

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

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CDD-A 25-946446

October 16, 2025

Ms. Mary Alice Evans, Director
Office of Planning & Sustainable Development
State of Hawai'i
235 South Beretania Street, 6th Floor
Honolulu, Hawai'i 96813

Dear Ms. Evans:

SUBJECT: Final Environmental Assessment (FEA) and Finding of No Significant Impact (FONSI)
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.);
(1) 5-5-009:007 (por.), 008 (por.), 009 (por.), 010 (por.), 011 (por.),
047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

With this letter, the City and County of Honolulu, Department of Design and Construction hereby transmits the Final Environmental Assessment (FEA) for the Kahawainui Stream Maintenance Dredging for publication in the upcoming edition of *The Environmental Notice*. The Proposed Action will consist of maintenance dredging of the Kahawainui Stream, between the intersection of Lā'ie Wai Stream to the sand berm at the Kahawainui Stream mouth. The sand berm will be excluded from dredging activities. The purpose of the maintenance dredging project is to maintain sufficient flow capacity to prevent flooding of the adjacent areas. Approximately 2,955 cubic yards of sediment and debris will be dredged. The dredged material will be utilized for beneficial reuse or disposed at a Hawai'i Department of Health-approved disposal site.

Based on the comments received during the 30-day public comment period for the Draft Environmental Assessment, and pursuant to the significant criteria specified in the Hawai'i Administrative Rules, Section 11-200.1-13, we hereby issue a Finding of No

Ms. Mary Alice Evans, Director
October 16, 2025
Page 2

Significant Impact (FONSI). The FEA has been prepared pursuant to Chapter 343, Hawai'i Revised Statutes and Chapter 11-200.1, Hawai'i Administrative Rules.

An electronic copy of the FEA-FONSI has been uploaded to the Environmental Review Program's online submission portal.

If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching with our Civil Division at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,



Haku Milles, P.E., LEED AP
Director

JL:KC:pto

From: dbedt.opsd.erp@hawaii.gov
To: [DBEDT OPSD Environmental Review Program](#)
Subject: New online submission for The Environmental Notice
Date: Monday, November 3, 2025 1:57:14 PM

Action Name

Kahawainui Stream Maintenance Dredging

Type of Document/Determination

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

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds
- (3) Propose any use within a shoreline area

Judicial district

Ko'olauloa, O'ahu

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

(1) 5-5-005:022 (POR.); 5-5-009:007 (POR.), 008 (POR.), 009 (POR.), 010 (POR.). 011 (POR.), 047 (POR.). 061 (POR.); 5-6-001:004 (POR.)

Action type

Agency

Other required permits and approvals

Various - see Table 8 in the FEA

Proposing/determining agency

City and County of Honolulu, Department of Design and Construction

Agency jurisdiction

City and County of Honolulu

Agency contact name

Kristie Ching

Agency contact email (for info about the action)

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[Map It](#)

Is there a consultant for this action?

Yes

Consultant

Bowers + Kubota Consulting, Inc.

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[Map It](#)

Action summary

The Project will consist of maintenance dredging of the Kahawainui Stream, between the intersection of Lā'ie Wai Stream to the sand berm at the Kahawainui Stream mouth. The sand berm will be excluded from dredging activities. The chain link fence and gates along both sides of the levee will also be replaced.

The purpose of the maintenance dredging project is to maintain sufficient flow capacity to prevent flooding of the adjacent areas. Approximately 2,955 cubic yards of sediment and debris will be dredged. The dredged material will be utilized for beneficial reuse or disposed at a Hawai'i Department of Health-approved disposal site.

