BOARD OF WATER SUPPLY

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

FILE COPY

MAR 23 2015

March 3, 2015

RECEIVED
'15 MAR -6 A10:36
OFC. OF ENVIRONMENTAL QUALITY CONTROL

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

Dear Ms. Wooley:

Subject: Draft Environmental Assessment, Kaimuki Pump Station
Well Replacements, Tax Map Key: (1) 2-7-30: 12 and 55

We transmit the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the Kaimuki Pump Station Well Replacements situated at the above described tax map key location in Honolulu, Oahu, Hawaii for publication in the next available edition of the Environmental Notice.

Enclosed is a completed Office of Environmental Quality Control Publication Form, two (2) copies of the DEA-AFONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If you have any questions regarding this submittal, please contact Scot Muraoka, Project Manager, Water Resources Division, at 748-5942.

Very truly yours,

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

Enclosures

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

Project Name:	Kaimukī Pump Station Well Replacements
Island:	O'ahu
District:	Honolulu
TMK:	(1) 2-7-30: 12 and 55
Permits:	Well Construction, Pump Installation, NPDES, Noise, New Drinking Water Source, Discharge Well Effluent, Building and Grading.

Proposing/Determination Agency: Honolulu Board of Water Supply, 630 S. Beretania Street, Honolulu, Hawaii 96843

Contact: Mr. Scot Muraoka
Phone: (808) 748-5942

Accepting Authority:
(for EIS submittals only)

Consultant: Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Contact: Mr. Jay Minoaka Kakela Stone
Phone: (808) 521-5361

Status (check one only):

_X_DEA-AFNSI	Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.
__FEA-FONSI	Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
__FEA-EISPN	Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.
__Act 172-12 EISPN	Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.
__DEIS	The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.

__FEIS	The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
__ Section 11-200-23 Determination	The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.
__Section 11-200-27 Determination	The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.
__Withdrawal (explain)	

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

The Honolulu Board of Water Supply (BWS) is proposing to replace eight (8) existing wells on the Kaimuki Pump Station property, located at the corner of Kapahulu Avenue and Harding Avenue, with five (5) new wells and associated improvements. The new wells would be outfitted with submersible pumps and connected to on-site booster pumps for transmission of the pumped water to upland reservoirs for storage and distribution to BWS customers.

Aging and deterioration of the existing well casings and connecting pipes (suction piping system) have prompted BWS to move forward with this replacement effort. When the new wells are installed, the old wells will be filled, capped, and inactivated. Additionally, security improvements would encompass the entire pump station property.

DRAFT ENVIRONMENTAL ASSESSMENT

KAIMUKĪ PUMP STATION WELL REPLACEMENTS

Honolulu, Hawai'i

Board of Water Supply
City and County of Honolulu

DRAFT ENVIRONMENTAL ASSESSMENT

KAIMUKĪ PUMP STATION WELL REPLACEMENTS

Honolulu, Hawai'i

March 2015

PREPARED FOR

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

PREPARED BY

BELT COLLINS HAWAII LLC
Honolulu, Hawai'i

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AQI	Air Quality Index
BLNR	Board of Land and Natural Resources (State of Hawaiʻi)
BMP	best management practices
BWS	Board of Water Supply (City and County of Honolulu)
CATV	cable television
CIA	Cultural Impact Assessment
CIP	Capital Improvement Program
CO	carbon monoxide
CWRM	Commission on Water Resource Management (State of Hawaiʻi)
CZM	Coastal Zone Management
dBA	A-weighted decibels
DLNR	Department of Land and Natural Resources (State of Hawaiʻi)
DOH	Department of Health (State of Hawaiʻi)
DDC	Department of Design and Construction (City and County of Honolulu)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMS	Emergency Medical Service
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FTA	Federal Transit Authority
FY	Fiscal Year
gpm	gallons per minute
HAR	Hawaiʻi Administrative Rules
HECO	Hawaiian Electric Company
HRS	Hawaiʻi Revised Statutes
IBC	International Building Code
i.d.	inside diameter
KIA	Kawaihāpai clay loam, 0 to 2 percent slopes
L_{eq}	equivalent continuous sound level
L_{90}	sound level that is exceeded for 90 percent of the measured time period
L_{dn}	calculated day-night sound level

L_{max}	maximum measured sound level
LUO	Land Use Ordinance
MAV	moving average
MG	million gallons
mgd	million gallons per day
msl	mean sea level
MS4	municipal separate storm sewer system
N.A.	not available
n.d.	no date
ND	not detected
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
Planning Act	Hawai‘i State Planning
$PM_{2.5}$	fine particulate matter (2.5 microns or smaller diameter)
PM_{10}	particulate matter (10 microns or smaller diameter)
ppb	parts per billion
ppm	parts per million
PUC	Primary Urban Center
RCNM	Roadway Construction Noise Model
SCADA	Supervisory Control and Data Acquisition
SE	Southeast
SHPD	State Historic Preservation Division
SMA	Special Management Area
SO_2	sulfur dioxide
STC	Sound Transmission Class
SW	Southwest
SY	sustainable yield
TMK	Tax Map Key
U.S.	United States
WMP	Watershed Management Plan

1 SUMMARY

PROPOSING AGENCY	Board of Water Supply (BWS), City and County of Honolulu
APPROVING AGENCY	BWS, City and County of Honolulu (City)
GENERAL PROJECT DESCRIPTION	The Honolulu Board of Water Supply (BWS) is proposing to replace eight (8) existing wells on the Kaimukī Pump Station Property, located at the corner of Kapahulu Avenue and Harding Avenue, with five (5) new wells and associated improvements. The new wells would be outfitted with submersible pumps and connected to on-site booster pumps for transmission of the pumped water to upland reservoirs for storage and distribution to BWS customers. Aging and deterioration of the existing well casings and connecting pipes (suction piping system) have prompted BWS to move forward with this replacement effort. When the new wells are installed the old wells will be filled, capped, and inactivated. Additionally, security improvements would encompass the entire pump station property.
PROJECT LOCATION	The five replacement wells would be located entirely within the 1.15-acre Kaimukī Pump Station property located at the corner of Kapahulu Avenue and Harding Avenue in Honolulu, Oʻahu, Hawaiʻi. The Tax Map Key (TMK) for the BWS-owned property is (1) 2-7-30: 12 and 55.
ANTICIPATED DETERMINATION	Finding of No Significant Impact (FONSI)
CONSULTED AGENCIES AND STAKEHOLDERS DURING EARLY CONSULTATION PERIOD	**State of Hawaiʻi Agencies** Office of Environmental Quality Control Department of Health, Environmental Management Division, Department of Land and Natural Resources (DLNR), Commission of Water Resource Management, Land Division, State Historic Preservation Division **City and County of Honolulu Agencies** Department of Planning and Permitting Department of Design and Construction Department of Environmental Services Department of Facility Maintenance Honolulu Fire Department **Adjacent Landowners** Mr. & Mrs. Eishiro Watanabe (TMK 2-7-30: 53) Mr. & Mrs. Michael T. Nakano ((TMK 2-7-30: 54) Mr. & Mrs. Richard H.F. Yee (TMK 2-7-30: 56) Mr. & Mrs. David M. Yamada, et al (TMK 2-7-30: 59) Market City Ltd. (TMK 2-7-30: 60) Mr. Giampaolo Boschetti/Lion King LLC (TMK 2-7-30: 56 & 59)

2 DESCRIPTION OF PROPOSED ACTION

2.1 Purpose and Need

The purpose of the proposed action is to drill and develop five new wells to replace eight existing wells on the Board of Water Supply's (BWS) existing Kaimukī Pump Station site in Kaimukī, Oʻahu, Hawaiʻi. Located at the corner of Kapahulu Avenue and Harding Avenue (see Figures 1 and 2), the 1.15-acre site is identified by Tax Map Key (TMK) as (1) 2-7-30: 12 and 55 (see Figure 3). The Kaimukī Pump Station is part of BWS' interconnected water system in Honolulu that includes wells and tunnels as sources for the system's potable water; reservoirs and tanks as storage facilities; and booster pumps, transmission lines, and service laterals as distribution systems to BWS customers.

The present Kaimukī Pump Station building was built in 1928 and has been continually renovated and updated over the years including its main booster pumps to meet operational requirements and current BWS design standards. The existing on-site wells, drilled between and inclusive of 1898 and 1928, have not been altered and remain in their original condition. In consideration of their age, there is a potential for leaks from the well shafts into the overlying stratum and loss of potable groundwater for general use and consumption. Recasing the existing wells would not be feasible because physical constraints in the outdated well casing dimensions reduce the well capacity and prevent modern standard equipment from accessing and repairing or servicing the well shaft interiors. Hence, the need to develop new wells to replace the old wells is the practicable and most feasible plan.

Along with replacing the existing aging wells, the suction piping system on the pump station site would require evaluation and possible replacement. This would include the water lines from the wells to the booster pumps in the pump station building where it would then be pumped into the BWS distribution system for the City.

2.2 Background

2.2.1 Background and Status of Existing Pump Station

The Kaimukī Pump Station, originally known as the "Kaimukī Pumping Station," was initially built in 1898 with the construction of the first two wells. Over the years, renovations and updates were made to the facility to accommodate increasing demand and current BWS design standards. Since the initial wells were dug, seven more wells were developed and in 1986 the final well was drilled providing the pump station site with eight production or supply wells and two monitoring wells. Meanwhile, in 1928, a pump station building was reconstructed on the site; it exists today with some additions and renovations.

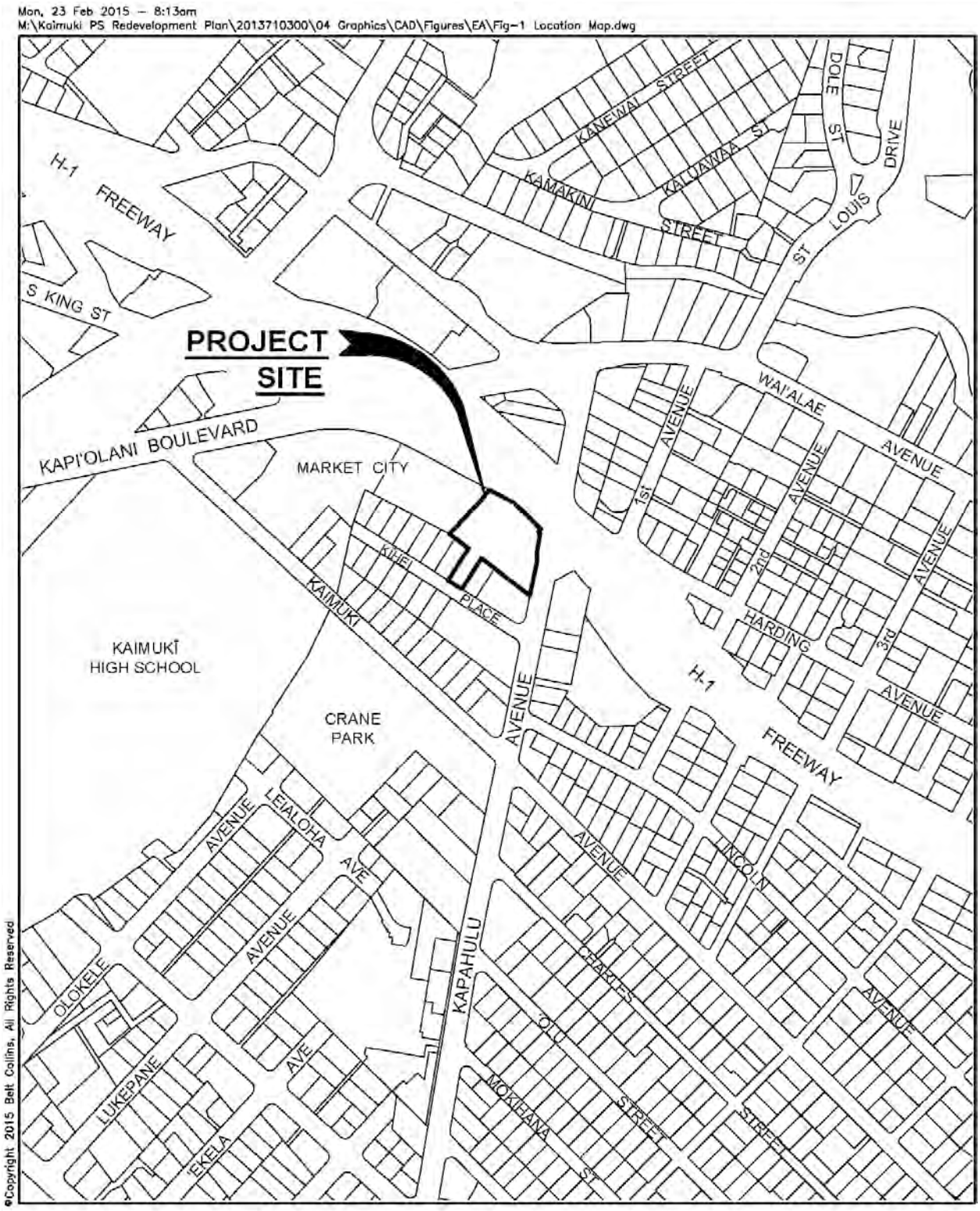


Figure 1
LOCATION MAP

BELT COLLINS

NORTH

0 200 400
SCALE IN FEET

Figure 2
PROJECT SITE

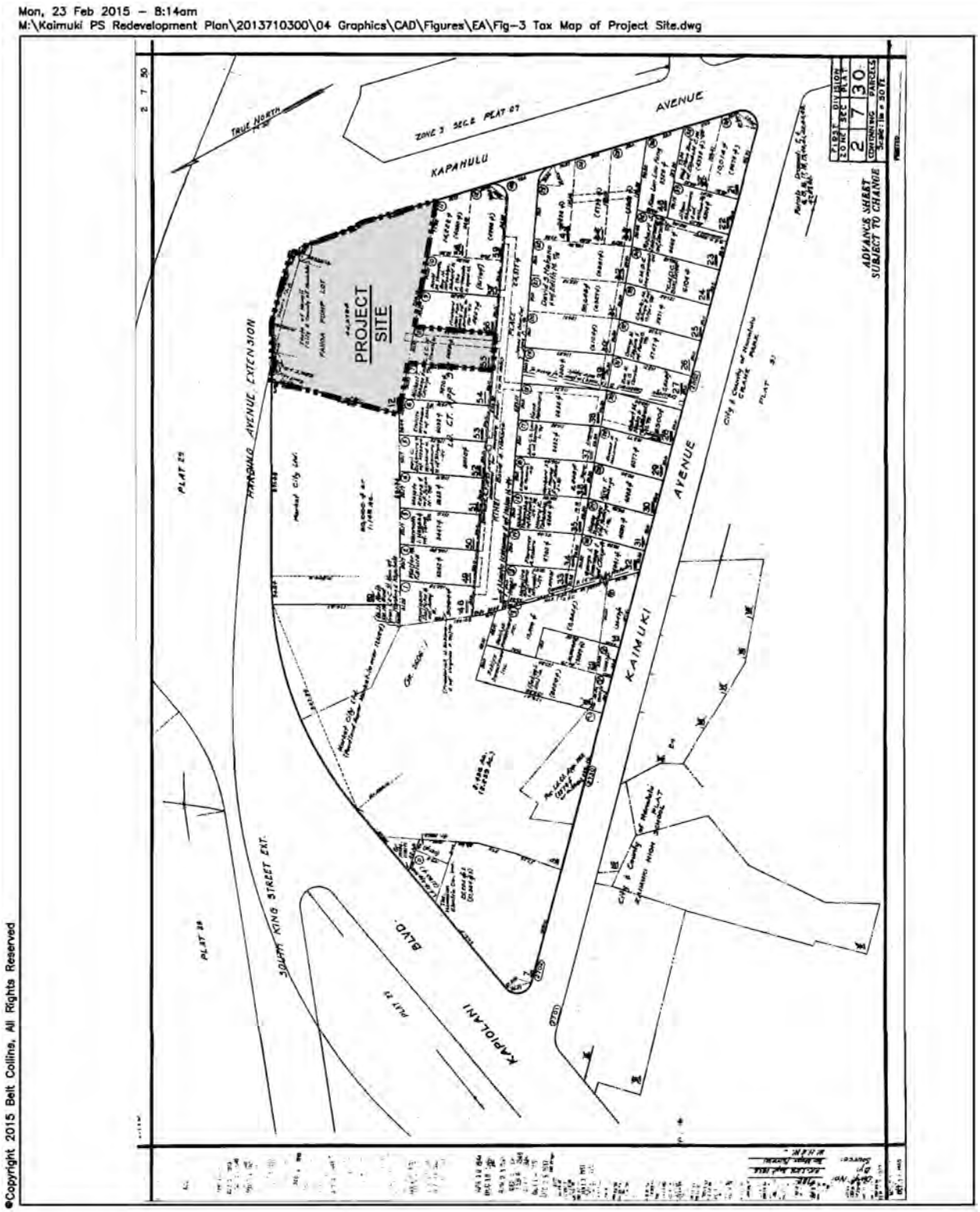


Figure 3
TAX MAP OF PROJECT SITE

Table 1 provides the identification and description of the on-site wells and their year of construction.

Table 1. Kaimukī Pump Station Existing Wells

State Well Number	Old Well Number	Well Type	Installation Date	Casing Construction	Access Vault
1748-03	7-A, No. 1	supply	1898	steel	well vault, brick and mortar
1748-04	7-B, No. 2	supply	1898	steel	well vault, brick and mortar
1748-05	7-G, No. 3	supply	1912	steel	value vault, brick and mortar
1748-06	7-H, No. 4	supply	1912	steel	value vault, brick and mortar
1748-07	7-C, No. 5	supply	1925	steel	value vault, brick and mortar
1748-08	7-D, No. 6	supply	1925	steel	value vault, brick and mortar
1748-09	7-E, No. 7	supply	1925	steel	value vault, brick and mortar
1748-10	7-F, No. 8	supply	1928	steel	well vault, concrete
1748-11	T86	monitor	1960	N.A.	no vault
1748-14	—	monitor	1986	N.A.	no vault

N.A. = Information not available.
Source: Honolulu Board of Water Supply

Aside from the addition of wells to the site, improvements to the pump station, over the past 100 years, have included pump replacements, pipeline reconnections, line replacements and upgrades, valve replacements and upgrades, pump station building renovations, and landscape enhancements. All eight supply wells were developed in the thirty-year period following the installation of the first two wells. Hence, all eight wells are more than 80 years old.

Well construction methodology at the turn of the 20th century typically included bricks and mortar access vaults. Use of such material in construction has invited deterioration in the aging process.

In early 2013, BWS commissioned engineering consultant Belt Collins Hawaii LLC to investigate the condition of the wells and their suction piping system, which connect to the booster pumps in the pump station building, and to recommend improvements to the facility, if needed, for their long-term and continued operation. Upon completion of the facilities evaluation, the recommendation is to develop new

wells to replace the old existing wells, install submersible pumps, and replace connecting pipelines in the suction piping system as conditions in the existing facilities are deteriorated beyond repair. These recommendations are included in the proposed action for this Environmental Assessment.

2.2.2 Board of Water Supply's Mission and Long-Range Plans

The mission of BWS is to provide "Water for Life," a safe and dependable water supply, now and into the future. In doing so, BWS' strategic objectives are broken down into three areas of action sustainability: resource, economic, and organizational. The resource objective ensures that the natural groundwater supplies are protected and managed efficiently. The economic objective calls for a sound financial program to support the department's operating and capital needs. It is noted, while BWS provides new system facilities to meet demand, it continues to focus on improving its core services by addressing aging infrastructure and ensuring the reliability and quality of water provided to all customers on Oʻahu. The third objective, organizational, is to maintain a strong, flexible organization that is able to resolve economic, regulatory, and service challenges.

BWS has initiated preparation of its watershed management plans (WMPs) for Oʻahu's eight watershed planning districts.[1] Each of these plans will be used to meet the requirements of preparing a county water use and development plan under the State Water Code and City and County of Honolulu ordinance. The WMP for the Primary Urban Center (PUC), in which the Kaimukī Pump Station is located, is scheduled for completion during the 2013–2017 period, according to BWS' website.

The goal of the WMP is to provide short-, mid-, and long-range guidance for the sustainable management and use of Oʻahu's valuable and finite surface water and groundwater resources to meet demands consistent with the City's land use plans. The three planning districts that have completed their WMPs thus far are: Waiʻanae, Koʻolau Loa, and Koʻolau Poko.

2.2.3 BWS Capital Improvement Program

The funding requirements for the proposed action planning studies are identified in BWS' current Capital Improvement Program (CIP) [Fiscal Year (FY) 2014–2019] and listed as "prior appropriations." Funding for the construction of the proposed improvements is pending the findings of the project's final Condition Assessment, Redevelopment Plan, and Environmental Assessment studies.[2]

2.3 Proposed Action

2.3.1 Well Replacements

The proposed action calls for replacing all eight supply wells on the Kaimukī Pump Station property with five new supply wells (see Figure 4). The new wells each would have larger dimensions than the existing wells, but would have an identical total yield capacity as the larger number of existing wells. The State

[1] Honolulu Board of Water Supply website: hbws.org/cssweb/display.cfm?sid=1406.

[2] Six-Year Capital Improvement Program (For the Fiscal Years Beginning July 1, 2013, and Ending June 30, 2019), Board of Water Supply, City and County of Honolulu, October 28, 2013.

Commission on Water Resource Management (CWRM) has issued a permit limiting the maximum yield on average for the site to 4.0 million gallons per day (mgd).

Each new well would be drilled to a depth of approximately 200 to 300 feet and at a minimum distance of approximately 100 feet from each other to ensure adequate spacing and avoidance of any negative effects from groundwater drawdown. The wells would have a diameter of 16 to 20 inches and shaft casing to a depth of approximately 100 feet[3] (see Figure 5), depending on final well design. The location of each well within the property is shown on Figure 4 and was determined by logistical systems requirements (see Figure 6) and avoidance of existing surface structures, mature trees, and on-site underground pipelines.

The new replacement wells would be equipped with submersible pumps or vertical turbine pumps with sound-attenuating enclosures to meet BWS' modern standards of well operation and design and to minimize noise impacts to surrounding properties. The ratings for the pumps would depend on the power requirement for the pumping operation. The pumps would operate on electrical power from Hawaiian Electric Company (HECO).

When the replacement wells are fully in operation, the existing wells would be filled, capped, and abandoned.

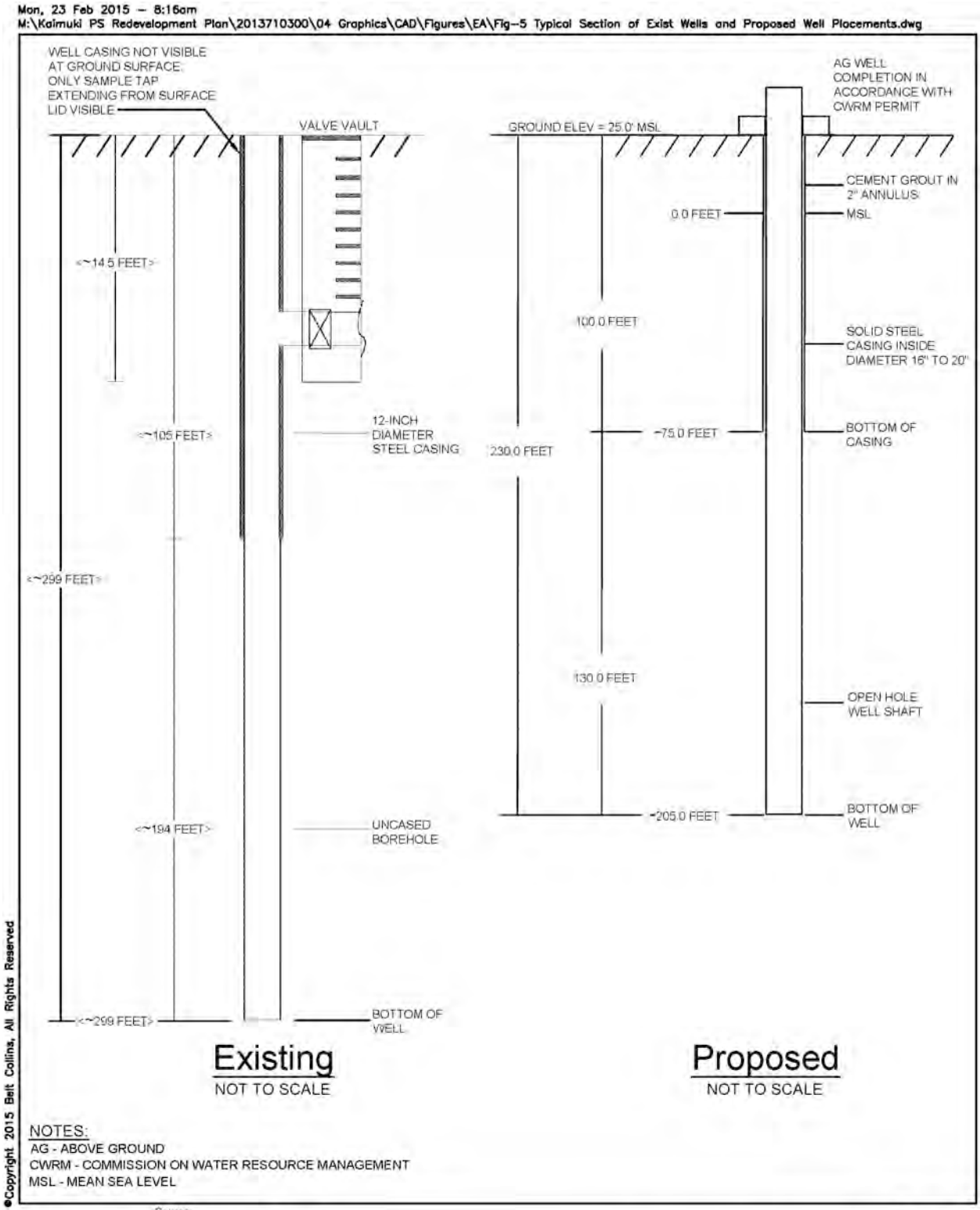
2.3.2 Ancillary Improvements

Replacement of the existing wells at the pump station would involve optional connections to the existing pumping system. BWS is currently studying these options and would select the most feasible connection option during the project's final planning stage. These optional connections involve tie-ins to different combinations of the site's suction piping system, high-pressure booster pumps, and low-pressure booster pumps or, alternatively, a bypass of these systems with the use of submersible pumps in each of the new wells. In other words, the water from these submersible pumps could bypass the booster pumps in the pump station building and flow directly into the off-site BWS storage and distribution system.

Depending on the connection option, the ancillary improvements for the project would include any combination of electrical system improvements, new variable-frequency drives for the existing high-pressure booster pumps including minor interior building modifications, new chlorination systems, suction piping system replacement, new 16- to 20-inch diameter ductile iron connecting pipes to the suction piping system, new valves and valve vaults, new venturi flow meters with vaults, new air-conditioning unit, new lighting, and drainage system improvements. All of these improvements would occur within the existing pump station building, within the new well shafts, and/or between the new wells and pump station building within the BWS site.

[3] Based on depth of well casing in current on-site wells.

Figure 4
PROPOSED REPLACEMENT WELLS



Source
Honolulu Board of Water Supply

BELT COLLINS

Figure 5
TYPICAL SECTION OF EXISTING WELLS AND PROPOSED WELL REPLACEMENTS

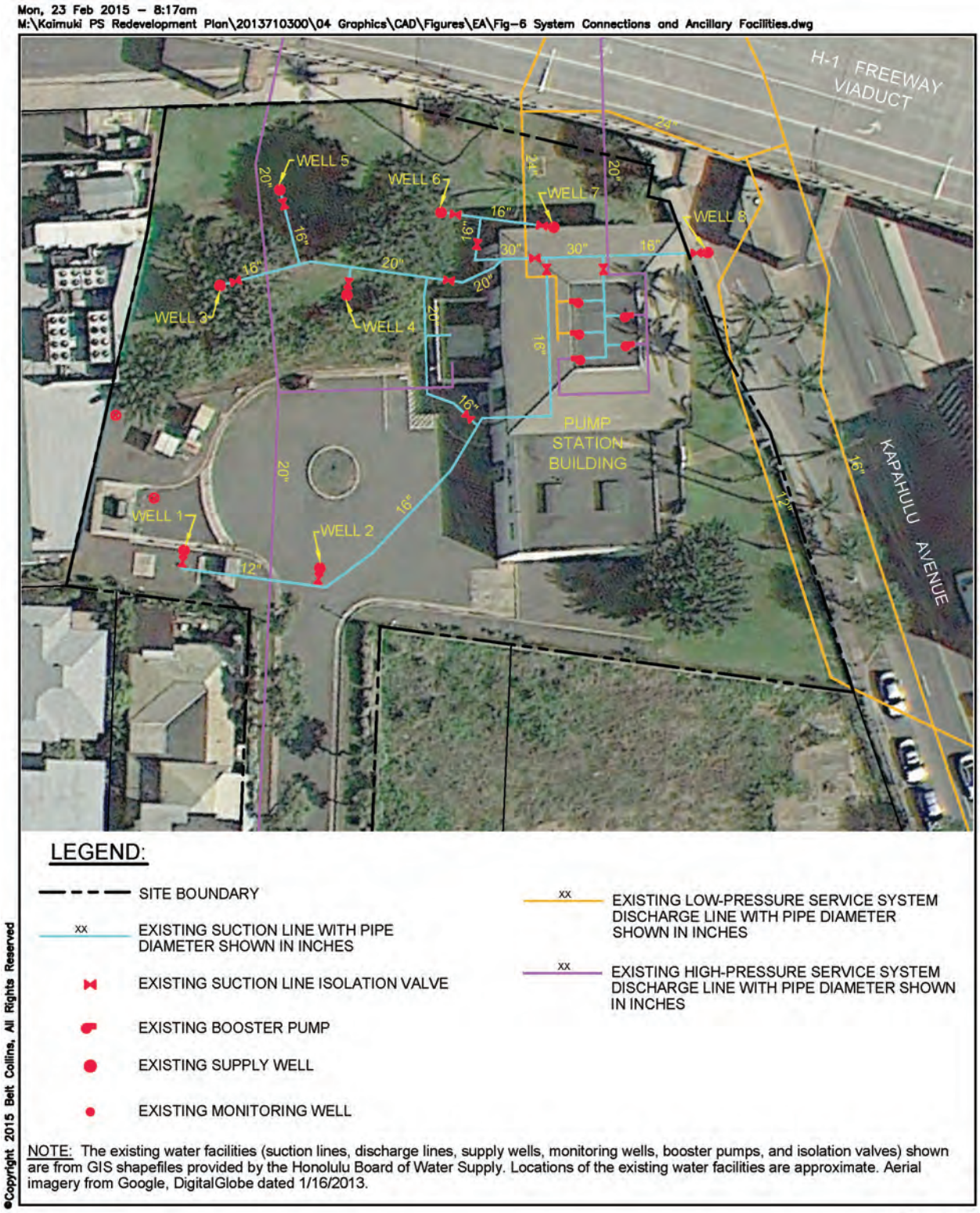


Figure 6
SYSTEM CONNECTIONS AND ANCILLARY FACILITIES

Security for the pump station grounds would be expanded from the existing chain-link fence around the pump station building, driveway and turnaround to the boundaries of the BWS property. This would require BWS to relocate the existing security barrier to enclose the entire BWS property along Kapahulu Avenue and Harding Avenue rights-of-way. The security boundary could be established using thick hedge vegetation around the grass area fronting Harding and Kapahulu Avenues.

2.4 Estimated Construction Cost

Preliminary cost estimates for construction of the replacement wells, submersible pumps, suction piping, and ancillary improvements (based on 2014 prices) range from $7.0 to $8.0 million depending on the final design of the replacement system.

2.5 Preliminary Project Timetable

Construction or installation of the improvements is scheduled in conjunction with the timing to replace the existing wells as deteriorating conditions warrant. Continuous assessment and monitoring of the existing facility conditions are necessary to assure proper timing for the construction of the replacement facilities and to prevent any delays or disruption in BWS service to customers.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Existing Land Use and Wells

3.1.1 Land Use

The project site is located in urban Honolulu at the corner of Kapahulu Avenue and Harding Avenue. A mix of commercial uses, business offices, and residential homes occupy the project vicinity. Market City, a community shopping center, is located to the west adjacent to the property. The Kapahulu Avenue–Harding Avenue intersection is at the crossroads of two major routes connecting Waikīkī and H-1 Freeway, and Kapiʻolani Boulevard and Kaimukī suburbs. The H-1 Freeway, a crosstown federally-aided State highway, passes over the intersection via an elevated viaduct.

The Kaimukī Pump Station site has a land area of 1.15 acres and is occupied by the single-story concrete pump station building that houses the large booster pumps for the station. There are eight wells on the site that feed the booster pumps and two other wells that serve as monitoring wells. Access into the property is via a driveway from Kīhei Place.

The pump station is self-operating and is routinely monitored once or twice a week by a BWS crew from the Plant Operations Division. Another BWS crew from the Field Operations Division regularly cleans and maintains the pump station grounds, which include a landscaped lawn with shrubs, coconut palm, and mature trees. The site is secured by a gate and chain-link fence and has a security camera for real-time surveillance.

3.1.2 Existing Wells

Tables 1 and 2 describe the physical characteristics of the existing wells. Eight are supply wells, and two are monitoring wells. All of the supply wells are interconnected by the suction piping system which feeds the booster pumps in the pump station building. Water drawn from the wells and pumped via the booster pumps to the off-site reservoirs and BWS distribution system is limited to a maximum running average flow rate of 4.0 mgd by the State CWRM (see Section 2.3.1).

The existing supply wells typically have a depth of approximately 240 to 300 feet with well casing to a depth of approximately 100 feet. The well casing diameter is 12 inches.

The monitoring wells are deeper and have smaller diameter well casings.

Table 2. Physical Characteristics of Existing Wells in Pump Station Site

State Well No.	Well Type	Casing Diameter (in inches)	Casing Length (in feet)	Open Hole Length (in feet)	Total Well Depth (in feet)
1748-03	Supply	12	N.A.	N.A.	260
1748-04	Supply	12	100	160	260
1748-05	Supply	12	N.A.	N.A.	240
1748-06	Supply	12	N.A.	N.A.	240
1748-07	Supply	12	95	206	301
1748-08	Supply	12	101	203	304
1748-09	Supply	12	105	194	299
1748-10	Supply	12	101	185	286
1748-11	Monitor	6	114	1,290	1,404
1748-14	Monitor	9.085 (i.d.)	120	1,080	1,200

i.d. = inside diameter.
N.A. = information not available.
Source: Honolulu Board of Water Supply

3.1.3 Existing Water System

The existing water system in the project district of Honolulu comprises a system of wells, reservoirs or storage tanks, booster pumps, pressure valves, transmission mains, and service laterals. These system components are not necessarily dedicated solely to the service of that system. The systems in the neighboring districts of Honolulu are interconnected and are able to share resources. As a result, when the demand for water is unexpectedly high in one district, water from the neighboring district can be conveyed over to supplement the affected district.

The Kaimukī Pump Station contains booster pumps, which pump water from their on-site wells to upland reservoirs for storage and distribution to two water service systems: a high-pressure service system (405 feet Metro System) and a low-pressure service system (180 feet Metro System). The service area for the high-pressure service system includes the St. Louis Heights, Pālolo Valley, Whilhelmina Rise, ʻĀinakoa, Waiʻalae, and Kaimukī areas. The service area for the low-pressure system includes the Kapahulu, Waikīkī, McCully, Mōʻiliʻili, and University of Hawaiʻi at Mānoa areas.

Water from the supply wells is conveyed to the booster pumps in the pump station building via a network of suction lines. Available records for the existing suction lines date back to 1927; however, some of the suction lines in use today may have been constructed as early as 1912, when two of the eight wells were constructed.

Flow from the suction lines discharges into a common suction manifold that supplies both the high- and low-pressure service system pumps. The pump station building contains five horizontal split-case centrifugal pumps mounted on concrete pads. Three of the pumps supply the high-pressure system, and the other two pumps supply the low-pressure system. On average, the high-pressure system delivers approximately 2.9 to 3.5 mgd and the low-pressure system delivers between 0.5 and 1.4 mgd of daily water into the BWS distribution system.

3.2 Land Tenure

The pump station property is comprised of two adjoining parcels identified by TMK as (1) 2-7-30: 12 and 55 (see Figure 2). Both parcels are owned by BWS.

3.3 Geology/Physiography/Soils

3.3.1 Geology

The volcanic origin of Oʻahu, which includes the Waiʻanae volcano and Koʻolau shield volcano, and the millions of years of erosion and sea level change, have shaped the island and its subsurface composition to what it is now. Kaimukī is located in the Honolulu Volcanic Series of the Koʻolau shield volcano. The Honolulu Volcanic Series, occurring after a long absence of volcanic activity in the Koʻolau volcano, included a set of one-time volcanic eruptions in the Honolulu area probably between 800,000 and 30,000 years ago.[4] These individual eruptions created some notable island features including Diamond Head, Punchbowl Crater, and Hanauma Bay. The composition of these volcanic outflows is significantly different from those of the original volcanoes.[5]

[4] *Geotechnical Engineering Exploration Excavation Shoring Design Kaimuki Station Wells Redevelopment*, Geolabs, Inc., December 5, 2013, and *Honolulu Volcanics Series*, Wikipedia, February 9, 2012.

[5] *Honolulu Volcanic Series*, Wikipedia, February 9, 2012.

3.3.2 Physiography

The pump station site is relatively level with elevations ranging from 32 feet above sea level at the northeastern boundary of the property to 26 feet at the southwestern boundary (see Figure 7). The predominant slope across this area is approximately 3.3 percent. Surface runoff occurs generally by sheet flow following the overall slope of the property.

The pump station driveway off of Kīhei Place has an overall gradient of 5 percent. Runoff from the pump station site flows down the length of the paved access to the private road where the elevation is at 20 feet.

3.3.3 Soils

The U.S. Soil Conservation Service, now known as the Natural Resources Conservation Service, classifies the soil on the property as Kawaihāpai clay loam, 0 to 2 percent slopes (KIA) (see Figure 8).[6] This soil generally occurs on smooth slopes with grades of 3 to 7 percent. The texture of the soil is silty clay and is known to include small areas that are poorly drained.

In December 2013, a geotechnical investigation was conducted on the property to determine the excavation shoring design for the in-situ testing of the existing underground piping at the Kaimukī site. Three sample borings were performed, and the results showed that the subsurface conditions typically included a top layer of silty clay, gravelly sand, or sandy silt. Below that layer is a layer of clayey gravel or sand, silty clay, boulders, or cobbles, and hard basalt rock is at 20 to 27 feet below the surface.

3.4 Hydrology and Water Resources

3.4.1 General Hydrology

3.4.1.1 Surface Water

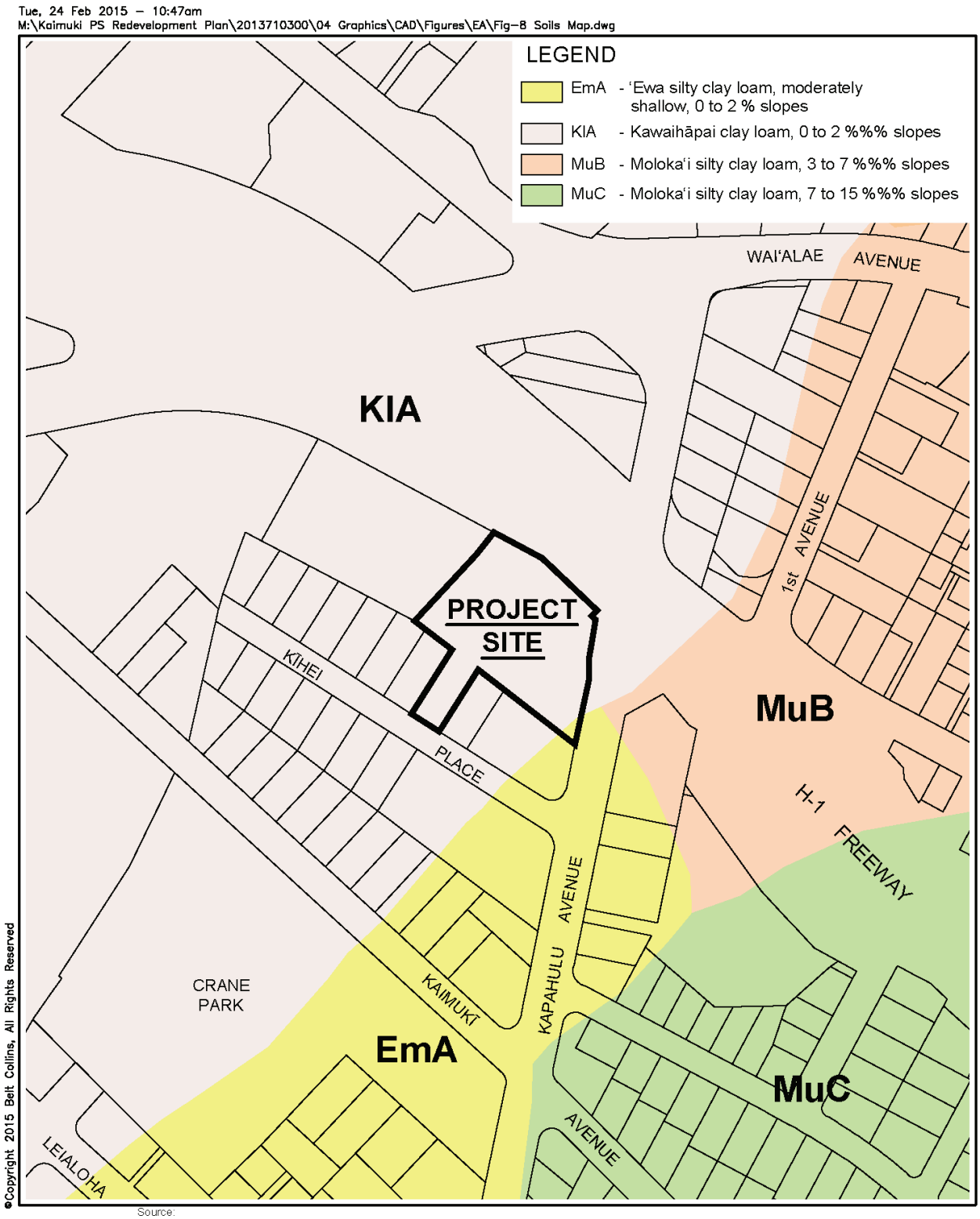
No streams, ponds, or other surface water features occur near or within the pump station site. The nearest coastal shoreline, Waikīkī Beach, is located approximately 1.1 miles from the property.

3.4.1.2 Groundwater

Groundwater occurs in the project area as basal groundwater which rests on seawater or brackish water beneath the surface of the land. The thickness of this freshwater layer increases toward the center of the island, particularly in the mountain areas where rainfall recharge occurs. With sections of this groundwater occurring at higher elevations than the project site, wells drilled at lower elevations such as at the Kaimukī Pump Station could occur as artesian with the aid of a confining layer of soil with low permeability (referred to as an aquiclude) that overlie the confined aquifer. The water in the confined aquifer is under pressure due to the confining layer and the higher level of the water table upgradient of the Kaimukī Pump Station wells. This pressure causes the water below the pump station site to flow from the wells without pumps. However, this pressure is not sufficient for the operation of the existing booster pumps. Vacuum pumps within the pump station building provide sufficient vacuum to raise the well water to the suction inlet of the existing booster pumps.

[6] *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawai'i*, U.S. Department of Agriculture, Soils Conservation Service, Issued August 1972.

Figure 7
EXISTING SITE CONDITIONS



Source:
U.S. Soil Conservation Service, 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*

BELT COLLINS

NORTH

0 50 100 200
SCALE IN FEET

Figure 8
SOILS MAP

3.4.2 Honolulu Sector Aquifer

CWRM identifies the aquifer sector serving the city of Honolulu as the Honolulu Aquifer. The boundaries of this aquifer stretch from Hawai‘i Kai on the east end to Red Hill on the west end, a lateral distance of approximately 17 miles. This immense aquifer sector has a sustainable yield of approximately 50 mgd.[7] Recent usage in this aquifer has been in the mid-40-mgd range and includes consumption by a wide variety of users, including residential, commercial, industrial, manufacturing, government, tourism, parks, schools, and other public facilities.[8]

3.4.3 Existing Water System and Usage

The BWS water system that serves the Honolulu sector of the island consists of an interconnected network of subsystems each containing their own wells, reservoirs, transmission mains, pump stations, pressure reducing valves, and service laterals. The interconnection of these subsystems assures that when the source of one subsystem is down, for whatever reason, the sources for the other subsystems can readily feed the down area without causing overall disruption in BWS service.

3.4.4 Well Replacements Impact on Existing Area Wells and Groundwater Resource

The proposed replacement of eight existing supply wells with five new wells is expected to have no adverse impact on other BWS wells in the vicinity nor on existing groundwater in the project area. When the new wells are online, the old existing wells would be deactivated, sealed, and abandoned. There would be no change in the volume of water withdrawn from the aquifer and no change in pumping discharges into the BWS water system. The Kaimukī Pump Station is restricted to a maximum running average withdrawal of 4.0 mgd regardless of the potential yield capacity of the site. This restriction has been set by the State CWRM.

Prior to drilling and development of the new wells, a well construction permit and pump installation permit will be secured from CWRM. CWRM is responsible for managing use of and regulating the State’s water resources.

3.4.5 Potential Contamination

No potential sources of contamination have been identified in the project vicinity. No landfills, industrial districts, agricultural fields, or hazardous waste disposal sites occur within 2.0 miles of the pump station. BWS Annual Water Quality Report indicates water quality from the water system serving the project area which includes the Kaimukī Pump Station wells has been tested and meets all Federal and State standards.[9] None of the water quality test components exceed minimum safe level parameters. The new wells would be drilled in the same well field of the Kaimukī site and subject to the same monitoring and testing requirements of the existing wells.

