, the overall residential setting is retained.

Materials – The reservoir's integrity of materials is intact. The above ground drainage vault is a simple utilitarian concrete structure, but the materials also appear intact.

Workmanship – The reservoir's integrity of workmanship appears intact.

Feeling – The reservoir's integrity of feeling appears intact.

Association – Integrity of association appears intact as the reservoir continues to function as originally designed, to supply water to the surrounding residential area.

Proposed Action

Installation of the exploratory well will start with preparing a level surface from which a drill rig can operate. To do this, an area approximately 50-feet by 40-feet will be graded level (primarily cut) and covered in gravel. A retaining wall will be constructed around the perimeter of the graded area. After this work is completed, the exploratory well will be installed.

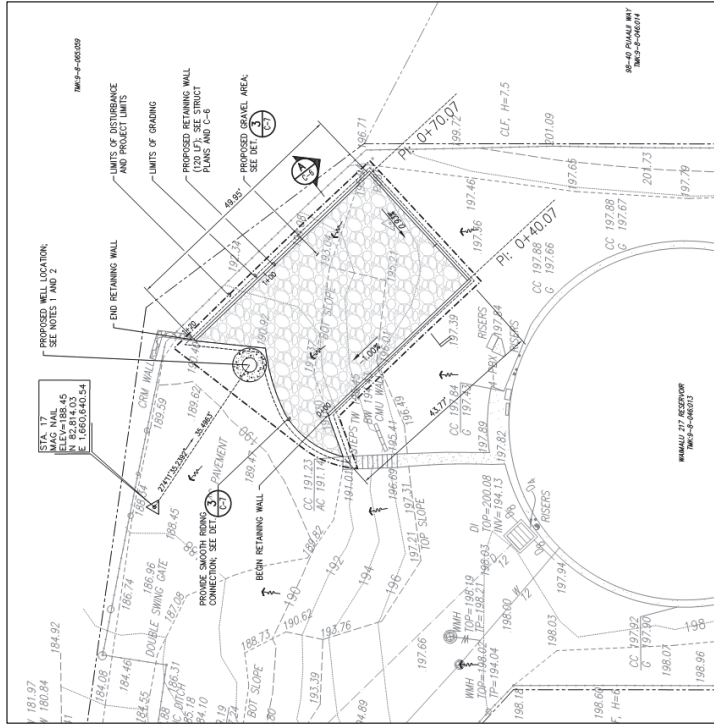


Figure 6. Schematic shows proposed placement of exploratory well and retaining wall. Source: Limitaco Consulting Group.

The proposed exploratory well will consist of 20-inch diameter (0.375-inch wall) steel casing from approximately 3 feet above ground surface (approximate ground surface elevation 218 feet above mean sea level [msl]) to a depth of approximately 201 feet below ground surface (approximate elevation 16 feet above ms) followed by an approximately 20-inch diameter open

bore hole for another 131 feet to its terminal depth of approximately 332 feet below ground surface where dike free basalt rock is expected host the basal aquifer. A 16-inch diameter (0.250-inch wall) steel slotted linear will be installed that extends approximately 55 feet below the bottom of the 20-inch diameter steel casing to approximately 256 feet below ground surface and serve to protect the pump.

The exploratory well will be used to test of the viability of siting a source well at the project location. An additional review will be performed at a later time if a source well will be installed at the project location. This review is for installation of the exploratory well only.

Evaluation of Effect on Historic Properties

Criteria Used for Evaluations of Effect

The proposed action was evaluated for its effects on the integrity of historic properties against HAR §13-275-7 criteria. See Appendix B for more information. HAR §13-275-7 - "Determining effects to significant historic properties" describes effects on historic properties as follows:

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 or destruction.

Further, §13-275-7 - "Determining effects to significant historic properties" explains that one of two effect determinations must be established; "No historic properties affected" or "Effect, with agreed upon mitigation commitments."