Reasons supporting determination

See Section 8 of the FEA

Attached documents (signed agency letter & EA/EIS)

- [251103-Kahawainui-Stream-Final-EA-with-Appendices1.pdf](#)
- [Kahawainui-Dredging-FEA-FONSI-Letter-signed1.PDF](#)

ADA Compliance certification (HRS §368-1.5):

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

Shapefile

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

Action location map

[Kahawainui-Stream-Proj1.zip](#)

Authorized individual

Carah Kadota Ito

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ckadotaito@bowersandkubota.com

Authorized individual phone

(808) 352-6900

Authorization

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

KAHAWAINUI STREAM MAINTENANCE DREDGING

FINAL ENVIRONMENTAL ASSESSMENT

Kahawainui Stream Maintenance Dredging Final Environmental Assessment

November 2025



Prepared for:
City and County of Honolulu,
Department of Design and Construction



Prepared by:
Bowers + Kubota Consulting, Inc.

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KAHAWAINUI STREAM MAINTENANCE DREDGING

FINAL ENVIRONMENTAL ASSESSMENT, FINDING OF NO SIGNIFICANT IMPACT

November 2025

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

Prepared by:
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Honolulu, Hawai'i 96819

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APPENDIX F: DEA Comment Letters and Responses

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ACRONYMS AND ABBREVIATIONS

§	Section
ft	feet
in	inches
mm	millimeter
msl	mean sea level
AFONSI	Finding of No Significant Impact
AG-1,2	Agriculture Zoning
AIS	Archaeological Inventory Survey
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CFR	Code of Federal Regulations
City	City and County of Honolulu
CIA	Cultural Impact Assessment
COPC	Contaminants of Potential Concern
CWA	Clean Water Act
CWB	Clean Water Branch
CZM	Coastal Zone Management
DA	Department of Army
DDC	Department of Design and Construction
DEA	Draft Environmental Assessment
DLNR	Department of Land and Natural Resources
DPW	City and County of Honolulu Department of Public Works
DU	Decision Unit
EMS	Emergency Medical Services
ESA	Endangered Species Act
EAL	Environmental Action Levels
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EFH	Essential Fish Habitat
FEA	Final Environmental Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HAR	Hawai'i Administrative Rules
HDOH	Hawai'i Department of Health
HEER	Hazard Evaluation and Emergency Response
HPD	Honolulu Police Department
HRS	Hawai'i Revised Statutes
HFD	Honolulu Fire Department
HPD	Honolulu Police Department

GPS	Global Positioning System
LRFI	Literature Review and Field Report
MBTA	Migratory Bird Treaty Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NWP	Nationwide Permit
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
ND	Non-Detected
OCCL	Office of Conservation and Coastal Lands
PIRO	Pacific Islands Regional Office
PCB	Polychlorinated Biphenyl
P-2	General Preservation Zone
RHA	Rivers and Harbors Act
SMA	Special Management Area
SCS	Soil Conservation Service
State	State of Hawai'i
SHPD	State Historic Preservation Division
SLR-XA	Sea Level Rise Exposure Area
stream	Kahawainui Stream
SCAP	Stream Channel Alteration Permit
TMK	Tax Map Key
TPH	Total Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WOTUS	Waters of the United States
WQC	Water Quality Certification