---

7 *Island of Oahu, Total = 407 MGD, Hydrologic Units*, Commission on Water Resource Management, Map ID: 1026, August 8, 2008.

8 *Hawaii Water Plan: Water Resource Protection Plan,* Commission on Water Resource Management, June 2008.

9 2013 Annual Water Quality Report, Honolulu Board of Water Supply. Online report on properties in project area.

3.5 Flora

3.5.1 Existing Conditions

Landscaping at the project site consists of a grass lawn and a variety of ornamental trees and plants around the pump station building, driveway, and turnaround.[10] At the eastern side of the property, there are a large rainbow shower tree (*Cassia x nealae*) and several coconut palms (*Cocos nufifera*), while plantings of snowbush (*Breynia disticha*) and bird-of-paradise (*Strelitzia reginae*) are located adjacent to the building.

Three additional rainbow shower trees and several peregrine (*Jatropha integerrima*) shade much of the northwest quarter of the property. Hedges of bougainvillea (*Bougainvillea spectablis*) and Fukien tea (*Carmona retusa*) are also present.

Spider lilies (*Crinum asiaticum*) grow along the gated entrance, and the driveway is lined with Caribbean trumpet trees (*Tabebuia aurea*) and hedges of Chinese hibiscus (*Hibiscus rosa-sinensis*). A sparse assemblage of weeds, mostly graceful spurge (*Euphorbia hypericifolia*), *Oldenalandia corymbosa*, peppergrass (*Lepidium virginicum*), and clumps of wiregrass (*Elusine indica*), occurs between the hedges and the driveway.

The large lawn surrounding the pump station is comprised primarily of a mix of Bermuda grass (*Cynodon dactylon*), narrow-leaved carpetgrass (*Axonopus fissifolius*), and Hilo grass (*Paspalum conjugatum*). A complete list of the flora recorded on the property is located in Appendix B.

Species of note include two Polynesian introductions, ʻihi ʻai or yellow wood sorrel (*Oxidalis corniculata*) and the earlier-mentioned coconut palm. One indigenous species is present: ʻaeʻae (*Bacopa monnieri*) grows in a small drainage swale next to the walkway on the northern side of the pump station building. The sprinkler system appears to be keeping this location wet enough for ʻaeʻae, an obligate wetland species.

3.5.2 Impacts and Mitigation Measures

Vegetation on the property is comprised predominantly of nonnative species. No federal or state listed endangered or threatened plant species were observed or recorded on the property. No mitigation is required.

[10] A botanical survey was conducted on the property by AECOS, Inc. in August 2013 and its findings are provided in the report, *Biological Survey at the Kaimukī Pump Station in Honolulu, Oʻahu*, January 21, 2014 (see Appendix B of this EA).

3.6 Fauna

3.6.1 Existing Conditions

In a fauna survey of the project site,[11] 104 individual birds of 11 different species, representing 8 separate families, were recorded within the property. An additional species, Japanese White-eye (*Zosterops Japonics*), was recorded as an incidental sighting during the botanical survey. Zebra Dove (*Geopelia strata*), Spotted Dove (*Streptophelia chinensis*), and Common Myna (*Acredotheres tristis*) accounted for just over 60 percent of all birds sighted during the survey. The White Tern or manu o kū (*Gygis alba*), an indigenous bird, was sighted briefly flying high over the property. A survey of visible areas in trees, hedges, and groundcover did not locate any eggs of this species. A complete list of the avifauna observed on the property is provided in Appendix B of this document.

Mammals observed on the property were limited to a leashed domestic dog being walked on the site.

3.6.2 Impacts and Mitigation Measures

None of the species observed or recorded on the property are important from a natural resource conservation perspective. None are listed as threatened or endangered by federal or state regulations. Further, the proposed action would not result in modification of any federally designated Critical Habitat, as none occur on or adjacent to the project site. The White Tern, which was observed flying over the property, was a singular observation that provided no evidence of a regular occurrence. No adverse project impact on this species is anticipated.

No mammalian species, currently protected or proposed for protection under federal or state endangered species statutes, were observed on the property during the survey. Although no rodents were recorded, it is likely that one or more of the four established alien Muridae found on Oʻahu—roof rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus domesticus*)—utilize various resources found within the general project area on a seasonal basis.

No Hawaiian hoary bat, which is a federal and state listed endangered species, was observed during the survey. The proposed action is not anticipated to impact this species which is highly unlikely to occur in lower urban Honolulu.

No mitigation measure is required to minimize impacts on any significant fauna species on the property.

3.7 Air Quality

3.7.1 Existing Conditions

Air quality around the project area is typical of an urban district in Honolulu. The State Department of Health (DOH) operates four air quality monitoring stations around Honolulu and Leeward Oʻahu. The

[11] A biological survey was conducted on the property by AECOS, Inc. in August 2013 and its findings are provided in the report, *Biological Survey at the Kaimukī Pump Station in Honolulu, Oʻahu*, January 21, 2014 (see Appendix B of this EA).

closest test station in a similar urban environment as the pump station site is the test station located on Beretania Street. The monitoring equipment is located on the rooftop of the DOH building. This station monitors for sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter 10 microns or smaller diameter (PM_{10}), and particulate matter 2.5 microns or smaller diameter ($PM_{2.5}$). Air quality readings have typically shown Good air quality on a scale that ranged from Good to Hazardous.[12] Lower readings are expected when extreme conditions occur, for instance on days when wind conditions are still and nearby traffic is extremely heavy or congested. On days when vog blankets the area, air quality readings drops below Good.

3.7.2 Impacts and Mitigation Measures

Construction-related air emissions would not be significant as they would be short-term and controlled through implementation of required construction management procedures. Fugitive dust generated by earthwork or other site preparation activities would be controlled by best management practices (BMPs) such as sprinkling of water over exposed dirt areas, covering dirt stockpiles, and temporarily halting site preparation activities during gusty wind periods. Properly maintained exhaust systems on diesel-powered trucks and construction equipment would mitigate dirty emissions. As applicable, permits under Hawai'i Administrative Rules (HAR) 11-60.1 would be obtained by the contractor for use of any regulated stationary source equipment in construction.

After construction and during facility operations, no emissions from the proposed action would be generated. No mitigation measures are required.

3.8 Acoustical Environment

3.8.1 Existing Conditions

Ambient noise level measurements were conducted on the Kaimukī property by D.L. Adams Associates in November 2013 (see Appendix C). The acoustics consultant used a Larson-Davis, Model 831, Type 1 Sound Level Meter together with a Larson-Davis, Model 377B20 Type 1 Microphone at two locations on the site.

The ambient sound levels at the study site are typical of an urban environment and vary with the time of day based on vehicular traffic volumes. There is minimal difference between the two measurement locations due to the proximity of the sound meters to each other on the property. The range of equivalent continuous sound level, L_{eq}, during the day (7:00 AM to 10:00 PM) and during the night (10:00 PM to 7:00 AM) and the average calculated day-night level, L_{dn}, for each location are summarized in Table 3.

[12] DOH's assessment of air quality at its monitoring station is conducted daily and is based on an Air Quality Index (AQI) which is scaled from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. When the AQI is in the range of 0 to 50, the level of health concern is the least and is thus rated Good, 51 to 100 is rated Moderate, 101 to 150 is Unhealthy for Sensitive Groups, 151 to 200 is Unhealthy, 201 to 300 is very Unhealthy, and 301 to 500 is Hazardous.

Table 3. Summary of Noise Measurement Results (A-weighted decibels [dBA])

Measurement Location	AM L_{eq}	PM L_{eq}	Average L_{dn}
Location 1 – Southeast (SE) Corner of BWS Site	59–66	53–62	65
Location 2 – Southwest (SW) Corner of BWS Site	59–65	56–60	65

Notes

AM L_{eq} = 7:00 AM to 10:00 PM continuous, hourly equivalent sound levels.

PM L_{eq} = 10:00 PM to 7:00 AM continuous, hourly equivalent sound levels.

Average L_{dn} = average calculated day-night sound level.

Source: D.L. Adams Associates, 2014

3.8.2 Probable Project Impacts

3.8.2.1 Construction Noise

Construction and testing of the wells, which would have the biggest noise impact, would involve primarily four stages. Each stage would utilize various types of construction equipment listed in Table 4. An estimated duration is provided for each stage, but these estimates assume that the contractor is able to work continuously with minimal interruptions. The noise levels shown in Table 4, as provided by D.L. Adams, represent A-weighted maximum sound levels (L_{max}), measured at a distance of 50 feet from the construction equipment. The actual noise levels produced during construction would be a function of the methods employed at each construction stage. The equipment described below represents a reasonable approximation of the type of equipment that would be used.

From Table 4, the jackhammer used during the site preparation stage and the drill rig and crane used during the well installation stage would be the loudest equipment. The actual sound levels experienced at the site, however, are dependent on the distance of the sound receptor from the noise source, the duration of the construction activities, and the number of construction equipment used at the same time.

Table 4. General Construction Stages and Equipment

Construction Stages	Expected Equipment	Acoustical Use Factor (%)[1]	L_{max} at 50 feet (dBA, slow)[2]	Impact Device[3]
A Site Preparation[4] (4 hours)	Backhoe	50	81	
	Jackhammer	50	83	Yes
B Well Installation (wells to be drilled one after the other (5 weeks)	Drill Rig	50	82	
	Circulation Pump	50	72	
	Shaker Screen	50	69	
	Backhoe	40	78	
	Crane	15	84	
	Welding Equipment	40	71	
C Concrete Base Pour (6 work days)	Backhoe	40	78	
	Drum Mixer	50	83	
	Pump	100	53	
D Testing (5 weeks)	Pump	100	N/A	
	Generator	100	64[5]	

Notes

1. The acoustical use factor is an estimate of the fraction of time each piece of construction equipment is operating at full power (i.e., the equipment would be operating in its loudest condition). The use factors shown are based on information provided by Belt Collins. For the remaining usage factors, the value is based on the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) [Reference 6 (see Appendix C)] database.

2. The L_{max} values are based on the RCNM construction noise database and other construction noise databases. The noise levels listed represent L_{max} measured at a distance of 50 feet from the construction equipment using a slow meter response.

3. Impact equipment is equipment that generates an impulsive noise produced by the periodic impact of a mass on a surface which is of short duration and high intensity, characterized by abrupt onset and rapid decay, and often rapidly changing spectral composition.

4. The site preparation phase would only occur at locations 1 and 2 which require the breaking up and removal of existing pavement.

5. A larger generator may be required to power two well pumps simultaneously during the testing period.

N/A = not applicable.

Source: D.L. Adams Associates, 2014

The Datakustik Cadna-A, noise prediction software,[13] was used to predict construction noise to six receptor locations neighboring the project site. Table 5 provides the results of the construction noise analysis.

[13] DataKustik Cadna-A, Version 4.2; DataKustik GmbH, 2010.

Table 5. Construction Noise Analysis Results

ID	Noise Receptor	Approximate Distance[1] to Well (ft)	Existing Ambient Noise[2] (dBA)	Maximum Predicted Construction Noise per Stage[3] (L_{max} dBA)				Hourly Equivalent Predicted Construction Noise per Stage[4] ($L_{eq\ (8hr)}$ dBA)			
				A	B	C	D	A	B	C	D
R1	Nearest Residences (2832–2838 Kīhei Pl.)	25 (Well 3)	60-65	91	94	92	71	85	88	88	71
R2	Nearby Residences (2835–2841 Kīhei Pl.)	180 (Well 4)		74	77	74	54	67	71	70	54
R3	Market City Shopping Center (2919 Kapiʻolani Blvd)	220 (Well 1)		47	61	58	38	41	55	55	38
R4	Kilohana Square (2848 Kīhei Pl.)	150 (Wells 4, 5)		74	77	74	54	67	71	70	54
R5	Kapahulu Medical Clinic (1029 Kapahulu Ave)	110 (Well 5)[5]		72	81	78	57	65	75	74	57
R6	Commercial Walkup (1111/1115 Kapahulu Ave)	200 (Well 2)[5]	N/A	67	75	72	51	61	69	68	51

Notes

A, B, C and D refer to the project's construction stage. N/A = Not available.

1. The value is the approximate distance from the noise receptor to the location of the nearest proposed well.

2. Existing ambient noise at the receptor locations is the range of L_{eq} measured at the project site. The hourly L_{eq} range is based on data collected from 7:00 AM to 6:00 PM which corresponds to the allowable construction hours under the DOH noise permit. Noise receptors that are located closer to the main roadway surrounding the project site (i.e., Kapahulu Avenue, Kapiʻolani Blvd) are expected to have slightly higher ambient noise levels.

3. The maximum construction noise levels are represented as L_{max} and take into account distance from the closest noise source, shielding due to the buildings that surround the project site, and reflections from the ground surface. The construction noise levels were calculated for each construction stage (defined in Table 4).

4. The predicted construction noise levels are represented as L_{eq} and take into account the usage factor of each piece of equipment, as defined by Belt Collins and the RCNM construction equipment database. The construction noise levels were calculated for each construction stage (defined in Table 4). The analysis assumed that all construction activities occur during an 8-hour workday and takes into account distance from the closest noise source, shielding due to the buildings that surround the project site, and reflections from the ground surface.

5. D.L.Adams Associates analyzed noise associated with construction at five well sites proposed as of mid-2014. Since that analysis was completed, Well 2's location has been moved to the site shown in Figure 4, about 50 feet farther from Kapahulu Avenue and receptors to the east. The predicted noise levels due to activities at the revised Well 2 location are not expected to be significantly different than the levels shown in the table.

Source: D.L. Adams Associates, 2014

Both stationary and impulse[14] construction noise are anticipated to exceed maximum permissible limits specified in the State "Community Noise Rule," and as a result, a permit must be obtained from the State DOH to allow the operation of the construction equipment to proceed.

The results of the construction noise analysis show that construction noise levels at the nearest residential receptors are expected to be excessive. Noise levels would exceed the Federal Transit Authority's (FTA) noise impact thresholds of 80 dBA for residential uses. Due to the very close proximity of the new well locations to the adjacent residences, noise levels may increase by up to 34 decibels (dB) over existing levels during the installation of the wells. This may be perceived as more than four times as loud as the existing ambient noise.

The 8-hour time-weighted average sound level at these nearest residences is calculated to be 88 dBA during the well installation and concrete base pour stages when construction occurs at the well location closest to the residences. The National Institute for Occupational Safety and Health (NIOSH) recommends noise standards to protect workers from hearing losses resulting from occupational noise exposure.[15] In particular, it recommends a noise exposure of no more than 85 dBA for an 8-hour duration. Under these guidelines, it would be considered hazardous for the residents in the homes surrounding the Kaimukī Pump Station site to be exposed to noise levels of 88 dBA for more than 4 hours.

Construction noise levels at other locations in the vicinity would be lower than for the nearest houses.

The FTA's noise impact threshold of 85 dBA for commercial land uses would not be exceeded during any phases of the construction. During installation of the wells however, exterior ambient noise levels may increase by as much as 21 dB over existing ambient levels. This may be high enough to cause some people in surrounding commercial buildings that face the BWS site to feel necessary to raise their voices or speak closer to others during the well installation period.

The commercial walkup and other buildings close to the H-1 viaduct will likely experience noise reflections from the underside of the highway overpass. Therefore, at this location, construction noise may be up to 3 dB higher than the levels shown in Table 5. Ambient noise, however, at this busy intersection is also likely, and it may mask some of the construction noise from the Kaimukī site. Moreover, the relocation of Well 2 to the site shown in Figure 4 would tend to reduce noise impacts to the east.

Construction activities generate not only audible airborne sounds, but also varying degrees of ground vibrations depending on the equipment and methodology used. Jackhammering and well drilling are two likely major sources of vibration. Vibration induced by specific construction equipment on a short-term, temporary basis would not usually result in adverse effects on people or structures.

[14] Stationary noise sources include air-conditioning units, exhaust systems, generators, compressors, pumps, etc.; impact or impulse noise, as defined by DOH, consists of "any sound with a rapid rise and decay of sound pressure level, lasting less than one second, caused by sudden contact between two or more surfaces . . . ."

[15] *Criteria for a Recommended Standard – Occupational Noise Exposure,* Department of Health and Human Services, Center for Disease Control and Prevention, June 1998.

3.8.2.2 Operations Noise

Operations of the replacement wells would involve use of submersible pumps deep in the well shaft where water in the well is pumped to the surface and conveyed through the suction piping system to booster pumps in the existing pump station building or directly to the off-site BWS storage and distribution system. The submersible pumps would not generate any notable audible noise at the surface. No other operations from the proposed improvements are expected to be audible at the neighboring property line.

3.8.3 Noise Mitigation Measures

In cases where construction noise is expected to exceed the State's "maximum permissible" level as provided in HAR, Chapter 46, Community Noise Control,[16] a permit must be obtained from DOH prior to the construction activity. In issuing a noise permit to the contractor, DOH may require action by the contractor to incorporate noise mitigation into the construction plan. DOH may also require the contractor to conduct noise monitoring or community meetings inviting the neighboring residents and businesses to discuss construction noise impacts. The contractor should use reasonable and standard practices to mitigate noise, such as employing mufflers on diesel and gasoline engines, employing properly tuned and balanced machines, etc. DOH may, however, require additional noise mitigation, such as a temporary noise barrier or time of day usage limits for certain kinds of construction activities.

The testing stage for each well would involve continuous operation by a generator and pump over 96 hours. On occasion, two wells may be pump tested at the same time to measure the effects, if any, of each well's drawdown in the groundwater on the other well. A noise variance would need to be obtained from the DOH to allow this operation to exceed maximum permissible noise levels and operate outside of permitted operating times. DOH will require the contractor to prove that nighttime work is in the public interest, that it does not substantially endanger public health or safety, and that appropriate measures for the attenuation of excessive noise will be taken. Property owners and residents in the neighborhood must be notified of the variance application through public notice procedures. A public hearing may be requested where the neighboring residents and businesses can discuss construction noise impacts. If a public hearing is held, a letter stating the purpose of the project and indicating the time and place of the public meeting must be delivered to all affected residences and property owners.

Noise mitigation for nighttime construction activities should be addressed using management of both source and path as described below.

Mitigation of Noise Source: Mitigating construction noise at the source is the most effective form of noise control. Possible source control methods include:

- Schedule noisy activities to less sensitive time periods or to restricted hours
- Substitute quieter equipment
- Install quality exhaust mufflers

[16] Chapter 46, Community Noise Control, Department of Health, State of Hawai'i, HAR, Title 11, Sept. 23, 1996.

- Reduce power options (use smallest size and/or lowest power as required)
- Employ quieter backup alarms/install manual adjustable or ambient sensitive alarms
- Insulate or enclose motors
- Retrofit equipment such as with rubber chucks in jackhammers
- Upkeep equipment maintenance

Mitigation of Noise Path: Source control measures alone would not be sufficient to avoid noise impacts to the adjacent residences; as a result, path control measures should also be considered.

A temporary noise barrier wall having a sound transmission class (STC) rating of STC 25 or greater[17] could be constructed along the BWS property line to reduce noise to the nearest residences along Kīhei Place. The height of the barrier should be 12 feet high and break the line of sight from the upper story windows of the adjacent homes. An on-site inspection should occur to determine whether the barrier should be higher than 12 feet. Absorptive material could cover the face of the barrier facing the BWS site (see Appendix C for further details). This temporary noise barrier wall should reduce noise levels by at least 10 to 15 dB to the nearest residences. While noise levels due to construction would remain excessive at the neighboring residences, they would no longer be considered hazardous.

Additional mitigation options call for the façade of the Foodland building in the vicinity of the westernmost well to be covered with a sound absorptive curtain. The absorptive material would prevent noise from the construction equipment from reflecting off the building's hard surface toward the surrounding areas. This mitigative measure may reduce noise levels by an additional 3 dB to the nearest residences.

In addition to the temporary noise barrier wall at the BWS property line, portable noise enclosures lined inside with absorptive material could be constructed around the drill rig, pumps, and equipment generators. Typically, these enclosure systems should be installed as close as possible to the noise sources while allowing for access and adequate airflow. They should be high enough to break the line of sight between the noise source and receiver.

3.9 Natural Hazards

3.9.1 Flood

The Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency under the National Flood Insurance Program does not identify any major floodways or floodplains in the project

[17] This would require a material having a surface weight of at least 2.5 pounds per square feet, such as 1-inch marine grade plywood, 3/4-inch medium density fiberboard or a prefabricated temporary noise barrier system (see Appendix C for further details).

area (see Figure 9). According to the FIRM, the pump station site is located in Flood Zone X, which are areas determined to be outside the 0.2 percent annual chance flood plain.[18]

Located approximately 1.1 miles from the coast and at an elevation of approximately 30 feet, the pump station site would not be affected by any tsunami inundation.

3.9.2 Earthquake

Earthquakes occur frequently in Hawaiʻi; however, many are so small that they cannot be felt. The islands are in a volcanic and tectonically active region with rifts, faults, and fissures cutting through every one of the major islands. The tectonic process of the earth's moving crust builds stresses along the faults. The sudden release of stress causes earthquakes on land and undersea. The actual movement of the ground, however, is seldom the direct cause of death or injury. Most casualties result from partial or total building collapse, falling objects, debris, and shattering glass.[19]

According to geophysicist Dr. Gerard Fryer, currently with the Pacific Tsunami Warning Center, the last damaging earthquake to occur on Oʻahu was in 1948 with a magnitude of about 5.0. Dr. Fryer indicated, while older buildings on Oʻahu might suffer some damage, modern buildings in Honolulu are probably quite safe due to the upgrading of the City's building code through placement of Oʻahu in Seismic Zone 2A from Seismic Zone 1.[20] The proposed improvements at the Kaimukī Pump Station will be in accordance with the International Building Code (IBC), 2003 Edition, as adopted and amended by the City and County of Honolulu.

3.9.3 Hurricanes

Hurricanes could cause severe damage to life and property. Early warning systems by Civil Defense sirens, radio and television emergency broadcasts, and news reports should provide residents with ample preparation time to evacuate susceptible areas and minimize or avoid life-threatening situations.

In Hawaiʻi, hurricane winds, especially when augmented by local terrain, have been very damaging to trees, vegetation, crops, and lightly built dwellings and structures. During the last 50 years, many hurricanes and tropical storms have come close to the Hawaiian Islands, but only three have had direct impact. In all three cases, Kauaʻi was the hardest hit, although Oʻahu suffered significant damages as well. Hurricane Iniki was by far the most destructive storm to strike Hawaiʻi in recorded history, with widespread wind and water damages exceeding $2.2 billion dollars in value. One of the greatest threats from hurricane winds is caused by flying debris, such as lawn furniture, signs, roofing materials, and metal sidings.[21]

The proposed improvements at the Kaimukī Pump Station would be constructed in accordance with the enhanced wind design criteria, which are more stringent than the IBC as adopted and amended by the City and County of Honolulu.

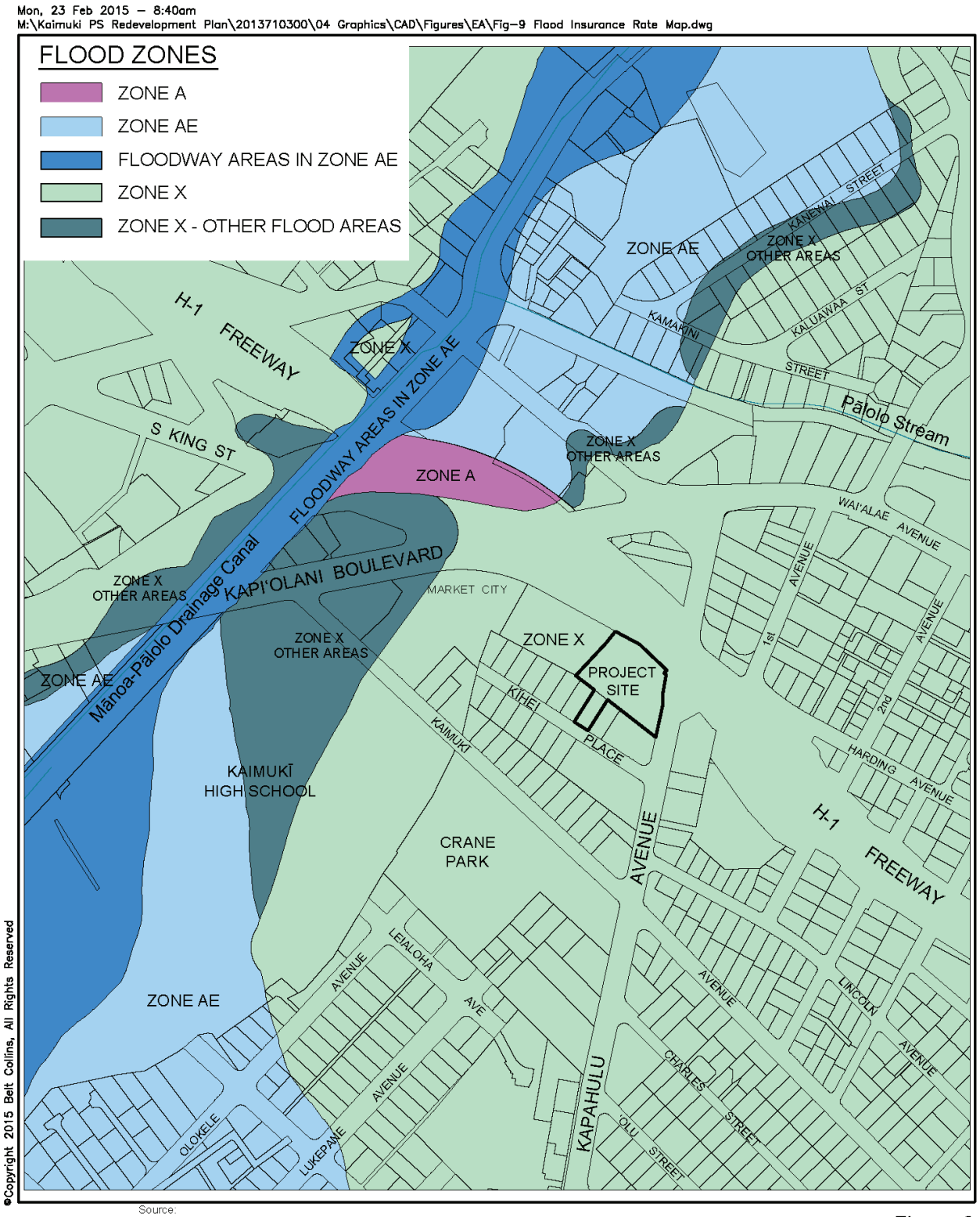
---

[18] Flood Insurance Rate Map, Panel 370F of 395, City and County of Honolulu, Hawaiʻi, Map No. 15003C0370F.

[19] City and County of Honolulu, Civil Defense Website at http://www.honolulu.gov.ocda/earth.htm.

[20] UH School of Ocean and Earth Sciences and Technology Website at www.soest.hawaii.edu/GG/ASK/earthquakes.html.

[21] City and County of Honolulu, Civil Defense Website: http://www.honolulu.gov/ocda/hurricane.htm.



Source:
Federal Emergency Management Agency
Flood Insurance Rate Maps

BELT COLLINS

NORTH

0 100 200 400
SCALE IN FEET

Figure 9
FLOOD INSURANCE RATE MAP

3.9.4 Scenic Resources

3.9.5 Existing Conditions

The visual characteristics of the project vicinity could be described as a built-up urban environment with long views toward the mountains and sea restricted by surrounding buildings and structures. The visual expectation for this area is not of scenic natural amenities, but of logistics and movement of vehicles and pedestrians between origins and destinations. Kapahulu Avenue and Harding Avenue are major collector roads that provide routes for the motorists to different parts of the city past the pump station site. The overhead H-1 Freeway viaduct adjacent to the pump station site is a dominant feature in the area's visual environment. To the east, west, and south, views consist of buildings (a mixture of commercial buildings, business offices, and residences), a vacant lot (presently undergoing on-site construction), streets, and pedestrian walkways. The City's current PUC Development Plan does not identify the rights-of-way in the vicinity as a public scenic route.

3.9.6 Impacts and Mitigation Measures

The new wells and connecting lines would consist of improvements primarily below grade. Some well fixtures, such as the standing well casing, valves and connecting pipes, and concrete pad would be above grade but low to the ground. Alternatively, only a manhole cover may be the only surface evidence of the well location. Overall, the visual impact of the proposed action would be minor or very negligible.

3.10 Historic, Archaeological, and Cultural Resources

3.10.1 Historic Properties

3.10.1.1 Existing Conditions

The current pump station building was constructed in 1928, and the eight on-site supply wells were drilled in 1928 or earlier. According to State law, any property that is over 50 years old qualifies as a "historic property." Hence, the Kaimukī Pump Station and its wells are considered historic properties, and projects involving the station would require review by the State Historic Preservation Division (SHPD).

The original pump station building was built circa 1912 and operated until it was replaced in 1928 by the new pump station building which is now what exists on the property with some modifications and additions. The original building was later abandoned and demolished. Many of the current equipment in the new pump station are the original pump station apparatus.

The current on-site wells are the original wells developed on the property from 1898 to 1928.

In 2013, Mason Architect, Inc. assessed the historic condition of the property under §6E-7 and 8, Hawai'i Revised Statutes (HRS), and Chapter 13-275, HAR. The results of its findings are provided in a report, entitled *Kaimuki Pumping Station, Historic Documentation & Compliance Considerations,* October 2013, and is included in Appendix E of this EA.

The character defining features of the property are as follows:

Site Features

- Well features in various locations on the site

Exterior Building Features

- General form of the building – two large rectangular sections
- Roof shapes – hip roof with flat center on pump room; flat roof with a parapet wall on boiler room
- Tile-roofing
- Overhanging eaves with decorative joists, soffit, and cornice at the pump room
- Round copper gutters with rectangular and round downspouts with collector boxes on pump room
- Window openings; multi-lite metal windows
- Concrete stucco wall surface
- Water table
- Simple cornice at top of boiler room walls
- Pedimented cornice above door in southeast addition

Interior Features

- Tile floor and walls in the pump room
- Concrete floor and walls in the boiler room
- Opening ceilings
- Historic equipment in general

3.10.1.2 Probable Impacts

BWS plans to abandon the eight existing supply wells and replace them with five new on-site supply wells. No work or improvements are planned for the existing pump station building. Some equipment and piping modifications may be required to accommodate the replacement well connections with the main booster pumps in the pump station building.

Since the wells provide the essence of the station and have visible elements at the ground surface, they do contribute to the historic integrity of the site. The well locations are currently marked simply by metal covers and, in three locations, with standpipes that protrude above the ground. BWS's proposed action intends to maintain the purpose of the station with replacement supply wells and to abandon the existing deteriorating supply wells in place. The standpipes would be removed.

3.10.1.3 Mitigation

In order to maintain the historic integrity of the site, Mason Architect recommends that BWS provide markers flush with the ground to indicate the historic construction date of each well. The markers would provide the same general appearance of the existing well covers and serve as historic markers.

3.10.2 Archaeological Sites

3.10.2.1 Existing Conditions

An archaeological field inspection was conducted on the pump station site by Scientific Consultant Services Inc. in September 2013. Results of the inspection found the site to be completely improved with the presence of a pump station building, driveway, turnaround and parking stalls, rock walls, fence, multiple vertical pipes, electric housing units, irrigation lines, water meters, metal covers (top of supply wells), and landscaped lawn. No archaeological sites were found; no historic properties (cultural materials or deposits) were identified in subsurface contexts.

Three historic properties at the surface, however, were identified including the pump station building which was constructed in 1928 and the east property wall which appears to have been constructed around 1951 (see Figure 10). The southern property wall which appears older than the east property wall may have been constructed around the same time as the pump station, thus resulting in all three structures possibly being over 50 years old.

3.10.2.2 Probable Impacts and Mitigation

Construction of the replacement wells and modifications to the suction piping system would not impact the existing pump station building or property walls. Well construction and piping system modifications would occur in the pump station yard and not alter any identified historic properties.

Although none of the identified historic properties would be altered during construction, documentation and recordation of those properties, as recommended by the archaeology consultant, would be undertaken and approved by SHPD prior to any site preparation activities.

3.10.3 Cultural Resources

3.10.3.1 Existing Conditions

In the early 1800s, John Papa Īʻī documented a series of trails extending from Makiki to the eastern boundary of Waikīkī ahupuaʻa.[22] One of these trails eventually evolved into the present day alignment of King Street and Waiʻalae Avenue. From other historic maps, it can be inferred that the ʻili of Kaimukī was an unsettled, yet well-traveled area within the Waikīkī ahupuaʻa.[23]

[22] *A Cultural Impact Assessment for the Kaimuki Pump Station Redevelopment Project* (Draft), Scientific Consultant Services Inc., March 2014.

[23] ibid.

Figure 10
HISTORIC & CULTURAL RESOURCES

The Waihona ʻAina Database and REDI Realty Tax Maps indicate one Land Grant (Land Grant 2606), consisting of two *ʻāpana* of 1.92 acres, was purchased by Nicholas George in 1859. This Land Grant was obtained for lands adjacent and west of the current project area and does not include the project site. Overall, the Land Grants recorded in the area seem to indicate that the project vicinity was in ranchlands in the mid-1800s.

It wasn't until 1898 that the pump station site was first used for water utility purposes.[24] Two wells were drilled at that time, followed by the drilling of two additional wells in 1912. At some time during this period, a pump station building containing two steam pumps and a double boiler for steam was built on the site. Between 1925 and 1928, four more wells were drilled. Then in 1928, the current pump station building was constructed to the southeast of the circa 1912 building.

According to legend, "Kaimukī" does not refer to "the oven where food is cooked in ti leaves." "Kaimukī" means "the oven for cooking the ti root" and makes reference to the Menehune who lived in the area at one time. Kaimukī was described by Emerson (n.d. in Sterling and Summers 1978:276)[25] as ". . . the wild region of Ka-imu-ki, thicket with bowlders—a region at one time chosen by the dwarf Menehune as a sort of stronghold where they could safely plant their famous ti ovens and not be molested by the nocturnal depredations of the swinish Kama-puaʻa . . . ." Handy and Handy (1972:224)[26] state that:

> *In famine times ti roots were gathered from the forest in large quantities and steamed in great ovens, then grated, mashed, mixed with water, and drunk. It is said that there was a famous oven of this sort east of Honolulu at Kaimuki.*

3.10.3.2 Probable Impacts and Mitigation

Scientific Consultant Services Inc. consulted with informed cultural resource members in the community about the pump station site and a cultural impact assessment notice was published in a local newspaper on October 24, 25, and 28, 2013, requesting information on cultural resources or activities in the project area. Based on historic research and responses received by the consultant from the resource members, the project area has not been used for traditional cultural purposes within recent times. Further, it is reasonable to conclude, according to the consultant, Hawaiian rights related to gathering, access to, or other customary activities within the project area, would not be affected and, as a result, no adverse effect would occur upon cultural practices or beliefs.[27] Therefore, no mitigation is required.

[24] Mason Architect, Inc. October 2013.

[25] Scientific Consultant Services Inc. March 2014.

[26] ibid.

[27] ibid.

4 SOCIOECONOMIC SETTING

4.1 Socioeconomic Background

The wells at the pump station site are integrated into BWS' Honolulu water system and serve consumers throughout the city. The site is located in a fully urbanized area, adjacent to commercial, business offices, and residential homes.

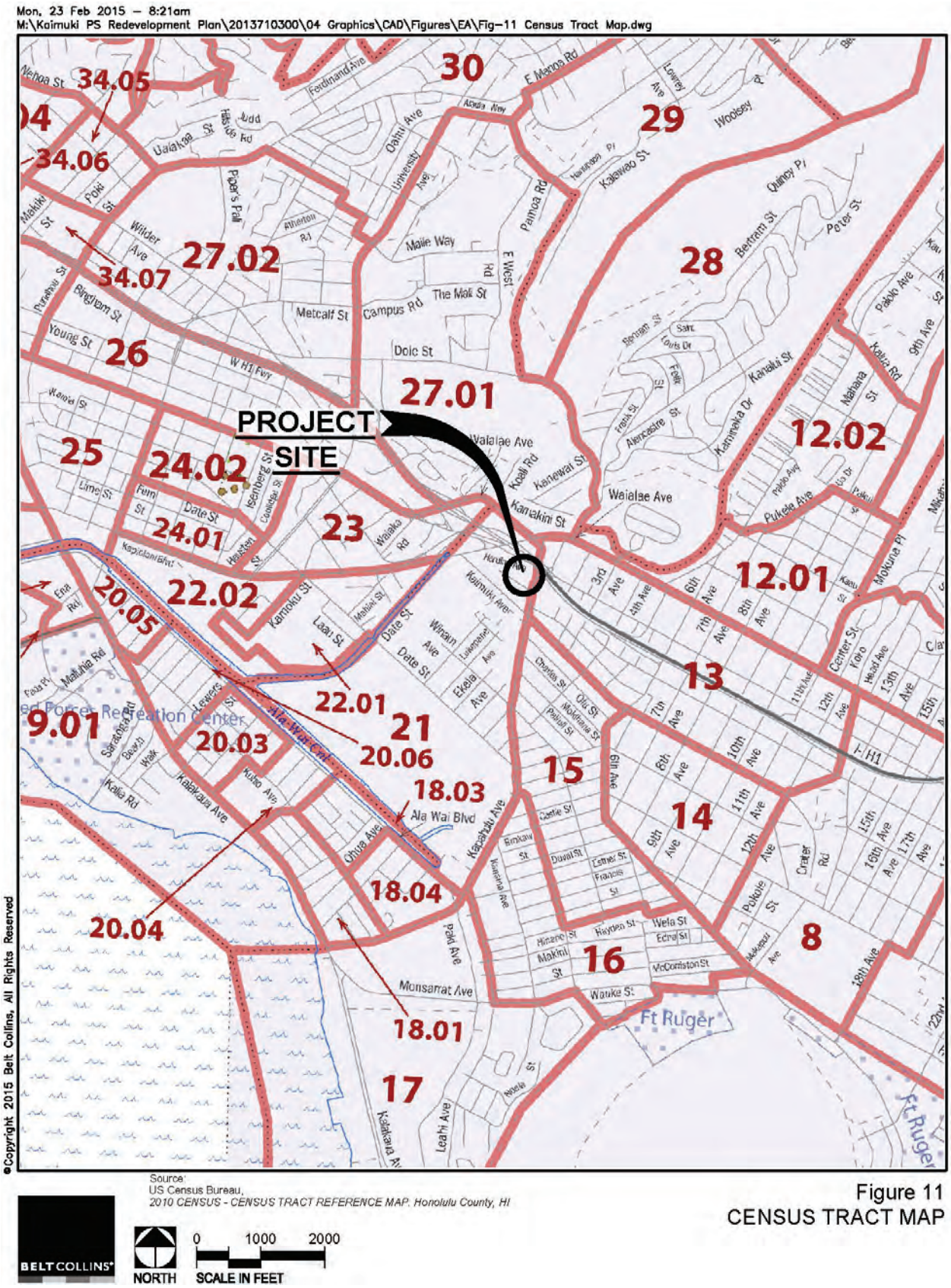
Recent data gathered by the U.S. Census shows Census Tract 21 (see Figure 11), located between the H-1 Freeway and Ala Wai Golf Course, to have a low share of owner-occupied housing. Households that are small and include renters comprise the majority of the area's household units. The median income is below the state median (Table 6).

The share of persons in poverty is higher than for the state as a whole, but lower for children and seniors. The characterization of the residents that emerges is of a neighborhood of low- to moderate-income workers.

Table 6. 2012 American Community Survey Indicators, Census Tract 21

Population Character	Census Tract 21		State of Hawai'i	
	Number	Percent	Number	Percent
Population	3,732			
Median Age (Years)	38.8		38.4	
Age 65 and up	447	12.0		14.5
Housing Units	1,827			
Households	1,684			
Average household size	2.13		2.95	
Family households	786	46.7		69.3
Family households with own children under 18	261	15.5		27.9
Tenure				
Owner occupied	401	23.8		58.2
Median Household Income	51,429		67,492	
Persons Below Poverty Line in Last Year				
Share of all persons		14.1		10.8
Share of persons under 18		10.5		14.6
Share of persons 65 and up		4.5		7.2

Source: American Community Survey, five-year sample for 2008 to 2012. Downloaded from http://census.hawaii.gov/acs/american-community-survey-2012/2780-2/**.** Since 2005, economic and household information that had earlier been part of the decennial census long form is gathered annually by the U.S. Census. One-, three- or five-year samples are published, with reports for smaller areas only from the longer and larger data sets. Information in dollars is reported in the current dollar of the last year of the data set, i.e., 2012.



Source:
US Census Bureau,
2010 CENSUS - CENSUS TRACT REFERENCE MAP: Honolulu County, HI

BELT COLLINS

NORTH

0 1000 2000
SCALE IN FEET

Figure 11
CENSUS TRACT MAP

4.2 Economic Considerations

Considering the size of the project, the proposed action would have limited economic impacts. It would involve minor construction and, hence, a small pool of construction labor. Based on the estimated construction cost of $7.0 to $8.0 million, the project would generate up to approximately 34 person-years of work for direct construction workforce, and up to an additional 58 person-years of indirect and induced jobs in the Hawai'i economy.[28] Income generated by the employment of construction workers would have a multiplier effect on the local economy as monies are spent and re-spent on purchases of goods and supplies.

Full-time operators are not required for the long-term operations of the proposed improvements. BWS would not need to add staffing to the current unmanned facility. Routine maintenance and monitoring of the pump station are handled by BWS's off-site field offices and base yard.

4.3 Social Considerations

The proposed action is intended to prolong the productive life of the site as a source of water for one of BWS' water systems in Honolulu. The pump station is an important component of BWS' public utility designed to improve and sustain the quality of life in the community.

The proposed action would occur within the existing pump station grounds, avoiding any requirement to use outside properties. There would be no need for displacement of existing structures or buildings or to relocate adjacent land uses.

As noted in Section 3.8, construction noise may affect occupants of residences and commercial buildings in the vicinity. Those noise impacts can be mitigated appreciably as described in Section 3.8.3, but a short-term impact on quality of life in the vicinity is likely.

Once the improvements are in place and the pump station is in full operation, the facility would be operating as normal without any notable increase in noise, emissions, traffic, and degradation in water quality. The facility would continue to be unmanned, which calls for no new on-site BWS employees. As a result, there would be no requirement for employee housing and no demand for more public facilities and public utility services.

During the biological survey of the pump station grounds by AECOS, Inc., a homeless person was observed occupying a small makeshift encampment in the northwestern section of the property. Although his presence was within the BWS grounds, his occupation was outside the security fence of the pump station building and appeared temporary.

[28] Construction jobs are estimated using the ratio of construction jobs to value of construction put in place for 2012, as reported in the 2012 *State of Hawaii Data Book:* 4.21 jobs per $1 million in construction spending. Indirect and induced jobs occur as firms spend for materials and services in the local economy, and workers spend their wages in the local economy. For each person-year of construction employment, an additional 1.68 person-years of employment is estimated to be generated in the state economy, according to the State's Input-Output Model of the 2007 economy.

5 PUBLIC FACILITIES AND SERVICES

5.1 Public Roads

5.1.1 Circulation and Traffic

Existing Conditions: The pump station site is located at the corner of Kapahulu Avenue and Harding Avenue in the Kaimukī district of Honolulu. Kīhei Place, a short cul-de-sac off of Kapahulu Avenue, provides access to the BWS property.

Above the Kapahulu Avenue–Harding Avenue intersection on a viaduct is the H-1 Freeway that traverses Honolulu and connects east Oʻahu and ʻEwa Oʻahu.

As major collector roads in the district, Kapahulu Avenue and Harding Avenue accommodate a high volume of traffic during morning and afternoon peak hours. The overhead H-1 Freeway is the sole high-speed, limited access, right-of-way for commuters that travel between east Oʻahu and downtown Honolulu. With relatively few properties on Kīhei Place, traffic on the short private road is extremely low.

Potential Impacts and Mitigation Measures: Replacement of the wells on the pump station site should have no long-term impacts on traffic on the adjacent streets. Operations at the pump station would continue as they would normally even if the wells were not replaced. The pump station is self-operating and runs without an operations crew; only routine maintenance is required to monitor and service the facility. The pump station, as a result, does not generate typical commuter traffic on the area roadways.

During well construction and suction piping improvements, some traffic would be generated to transport well drilling and testing equipment and supplies. These trips would be short-term, infrequent, and temporary. The construction contractor would schedule these deliveries during off-peak hours to avoid any delays in travel time by the public.

5.2 Public Utilities

5.2.1 Sewer, Electricity and Telecommunications

Existing Conditions: The pump station site contains a small restroom in the pump station building. Sewer service to the site is provided by the City's sewer collection system along Kīhei Place. Wastewater generated from the facility ultimately discharges to the Sand Island Wastewater Treatment Plant.

Electrical service is provided by HECO through underground lines along Harding Avenue. Electricity is primarily used to power the existing booster pumps and lighting on the property.

Telecommunication service is provided by Hawaiian Telcom through overhead lines along Kīhei Place. BWS currently operates a supervisory control and data acquisition (SCADA) system through these lines for remote data monitoring and operation of the station.

Oceanic Time Warner Cable provides cable television (CATV) services for BWS' on-site security cameras.

Potential Impacts and Mitigation Measures: The proposed action would result in an increased electrical demand, but not substantially enough to adversely impact existing HECO facilities. Wastewater generated and telecommunications usage on the property are not anticipated to change as a result of the project.

5.2.2 Solid Waste

Existing Conditions: Solid waste generated at the site consists primarily of vegetation clippings and debris from regular maintenance of the pump station grounds. Maintenance crews from the BWS Field Operations Division regularly remove the solid waste from the area.