Evaluations of Effect Findings

MASON found that the proposed action will result in a "No historic properties affected" finding under HAR §13-275-7, as follows:

The properties are evaluated as not historically significant. The proposed work would not alter directly or indirectly any characteristics of any significant historic properties. The proposed work would not partially or totally destroy or alter any significant historic properties, represent a detrimental alteration of the properties' surrounding environment, or pose any detrimental visual, spatial, noise or atmospheric impingement. Nor does the proposed work increase access with the chances of damage to any significant historic properties.

Mitigation Recommendations

No mitigation is recommended or required since no significant historic properties are affected.

Bibliography

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Appendix A – HAR §13-275-6 Evaluation of Significance

The following is an excerpt from HAR §13-275-6:

- (a) Once a historic property is identified, then an assessment of significance shall occur. The agency shall make this assessment or delegate this assessment, in writing, to the SHPD. This information shall be submitted in the survey report, if historic properties were found through the survey.
- (b) To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criterion:
 - (1) Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
 - (2) Criterion "b". Be associated with the lives of persons important in our past;
 - (3) Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;
 - (4) Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; or
 - (5) Criterion "e". Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts-- these associations being important to the group's history and cultural identity.

A group of sites can be collectively argued to be significant under any of the criteria.

Appendix B – HAR §13-275-7 Determining effects to significant historic properties

The following is an excerpt from HAR §13-275-7:

- (a) The effects or impacts of a project on significant properties shall be determined by the agency. Effects include direct as well as indirect impacts. One of the following effect determinations must be established:
 - (1) "No historic properties affected". The project will have no effect on significant historic properties, or
 - (2) "Effect, with proposed mitigation commitments". The project will affect one or more significant historic properties, and the effects will be potentially harmful. However, the agency has proposed mitigation commitments involving one or more forms of mitigation to reasonably and acceptably mitigate the harmful effects.
- (b) 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 or destruction.

Appendix C - HAR §13-275-8 Mitigation

According to Hawai'i Administrative Rules Chapter §13-275-8, mitigation for an architectural resource may take the form of one or more of the following:

- A. Preservation. Preservation may include avoidance of the effect and protection, rehabilitation, restoration, or reconstruction.
- B. Architectural Recordation. Recordation involves the photographic documentation and possibly the measured drawing of a building, structure or object prior to its alteration. Architectural recordation plans and photos shall meet the minimal standards as provided by Historic American Building Survey (HABS).
- C. Historical Data Recovery. Data recovery involves researching historical source materials to document an adequate and reasonable amount of information about the property when a property will be altered or destroyed.
- D. Ethnographic Documentation. Ethnographic documentation consists of interviewing knowledgeable individuals and researching historical materials to document an adequate and reasonable amount of information about the property.

Appendix F

Consultation and Comments

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THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Mr. Thomas G. Lileikis, Program Manager
Indoor and Radiological Health Branch
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046013

Dear Mr. Lileikis:

Thank you for your department's comments in the letter dated May 31, 2022 and addressed to Mr. Erwin Kawata, Board of Water Supply (BWS) Program Administrator. On behalf of Mr. Kawata and the BWS, we will include pertinent statements in the Environmental Assessment about the Administrative Rules of the Department of Health, and will refer to the regulatory guidance as the project proceeds.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Ian Arakaki
Principal

1622 Kamaekahi Street • Honolulu, Hawaii 96817
(808) 596-7790 • lchg.hawaii.com



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

May 31, 2022

Mr. Erwin Kawata, Program Administrator
Water Quality Division
Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, HI 96813

Dear Mr. Kawata:

Thank you for your submittal requesting comments to the Pre-assessment Consultation, Preparation of an Environmental Assessment for the Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046:013.

Project activities shall comply with the following Administrative Rules of the Department of Health:

- Chapter 11-39 Air Conditioning & Ventilating
- Chapter 11-41 Lead-based Paint Activities
- Chapter 11-46 Community Noise Control
- Chapter 11-501 Asbestos Requirements
- Chapter 11-504 Asbestos Abatement Certification Program

Information pertaining to other health and environmental issues may be addressed by other programs within our department.