PROJECT SUMMARY

PROPOSING AGENCY:	City and County of Honolulu Department of Design and Construction 650 South King St., 11 th Floor Honolulu, Hawai'i 96813
APPROVING AGENCY:	City and County of Honolulu Department of Design and Construction
RECORDED FEE OWNER:	Multiple Landowners
CONSULTANT	Bowers + Kubota Consulting, Inc. 2153 N. King St., Suite 200 Honolulu, Hawai'i 96819 Contact: Jared Chang, Planning Manager Email: jchang@bowersandkubota.com Phone: 808-836-7787
LOCATION:	Ko'olaupia District, Lā'ie, O'ahu, Hawai'i
TAX MAP KEY(S):	(1) 5-5-005:022 (POR.) 5-5-009:007 (POR.), 008 (POR.), 009 (POR.), 010 (POR.), 011 (POR.), 047 (POR.), 061 (POR.) 5-6-001:004 (POR.)
PROJECT SUMMARY:	<p>The Project will consist of maintenance dredging of the Kahawainui Stream, between the intersection of Lā'ie Wai Stream to the sand berm at the Kahawainui Stream mouth. The sand berm will be excluded from dredging activities. The chain link fence and gates along both sides of the levee will also be replaced.</p> <p>The purpose of the maintenance dredging project is to maintain sufficient flow capacity to prevent flooding of the adjacent areas. Approximately 2,955 cubic yards of sediment and debris will be dredged. The dredged material will be utilized for beneficial reuse or disposed at a Hawai'i Department of Health-approved disposal site.</p>
PROJECT SITE:	<p>The Project Site is located in Lā'ie town, along Kamehameha Highway. Several attractions are located within the vicinity of Project Site which includes the Hukilau Beach Park, Mālaekahana State Recreational Area and the Lā'ie Country Store which houses Ken's Fresh Fish takeout and Cackle Fresh Egg Farm Outlet.</p> <p>The Project encompasses a segment of the Kahawainui Stream, which spans from the intersection of Lā'ie Wai Stream to the sand berm located at the Kahawainui Stream mouth. The segment contains a concrete channel, levees and floodwalls constructed by the United States Army Corps of Engineers in</p>

	1990 for flood control measures. The segment runs underneath the state-owned Kamehameha Highway bridge. The Project also includes privately owned properties (Property Reserve, Inc) for the staging of equipment and placement of stockpiled dredge material.
EXISTING USE:	The Kahawainui Stream is classified as a Class 2 inland water, which offers recreational opportunities and protection of fish and wildlife, while simultaneously providing flood control for Lā'ie town downstream.
HRS §343-5(a) TRIGGER:	(1) Propose the use of state or county lands or the use of state or county funds (3) Propose any use within a shoreline area as defined in section 205A-41
CITY AND COUNTY ZONING:	AG-1, AG-2 and P-2
STATE LAND USE DISTRICT:	Urban and Agricultural
PERMITS AND APPROVALS:	Department of Army Nationwide Permits National Environmental Policy Act Section 401 Water Quality Certification National Pollutant Discharge Elimination System Stream Channel Alteration Permit Special Management Area Permit (Exemption) State of Hawai'i Preservation District HRS-6E Review
CONSISTENCY WITH LAND USE PLANS AND POLICIES:	Federal National Environmental Policy Act Clean Water Act Rivers and Harbors Act Endangered Species Act National Historic Preservation Act State of Hawai'i Hawai'i State Plan State Functional Plans State Land Use Law State Coastal Zone Management City and County of Honolulu O'ahu General Plan Ko'olauloa Sustainable Communities Plan Land Use Ordinance Special Management Area
DETERMINATION:	Finding of No Significant Impact (FONSI)

1. DESCRIPTION OF THE PROPOSED ACTION

1.1. Purpose of Proposed Action

The Lā'ie area has documented numerous damaging storms over the past century with more severe storms occurring during/after the 1960s. Rapid-runoff and flooding in the Kahawainui Stream (the "stream") from these storms resulted in multiple damage events to nearby residential areas. The United States Army Corps of Engineers (USACE) identified the need to install flood protection measures in the stream under Section (§) 205 of the Flood Control Act of 1948 to address the socio-economic impacts of the storms on the Lā'ie community. An initial reconnaissance study was conducted for the stream in May 1977 to analyze potential flood control measures. Another study titled *The Kahawainui Stream Final Detailed Project Report and Environmental Impact Statement* was published in November 1985 to address flood damage reduction measures and to commence flood mitigation construction in the channel in 1986 (USACE 1985). The Kahawainui Stream flood control project was completed in 1990 and includes 500 linear feet of concrete floodwalls, 1,420 linear feet of levees, a 550-foot-long concrete channel, and a 450-foot-long excavated earth channel. These structures terminate at the Kamehameha Highway bridge.