Potential Impacts and Mitigation Measures: Solid waste and minor construction debris generated at the site during construction is not anticipated to have a notable effect on the island's landfills or solid waste disposal sites. Any recycling or reuse of construction debris by the contractor would help minimize the amount of solid waste disposal.

When construction is completed, little or no increase in generated solid waste over existing generated solid waste from the pump station facility is expected to occur.

5.3 Public Facilities and Services

5.3.1 Education

Existing Conditions: The Kaimukī Pump Station is located in the State Department of Education's Kaimukī Complex which contains ten public schools, including elementary, middle and high schools. The nearest public school is Kaimukī High School with buildings located approximately 0.15 miles from the pump station.

Potential Impacts and Mitigation Measures: Operations of the pump station provide utility service for the area schools. The proposed action is not expected to generate any adverse effect on the functions of the State's educational system. No mitigation is needed.

5.3.2 Parks and Recreation

Existing Conditions: The City Department of Parks and Recreation operates parks and recreational facilities throughout the island. The nearest facilities to the Kaimukī Pump Station are located along Kapahulu Avenue:

- Crane Community Park, (with basketball courts and a softball field) located 0.1 mile from the pump station;
- Ala Wai Golf Course, located approximately 0.6 mile from the pump station; and
- Honolulu Zoo and Kapiʻolani Park, located approximately 1.0 mile from the pump station.

Potential Impacts and Mitigation Measures: Operations of the pump station provide utility service for the area recreational facilities. The proposed action is not expected to generate adverse effects on the functions of the City's parks system. No mitigation is needed.

5.3.3 Medical and Emergency Services

Existing Conditions: The nearest full-service hospital is Straub Hospital, located approximately 2.5 miles from the pump station.

Emergency medical service (EMS) is provided by the City with an EMS ambulance unit based at the Waikīkī Fire Station, approximately 0.6-mile from the pump station along Kapahulu Avenue.

Potential Impacts and Mitigation Measures: The proposed action would provide an important utility service to the City' medical facilities. When in full operation, the proposed action would not adversely affect existing medical and emergency services in the community. No mitigation is needed.

5.3.4 Fire Protection

Existing Conditions: The Honolulu Fire Department provides emergency service to the project area from its Waikīkī Fire Station located approximately 1.0 mile south on Kapahulu Avenue. Support could come from the Kaimukī Fire Station, located approximately 1.1 miles east of the pump station or from the McCully Fire Station on Date Street, approximately 0.7 mile west of the project site.

Potential Impacts and Mitigation Measures: As part of BWS' continuing maintenance and replacement program, the proposed action would contribute to the reliability of the area's water system in providing adequate fire flow for fire emergencies in the community. No mitigation is required.

5.3.5 Police

Existing Conditions: The Kaimukī Pump Station is located within Beat 756 of Honolulu Police Department's Patrol District 7. This district uses the department's downtown headquarters on Beretania Street as its headquarters as well as for dispatching its patrol vehicles on emergency calls.

Potential Impacts and Mitigation Measures: No police assistance is required to control traffic during construction and testing of the replacement wells. Security of construction equipment stored on the pump station site during construction would be the responsibility of the contractor.

After construction, long-term operations of the replacement wells are not expected to impact regular police operations serving the area. No mitigation is needed.

6 RELATIONSHIP TO PUBLIC AND LAND USE POLICIES

6.1 Hawai‘i State Plan

The Hawai‘i State Plan, as established under the Hawai‘i State Planning Act, Chapter 226, HRS, has served as a guide for the long-range development of the state since adoption of the law in 1978. The Plan identifies goals, objectives, and policies for the State government to (1) provide a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; (2) improve coordination of federal, state, and county plans, policies, programs, projects, and regulatory activities; and (3) establish a system for plan formulation and program coordination to provide for an integration of all major state and county activities.

Of the 107 sections that comprise Chapter 226, HRS, six sections are directly applicable to this EA: (1) HRS § 226-16 – Objectives and Policies for Facility Systems – Water; (2) HRS § 266-6 – Objectives and Policies for Facility Systems – In General; (3) HRS § 266-11 – Objectives and Policies for the Physical Development – Land-based, Shoreline, and Marine Resources; (4) HRS § 226-12 – Objectives and Policies for the Physical Environment – Scenic, Natural Beauty, and Historic Resources; (5) HRS § 226-13 – Objectives and Policies for the Physical Environment – Land, Air, and Water Quality; and (6) HRS § 226-25 – Objective and Policies for Sociocultural Advancement – Culture. The following table presents the relevant sections, assesses the project’s conformance with the State Plan’s goals and objectives, and summarizes the project’s benefits and probable impacts.

Table 7. Applicable Sections of the Hawai‘i State Planning Act

Section	Chapter – Part I. Overall Theme, Goals, Objectives and Policies
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:
(1)	Coordinate development of land use activities with existing and potential water supply.
(2)	Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
(4)	Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.
(5)	Support water supply services to areas experiencing critical water problems.
Comments: The basic responsibility of BWS is to manage O‘ahu’s municipal water resources and distribution system and provide residents with a safe and dependable drinking water supply. In carrying out this responsibility, BWS moves forward with the purpose and intent that are consistent with the State’s objectives and policies for Facility Systems – Water.	

Table 7. Applicable Sections of the Hawai‘i State Planning Act

Section	Chapter – Part I. Overall Theme, Goals, Objectives and Policies
226-6	**OBJECTIVES AND POLICIES FOR FACILITY SYSTEMS – IN GENERAL**
(a)	Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.
(b)	To achieve the general facility systems objective, it shall be the policy of this State to:
(1)	Accommodate the needs of Hawai‘i'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.
Comments: BWS would not interfere with the State's guided efforts to achieve general facility systems (in general). As a public utility, BWS would coordinate its plans with the State and County plans, and as an agency of the County, it would allow flexibility in design and development of facility systems to provide compliance with minimum agency design standards. BWS is also bound by its public function to manage and control facilities costs for its users.	
226-11	**OBJECTIVES AND POLICIES FOR THE PHYSICAL DEVELOPMENT – 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 Hawai‘i's land-based, shoreline, and marine resources.
(2)	Effective protection of Hawai‘i's unique and fragile environmental resources.
(b)	To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of the State to:
(2)	Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.
(3)	Take into account the physical attributes of areas when planning and designing activities and facilities.
(4)	Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.
(8)	Pursue compatible relationships among activities, facilities, and natural resources.

Table 7. Applicable Sections of the Hawai‘i State Planning Act

Section	Chapter – Part I. Overall Theme, Goals, Objectives and Policies
Comments: The proposed action would occur on an existing BWS site in inland urban Honolulu. A site selection was not part of the planning process. There would be no impact on water-based activities or shoreline areas and their natural/marine resources. This EA, prepared for BWS, evaluated the potential impacts of the project and, where applicable, indicated potential mitigation measures to minimize or avoid those impacts.	
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 Hawai‘i’s scenic assets, natural beauty, and multicultural/historical resources.
(b)	To achieve the 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.
(3)	Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.
(4)	Protect those special areas, structures, and elements that are an integral and functional part of Hawai‘i’s ethnic and cultural heritage.
Comments: The proposed action would involve primarily underground improvements which would not interfere with aboveground scenic amenities or visual corridors. There are some on-site buildings and structures that have been classified as having historic value. Appropriate measures would be taken to properly accommodate their historic status.	
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 Hawai‘i’s land, air, and water resources.
(2)	Greater public awareness and appreciation of Hawai‘i’s environmental 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 Hawai‘i’s land and water resources.
(3)	Promote effective measures to achieve desired quality in Hawai‘i’s surface, ground, and coastal waters.
(7)	Encourage urban development in close proximity to existing services and facilities.
Comments: It is in BWS’ inherent responsibility to exercise proper management of O‘ahu’s land and water resources as well as to maintain and pursue their improved or desired quality.	

Table 7. Applicable Sections of the Hawai‘i State Planning Act

Section	Chapter – Part I. Overall Theme, Goals, Objectives and Policies
226-25	**OBJECTIVE AND POLICIES FOR SOCIOCULTURAL ADVANCEMENT – CULTURE**
(a)	Planning for the State's sociocultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawai‘i's people.
(b)	To achieve the culture objective, it shall be the policy of this State to:
(2)	Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai‘i's people and which are sensitive and responsive to family and community needs.
Comments: The findings of a cultural impact assessment show no cultural significance in the area. A historic properties assessment reveals that the pump station building, the existing wells, and two property walls have potential historic value. Appropriate measures would be taken to properly accommodate their potential historic status.	

6.2 State Land Use Law

The Hawai‘i State Legislature adopted the State Land Use Law in 1961 to protect Hawai‘i's valuable land from development that resulted in short-term gains from a few developments and long-term losses to the income and growth potential of the state's economy. Accordingly, the Legislature established an overall framework of land-use management. HRS, Chapter 205, placed all lands in the state in one of four land use districts: Urban, Agricultural, Conservation, or Rural (the Rural District was added in 1963), and established the State Land Use Commission to administer the law.

The State Land Use District Maps, which designates the location of the various land use districts, identify the pump station site in the Urban District. The existing and proposed uses for the pump station are permitted in the designated Urban District. As such, the proposed action would take place in an urban environment where development and foreseeable growth are anticipated and planned. No costly changes in land use, buildup of infrastructure, or consequent adverse impacts are anticipated.

6.3 State Environmental Policy

The State Environmental Policy under HRS Chapter 344 established an environmental policy that (1) encourages productive and enjoyable harmony between people and their environment; (2) promotes efforts that would prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity; and (3) enriches the understanding of the ecological systems and natural resources important to the people of Hawai‘i.

The proposed action is consistent with Section 344-3(1) of the State Environmental Policy which states:

> *Conserve the natural resources, so that land, water, mineral, visual, air and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony and fulfill the social, economic, and other requirements of the people of Hawaii.*

BWS' mission is to provide a safe and dependable water supply for its customers. One of its strategic objectives is to ensure that natural groundwater supplies are protected and managed efficiently. BWS undertakes diversified approaches and projects in conservation, potable groundwater, and alternative water supplies, including brackish, recycled, and desalinated water to meet future demands. Efforts are also focused on protecting the natural environment, important watersheds, and water sources by monitoring the island's rainfall and aquifer water levels and salinity, and taking appropriate precautions to ensure the sustainability of the island's potable water supplies.

6.4 Hawai‘i Coastal Zone Management Program

Federal Coastal Zone Management (CZM) enforcement authority (Public Law 92-583), as amended, has been delegated to the state and enacted as HRS, Chapter 205A. The Hawai‘i CZM Program was promulgated in 1977 in response to the federal CZM Act of 1972. The areas encompassed by the CZM are all the lands and waters of the state, including the northwestern Hawaiian Islands. Following is a list of the CZM's main objective and policy headings and an assessment of the project's relationship to those public parameters.

Recreational Resources

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

Historic Resources

Studies have been conducted to investigate and identify archaeological, cultural, and historic resources on the property and develop, if necessary, treatment or management measures for any significant finds that may be impacted. Results from the studies indicate that the pump station building, the existing wells, and two property walls qualify as possible historic properties. Regarding archaeological or cultural resources on the property, none were found. The proposed action is not expected to adversely affect the identified historic features on the property.

Scenic and Open Space Resource

The proposed action would not interfere with nor obstruct public efforts to meet CZM objective and policies relating to protection, preservation, and restoration or improvement of the quality of coastal scenic and open space resources. Construction and operation of the replacement wells would be located more than 1.1 miles from the shoreline in the midst of commercial, office, and residential facilities. Views to distant scenic amenities are not available and open space resources are scare in the vicinity.

Coastal Ecosystem
The proposed action would occur upland of the shoreline and would not adversely affect valuable coastal ecosystems, including reefs.

Economic Uses
The CZM objective and policies pertaining to economic uses provide for public or private facilities and improvements important to the state's economy in suitable locations. The selected location for the replacement wells could not be more suitable than at the existing station where existing pumps and piping systems occur.

Coastal Hazards
The proposed action, which is located more than 1.1 miles from the shoreline, would not be adversely affected by coastal hazards, such as tsunami inundation, storm waves, stream flooding near the shoreline, and coastal erosion, subsidence, or pollution.

Managing Development
The proposed action would not interfere with public efforts to improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Public Participation
The proposed action is engaged in public participation by undertaking this EA preparation and public comment and response process. Through this environmental review, information and public awareness are generated on the project and its affected environment.

Beach Protection
The proposed action would not interfere with public efforts to protect beaches for public use and recreation. Operations of the replacement wells would not have any direct adverse impact on these natural resources of the state.

Marine Resources
The proposed action would not obstruct public efforts to implement the State's ocean resources management plan.

6.5 City and County of Honolulu General Plan

The City and County of Honolulu's General Plan is comprised of 11 sections relating to: *Population; Economic Activity; Natural Environment; Housing; Transportation and Utilities; Energy; Physical Development and Urban Design; Public Safety; Health and Education; Culture and Recreation;* and *Government Operations and Fiscal Management.*

The sections on *Natural Environment, Housing, Transportation and Utilities,* and *Physical Development and Urban Design* are relevant to the proposed action and this EA and are presented and described in Table 8.

Table 8. Applicable Sections of the City and County of Honolulu General Plan

Section	Objective/Policy
NATURAL ENVIRONMENT	
Objective A	To protect and preserve the natural environment.
Policy 4	Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms, and existing vegetation.
Policy 7	Protect the natural environment from damaging levels of air, water, and noise pollution.
Policy 10	Increase public awareness and appreciation of Oʻahu's land, air, and water resources.
Objective B	To preserve and enhance the natural monuments and scenic views of Oʻahu for the benefit of both residents and visitors.
Policy 1	Protect the Island's well-known resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shoreline, fishponds, and bays; and reefs and offshore islands.
HOUSING	
Objective C	To provide the people of Oʻahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.
Policy 4	Encourage residential development in areas where existing roads, utilities, and other community facilities are not being used to capacity.
Policy 5	Discourage residential development where roads, utilities, and community facilities cannot be provided at a reasonable cost.
TRANSPORTATION AND UTILITIES	
Objective B	To meet the needs of the people of Oʻahu for an adequate supply of water and for environmentally sound system of waste disposal.
Policy 1	Develop and maintain an adequate supply of water for both residents and visitors.
Policy 2	Develop and maintain an adequate supply of water for agricultural and industrial needs.
Policy 3	Encourage the development of new technology which will reduce the cost of providing water and the cost of waste disposal.
Policy 4	Encourage a lowering of the per-capita consumption of water and the per-capita production of waste.
Objective C	To maintain a high level of service for all utilities.
Policy 1	Maintain existing utility systems in order to avoid major breakdowns.
Policy 2	Provide improvements to utilities in existing neighborhoods to reduce substandard conditions.

Table 8. Applicable Sections of the City and County of Honolulu General Plan

Section	Objective/Policy
Policy 3	Plan for the timely and orderly expansion of utility systems.
Policy 4	Increase the efficiency of public utilities by encouraging a mixture of uses with peak periods of demand occurring at different times of the day.
PHYSICAL DEVELOPMENT AND URBAN DESIGN	
Objective A	To coordinate changes in the physical environment of Oʻahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.
Policy 2	Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and public safety facilities.
Policy 4	Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.
Comments: The proposed action is consistent with the above City objectives and policies. It is small-scale in size essentially calling for the replacement of aging existing facilities on an existing BWS site. Such improvements would have no significant impact on the environment. BWS is responsible for managing Oʻahu's municipal water resources and distribution system and providing residents with a safe and dependable drinking water supply. As a result, BWS would move forward with the purpose and intent that is consistent with the above City objectives and policies.	

6.6 Primary Urban Center Development Plan

The intent of the PUC Development Plan is to guide public policy, investment, and decision-making through the 2025 planning horizon. The Development Plan is intended to support more detailed planning at the neighborhood level. The PUC area extends from the core of historic downtown Honolulu to Pearl City in the west and to Waiʻalae-Kāhala in the east, and serves as the economic center of the state (see Figure 12). The vision for the PUC's future emphasizes retaining qualities that attract both residents and visitors while encouraging growth and redevelopment. The key elements of the Development Plan vision include:

- The natural, cultural, and scenic resources of the PUC are protected and enhanced.
- Livable neighborhoods have business districts, parks and plazas, and walkable streets.
- In-town housing choices are offered to people of all ages and income.
- Honolulu as the Pacific's leading city and travel destination.
- A balanced transportation system that provides excellent mobility.

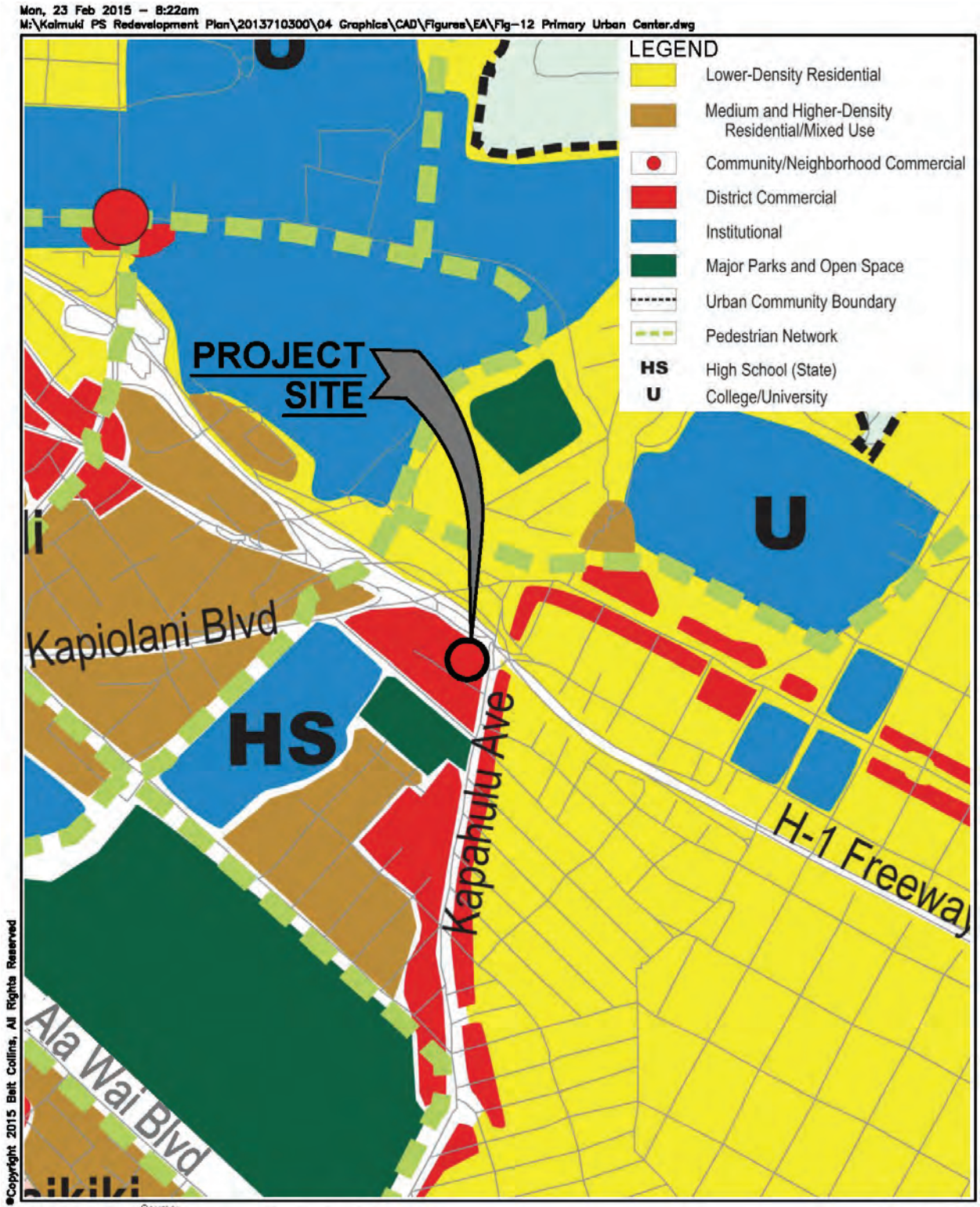


Figure 12
PRIMARY URBAN CENTER
DEVELOPMENT PLAN

The City recognizes BWS as the utility entity responsible for the management, control, and operation of Oʻahu's municipal water system that serves the entire PUC Development Plan area. BWS is aware of the need to integrate water resource planning for urban development, in-stream uses, agricultural uses, possible use of reclaimed water, and the sustainability of groundwater aquifers. As a result, BWS is engaged in long-range integrated water resources planning in coordination with the State CWRM. BWS also functions in conformance with the PUC Development Plan's policies on "water allocation and system development" including:

- Implement upgrades and capacity improvements to serve projected population increases.
- Protect and maintain watersheds to ensure adequate supply of high quality water with sufficient infiltration recharge into groundwater aquifers.

6.7 Land Use Ordinance

The Land Use Ordinance (LUO) of the City and County of Honolulu regulates land uses on the island of Oʻahu. The LUO consists of permitted land uses for specific urban areas, development standards, application procedures, and criteria for granting permits and other land use approvals.

Parcel 12 (TMK 2-7-30:12) of the pump station site is designated as "B-2 Community Business" by the City. This zoning designation allows BWS to continue use of the property for public utility purposes. Parcel 55 (TMK 2-7-30:55) of the pump station site, which encompasses the driveway access of the property, is designated as "A-2 Apartment." Although this section of the pump station site has a different zoning from the main section of the site, which is occupied by the pump station and existing wells, its designated zoning allows the continued use of the driveway for public utility purposes.

6.8 Special District

There are two special districts near the project area: Waikīkī Special District and Diamond Head Special District. These specially designated areas are intended to provide a means by which certain areas in the community may be designated as special areas to guide development to protect and/or enhance the physical and visual uniqueness of those areas for the benefit of the community as a whole. The Kaimukī Pump Station is located upland more than 2,000 feet from either special district. Hence, the City's land use requirements of Sections 21-9.40-1 to -6 and 21-9.80-1 to -9 of the LUO are not applicable to the project.

6.9 Special Management Area

In 1977, the Hawaiʻi Coastal Zone Management Act, Chapter 205A, HRS, became law and incorporated many of the features of the Hawaiʻi Shoreline Protection Act of 1975. Under the new law, each county in the state established its own procedures for administering the Special Management Area (SMA) and issuing a SMA use permit.

The SMA for Oʻahu encompasses a band of coastal land around the island. In Waikīkī, the inland boundary of the SMA is located generally near Kalākaua Avenue in the vicinity of Kapahulu Avenue.

The pump station site is located approximately one mile from the SMA and not subject to the City's SMA rules and regulations.

6.10 Other Permits and Approvals

In order to construct and operate the five replacement wells, a Well Construction Permit and Pump Installation Permit from CWRM will be required.

A Storm Drain Connection Permit may be required from the City Department of Planning and Permitting (DPP) for discharge of pump test water and well water into the City stormwater drainage system, unless BWS already has a blanket approval for such operations from the City. The construction site would be less than one acre in size and, as a result, would not require National Pollutant Discharge Elimination System (NPDES) coverage for storm water discharge associated with construction activity.

In applying for construction permits on the proposed action, a building permit would be required from the City DPP. A grading permit is anticipated for construction of underground vaults and minor grading at the site.

6.11 Summary of Required Permits and Approval

The following are major land use permits and approvals required for the construction and operation of the five replacement wells, suction piping system, and ancillary improvements.

Table 9. Required State and City Land Use Permits and Approvals

Permit/Approval	Approving Agency
State of Hawaiʻi	
Well Construction Permit	State Commission on Water Resource Management
Pump Installation Permit	State Commission on Water Resource Management
City and County of Honolulu	
Building Permit	City & County Department of Planning and Permitting
Storm Drain Connection Permit for Pump Test Water Discharge and Well Water Discharge	BWS may have a blanket Permit from the City Department of Planning and Permitting
Grading Permit	City & County Department of Planning and Permitting

7 SUMMARY OF MAJOR IMPACTS

7.1 Short-Term Probable Impacts

Construction of the five replacement wells may occur within a single timeframe rather than in sequence at different timeframes over a number of years. In terms of evaluating the proposed action's largest short-term probable impacts, this EA has reviewed the construction of the wells within a single timeframe with construction of the five wells occurring simultaneously or in tight sequence, one after the other. In all likelihood, the wells would be drilled one after the other in order to take advantage of testing and evaluation procedures before moving to the next well and to work within the contractor's capacity, particularly if limited drilling equipment is available.

During the probable two- to three-month drilling and pump test operations for the five new wells, audible noise of different levels and duration would be generated. The early drilling operation may result in higher noise levels than the later test pump operations. The overall noise level is expected to exceed the State maximum limits at the adjacent residential property line.

During the pump tests, water from the well would be discharged into the nearest City stormwater drainage system. Proper permits will be obtained from the City before any discharge is made to the municipal system. As part of the contractor's BMPs, the discharge water would be conveyed via a pipeline to avoid soil erosion along the route.

The quality of the discharge water is expected to be of potable quality. The quality of the stormwater in the drainage system is expected to be lower than the quality of the well water. It is noted that the flows from the City's drainage system surrounding the pump station include runoff from areas in commercial and residential uses and from collector and local streets. These runoffs carry with them the pollution and contaminants associated with those uses.

Drawing groundwater from the aquifer during the pump tests is not expected to impact the flow in Pālolo Stream, the nearest watercourse (approximately 700 feet) to the pump station. Since the pump tests on the five wells would occur in sequence, the testing procedures and results would not affect the testing results of the other project wells. The nearest municipal wells, including the Pālolo Wells (Well 1847-01 and -02), are located inland over one mile from the pump station site and are not expected to be impacted by the well pump tests.

7.2 Long-Term Probable Impacts

Impacts from the long-term operations of the replacement wells, suction piping system, and ancillary improvements would be confined within the grounds of the BWS facility. Noise from the submersible pumps in the individual wells would generate inaudible sounds beyond the immediate area of the wells. The remainder of the wells and piping system is static and does not generate noise.

Routine monitoring and maintenance are required to upkeep the facilities and continue the operations of the facilities. Since regular operations at the pump station are unmanned, there are little or no adverse impacts generated on the environment.

7.3 Cumulative Impacts

The maximum running average withdrawal for the Kaimukī Pump Station site, as permitted by the CWRM, is 4.0 mgd. BWS has no plans to expand the allowed withdrawal rate for the wells and pumping system at the existing pump station. The current proposed improvements for the property are intended to continue the productive life of the existing facilities at the site.

8 PROPOSED MITIGATION MEASURES

8.1 Mitigation Measures for Short-Term Impacts

Noise generated during construction would be short-term and localized to the construction vicinity. The construction contractor will obtain a construction noise permit from DOH prior to commencement of construction activities that are anticipated to generate noise levels exceeding State noise level standards. Nighttime drilling is not anticipated, but pump testing is expected to occur around-the-clock for four days for each well. A noise variance would be obtained by the contractor from DOH for the around-the-clock pump test work.

As described in Section 3.8.3 of this document, recommendations were also made by an acoustical consultant to provide further mitigation on noise impacts to adjacent residences.

Construction equipment and vehicles that emit gas or other emissions during construction (excluding pneumatic hand tools weighing less than 15 pounds) must be equipped with mufflers. The drilling rig for the new wells would be powered by a portable diesel engine that emits exhaust.

Although no notable earthwork is required for the proposed action, the use and movement of heavy construction equipment on the pump station site may generate fugitive dust, especially during windy days. For those days, dust control measures such as dust screens, frequent water sprinkling over exposed dirt areas, and temporary ceasing of operations could be employed.

No archaeological or cultural features were identified on the property. However, underground cultural deposits are still a possibility for the area. If any buried cultural deposits are uncovered during construction, work would be halted in the immediate location of the find and SHPD would be notified and consulted for proper treatment before any construction work is resumed.

Historic structures, identified on the property by Scientific Consultant Services, Inc., would not be impacted by the proposed action.

Erosion and sedimentation control measures and BMPs, such as berms, silt screens, gravel bags, compost socks, and sedimentation basins, would be employed, if necessary, to ensure that sediment-laden runoff

from the construction site does not flow into adjacent properties and the City's stormwater drainage system.

All solid waste and debris generated during construction would be collected and hauled away by the construction contractor to a permitted landfill or solid waste disposal site.

Probable impacts on traffic during construction are expected to be minor as nominal construction equipment and supply trips would occur. The construction contractor would still be responsible for scheduling its equipment and supply deliveries during nonpeak hour periods.

As a public utility, it is BWS' usual protocol to coordinate its facility installations with other utility companies. This coordination would help ensure uninterrupted service by all the utilities and any unnecessary added cost in utility line realignments.

8.2 Mitigation Measures for Long-Term Impacts

No mitigation measure is required for a well replacement operation. BWS' purpose for the proposed action is to prolong and maintain the long-term operations of the existing well/pump facility for continued service in the community.

The pump station's unmanned operations require only routine facility monitoring and maintenance and periodic systems upkeep and repair by off-site BWS crews. With these operations in place, minimal impact is generated on the economic and social environment of the community.

The predominantly underground location of the proposed improvements would result in nominal impacts to the property's surface environment and little or no impact to the area's scenic amenities and visual corridors.

Long-term use of electrical energy to power the submersible pumps in the replacement wells would be similar in scale to the electrical energy that currently powers the existing booster pumps. As a long-term option for BWS, the submersible pumps would eventually replace the booster pumps in the pump station building.

9 ALTERNATIVES CONSIDERED

9.1 No Action Alternative

Under the No Action alternative, no improvements to the pump station facility would occur. There would be no alteration to the land and, as a result, no impact to existing land uses and the natural environment. No funds would be expended for the facility, no construction revenues would be generated, and no economic benefits would be realized.

Under the No Action alternative, BWS would not proceed with any capital improvements to prolong the life of the on-site wells, pumps, and piping system. The existing facilities would continue to deteriorate

and jeopardize the long-term productive life of the pump station to adequately serve its BWS customers. The No Action alternative would not meet the purpose and need of the project.

9.2 Restoration or Rehabilitation of Existing Wells and Suction Piping

During the early evaluation and assessment stage of the project, the possibility of restoring or rehabilitating the wells, instead of replacing them, was considered. This possibility would require relining or re-casing the well shafts to stabilize the conditions of the well shaft walls.

Restoration or rehabilitation of the existing wells would be a feasible option since the existing wells would still have some shelf life. Scheduling and implementing the required restoration or rehabilitation would occur on an individual well basis rather than as a comprehensive overhaul effort.

For the long-term however, a complete replacement of the wells would be preferred. Relining or re-casing of the well shafts would reduce the operating capacity of the wells, as the thickness of the lining in the well casing reduces the shaft's interior diameter. Additionally, the process of rehabilitating the existing wells would present a dilemma while construction work is in progress. Those wells that are undergoing rehabilitation would effectively be out of commission and as result could disrupt service to BWS' customers.

9.3 Alternative Design

BWS considered alternative locations for the well replacements, all within the Kaimukī Pump Station property. Locating outside of the property would be unfeasible, due to the availability of a site for immediate use, potential high land cost, displacement cost for existing land uses, and required entitlements. Additional infrastructure would also be required to connect with the off-site storage and distribution system.

Other locations for the replacement wells within the pump station property were considered and found to be unfeasible. The criteria used in the site selection process included maintaining minimum spacing between wells; avoidance of existing surface structures, mature trees, and underground utilities; and strategic location for connecting with the existing on-site piping system.

Design considerations were also given to alternative setups for the replacement wells. Combinations of how the new wells would tie in with the new or existing pumps and suction piping system were explored. These alternative setups represent primarily variations in systems design and would not have any notable difference in impacts on land uses and the natural environment outside of the BWS site.

10 ANTICIPATED DETERMINATION

This EA demonstrates that the proposed action would have no significant adverse impact on the environment and that an Environmental Impact Statement (EIS) would not be warranted. Therefore, a Finding of No Significant Impact (FONSI) is anticipated for this project.

11 FINDINGS AND REASONS SUPPORTING ANTICIPATED DETERMINATION

The following findings and reasons demonstrate how the proposed action would have no significant adverse impact on the environment and in doing so supports the above anticipated determination. All findings and reasons provided in this section are referenced with the significance criteria specified in the HAR, Section 11-200-12.

(1) *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.*
The proposed action calls primarily for replacement of some existing facilities. As a result, modifications to the site would be minimal. Construction work associated with the proposed action would not impact any historic structures or cultural resources as identified by historic and cultural studies recently conducted on the property. Drilling and trenching during construction may encounter underground cultural deposits, in which case established State procedures would be followed to assure proper treatment of the find.

(2) *Curtails the range of beneficial uses of the environment.*
The proposed action calls primarily for replacement of some existing facilities. There would be no change in use of the project site.

(3) *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*
As demonstrated in Chapter 6.3 of this document, the proposed action is consistent with the State's long-term environmental policies and guidelines as expressed in HRS, Chapter 344.

(4) *Substantially affects the economic or social welfare of the community or state.*
The proposed action is expected to have a minor effect on the economic or social welfare of the community. Construction of the project is expected to mobilize a limited number of construction workers and have minor effects in increasing salary incomes in the local economy. No new residents are expected to move and establish residency in the project vicinity as a result of the project. The absence of any population increase should keep in check any additional demand for public facilities and services in the community.

(5) *Substantially affects public health.*
Existing State DOH regulations protect air and water quality in the state. Additionally, BMPs would be employed by the construction contractor during construction to ensure control of fugitive dust and sediment from entering adjacent properties. Construction noise would be minimized through compliance with HAR, Chapter 11-46, Community Noise Control, requirements and recommendations from a project-related noise impact study.

(6) *Involves substantial secondary impacts, such as population changes or effects on public facilities.*
The proposed action is intended to prolong and maintain the long-term operations and function of the BWS facility. There are no plans to expand the capacity or role of the pump station in the

BWS water system. The proposed action, therefore, is not expected to have secondary impacts on the community's population or create additional burden on the area's public facilities.

(7) *Involves a substantial degradation of environmental quality.*
Studies on the probable impacts from the proposed action show no substantial degradation of the area's environmental quality. Construction and operational impacts would be controlled by the use of BMPs and compliance with existing federal, state and county environmental laws, rules and regulations, and permit requirements.

(8) *Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.*
The proposed action is intended to prolong and maintain the long-term operations and function of the BWS facility. There are no plans to expand its capacity or role in the BWS water system.

(9) *Substantially affects a rare, threatened, or endangered species, or its habitat.*
A flora and fauna study conducted for the project identified no rare, threatened, or endangered species as well as no habitats for these species on the property.

(10) *Detrimentally affects air or water quality or ambient noise levels.*
The anticipated impacts associated with the project construction work, such as dust, noise, and possibly erosion and discharges to waters of the State of Hawaiʻi, are short-term and temporary. These impacts would be minimized by the implementation of BMPs and use of mitigation measures in accordance with applicable federal, state, and county government statutes, laws, ordinances, rules and regulations, and permits.

(11) *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.*
The proposed action is located in a highly-urbanized area of Honolulu over one mile from the ocean. No coastal lands, floodplains, beaches, surface waters, and estuaries would be impacted. The site is not located in any geologically hazardous or erosion-prone area.

(12) *Substantially affects scenic vistas and viewplanes identified in County or State plans or studies.*
The proposed action does not involve the construction of structures substantially above the surface of the ground. There would be no effects on existing scenic vistas or viewplanes as identified in current County or State plans.

(13) *Requires substantial energy consumption.*
The replacement facilities at the existing pump station are not expected to substantially change overall energy consumption at the site.

12 DISTRIBUTION LIST

12.1 Pre-Consultation Distribution List

Agencies and interested parties contacted as part of the pre-consultation process are as follows:

State Legislature

- Senator Les Ihara (10th District)
- Representative Scott Y. Nishimoto (District 21)

State Agencies

- Clean Water Branch (DOH)
- Commission on Water Resource Management (DLNR)
- Land Division (DLNR)
- Department of Transportation, Highways Division
- Environmental Health Service Division (DOH)
- Environmental Management division (DOH)
- Environmental Planning Office (DOH)
- Indoor and Radiological Health Branch (DOH)
- Office of Environmental Quality Control (DOH)
- Safe Drinking Water Branch (DOH)
- State Historic Preservation Division (DLNR)

City Council

- Councilmember Ann Kobayashi (Council District 5)

City and County of Honolulu Agencies

- Department of Design and Construction
- Department of Environmental Services
- Department of Facility Maintenance
- Department of Planning and Permitting
- Department of Transportation Services
- Honolulu Fire Department
- Honolulu Police Department
- Linda Wong, Chair (Neighborhood Board 5)

Other Interested Parties

- Hawaiian Electric Company
- Hawaiian Telcom
- Oceanic Time Warner Cable
- Hawaiʻi Gas
- Carl T. Watanabe Trust
- Donald T. Nakano Trust
- Giampaolo Boschetti/LionKing LLC
- Market City LLC

Copies of the comment and response letters are included in Appendix A.

12.2 Draft EA Distribution list

The following agencies and organizations were sent the Draft EA.

State Agencies

- Commission of Water Resource Management (DOH)
- Department of Business, Economic Development and Tourism, Planning Office
- Department of Health
- Department of Land and Natural Resources
- Department of Transportation
- Office of Hawaiian Affairs
- State Historic Preservation Division (CLNR)

State Legislature

- Senator Les Ihara, Jr. (10th District)
- Representative Scott Y. Nishimoto (District 21)

City and County of Honolulu Agencies

- Neighborhood Board No. 5 (Diamond Head/Kapahulu/St. Louis)

Other Interested Parties

- Hawaiian Electric Company
- Hawaiʻi Gas

- Hawaiian Telcom
- Oceanic Time Warner Cable
- Kaimukī Public Library
- Waikīkī Kapahulu Public Library
- Central Venture Partners LLC
- Giampaolo Boshetti
- LionKing LLC
- Liu Properties LLC
- Jeffrey and Doris Lum Trusts
- Market City
- Miles Nakamura
- Donald T. Nakano Trust
- Myron K. Otsu et al.
- SKC Properties LLC
- Carl T. Watanabe Trust
- Richard and Nancy Zukemura Trusts

13 REFERENCES

AECOS, Inc. January 21, 2013. Photograph on cover page from *Biological Survey at the Kaimukī Pump Station in Honolulu, Oʻahu.*

City and County of Honolulu, Board of Water Supply. January 2014. *Draft, Kaimukī Pump Station Suction Piping Condition Assessment, Honolulu, Oʻahu, Hawaiʻi.*

City and County of Honolulu, Board of Water Supply. May 28, 2013. *Operating and Capital Improvement Program (CIP) Budget, 2013 – 2014 Budget, For the Fiscal Year beginning July 1, 2013 and ending June 30, 2014.*

City and County of Honolulu, Board of Water Supply. October 28, 2013. *Six-Year Capital Improvement Program, For the Fiscal Years Beginning July 1, 2013 and Ending June 30, 2019.*

City and County of Honolulu, Civil Defense Website: http://www.honolulu.gov/ocda/hurricane.htm.

City and County of Honolulu, Department of General Planning. 1992. *General Plan, Objectives and Policies*, Amended October 3, 2002, Resolution 02-205, CD1.

City and County of Honolulu, Department of Planning and Permitting. June 2004. *Primary Urban Center Development Plan.*

City and County of Honolulu, Department of General Planning and State of Hawai'i, Commission on Water Resource Management. March 1990. *Oahu Water Management Plan*. Prepared by Wilson Okamoto and Associates, Inc.

Federal Emergency Management Agency. Flood Insurance Rate Map, Panel 370F of 395, City and County of Honolulu, Hawai'i, Map No. 15003C0370F.

Geolabs, Inc. December 5, 2013. *Geotechnical Engineering Exploration Excavation Shoring Design Kaimuki Station Wells Redevelopment.*

MacDonald, Gordon Andrew. 1983. *Volcanoes in the Sea: The Geology of Hawaii.*

State of Hawai'i. *Chapter 226, Hawaii State Planning Act*, Part I, Part II, and Part III.

State of Hawai'i, Commission on Water Resource Management. June 2008. *Hawai'i Water Plan: Water Resource Protection Plan.* Prepared by Wilson Okamoto Corporation.

State of Hawai'i, Department of Health. Sept. 23, 1996. *Chapter 46, Community Noise Control, State of Hawai'i,* HAR, Title 11.

U.S. Department of Health and Human Services, Center for Disease Control and Prevention. June 1998. *Criteria for a Recommended Standard – Occupational Noise Exposure.*

State of Hawai'i, Office of the Governor. *The Hawaii State Plan*.

Towill Shigeoka & Associates, Inc. Topographic Survey of Parcel 12, "Kaimuki Station Wells," "Pahoa Pump Lot," and Lot 8 as shown on Land Court Application 921 (Map 3) .

U.S. Department of Agriculture, Soils Conservation Service. Issued August 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.*

Appendices

Appendix A

Public Involvement

NEIL ABERCROMBIE
GOVERNOR

GENEVIEVE SALMONSON
INTERIM DIRECTOR

RECEIVED
2013 OCT 16 PM 1:08
BELT COLLINS HAWAII

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813
Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqchawaii@doh.hawaii.gov

October 14, 2013

Mr. Gary Koyama
Belt Collins Hawaii LLC
2153 N. King Street Suite 200
Honolulu, HI 96819-4554

SUBJECT: Pre-Consultation for Environmental Assessment Proposed Board of Water Supply Kaimuki Pump Station Improvements

Dear Mr. Koyama,

The Office of Environmental Quality Control is in receipt of your letter dated October 10, 2013 for the Kaimuki Pump Station Improvements.

We have reviewed the information provided and have no comments at this time. We look forward to reviewing and commenting on the project once the Draft Environmental Assessment is prepared.

Sincerely,

Genevieve Salmonson
Interim Director

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-108

Director
Office of Environmental Quality Control
State of Hawai'i
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Director:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 14, 2013, regarding the Kaimukī Pump Station Improvements Environmental Assessment (EA) and acknowledge you have no comments at this time.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

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

RECEIVED
2013 OCT 22 PM 2:57
BELT COLLINS HAWAII

In reply, please refer to:
File:
13-199
Kaimuki Pump Station

October 17, 2013

Mr. Glen T. Koyama
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

SUBJECT: Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimuki Pump Station Improvements
Tax Map Key: (1) 2-7-030: 012 and 055, Honolulu, Oahu, Hawaii

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your letter dated October 10, 2013. Thank you for allowing us to review and comment on the subject document. The document was routed to DOH's Safe Drinking Water Branch. They will provide specific comments to you if necessary. EPO recommends that you review the Standard Comments (www.health.hawaii.gov/epo/ under the land use tab). You are required to adhere to all Standard Comments specifically applicable to this application.

EPO suggests that you examine the many sources available on strategies to support the sustainable design of communities, including the following:
State of Hawaii, Office of Planning: www.planning.hawaii.gov and the new 2013 ORMP;
U.H., School of Ocean and Earth Science and Technology: www.soest.hawaii.edu;
U.S. Environmental Protection Agency's sustainability programs: www.epa.gov/sustainability;
U.S. Green Building Council's LEED program: www.usgbc.org/leed; and
State of Hawaii, Office of Planning, Coastal Zone Management website on adapting to climate change: http://planning.hawaii.gov/czm/initiatives/adapting-to-climate-change-2/.

The DOH encourages everyone, to apply these sustainability strategies and principles early in the planning and review of projects. We also request that for future projects you consider conducting a Health Impact Assessment (HIA). More information is available at www.cdc.gov/healthyplaces/hia.htm. We request you share all of this information with others to increase community awareness on sustainable, innovative, inspirational, and healthy community design.

We require a written response confirming receipt of this letter and any other letters you receive from DOH in regards to this submission. You may mail your response to 919 Ala Moana Blvd., Ste. 312, Honolulu, Hawaii 96814. However, we would prefer an email submission to epo@doh.hawaii.gov. We anticipate that our letter(s) and your response(s) will be included in the final document. If you have any questions, please contact me at (808) 586-4337.

Mahalo,

Laura Leialoha Phillips McIntyre, AICP
Manager, Environmental Planning Office

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-100

Ms. Laura Leialoha Phillips McIntyre, AICP, Manager
Environmental Planning Office
Department of Health
State of Hawai'i
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Ms. McIntyre:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 17, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

RECEIVED
2013 OCT 25 PM 3:24
BELT COLLINS HAWAII

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

In reply, please refer to:
EMD/CWB

10072PMR.13

October 22, 2013

Mr. Glen T. Koyama
Project Planner
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

SUBJECT: Comments on the Pre-Consultation for Environmental Assessment for the Proposed Board of Water Supply Kaimuki Pump Station Improvements, Tax Map Key: (1) 2-7-30:12 and 55 Honolulu, Island of Oahu, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt your letter, dated October 10, 2013, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/home/landuse-planning-review-program.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of

the discharge. To request NPDES permit coverage, you must submit the CWB Individual NPDES Form through the e-Permitting Portal and the hard copy certification statement with $1,000 filing fee. Please open the e-Permitting Portal website at: https://eha-cloud.doh.hawaii.gov/epermit/View/home.aspx. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the "CWB Individual NPDES Form." Follow the instructions to complete and submit this form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommend that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at: http://health.hawaii.gov/cwb, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

MR:rh

c: DOH-EPO [via email only]

December 5, 2013
2013-71-0300 / 13P-099

Mr. Alec Wong, P.E., Chief
Clean Water Branch
Department of Health
State of Hawai'i
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Mr. Wong:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 22, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

October 18, 2013

Mr. Glen Koyama
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

SUBJECT: PRE-CONSULTATION FOR ENVIRONMENTAL ASSESSMENT
PROPOSED BOARD OF WATER SUPPLY
KAIMUKI PUMP STATION IMPROVEMENTS
HONOLULU, OAHU, HAWAII
TMK: (1) 2-7-30:12 AND 55

The Safe Drinking Water Branch (SDWB) has reviewed the subject document and has the following comments:

1. The project proposes to construct four new drinking water wells at the existing Kaimuki Pump Station serving the Board of Water Supply's Honolulu-Windward-Pearl Harbor water system. This project must comply with the terms of Hawaii Administrative Rules, Title 11, Chapter 20, Section 29, "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.