Should you have any questions, please contact me at (808) 586-4700.

Sincerely,

Thomas G. Lileikis
Program Manager
Indoor and Radiological Health Branch

C: Ian Arakaki, The Limtiaco Consulting Group ✓

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

DAVID Y. ICE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HEALTH
SAFE DRINKING WATER BRANCH
ULUKAPU BLDG. 4
2385 WAIMANO HOME ROAD, SUITE 110
PEARL CITY, HI 96782

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
File: SDWB
Number: 2022-0001

Mr. Erwin Kawata, Program Administrator
June 20, 2022
Page 2

In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the state of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.

Mr. Erwin Kawata, Program Administrator
Water Quality Division
Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813
[via ekawata@hbws.org only]

June 20, 2022

4. All public water system sources must undergo a source water assessment, which will delineate a source water protection area. This process is preliminary to the creation of a source water protection plan for that source and activities which will take place to protect the drinking water source.

If there are any questions, please contact Michael Miyahira, SDWB Engineering Section Supervisor, at (808) 586-4258 or michael.miyahira@doh.hawaii.gov.

Sincerely,

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

MM: cw

c: Mr. Ian Arakaki, Principal
The Limitaco Consulting Group
1622 Kanakanui Street
Honolulu, HI 96817
[via ian@lcoqhawaii.com only]

Dear Mr. Kawata:

SUBJECT: PRE-ASSESSMENT CONSULTATION, PREPARATION OF AN ENVIRONMENTAL ASSESSMENT FOR THE WAIMALU 217' EXPLORATORY WELL, AIEA, OAHU, HAWAII
TMK (1) 9-8-046:013

The Department of Health (DOH), Safe Drinking Water Branch (SDWB) acknowledges receipt of your letter dated May 24, 2022, regarding the subject project. The SDWB comments are as follows:

1. This well qualifies as a source that serves a regulated public water system. All public water system owners and operators are required to comply with Hawaii Administrative Rules (HAR), Title 11, Chapter 20, "Rules Relating to Public Water Systems."
2. Projects that propose development of new sources of drinking water serving or proposed to serve a public water system must comply with the terms of HAR 11-20-29, entitled "Use of new sources of raw water for public water systems." This section requires that all new public water system sources be approved by the Director of Health prior to its use. Such approval is based primarily upon the submission of a satisfactory engineering report, which addresses the requirements set in HAR Section 11-20-29.
3. The engineering report must identify all potential sources of contamination and evaluate alternative control measures, which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source.



THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Guadencio Lopez (Dennis), Chief
Department of Health
Safe Drinking Water Branch
2385 Waimano Home Road, Suite 110
Uluakupu Building 4
Pearl City, Hawaii 96782-1400

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046:013

Dear Branch Chief Lopez:

Thank you for your agency's comments in the letter dated June 20, 2022 (Ref. SDWB Kawata02.docx) and addressed to Mr. Erwin Kawata, Board of Water Supply (BWS) Program Administrator. Pertinent information from the letter will be included in the Environmental Assessment. On behalf of Mr. Kawata and the BWS, we will refer to your department's regulatory guidance as the project proceeds and acknowledge the following itemized comments from your letter:

1. The new well qualifies as a source that serves a regulated public water supply.
2. A satisfactory engineering report will be prepared and submitted as required should the exploratory well become a production well.
3. Laboratory analyses of water quality is required content for the engineering report.
4. The process pertaining to a source water assessment will be followed.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Ian Arakaki
Principal

1622 Kamaekani Street • Honolulu, Hawaii 96817
(808) 596-7790 • lchg.hawaii.com



DAVID V. JOE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHIEF OF BUREAU
MICHAEL G. BUCK
ELIZABETH A. CHAR, M.D.
NIEL J. HANNAH
AURORA M. HARRIS, PH.D.
WAYNE K. KATAVANA
PAUL J. MEYER
M. KALEO MANUEL
DEPUTY DIRECTOR