Since the installation of the flood control project, damages due to flooding have been reduced for the coastal town of Lā'ie. This was exhibited in a storm that struck the town in March 1991. The modified flood protection enhancements to the stream have mitigated the brunt of the damages, and prevented an estimated \$4.1 million in damages. The flood control project has been estimated to save \$675,000 in flood damages annually.

Routine maintenance dredging is expected to occur every 10 to 15 years to control sediment accumulation in the stream channel and is to be carried out by the local sponsor, the City and County of Honolulu (City) Department of Design and Construction (DDC). However, no maintenance dredging has taken place since the time of the Project's completion.

The primary purpose of this Proposed Action is to prevent flood waters of Kahawainui Stream from overtopping onto surrounding areas and to maintain a sufficient downstream flow towards the stream mouth, which discharges into Lā'ie Bay. The stream operates as a drainage basin for the Kahawainui watershed, which is made up of several tributaries. Sufficient capacity towards the stream mouth is needed to allow for the movement of water towards Lā'ie Bay. Otherwise, water levels will rise within the stream and potentially overflow to surrounding areas. Downstream flow in the stream is influenced by runoff from rainfall and extreme events, groundwater recharge and discharge, stream channelization, and sedimentation. In this case, sedimentation buildup in the stream can be addressed by maintenance dredging, supporting the intended flood control measures.

Consequently, the Proposed Action entails dredging the artificial segment of the Stream towards the stream mouth to maintain flood control measures regulating stream flow. The Proposed Action also involves staging of dredging equipment and stockpiling dredged materials onto adjacent parcels for drying and subsequent onsite or offsite use or disposal.

Although the stream is under the jurisdiction of USACE as it is considered Waters of the United States (WOTUS), the maintenance of the stream channel and flood control measures had since been allocated to, and under the management of, the City.

1.2. Location of Proposed Action

Kahawainui Stream is located on the northeast side of 'Oahu, in Lā'ie town. The stream is situated in the Ko'olau District and is one of many tributaries making up the Kahawainui Watershed. Surface waters near the Project Site include the Kahawainui Stream itself, and Lā'ie Wai Stream, which intersect at the Project Limit. The nearest coastal water is located at the point of discharge of Kahawainui Stream, which is Lā'ie Bay. Lā'ie Bay receives waters from the Kahawainui and Lā'ie Wai Streams. The stream is fed from several gulches: Ihihi, Kanoao, 'Ōma'o and Kahawainui Gulches (see **Figure 1**). The stream intersects with Lā'ie Wai Stream, which is fed from the Ihihi Gulch, and discharges into Lā'ie Bay. A sand berm is located at the stream mouth and separates the Kahawainui Stream and Lā'ie Bay.

Dredging activities are proposed in an area of the stream that is between approximately 91.42 feet and 1,493.187 feet from Lā'ie Bay (the "Dredging Limit") (see **Figure 2**). The Dredging Limit encompasses the confluence of Kahawainui and Lā'ie Wai Streams and extends beyond the bridgeway of Kamehameha Highway, terminating at the sand berm. See **Figure 3** and **Figure 4** for mauka and makai views of the stream from Kamehameha Highway.

The Dredging Limit encompasses the concrete levees, flood walls, and channel that make up the flood control project constructed by USACE in 1990. Bordering the Dredging Limit are multiple properties owned by the City and County of Honolulu, Property Reserve Inc., State of Hawai'i, and several private parties. Dredged material will be placed on parcels owned by Property Reserve, Inc. for stockpiling and drying. These designated areas and the Dredging Limit are denoted as the "Project Site" (see **Figure 2**).