2. The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses for all regulated contaminants, performed by a laboratory certified by the State Laboratories Division of the State of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional parameters may be required by the Director for this submittal or additional tests required upon his or her review of the information submitted.

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

If there are any questions, please call Ms. Jennifer Nikaido of the Engineering Section, at 586-4258.

Sincerely,

JOANNA L. SETO, P.E., CHIEF
Safe Drinking Water Branch

JN:slm

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-101

Ms. Joanna L. Seto, P.E., Chief
Safe Drinking Water Branch
Department of Health
State of Hawai'i
919 Ala Moana Boulevard, Room 308
Honolulu, HI 96814-4920

Dear Ms. Seto:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 18, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

From: Steve.Molmen@hawaii.gov [mailto:Steve.Molmen@hawaii.gov]
Sent: Thursday, October 31, 2013 8:15 AM
To: Glen Koyama
Subject: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements, Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O`ahu, Hawai`i

Dear Mr. Koyama,

Attached, please find our comments on the subject project. No hard copy will be sent.

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 30, 2013

Belt Collins Hawaii LLC.
Attention: Mr. Glen T. Koyama
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

via email: gkoyama@beltcollins.com

Dear Mr. Koyama,

SUBJECT: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements, Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O`ahu, Hawai`i

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

At this time, enclosed are comments from Engineering Division. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

'13 OCT 16 AM 9 40 ENGINEERING

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

2013 OCT 25 PM 2:55
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
RECEIVED
LAND DIVISION

October 16, 2013

MEMORANDUM

TO: FR:

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements
LOCATION: Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O'ahu
APPLICANT: Honolulu Board of Water Supply (BWS) by its consultant, Belt Collins Hawaii LLC

Transmitted for your review and comment on the above-referenced document.

We would appreciate your comments on this document. Please submit any comments by October 30, 2013. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

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

Signed: _____
Print Name: Carty S. Chang, Chief Engineer
Date: 10/25/13

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/SteveMolmen
RE:KaimukiPumpStationPreConEA
Oahu.939

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone X. The National Flood Insurance Program does not have any regulations for developments within Zone X.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

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

( ) Mr. Mario Siu Li at (808) 768-8098 or Ms. Ardis Shaw-Kim at (808) 768-8296 of t he City and County of Honolulu, Department of Planning and Permitting.
( ) Mr. Frank DeMarco at (808) 961-8042 of the County of Hawaii, Department of Public Works.
( ) Ms. Carolyn Cortez at (808) 270-7813 of the County of Maui, Department of Planning.
( ) Mr. Stanford Iwamoto at (808) 241-4884 of the County of Kauai, Department of Public Works.

( ) The applicant should include water demands and infrastructure required to meet project needs. Please note that projects within State lands requiring water service from the Honolulu Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

( ) Other: _____

Should you have any questions, please call Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER
Date: 10/25/13

December 5, 2013
2013-71-0300 / 13P-097

Mr. Russell Y. Tsuji, Land Administrator
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Tsuji:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 30, 2013, and the Engineering Division's input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will include your information in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

From: Steve.Molmen@hawaii.gov [mailto:Steve.Molmen@hawaii.gov]
Sent: Thursday, October 31, 2013 9:57 AM
To: Glen Koyama
Subject: Re: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements, Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O`ahu, Hawai`i

Dear Mr. Koyama,

Attached, please find an additional comment on the subject project. Again, no hard copy will be sent.

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

From: Steve Molmen/DLNR/StateHiUS
To: gkoyama@beltcollins.com
Date: 10/31/2013 08:15 AM
Subject: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements, Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O`ahu, Hawai`i

Dear Mr. Koyama,

Attached, please find our comments on the subject project. No hard copy will be sent.

[attachment "DOC113.pdf" deleted by Steve Molmen/DLNR/StateHiUS]

Best regards,

Steve Molmen, Supervising Land Agent
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621
Tel.: (808) 587-0439
Fax: (808) 312-6357
Email: steve.molmen@hawaii.gov

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 16, 2013

MEMORANDUM

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Consultation for Environmental Assessment, Proposed Board of Water Supply Kaimuki Pump Station Improvements
LOCATION: Tax Map Key: (1) 2-7-30: 12 and 55, Honolulu, O'ahu
APPLICANT: Honolulu Board of Water Supply (BWS) by its consultant, Belt Collins Hawaii LLC

Transmitted for your review and comment on the above-referenced document.

We would appreciate your comments on this document. Please submit any comments by October 30, 2013. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

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

Signed: _____
Print Name: Tommy Chee
Date: 10/21/13

cc: Central Files

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-098

Mr. Steve Molmen, Supervising Land Agent
Department of Land and Natural Resources
State of Hawai'i
1151 Punchbowl Street, Suite 220
Honolulu, HI 96809-0621

Dear Mr. Molmen:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your email, dated October 31, 2013, and the Land Division's input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We acknowledge the Land Division has no comments to offer at this time.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2013/ELOG-1992 (mw)

October 23, 2013

Glen T. Koyama, Project Planner
Belt Collins Hawaii, LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama,

In response to your letter dated October 10, 2013 regarding the Pre-Consultation for an environmental assessment on the proposed Board of Water Supply Kaimuki Pump Station Improvements, right next to Market City near the top of Kapahulu Avenue, we have the following comments:

1. Since the building is over 50 years old and thus is eligible for historic status, please describe its history and state whether any visible alteration of the building or grounds is being proposed. Also, consult with the Historic Preservation Division of the State Department of Land and Natural Resources.

2. If any significant alterations to the site's existing utility needs, road access, or drainage are planned, please describe them and their anticipated impacts.

3. Information on this pump station's main service area would also be helpful.

4. We recently reviewed the Board of Water Supply's Six Year Capital Improvement Program, and determined that this project does not need a Public Infrastructure Map revision, since it does not propose to increase the facility's capacity to provide water.

Should you have any questions, please contact Mike Watkins of my staff at 768-8044.

Very truly yours,

George I. Atta, FAICP
Director

GIA:mw
EA-EIS\2013\2013elog-1992

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-102

Mr. George I. Atta, FAICP, Director
Department of Planning and Permitting
City and County of Honolulu
650 South Street, 7th Floor
Honolulu, HI 96813

Dear Mr. Atta:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 23, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

CHRIS T. TAKASHIGE, P.E., CCM
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

October 23, 2013

Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Attn: Glen Koyama

Dear Mr. Koyama:

Subject: Pre-Consultation for Environmental Assessment Proposed Board of Water Supply Kaimuki Pump Station Improvements Tax Map Key :(1) 2-7-30: 12 and 55 Honolulu, Oahu, Hawaii

The Department of Design and Construction does not have any comments to offer on the environmental assessment pre-consultation.

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

Sincerely,

Chris T. Takashige, P.E., CCM
Director

CTT: cf (534441)

December 5, 2013
2013-71-0300 / 13P-096

Mr. Chris T. Takashige, P.E., CCM, Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, HI 96813

Dear Mr. Takashige:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 23, 2013, regarding the Kaimukī Pump Station Improvements Environmental Assessment (EA) and acknowledge you have no comments at this time.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 788-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RECEIVED
2013 NOV 12 PM 3:37
BELT COLLINS HAWAII

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP10/13-534488R

November 1, 2013

Mr. Glen T. Koyama, Project Planner
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

SUBJECT: Pre-Assessment Consultation for Draft Environmental Assessment (DEA) Board of Water Supply Kaimuki Pump Station Improvements; Tax Map Key (TMK) (1) 2-7-30: 12 and 55; Honolulu, Oahu, Hawaii

In response to your letter of October 10, 2013, we have the following comments:

1. The area Neighborhood Board, as well as the area residents, businesses, etc., should be kept apprised of the details of the proposed project and the impacts, particularly during construction, the project may have on the adjoining local street area network.

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

We reserve further comments pending submission of the DEA.

Thank you for the opportunity to review this matter. Should you have any further questions, please contact Michael Murphy of my staff at 768-8359.

Very truly yours,

Michael D. Formby
Director

cc: Scot Muraoka
Honolulu Board of Water Supply

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-103

Mr. Michael D. Formby, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, HI 96813

Dear Mr. Formby:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated November 1, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

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

KIRK CALDWELL
MAYOR

OUR REFERENCE EO-WS

RECEIVED
2013 OCT 29 PM 2:04
BELT COLLINS HAWAII

LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. McCAULEY
DEPUTY CHIEFS

October 24, 2013

Mr. Glen T. Koyama
Project Planner
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

This is in response to your letter dated October 10, 2013, requesting comments on the Pre-Consultation for the Environmental Assessment of the Proposed Board of Water Supply Kaimuki Pump Station Improvements project.

The Honolulu Police Department (HPD) anticipates that there may be possible short-term impacts to traffic around the Harding Avenue extension and Kapahulu Avenue during the construction phase of the project. The HPD recommends scheduling construction vehicles and supply deliveries during off-peak, traffic hours and informing the public of any potential delays in the project areas.

If there are any questions, please contact Major Raymond Ancheta of District 7 (East Honolulu) at 723-3669 or via e-mail at rancheta@honolulu.gov.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
CLAYTON G. KAU
Assistant Chief
Support Services Bureau

Serving and Protecting With Aloha

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-109

Mr. Clayton G. Kau, Assistant Chief
Support Services Bureau
Police Department
801 South Beretania Street
Honolulu, HI 96813

Dear Mr. Kau:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 24, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will address your areas of interest in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

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

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

October 23, 2013

Mr. Glen Koyama
Project Planner
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

Subject: Preconsultation for Environmental Assessment
Proposed Board of Water Supply Kaimuki Pump Station Improvements
Tax Map Keys: 2-7-030: 012 and 055

In response to your letter of October 10, 2013, regarding the above-mentioned subject, the Honolulu Fire Department determined that there will be no significant impact to fire department services.

Should you have questions, please contact Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151 or sbratakos@honolulu.gov.

Sincerely,

ROLLAND J. HARVEST
Assistant Chief

RJH/SY:bh

BELTCOLLINS

December 5, 2013
2013-71-0300 / 13P-104

Mr. Rolland J. Harvest, Assistant Chief
Honolulu Fire Department
City and County of Honolulu
636 South Street
Honolulu, HI 96813-5007

Dear Mr. Harvest:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 23, 2013, regarding the Kaimukī Pump Station Improvements Environmental Assessment (EA) and acknowledge the Fire Department's determination that the proposed improvements will have no significant impact to its services.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

November 5, 2013

Mr. Glen T. Koyama
Belt Collins Hawaii
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

Dear Mr. Koyama:

Subject **Pre-Assessment Consultation for Environmental Assessment for the Proposed Board of Water Supply Kaimuki Pump Station Improvements TMKs: 2-7-030:12 and 55, Honolulu, Oahu, Hawaii**

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

We appreciate your efforts to keep us apprised of the subject project in the planning process. As the BWS Kaimuki Pump Station Improvements project comes to fruition; please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.

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

Sincerely,

Rouen Q. W. Liu
Permits Engineer

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-106

Mr. Rouen Q.W. Liu, Permits Engineer
Hawaiian Electric Company
820 Ward Avenue
Honolulu, HI 96813

Dear Mr. Liu:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated November 5, 2013, and your input on the Board of Water Supply's (BWS) preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. The BWS will continue to coordinate with and include Hawaiian Electric Company in the review of its improvement plans.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

HAWAI'IGAS
THE CLEAN ENERGY COMPANY

October 17, 2013

Mr. Glen T. Koyama
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

Subject: Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimuki Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

In response to your letter dated October 10, 2013, it has been determined that the area is currently clear of utility gas facilities.

Thank you for the opportunity to review the map. Should there be any questions, or if additional information is desired, please feel free to call Jared Pasalo at 594-5008.

Sincerely,

HAWAI'IGAS

Keith K. Yamamoto
Manager, Engineering

KKY:krs
13-190

P.O. Box 3000 | Honolulu, Hawai'i 96802-3000 | www.HawaiiGas.com

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-105

Mr. Keith K. Yamamoto, Manager
Engineering
Hawai'i Gas
P.O. Box 3000
Honolulu, HI 96802-3000

Dear Mr. Yamamoto:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 17, 2013, and your input on the Board of Water Supply's preparation of an Environmental Assessment (EA) for the proposed improvements at the Kaimukī Pump Station on Kapahulu Avenue. We will include your information in the Draft EA, which is scheduled to be available for public review in the coming months.

We look forward to your continued participation in this EA review process.

Sincerely yours,
BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

Oceanic Time Warner Cable

October 15, 2013

Belt Collins Hawaii
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Attention: Glen T. Koyama

Project: Proposed Board of Water Supply Kaimuki Pump Station Improvements

Subject: CATV Comments

Dear Mr. Koyama:

Time Warner Cable does not have any comments at this time regarding the Environmental Assessment. Our CATV facilities are aerial along Kihei Place and should not affect the work that will be done. If you have any questions, contact me at #625-8576.

Sincerely,

Lionel Aguiar
OSP Engineer
Oceanic Time Warner Cable

200 Akamainui Street
Mililani, Hawaii 96789-3999
Tel (808) 625 2100
Fax (808) 625 5888

BELT COLLINS

December 5, 2013
2013-71-0300 / 13P-107

Mr. Lionel Aguiar, OSP Engineer
Oceanic Time Warner Cable
200 Akamainui Street
Mililani, HI 96789-3999

Dear Mr. Aguiar:

Pre-Consultation for Environmental Assessment
Proposed Board of Water Supply Kaimukī Pump Station Improvements
Tax Map Key: (1) 2-7-30: 12 and 55
Honolulu, O'ahu, Hawai'i

We thank you for your letter, dated October 15, 2013, regarding the Kaimukī Pump Station Improvements Environmental Assessment (EA) and acknowledge you have no comments at this time. We note that Oceanic Time Warner Cable has overhead CATV facilities along Kihei Place and that they should not affect the Board of Water Supply improvements.

We look forward to your continued participation in this EA review process.

Sincerely yours,

BELT COLLINS HAWAII LLC

Glen T. Koyama
Project Planner

GTK:jdk

cc: Scot Muraoka, Honolulu BWS

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

Appendix B

Biological Survey

AECOS No. 1362

Biological survey at the Kaimukī Pump Station in Honolulu, Oʻahu

Prepared by:

AECOS, Inc.
45-939 Kamehameha Hwy, Suite 104
Kāneʻohe, Hawaiʻi 96744-3221

January 21, 2013

Biological survey at the Kaimukī Pump Station in Honolulu, Oʻahu

December 27, 2013
Revised January 21, 2013

AECOS No. 1362

Chad Linebaugh
AECOS, Inc.
45-939 Kamehameha Hwy, Suite 104
Kāneʻohe, Hawaiʻi 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

The Board of Water Supply is planning to redevelop the existing wells at the Kaimukī Pump Station on the Island of Oʻahu (Fig 1). The project is still in the planning phase but anticipated project work will take place within the confines of the Kaimukī Pump Station property located at 2951 Harding Avenue (TMK: 2-70-300:012 & :055). *AECOS* Inc. was contracted by Belt Collins, LLC[1] to survey flora and fauna at the project site. This report details findings of a survey undertaken in August 2013.

Project Site

The Kaimukī Pump Station is located at the corner of Harding Avenue and Kapahulu Avenue at an elevation of 9 m (30 ft) above sea level, and sits partially in the shadow of the H-1 viaduct. The property is roughly trapezoidal in shape with a driveway extending southwest to Kihei Place (Fig. 2). A two story high structure and driveway with roundabout account for over half of the roughly 0.4-ha (1.0-ac) parcel.

Ornamental trees and hedges grow around a maintained lawn on the north, west and east margins of the property. Areas between the building and roundabout and some margins of the roundabout are a bed of gravel. The southwestern half of the property, including the building, roundabout, and driveway, is enclosed by a chain link fence.

[1] This document will be incorporated into an Environmental Assessment (EA) and will become part of the public record.

Figure 1. General location of the project on the Island of O'ahu.

Figure 2. Project site showing avian count station locations.

Methods

Botanical

Botanical resources were identified by walking around the subject property on August 9, 2013 and noting the names and relative abundances of all vascular plants present. For the most part, plant names given in the listing follow *Manual of the Flowering Plants of Hawai'i* (Wagner et al., 1990, 1999) for native and naturalized flowering plants, and *A Tropical Garden Flora* (Staples and Herbst, 2005) for ornamental plants. Names have been updated as appropriate to reflect more recent taxonomic or nomenclatural name changes as provided by Imada (2012).

Avian Biota

Six avian count stations were established on the Kaimukī Pump Station parcels. A single five-minute time dependent bird count was made at each station. Field observations were made with the aid of Tasco 12 X 25 binoculars and by listening for vocalizations. Numbers of birds encountered during the botanical survey were not counted, but additional species not observed during point counts are included as incidental sightings in survey results. Weather conditions during the survey were ideal, with no rain, unlimited visibility, and light tradewinds. All station counts were conducted between 0800 and 0900 on August 9, 2013. Additionally, all visible areas of trees, bushes, and open ground on the property were inspected for the presence of White Tern or *manu o kū* (*Gygis alba*) eggs.

The avian nomenclature used in this report follows the *AOU Check-List of North American Birds* (American Ornithologists' Union, 1998), and the 42nd through the 53rd supplements to the Check-List (American Ornithologists' Union, 2000; Banks et al., 2002, 2003, 2004, 2005, 2006, 2007, 2008; Chesser et al., 2009, 2010, 2011, 2012).

Terrestrial Mammals

With the exception of the endangered Hawaiian hoary bat or *'ōpe'ape'a* (*Lasiurus cinereus semotus*), all terrestrial mammals found on the Island of O'ahu are alien species (R. David, pers. comm.). Our survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal signs during the avian and botanical surveys on the site. Mammal scientific names follow Tomich (1986).

Survey Results

Botanical

The vegetation present on the Kaimukī Pump Station property is primarily ornamental plantings and a lawn of grasses, sedges, and various weeds. Spider lilies (*Crinum asiaticum*) grow along the gated entrance and the driveway is lined with Caribbean trumpet trees (*Tabebuia aurea*) and hedges of Chinese hibiscus (*Hibiscus rosa-sinensis*). A sparse assemblage of weeds—mostly graceful spurge (*Euphorbia hypericifolia*), *Oldenalandia corymbosa*, peppergrass (*Lepidium virginicum*), and clumps of wiregrass (*Elusine indica*)—occurs between the hedges and the driveway.

The lawn to the east and north of the building is composed of a mix of narrow-leaved carpetgrass (*Axonopus fissifolius*), Bermuda grass (*Cynodon dactylon*), and *Calyptocarpus vialis*. Patches of nut grass (*Cyperus rotundus*) and swollen fingergrass (*Chloris radiata*)are present. Spanish clover (*Desmodium incanum*) and creeping indigo (*Indigofera spicata*) also grow throughout the lawn. The eastern side of the property (Figure 3) is home to a large rainbow shower tree (*Cassia* x *nealae*) and several coconut palms (*Cocos nucifera*), while plantings of snowbush (*Breynia disticha*) and bird-paradise (*Strelitzia reginae*) are located adjacent to the building.

Figure 3. View of site from southeast corner of property.

Three additional rainbow shower trees and several peregrina (*Jatropha integerrima*) shade much of the northwest quarter of the property. Hedges of bougainvillea (*Bougainvillea spectablis*) and Fukien tea (*Carmona retusa*) are also present. The lawn on this side of the building is composed of similar species as on the east side, though lawn grasses, such as Bermuda grass and

Hilo grass (*Paspalum conjugatum*) are more prevalent. Coat buttons (*Tridax procumbens*) is conspicuous along margins of sidewalks, beneath hedges, and along the fenceline.

Two Polynesian introductions, *'ihi 'ai* or yellow wood sorrel (*Oxidalis corniculata*) and coconut palm are present on the property. One indigenous species is present: *'ae'ae* (*Bacopa monnieri*) grows in a small drainage next to the sidewalk on the northwest side of the building. The sprinkler system appears to be keeping this location wet enough for *'ae'ae,* an obligate wetland species (Lichivar, 2013).

Table 1. Flora listing for the Kaimukī Pump Station, August 2013.

Family *Species*	Common Name	Status	Abundance
	FLOWERING PLANTS		
	DICOTYLEDONE		
ACANTHACEAE			
Thunbergia fragrans Roxb.	sweet clockvine	Nat	R
AMARANTHACEAE			
Amaranthus viridis L.	slender amaranth	Nat	O
ASTERACEAE (COMPOSITAE)			
Calyptocarpus vialis Less.	--	Nat	AA
Conyza bonariensis (L.) Cronq.	hairy horseweed	Nat	C
Elephantopus mollis Kunth	elephant's foot	Nat	R
Emilia fosbergi Nicolson	Flora's paintbrush	Nat	R
Synedrella nodiflora (L.) J. Gaertn.	nodeweed	Nat	O
Taraxacum officinale W.W.Weber ex F.H.Wigg.	common dandelion	Nat	O
Tridax procumbens L.	coat buttons	Nat	C
Youngia japonica (L.) DC.	Oriental hawksbeard	Nat	R
BIGNONIACEAE			
Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore	Caribbean trumpet tree	Nat	O
BORAGINACEAE			
Carmona retusa (Vahl) Masam.	Fukien-tea	Orn	O
BRASSICACEAE			
Lepidium virginicum L.	peppergrass	Nat	C
CONVOLVULACEAE			
Ipomoea obscura (L.) Ker-Gawl.	---	Nat.	U
Ipomoea triloba L.	little bell		

Table 1 (continued).

Family *Species*	Common Name	Status	Abundance
CUCURBITACEAE			
Coccinia grandis (L.) Voigt	scarlet-fruited gourd	Nat	R
Momordica charantia L.	wild bittermelon	Nat	R
EUPHORBIACEAE			
Euphorbia albomarginata Torr. & A.Gray	rattlesnake weed	Nat	C
Euphorbia hirta L.	garden spurge	Nat	C
Euphorbia hypercifolia L.	graceful spurge	Nat	C
Euphorbia prostrata Aiton	prostrate spurge	Nat	C
Jatropha integerrima Jacq.	peregrina	Orn	O
FABACEAE			
Breynia disticha J. R. & G. F. Foistern	snowbush	Orn	R
Cassia x *nealae*	rainbow shower tree	Orn	R
Desmodium triflorum (L.) DC.	---	Nat	U
Desmodium incanum DC.	Spanish clover	Nat	C
Indigofera spicata Forssk.	creeping indigo	Nat	C
Trifolium repens L. var. *repens*	white clover	Nat	O
LILIACEAE			
Crinum asiaticum L.	spider lily	Orn	R
LYTHRACEAE			
Cuphea hyssopifolia Kunth	false heather	Nat	O
MALVACEAE			
Hibiscus rosa-sinensis L.	Chinese hibiscus	Orn	O
OXALIDACEAE			
Oxidalis corniculata L.	*'ihi 'ai*; yellow wood sorrel	**Pol**	R
NYCTAGINACEAE			
Boerhavia coccinea Mill.	false alena	Nat	R
Bougainvillea spectablis Willd.	bougainvillea	Orn	U
PORTULACACEAE			
Portulaca oleracea L.	pigweed	Nat	C
PLANTAGINACEAE			
Plantago lancelota L.	narrow-lvd. plantain	Nat	R
RUBIACEAE			
Hedyotis corymbosa (L.) Lam	---	Nat	C
Spermacoce assurgens Ruiz. & Pav.	buttonweed	Nat	U
SCHROPHULARIACEAE			
Bacopa monnieri (L.) Wettst.	*'ae'ae*; water hyssop	**Ind**	R

Table 1 (continued).

Family *Species*	Common Name	Status	Abundance
URTICACEAE			
Pilea microphylla (L.) Liebm.	artillery plant	Nat	A
MONOCOTYLEDONES			
ALOEACEAE			
Aloe vera (L.) Burm.f.	aloe	Nat	R
ARECACEAE			
Cocos nucifera L.	coconut palm	**Pol**	O
CYPERACEAE			
Cyperus rotundus L.	nut grass	Nat	A
Kyllinga nemoralis (J.R.Forst. & G.Forst.) Dandy ex Hutch&Daziel	*kili'o'opu*	Nat	O
POACEAE (GRAMINEAE)			
Axonopus fissifolius (Raddi) Kuhlm.	nrw-lvd. carpetgrass	Nat	O
Cenchrus ciliaris L.	buffelgrass	Nat	R
Cenchrus echinatus L.	common sandbur	Nat	R
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	C
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	C
Eleusine indica (L.) Gaertn.	wiregrass	Nat	C
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	C
Paspalum conjugatum Bergius	Hilo grass	Nat	O
Sporobolus cf. *indicus* (L.) R. Br.	smutgrass	Nat	O
Urochloa maxima Jacq.	Guinea grass	Nat	R
STRELITZIACEAE			
Strelitzia reginae Aiton	bird of paradise	Orn	R

Legend to Table 1

Status = distributional status
- End = endemic; native to Hawai'i and found naturally nowhere else.
- Ind = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
- Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
- Orn = exotic, ornamental or cultivated crop; plant not naturalized (not well-established outside of cultivation, at least at this location).
- Pol = Polynesian introduction; brought to the Hawaiian Islands before 1778.

Abundance = occurrence ratings for plants on property in August 2013
- R – Rare - encountered only rarely.
- U - Uncommon - encountered occasionally.
- O - Occasional - seen regularly, but not typically abundant.
- C - Common - seen regularly in most environments; abundant in some places.
- A - Abundant - found almost everywhere; may be locally dominant.
- AA - Abundant - very abundant and dominant; a defining vegetation type.

Table 2. Bird sightings at individual stations and mean abundance per station.

PHYLUM, CLASS, ORDER, FAMILY *Genus species*	Common name	Status	Station Counts Sta. 1	Sta. 2	Sta. 3	Sta. 4	Sta. 5	Sta. 6	Mean (Count/6)
CHORDATA, AVES	**BIRDS**								
AVES, CHARADRIFORMES									
LARIDAE									
Gygis alba Sparrman	*Manu o kū*; White tern	**Ind**	--	--	--	--	--	1	0.17
AVES, COLOMBIFORMES									
COLUMBIDAE									
Columba livia Gmelin	Rock pigeon	Nat	--	--	1	--	--	--	0.17
Geopelia striata Linnaeus	Zebra dove	Nat	8	1	4	--	7	--	3.33
Streptopelia chinensis Scopoli	Spotted dove	Nat	5	3	2	3	5	3	3.50
AVES, PASSERIFORMES									
ESTRILDIDAE									
Estrilda astrild Linnaeus	Common waxbill	Nat	--	--	4	5	--	--	1.50
FRINGILLIDAE									
Carpodacus mexicanus Muller	House finch	Nat	7	--	--	--	--	4	1.83
Serinus mozambicus Muller	Yellow-fronted canary	Nat	--	--	--	--	--	6	1.00
MIMIDAE									
Mimus polyglotto Linnaeus	Northern mockingbird	Nat	--	--	--	1	--	--	0.17
PASSERIDAE									
Passer domesticus Linnaeus	House sparrow	Nat	2	2	--	--	--	--	0.67
PYCNONOTIDAE									
Pycnonotus cafer Linnaeus	Red-vented bulbul	Nat	--	--	4	1	2	1	1.33
STURNIDAE									
Acridotheres tristis Linnaeus	Common myna	Nat	4	6	2	3	5	2	3.67
ZOSTEROPIDAE									
Zosterops japonicus Temminck & Schlegel	Japanese white-eye	Nat	--	--	--	--	--	--	--

Legend to Table 2
Ind = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

Avian Biota

The project site is utilized by various non-native bird species. A total of 104 individual birds, of eleven different species, representing eight separate families, were recorded during station counts (Table 2, above). One additional species, Japanese White-eye (*Zosterops japonicus*), was recorded as an incidental sighting during the botanical survey. Zebra Dove (*Geopelia striata*), Spotted Dove (*Streptopelia chinensis*), and Common Myna (*Acridotheres tristis*) account for just over 60% of all birds sighted during the station counts.

The White Tern or *manu o kū* (*Gygis alba*), the only indigenous bird found during the survey, was sighted briefly, flying high overhead and not observed on the property. Additionally, a survey of visible areas in trees, hedges, and ground cover did not locate any eggs of this species, which does not build a physical nest.

Terrestrial Mammals

Mammals observed on the property are limited to a leashed, domestic dog (*Canis familiaris familiaris*) being walked on the site and a single, apparently homeless human (*Homo sapiens*) living in a small encampment on the northwestern edge of the property.

Assessment

Botanical Resources

As noted, the vast majority of the plants found on the Kaimukī Pump Station property are non-native species. No federal or state listed endangered or threatened (DLNR, 1998; USFWS, 2005a, 2013) plant species was observed in the survey.

Avian Resources

The findings of the bird survey are consistent with the location of the property and the habitats present on and adjacent to the site. The property has more trees than most lots nearby in this urban part of Honolulu, and may be more heavily utilized by birds. However, none of the species observed on the property are important from a natural resource conservation perspective. None of the species of birds observed on the property is listed as threatened or endangered by state (DLNR, 1998) or federal (USFWS, 2013) regulations.

Furthermore, the proposed action will not result in modification of any federally designated Critical Habitat, as there is none present on or adjacent the project site.

The White Tern or *manu o kū*, observed flying overhead is listed as threatened by the State of Hawai'i (DLNR, 2008). The species is sighted regularly along the south shore of O'ahu with an estimated population of greater than 250 pairs nesting on island (Mitchell et al., 2005).

Mammalian Resources

No mammalian species currently protected or proposed for protection under either federal or state endangered species statutes were detected during the course of this survey (DLNR, 1998; USFWS, 2005a, 2013).

The findings of the mammalian survey are consistent with the location of the property and the habitat currently present on the site. Although no rodents were recorded, it is likely that one or more of the four established alien Muridae found on O'ahu—roof rat (*Rattus rattus rattus*), Norway rat (*Rattus norvegicus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus domesticus*)—utilize various resources found within the general project area on a seasonal basis.

No Hawaiian hoary bats were detected during the course of this survey. The species is listed as endangered by both state and federal regulations (DLNR, 1998; USFWS, 2005a, 2013) and is reported to roost in a wide range of trees (Mitchell et al, 2005). It is however, highly unlikely that this bat species would roost in urban Honolulu.

References

American Ornithologist's Union. 1998. *Check-list of North American Birds*. 7th edition. AOU. Washington D.C. 829pp.

_____. 2000. Forty-second supplement to the American Ornithologist's Union Check-list of North American Birds. *The Auk,* 117:847-858.

Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2002. Forty-third supplement to the American Ornithologist's Union Check-list of North American Birds. *The Auk,* 119:897-906.

_____, _____, _____, _____, _____, _____, _____, and _____. 2003. Forty-fourth supplement to the American Ornithologist's Union Check-list of North American Birds. *The Auk,* 120: 923-931.

Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2004. Forty-fifth supplement to the American Ornithologist's Union Check-list of North American Birds. *The Auk,* 121: 985-995.

_____, _____, _____, _____, _____, _____, _____, and _____. 2005. Forty-sixth supplement to the American Ornithologist's Union Check-list of North American Birds. *The Auk,* 122: 1026-1031.

_____, _____, _____, _____, _____, _____, _____, and _____. 2006. Forty-seventh supplement to the American Ornithologist's Union *Check-list of North American Birds*. *The Auk*, 123: 926-936.

_____, C. R. Terry Chesser, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2007. Forty-eighth supplement to the American Ornithologist Union Check-list of North American Birds. *The Auk*, 124: 1109-1115.

_____, _____, _____, _____, _____, _____, _____, _____, _____, _____, and K. Winker. 2008. Forty-ninth supplement to the American Ornithologist Union Check-list of North American Birds. *The Auk,* 125: 758-768.

Chesser, R. T., R. C. Banks, F. K. Barker, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, D. F. Stotz, and K. Winker. 2009. Fiftieth supplement to the American Ornithologist Union, *Check-list of North American Birds*. *The Auk*, 126: 1-10.

_____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, and _____. 2010. Fifty-first supplement to the American Ornithologist Union, *Check-list of North American Birds*. *The Auk*, 127: 726-744.

_____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, and _____. 2011. Fifty-second supplement to the American Ornithologist Union, *Check-list of North American Birds*. *The Auk*, 128: 600-613.

_____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, and _____. 2012. Fifty-third supplement to the American Ornithologist Union *Check-list of North American Birds*. *The Auk*, 129: 573-588.

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

Imada, C. 2012. Hawaiian Native and Naturalized Vascular Plants Checklist: December 2012 update. Bishop Museum Technical Report 60. Hawai'i Biological Survey No. 2012-021. 343 pp.

Lichvar, R. W. 2012. *The National Wetland Plant List*. ERDC/CRREL TR-12-11. U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory.

Mitchell, C., C. Ogura, D.W. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. Hawaii's Comprehensive Wildlife Conservation Strategy. Department of Land and Natural Resources. Honolulu, Hawai'i. 722 pp.

Staples, G. W. and D. R. Herbst. 2005. *A Tropical Garden Flora. Plants Cultivated in the Hawaiian Islands and other Tropical Places.* Bishop Museum, Honolulu. 908 pp.

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

U.S. Fish & Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 (Tuesday, November 1, 2005).

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

_____. 2013 USFWS Threatened and Endangered Species System (TESS), online at URL: http://ecos.fws.gov/ tess_public/StartTESS.do; last accessed November 2, 2013.

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

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

Appendix C

Environmental Noise Assessment

D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology

970 N. Kalaheo Ave.
Suite A311
Kailua, HI 96734
www.dlaa.com
808.254.3318

Environmental Noise Assessment Report
Board of Water Supply Kaimuki Pumping Station Improvements
Honolulu, Island of Oahu, Hawaii

October 2014

DLAA Project No. 13-34

Prepared for:
Belt Collins Hawaii LLC
2153 N King St #200
Honolulu, Hawaii 96819

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 EXECUTIVE SUMMARY

1.1 The Honolulu Board of Water Supply (BWS) Kaimuki Pumping Station Improvements project is located in the Kaimuki area of Honolulu, on the corner of Kapahulu Avenue and Harding Avenue. The H-1 Freeway viaduct passes overhead along the northeastern boundary of the project site. Immediately adjacent to the project site are the Market City commercial shopping center to the northwest and a residential area to the south. The proposed Pump Station Improvements project involves primarily the replacement of eight existing supply wells with five new supply wells.

1.2 The ambient sound levels are typical of an urban environment and vary with the time of day based on vehicular traffic volumes. Daytime noise levels measured at the project site range from 59 A-weighted decibels (dBA) to 66 dBA and nighttime levels range from 53 dBA to 62 dBA. The average day-night level, L_{dn}, on the BWS project site is 65 dBA.

1.3 Construction noises from the replacement of eight existing wells with five new supply wells must comply with the Hawai‘i Department of Health (HDOH) Community Noise Control Rule, which stipulates maximum permissible noise limits at the property line. However, noise levels for all stages of construction are expected to exceed these maximum permissible noise limits and a permit must be obtained from the HDOH to allow the operation of construction equipment. In addition, testing of each well will be conducted over 96 hours where continuous operation of equipment will be required. In some instances, two wells will be tested at the same time to measure the effects, if any, on the well’s drawdown considering their close proximity to each other. A variance must be obtained from HDOH to allow the operation of these noise sources during the nighttime hours.

1.4 The replacement of the existing supply wells will involve four general stages which utilize various types of construction equipment. The jackhammer used during the site preparation stage and drill rig and crane used during the well installation stage will be the loudest equipment. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process, the duration of construction activities, and the number of pieces of equipment used. Construction noise levels were predicted using a noise modeling software at various residential and commercial noise receptor locations located adjacent to the project site.

1.5 The nearest homes are less than 25 feet from a proposed well location. Therefore, construction noise levels at the nearest residential receptor locations are expected to be excessive and will exceed the Federal Transit Authority’s noise impact thresholds of 80 dBA for residential land uses. Noise levels may increase by up to 34 decibels (dB) over existing levels during the installation of the nearest well. This may be perceived as more than 4 times as loud as the existing ambient noise and complaints from the residents are expected. Furthermore, it would be

considered hazardous for the residents in the homes surrounding the BWS site to be exposed to construction noise during the loudest phases for more than 4 hours.

1.6 Construction noise levels at the nearest commercial buildings will not exceed the Federal Transit Authority's noise impact threshold of 85 dBA for commercial land uses. During installation of the new wells, exterior ambient noise levels may increase by up to 21 dB over existing levels. This may still be disturbing to the tenants and patrons of the surrounding commercial buildings that face the BWS property. People may need to raise their voice or reduce the talker-to-listener distance in order to communicate effectively during the installation of the wells.

1.7 Noise mitigation for construction activities should be addressed using good management practices to control the noise source. Control methods include scheduling, equipment selection, retrofitting equipment with mufflers or enclosures, and regular maintenance of equipment. In addition, stationary equipment should be sited as far from the residential property line as possible.

1.8 Source control measures will not be sufficient to avoid a noise impact to the adjacent residences; therefore path control measures must also be implemented. A temporary noise barrier wall should be constructed along the BWS property line to reduce noise to the nearest residential properties along Kihei Place. The façade of the Foodland building should be covered with a sound absorptive curtain in the vicinity of Well 2. Finally, portable noise enclosures should be constructed around the drill rigs and the equipment generators. Typically, a temporary noise enclosure system should be installed as close as possible to the noise source while allowing for access and adequate airflow. The noise enclosure should be tall enough to break the line of sight between the noise source and receiver. While noise levels due to construction will remain excessive at the neighboring residences, it will no longer be considered hazardous.

1.9 The submersible pumps will be utilized in the long-term operation of the new wells. HECO power from the existing pump station building's motor control center will be used to power these submersible pumps. Since the pumps themselves are inaudible, no noise impact is anticipated.

2.0 PROJECT DESCRIPTION

The Honolulu BWS Kaimuki Pumping Station Improvements project is located in the Kaimuki area of Honolulu, on the corner of Kapahulu Avenue and Harding Avenue. The H-1 Freeway viaduct passes overhead along the northeastern boundary of the project site. Adjacent to the project site are the Market City commercial shopping center to the northwest and a residential area to the south. The proposed Pumping Station Improvements project involves primarily the replacement of eight existing supply wells with five new supply wells.

3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

3.1 State of Hawaii, Community Noise Control (HDOH)

The State of Hawaii Community Noise Control Rule [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to *stationary* noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc. The Community Noise Control Rule does not address most *moving* sources, such as vehicular traffic noise, aircraft noise, or rail transit noise. However, the Community Noise Control Rule does regulate noise related to agricultural, construction, and industrial activities, which may not be stationary.

The maximum permissible noise levels for stationary mechanical equipment are enforced by the HDOH for any location at or beyond the property line and shall not be exceeded for more than 10 percent (%) of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 1. With respect to mixed zoning districts, the rule specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level. In determining the maximum permissible sound level, the background noise level is taken into account by HDOH.

The criteria for *impulse* or impact noise is separate from stationary noise due to the nature of the sound. HDOH defines impulse noise as "any sound with a rapid rise and decay of sound pressure level, lasting less than one second, caused by sudden contact between two or more surfaces…". Noise from pile driving is considered impulse noise and the maximum permissible noise level is 10 dB above the specified noise limits for stationary sources, as shown in Figure 1.

3.2 Federal Transit Administration (FTA)

Although the proposed Pumping Station Improvements project is not associated with mass transit, the criteria developed by the FTA is presented here as a relevant guideline for assessing construction noise. In general, the HDOH Community Noise Rule only assesses the impact of a construction project as it relates to nuisance and hours of allowed activity. Project construction noise criteria should take into account the existing noise environment, the equivalent sound levels, L_{eq}, during the construction activities, the duration of the construction activities, and the adjacent land use. While it is not the intention of the FTA to specify standardized criteria for construction noise impact, it has defined guidelines for assessment [Reference 2]. According to the FTA, if the criteria shown in Table 1 are exceeded, there may be adverse community reaction.

Table 1. Federal Transit Administration Construction Noise Impact Threshold

	8- Hour L_{eq} (dBA)	
Land Use	Day (7 AM – 10 PM)	Night (10 PM – 7 AM)
Residential	80	70
Commercial	85	85
Industrial	90	90

3.3 Community Response to Change in Noise Level

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, the average ability of an individual to perceive changes in noise levels is well documented and has been summarized in Table 2 [Reference 3, 4]. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

Table 2. Average Ability to Perceive Changes in Noise Level

Sound Level Change (dB)	Human Perception of Sound
0	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	Two times (or 1/2) as loud
20	Four times (or 1/4) as loud

A commonly applied criterion for estimating a community's response to changes in noise level is the 'community response scale' proposed by the International Standards Organization (ISO) of the United Nations [Reference 5]. The scale shown in Table 3 relates changes in noise level to the degree of community response and allows for direct estimation of the probable response of a community to a predicted change in noise level.

Table 3. Community Response to Increases in Noise Levels

Sound Level Change (dB)	Category	Response Description
0	None	No observed reaction
5	Little	Sporadic Complaints
10	Medium	Widespread Complaints
15	Strong	Threats of Community Action
20	Very Strong	Vigorous Community Action

The values stated in Tables 2 and 3 should not be considered regulatory requirements because they are not associated with a specific governing document for this project. However, these tables are very useful in assessing the human perception to changes in sound levels and they are considered to be supplemental information to the governing State of Hawaii Community Noise Control Rule, which does not discuss community response to changes in noise levels.

4.0 EXISTING ACOUSTICAL ENVIRONMENT

Continuous long-term ambient noise level measurements were conducted to assess the existing acoustical environment in the vicinity of the project site. Long-term measurements (taken continuously over the course of multiple days) offer a baseline for establishing existing ambient noise levels in the area and are used for estimating future noise levels by adding the ambient levels to other noise levels generated from the proposed project.

The methodology, location, and results for each of the measurements are described below and the measurement locations are illustrated in Figure 2. Photographs of the measurements locations can be viewed in Appendix B.

4.1 Long-Term Noise Measurements

4.1.1 Long-Term Noise Measurement Procedure

Ambient noise level measurements were conducted in two different locations from November 4, 2013, to November 6, 2013, to assess the existing acoustical environment on or near the project site. Continuous, hourly equivalent sound levels, L_{eq}, were recorded for 2-1/2 days at each location. The measurements were taken using a Larson-Davis, Model 831, Type 1 Sound Level Meter together with a Larson-Davis, Model 377B20 Type 1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended 2-year calibration period. The microphone was mounted on a tripod, approximately 6 feet above grade. A windscreen covered the microphone during the entire measurement period. The sound level meter was secured in a weather-resistant case.

4.1.2 Long-Term Noise Measurement Locations

Location 1 (L1): The sound level meter was located near the southeast corner of the BWS site adjacent to the Pumping Station building. Dominant noise sources included vehicular traffic from Kapahulu Avenue and Kihei Place. It was also observed that the underside of the H-1 viaduct caused traffic noise from Harding Avenue to reflect onto the project site.

Location 2 (L2): The sound level meter was located near the southwest corner of the BWS site adjacent to several single family homes and the southeast corner of Market City. The dominant noise source at this location was also vehicular traffic.

4.1.3 Long-Term Noise Measurement Results

The measured L_{eq}, and the 90 percent exceedance level, L_{90}, in dBA are graphically presented in Figures 3 and 4 for each location. The ambient sound levels are typical of an urban environment and vary with the time of day based on vehicular traffic volumes. There is minimal difference between the two measurement locations due to the proximity of the sound level meters on the BWS site. The range of L_{eq} during the day (7:00 AM to 10:00 PM) and during the night (10:00 PM to 7:00 AM) and average calculated day-night level, L_{dn}, are summarized for each location below.

Table 4. Summary of Noise Measurement Results (dBA)

Measurement Location	AM L_{eq}	PM L_{eq}	Average L_{dn}
L1 – SE corner of BWS site	59 - 66	53 - 62	65
L2 – SW corner of BWS	59 - 65	56 - 60	65

5.0 POTENTIAL NOISE IMPACTS

5.1 Construction Noise

The proposed Pumping Station Improvements project construction will involve several stages which utilize various types of construction equipment, as described in Table 5. The estimated duration of each stage is included in the table; however, these estimations are based on the contractor's ability to work with minimal interruptions. The noise levels listed in Table 5 represent the A-weighted maximum sound level (L_{max}), measured at a distance of 50 feet from the construction equipment. The actual noise levels produced during construction of the proposed Pumping Station Improvements project will be a function of the methods employed during each stage of the construction process. Although specific equipment that will be used for this project has not been finalized, the equipment described below represents a reasonable approximation of the type of equipment that will be used.

Table 5. General Construction Stages and Equipment

Construction Stage (duration)	Expected Equipment	Acoustical Use Factor (%)[N1]	L_{max} at 50 feet (dBA, slow)[N2]	Impact Device[N3]
A Site Preparation[N4] (4 hours)	Backhoe	*50*	81	
	Jackhammer	*50*	83	Yes
B Well Installation – wells to be drilled one after the other (5 weeks)	Drill Rig	*50*	82	
	Circulation Pump	*50*	72	
	Shaker Screen	*50*	69	
	Backhoe	40	78	
	Crane	15	84	
	Welding Equipment	40	71	
C Concrete Base Pour (6 weekdays)	Backhoe	40	78	
	Drum Mixer	50	83	
	Pump	*100*	53	
D Testing (5 weeks)	Pump	*100*	N/A	
	Generator	*100*	64[N5]	

Notes:

N1. The acoustical usage factor is an estimate of the fraction of time each piece of construction equipment is operating at full power (i.e., the equipment will be operating in its loudest condition). The usage factors shown in italics are based on information provided by Belt Collins. For the remaining usage factors, the value is based on the Federal Highway Administration Roadway Construction Noise Model (RCNM) [Reference 6] database.