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

June 20, 2022

REF: RFD.5900.3

TO: Erwin Kawata, Program Administrator
Water Quality Division, Honolulu Board of Water Supply

FROM: M. Kaleo Manuel, Deputy Director *KALEO*
Commission on Water Resource Management

SUBJECT: Pre-Assessment Consultation, Preparation of an Environmental Assessment for the Waimalu 217' Exploratory Well in Aiea, Island of Oahu

FILE NO.: RFD.5900.3
TRK NO.: (1) 9-8-046:013

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

Our comments related to water resources are checked off below.

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

- http://www.hawaiiscape.com/wp-content/uploads/2013/04/LUCH_Irrigation_Conservation_BMPs.pdf
- There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
- 10 The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- 11 The Hawaii Water Plan is directed toward the achievement of the utilization of reclaimed water for uses other than drinking and for potable water needs in one hundred per cent of State and County facilities by December 31, 2045 (§174C-31(g)(6), Hawaii Revised Statutes). We strongly recommend that this project consider using reclaimed water for its non-potable water needs, such as irrigation. Reclaimed water may include, but is not limited to, recycled wastewater, gray water, and captured rainwater/stormwater. Please contact the Hawaii Department of Health, Wastewater Branch, for more information on their reuse guidelines and the availability of reclaimed water in the project area.
- 12 A Well Construction Permit(s) is (are) required before the commencement of any well construction work.
- 13 A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 14 There is (ere) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 15 Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 16 A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.
- 17 A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- 18 A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 19 The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- OTHER:

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

c: Ian Arakaki, Principal, The Limitiaco Consulting Group



THE LIMITIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Deputy Director M. Kaleo Manuel
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046013

Dear Deputy Director Manuel:

Thank you for your department's letter dated June 20, 2022 (Ref. RFD.5900.3) and addressed to Mr. Erwin Kawata, Board of Water Supply (BWS) Program Administrator. On behalf of Mr. Kawata and the BWS, we appreciate the comments pertaining to best management practices for stormwater management, the ground or surface water degradation/contamination concerns, and well construction and pump installation permits. We will incorporate pertinent comments from the letter in the Environmental Assessment.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limitiaco Consulting Group, Inc.

Ian Arakaki
Principal



DAVID Y. IGE
GOVERNOR OF HAWAII



DAVID Y. IGE
GOVERNOR OF HAWAII

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



DAVID Y. IGE
GOVERNOR OF HAWAII



DAVID Y. IGE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 631
HONOLULU, HAWAII 96809

July 07, 2022

LD 0548

Erwin Kawata, Program Administrator
Water Quality Division
Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, HI 96813

Dear Sirs:

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Waimalu 217' Exploratory Well in Aiea
98-183 Puualii Street, Aiea, Island of Oahu, Hawaii
TMK: (1) 9-8-046:013

Via email: ekawata@hbws.org

Thank you for the opportunity to review and comment on the subject project. The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to DLNR's various divisions for their review and comment.

Enclosed are comments received from our Engineering Division. Should you have any questions, please feel free to contact Barbara Lee via email at barbara.j.lee@hawaii.gov. Thank you.

Sincerely,
Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments
cc: Central Files
Ian Arakaki, The Limtiaco Consulting Group via email: ian@tlcg-hawaii.com

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 631
HONOLULU, HAWAII 96809

June 15, 2022

LD 0548

MEMORANDUM

TO: FROM: ~~TO:~~

- DLNR Agencies:**
- Div. of Aquatic Resources (via email: kendall.i.tucker@hawaii.gov)
 - Div. of Boating & Ocean Recreation (via email: richard.l.howard@hawaii.gov)
 - Engineering Division (via email: DLNR_engr@hawaii.gov)
 - Div. of Forestry & Wildlife (via email: rubyrosa.terrago@hawaii.gov)
 - Div. of State Parks (via email: carl.a.cottrell@hawaii.gov)
 - Commission on Water Resource Management (via email: DLNR_CWRM@hawaii.gov)
 - Office of Conservation & Coastal Lands (via email: sharleen.k.kuba@hawaii.gov)
 - Land Division - Oahu District (via email: barry.w.cheung@hawaii.gov)