Figure 1: Kahawainui Stream and Other Tributaries



Figure 2: Project Site



Figure 3: Kahawainui Stream from Kamehameha Highway, looking mauka



Figure 4: Kahawainui Stream looking makai, across Kamehameha Highway

1.3. Proposed Action

The City DDC is seeking to perform maintenance dredging at the downstream banks of Kahawainui Stream (the “Proposed Action”). The Proposed Action includes dredging the extent of the Dredging Limit, from the Lā’ie Wai Stream intersection to the sand berm situated at the Kahawainui Stream mouth to reduce the potential for flooding to surrounding areas and maintain sufficient downstream flow. The dredged material is expected to yield approximately 2,955 cubic yards of sediment and debris and this computes to an estimated average layer of 6-inches of sediment from the stream bank and channel walls. The dredged material will be placed in designated stockpile areas to be dried prior to loading and transport. The dried material will be designated for onsite or offsite reuse purposes and/or disposal according to the Hawai’i Department of Health (HDOH) standards.

In addition to the maintenance dredging, the chain link fence and gates along both sides of the levee will also be replaced.

1.4. Project Design

The Proposed Action will involve the use of clamshell dredging which involves a clamshell-like bucket attached to a crane through cables. The machine is operated by lowering the bucket into the channel bottom, scooping up the accumulated sediment, raising the resultant material, and placing the material into a stockpile. Depending on the phase of the project and weather conditions, the clamshell dredger will be placed near the shore, on a platform, or directly in the stream at low tide. The equipment will be used to dredge the 6-inch (average) sediment layer that has accumulated at the sides and bottom of the stream channel.

Temporary access routes and equipment staging areas will be located on properties owned by Property Reserve, Inc. Three parcels have been selected for staging and placement of dredged spoils: Site #1) TMK 5-5-005:002, Site #2) TMK 5-5-009:010, and Site #3) TMK 5-5-009:011 (see **Figure 2**). Access to Site #1 will be provided through Cackle Fresh Egg Farm Road and a private roadway leading to the Dredging Limit. Access to Site #2 will be provided by Wahinepe’e Street. Access to Site #3 may be modified to allow direct access to work area from Kamehameha Highway instead of through Hukilau Beach parking lot (pending DOT approval). See **Figure 5** for access points and exit/haul routes. During dredging activities, dredged spoils will be placed into stockpiles for drying. After the material is dried, it will be loaded into trucks and hauled off to the appropriate sites for beach replenishment, re-use or disposal at a landfill. Per DLNR’s Office of Conservation and Coastal Lands (OCCL) DEA comment letter dated April 13, 2023, the dredged and dried materials from all dredging sites must be submitted to DLNR OCCL for assessment prior to placement on beaches. Appropriate best management practices (BMPs) will be installed during dredging and operations. See Section 3.2.3 for further discussions on BMPs.

The U.S. Geological Survey, Pacific Islands Water Science Center (PIWSC) provided a comment on the DEA via email on March 28, 2023 noting that the PIWSC has existing equipment on the mauka side of the Kamehameha Highway bridgeway, which includes a 2-

inch diameter, 10-foot long polyvinyl chloride (PVC) pipe and brackets attached to the bridgeway (see Appendix F). All dredging activities should avoid damage to the PIWSC's existing equipment. Charter Communications provided a similar comment on the DEA in a letter dated May 1, 2023 noting that Spectrum has existing aerial facilities in the project area. Charter Communication's office should be notified if the project requires equipment that may interfere with aerial facilities. In addition, should any digging occur then toning may be required and Charter Communication's "One Call Center" should be contacted to set up toning.

1.5. Estimated Project Budget and Timeframe

The Proposed Action is anticipated to cost approximately \$3.8 million. The Proposed Action is anticipated to begin in July 2026 and last for a duration of approximately 15 months.