N2. The A-weighted maximum sound level (L_{max}) values are based on the RCNM construction equipment noise database and other construction noise databases. The noise levels listed represent L_{max} measured at a distance of 50 feet from the construction equipment using a slow meter response.

N3. Impact equipment is equipment that generates an impulsive noise produced by the periodic impact of a mass on a surface which is of short duration and high intensity, characterized by abrupt onset and rapid decay, and often rapidly changing spectral composition.

N4. The site preparation phase will only occur at well locations 2 and 3 which require the breaking up and removal of existing pavement.

N5. A larger generator may be required to power two pumps simultaneously during the testing period.

The jackhammer used during the site preparation stage and drill rig and crane used during the well installation stage will be the loudest equipment. However, the actual sound levels that will be experienced in the vicinity of the project site are a function of the distance from the noise source, the duration of the construction activities, and the number of pieces of equipment used. The Datakustik Cadna-A noise prediction software [Reference 7] was used to predict construction noise to receptor locations surrounding the project site. These locations include the adjacent residences on Kihei Place, Market City Shopping Center, Kilohana Square, Kapahulu Medical Clinic, and the commercial walkup on the corner of Kapahulu Avenue and Harding Avenue. The predictions are based on a summary of the construction methodology provided by Belt Collins. Table 6 below summarizes the results of the construction noise analysis.

Table 6. Construction Noise Analysis Results

ID	Noise Receptor	Approx. Distance[N1] to Well (ft)	Existing Ambient Noise[N2] (dBA)	Maximum Predicted Construction Noise per Stage[N3] (L_{max} dBA) A	B	C	D	8-Hour Equivalent Predicted Construction Noise per Stage[N4] ($L_{eq\ (8hr)}$ dBA) A	B	C	D
R1	Nearest Residences (2832-2838 Kihei Place)	25 (Well 2)	60-65	91	94	92	71	85	88	88	71
R2	Nearby Residences (2835-2841 Kihei Place)	180 (Well 3)		74	77	74	54	67	71	70	54
R3	Market City Shopping Center (2919 Kapiolani Blvd)	220 (Well 1)		47	61	58	38	41	55	55	38
R4	Kilohana Square (2848 Kihei Place)	150 (Well 3,4)		74	77	74	54	67	71	70	54
R5	Kapahulu Medical Clinic (1029 Kapahulu Ave)	110 (Well 4)		72	81	78	57	65	75	74	57
R6	Commercial Walkup (1111/1115 Kapahulu Ave)	200 (Well 5)	N/A	67	75	72	51	61	69	68	51

Notes:

N1. The value is the approximate distance from the noise receptor to the location of the nearest proposed well.

N2. Existing ambient noise at the receptor locations is the range of L_{eq} measured at the project site. The hourly L_{eq} range is based on data collected from 7:00 AM to 6:00 PM which corresponds to the allowable construction hours under the Department of Health noise permit. Noise receptors that are located closer to the main roadways surrounding the project site (i.e., Kapahulu Avenue, Kapiolani Blvd) are expected to have slightly higher ambient noise levels.

N3. The maximum construction noise levels are represented as L_{max} and take into account distance from the closest noise source, shielding due to the buildings that surround the project site, and reflections from the ground surface. The construction noise levels were calculated for each construction stage (defined in Table 5).

N4. The predicted construction noise levels are represented as L_{eq} and take into account the usage factor of each piece of equipment, as defined by Belt Collins and the RCNM construction equipment database. The construction noise levels were calculated for each construction stage (defined in Table 5). The analysis assumed that all construction activities occur during an 8 hour work day and takes into account distance from the closest noise source, shielding due to the buildings that surround the project site, and reflections from the ground surface.

Figures 5 through 8 illustrate the projected maximum sound level contours due to the various phases of construction at well location 2. This location was selected for illustration because it presents the worst case condition for the nearest residences (noise receptor R1).

Since both stationary and impulse construction noise levels will exceed maximum permissible noise limits specified in the *Community Noise Rule*, a permit must be obtained from the HDOH to allow the operation of construction equipment. Nevertheless, intermittent construction noises will still be audible in the vicinity of the project site, as described in the following sections.

5.1.1 Residential Receptor Locations

The results of the construction noise analysis show that construction noise levels at the nearest residential receptor locations (2832/2838 Kihei Place) are expected to be excessive. The predicted noise levels at these residences exceed the Federal Transit Authority's noise impact thresholds of 80 dBA for residential land uses. Due to the very close proximity of the new proposed well location to the residences (less than 25 feet), noise levels may increase by up to 34 dB over existing levels during the installation of the new well. This may be perceived as more than 4 times as loud as the existing ambient noise and complaints from the residents are expected.

The 8-hour time-weighted average sound level at these residences is calculated to be 88 dBA during the well installation and concrete base pour phases when the construction occurs at the well location closest to the residences. The National Institute for Occupational Safety and Health (NIOSH) recommends noise standards to protect workers from hearing losses resulting from occupational noise exposure [Reference 8]. NIOSH recommends a noise exposure of no more than 85 dBA for an 8-hour duration. Following these guidelines, it would be considered hazardous for the residents in the homes surrounding the BWS site to be exposed to noise levels of 88 dBA for more than 4 hours.

5.1.2 Commercial Receptor Locations

The Federal Transit Authority's noise impact threshold of 85 dBA for commercial land uses will not be exceeded during any of the construction phases. During the well installation, exterior ambient noise levels may increase by up to 21 dB over existing levels. This may still be disturbing to the tenants and patrons of the surrounding commercial buildings that face the BWS property, such as Kilohana Square (R4) and the Kapahulu Medical Clinic (R5). People may need to raise their voice or reduce the talker-to-listener distance in order to communicate effectively during the installation of the wells.

The commercial walkup (R6), and other buildings close to the H-1 viaduct, will likely experience noise reflections from the underside of highway. Therefore, at this location construction noise may be up to 3 dB higher than

the levels shown in Table 6. However, ambient noise at this busy intersection is also likely higher and may mask some of the construction noise.

5.2 Construction Noise vs. Vibration

Construction activities generate not only audible airborne sounds, but can also result in varying degrees of ground vibration depending on the equipment and methods employed. Jackhammering and well drilling is likely the greatest source of vibration associated with the equipment used during construction. While the previous section of this report evaluates the airborne sound of construction activities at the Kaimuki Pumping Station, that section does not assess human or structural responses to potential ground borne vibration due to these activities.

Vibration induced by the specific construction equipment utilized for this project (refer to Table 5) would not usually result in adverse effects on people or structures. Due to the close proximity of the well site to the adjacent residences, noise from the construction equipment will likely be more noticeable than any perceived vibration. In addition, ground vibration from construction activities would be temporary.

5.3 Long-Term Pump Noise

The submersible pumps will be utilized in the long-term operation of the new wells. HECO power from the existing pump station building's motor control center will be used to power these submersible pumps. Since the pumps themselves are inaudible, no noise impact is anticipated.

6.0 NOISE IMPACT MITIGATION

6.1 HDOH Noise Permit

In cases where construction noise exceeds, or is expected to exceed the State's "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from HDOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels.

In order for HDOH to issue a construction noise permit, the contractor must submit a noise permit application to HDOH, which describes the construction activities for the project. Prior to issuing the noise permit, HDOH may require action by the contractor to incorporate noise mitigation into the construction plan. HDOH may also require the contractor to conduct noise monitoring or community meetings inviting the neighboring residents and business owners to discuss construction noise. The contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, etc. However, HDOH may require additional noise mitigation, such as temporary noise barriers, or time of day usage limits for certain kinds of construction activities.

Specific permit restrictions for construction activities [Reference 1] are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels ... before 7:00 AM and after 6:00 PM of the same day, Monday through Friday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels... before 9:00 AM and after 6:00 PM on Saturday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

The use of pile drivers, hoe rams and jack hammers 25 pounds (lbs.) or larger, high pressure sprayers, and chain saws are restricted to 9:00 AM to 5:30 PM, Monday through Friday. In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds (lbs.), must be equipped with mufflers [Reference 1].

The HDOH noise permit does not limit the noise level generated at the construction site, but rather the times at which noisy construction can take place. However, when considering a noise permit application, consideration is also given to any proposed noise mitigation for the project. Therefore, noise mitigation for construction activities should be addressed using project management and the source and path noise control measures discussed in Section 6.3 below.

6.2 HDOH Noise Variance

The testing phase will be conducted over 96 hours where continuous operation of the generator and submersible pump for each well will be required. A variance must be obtained from HDOH to allow the operation of these noise sources which emit noise levels in excess of the maximum permissible levels and which operation does not conform to the requirements of the noise permit (i.e., nighttime construction activities which occur between 6:00 PM and 7:00 AM, Monday through Friday).

In order for HDOH to issue a construction noise variance, the contractor must submit a noise variance application to HDOH which describes the construction activities for the project. The contractor is required to prove that nighttime work is in the public interest, that it does not substantially endanger public health or safety, and that appropriate measures for the attenuation of excessive noise will be taken. Reasonable and standard practices to mitigate noise include the use of mufflers on diesel and gasoline engines, using properly tuned and balanced machines, and temporary noise barriers. In addition, property owners and residents in the neighborhood surrounding the project site must be notified of the variance application through a public notice procedure. A public hearing may be requested where the neighboring residents and business owners can discuss construction

noise. If a public meeting is required, a letter stating the purpose of the project and indicating the time and place of the public meeting must be delivered to all affected residences and property owners.

Noise mitigation for nighttime construction activities should be addressed using management of both source and path, as described in the section below.

6.3 Mitigation of Construction Noise

6.3.1 Mitigation of Noise Source

Mitigating construction noise at the source is the most effective form of noise control. The source control methods listed in Table 7 below can be applied to most construction equipment.

Table 7. Construction Noise Source Control Methods

Scheduling	Limit activities that generate the most noise to less sensitive time periods (e.g. daytime hours).
Substitution	Use quieter methods/equipment when possible (e.g. low noise generators, smaller excavators, etc.).
Exhaust Mufflers	Install quality mufflers on equipment.
Reduced Power Options	Use smallest size and/or lowest power as required.
Quieter Backup Alarms	Install manual adjustable or ambient sensitive alarms. Do not use backup alarms during night work.
Motors	Insulate or enclose motors
Equipment Selection	Electric equipment is quieter than pneumatic equipment
Equipment Retrofit	Rubber chucks in jackhammers
Equipment Maintenance	Sharpen and balance tools, repair silencing equipment, replace worn parts and open airways

In general, a majority of the construction noise mitigation is in the form of scheduling, specifically, limiting the construction hours to the time frame specified by the HDOH. The jackhammer and drill rig are expected to be the most disruptive pieces of equipment used during the construction process so the allowable hours of operation are even more restrictive, as described in Section 6.1.

In order to maximize the distance between noise source and receiver, the stationary equipment used during the testing period should be sited as far from the adjacent residences as possible. Portable enclosures for the generators are discussed in Section 6.3.2 below.

6.3.2 Mitigation of Noise Path

Source control measures will not be sufficient to avoid a noise impact to the adjacent residences, therefore path control measures must be considered. Recommendations are summarized below and illustrated in Figure 2.

A temporary noise barrier wall should be constructed along the BWS property line to reduce noise to the nearest residential properties along Kihei Place. The height of the barrier should be at least 12 feet high and, based on the topography of the BWS site, break the line of sight from the upper story windows of the adjacent homes. An on-site inspection should occur to determine whether the barrier should be higher than 12 feet. Absorptive material should cover the surface of the temporary barrier on the side facing the BWS site. The temporary barrier should have a sound transmission class rating of STC 25 or greater. This will require a material having a surface weight of at least 2.5 pounds per square feet (psf), such as 1” marine grade plywood, ¾” medium density fiberboard, or a pre-fabricated temporary noise barrier system. When the panels of the barrier are joined together, the sides should be flush with each other and any gaps or cracks should be completely sealed. The bottom edge of the barrier panels should be closed with a material (such as mass loaded vinyl) that will completely cover the gap and dense enough to attenuate noise. The temporary noise barrier wall should reduce noise levels by at least 10 to 15 dB to the nearest residential properties along Kihei Place. While noise levels due to construction will remain excessive at the neighboring residences, it will no longer be considered hazardous.

It is also strongly recommended that the façade of the Foodland building be covered with a sound absorptive curtain in the vicinity of Well 2. The absorptive material will prevent noise from the construction equipment from reflecting off the hard surface of the building. The curtain should be at least 2" thick fiberglass encapsulated by exterior grade vinyl-coated polyester. This may reduce noise levels by an additional 3 dB to the nearest residential properties along Kihei Place.

In addition to the temporary noise barrier wall along the perimeter of the BWS site, portable noise enclosures should be constructed around the drill rigs and the equipment generators. Typically, a temporary noise enclosure system should be installed as close as possible to the noise sources while allowing for access and adequate airflow. The enclosure should be tall enough to break the line of sight between the noise source and receiver. Absorptive material, as described above, should line the inside of the portable noise enclosure.

REFERENCES

1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. U.S. Department of Transportation - Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

3. *Highway Noise Policy and Abatement Guidelines*, Department of Transportation, Highways Division, State of Hawaii, April 25, 2011.

4. M. David Egan, *Architectural Acoustics*, McGraw-Hill Book Company, 1998

5. International Standards Organization ISO/TC 43, *Noise Assessment with Respect to Community Responses*, New York: United Nations, November 1969.

6. *Federal Highway Administration's Roadway Construction Noise Model*, FHWA-HEP-05-054, U.S. Department of Transportation, February 2006.

7. *DataKustik CadnaA software program*, Version 4.2; DataKustik GmbH, 2010.

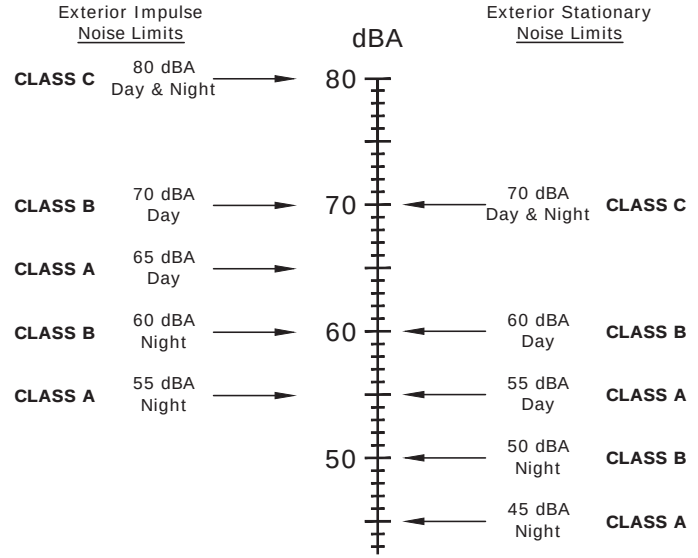
8. *Criteria for a Recommended Standard – Occupational Noise Exposure*, Department of Health and Human Services, Centers for Disease Control and Prevention, June 1998.

HAWAII DEPARTMENT OF HEALTH MAXIMUM PERMISSIBLE SOUND LEVELS FOR VARIOUS ZONING DISTRICTS

Zoning District	**Day Hours** (7 AM to 10 PM)	**Night Hours** (10 PM to 7 AM)
CLASS A Residential, Conservation, Preservation, Public Space, Open Space	55 dBA (Exterior)	45 dBA (Exterior)
CLASS B Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort	60 dBA (Exterior)	50 dBA (Exterior)
CLASS C Agriculture, Country, Industrial	70 dBA (Exterior)	70 dBA (Exterior)

IMPULSE NOISE:

The maximum permissible noise limit for impulse noise is 10 dBA above the stationary noise limits.

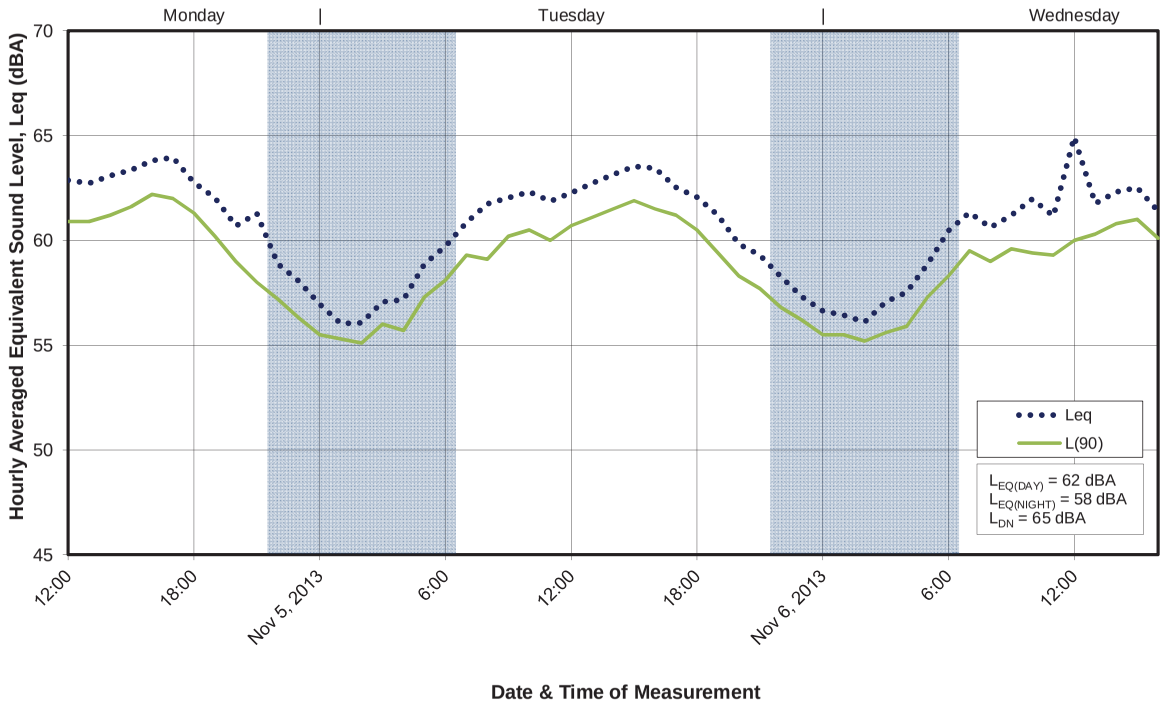


D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology

PROJECT: BWS Kaimuki Pumping Station Improvements

PROJECT NO:	DATE:	FIGURE:
13-34	October 2014	1

Long Term Noise Measurement Data - Location 1



Date & Time of Measurement

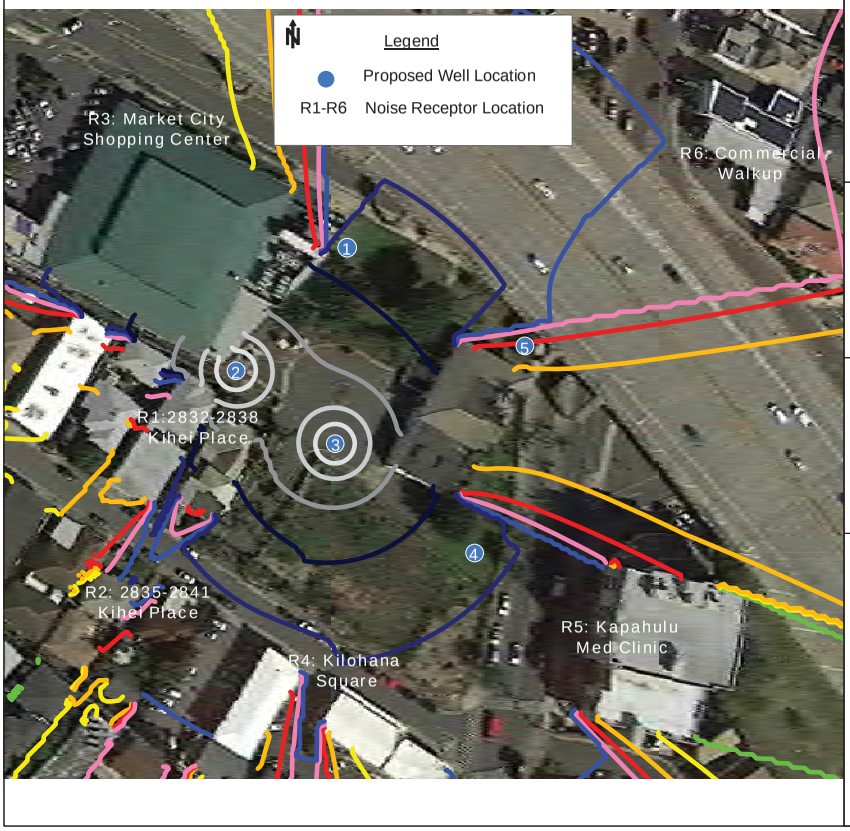
D. L. ADAMS ASSOCIATES acoustics | performing arts | technology	PROJECT: BWS Kaimuki Pumping Station Improvements		
	PROJECT NO: 13-34	DATE: October 2014	FIGURE: 3

Site Plan, Noise Measurement Locations, and Mitigation Recommendations

Legend

- Proposed Well Location
- Noise Measurement Location
- BWS Property
- Temporary Noise Barrier Wall
- Sound Absorptive Curtain

D. L. ADAMS ASSOCIATES acoustics | performing arts | technology	BWS Kaimuki Pumping Station Improvements		
	PROJECT NO: 13-34	DATE: October 2014	FIGURE: 2



D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology
970 N. Kalaheo Ave.
Suite A311
Kailua, HI 96734
www.dlaa.com
808.254.3318

BWS Kaimuki Pumping Station Improvements Project

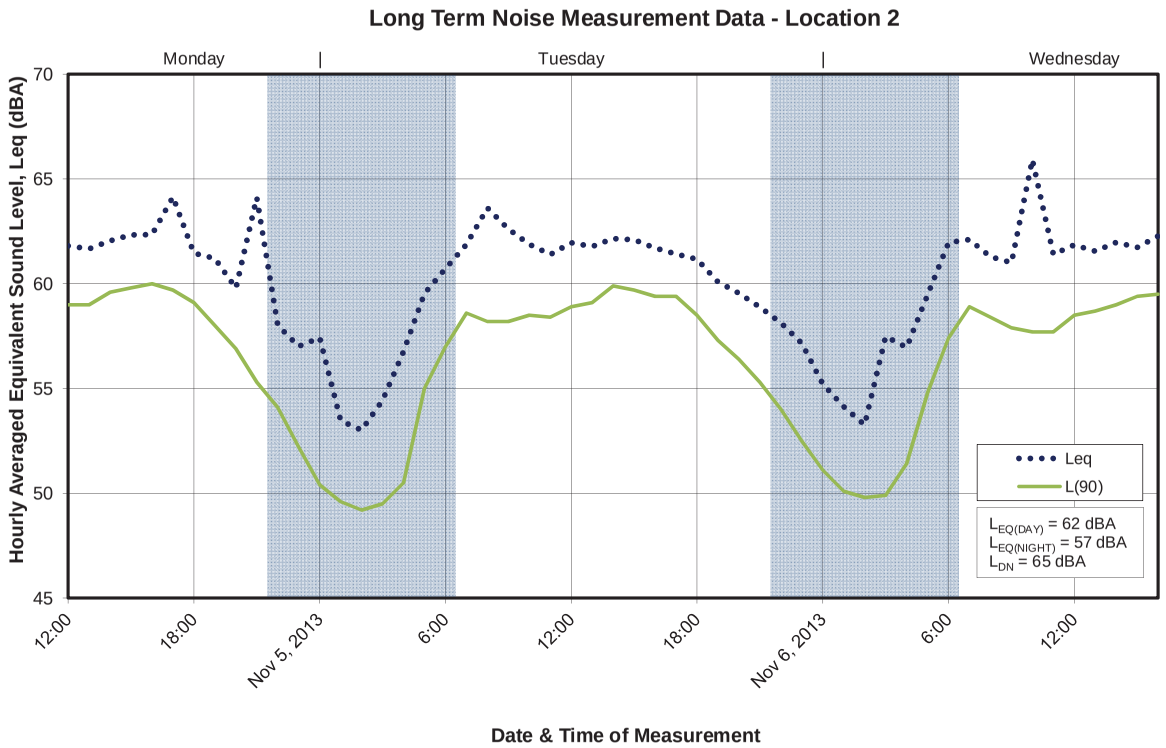
Honolulu Oahu, Hawaii

October 2014

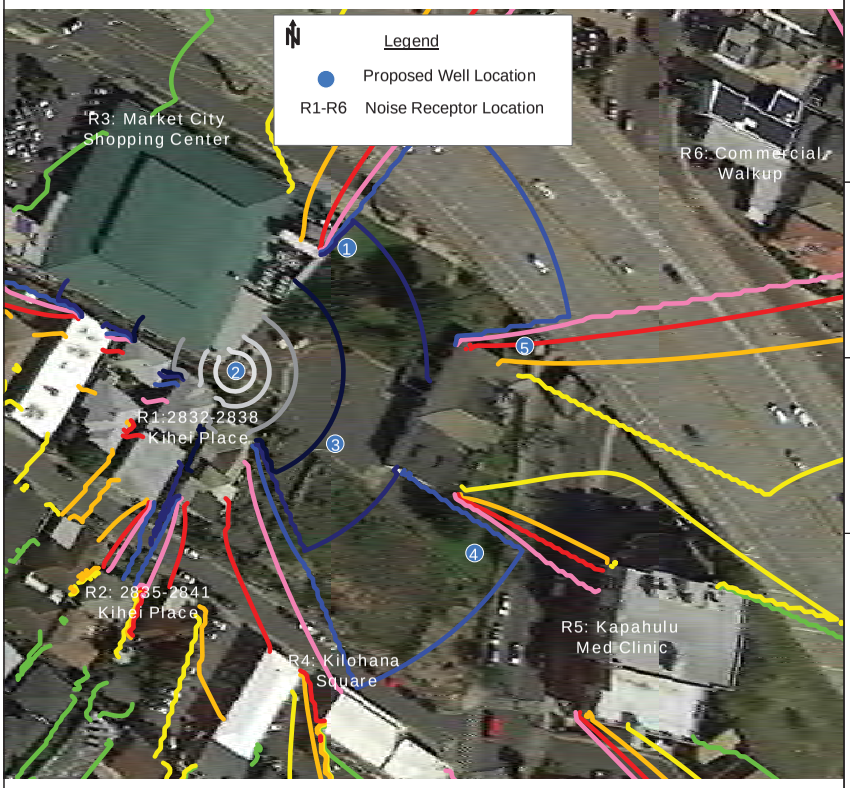
Figure 5

Projected L_{max} Sound Level Contours due to Stage A Activities at Wells 2 and 3

= 45 dBA
= 50 dBA
= 55 dBA
= 60 dBA
= 65 dBA
= 70 dBA
= 75 dBA
= 80 dBA
= 85 dBA
= 90 dBA
= 95 dBA



D. L. ADAMS ASSOCIATES acoustics | performing arts | technology	PROJECT: BWS Kaimuki Pumping Station Improvements		
	PROJECT NO: 13-34	DATE: October 2014	FIGURE: 4



D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology
970 N. Kalaheo Ave
Suite A311
Kailua, HI 96734
www.dlaa.com
808.254.3318

BWS Kaimuki Pumping Station Improvements Project

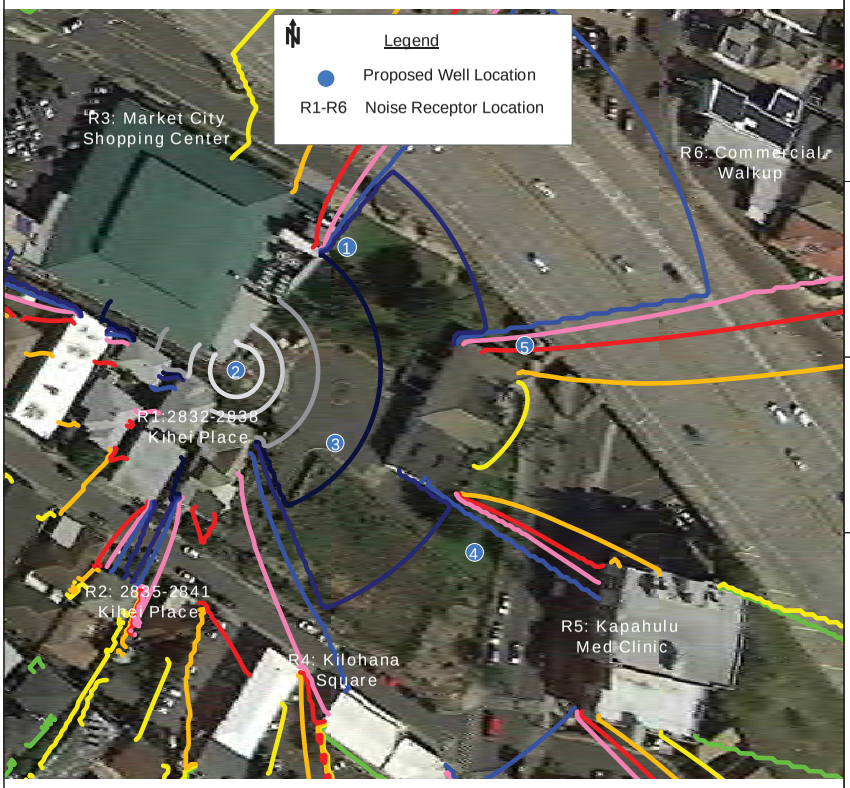
Honolulu Oahu, Hawaii

October 2014

Figure 7

Projected L_{max} Sound Level Contours due to Stage C Activities at Well 2

= 45 dBA
= 50 dBA
= 55 dBA
= 60 dBA
= 65 dBA
= 70 dBA
= 75 dBA
= 80 dBA
= 85 dBA
= 90 dBA
= 95 dBA



D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology
970 N. Kalaheo Ave
Suite A311
Kailua, HI 96734
www.dlaa.com
808.254.3318

BWS Kaimuki Pumping Station Improvements Project

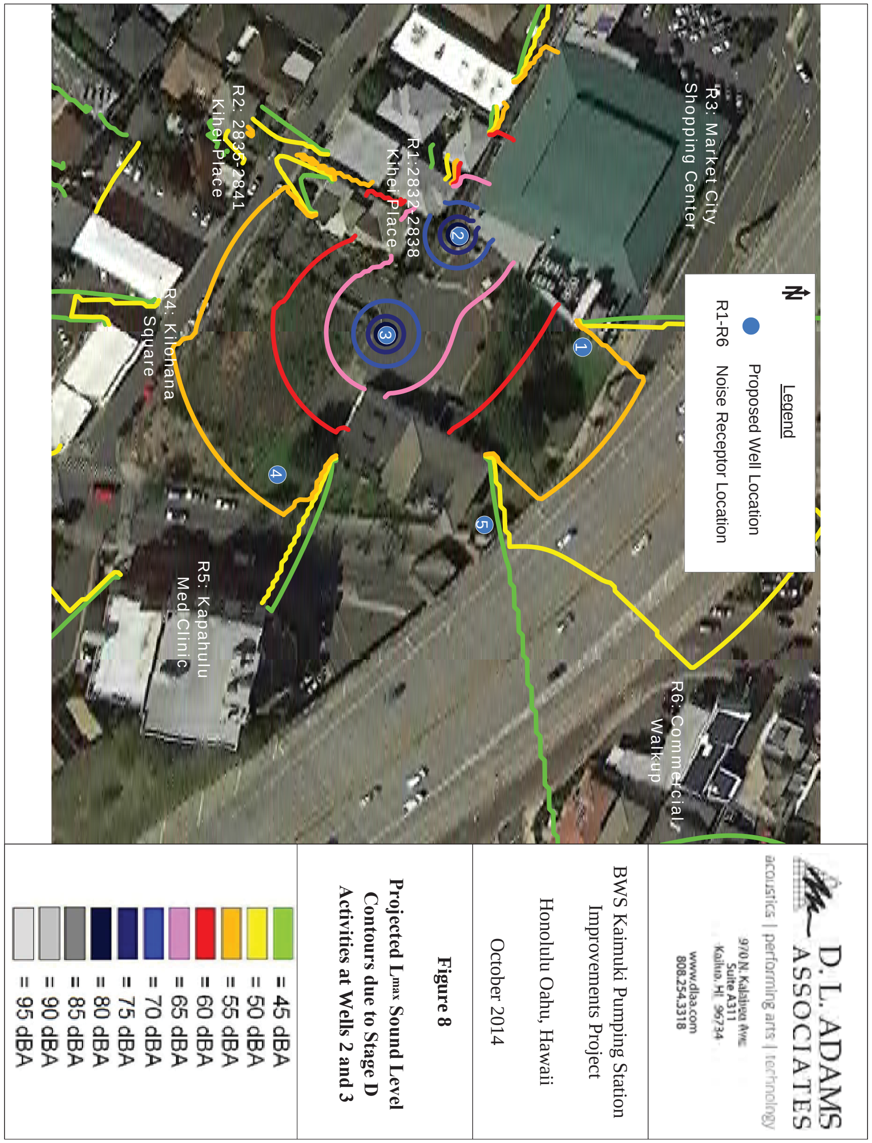
Honolulu Oahu, Hawaii

October 2014

Figure 6

Projected L_{max} Sound Level Contours due to Stage B Activities at Well 2

= 45 dBA
= 50 dBA
= 55 dBA
= 60 dBA
= 65 dBA
= 70 dBA
= 75 dBA
= 80 dBA
= 85 dBA
= 90 dBA
= 95 dBA



APPENDIX A

Acoustic Terminology

Acoustic Terminology

Sound Pressure Level

Sound, or noise, is the term given to variations in air pressure that are capable of being detected by the human ear. Small fluctuations in atmospheric pressure (sound pressure) constitute the physical property measured with a sound pressure level meter. Because the human ear can detect variations in atmospheric pressure over such a large range of magnitudes, sound pressure is expressed on a logarithmic scale in units called decibels (dB). Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/P_{ref}) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and P_{ref} is the reference pressure, 20 μPa, which is approximately the lowest sound pressure that can be detected by the human ear. For example:

If P = 20 μPa, then SPL = 0 dB
If P = 200 μPa, then SPL = 20 dB
If P = 2000 μPa, then SPL = 40 dB

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound sources, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined sound level of 53 dB, not 100 dB. Two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 6 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

Studies have shown conclusively that at equal sound pressure levels, people are generally more sensitive to certain higher frequency sounds (such as made by speech, horns, and whistles) than most lower frequency sounds (such as made by motors and engines)[1] at the same level. To address this preferential response to frequency, the A-weighted scale was developed. The A-weighted scale adjusts the sound level in each frequency band in much the same manner that the human auditory system does. Thus the A-weighted sound level (read as "dBA") becomes a single number that defines the level of a sound and has some correlation with the sensitivity of the human ear to that sound. Different sounds with the same A-weighted sound level are perceived as being equally loud. The A-weighted noise level is commonly used today in environmental noise analysis and in noise regulations. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

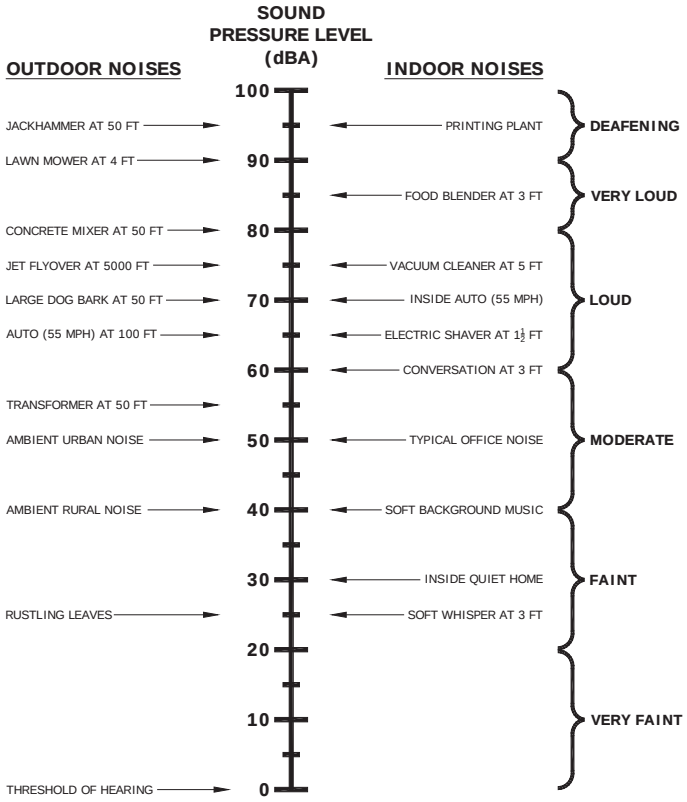


Figure A-1. Common Outdoor/Indoor Sound Levels

[1] D.W. Robinson and R.S. Dadson, "A Re-Determination of the Equal-Loudness Relations for Pure Tones," *British Journal of Applied Physics*, vol. 7, pp. 166 - 181, 1956. (Adopted by the International Standards Organization as Recommendation R-226.

Equivalent Sound Level

The Equivalent Sound Level (L_{eq}) is a type of average which represents the steady level that, integrated over a time period, would produce the same energy as the actual signal. The actual *instantaneous* noise levels typically fluctuate above and below the measured L_{eq} during the measurement period. The A-weighted L_{eq} is a common index for measuring environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

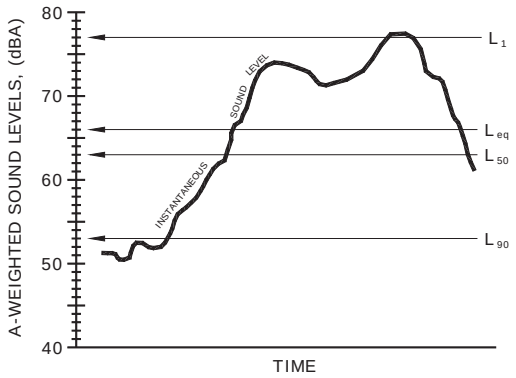


Figure A-2. Example Graph of Equivalent and Statistical Sound Levels

Statistical Sound Level

The sound levels of long-term noise producing activities such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels has been developed. It is known as the Exceedence Level, L_n. The L_n represents the sound level that is exceeded for n% of the measurement time period. For example, L_{10} = 60 dBA indicates that for the duration of the measurement period, the sound level exceeded 60 dBA 10% of the time. Typically, in noise regulations and standards, the specified time period is one hour. Commonly used Exceedence Levels include L_{01}, L_{10}, L_{50}, and L_{90}, which are widely used to assess community and environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, L_{dn}, is the Equivalent Sound Level, L_{eq}, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 p.m. and 7 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The L_{dn} is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations.

APPENDIX B

Photographs at Project Site

.

Location 1

Microphone mounted on a tripod near the southeast corner of the BWS site adjacent to the Pumping Station building.

Location 2

Microphone mounted on tripod near the southwest corner of the BWS site adjacent to several single family homes and the southeast corner of Market City.

Appendix D

Historical Documentation

KAIMUKI PUMPING STATION

Historic Documentation & Compliance Considerations

October 2013

Prepared for:
Honolulu Board of Water Supply

Prepared by:
Mason Architects, Inc.
under Belt Collins Hawaii LLC

Introduction

The Kaimuki pumping station is part of the Honolulu Board of Water Supply (HBWS) water system and is located on the corner of Kapahulu Avenue and Harding Avenue. The HBWS is planning to establish five new supply wells and inactivate the existing supply wells. An Environmental Assessment (EA) is being conducted as part of the planning for the construction of the wells. This report informs the EA by providing information regarding the facility history and an analysis of the affects of the project on the building and site.

Historic Preservation Compliance

Under §6E-7 and 8, HRS, and Chapter 13-275, HAR, HBWS is required to give the State Historic Preservation Division (SHPD) the opportunity to review projects or actions that could potentially affect historic properties and receive written concurrence from SHPD to proceed. SHPD has 90 days to respond with their concurrence and 30 or 45 days to approve specified types of reports and plans. Concurrence and approval is assumed if no response is received within these time frames.

'Historic property' is defined in the statute as any property over fifty years old. Eight of the wells were drilled at the site in 1928 or earlier and the current building was constructed in 1928, so the Kaimuki Pumping Station and its site are considered historic properties and projects involving this facility require review by SHPD.

Description

The Kaimuki pumping station is located on the corner of Kapahulu Avenue and Harding Avenue. The building covers the majority of the southeast side of the site with an asphalt drive and grassy area on the northwest side of the site. Ten wells are in various locations on the site. All the wells have manhole covers, and three wells have standpipes that protrude above ground. See the three figures at the end of this document for the site location and the locations of the wells.

The facility is a concrete building with an irregular footprint comprised primarily of two main rectangular sections, the pump room and the boiler room, and two smaller additions. It has overall dimensions of about 117' x 80'. The main section of the building is an approximate 70' x 60' pump room that has a concrete hip roof covered with concrete tiles with a flat section in the center. The pump room is flanked by a flat-roofed 47' x 54' boiler room section at the southwest and a low, 20' x 30' addition that has a flat roof with a large ventilation clerestory and a high parapet. The exterior wall surfaces are concrete stucco and a water table circles the base of the building.

Photo 1: Standpipe and well manhole cover at Well 1.

At the pump room section, the eaves (approximate 18' high) of the hip roof overhang by about 3' and are supported by decorative joists on about 20" spacing with a horizontal soffit between the joists of recessed panels. The rafters project from a simple molding at the top of the walls. Half-round copper gutters at the eaves transfer rainwater to rectangular metal downspouts with copper collector boxes, round downspouts

below the boxes with decorative straps. A row of rectangular clerestory windows (each opening is about 3' wide x 2' high) circles the building just below the eave. These openings have six-light metal frame awning windows. Large arched openings (about 7' wide and 12' high) at the top of the water table form the main windows in this section of the building. These are multi-light metal sash with awning sections. On the parking lot side of the building the historic windows have been relatively recently been replaced with steel windows that closely resemble the historic windows. At both street sides (northeast and southeast), the arched openings retain the historic windows, which are covered on the exterior side with solid panels painted to simulate the historic window lights. The center, arched opening of the three on the Harding Avenue Extension side is extended down to grade and forms a doorway with a flush, double metal door. The interior of the pump room is basically one large space with quarry tile flooring and one by one inch ceramic tile on the walls from the quarry tile base up to about 8'. A set of stairs leads up to a catwalk at each end of the room. The ceiling is open to the painted roof trusses. The historic windows that are covered on the two street-sides of the building are visible on the interior and the operating devices are still intact. Several pieces of historic equipment also remain in the space.

The boiler room section has a flat roof and a parapet with a simple cornice that is typically about 15' above grade. Window openings in the boiler room are placed high on the walls. They are about 2'-6" high x 6' wide with paired 6-light metal frame awning windows. Entry to the boiler room on the northwest side is through a wide opening (approximately 7') that has a steel door of expanded metal mesh flanked by fixed panels of expanded metal mesh. At the southeast side of the boiler room is a small flat roofed section (footprint about 36' x 12') with a cornice about 11' above grade. This section contains the employee toilet and shower. It has a short section of pedimented parapet above the entry doorway on the southeast side. Windows are typically six-light, horizontally pivoting steel frame with screens of expanded metal mesh. On the interior of the boiler, the floor and walls are painted concrete and the painted roof framing members are exposed at the ceiling.

The 20' x 30' addition on the northwest side of the pump room was built to provide vertical access, through its clerestory, to electric pumps. This addition has no doorway or window openings in its exterior walls. This addition is about 6'-9" high above grade and it is excavated down to the level of the engine room floor, about 13'-3" below grade. The 6'-9" high exterior walls of this addition are painted concrete stucco with a plain cornice. They form an approximate 4' high parapet for the flat roof. The parapet also serves to conceal from direct view a 6' wide, 12' long ventilation clerestory on the addition's roof that was apparently built to allow equipment (electric motors and large diameter piping) to be lowered to the floor of the addition. The clerestory has a gable roof of corrugated metal panels.

Photo 2: Several features of the pump room are illustrated in this photo including the arched windows, rectangular windows, eave, collector boxes, downspouts and water table.

History

The Kaimuki pumping station was established in 1898 when two wells were drilled at the site. These wells are located at the west corner of the lot (TMK 1-2-7-030:012).

The exact configuration and pumping specifications of this original installation are not known. In 1912 two additional wells were sunk by the McCandless Brothers that were located about 150' north east of the original two wells. At some time during this period, a pumping station building containing two steam pumps and a double boiler for steam was built between the two pairs of wells. In 1917 these four wells had a capacity of 4,750,000 gallons per day.[1]

In 1928 the extant Kaimuki pumping station building was built to the southeast of the ca. 1912 building. In addition, four more artesian wells were drilled at the site by the McCandless Brothers between 1925 and 1928.[2] The water pumped from the wells at the Kaimuki pumping station was distributed to customers in the Kaimuki and Waialae districts.[3]

The 1928 construction of the Kaimuki pumping station included the installation of two steam pumps in the engine room, a 4 mgd HL (high level) pump and a 10mgd LL (low level pump). The high level pump would have been used to lift water to reservoirs at high elevations, the low level pump to supply water to service mains or booster stations at lower elevations. In addition, the existing double boiler from the ca. 1912 pump station was relocated into the boiler room of the new building and a new single boiler was installed. These three boilers in the new building were connected to a chimney at the west corner of the building. Original plans dated July 19, 1927 state that "Existing chimney at Beretania pumping station to be dismantled & re-erected at Kaimuki station."[4] In a historic photograph of Kaimuki pumping station taken shortly after its construction, the 4' diameter 120' high steel chimney is unadorned.[5]

A 20' x 30' addition was constructed on the northwest side of the pumping station building at an unknown date before 1969 to house an additional two electric pumps.