TO: FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Waimalu 217' Exploratory Well in Aiea
98-183 Puualii Street, Aiea, Island of Oahu, Hawaii
TMK: (1) 9-8-046:013
APPLICANT: Limtiaco Consulting Group on behalf of Honolulu Board of Water Supply

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **June 22, 2022** to barbara.j.lee@hawaii.gov at the Land Division.

If no response is received by the above due date, we will assume your agency has no comments at this time. Should you have any questions about this request, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

- We have no objections.
- We have no comments.
- We have no additional comments.
- Comments are included/attached.

Signed: 
 Print Name: Caryl S. Chang, Chief Engineer
 Division: Engineering Division
 Date: Jun 16, 2022

Attachments
Cc: Central Files

LD0548



RECEIVED
LAND DIVISION

2022 MAY 31 AM 10:48 THE LIMITACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

May 24, 2022

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Waimalu 217' Exploratory Well in Aiea
Location: 98-183 Puaalii Street, Aiea, Island of Oahu, Hawaii
TMK: (1) 9-8-046:013
Applicant: Limitaco Consulting Group on behalf of Honolulu Board of Water
Supply

Suzanne Case, Chairperson
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Subject: Pre-Assessment Consultation, Preparation of an Environmental Assessment for the
Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046:013

Dear Ms. Case,

On behalf of the Board of Water Supply (BWS), we are contacting you to inform you and solicit comments regarding an upcoming BWS project. The BWS plans to install a new exploratory well at its existing Waimalu 217' Reservoir and Booster 2 facility, located at 98-183 Puaalii Street (TMK 9-8-046:013) in Aiea, Hawaii. In the next section, we have provided an explanation of the project's purpose and a written description of the proposed action.

The project is currently in the early planning stage and we are soliciting comments as part of the environmental review process. Comments you provide will be considered in preparation of the forthcoming Environmental Assessment (EA), which will be prepared by the BWS and made available for public review and comment pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and Title 11, Chapter 200.1, Hawaii Administrative Rules (HAR) of the Department of Health.

Project Purpose

In early December 2021, after fuel releases from the Navy's Red Hill Bulk Fuel Storage Facility and Pipelines, BWS shut down its Halawa Shaft, Aiea Wells, and Halawa Wells to prevent any petroleum contamination present in the groundwater aquifer from entering the BWS water system. The purpose of this project is to locate new water supplies to replace the capacity lost from the shutdown of these wells. The first step in locating new water sources is installing and testing exploratory wells at prospective water source locations. The exploratory well will be used to collect data on the underlying groundwater and determine if the location is suitable for the installation of a permanent groundwater well. The BWS has chosen its Waimalu 217' Reservoir and Booster 2 facility for the installation of an exploratory well (see Figure 1- Location and Vicinity Map).

If the site is suitable for a permanent groundwater well, the facility will need further improvements. The BWS will conduct additional consultations and prepare a subsequent EA for those improvements when necessary.

Project Description

The project proposes the installation of an exploratory well on an existing BWS-owned site in Aiea. The project includes drilling a groundwater well and installing a test pump to determine the quantity and quality of groundwater at this location. Clearing and grading of a portion of the site will be required to prepare the facility for the installation of the exploratory well.

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). Be advised that 44CFR, Chapter 1, Subchapter B, Part 60 reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood zones subject to NFIP requirements are identified on FEMA's Flood Insurance Rate Maps (FIRM). The official FIRMs can be accessed through FEMA's Map Service Center (msc.fema.gov). Our Flood Hazard Assessment Tool (FHAT) (<http://gis.hawaiinrip.org/FHAT>) could also be used to research flood hazard information.