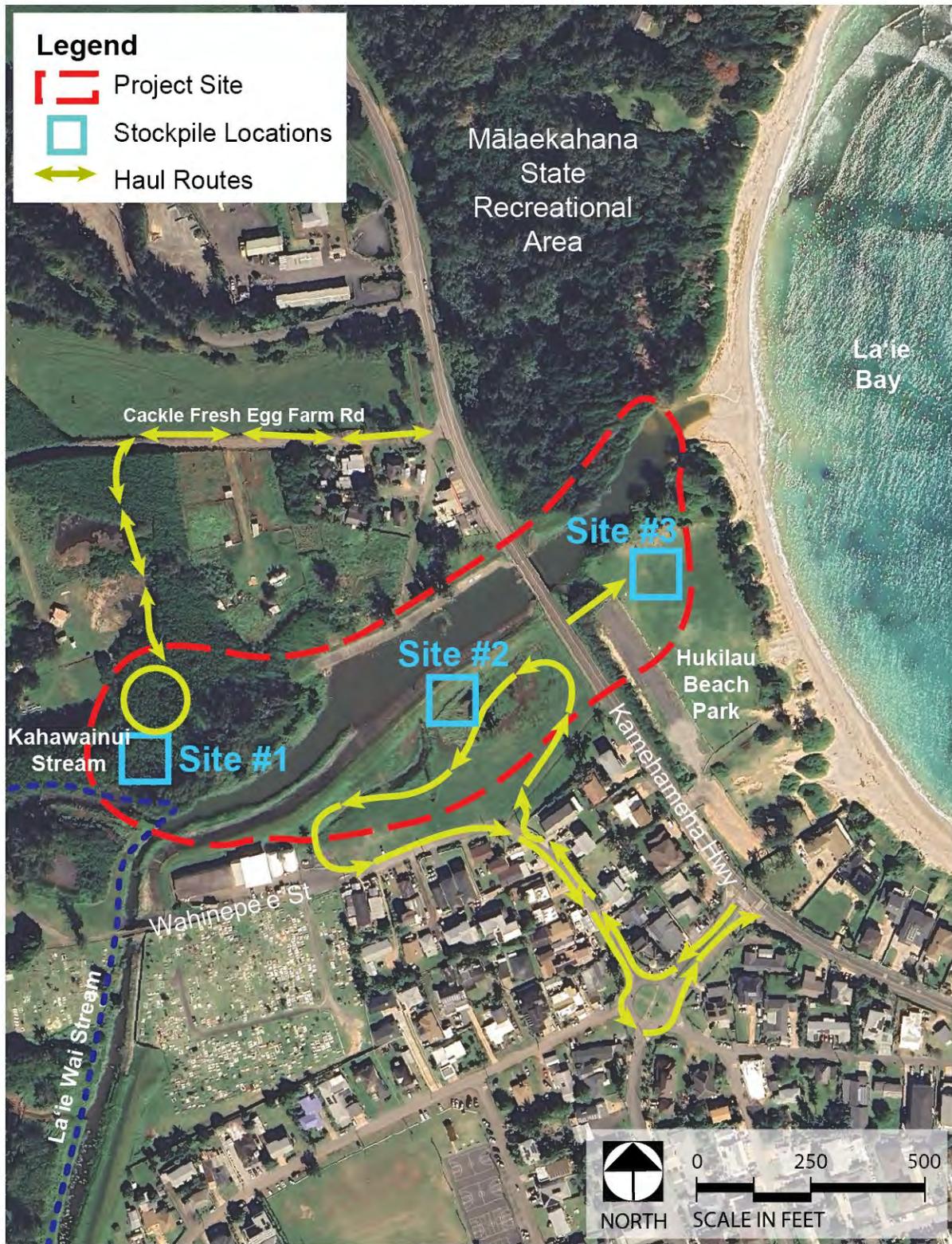


Figure 5: Access Points and Haul Routes

2. ALTERNATIVES CONSIDERED

As a requirement of HAR §11-200.1, an environmental assessment must identify and consider reasonable alternatives that are technically or financially feasible to achieve the purpose and need of the Proposed Action. Alternatives eliminated from consideration are those that do not meet the purpose and need. They are described in this section and include the No Action Alternative, Alternative Dredging Methods and Alternative Stockpiling Locations.