Ca. 1970 the Kaimuki pumping station was fitted with new electric pumps to replace the steam driven ones. Both steam pumps were decommissioned and the 4 mgd steam pump was removed. Also at this time the existing three boilers were decommissioned and left in place in the boiler room. The 10mgd steam pump in the engine room was left in place. Five electric pumps were installed in the area of the engine room that previously held the 4 mgd steam pump; three pumps were 100 Hp with a 2.5 mgd capacity, one was 200 Hp 5 mgd, and two were 250 Hp 2.5 mgd. The existing electric pumps in the pre-1969 addition (two – 300 Hp) remained in place. They were removed later at an unknown date.

[1] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[2] James Sutton McCandless, A Brief History of the McCandless Brothers and Their Part in the Development of Artesian Well Water in the Hawaiian Islands 1880-1936. Honolulu: Privately published. 1936. P. 79.
[3] Harold T. Stearns, Future Ground Water Supplies For Honolulu Hawaii. US Geological Survey. 1934. P. 15.
[4] Honolulu Sewer and Water Commission, drawing "Kaimuki Pumping Station General Layout, plan no. 109-A." July 19, 1927.
[5] Kalihi Pumping Station, photograph in Hawaii State Archives, folder PP-12-9, photo # .014. Ca. 1930.

Early well water supply in Honolulu

By 1884, five drilled wells contributed their water to Honolulu's municipal water system, from a total of 45 producing wells in the area. Most all of the wells drilled in Honolulu over the next sixteen years were for agriculture, principally rice fields and dairy farms. The Honolulu Iron Works and OR&L Railway Co had their own wells for industrial use. Others were for domestic use. In 1895, two wells were drilled at the site of the present Beretania Street pumping station. The flow from these wells was pumped by the station there to supply the municipal system. Droughts during the 1890s and an increasing population led to the construction of the Kalihi pumping station with three wells in 1900 and the Kaimuki pumping station with two wells in 1898. In 1912, two additional wells went in at the Kaimuki pumping station.[6]

By 1917 Honolulu had added two more pumping stations, Wilder Avenue had electric pumps taking water from two wells, and Makiki had electric and gasoline powered pumps taking water from one well. At that time the city also owned four other wells that were unused except during drought because of their low water pressure. These were located at Iolani Palace, Aliiolani Hale, Thomas Square, and Waikiki.[7] By 1938 the three wells at Wilder Avenue and at Makiki "[had] not been in use for several years."[8]

In early 1926, Fred Ohrt, Chief Engineer of the Honolulu Sewer and Water Commission recommended that the steam pumping stations at Kalihi, Beretania Street, and Kaimuki be upgraded with the addition of two steam pumps at each, one 10 mgd LL pump and one 4 mgd HL pump.[9] This pump installation was completed in April 1929, when the low level and high level systems between the three pumping stations were connected.

> "With flexible and full intercommunication between the three new stations, it will now be possible to shut down one pump and work the others as the needs of the time demand, making possible economies which Chief Engineer Frederick Ohrt estimated yesterday at $50,000 annually in pumping costs."[10]

During the time the three steam powered pumping stations were upgraded, additional wells went in; at Beretania Street; one in 1923, one in 1924, and three in 1926. Kaimuki; three in 1925 and one in 1928. Kalihi; four in 1926, and one in 1927.[11]

[6] Harold T Stearns and Knute N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249
[7] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[8] Harold T. Stearns and K. N. Vaksvik, Records of the Drilled Wells on the Island of Oahu. Honolulu Advertiser Publishing. 1938. P. 7.
[9] "Water Plans to Cost $7,000,000 Ohrt Estimates," Honolulu Star Bulletin, January 4, 1926. P. 1.
[10] "New System of Pumps at Work Today," Honolulu Advertiser, April 5, 1929. P. 2.
[11] Harold T Stearns and Knute N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249

Character – Defining Features

Site Features:

- Well features in various locations on the site (see attached site plan)

Exterior Building Features:

- General Form of the building – two large rectangular sections
- Roof shapes - hip roof with flat center on pump room; flat roof with a parapet wall on boiler room
- Tile-roofing
- Overhanging eaves with decorative joists, soffit, and cornice at the pump room
- Round copper gutters with rectangular and round downspouts with collector boxes on pump room.
- Window openings; multi-lite metal windows
- Concrete stucco wall surface
- Water table
- Simple cornice at top of boiler room walls
- Pedimented cornice above door in southeast addition.

Interior Features:

- Tile floor and walls in the pump room
- Concrete floor and walls in the boiler room
- Opening ceilings
- Historic equipment in general

Project Affects on Historic Property

This project plans to inactivate the existing wells and provide five new wells. No work is planned for the exterior of the building. Because the wells provide the essence of the station and have visible elements, they do contribute to the historic integrity of the site. Their locations are currently simply marked by metal covers and, in three locations, standpipes that protrude above ground. The project intends to maintain the purpose of the station with new wells, and inactivate the existing supply wells in place. The standpipes will be removed.

In order to maintain the historic integrity of the site, we recommend providing markers flush with the ground that indicate the historic construction date of each well. The markers would provide the same general appearance of the well covers and serve as historic markers.

Appendix E

Archaeological Assessment

SCS Project Number 1464 FI-3

ARCHAEOLOGICAL FIELD INSPECTION REPORT FOR THE KAIMUKI PUMP STATION IMPROVEMENTS `ILI OF KAIMUKĪ, WAIKĪKĪ AHUPUA`A, HONOLULU (KONA) DISTRICT O`AHU ISLAND, HAWAI`I [TMK: (1) 2-7-030:012 and 055]

Prepared by:
Cathleen A. Dagher, B.A.
and
Robert L. Spear, Ph.D.

April 2014
DRAFT

Prepared for:
Belt Collins Hawaii. LLC
2153 King Street, Suite 200
Honolulu, Hawai`i 96819-4454

SCIENTIFIC CONSULTANT SERVICES Inc.
1347 Kapiolani Blvd., Suite 408 Honolulu, Hawai`i 96814

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

At the request of Belt Collins Hawaii. LLC, Scientific Consultant Services, Inc. (SCS) has prepared an Archaeological Field Inspection Report for the proposed Kaimuki Pumping Station Improvements, *`ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District O`ahu Island, Hawai`i [TMK: (1) 2-7-030:012 and 055]. The 1.1483 acre project area is owned by the City and County of Honolulu, Board of Water Supply (Figures 1 through 3).

The Archaeological Field Inspection was conducted of the Kaimuki Pumping Station property in order to assess the potential presence of historic properties (including archaeological sites, buildings, structures, and Traditional and Historic cultural materials). In addition to the field inspection, historic background research, which entailed investigating Land Commission Awards (LCAs) and Land Grants associated with the project areas, was conducted.

Fieldwork for this project was conducted on September 13, 2013, by SCS archaeologist Guerin Tome, B.A., under the supervision of Robert L. Spear, Ph.D., Principal Investigator. The results of the field inspection and the recommendations are discussed below. Archaeological documentation is recommended for the Kaimuki Pumping Station and two associated rock walls, as these features are over 50 years old and considered historic properties, as defined by the Hawaii Administrative Rules (HAR) § 13-275.

ENVIRONMENTAL SETTING

LOCATION

The Kaimuki Pump Station is situated in the southeastern portion of the island of O`ahu and on the leeward side of the Ko`olau Mountain Range. The project area is located an estimated 1.5 miles (1812.2 m) north of the coastline at an elevation of 20 to 32 feet (6.0 to 9.8 m) above mean sea level (amsl). The proposed project area is located at 2951 Harding Avenue, in the *`ili* of Kaimukī, near the northern border of Waikīkī Ahupua`a, Honolulu (Kona) District, O`ahu Island, Hawai`i [TMK (1) 2-7-030:012 and 055]. According to the Honolulu Property Tax website (http://www.honolulupropertytax.com), the project area consists of 1.1483 acres of land owned by the City and County of Honolulu, Board of Water Supply. The proposed project area is bound on the northwest by the Harding Avenue Extension, on the north and northeast by the H-1 Freeway Viaduct, on the east by Kapahulu Avenue, on the south and southeast by Kīhei Place, and on the southwest by an existing by residential area.

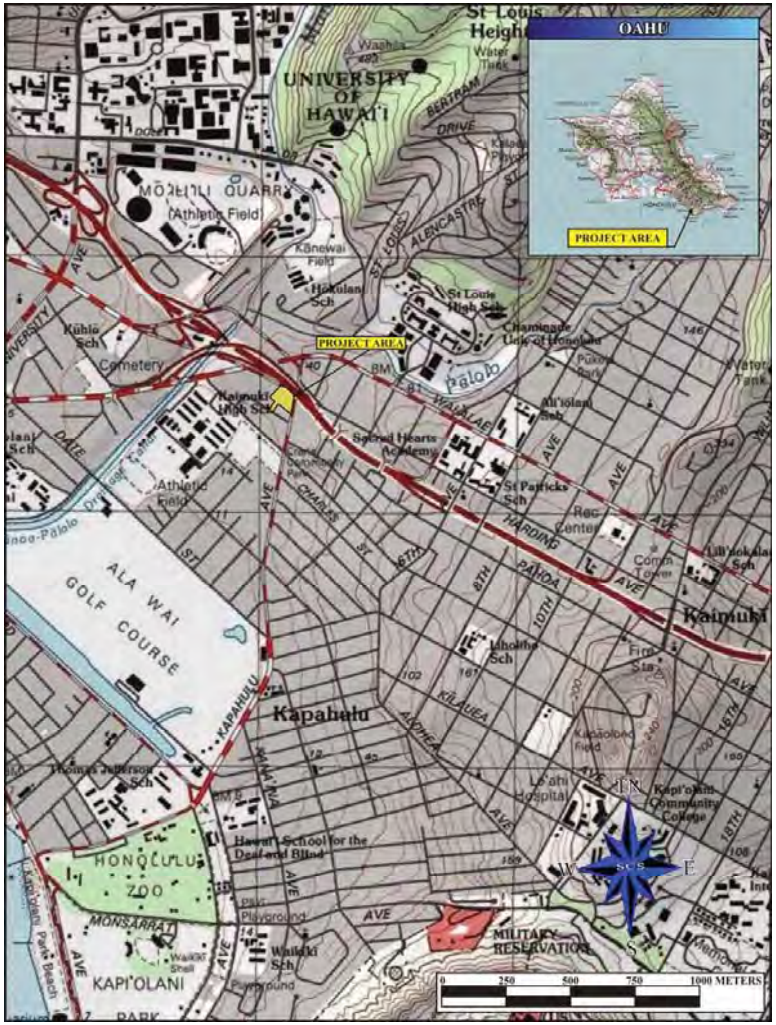


Figure 1: USGS Quadrangle (Honolulu, 1998) Map Showing Project Area Location.

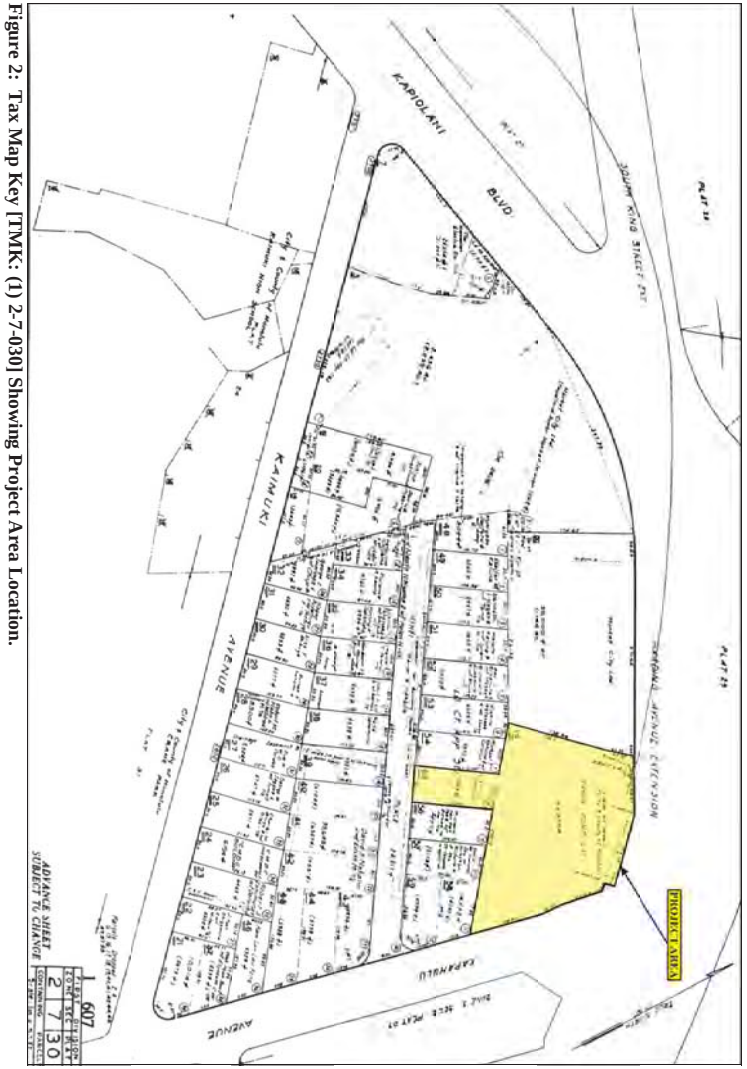


Figure 2: Tax Map Key [TMK: (1) 2-7-030] Showing Project Area Location.

Figure 3: Google Earth Image (Aerial imagery from Google, Digital Globe dated 1/16/2013) Showing Project Area Location.

CLIMATE

Temperatures within the *ahupua`a* of Waikīkī range from the high 50s to the high 80s (degrees Fahrenheit) during the winter months. Winter rainfall ranges from 15 to 20 inches (Armstrong 1983:62, 64). During the summer months, temperatures in Waikīkī Ahupua`a range from the high 60s to the low 90s (degrees Fahrenheit). Rainfall during the summer months can range from 2 to 7 inches (*ibid*).

SOILS

According to Foote *et al*. (1972:63, 64, Sheet Map 63), the project area is located within the Kawaihapai Soil Series, and specifically within in Kawaihapai clay loam (KlA) deposits. In general, soils of the Kawaihapai Series are comprised of alluvial deposits that originated from basic igneous rock in the humid upland regions of O`ahu and Moloka`i. These well-drained soils can be found in drainage ways and on alluvial fans, in coastal areas elevations extending from sea level to 300 feet amsl (Foote *et al*. 1972:63). The Kla soils occur on 0 to 2 percent slopes in areas receiving 30 to 50 inches of annual rainfall exhibit moderate permeability, slow runoff, and a very slight erosion hazard (*ibid*:64). Typically, the Kla soils are agricultural soils used in the cultivation of sugarcane, vegetables, and as ranchlands (*ibid*).

VEGETATION

The vegetation within the project area represents historic events and does not reflect the vegetation pattern prior to contact. The project area is currently a landscaped environment dominated by a dense growth of exotic species, used for ornamental purposes. The project area includes manicured lawns coconut palm (*Cocos nucifera*), hibiscus (*Hibiscus spp.*), shower tree (Cassia spp.), coat buttons (*Tridax procumbens*), snow bush (*Breynia disticha*), bird of paradise (*Heliconia sp.*), peregrina (*Jatropha integerrima*), and the Caribbean trumpet tree (*Tabebuia aurea*).

CULTURAL HISTORICAL CONTEXT

The island of O`ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai`anae and Ko`olau mountain ranges were formed by two volcanoes. Through the millennia the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970). According to Stearns (1966:86-87), numerous volcanic eruptions created a number of today's well-known landmarks, including the Mōkapu Peninsula, on the

windward side of O`ahu, Ka`au Crater, Kaimukī Dome, and Diamond Head Crater. Soon after the Diamond Head eruption, a thin black lava flow occurred on the southeast side of Diamond Head forming the area currently known as Black Point. At the same time, "... voluminous lava flows from a vent on the northeast side [of Diamond Head formed] "... the Kaimuki lava dome, on which [the] Kaimuki section of Honolulu is now built."

PAST POLITICAL BOUNDARIES

Traditionally, the division of O`ahu's land into districts (*moku*) and sub-districts was said to be performed by a *Mā`ilikukahi* who was chosen by the chiefs to be the *mō`īho`oponopono o ke aupuni* (administrator of the government; Kamakau 1991:53-55). Cordy (2002) places Mā`ilikukahi at the beginning of the 16th century. Mā`ilikukahi created six districts and six district chiefs (*ali`i `ai moku*). Land was considered the property of the king or *ali`i `ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land. It is said that Mā`ilikukahi gave land to *maka`āinana* (commoners) all over the island of O`ahu (*ibid*).

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili` āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili `āina* or *`ili* were smaller land divisions next to importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa `āina* residing in a *ahupua`a* was called a *kuleana* (Lucas 1995:61). The project area is located in the Waikīkī Ahupua`a. Waikīkī means literally "spouting water" and is said to be named for the swamps (Pukui *et al*. 1974:223).

TRADITIONAL SETTLEMENT PATTERNS

Archaeological settlement pattern data suggests that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas of the main islands between A. D. 850 and 1100, with populations eventually settling in drier leeward areas during later

periods (Kirch 2011). Although coastal settlement was dominant, Native Hawaiians began cultivating and living in the upland *kula* (plains) zones. Greater population expansion to inland areas began around the 14th century and continued through the 16th century. Large scale or intensive agriculture was implemented in association with habitation, religious, and ceremonial activities.

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on the windward side of O`ahu was likely to have begun early (AD 1100–1300) during what is known as the Expansion Period (Kirch 1985).

In Hawai`i, much of the coastal lands were preferred for chiefly residence. Easily accessible resources such as offshore and onshore fishponds, the sea with its fishing and surfing—known as the sports of kings, and some of the most extensive and fertile wet taro lands were located in the area (Kirch and Sahlins, 1992 Vol. 1:19). Inland resources necessary for subsistence, could easily be brought to the *ali`i* residences on the coast from nearby inland plantations. The majority of farming was situated in the lower portions of stream valleys where there were broader alluvial flat lands or on bends in the streams where alluvial terraces could be modified to take advantage of the stream flow. Dry land cultivation occurred in colluvial areas at the base of gulch walls or on flat slopes (Kirch 1985; Kirch and Sahlins 1992, Vol. 2:59).

One of the most extensive terrace areas for taro was the level land between what is now Kalākaua Avenue, Kapi`olani Park and Mō`ili`ili (Handy 1940). They were watered by Pālolo and Mānoa Stream and freshwater ponds (*loko wai*) were formed as the water meandered to the sea. Tradition says this vast garden was developed by Chief Kalamakua-a-Kaipūhōlua (16th century (Fornander 1969).

> Farming was one of the principal duties of the chiefs, and the land [in Waikiki] was rich under cultivation. It was planted from the upper part to its entering the

> coconut grove [along the shore]…Water courses were made throughout the land, thereby feeding the taro patches and fishponds. A good chief was Kalamakua, who was well known for his farming. He constructed the large taro *lo`i* of Keokea. Kalamanamana, Kualualu and others at Waikiki. [*Ka Nupepa Kuokoa*, Aug 12, 1865]

Most of the ponds in Waikīkī were *loko pu`uone*, those isolated inshore ponds formed by the development of a barrier beach that created a single, elongated sand dune parallel to the coast. These were modified for agricultural use by the occupants who deepened them, built up the banks and constructed *`auwai* (canals) to allow water and small fish to flow in and out. The majority of *pu`uone* were located in the *`ili* of Kālia near the Pi`inaio Stream and its estuary. Fish commonly raised in the ponds included *`ama`ama* (mullet) and *awa* (milkfish; Kanahele 1995). Trails extended from the coast to the mountains, through the taro ponds, linking them for economic and social reasons.

Because of its fine beach and rich agricultural lands, the ruling chiefs of Hawai`i chose this area for the seat of government in very early times (Handy and Handy 1972). The a*li`i nui*, Mā`ilikukahi, transferred the government from Waialua to Waikīkī in the 1400s, thus making it one of the main political and economic centers of O`ahu for the next 400 years (Kamakau 1991; Kanahele 1995). Chiefs of O`ahu, including Kuamanuia, Ka`ihikapuamanuia whose large fishpond is under Fort DeRussy, Kakuhihewa and Ka`ihikapuakakuhihewa his son, chose to live in Waikīkī, at least part of the time (Kanahele 1995).

In 1783, Kahekili, a Maui chief, invaded O`ahu landing in Waikīkī. It was said his fleet of war canoes extended from Ka`alawai, near Leahi (Diamond Head) to Kawehewehe, the location of the Halekūlani Hotel. The struggle to arrest O`ahu from his nephew Kahahana took a total of five years, but resulted in Kahekili's brief rule over Moloka`i, Maui, and O`ahu. Kahekili died in Waikīkī in Ulukou (near the Moana Hotel) in 1794 leaving his kingdom to his son, Kalanikupule (*ibid*). Kamehameha was to be Kalanikupule's downfall, when in 1795 he decisively won O`ahu in the Battle of Nu`uanu.

WAHI PANA (LEGENDARY PLACES)

According to legend "Kaimukī" does not refer to "the oven where food is cooked in ti leaves." "Kaimukī" means "the oven for cooking the ti root" (Lyons in Sterling and Summers 1978:276) and makes reference to the Menehune who lived there at one time. Kaimukī was described as "...the wild region of Ka-imu-ki, thickset with bowlders--a region at one time chosen by the dwarf Menehune as a sort of stronghold where they could safely plant their famous

ti ovens and not be molested by the nocturnal depredations of the swinish Kama-pua`a..." by Emerson (n.d. in Sterling and Summers 1978:276). Handy and Handy (1972:224) state that:

> In famine times *ti* roots were gathered from the forest in large quantities and steamed in great ovens, then grated, mashed, mixed with water, and drunk. It is said that there was a famous oven of this sort east of Honolulu at Kaimuki.

Many legends refer to Hi`iaka, Pele's sister, and her companions Wahineomao and Lohiau as they traveled back to Hawai`i Island from Kaua`i. One legend recounted in the Hawaiian language newspaper Ka Na`i Aupuni (June 28, 1906 in Sterling and Summers 1978:277-278), begins as Hi`iaka and her companions left their canoe at Waikīkī and traveled inland to a place known as Pāhoa [Kaimukī] (Figure 4). As the legend is recounted in Sterling and Summers (1978: 277-278), Hi`iaka informed "...her companions that they were to meet with super-natural beings, a male and a female, brother and sister, who were evil doers. As they ascended, Hi`iaka chanted

> It is thou, o Pahoa
> And the woman, Makahuna who lives in the
> light rain of Palolo.
> Hearken to the voice
> To the cry of the traveler.
> Travelling on this hot scorching day from Waikiki,
> How warm it is.
>
> Pahoa replied rudely, "Who are you, you rude woman who speak our names? You rude woman, you." Then he said to his sister, "With your strength and mine combined we'll kill Hiiaka. The dust then arose hiding the trail from view.
>
> Lohiau said, "What a whirlwind that is " Hiiaka replied. "That is not a natural whirlwind but one that has been made by Pahoa and his sister, who are lizards (moo). They are not the only evil ones here, but we will meet yet others, Kamoiliili and Pohaku-Kikeke."
>
> They continued going and near the spot where
> the Kamoiliili church now stands. they encountered
> a large lizard named Kamoiliili. It came forward to battle. Lohiau noticed that it resembled a woman. With a stroke of her skirt, Hiiaka broke its body
> to pieces and changed it into the low, long rocky mound above the church, They went on and when they drew close to Pahoa, he and

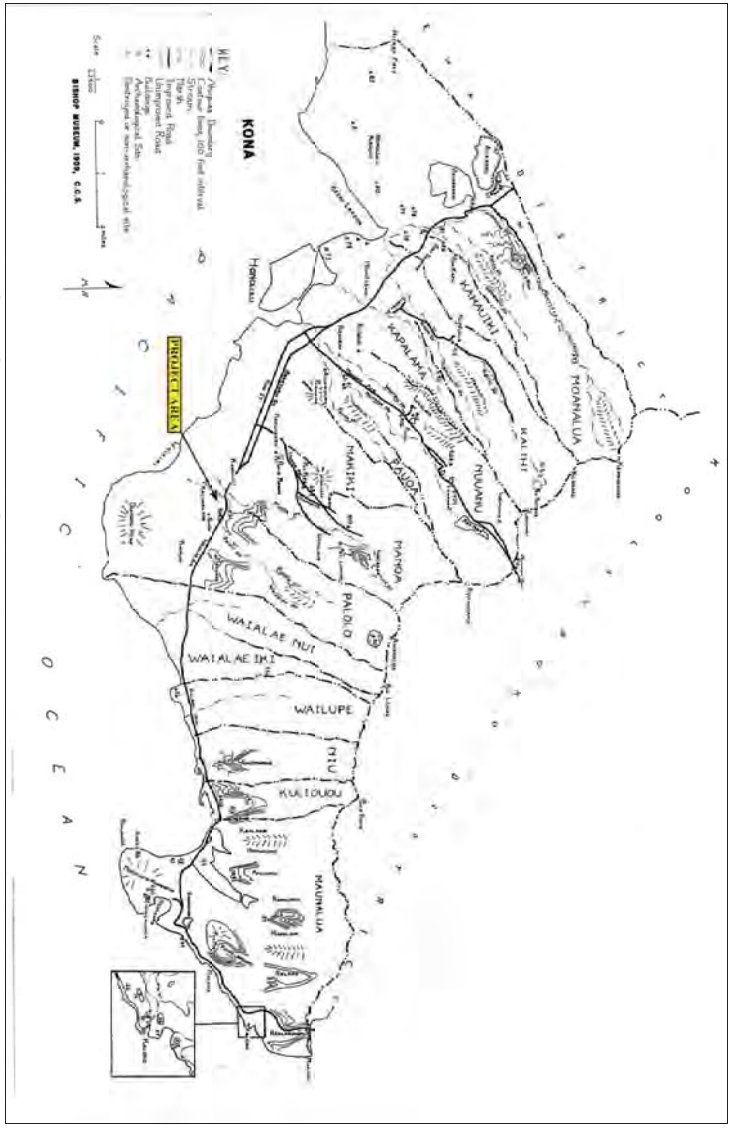


Figure 4: Kona District Map (Sterling and Summers 1978) Showing Project Area Location.

his sister Maka-huna came to fight Hiiaka. Hiiaka struck them with her skirt and they cried out to her for mercy. She refused saying that she had greeted them politely but they were rude and insisted on fighting. She killed them, The rise below Pohaku-kikeke became known as Ahua a Pahoa." According to another version, Pahoa was spared.

Pahoa used to sit on this rise to watch the pool Huewa to watch Pohaku-kikeke bathe, Pohaku-kikeke was also a lizard whose former name was Ua-lililehua. Pahoa was in love with Lililehua...

Hiiaka came above Mau`u-mae at a place called Ka-ahu-kahi-ai where the zoo now stands (it was then located in Kaimuki). Pahoa saw her and ran swiftly to gather luau for he knew she was fond of it. He cooked and served the luau. Hiiaka asked what favor she might do for him. He then told her of his love for Lililehua who accepted his gifts but spurned his love. She suggested his going once more to look at her before she would do anything about helping him win her for him. He ran
and saw Lililehua in her own brother's arms and the following mele describes what he saw:

The leaves of the banana tree sway up and down.
Set a-sway by the wind.
The leaves of the taro toss to and fro
Stirred by the wind,
The wind that blows from below ...
The sight filled him with disgust and he
lost his love for her completely. He told Hiiaka
that he no longer cared for the girl.

On June 28, 1906, Ka Na`i Aupuni (in Sterling and Summers 1978:278) continue the legend:

Hiiaka destroyed Lililehua and her brother.
She placed Lililehua's ringing voice in a rock called
Pohaku-kikeke which lies on the lower side of the
road going to Waialae.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy

(Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). There were about 250 claims for land in Waikīkī Ahupua`a. Based on the findings of a search of the Waihona `Aina Database (2013), no LCAs were claimed or awarded in the *`ili* of Kaimukī. However, thirty-nine claims were made in the *`ili* of Pāhoa, which was another name for the Kaimukī area (Pukui *et al*. 1974: 174).

A documents search at the Department of Land and Natural Resources Bureau of Conveyances and of the Waihona `Aina Database (2013) indicated that Land Commission Award (LCA) 8515, which included the *`ili* of Kaimukī (also called Pāhoa) was claimed by Keoni Ana (John Young II), the son of the *ali`i* Kaonaeha, niece of Kamehameha, and John Young, advisor of Kamehameha (Day 1984:133; Figure 5). Under Royal Patent 1666, Keoni Ana was awarded 1 *`āpana* comprised of 11.43 acres in the *`ili* of Pāhoa (see below).

No. 8515*O, Keoni Ana [John Young]
F.R. 26v3

Claim 8515 Keoni Ana, See Native Register Volume [left blank]
Page [left blank].

N.R. 708v3
No. 8515 John Young /Jr./ /Keoni Ana/, Palace, February 14, 1848

Greetings: I hereby describe my lands and those of my cousins, for you to investigate and award. Given below are the names of the lands, and the ones who have the land.
With thanks,
JOHN YOUNG /JR./

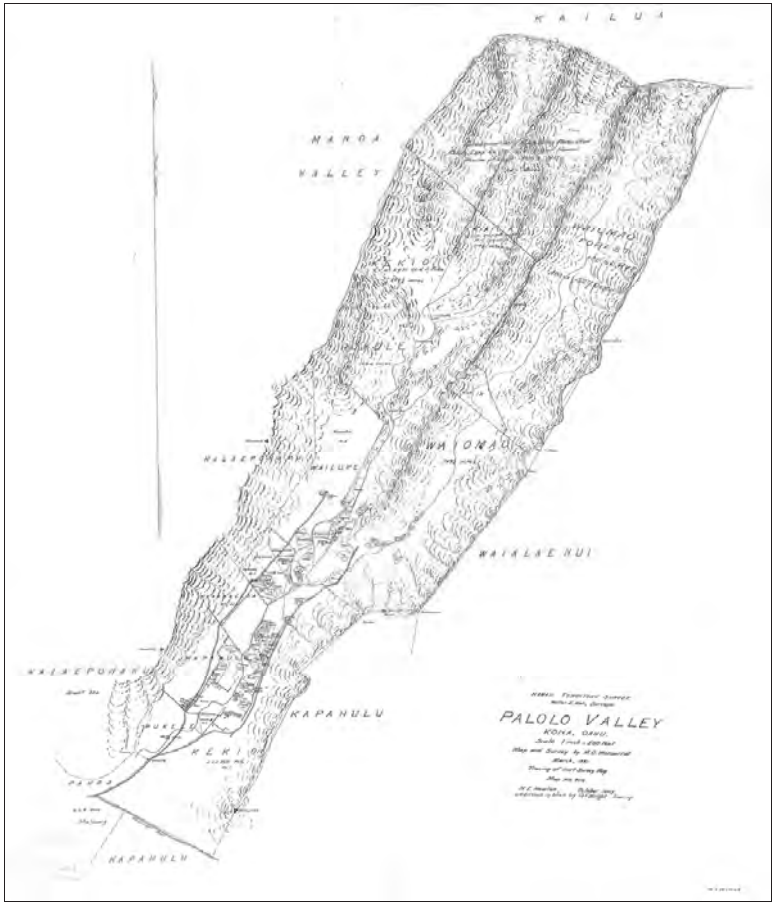


Figure 5: Hawaii Territory Survey Map of Palolo Valley, Kona, O`ahu (Monsarrat 1881: Reg. Map 0908).

John Young's /Jr.? /Keoni Ana/
for Kaimuki
Puunui, an `ili Honolulu, Kona, Oahu.
Puunoa for Lahilahi Ahupuaa, Lahaina, Maui.

The Inherited Lands,
East Kawaihae, Ahupuaa, Kohala, Hawaii
Keaku 1, Ahupuaa, Hilo, Hawaii.

Halehaku, Ahupuaa, Hamakua, Maui

Pahoa, an `ili, Kona, Oahu

[See below 8518B for James Y. Kanehoa and 8519B for Pane /Fannie's/, Peke 8524B, Julia Alapai Kauwa 8525B for Maui holdings]

N.T. 352v10
No. 8515, John Young (Keoni Ana), 22 April 1854 (from page 408, Vol. 3, F/T.) [Nos. 7713, 10474, 7716, 7714B, & 7712]

Kukahiko, sworn, I have this house lot, which belongs to John Young in Luakaha ili in Nuuanu, Honolulu, Oahu.

Mauka, Kaholuahune's land
Waikiki, Nuuanu Street
Makai and Ewa, the konohiki's land.

This place was received from King Kamehameha III in 1846, probably, and he has had it since that time to the present time. No objections.

Maneo (kane), sworn, I have known in the same way as Kukahiko has related, indeed. here were no objections.

Kailiwai (kane), sworn, I have known in the same way as they have related.

[Award 8515; R.P. 6778; Queen St. Honolulu Kona; 1 ap.; .61 Ac.; R.P. 6776; Luakaha Honolulu Kona; 1 ap.; 81.00 Acs; R.P. 1666; Pahoa Waikiki Kona; 1 ap.; 11.43 Acs]

HISTORIC LAND USE

Once land became available through the Māhele, large grants of land in districts throughout the island were leased or sold to foreigners for commercial ventures. According to Altizer *et al.* (2009: 21, 24):

> It was during this period that the first detailed maps of the vicinity were produced. Maps including the Hawaii Government Survey Palolo Valley, Lower Portion, Kona, O`ahu (1881) and Hawaiian Government Survey Manoa Valley (1882) were consulted but they show no details or any significant data for the Kalaepohaku area - presumably because there was virtually nothing there (as indicated in early twentieth century maps).
>
> During the early 1900s, the first detailed maps of the vicinity were produced by land companies that wished to develop the land for housing subdivisions. Other areas such as Nu` uanu, Pauoa, Makiki, and Manoa were developed first. Much of the land in Palolo was too swampy, too steep, or too remote. The first sections to be developed were the McCully and Kaimuki areas. In 1908, a mule-drawn trolley car service was built along Wai`alae Road, linking the people of Palolo to the urban center at Honolulu.

Unfortunately, very little additional data is available pertaining to the use of Kaimukī `Ili during the Historic Period. In the early 1800s, John Papa `Ī`ī documented a series of trails extending from the southern portion of Makiki to the eastern boundary of Waikīkī Ahupua`a (`Ī`ī 1959: 93; Figure 6). According to Altizer *et al.* (2009: 15), the main trail "... eventually evolved into the present day alignment of King Street and Wai `alae Avenue. The trail passed through Palolo, where `Ī`ī mentions a place called Kapohakikeke, indicating the trail passed by Pōhaku Kīkēkē." According to `Ī`ī (1959: 94), the trail series extended across Waikīkī Ahupua`a, and beyond:

> From Paliiki the trail ran up to Kalahu, above Leahi, and on to the place where Waialae stream reached the sand. The trail that ran through Kaluahole went to Kaalawai, up over, and down into Kahala, to meet the other trail at the place where the stream reached the sand. There they met the mauka trail that came from Ululani's place in Pawaa to Kapaakea, then up to Kamoilili, and to Kapohakikeke, where it left the trail that went to Palolo, and continued on...

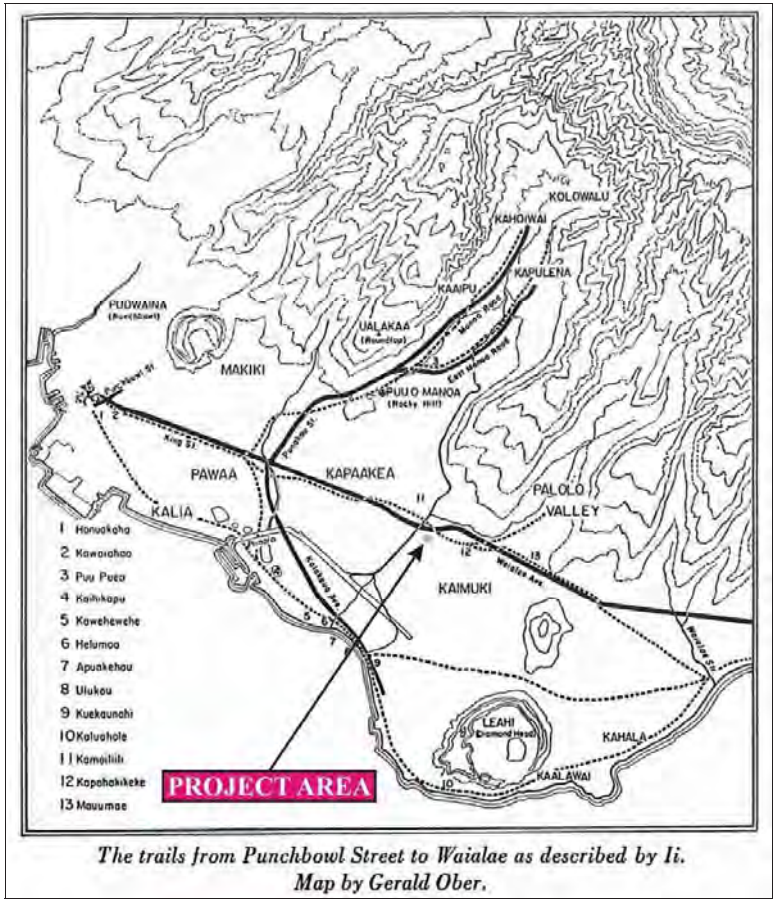


Figure 6: Early Nineteenth Century Map of Honolulu [Gerald Ober (in `Ī`ī 1957:93)].

We can infer from `Ī`ī (1959: 93, 94; see Figure 6), historic maps (Figure 7 see Figure 5), and the historic data that the *`ili* of Kaimukī was an unsettled, yet well-traveled area, within Waikīkī Ahupua`a, which serves as a connecting link to the adjacent *ahupua`a* of Makiki, Mānoa, Pālolo, and Kāhala.

The Waihona `Aina Database and the REDI Realty Tax Map Key indicates one Land Grant (Land Grant 2606), consisting of two *`āpana* comprised of 1.92 acres, was purchased by Nicholas George in 1859. While this Land Grant was obtained for lands adjacent and west of the current project area, and does not include the project area, it does suggest that additional land grants may have been purchased in the vicinity and that the project area may have been in ranchlands in the mid-1800s.

KAIMUKI PUMP STATION

Mason Architect, Inc. under Belt Collins Hawaii LLC (2013) conducted an historic architectural study and historic documentation of the Kaimuki Pumping Station (Appendix E). According to the Mason Architect, Inc. (2013:7) study, the Kaimuki Pumping Station:

> was established in 1898 when two wells were drilled at the site. These wells are located at the west corner of the lot (TMK 1-2-7-030:012).
>
> The exact configuration and pumping specifications of this original installation are not known. In 1912 two additional wells were sunk by the McCandless Brothers that were located about 150' north east of the original two wells. At some time during this period, a pumping station building containing two steam pumps and a double boiler for steam was built between the two pairs of wells. In 1917 these four wells had a capacity of 4,750,000 gallons per day.
>
> In 1928 the extant Kaimuki pumping station building was built to the southeast of the ca. 1912 building. In addition, four more artesian wells were drilled at the site by the McCandless Brothers between 1925 and 1928. The water pumped from the wells at the Kaimuki pumping station was distributed to customers in the Kaimuki and Waialae districts.
>
> The 1928 construction of the Kaimuki pumping station included the installation of two steam pumps in the engine room, a 4 mgd HL (high level) pump and a 10mgd LL (low level pump). The high level pump would have been used to lift water to reservoirs at high elevations, the low level pump to supply water to service mains or booster stations at

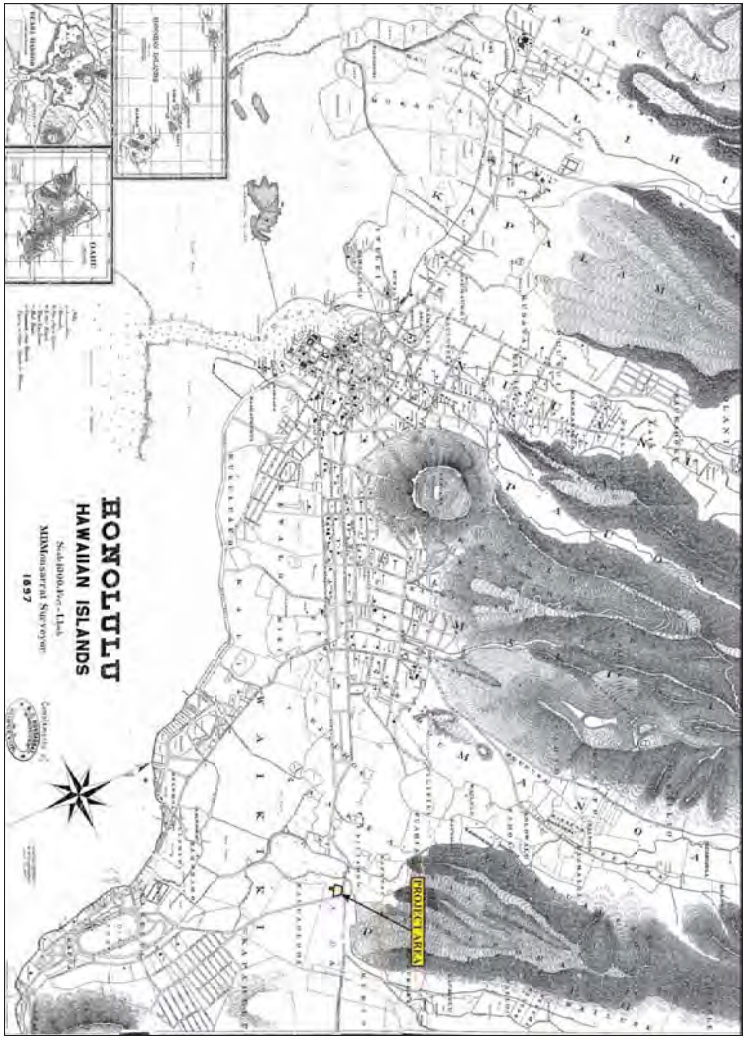


Figure 7: Late Nineteenth Century Map of Honolulu (Monsarrat 1897:Reg. Map 1910).

lower elevations. In addition, the existing double boiler from the ca. 1912 pump station was relocated into the boiler room of the new building and a new single boiler was installed. These three boilers in the new building were connected to a chimney at the west corner of the building. Original plans dated July 19, 1927 state that "Existing chimney at Beretania pumping station to be dismantled & re-erected at Kaimuki station." In a historic photograph of Kaimuki pumping station taken shortly after its construction, the 4' diameter 120' high steel chimney is unadorned.

A 20' x 30' addition was constructed on the northwest side of the pumping station building at an unknown date before 1969 to house an additional two electric pumps.

Ca. 1970 the Kaimuki pumping station was fitted with new electric pumps to replace the steam driven ones. Both steam pumps were decommissioned and the 4 mgd steam pump was removed. Also at this time the existing three boilers were decommissioned and left in place in the boiler room. The 10mgd steam pump in the engine room was left in place. Five electric pumps were installed in the area of the engine room that previously held the 4 mgd steam pump; three pumps were 100 Hp with a 2.5 mgd capacity, one was 200 Hp 5 mgd, and two were 250 Hp 2.5 mgd. The existing electric pumps in the pre31969 addition (two – 300 Hp) remained in place. They were removed later at an unknown date.

By 1884, five drilled wells contributed their water to Honolulu's municipal water system, from a total of 45 producing wells in the area. Most all of the wells drilled in Honolulu over the next sixteen years were for agriculture, principally rice fields and dairy farms. The Honolulu Iron Works and OR&L Railway Co had their own wells for industrial use. Others were for domestic use. In 1895, two wells were drilled at the site of the present Beretania Street pumping station. The flow from these wells was pumped by the station there to supply the municipal system. Droughts during the 1890s and an increasing population led to the construction of the Kalihi pumping station with three wells in 1900 and the Kaimuki pumping station with two wells in 1898. In 1912, two additional wells went in at the Kaimuki pumping station.

By 1917 Honolulu had added two more pumping stations, Wilder Avenue had electric pumps taking water from two wells, and Makiki had electric and gasoline powered pumps taking water from one well. At that time the city also owned four other wells that were unused except during drought because of their low water pressure. These were located at Iolani Palace, Aliiolani Hale, Thomas Square, and Waikiki. ...

> ...In early 1926, Fred Ohrt, Chief Engineer of the Honolulu Sewer and Water Commission recommended that the steam pumping stations at Kalihi, Beretania Street, and Kaimuki be upgraded with the addition of two steam pumps at each, one 10 mgd LL pump and one 4 mgd HL pump. This pump installation was completed in April 1929, when the low level and high level systems between the three pumping stations were connected.
>
> ...During the time the three steam powered pumping stations were upgraded, additional wells went in; at Beretania Street; one in 1923, one in 1924, and three in 1926. Kaimuki; three in 1925 and one in 1928. Kalihi; four in 1926, and one in 1927.

PREVIOUS ARCHAEOLOGICAL STUDIES

A literature search indicated that, to date, no archaeological studies have been conducted within the confines of the current project area. Due to the limited amount of archaeological studies conducted in Kaimukī `Ili, the selected previous archaeological studies were intended to reflect a range of findings within the vicinity of the current project area. The studies selected for the Previous Archaeology discussion was based on report availability at the State Historic Preservation Division (SHPD), Kapolei, library.

One of the earliest archaeological surveys on O`ahu was conducted by J. Gilbert McAllister in the early 1930s, under the auspices of the Bernice P. Bishop Museum (McAllister 1933). During this survey McAllister (1933) was not able to relocate Kukuionapehā Heiau, which was initially described by Thrum (1908) as located "[a]t the town side of old signal station. All destroyed." Nor was McAllister able to relocate Maumau Heiau, which was located above Kaimukī, in Pālolo. Maumau Heiau was initially documented by Thrum (1908) as "[a] medium-sized heiau of pookanaka [human sacrifice] class, credited at the time to Olopana. Foundations only remain." According to A. Grove Day (1984: 143), Olopana was an *ali`i* from O`ahu and the uncle of Kamapua`a, the legendary demigod.