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- o Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- o Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- o Maui/Molokai/Lanai: County of Maui, Department of Planning (808) 270-7139.
- o Kauai: County of Kauai, Department of Public Works (808) 241-4849.

Signed:  CARY S. CHANG, CHIEF ENGINEER
Date: Jun 16, 2022

We would greatly appreciate the input that you or your organization may have regarding the subject project. Your comments will be considered in the forthcoming EA document which will be made publicly available for review. You are welcome to provide input at this time or be a consulted party while the EA is being prepared. You will have an additional opportunity to remark on the EA when it is published. We would appreciate your response to this pre-assessment consultation letter by June 23, 2022.

Please send comments to:

Erwin Kawata, Program Administrator
 Water Quality Division
 Honolulu Board of Water Supply
 630 South Beretania Street
 Honolulu, HI 96813

And please provide a copy to:

Ian Arakaki, Principal
 The Limitaco Consulting Group
 1622 Kananani Street
 Honolulu, HI 96817
 email: ian@tlcgohawaii.com

Thank you for your interest and participation in the environmental review process. Should you have any questions, please contact me at (808) 596-7790 or via email at ian@tlcgohawaii.com.

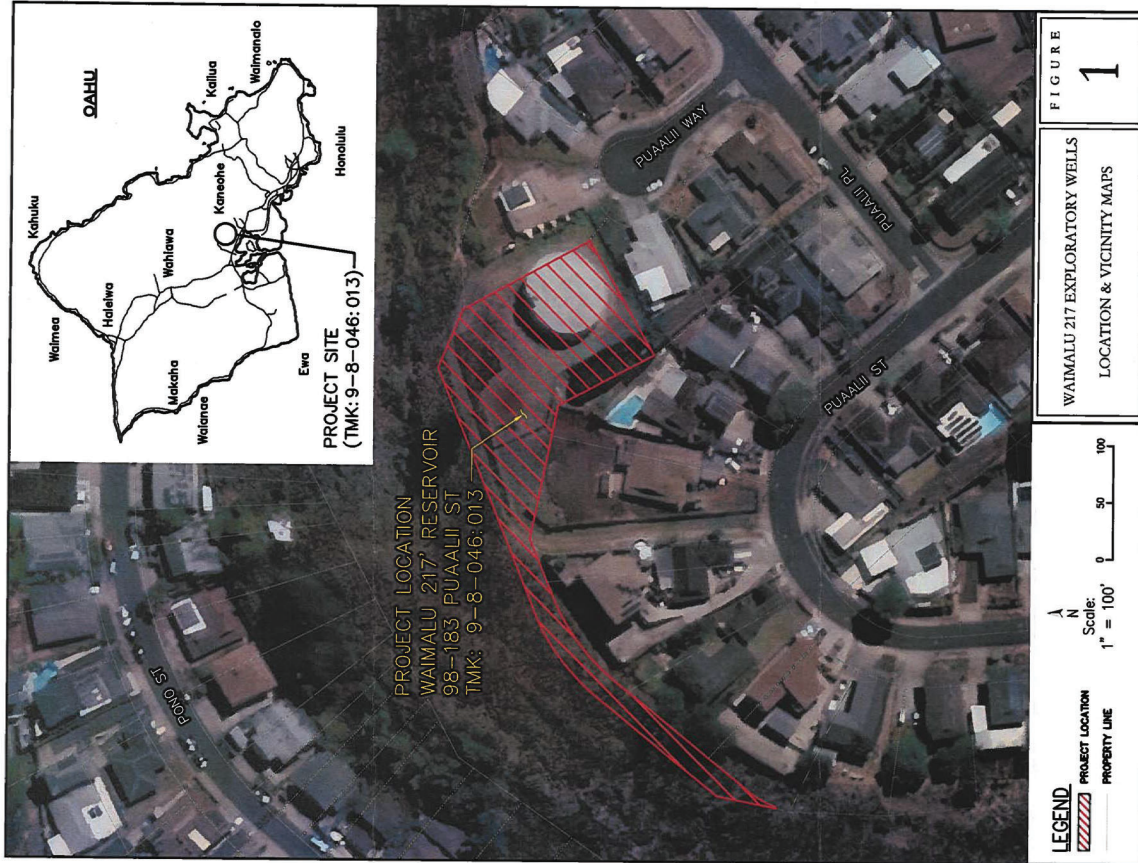
Best regards,
 The Limitaco Consulting Group, Inc.