2.1. No Action Alternative

Under the No Action Alternative, the Project Site's existing conditions would remain as the Proposed Action would not take place. This implies that no dredging activities will occur in Kahawainui Stream and sediment accumulation in the bottom of the stream channel would continue to increase over time. As a result, flooding during heavy rainfall and extreme events will be exacerbated due to the lack of maintenance in the stream channel.

In the long-term, climate change is expected to increase the likelihood of tropical storms and hurricanes, leading to heavy rainfall events which would further strain the stream. Records from 1991 through 2010 have shown more hurricanes have developed from tropical storms in the Pacific compared to the last century (Webster et al, 2005). Potential impacts from these increased storms includes damages to nearby residential, commercial, and agricultural properties.

Sea level rise would also impact the stream, where sand from wave action would be pushed inland, causing more sediment to build up in the channel. With the projected increase of 3.2 feet sea level rise as early as 2060 (Sweet et al 2017), the Dredging Limit will be completely within the inundation zone. Sediment accumulation would progress as sand dunes are shifted from the shoreline area towards the stream channel. This process is likely to be intensified during storm surges and high wave run up.

Damages resulting from flooding can be costly for the community. Areas surrounding the Project Site will need to consider not only property losses from sea level rise, but from flooding from the stream as well. Prior to the completion of the Kahawainui flood control project in 1990, there were at least 12 floods that effected the area between 1879 through 1985. The cost of damages resulting from these floods is estimated to be over \$5 million worth of damages today. Without proper maintenance of the flood control project, , the stream capacity significantly drops. While the capacity level of the stream decreases, flooding and resulting damages are more likely to occur. As this alternative does not meet the purpose and need of the Proposed Action, which is to decrease flooding to the surrounding area, it was eliminated from consideration.

2.2. Alternative Dredging Methods

An alternative to clamshell dredging would be through hydraulic dredging, which is the use of a vacuum to suction out the sediments at the channel bottom. This process of dredging involves the suction of both water and sediment, requiring treatment of the effluent and discharging it back into the stream.

This alternative was eliminated due to the lack of space within the Project Site and risk to marine biota. There is also limited budgeting to cover the treatment system for the effluent, as the Proposed Action accounts for only mechanical dredging via a clamshell dredger and no additional treatment processes.

2.3. Alternative Stockpiling Locations

Another alternative considered for the project design involves placement of stockpiles onto City and State parcels (TMKs 5-5-009:007, 5-5-009:047, and 5-6-001:004). Through this alternative, permission and use of private property will not be required. However, due to the location and size of the parcels, the project design will not be feasible. Access to City parcel TMK 5-5-009:007 would require the use of Wahinepe'e Street and entrance through the parcel owned by Property Reserve, Inc. requiring a right-of-entry permit. Additionally, the truck haul routes would be close to the stream, leading to the potential of erosion along the stream.

This also poses a safety issue for loading trucks as the access and space is limited along the Property Reserve, Inc. (TMK 5-5-005:018) parcel and the stream. City parcel TMK 5-5-009:047 does not have sufficient area for stockpiling and transport and may negatively impact traffic as the parcel abuts Kamehameha Highway. Lastly, State parcel TMK 5-6-001:004 which is Mālaekahana State Park Area does not have an appropriate entry point in the vicinity of the Dredging Limit. Access to the state park is located approximately half a mile away and is frequently used by the public for beach access which could be impacted by construction operations.

This alternative is eliminated due to the lack of space for stockpiling dredged material; lack of access points; and safety concerns for beachgoers from loading trucks; and limited available space between Property Reserve, Inc. and the stream.

2.4. Alternative Eliminating Future Need of Maintenance Dredging

This alternative would require that the City enact eminent domain and displace residents that have land claims. A full study of this alternative was included in the USACE EIS (1985) and is summarized below.

This alternative included floodplain restrictions, maintenance and a flood warning system, as well as floodproofing, relocating, or replacing existing structures. **Table 1** below

summarizes the structures affected in a 100-year or 50-year flood management plan. The floodplain management requires building codes and standards be enforced by the City to minimize future development in the 100-year floodplain. This alternative would also require a maintenance and inspection program to repair channels and remove accumulated sediments.