In 1994, SCS conducted an Archaeological Assessment of four Hausten Street Lots in Mō`ili`ili, Mānoa, Waikīkī Ahupua`a, O`ahu (Chaffee and Spear 1994). As the area had been subjected to extensive development previously no historic properties were identified. The report also discusses the controversy over identifying the exact location of the legendary Kumalae Spring and tries to answer the question of whether Kumalae Spring is the same spring as the pool at the Willows Restaurant. Chaffee and Spear (1994) indicated that several individuals have placed Kumalae Spring at the present day location of the St. Louis Alumni Club (916 Coolidge

Street), rather than at the Willows Restaurant (901 Hausten Street). Based on the information presented by informants, Chaffee and Spear (1994) concluded that Kumulae Spring was most likely located at the site of the present St. Louis Alumni Club, a short distance from the Hausten Street site. It is possible that the spring referenced as being Kumulae Spring at the Willows Restaurant site did have historical significance at one time, but may have been known by a different name. The spring has since been destroyed.

In 1996, Paul H. Rosendahl, Ph.D., Inc. conducted an Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments (Wolforth *et al.* 1996). One newly identified site, PHRI Site 1726.1, a complex associated with the Kawao Community Park, was located within the project area. Two newly identified sites (State Site 50-80-14-5463, an agricultural enclosure, and State Site 50-80-14-4266, a pre-Contact burial complex) were located outside of the project area. Four previously identified sites were relocated within the project area: State Site 50-80-14-4266 consisted of a pre-Contact burial complex initially identified by Hammatt and Shideler (1991); State Site 50-80-14-4998 consisted of an *`auwai* l initially identified by Liston and Burtchard 1996); State Site 50-80-14-9749, the Church of the Crossroads, which was placed on the Historic Register of Historic Properties June 28, 1991 and on the National Register of Historic Properties November 20, 1992; and State Site 50-80-14-1352, University of Hawai`i buildings (Wist Hall), which was placed on the National Register of Historic Properties March 19, 1984.

In 2009, Cultural Surveys Hawai`i, Inc. conducted an Archaeological Inventory Survey for the Proposed Chaminade-Saint Louis School Campus Project, Pālolo Ahupua`a, Honolulu (Kona) District, O`ahu Island. TMK: (1) 3-3-001: por. 001 & por. 006 (Altizer *et al.* 2009). During the survey, two sites were identified: State Sites 50-80- 14-7077 and Site 50-80-14-7078. State Sites 50-80-14-7077 consisted of the remnants of terracing and water control features associated with early campus construction, while Site 50-80-14-7078 is the remnants of the Army hospital of WW II.

METHODOLOGY

Fieldwork for the Kaimuki Pumping Station Improvements project area was conducted on September 13, 2013, by SCS archaeologist Guerin Tome, B.A., under the supervision of Robert L. Spear, Ph.D., Principal Investigator. A 100% pedestrian survey was conducted of the built and landscaped project site (see Figure 3). Given the extensive infrastructure, no subsurface testing was conducted.

The project area consisted of two main areas: Area 1 and Area 2. Area 1 consisted of the fenced area which contains the asphalt driveway and parking area, the pump station, and multiple vertical pipes and electric housing units, and irrigation lines. This area exhibited very limited soil deposits.

Area 2 consisted of the un-fenced area located on the east and north sides of Area 1. The north side of Area 2 sloped to the south and was undulated. Portions of Area 2 displayed water meters and metal covers over access holes. Area 2 also exhibited manicured lawns.

FINDINGS AND RECOMMENDATIONS

A 100% pedestrian survey of the Kaimuki Pump Station grounds identified the Kaimuki Pump Station building as an historic property, as the pump station building was constructed in 1928 (see Figures 1 through 3). Three historic properties were identified during the Archaeological Field Inspection. The historic properties are the Pump Station structure, which was constructed in 1928 (Figure 8), and the east wall (Figure 9), which appears to have been constructed in 1951 or early 1952, based on aerial photographs (Figure 10). The southern wall is not visible in the 1952 aerial photograph. However, the south wall may have been constructed around the same time as the Pump Station. No historic properties (cultural materials or cultural deposits) were identified in subsurface contexts.

Based on the findings of the Archaeological Field Inspection, an Archaeological Inventory Survey is recommended for the proposed undertaking, to be conducted prior to any ground altering activities, in order to provide adequate documentation and to assess the significance of the newly identified historic properties, pursuant to Hawaii Administrative Rules (HAR) § 13-275. In addition, consultation with the Sate Historic Preservation Division Architectural Branch is also recommended prior to the commencement of any ground altering activities.

Figure 8: Photograph of the Plaque located on the North Side of the Northeast Corner of the Kaimuki Pumping Station. View to Southwest.

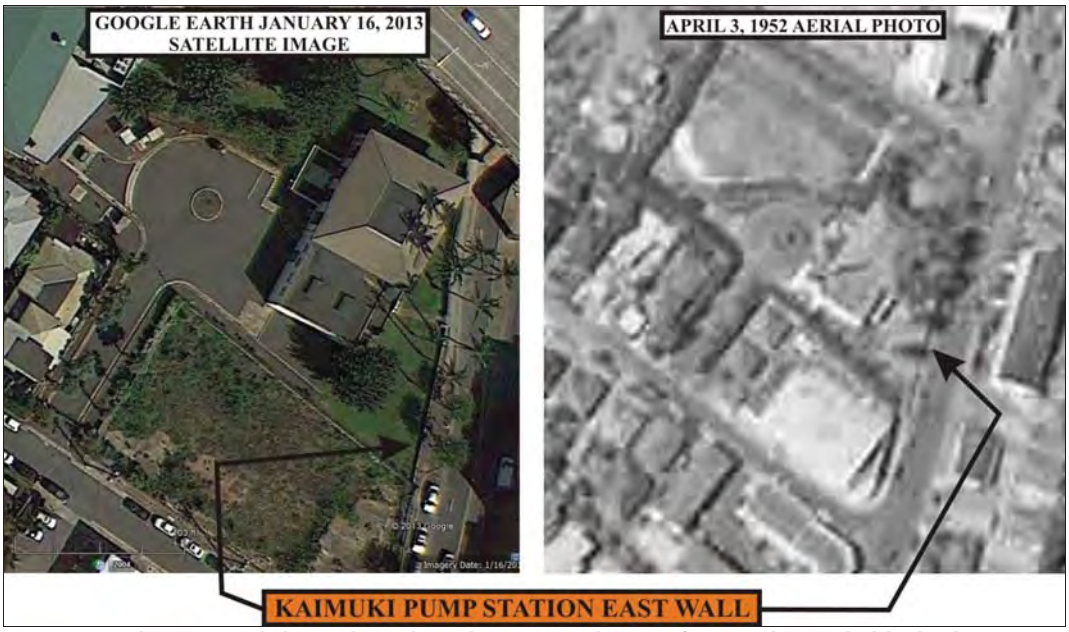


Figure 10: April 3, 1952 Aerial Photo with Google Earth Image (Aerial imagery from Google, Digital Globe dated 1/16/2013), Showing Project Area.

Figure 9: Photograph of the Rock Walls Located on the South and East Boundaries of the Kaimuki Pumping Station. View to West.

REEFERENCES

Alexander, w .O. (surveyor)
1873 Map of Makiki Valley and Lands Adjacent. Hawaii Government Survey, drawn by W.A. Wall. Registered Map No. 1071, State Survey Office, Honolulu.

1874 Map of the Estate of Kamehameha V in Pawaa, Waikiki. Registered Map No. 813, State Survey Office, Honolulu.

Altizer, Kendy David Shideler, and Hallett H. Hammatt
2009 *Archaeological Inventory Survey Report for the Proposed Chaminade-Saint Louis School Campus Project, Palolo Ahupua`a, Honolulu (Kona) District, O`ahu Island. TMK: (1) 3-3-001: por. 001 & por. 006.* Cultural Surveys Hawai`i, Inc., Kailua.

Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. The University of Hawaii Press, Honolulu.

Chaffee and Spear, David and Robert L. Spear
1994 *n Archaeological Assessment of Four Hausten Street Lots in Mo`'iii `ili, Manoa, Waikiki Ahupua`a, O`ahu, Hawai'i [TMK: 2-7-9:13,14 and 2-7-10:8,9].* Scientific Consultant Services, Inc., Kane`ohe.

Chinen, Jon
1961 *Original Land Titles in Hawaii*. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.

City and County of Honolulu Public Access
2013 Real Property Assessment Forms & Information. (http://www.honoluluproperytax.com). Accessed November 2013.

Cordy, Ross
1974 Cultural *adaptation and evolution in Hawaii: A suggested new sequence*. Journal of the Polynesian Society, 83:180-91.

2002 *An Ancient History of Wai`anae*. Mutual Publishing, Honolulu.

Daws, G.
1977 *Shoal of Time: History of the Hawaiian Islands.* University of Hawai`i Press, Honolulu.

Day, A. Grove
1984 *History Makers of Hawaii*. Mutual Publishing of Honolulu, Honolulu.

Foote, Donald E. *et. al.*
1972 *Soil Survey of Island of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station, Washington, D.C.

Fornander, Abraham
1969 *An Account of the Polynesian Race, Its Origins and Migrations*. Vol. 1 to 3. Charles E. Tuttle Co. Inc.: Jutland.

Giambelluca, Thomas W., Michael A. Nullet and Thomas A. Schroeder
1986 Rainfall Atlas of Hawai'i. Report R76. State of Hawaii, DLNR, Division of Water and Land Development, Honolulu.

Hammatt, H.H. and DW. Shideler
1991 *Archaeological Disinterment of Inadvertent Finds at Site 50-80-14-4266 on Dole Street Kanewai, Manoa, Kona District, O`ahu.* Cultural Surveys Hawai`i, Kailua.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bishop Museum Press. Honolulu.

Handy, E.S. Craighill and Elizabeth Handy
1972 *Native Planters in Old Hawaii*. Bishop Museum Bulletin 233. Bishop Museum Press. Honolulu.

Hawaii State Archives
n.d. Bertram Collection. Photograph Files, Folder PP Ber 1-12.

`Ī`ī, John Papa
1959 *Fragments of Hawaiian History*. Bishop Museum Press. Honolulu.

Indices of Awards
1929 *Indices of Awards Made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. 4 volumes plus Native and Foreign Register and Native and Foreign Testimony*. Hawaii State Archives, Honolulu.

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

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

Kanahele, George S.
1995 *Waikīkī 100 B.C. to 1900 A.D. An Untold Story*. The Queen Emma Foundation. Honolulu.

Kelly, Marion
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum, Honolulu.

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

Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
2011 " When Did the Polynesians Settle Hawai'i? A Review of 150 Years of Scholarly Inquiry and a Tentative Answer," in *Hawaiian Archaeology*. 12 (2011) pp. 3-26.

Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press, Chicago.

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

Liston, J., and G.C. Burtchard
1996 *Kapapo Loi Kanewai; Archaeology at the Center for Hawaiian Studies.* University of Hawai`i, Mānoa.

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

Lyons, C. J.
1875 "Land Matters in Hawaii 2," The Islander, June 9, 1875. Honolulu, Hawai`i.

MacDonald, Gordon and Agatin T. Abbott
1970 *Volcanoes in the Sea*. The University Press of Hawaii. Honolulu.

Mason Architect, Inc. under Belt Collins Hawaii LLC
2013 *Kaimuki Pumping Station: Historic Documentation & Compliance Considerations.* Honolulu.

McAllister, J. Gilbert
1933 *Archaeology of O`ahu.* Bernice P. Bishop Museum, Honolulu.

Newton, H.E
1911 Hawaii Territory Survey: Honolulu Showing Makiki Valley Section. Compiled from Government Survey Maps, March 1911. Registered Map No. 2521, State Survey Office, Honolulu

Podmore, G.
1913 *Hawaii Territory Survey: Honolulu Showing Mountain Sections.* Registered Map No. 2554, State Survey Office, Honolulu.

Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai`i Press: Honolulu.

Pultz, Mary Anne (Ed.)
1981 *A Botanist's Visit to Oahu in 1831: Being the Journal of Dr. F.J.F. Meyen's Travels and Observations about the Island of Oahu*. Press Pacifica, Ltd., Kailua.

Stearns, Harold T.
1966 *Geology of the State of Hawai`i.* Pacific Book Publishers, Palo Alto.

Sterling E. and C. Summers
1976 *Sites of O`ahu*. Bishop Museum Press, Honolulu.

Thrum, T.G.
1908 "Heiaus and Heiau Sites Throughout the Hawaiian Islands - Additions to Other Islands. Island of O`ahu, of 1907 List" [in Thos. G. Thrum, compiler, Hawaiian Almanac and Annual for 1909, pp. 38-47, Honolulu.

Waihona `Aina Database
2013 https://www.waihona.com. Accessed October 2014.

Wolforth, Thomas R., and Alan Haun
1996 *Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments, Lands of Mānoa, Pālolo, and Waikīkī, Honolu District, Island of O`ahu (TMK: 2-7, 2-8, 2-9, 3-2, 3-3, 3-4).* Pau H. Rosendahl Ph.D., Inc. Hilo.

APPENDIX A: MASON ARCHITECT EVALUATION OF THE KAIMUKI PUMPING STATION - HISTORIC REPORT

A

KAIMUKI PUMPING STATION

Historic Documentation & Compliance Considerations

October 2013

Prepared for:
Honolulu Board of Water Supply

Prepared by:
Mason Architect, Inc.
under Belt Collins Hawaii LLC

A1

Introduction

The Kaimuki pumping station is part of the Honolulu Board of Water Supply (HBWS) water system and is located on the corner of Kapahulu Avenue and Harding Avenue. The HBWS is planning to establish four new supply wells and abandon the existing supply wells. An Environmental Assessment (EA) is being conducted as part of the planning for the construction of the wells. This report informs the EA by providing information regarding the facility history and an analysis of the affects of the project on the building and site.

Historic Preservation Compliance

Under §6E-7 and 8, HRS, and Chapter 13-275, HAR, HBWS is required to give the State Historic Preservation Division (SHPD) the opportunity to review projects or actions that could potentially affect historic properties and receive written concurrence from SHPD to proceed. SHPD has 90 days to respond with their concurrence and 30 or 45 days to approve specified types of reports and plans. Concurrence and approval is assumed if no response is received within these time frames.

'Historic property' is defined in the statute as any property over fifty years old. Eight of the wells were drilled at the site in 1928 or earlier and the current building was constructed in 1928, so the Kaimuki Pumping Station and its site are considered historic properties and projects involving this facility require review by SHPD.

Description

The Kaimuki pumping station is located on the corner of Kapahulu Avenue and Harding Avenue. The building covers the majority of the southeast side of the site with an asphalt drive and grassy area on the northwest side of the site. Ten wells are in various locations on the site. All the wells have manhole covers, and three wells have standpipes that protrude above ground. See the three figures at the end of this document for the site location and the locations of the wells.

The facility is a concrete building with an irregular footprint comprised primarily of two main rectangular sections, the pump room and the boiler room, and two smaller additions. It has overall dimensions of about 117' x 80'. The main section of the building is an approximate 70' x 60' pump room that has a concrete hip roof covered with concrete tiles with a flat section in the center. The pump room is flanked by a flat-roofed 47' x 54' boiler room section at the southwest and a low, 20' x 30' addition that has a flat roof with a large ventilation clerestory and a high parapet. The exterior wall surfaces are concrete stucco and a water table circles the base of the building.

Photo 1: Standpipe and well manhole cover at Well 1.

At the pump room section, the eaves (approximate 18' high) of the hip roof overhang by about 3' and are supported by decorative joists on about 20" spacing with a horizontal soffit between the joists of recessed panels. The rafters project from a simple molding at the top of the walls. Half-round copper gutters at the eaves transfer rainwater to rectangular metal downspouts with copper collector boxes, round downspouts

A2

below the boxes with decorative straps. A row of rectangular clerestory windows (each opening is about 3' wide x 2' high) circles the building just below the eave. These openings have six-light metal frame awning windows. Large arched openings (about 7' wide and 12' high) at the top of the water table form the main windows in this section of the building. These are multi-light metal sash with awning sections. On the parking lot side of the building the historic windows have been relatively recently been replaced with steel windows that closely resemble the historic windows. At both street sides (northeast and southeast), the arched openings retain the historic windows, which are covered on the exterior side with solid panels painted to simulate the historic window lights. The center, arched opening of the three on the Harding Avenue Extension side is extended down to grade and forms a doorway with a flush, double metal door. The interior of the pump room is basically one large space with quarry tile flooring and one by one inch ceramic tile on the walls from the quarry tile base up to about 8'. A set of stairs leads up to a catwalk at each end of the room. The ceiling is open to the painted roof trusses. The historic windows that are covered on the two street sides of the building are visible on the interior and the operating devices are still intact. Several pieces of historic equipment also remain in the space.

The boiler room section has a flat roof and a parapet with a simple cornice that is typically about 15' above grade. Window openings in the boiler room are placed high on the walls. They are about 2'-6" high x 6' wide with paired 6-light metal frame awning windows. Entry to the boiler room on the northwest side is through a wide opening (approximately 7') that has a steel door of expanded metal mesh flanked by fixed panels of expanded metal mesh. At the southeast side of the boiler room is a small flat roofed section (footprint about 30' x 12') with a cornice about 11' above grade. This section contains the employee toilet and shower. It has a short section of pedimented parapet above the entry doorway on the southeast side. Windows are typically six-light, horizontally pivoting steel frame with screens of expanded metal mesh. On the interior of the boiler, the floor and walls are painted concrete and the painted roof framing members are exposed at the ceiling.

The 20' x 30' addition on the northwest side of the pump room was built to provide vertical access, through its clerestory, to electric pumps. This addition has no doorway or window openings in its exterior walls. This addition is about 6'-9" high above grade and it is excavated down to the level of the engine room floor, about 13'-3" below grade. The 6'-9" high exterior walls of this addition are painted concrete stucco with a plain cornice. They form an approximate 4' high parapet for the flat roof. The parapet also serves to conceal from direct view a 6' wide, 12' long ventilation clerestory on the addition's roof that was apparently built to allow equipment (electric motors and large diameter piping) to be lowered to the floor of the addition. The clerestory has a gable roof of corrugated metal panels.

Photo 2: Several features of the pump room are illustrated in this photo including the arched windows, rectangular windows, eave, collector boxes, downspouts and water table.

A3

History

The Kaimuki pumping station was established in 1898 when two wells were drilled at the site. These wells are located at the west corner of the lot (TMK 1-2-7-030:012).

The exact configuration and pumping specifications of the original installation are not known. In 1912 two additional wells were sunk by the McCandless Brothers that were located about 150' north east of the original two wells. At some time during this period, a pumping station building containing two steam pumps and a double boiler for steam was built between the two pairs of wells. In 1917 these four wells had a capacity of 4,750,000 gallons per day.[1]

In 1928 the extant Kaimuki pumping station building was built to the southeast of the ca. 1912 building. In addition, four more artesian wells were drilled at the site by the McCandless Brothers between 1925 and 1928.[2] The water pumped from the wells at the Kaimuki pumping station was distributed to customers in the Kaimuki and Waialae districts.[3]

The 1928 construction of the Kaimuki pumping station included the installation of two steam pumps in the engine room, a 4 mgd HL (high level) pump and a 10mgd LL (low level pump). The high level pump would have been used to lift water to reservoirs at high elevations, the low level pump to supply water to service mains or booster stations at lower elevations. In addition, the existing double boiler from the ca. 1912 pump station was relocated into the boiler room of the new building and a new single boiler was installed. These three boilers in the new building were connected to a chimney at the west corner of the building. Original plans dated July 19, 1927 state that "Existing chimney at Beretania pumping station to be dismantled & re-erected at Kaimuki station."[4] In a historic photograph of Kaimuki pumping station taken shortly after its construction, the 4' diameter 120' high steel chimney is unadorned.[5]

A 20' x 30' addition was constructed on the northwest side of the pumping station building at an unknown date before 1969 to house an additional two electric pumps.

Ca. 1970 the Kaimuki pumping station was fitted with new electric pumps to replace the steam driven ones. Both steam pumps were decommissioned and the 4 mgd steam pump was removed. Also at this time the existing three boilers were decommissioned and left in place in the boiler room. The 10mgd steam pump in the engine room was left in place. Five electric pumps were installed in the area of the engine room that previously held the 4 mgd steam pump; three pumps were 100 Hp with a 2.5 mgd capacity, one was 200 Hp 5 mgd, and two were 250 Hp 2.5 mgd. The existing electric pumps in the pre-1969 addition (two – 300 Hp) remained in place. They were removed later at an unknown date.

[1] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[2] James Sutton McCandless, A Brief History of the McCandless Brothers and Their Part in the Development of Artesian Well Water in the Hawaiian Islands 1880-1936. Honolulu: Privately published. 1936. P. 79.
[3] Harold T. Stearns, Future Ground Water Supplies For Honolulu Hawaii. US Geological Survey. 1934. P. 15.
[4] Honolulu Sewer and Water Commission, drawing "Kaimuki Pumping Station General Layout, plan no. 109-A." July 19, 1927.
[5] Kalihi Pumping Station, photograph in Hawaii State Archives, folder PP 12-9, photo # 014. Ca. 1930.

A4

Early well water supply in Honolulu

By 1884, five drilled wells contributed their water to Honolulu's municipal water system, from a total of 45 producing wells in the area. Most all of the wells drilled in Honolulu over the next sixteen years were for agriculture, principally rice fields and dairy farms. The Honolulu Iron Works and OR&L Railway Co had their own wells for industrial use. Others were for domestic use. In 1895, two wells were drilled at the site of the present Beretania Street pumping station. The flow from these wells was pumped by the station there to supply the municipal system. Droughts during the 1890s and an increasing population led to the construction of the Kalihi pumping station with three wells in 1900 and the Kaimuki pumping station with two wells in 1898. In 1912, two additional wells went in at the Kaimuki pumping station.[1]

By 1917 Honolulu had added two more pumping stations, Wilder Avenue had electric pumps taking water from two wells, and Makiki had electric and gasoline powered pumps taking water from one well. At that time the city also owned four other wells that were unused except during drought because of their low water pressure. These were located at Iolani Palace, Aliiolani Hale, Thomas Square, and Waikiki.[2] By 1938 the three wells at Wilder Avenue and at Makiki "[had] not been in use for several years."[3]

In early 1926, Fred Ohrt, Chief Engineer of the Honolulu Sewer and Water Commission recommended that the steam pumping stations at Kalihi, Beretania Street, and Kaimuki be upgraded with the addition of two steam pumps at each, one 10 mgd LL pump and one 4 mgd HL pump.[4] This pump installation was completed in April 1929, when the low level and high level systems between the three pumping stations were connected.

> "With flexible and full intercommunication between the three new stations, it will now be possible to shut down one pump and work the others at the needs of the time demand, making possible economies which Chief Engineer Frederick Ohrt estimated yesterday at $50,000 annually in pumping costs."[5]

During the time the three steam powered pumping stations were upgraded, additional wells went in; at Beretania Street; one in 1923, one in 1924, and three in 1926. Kaimuki; three in 1925 and one in 1928. Kalihi; four in 1926, and one in 1927.[6]

[1] Harold T Stearns and Knute N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249.
[2] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[3] Harold T. Stearns and K. N. Vaksvik, Records of the Drilled Wells on the Island of Oahu. Honolulu Advertiser Publishing. 1938. P. 7.
[4] "Water Plans to Cost $7,000,000 Ohrt Estimates," Honolulu Star Bulletin, January 4, 1926. P. 1.
[5] "New System of Pumps at Work Today," Honolulu Advertiser, April 5, 1929. P. 2.
[6] Harold T Stearns and Knute N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249.

A5

Character - Defining Features

Site Features:

- Well features in various locations on the site (see attached site plan)

Exterior Building Features:

- General Form of the building – two large rectangular sections
- Roof shapes – hip roof with flat center on pump room; flat roof with a parapet wall on boiler room
- Tile roofing
- Overhanging eaves with decorative joists, soffit, and cornice at the pump room
- Round copper gutters with rectangular and round downspouts with collector boxes on pump room.
- Window openings; multi-lite metal windows
- Concrete stucco wall surface
- Water table
- Simple cornice at top of boiler room walls
- Pedimented cornice above door in southeast addition.

Interior Features:

- Tile floor and walls in the pump room
- Concrete floor and walls in the boiler room
- Opening ceilings
- Historic equipment in general

Project Affects on Historic Property

This project plans to abandon the existing wells and provide four new wells. No work is planned for the exterior of the building. Because the wells provide the essence of the station and have visible elements, they do contribute to the historic integrity of the site. Their locations are currently simply marked by metal covers and, in three locations, standpipes that protrude above ground. The project intends to maintain the purpose of the station with new wells, and abandon the existing supply wells in place. The standpipes will be removed.

In order to maintain the historic integrity of the site, we recommend providing markers flush with the ground that indicate the historic construction date of each well. The markers would provide the same general appearance of the well covers and serve as historic markers.

Appendix F

Cultural Impact Assessment

SCS Project Number 1464-3 CIA

A CULTURAL IMPACT ASSESSMENT FOR THE KAIMUKI PUMP STATION IMPROVEMENTS `ILI OF KAIMUKĪ, WAIKĪKĪ AHUPUA`A, HONOLULU (KONA) DISTRICT O`AHU ISLAND, HAWAI`I [TMK: (1) 2-7-030:012 and 055]

Prepared by:
Cathleen A. Dagher, B.A.
and
Robert L. Spear, Ph.D.

April 2014
DRAFT

Prepared for:
Belt Collins Hawaii. LLC
2153 King Street, Suite 200
Honolulu, Hawai`i 96819-4454

SCIENTIFIC CONSULTANT SERVICES Inc.
1347 Kapiolani Blvd., Suite 408 Honolulu, Hawai`i 96814

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

At the request of Belt Collins Hawaii. LLC, Scientific Consultant Services, Inc. (SCS) has prepared a Cultural Impact Assessment (CIA) for the proposed Kaimuki Pumping Station Improvements, `*ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District O`ahu Island, Hawai`i [TMK: (1) 2-7-030:012 and 055]. The 1.1483 acre project area is owned by the City and County of Honolulu, Board of Water Supply (Figures 1 through 3).

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

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

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

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

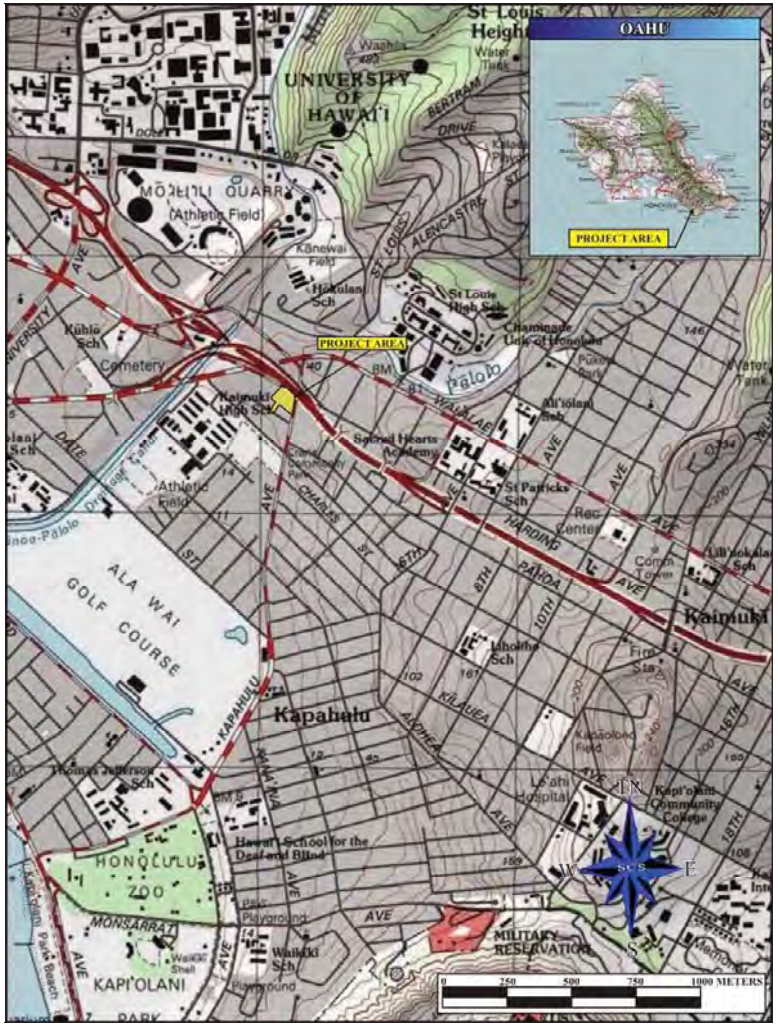


Figure 1: USGS Quadrangle (Honolulu, 1998) Map Showing Project Area Location.

Figure 2: Tax Map Key [TMK: (1) 2-7-030] Showing Project Area Location.

Figure 3: Google Earth Image (Aerial imagery from Google, Digital Globe dated 1/16/2013) Showing Project Area Location.

"cultural practices of the community and State" as part of the HRS Chapter 343 (2001) environmental review process.

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

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

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

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

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

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

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

METHODOLOGY

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

> "…information may be obtained through scoping, community meetings, ethnographic interviews and oral histories…"

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

A. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

B. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

C. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

D. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

E. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

F. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

G. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area affected directly or indirectly by the proposed project.

H. An explanation of confidential information that has been withheld from public disclosure in the assessment.

I. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

J. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

K. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

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

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These sources included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps; land records, such as Land

Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological reports.

INTERVIEW METHODOLOGY

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

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

ENVIRONMENTAL SETTING

LOCATION

The Kaimuki Pump Station is situated in the southeastern portion of the island of O`ahu and on the leeward side of the Ko`olau Mountain Range. The project area is located an estimated 1.5 miles (1812.2 m) north of the coastline at an elevation of 20 to 32 feet (6.0 to 9.8 m) above mean sea level (amsl). The proposed project area is located at 2951 Harding Avenue, in the *`ili*

of Kaimukī, near the northern border of Waikīkī Ahupua`a, Honolulu (Kona) District, O`ahu Island, Hawai`i [TMK (1) 2-7-030:012 and 055]. According to the Honolulu Property Tax website (http://www.honolulupropertytax.com), the project area consists of 1.1483 acres of land owned by the City and County of Honolulu, Board of Water Supply. The proposed project area is bound on the northwest by the Harding Avenue Extension, on the north and northeast by the H-1 Freeway Viaduct, on the east by Kapahulu Avenue, on the south and southeast by Kīhei Place, and on the southwest by an existing by residential area.

CLIMATE

Temperatures within the *ahupua`a* of Waikīkī range from the high 50s to the high 80s (degrees Fahrenheit) during the winter months. Winter rainfall ranges from 15 to 20 inches (Armstrong 1983:62, 64). During the summer months, temperatures in Waikīkī Ahupua`a range from the high 60s to the low 90s (degrees Fahrenheit). Rainfall during the summer months can range from 2 to 7 inches (*ibid*).

SOILS

According to Foote *et al*. (1972:63, 64, Sheet Map 63), the project area is located within the Kawaihapai Soil Series, and specifically within Kawaihapai clay loam (KlA) deposits. In general, soils of the Kawaihapai Series are comprised of alluvial deposits that originated from basic igneous rock in the humid upland regions of O`ahu and Moloka`i. These well-drained soils can be found in drainage ways and on alluvial fans, in coastal areas elevations extending from sea level to 300 feet amsl (Foote *et al*. 1972:63). The Kla soils occur on 0 to 2 percent slopes in areas receiving 30 to 50 inches of annual rainfall exhibit moderate permeability, slow runoff, and a very slight erosion hazard (*ibid*:64). Typically, the Kla soils are agricultural soils used in the cultivation of sugarcane, vegetables, and as ranchlands (*ibid*).

VEGETATION

The vegetation within the project area represents historic events and does not reflect the vegetation pattern prior to contact. The project area is currently a landscaped environment dominated by a dense growth of exotic species, used for ornamental purposes. The project area includes manicured lawns coconut palm (*Cocos nucifera*), hibiscus (*Hibiscus spp.*), shower tree (Cassia spp.), coat buttons (*Tridax procumbens*), snow bush (*Breynia disticha*), bird of paradise (*Heliconia sp.*), peregrina (*Jatropha integerrima*), and the Caribbean trumpet tree (*Tabebuia aurea*).

CULTURAL HISTORICAL CONTEXT

The island of O`ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai`anae and Ko`olau mountain ranges were formed by two volcanoes. Through the millennia the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970). According to Stearns (1966:86-87), numerous volcanic eruptions created a number of today's well-known landmarks, including the Mōkapu Peninsula, on the windward side of O`ahu, Ka`au Crater, Kaimukī Dome, and Diamond Head Crater. Soon after the Diamond Head eruption, a thin black lava flow occurred on the southeast side of Diamond Head forming the area currently known as Black Point. At the same time, "... voluminous lava flows from a vent on the northeast side [of Diamond Head formed] "... the Kaimuki lava dome, on which [the] Kaimuki section of Honolulu is now built."

PAST POLITICAL BOUNDARIES

Traditionally, the division of O`ahu's land into districts (*moku*) and sub-districts was said to be performed by a *Mā`ilikukahi* who was chosen by the chiefs to be the *mō`īho`oponopono o ke aupuni* (administrator of the government; Kamakau 1991:53–55). Cordy (2002) places Mā`ilikukahi at the beginning of the 16th century. Mā`ilikukahi created six districts and six district chiefs (*ali`i `ai moku*). Land was considered the property of the king or *ali`i `ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land. It is said that Mā`ilikukahi gave land to *maka`āinana* (commoners) all over the island of O`ahu (*ibid*).

In general, several terms, such as *moku, ahupua`a, `ili* or *`ili` āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili `āina* or *`ili* were smaller land divisions next to importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa `āina*

residing in a *ahupua`a* was called a *kuleana* (Lucas 1995:61). The project area is located in the Waikīkī Ahupua`a. Waikīkī means literally "spouting water" and is said to be named for the swamps (Pukui *et al*. 1974:223).

TRADITIONAL SETTLEMENT PATTERNS

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

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on the windward side of O`ahu was likely to have begun early (AD 1100–1300) during what is known as the Expansion Period (Kirch 1985).

In Hawai`i, much of the coastal lands were preferred for chiefly residence. Easily accessible resources such as offshore and onshore fishponds, the sea with its fishing and surfing—known as the sports of kings, and some of the most extensive and fertile wet taro lands were located in the area (Kirch and Sahlins, 1992 Vol. 1:19). Inland resources necessary for subsistence, could easily be brought to the *ali`i* residences on the coast from nearby inland plantations. The majority of farming was situated in the lower portions of stream valleys where there were broader alluvial flat lands or on bends in the streams where alluvial terraces could be modified to take advantage of the stream flow. Dry land cultivation occurred in colluvial areas at the base of gulch walls or on flat slopes (Kirch 1985; Kirch and Sahlins 1992, Vol. 2:59).

One of the most extensive terrace areas for taro was the level land between what is now Kalākaua Avenue, Kapi`olani Park and Mō`ili`ili (Handy 1940). They were watered by Pālolo and Mānoa Stream and freshwater ponds (*loko wai*) were formed as the water meandered to the sea. Tradition says this vast garden was developed by Chief Kalamakua-a-Kaipūhōlua (16th century (Fornander 1969).

> Farming was one of the principal duties of the chiefs, and the land [in Waikiki] was rich under cultivation. It was planted from the upper part to its entering the coconut grove [along the shore]…Water courses were made throughout the land, thereby feeding the taro patches and fishponds. A good chief was Kalamakua, who was well known for his farming. He constructed the large taro *lo`i* of Keokea. Kalamanamana, Kualualu and others at Waikiki. [*Ka Nupepa Kuokoa*, Aug 12, 1865]

Most of the ponds in Waikīkī were *loko pu`uone*, those isolated inshore ponds formed by the development of a barrier beach that created a single, elongated sand dune parallel to the coast. These were modified for agricultural use by the occupants who deepened them, built up the banks and constructed *`auwai* (canals) to allow water and small fish to flow in and out. The majority of *pu`uone* were located in the *`ili* of Kālia near the Pi`inaio Stream and its estuary. Fish commonly raised in the ponds included *`ama`ama* (mullet) and *awa* (milkfish; Kanahele 1995). Trails extended from the coast to the mountains, through the taro ponds, linking them for economic and social reasons.

Because of its fine beach and rich agricultural lands, the ruling chiefs of Hawai`i chose this area for the seat of government in very early times (Handy and Handy 1972). The a*li`i nui*, Mā`ilikukahi, transferred the government from Waialua to Waikīkī in the 1400s, thus making it one of the main political and economic centers of O`ahu for the next 400 years (Kamakau 1991; Kanahele 1995). Chiefs of O`ahu, including Kuamanuia, Ka`ihikapuamanuia whose large fishpond is under Fort DeRussy, Kakuhihewa and Ka`ihikapuakakuhihewa his son, chose to live in Waikīkī, at least part of the time (Kanahele 1995).

In 1783, Kahekili, a Maui chief, invaded O`ahu landing in Waikīkī. It was said his fleet of war canoes extended from Ka`alawai, near Leahi (Diamond Head) to Kawehewehe, the location of the Halekūlani Hotel. The struggle to arrest O`ahu from his nephew Kahahana took a total of five years, but resulted in Kahekili's brief rule over Moloka`i, Maui, and O`ahu. Kahekili died in Waikīkī in Ulukou (near the Moana Hotel) in 1794 leaving his kingdom to his

son, Kalanikupule (*ibid*). Kamehameha was to be Kalanikupule's downfall, when in 1795 he decisively won O`ahu in the Battle of Nu`uanu.

WAHI PANA (LEGENDARY PLACES)

According to legend, "Kaimukī" does not refer to "the oven where food is cooked in ti leaves." "Kaimukī" means "the oven for cooking the ti root" (Lyons in Sterling and Summers 1978:276) and makes reference to the Menehune who lived there at one time. Kaimukī was described as "...the wild region of Ka-imu-ki, thickset with bowlders--a region at one time chosen by the dwarf Menehune as a sort of stronghold where they could safely plant their famous ti ovens and not be molested by the nocturnal depredations of the swinish Kama-pua`a..." by Emerson (n.d. in Sterling and Summers 1978:276). Handy and Handy (1972: 224) state that:

> In famine times *ti* roots were gathered from the forest in large quantities and steamed in great ovens, then grated, mashed, mixed with water, and drunk. It is said that there was a famous oven of this sort east of Honolulu at Kaimuki.

Many legends refer to Hi`iaka, Pele's sister, and her companions Wahineomao and Lohiau as they traveled back to Hawai`i Island from Kaua`i. One legend recounted in the Hawaiian language newspaper Ka Na`i Aupuni (June 28, 1906 in Sterling and Summers 1978:277-278), begins as Hi`iaka and her companions left their canoe at Waikīkī and traveled inland to a place known as Pāhoa [Kaimukī] (Figure 4). As the legend is recounted in Sterling and Summers (1978: 277-278), Hi`iaka informed "...her companions that they were to meet with super-natural beings, a male and a female, brother and sister, who were evil doers. As they ascended, Hi`iaka chanted:

> It is thou, o Pahoa
> And the woman, Makahuna who lives in the
> light rain of Palolo.
> Hearken to the voice
> To the cry of the traveler.
> Travelling on this hot scorching day from Waikiki,
> How warm it is.
>
> Pahoa replied rudely, "Who are you, you rude woman who speak our names? You rude woman, you." Then he said to his sister, "With your strength and mine combined we'll kill Hiiaka. The dust then arose hiding the trail from view.

Lohiau said, "What a whirlwind that is " Hiiaka replied. "That is not a natural whirlwind but one that has been made by Pahoa and his sister, who are lizards (moo). They are not the only evil

ones here, but we will meet yet others, Kamoiliili and Pohaku-Kikeke."

They continued going and near the spot where the Kamoiliili church now stands. they encountered a large lizard named Kamoiliili. It came forward to battle. Lohiau noticed that it resembled a woman. With a stroke of her skirt, Hiiaka broke its body to pieces and changed it into the low, long rocky mound above the church, They went on and when they drew close to Pahoa, he and his sister Maka-huna came to fight Hiiaka. Hiiaka struck them with her skirt and they cried out to her for mercy. She refused saying that she had greeted them politely but they were rude and insisted on fighting. She killed them, The rise below Pohaku-kikeke became known as Ahua a Pahoa." According to another version, Pahoa was spared.

Pahoa used to sit on this rise to watch the pool Huewa to watch Pohaku-kikeke bathe, Pohaku-kikeke was also a lizard whose former name was Ua-lililehua. Pahoa was in love with Lililehua...

Hiiaka came above Mau`u-mae at a place called Ka-ahu-kahi-ai where the zoo now stands (it was then located in Kaimuki). Pahoa saw her and ran swiftly to gather luau for he knew she was fond of it. He cooked and served the luau. Hiiaka asked what favor she might do for him. He then told her of his love for Lililehua who accepted his gifts but spurned his love. She suggested his going once more to look at her before she would do anything about helping him win her for him. He ran and saw Lililehua in her own brother's arms and the following mele describes what he saw:

The leaves of the banana tree sway up and down.
Set a-sway by the wind.
The leaves of the taro toss to and fro
Stirred by the wind,
The wind that blows from below ...
The sight filled him with disgust and he
lost his love for her completely. He told Hiiaka
that he no longer cared for the girl.

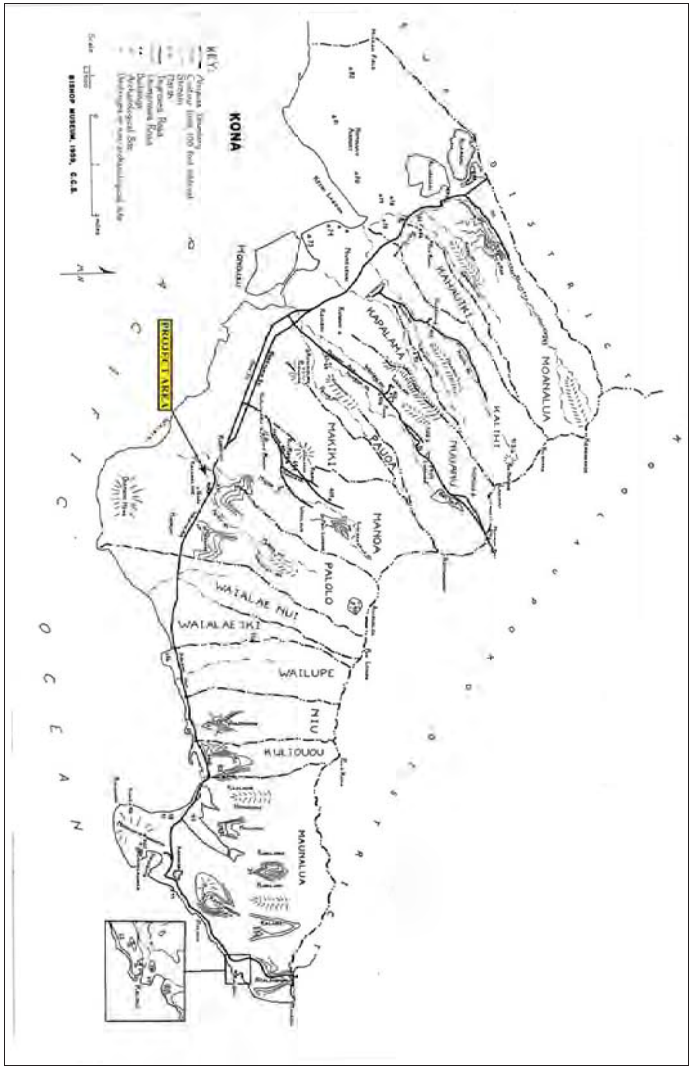


Figure 4: Kona District Map (Sterling and Summers 1978) Showing Project Area Location.

On June 28, 1906, Ka Na`i Aupuni (in Sterling and Summers 1978:278) continue the legend:

> Hiiaka destroyed Lililehua and her brother.
> She placed Lililehua's ringing voice in a rock called
> Pohaku-kikeke which lies on the lower side of the
> road going to Waialae.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the maka`āinana (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, `okipū (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). There were about 250 claims for land in Waikīkī Ahupua`a. However, thirty-nine claims were made in the *`ili* of Pāhoa, which was another name for the Kaimukī area (Pukui *et al.* 1974: 174).

A documents search at the Department of Land and Natural Resources Bureau of Conveyances and of the Waihona `Aina Database (2013) indicated that Land Commission Award (LCA) 8515, which included the *`ili* of Kaimukī (also called Pāhoa) was claimed by Keoni Ana (John Young II), the son of the *ali`i* Kaonaeha, niece of Kamehameha, and John Young, advisor of Kamehameha (Day 1984:133; Figure 5). Under Royal Patent 1666, Keoni Ana was awarded 1 *`āpana* comprised of 11.43 acres in the *`ili* of Pāhoa (see below).