Ian Arakaki
 Principal

Attachments:
 Figure 1 – Location and Vicinity Map

RECEIVED
 2022 MAY 27 PM 12:57
 DEPT. OF LAND
 & NATURAL RESOURCES
 STATE OF HAWAII



\\TLCG-FS\NETSHARE\1. PROJECTS\88 - INTERA\18802 - RED HILL PHASE 2\EXPLORATORY WELLS\PLANNING\FIGURES\2. WAIMALU 217\EA FIGURES.DWG 5/19/2022 1:25 PM



THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Russell Tsuji, Land Administrator
State of Hawaii Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Alea, Island of Oahu, Tax Map Key (1) 9-8-046:013

Dear Administrator Tsuji:

Thank you for your department's letter dated July 7, 2022 (Ref. LD0548) that is addressed to Mr. Erwin Kawata, Board of Water Supply (BWS) Program Administrator, and for collecting comments from other divisions.

Engineering Division - signed June 16, 2022
We appreciate the information pertaining to the National Flood Insurance Program, Flood Hazard Zone designations, and the Flood Hazard Assessment Tool.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Ian Arakaki
Principal

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7199 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

RICK BLANGIARDI
MAYOR



SHELDON K. HAO
FIRE CHIEF
JASON SAMALA
DEPUTY FIRE CHIEF

June 7, 2022

Mr. Ian Arakaki, Principal
The Limtiaco Consulting Group, Inc.
1622 Kanakanui Street
Honolulu, Hawaii 96817

Dear Mr. Arakaki:

Subject: Preassessment Consultation for an Environmental Assessment
Waimalu 217 Feet Exploratory Well
98-183 Puaalii Street
Honolulu, Hawaii 96701
Tax Map Key: 9-8-046: 013

In response to your letter received on May 27, 2022, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.)

A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.)

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

Mr. Ian Araki, Principal
Page 2
June 7, 2022

- moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Section 18.3 and 18.4.
3. The fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.
 4. Submit civil drawings to the HFD for review and approval.

Should you have questions, please contact Acting Battalion Chief Kendall Ching of our Fire Prevention Bureau at 808-723-7154 or kching3@honolulu.gov.

Sincerely,



CRAIG UCHIMURA
Acting Assistant Chief

CU/EO:bh



THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Acting Assistant Chief Craig Uchimura
City and County of Honolulu
Honolulu Fire Department
636 South Street
Honolulu, Hawaii 96813-5007

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046013

Dear Acting Assistant Chief Uchimura:

Thank you for your department's comments in the letter dated June 7, 2022 that are intended for Mr. Erwin Kawata, Board of Water Supply (BWS) Program Administrator. On behalf of Mr. Kawata and the BWS, we will incorporate the following comments in the Environmental Assessment: the project will be designed in consideration of fire department access and required fire flow for fire protection. The civil drawings will be submitted to the Honolulu Fire Department for review and approval.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.



Ian Arakaki
Principal

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-5000 • FAX: (808) 768-5041
DEPT. WEB SITE: www.honolulu.gov • CITY WEB SITE: www.honolulu.gov



RICK BLANGARDI
MAYOR

DEAN UCHIDA
DIRECTOR
DAWN TAKEUCHI-APUNA
DEPUTY DIRECTOR

June 24, 2022

2022/ELOG-1151(cc)
2202829

Mr. Erwin Kawata, Program Administrator
Water Quality Division
Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Kawata:

SUBJECT: Preparation of an Environmental Assessment (EA) for
Waimalu 217' Exploratory Well

This is in response to your letter dated, May 24, 2022, regarding the request for comments in
preparation of an EA for the Waimalu 217' Exploratory Well (Project).

Based on the information provided in the Pre-Assessment Consultation, the Department of
Planning and Permitting provides the following comments:

1. The Environmental Assessment should include a discussion on how the Project
is consistent with the O'ahu General Plan and the Primary Urban Center
Development Plan.
2. The Project should submit a formal request for determination on whether a Public
Infrastructure Map Amendment will be required for the Project.
3. The Project should provide a discussion on what type of permits are needed,
e.g., grading, building (electric for pump, mechanical, etc.) unless waived if
deemed an emergency situation.

Should you have any questions, please contact Celine Chan, of our staff, at (808) 768-8043.

Very truly yours,

Dina L. T. Wong
Chief
Planning Division

cc: The Limitaco Consulting Group
Ian Arakaki, Principal



THE LIMITACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

July 26, 2022

Chief Dina L. T. Wong
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental
Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island
of Oahu, Tax Map Key (1) 9-8-046:013

Dear Planning Division Chief Wong:

Thank you for your department's comments in the letter dated June 24, 2022 (Ref.
2022/ELOG-1151; 2202829) and addressed to Mr. Erwin Kawata, Board of Water
Supply (BWS) Program Administrator. The discussion of the Oahu General Plan and
the Primary Urban Center Development Plan will be included in the Environmental
Assessment.

On behalf of Mr. Kawata and the BWS, we acknowledge the statement pertaining to the
Public Infrastructure Map Amendment. The Environmental Assessment will identify the
types of permits that may be required for the proposed project.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limitaco Consulting Group, Inc.

Ian Arakaki
Principal

1622 Kamaekahi Street • Honolulu, Hawaii 96817
(808) 596-7790 • lclg.hawaii.com

From: Ian Arakaki
Sent: Thursday, July 28, 2022 9:59 AM
To: Christine Maiava <anaparoo7@gmail.com>
Subject: Waimalu 217 Pre-Assessment Consultation Comments

Hi Christine,
Per our previous correspondence, would it be alright with you to formally accept your comments as stated below:

My concerns are for the board of water supply renovation on Puaalii St. Is the dust coming into our houses my family is 98-185 and 98-187 Puaalii St. Also can you put a retaining wall for land being excavated behind 98-187 Puaalii St. due we are worried about the foundation to our properties. We did have a contractor try to build a townhouse behind us and they found it to be dangerous to our foundation. An expert came in and said so. And we reserve the right to address future complaints.

Sincerely,

Christine Maiava
And the Tomiyama Family

Thank You,
Ian Arakaki, P.E.
Principal
Direct: (808) 687-8722
Cell: (808) 780-7150



THE LIMTIACO CONSULTING GROUP
CIVIL ENGINEERING AND ENVIRONMENTAL CONSULTANTS

August 8, 2022

Christine Maiava
98-185 Puaalii Street
Aiea, HI 96701

Subject: Response to Pre-Assessment Consultation, Preparation of the Environmental Assessment for the Proposed Waimalu 217' Exploratory Well in Aiea, Island of Oahu, Tax Map Key (1) 9-8-046:013

Dear Ms. Maiava:

Thank you for the comments in your phone discussion and email correspondence with myself.

On behalf of Mr. Kawata and the BWS, we acknowledge your concerns pertaining to potential dust and ground settling related to the proposed project. Currently, there are no plans to excavate outside of the fenced area of the BWS property nor behind 98-187 Puaalii Street. Best management practices to mitigate dust will be followed during construction according to Hawaii Administrative Rules.

Thank you for your interest and participation in the environmental review process.

Best regards,
The Limtiaco Consulting Group, Inc.

Ian Arakaki
Principal

cc: Erwin Kawata, Program Administrator
Kathleen M. Pahinui, Information Officer