> **No. 8515*O, Keoni Ana [John Young]**
> **F.R. 26v3**
>
> Claim 8515 Keoni Ana, See Native Register Volume [left blank]

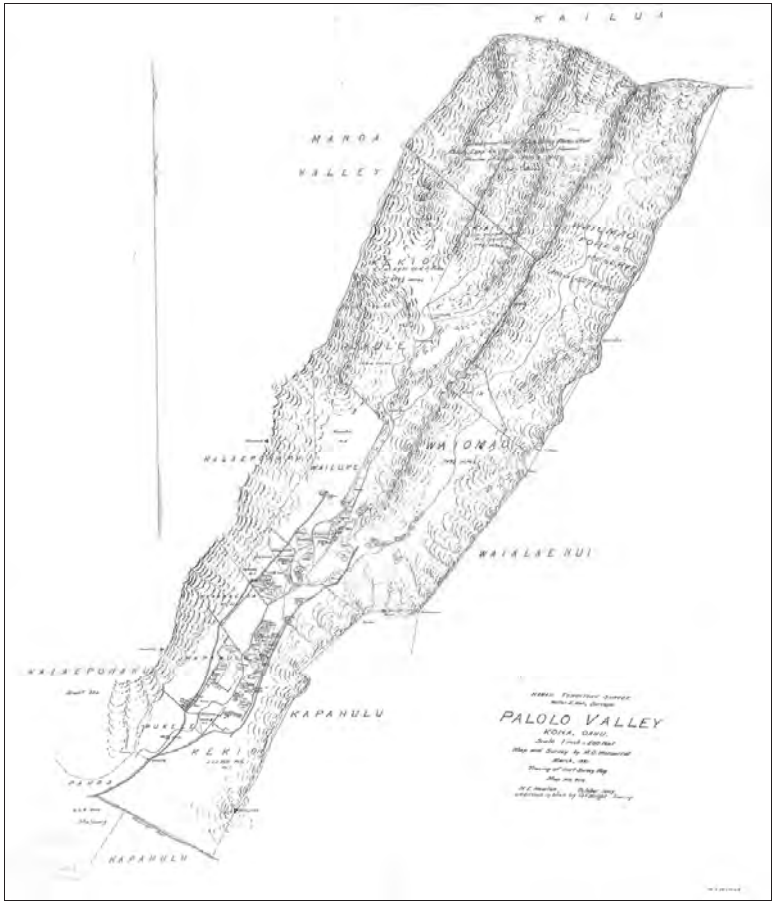


Figure 5: Hawaii Territory Survey Map of Palolo Valley, Kona, Oahu (Monsarrat 1881: Reg. Map 0908).

Page [left blank].

No. 8515 John Young /Jr./ /Keoni Ana/, Palace, February 14, 1848

Greetings: I hereby describe my lands and those of my cousins, for you to investigate and award. Given below are the names of the lands, and the ones who have the land.
With thanks,
JOHN YOUNG /JR./

John Young's /Jr.? /Keoni Ana/
for Kaimuki
Puunui, an `ili Honolulu, Kona, Oahu.
Puunoa for Lahilahi Ahupuaa, Lahaina, Maui.

The Inherited Lands,
East Kawaihae, Ahupuaa, Kohala, Hawaii
Keaku 1, Ahupuaa, Hilo, Hawaii.

Halehaku, Ahupuaa, Hamakua, Maui

Pahoa, an `ili, Kona, Oahu

[See below 8518B for James Y. Kanehoa and 8519B for Pane /Fannie's/, Peke 8524B, Julia Alapai Kauwa 8525B for Maui holdings]
N.R. 708v3

N.T. 352v10
No. 8515, John Young (Keoni Ana), 22 April 1854 (from page 408, Vol. 3, F/T.) [Nos. 7713, 10474, 7716, 7714B, & 7712]

Kukahiko, sworn, I have this house lot, which belongs to John Young in Luakaha ili in Nuuanu, Honolulu, Oahu.

Mauka, Kaholuahune's land
Waikiki, Nuuanu Street
Makai and Ewa, the konohiki's land.

This place was received from King Kamehameha III in 1846, probably, and he has had it since that time to the present time. No objections.

Maneo (kane), sworn, I have known in the same way as Kukahiko has related, indeed. here were no objections.

Kailiwai (kane), sworn, I have known in the same way as they have related.

[Award 8515; R.P. 6778; Queen St. Honolulu Kona; 1 ap.; .61 Ac.; R.P. 6776; Luakaha Honolulu Kona; 1 ap.; 81.00 Acs; R.P. 1666; Pahoa Waikiki Kona; 1 ap.; 11.43 Acs]

HISTORIC LAND USE

Once land became available through the Māhele, large grants of land in districts throughout the island were leased or sold to foreigners for commercial ventures. According to Altizer *et al.* (2009: 21, 24):

> It was during this period that the first detailed maps of the vicinity were produced. Maps including the Hawaii Government Survey Palolo Valley, Lower Portion, Kona, O`ahu (1881) and Hawaiian Government Survey Manoa Valley (1882) were consulted but they show no details or any significant data for the Kalaepohaku area - presumably because there was virtually nothing there (as indicated in early twentieth century maps).
>
> During the early 1900s, the first detailed maps of the vicinity were produced by land companies that wished to develop the land for housing subdivisions. Other areas such as Nu` uanu, Pauoa, Makiki, and Manoa were developed first. Much of the land in Palolo was too swampy, too steep, or too remote. The first sections to be developed were the McCully and Kaimuki areas. In 1908, a mule-drawn trolley car service was built along Wai`alae Road, linking the people of Palolo to the urban center at Honolulu.

Unfortunately, very little additional data is available pertaining to the use of Kaimukī `Ili during the Historic Period. In the early 1800s, John Papa `Ī`ī documented a series of trails extending from the southern portion of Makiki to the eastern boundary of Waikīkī Ahupua`a (`Ī`ī 1959: 93; Figure 6). According to Altizer *et al.* (2009: 15), the main trail "... eventually evolved into the present day alignment of King Street and Wai `alae Avenue. The trail passed through Palolo, where `Ī`ī mentions a place called Kapohapakikeke, indicating the trail passed by Pōhaku Kīkēkē." According to `Ī`ī (1959: 92, 94), the trail series extended across Waikīkī Ahupua`a, and beyond:

> From Paliiki the trail ran up to Kalahu, above Leahi, and on to the place where Waialae stream reached the sand. The trail that ran through Kaluahole went to Kaalawai, up, over, and down into Kahala, to meet the other trail at the place where the stream reached the sand. There they met the mauka trail that came from Ululani's place in Pawaa to Kapaakea,

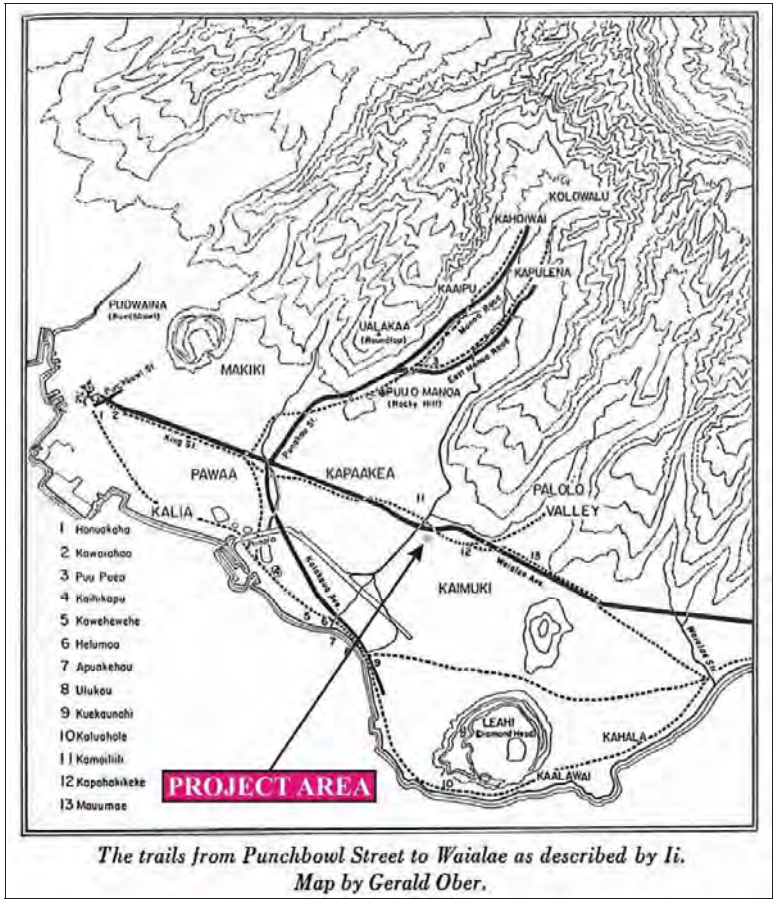


Figure 6: Early Nineteenth Century Map of Honolulu [Gerald Ober (in `Ī`ī 1959:93)].

> then up to Kamoililii, and to Kapohakikeke, where it left the trail that went to Palolo, and continued on...

We can infer from `Ī`ī (1959: 93, 94; see Figure 6), historic maps (Figure 7 see Figure 5), and the historic data that the *`ili* of Kaimukī was an unsettled, yet well-traveled area, within Waikīkī Ahupua`a, which serves as a connecting link to the adjacent *ahupua`a* of Makiki, Mānoa, Pālolo, and Kāhala.

The Waihona `Aina Database and the REDI Realty Tax Map Key indicates one Land Grant (Land Grant 2606), consisting of two *`āpana* comprised of 1.92 acres, was purchased by Nicholas George in 1859. While this Land Grant was obtained for lands adjacent and west of the current project area, and does not include the project area, it does suggest that additional land grants may have been purchased in the vicinity and that the project area may have been in ranchlands in the mid-1800s.

KAIMUKI PUMP STATION

Mason Architect, Inc. under Belt Collins Hawaii LLC (2013) conducted an historic architectural study and historic documentation of the Kaimuki Pumping Station (Appendix E). According to the Mason Architect, Inc. (2013:7) study, the Kaimuki Pumping Station:

> was established in 1898 when two wells were drilled at the site. These wells are located at the west corner of the lot (TMK 1-2-7-030:012).
>
> The exact configuration and pumping specifications of this original installation are not known. In 1912 two additional wells were sunk by the McCandless Brothers that were located about 150' north east of the original two wells. At some time during this period, a pumping station building containing two steam pumps and a double boiler for steam was built between the two pairs of wells. In 1917 these four wells had a capacity of 4,750,000 gallons per day.
>
> In 1928 the extant Kaimuki pumping station building was built to the southeast of the ca. 1912 building. In addition, four more artesian wells were drilled at the site by the McCandless Brothers between 1925 and 1928. The water pumped from the wells at the Kaimuki pumping station was distributed to customers in the Kaimuki and Waialae districts.
>
> The 1928 construction of the Kaimuki pumping station included the installation of two steam pumps in the engine room, a 4 mgd HL (high level) pump and a 10mgd LL (low level pump). The high level pump

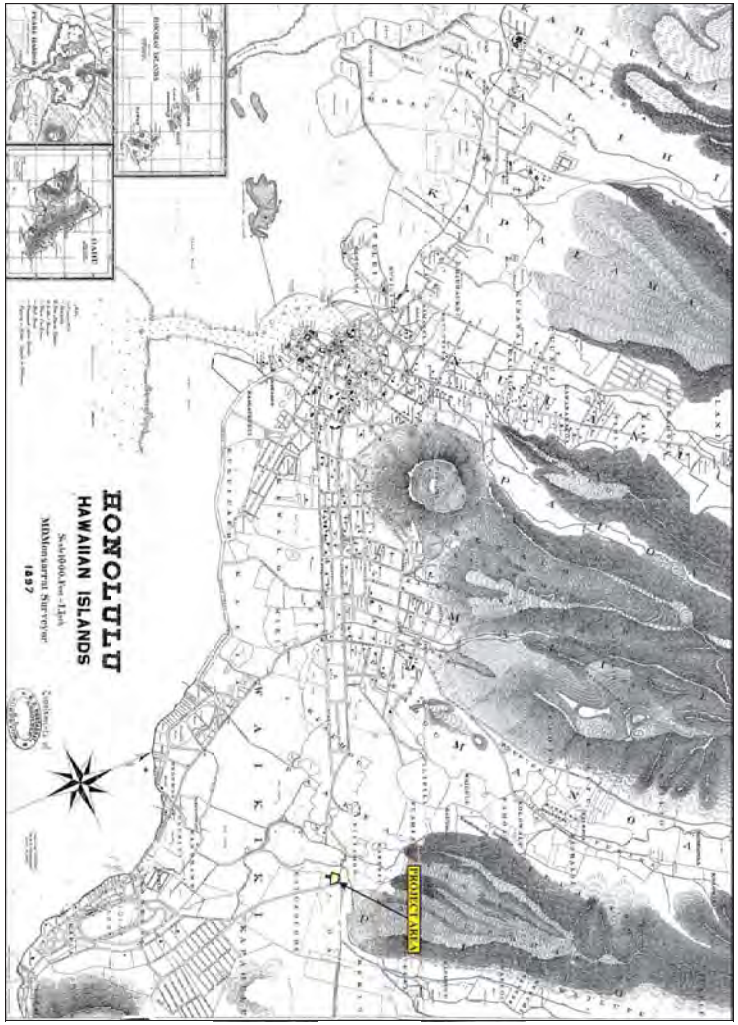


Figure 7: Late Nineteenth Century Map of Honolulu (Monsarrat 1897:Reg. Map 1910).

would have been used to lift water to reservoirs at high elevations, the low level pump to supply water to service mains or booster stations at lower elevations. In addition, the existing double boiler from the ca. 1912 pump station was relocated into the boiler room of the new building and a new single boiler was installed. These three boilers in the new building were connected to a chimney at the west corner of the building. Original plans dated July 19, 1927 state that "Existing chimney at Beretania pumping station to be dismantled & re-erected at Kaimuki station." In a historic photograph of Kaimuki pumping station taken shortly after its construction, the 4' diameter 120' high steel chimney is unadorned.

A 20' x 30' addition was constructed on the northwest side of the pumping station building at an unknown date before 1969 to house an additional two electric pumps.

Ca. 1970 the Kaimuki pumping station was fitted with new electric pumps to replace the steam driven ones. Both steam pumps were decommissioned and the 4 mgd steam pump was removed. Also at this time the existing three boilers were decommissioned and left in place in the boiler room. The 10mgd steam pump in the engine room was left in place. Five electric pumps were installed in the area of the engine room that previously held the 4 mgd steam pump; three pumps were 100 Hp with a 2.5 mgd capacity, one was 200 Hp 5 mgd, and two were 250 Hp 2.5 mgd. The existing electric pumps in the pre-1969 addition (two – 300 Hp) remained in place. They were removed later at an unknown date.

By 1884, five drilled wells contributed their water to Honolulu's municipal water system, from a total of 45 producing wells in the area. Most all of the wells drilled in Honolulu over the next sixteen years were for agriculture, principally rice fields and dairy farms. The Honolulu Iron Works and OR&L Railway Co had their own wells for industrial use. Others were for domestic use. In 1895, two wells were drilled at the site of the present Beretania Street pumping station. The flow from these wells was pumped by the station there to supply the municipal system. Droughts during the 1890s and an increasing population led to the construction of the Kalihi pumping station with three wells in 1900 and the Kaimuki pumping station with two wells in 1898. In 1912, two additional wells went in at the Kaimuki pumping station.

By 1917 Honolulu had added two more pumping stations, Wilder Avenue had electric pumps taking water from two wells, and Makiki had electric and gasoline powered pumps taking water from one well. At that time the city also owned four other wells that were unused except during drought because of their low water pressure. These were located at Iolani Palace, Aliiolani Hale, Thomas Square, and Waikiki. ...

> ...In early 1926, Fred Ohrt, Chief Engineer of the Honolulu Sewer and Water Commission recommended that the steam pumping stations at Kalihi, Beretania Street, and Kaimuki be upgraded with the addition of two steam pumps at each, one 10 mgd LL pump and one 4 mgd HL pump. This pump installation was completed in April 1929, when the low level and high level systems between the three pumping stations were connected.
>
> ...During the time the three steam powered pumping stations were upgraded, additional wells went in; at Beretania Street; one in 1923, one in 1924, and three in 1926. Kaimuki; three in 1925 and one in 1928. Kalihi; four in 1926, and one in 1927.

PREVIOUS ARCHAEOLOGICAL STUDIES

A literature search indicated that, to date, no archaeological studies have been conducted within the confines of the current project area. Due to the limited amount of archaeological studies conducted in Kaimukī `Ili, the selected previous archaeological studies were intended to reflect a range of findings within the vicinity of the current project area. The studies selected for the Previous Archaeology discussion was based on report availability at the State Historic Preservation Division (SHPD), Kapolei, library.

One of the earliest archaeological surveys on O`ahu was conducted by J. Gilbert McAllister in the early 1930s, under the auspices of the Bernice P. Bishop Museum (McAllister 1933). During this survey McAllister (1933) was not able to relocate Kukuionapehā Heiau, which was initially described by Thrum (1908) as located "[a]t the town side of old signal station. All destroyed." Nor was McAllister able to relocate Maumau Heiau, which was located above Kaimukī, in Pālolo. Maumau Heiau was initially documented by Thrum (1908) as "[a] medium-sized heiau of pookanaka [human sacrifice] class, credited at the time to Olopana. Foundations only remain." According to A. Grove Day (1984: 143), Olopana was an *ali`i* from O`ahu and the uncle of Kamapua`a, the legendary demigod.

In 1994, SCS conducted an Archaeological Assessment of four Hausten Street Lots in Mō`ili`ili, Mānoa, Waikīkī Ahupua`a, O`ahu (Chaffee and Spear 1994). As the area had been subjected to extensive development previously no historic properties were identified. The report also discusses the controversy over identifying the exact location of the legendary Kumalae Spring and tries to answer the question of whether Kumalae Spring is the same spring as the pool at the Willows Restaurant. Chaffee and Spear (1994) indicated that several individuals have placed Kumalae Spring at the present day location of the St. Louis Alumni Club (916 Coolidge

Street), rather than at the Willows Restaurant (901 Hausten Street). Based on the information presented by informants, Chaffee and Spear (1994) concluded that Kumulae Spring was most likely located at the site of the present St. Louis Alumni Club, a short distance from the Hausten Street site. It is possible that the spring referenced as being Kumulae Spring at the Willows Restaurant site did have historical significance at one time, but may have been known by a different name. The spring has since been destroyed.

In 1996, Paul H. Rosendahl, Ph.D., Inc. conducted an Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments (Wolforth *et al.* 1996). One newly identified site, PHRI Site 1726.1, a complex associated with the Kawao Community Park, was located within the project area. Two newly identified sites (State Site 50-80-14-5463, an agricultural enclosure, and State Site 50-80-14-4266, a pre-Contact burial complex) were located outside of the project area. Four previously identified sites were relocated within the project area: State Site 50-80-14-4266 consisted of a pre-Contact burial complex initially identified by Hammatt and Shideler (1991); State Site 50-80-14-4998 consisted of an *`auwai* l initially identified by Liston and Burtchard 1996); State Site 50-80-14-9749, the Church of the Crossroads, which was placed on the Historic Register of Historic Properties June 28, 1991 and on the National Register of Historic Properties November 20, 1992; and State Site 50-80-14-1352, University of Hawai`i buildings (Wist Hall), which was placed on the National Register of Historic Properties March 19, 1984.

In 2009, Cultural Surveys Hawai`i, Inc. conducted an Archaeological Inventory Survey for the Proposed Chaminade-Saint Louis School Campus Project, Pālolo Ahupua`a, Honolulu (Kona) District, O`ahu Island. TMK: (1) 3-3-001: por. 001 & por. 006 (Altizer *et al.* 2009). During the survey, two sites were identified: State Sites 50-80- 14-7077 and Site 50-80-14-7078. State Sites 50-80-14-7077 consisted of the remnants of terracing and water control features associated with early campus construction, while Site 50-80-14-7078 is the remnants of the Army hospital of WW II.

In September 2013, SCS conducted an Archaeological Field Inspection of the proposed Kaimuki Pumping Station Improvements project area (Dagher and Spear 2014). Three historic properties were identified during the Archaeological Field Inspection. The historic properties are the Pump Station structure, which was constructed in 1928 (Figure 8), and the east wall (Figure 9), which appears to have been constructed in 1951 or early 1952, based on aerial photographs (Figure 10). The south wall may have been constructed

Figure 9: Photograph of the Rock Walls Located on the South and East Boundaries of the Kaimuki Pumping Station. View to West.

Figure 8: Photograph of the Plaque located on the North Side of the Northeast Corner of the Kaimuki Pumping Station. View to Southwest.

Figure 10: April 3, 1952 Aerial Photo with Google Earth Image (Aerial imagery from Google, Digital Globe dated 1/16/2013), Showing Project Area.

around the same time as the Pump Station. No historic properties (cultural materials or cultural deposits) were identified in subsurface contexts.

CONSULTATION

Consultation was conducted via telephone, e-mail, personal interviews, and the U.S. Postal Service. Consultation was sought from Karen Ah Mai, Ala Wai Watershed Association; Dr. Kamana`opono M. Crabbe, Chief Executive Officer, OHA; Kawika Farm, SHPD Burial Sites Program; Hinaleimoana K.K. Wong-Kalu, Chair, O`ahu Island Burial Council; William Ho`ohuli; Malia Nobrega, Waikīkī Hawaiian Civic Club; and Ka`anohi Kaleikini, community member.

In addition, a Cultural Impact Assessment Notice was published on October 24, 25, and 28, 2012, in *The Honolulu Star-Advertiser* and in *The Maui News*, which published on the same dates on Maui, and the November 2013 issue of the OHA newspaper, *Ka Wai Ola* (see Appendix B). These notices requested information of cultural resources or activities in the area of the proposed project, stated the Tax Map Key (TMK) number, and where to respond with pertinent information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

CULTURAL IMPACT ASSESSMENT INQUIRY RESPONSES

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

During the consultation process, SCS received one response to the inquiries pertaining to any information that individuals or organizations may have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the proposed Kaimuki Pump Station Improvements project. Ka`anohi Kaleikini, responded via e-mail to the inquiry of SCS. Ms. Kaleikini's comments are paraphrased below.

Ka`anohi Kaleikini

Ms. Kaleikini stated in her electronic message that Kaimukī is not an *ahupua`a*. It is an *`ili* in the ahupua`a of Waikīkī, to which she is a State-recognized descendant. Ms. Kaleikini indicated that she is in possession of maps that show this area belonged to Native Hawaiians based on Royal Patents. In addition, Ms. Kaleikini can easily trace her lineage to some of these Native Hawaiians who inhabited the lands prior to it being developed. Prior to development, there were certain areas of *lo`i*, or taro patches, and fishponds in the area. Ms. Kaleikini goes on to state that where there were *lo`i* and fishponds, there were usually families living in close proximity.

SUMMARY

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

In the case of the current undertaking, letters of inquiry were sent to individuals and organizations that may have knowledge or information pertaining to the collection of cultural resources and/or practices currently, or previously, conducted in close proximity to the proposed approximately 1.1483 acre project area owned by the City and County of Honolulu, Board of Water Supply located in the *`ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District O`ahu Island, Hawai`i [TMK: (1) 2-7-030:012 and 055].

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of this report. Such scholars as Samuel Kamakau, Martha Beckwith, Jon J. Chinen, Lilikalā Kame`eleihiwa, R. S. Kuykendall, Marion Kelly, E. S. C. Handy and E.G. Handy, Elspeth P. Sterling, and Mary Kawena Puku`i and Samuel H. Elbert continue to contribute to our knowledge and understanding of Hawai`i, past and present. The

works of these and other authors were consulted and incorporated in this report where appropriate. Land use document research was supplied by the Waihona `Aina Database (2013).

CULTURAL ASSESSMENT AND RECOMMENDATIONS

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a suggested guideline of the OEQC (2012). Based on the response from those organizations and individuals contacted, the proposed project area has not been used for traditional cultural purposes within recent times. Based on historical research and the response from those organizations and individuals contacted, it is reasonable to conclude that Hawaiian rights related to gathering, access or other customary activities within the project area will not be affected and there will be no adverse effect upon cultural practices or beliefs.

REFERENCES

Alexander, w .O. (surveyor)
1873 Map of Makiki Valley and Lands Adjacent. Hawaii Government Survey, drawn by W.A. Wall. Registered Map No. 1071, State Survey Office, Honolulu.

1874 Map of the Estate of Kamehameha V in Pawaa, Waikiki. Registered Map No. 813, State Survey Office, Honolulu.

Altizer, Kendy David Shideler, and Hallett H. Hammatt
2009 *Archaeological Inventory Survey Report for the Proposed Chaminade-Saint Louis School Campus Project, Palolo Ahupua`a, Honolulu (Kona) District, O`ahu Island. TMK: (1) 3-3-001: por. 001 & por. 006.* Cultural Surveys Hawai`i, Inc., Kailua.

Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. The University of Hawaii Press, Honolulu.

Chaffee and Spear, David and Robert L. Spear
1994 *n Archaeological Assessment of Four Hausten Street Lots in Mo`ili `ili, Manoa, Waikiki Ahupua`a, O`ahu, Hawai'i [TMK: 2-7-9:13,14 and 2-7-10:8,9]*. Scientific Consultant Services, Inc., Kane`ohe.

Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.

City and County of Honolulu Public Access
2013 Real Property Assessment Forms & Information. (http://www.honolulupropertytax.com). Accessed November 2013.

Cordy, Ross
1974 Cultural *adaptation and evolution in Hawaii: A suggested new sequence*. Journal of the Polynesian Society, 83:180-91.

2002 *The Rise and Fall of the O`ahu Kingdom*. Mutual Publishing, Honolulu.

Daws, G.
1968 *Shoal of Time: History of the Hawaiian Islands.* University of Hawai`i Press. Honolulu.

Day, A. Grove
1984 *History Makers of Hawaii*. Mutual Publishing of Honolulu, Honolulu.

Foote, Donald E. *et. al.*
1972 *Soil Survey of Island of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station, Washington, D.C.

Fornander, Abraham
1969 *An Account of the Polynesian Race, Its Origins and Migrations*. Vol. 1 to 3. Charles E. Tuttle Co. Inc.: Jutland.

Giambelluca, Thomas W., Michael A. Nullet and Thomas A. Schroeder
1986 Rainfall Atlas of Hawai'i. Report R76. State of Hawaii, DLNR, Division of Water and Land Development, Honolulu.

Hammatt, H.H. and DW. Shideler
1991 *Archaeological Disinterment of Inadvertent Finds at Site 50-80-14-4266 on Dole Street Kanewai, Manoa, Kona District, O`ahu.* Cultural Surveys Hawai`i, Kailua.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*. Bishop Museum Press. Honolulu.

Handy, E.S. Craighill and Elizabeth Handy
1972 *Native Planters in Old Hawaii*. Bishop Museum Bulletin 233. Bishop Museum Press. Honolulu.

Hawaii State Archives
n.d. Bertram Collection. Photograph Files, Folder PP Ber 1-12.

`Ī`ī, John Papa
1959 *Fragments of Hawaiian History*. Bishop Museum Press. Honolulu.

Indices of Awards
1929 *Indices of Awards Made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. 4 volumes plus Native and Foreign Register and Native and Foreign Testimony*. Hawaii State Archives, Honolulu.

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

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

Kanahele, George S.
1995 *Waikīkī 100 B.C. to 1900 A.D. An Untold Story*. The Queen Emma Foundation. Honolulu.

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

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

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

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

Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press. Chicago.

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

McAllister, J. Gilbert
1933 *Archaeology of O`ahu*. Bernice P. Bishop Museum, Honolulu.

Liston, J., and G.C. Burtchard
1996 *Kapapo Loi Kanewai; Archaeology at the Center for Hawaiian Studies.* University of Hawai`i, Mānoa.

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

Lyons, C. J.
1875 "Land Matters in Hawaii 2," The Islander, June 9, 1875. Honolulu, Hawai`i.

MacDonald, Gordon and Agatin T. Abbott
1970 *Volcanoes in the Sea*. The University Press of Hawaii. Honolulu.

Mason Architect, Inc. under Belt Collins Hawaii LLC
2013 *Kaimuki Pumping Station: Historic Documentation & Compliance Considerations.* Honolulu.

McAllister, J. Gilbert
1933 *Archaeology of O`ahu.* Bernice P. Bishop Museum, Honolulu.

Newton, H.E
1911 Hawaii Territory Survey: Honolulu Showing Makiki Valley Section. Compiled from Government Survey Maps, March 1911. Registered Map No. 2521, State Survey Office, Honolulu

Parker, Patricia L., and Thomas F. King
1990 *Guidelines for Evaluating and Documenting Traditional Cultural Properties.* National Register Bulletin 38. Washington, D.C.: National Park Service.

Podmore, G.
1913 *Hawaii Territory Survey: Honolulu Showing Mountain Sections.* Registered Map No. 2554, State Survey Office, Honolulu.

Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai`i Press: Honolulu.

Pultz, Mary Anne (Ed.)
1981 *A Botanist's Visit to Oahu in 1831: Being the Journal of Dr. F.J.F. Meyen's Travels and Observations about the Island of Oahu*. Press Pacifica, Ltd., Kailua.

Stearns, Harold T.
1966 *Geology of the State of Hawai`i.* Pacific Book Publishers, Palo Alto.

Sterling E. and C. Summers
1976 *Sites of O`ahu*. Bishop Museum Press, Honolulu.

Thrum, T.G.
1908 "Heiaus and Heiau Sites Throughout the Hawaiian Islands - Additions to Other Islands. Island of O`ahu, of 1907 List" [in Thos. G. Thrum, compiler, Hawaiian Almanac and Annual for 1909, pp. 38-47, Honolulu.

Waihona `Aina Database
2013 https://www.waihona.com. Accessed October 2014.

Wolforth, Thomas R., and Alan Haun
1996 *Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments, Lands of Mānoa, Pālolo, and Waikīkī, Honolua District, Island of O`ahu (TMK: 2-7, 2-8, 2-9, 3-2, 3-3, 3-4).* Pau H. Rosendahl Ph.D., Inc. Hilo.

APPENDIX A: EXAMPLE LETTER OF INQUIRY

In compliance with the State of Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai`i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai`i on November 19, 1997, Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) pertaining to the proposed Kaimuki Pump Station Redevelopment Project, *`ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District, Island of O`ahu, Hawai`i [TMK: (1) 2-7-030:012 and 055] (Figures 1 and 2).

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

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

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

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

Sincerely yours,

Cathleen Dagher
Senior Archaeologist
Enclosures (2)

Cc:

APPENDIX B: POSTED LEGAL NOTICE AND AFFIDAVIT

B

Information requested by Scientific Consultant Services, Inc. (SCS) on cultural resources and traditional, or ongoing, cultural activities on or near the proposed Kaimuki Pump Station Redevelopment Project, Kaimukī Ahupua`a, Honolulu (Kona) District, Island of O`ahu, Hawai`i [TMK: (1) 2-7-030:012 and 055]. Please respond within 30 days to Cathleen Dagher at (808) 597-1182.

(146)

AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
SCS Proj 1464 CIA for the Kaimuki Substation Redevelopment Project

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

Doc. Date: OCT 10 2013 **# Pages:** 1
Notary Name: Patricia K. Reese **First Judicial Circuit**
Doc. Description: Affidavit of Publication
Notary Signature — OCT 10 2013 — Date

PATRICIA K. REESE NOTARY PUBLIC Comm. No. 86-467 STATE OF HAWAII

Information requested by Scientific Consultant Services, Inc. (SCS) on cultural resources and traditional, or ongoing, cultural activities on or near the proposed Kaimuki Pump Station Redevelopment Project, Kaimukī Ahupua`a, Honolulu (Kona) District, Island of O`ahu, Hawai`i [TMK: (1) 2-7-030:012 and 055]. Please respond within 30 days to Cathleen Dagher at (808) 597-1182. (5456497 10/4, 10/9, 10/10/13)

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

Honolulu Star-Advertiser 3 times on:
10/04, 10/09, 10/10/2013

Midweek Wed. 0 times on:

_____ times on:

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

Rose Rosales

Subscribed to and sworn before me this 10th day
of Oct A.D. 20 13

Patricia K. Reese, Notary Public of the First Judicial Circuit, State of Hawaii
My commission expires: Oct 07 2014

PATRICIA K. REESE NOTARY PUBLIC Comm. No. 86-467 STATE OF HAWAII

Ad.# 0000564847 LN:_____

B1

APPENDIX C: EXAMPLE FOLLOW-UP LETTER OF INQUIRY

Dear:

This is our follow-up letter to our October 3, 2013 letter, which was in compliance with the statutory requirements of the State of Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai`i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai`i, on November 19, 1997.

Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) pertaining to the proposed Kaimuki Pump Station Redevelopment Project, `*ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District, Island of O`ahu, Hawai`i [TMK: (1) 2-7-030:012 and 055].

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

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

We are asking you for any information that you or other individuals have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the proposed Kaimuki Pump Station Redevelopment project. We are also asking for any information pertaining to traditional cultural activities or traditional rights which may be impacted by the proposed Kaimuki Pump Station Redevelopment project. The results of the cultural impact assessment are dependent on the response and contributions made by knowledgeable individuals and organizations, such as yourself and the Office of Hawaiian Affairs.

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

Sincerely yours,

Cathleen Dagher
Senior Archaeologist

Cc: Karen Ah Mai, Ala Wai Watershed Association; Kawika Farm, State Historic Preservation Division, Burial Sites Program; William Ho`ohuli, community member; Hinaleimoana K.K. Wong-Kalu, Chair, O`ahu Island Burial Council; Malia Nobrega, Waikīkī Hawaiian Civic Club; Dr. Kamana`opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs

APPENDIX D: INFORMATION RELEASE FORM

INFORMATION RELEASE FORM

I, the undersigned participated in an interview with Scientific Consultant Services, Inc. on October 7 of the year 2013, electronically transmitted sent comments via e-mail, pertaining to the to Scientific Consultant Services, Inc., Senior Archaeologist, ¸Cathleen Dagher.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on proposed Kaimuki Pumping Station Redevelopment Project, *`ili* of Kaimukī, Waikīkī Ahupua`a, Honolulu (Kona) District O`ahu Island, Hawai`i [TMK: (1) 2-7-030:012]

I have read the transcript of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above.

Date of comments: October 7, 2013

Print Name: P. Kaanohi Kaleikini

Signature: P. Kaanohi Kaleikini

Release Dated: March 13, 2014

D1

APPENDIX E: MASON ARCHITECT EVALUATION OF THE KAIMUKI PUMPING STATION - HISTORIC REPORT

E

KAIMUKI PUMPING STATION

Historic Documentation & Compliance Considerations

October 2013

Prepared for:
Honolulu Board of Water Supply

Prepared by:
Mason Architect, Inc.
under Belt Collins Hawaii LLC

Introduction

The Kaimuki pumping station is part of the Honolulu Board of Water Supply (HBWS) water system and is located on the corner of Kapahulu Avenue and Harding Avenue. The HBWS is planning to establish four new supply wells and abandon the existing supply wells. An Environmental Assessment (EA) is being conducted as part of the planning for the construction of the wells. This report informs the EA by providing information regarding the facility history and an analysis of the affects of the project on the building and site.

Historic Preservation Compliance

Under §6E-7 and 8, HRS, and Chapter 13-275, HAR, HBWS is required to give the State Historic Preservation Division (SHPD) the opportunity to review projects or actions that could potentially affect historic properties and receive written concurrence from SHPD to proceed. SHPD has 90 days to respond with their concurrence and 30 or 45 days to approve specified types of reports and plans. Concurrence and approval is assumed if no response is received within these time frames.

'Historic property' is defined in the statute as any property over fifty years old. Eight of the wells were drilled at the site in 1928 or earlier and the current building was constructed in 1928, so the Kaimuki Pumping Station and its site are considered historic properties and projects involving this facility require review by SHPD.

Description

The Kaimuki pumping station is located on the corner of Kapahulu Avenue and Harding Avenue. The building covers the majority of the southeast side of the site with an asphalt drive and grassy area on the northwest side of the site. Ten wells are in various locations on the site. All the wells have manhole covers, and three wells have standpipes that protrude above ground. See the three figures at the end of this document for the site location and the locations of the wells.

The facility is a concrete building with an irregular footprint comprised primarily of two main rectangular sections, the pump room and the boiler room, and two smaller additions. It has overall dimensions of about 117' x 80'. The main section of the building is an approximate 70' x 60' pump room that has a concrete hip roof covered with concrete tiles with a flat section in the center. The pump room is flanked by a flat-roofed 47' x 54' boiler room section at the southwest and a low, 20' x 30' addition that has a flat roof with a large ventilation clerestory and a high parapet. The exterior wall surfaces are concrete stucco and a water table circles the base of the building.

Photo 1 Standpipe and well manhole cover at Well 1.

At the pump room section, the eaves (approximate 18' high) of the hip roof overhang by about 3' and are supported by decorative joists on about 20" spacing with a horizontal soffit between the joists of recessed panels. The rafters project from a simple molding at the top of the walls. Half-round copper gutters at the eaves transfer rainwater to rectangular metal downspouts with copper collector boxes, round downspouts

below the boxes with decorative straps. A row of rectangular clerestory windows (each opening is about 3' wide x 2' high) circles the building just below the eave. These openings have six-light metal frame awning windows. Large arched openings (about 7' wide and 12' high) at the top of the water table form the main windows in this section of the building. These are multi-light metal sash with awning sections. On the parking lot side of the building the historic windows have been relatively recently been replaced with steel windows that closely resemble the historic windows. At both street sides (northeast and southeast), the arched openings retain the historic windows, which are covered on the exterior side with solid panels painted to simulate the historic window lights. The center, arched opening of the three on the Harding Avenue Extension side is extended down to grade and forms a doorway with a flush, double metal door. The interior of the pump room is basically one large space with quarry tile flooring and one by one inch ceramic tile on the walls from the quarry tile base up to about 8'. A set of stairs leads up to a catwalk at each end of the room. The ceiling is open to the painted roof trusses. The historic windows that are covered on the two street-sides of the building are visible on the interior and the operating devices are still intact. Several pieces of historic equipment also remain in the space.

The boiler room section has a flat roof and a parapet with a simple cornice that is typically about 15' above grade. Window openings in the boiler room are placed high on the walls. They are about 2'-6" high x 6' wide with paired 6-light metal frame awning windows. Entry to the boiler room on the northwest side is through a wide opening (approximately 7') that has a steel door of expanded metal mesh flanked by fixed panels of expanded metal mesh. At the southeast side of the boiler room is a small flat roofed section (footprint about 36' x 12') with a cornice about 13' above grade. This section contains the employee toilet and shower. It has a short section of pedimented parapet above the entry doorway on the southeast side. Windows are typically six-light, horizontally pivoting steel frame with screens of expanded metal mesh. On the interior of the boiler, the floor and walls are painted concrete and the painted roof framing members are exposed at the ceiling.

The 20' x 30' addition on the northwest side of the pump room was built to provide vertical access, through its clerestory, to electric pumps. This addition has no doorway or window openings in its exterior walls. This addition is about 6'-9" high above grade and it is excavated down to the level of the engine room floor, about 13'-3" below grade. The 6'-9" high exterior walls of this addition are painted concrete stucco with a plain cornice. They form an approximate 4' high parapet for the flat roof. The parapet also serves to conceal from direct view a 6' wide, 12' long ventilation clerestory on the addition's roof that was apparently built to allow equipment (electric motors and large diameter piping) to be lowered to the floor of the addition. The clerestory has a gable roof of corrugated metal panels.

Photo 2: Several features of the pump room are illustrated in this photo including the arched windows, rectangular windows, eave, collector boxes, downspouts and water table.

History

The Kaimuki pumping station was established in 1898 when two wells were drilled at the site. These wells are located at the west corner of the lot (TMK 1-2-7-030:012).

The exact configuration and pumping specifications of this original installation are not known. In 1912 two additional wells were sunk by the McCandless Brothers that were located about 150' north east of the original two wells. At some time during this period, a pumping station building containing two steam pumps and a double boiler for steam was built between the two pairs of wells. In 1917 these four wells had a capacity of 4,750,000 gallons per day.[1]

In 1928 the extant Kaimuki pumping station building was built to the southeast of the ca. 1912 building. In addition, four more artesian wells were drilled at the site by the McCandless Brothers between 1925 and 1928.[2] The water pumped from the wells at the Kaimuki pumping station was distributed to customers in the Kaimuki and Waialae districts.[3]

The 1928 construction of the Kaimuki pumping station included the installation of two steam pumps in the engine room, a 4 mgd HL (high level) pump and a 10mgd LL (low level pump). The high level pump would have been used to lift water to reservoirs at high elevations, the low level pump to supply water to service mauka or booster stations at lower elevations. In addition, the existing double boiler from the ca. 1912 pump station was relocated into the boiler room of the new building and a new single boiler was installed. These three boilers in the new building were connected to a chimney at the west corner of the building. Original plans dated July 19, 1927 state that "Existing chimney at Beretania pumping station to be dismantled & re-erected at Kaimuki station."[4] In a historic photograph of Kaimuki pumping station taken shortly after its construction, the 4' diameter 120' high steel chimney is unadorned.[5]

A 20' x 30' addition was constructed on the northwest side of the pumping station building at an unknown date before 1969 to house an additional two electric pumps.

Ca. 1970 the Kaimuki pumping station was fitted with new electric pumps to replace the steam driven ones. Both steam pumps were decommissioned and the 4 mgd steam pump was removed. Also at this time the existing three boilers were decommissioned and left in place in the boiler room. The 10mgd steam pump in the engine room was left in place. Five electric pumps were installed in the area of the engine room that previously held the 4 mgd steam pump; three pumps were 100 Hp with a 2.5 mgd capacity, one was 200 Hp 5 mgd, and two were 250 Hp 2.5 mgd. The existing electric pumps in the pre-1969 addition (two - 300 Hp) remained in place. They were removed later at an unknown date.

[1] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[2] James Sutton McCandless, A Brief History of the McCandless Brothers and Their Part in the Development of Artesian Well Water in the Hawaiian Islands 1880-1936. Honolulu: Privately published. 1936. P. 79.
[3] Harold T. Stearns, Future Ground Water Supplies For Honolulu Hawaii. US Geological Survey. 1934. P. 15.
[4] Honolulu Sewer and Water Commission, drawing "Kaimuki Pumping Station General Layout, plan no. 109-A." July 19, 1927.
[5] Kalihi Pumping Station, photograph in Hawaii State Archives, folder PP 42-9, photo # 011. Ca. 1930.

Early well water supply in Honolulu

By 1884, five dulled wells contributed their water to Honolulu's municipal water system, from a total of 45 producing wells in the area. Most all of the wells drilled in Honolulu over the next sixteen years were for agriculture, principally rice fields and dairy farms. The Honolulu Iron Works and OR&L Railway Co had their own wells for industrial use. Others were for domestic use. In 1895, two wells were drilled at the site of the present Beretania Street pumping station. The flow from these wells was pumped by the station there to supply the municipal system. Droughts during the 1890s and an increasing population led to the construction of the Kalihi pumping station with three wells in 1900 and the Kaimuki pumping station with two wells in 1898. In 1912 two additional wells went in at the Kaimuki pumping station.[2]

By 1917 Honolulu had added two more pumping stations. Wilder Avenue had electric pumps taking water from two wells, and Makiki had electric and gasoline powered pumps taking water from one well. At that time the city also owned four other wells that were unused except during drought because of their low water pressure. These were located at Iolani Palace, Ahiolani Hale, Thomas Square, and Waikiki.[3] By 1938 the three wells at Wilder Avenue and at Makiki "[had] not been in use for several years."[4]

In early 1926, Fred Ohrt, Chief Engineer of the Honolulu Sewer and Water Commission recommended that the steam pumping stations at Kalihi, Beretania Street, and Kaimuki be upgraded with the addition of two steam pumps at each, one 10 mgd LL pump and one 4 mgd HL pump.[5] The pump installation was completed in April 1929, when the low level and high level systems between the three pumping stations were connected.

> "With flexible and full intercommunication between the three new stations, it will now be possible to shut down one pump and work the others as the needs of the time demand, making possible economies which Chief Engineer Frederick Ohrt estimated yesterday at $50,000 annually in pumping costs."[6]

During the time the three steam powered pumping stations were upgraded, additional wells went in; at Beretania Street; one in 1923, one in 1924, and three in 1926. Kaimuki three in 1925 and one in 1928. Kalihi four in 1926, and one in 1927.[7]

[2] Harold T Stearns and Kinsie N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249.
[3] Honolulu Water Commission. "Report to the Honorable Mayor and Board of Supervisors of the City and County of Honolulu on the Available Water Supply for the City of Honolulu." 1917. P. 8.
[4] Harold T. Stearns and K. N. Vaksvik, Records of the Drilled Wells on the Island of Oahu. Honolulu Advertiser Publishing. 1938. P. 7.
[5] "Water Plans to Cost $7,000,000 Ohrt Estimates," Honolulu Star Bulletin, January 4, 1926. P. 1.
[6] "New System of Pumps at Work Today," Honolulu Advertiser, April 5, 1929. P. 2.
[7] Harold T Stearns and Kinsie N. Vaksvik, Geology and Ground Water Resources of the Island of Oahu, Hawaii, Bulletin 1. 1935. P. 249.

E5

Character – Defining Features

Site Features:

- Well features in various locations on the site (see attached site plan)

Exterior Building Features:

- General Form of the building – two large rectangular sections
- Roof shapes – hip roof with flat center on pump room; flat roof with a parapet wall on boiler room
- Tile roofing
- Overhanging eaves with decorative posts, soffit, and cornice at the pump room
- Round copper gutters with rectangular and round downspouts with collector boxes on pump room.
- Window openings; multi-lite metal windows
- Concrete stucco wall surface
- Water table
- Simple cornice at top of boiler room walls
- Pedimented cornice above door in southwest addition.

Interior Features:

- Tile floor and walls in the pump room
- Concrete floor and walls in the boiler room
- Opening ceilings
- Historic equipment in general

Project Affects on Historic Property

That project plans to abandon the existing wells and provide four new wells. No work is planned for the exterior of the building. Because the wells provide the essence of the station and have visible elements, they do contribute to the historic integrity of the site. Their locations are currently simply marked by metal covers and, in three locations, standpipes that protrude above ground. The project intends to maintain the purpose of the station with new wells, and abandon the existing supply wells in place. The standpipes will be removed.

In order to maintain the historic integrity of the site, we recommend providing markers flush with the ground that indicate the historic construction date of each well. The markers would provide the same general appearance of the well covers and serve as historic markers.

E1