This alternative determined that secondary roads would still be prone to flooding, and backyards, road surfaces and utilities would need cleaning and repairs after each storm. This was the only alternative considered where overtopping of Lā'ie Wai Bridge would be expected. Kuleana landowners also expressed concern over losing land and riparian rights with this scenario as relocation and removal of existing structures was necessary for completion of this alternative.

At the time of the study's publication, this alternative was more than double the cost and had the lowest cost to benefit ratio of the other alternatives considered. Due to projected inadequacy of flood control compared to historical flooding events, projected costs, and cost to benefit ratio this alternative was considered unsuitable for implementation.

Table 1: USACE EIS (1985) Alternative 3 Floodplain Management Summary

Floodproofing Measure	Number of Structures affected in the 50-year Plan	Number of Structures affected in the 100-year Plan
Temporary/Permanent Closures	96	68
Relocation of damageable property	6	7
Raising the Structure	139	159
Providing a Ring Wall	28	18
Total	269	252
Total Cost	\$23,270.00	\$23,090.00
Cost to Benefit Ratio	0.3	0.4

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3. NATURAL RESOURCES AFFECTED ENVIRONMENT

3.1. Land Use and Zoning

3.1.1. Existing Land Use

The Project Site is located within the Lā'iewai ahupua'a in the Ko'olaupua moku. The Project Site is downstream of Kahawainui Stream and borders multiple properties. Tax Map Keys (TMKs), corresponding uses, and property owners that are within the Project Site are listed in **Table 2**. The uses observed were conducted through a desktop analysis of aerial imagery of the site. The Project Site is classified as both Urban and Agricultural under the State Land Use District and is zoned AG-1, AG-2 (agriculture), and P-2 (preservation) under the City Ordinance. See **Figure 6** and **Figure 7**.

Table 2: Corresponding TMKs Uses and Owners

TMK	Uses Observed	Property Owner
5-5-009:007	Open space	City and County of Honolulu
5-5-009:047	Open space	
5-6-001:004	Open, vacant land (Mālaekahana Beach Park)	State of Hawai'i
5-5-009:061	Agricultural land	Rochelle Asao Trust
5-5-009:008	Agricultural land	
5-5-009:046	Single-family residential units	David Kamauoha Trust
5-5-005:022	Agricultural land	Property Reserve, Inc.
5-5-009:011	Open space (Hukilau Beach Park)	
5-5-009:010	Open space	
5-5-005:018	Storage yard	
5-5-009:012	Commercial (takeout and store)	

The segment of the stream within the Dredging Limit is primarily used as a flood control measure for Lā'ie town. Light recreational activities, such as fishing, may occur upstream of the Dredging Limit although the stream's impaired water quality may deter such activities downstream. The stream is generally calm during daytime and normal weather conditions (see **Figure 8**). Vegetation and sedimentation can be seen upstream from Kamehameha Highway (see **Figure 9**).

3.1.2. Potential Effects and Mitigation

Dredging activities will occur within the Kahawainui Stream which is not governed by State and City land use regulations. Although no farming activities were visually observed on the proposed stockpile locations located on State and City agricultural land, the Proposed Action may have short-term impacts to nearby farming operations relying on the stream as a source of water due to increased turbidity during dredging activities.

Short-term impacts within the City preservation zone may include decreased aesthetic quality of the stream and waters of Hukilau Beach, affecting the land's scenic and natural resource value. This may result from the visibility of construction equipment, stockpiles of dredged material, and the installment of BMPs for dust and erosion control structures such as dust fences and filter socks. A portion of Hukilau Beach may be closed off from recreational uses due to dredging and stockpiling activities.

As these actions are temporary, the Proposed Action is not anticipated to have any significant long-term impacts on the State and City land uses.

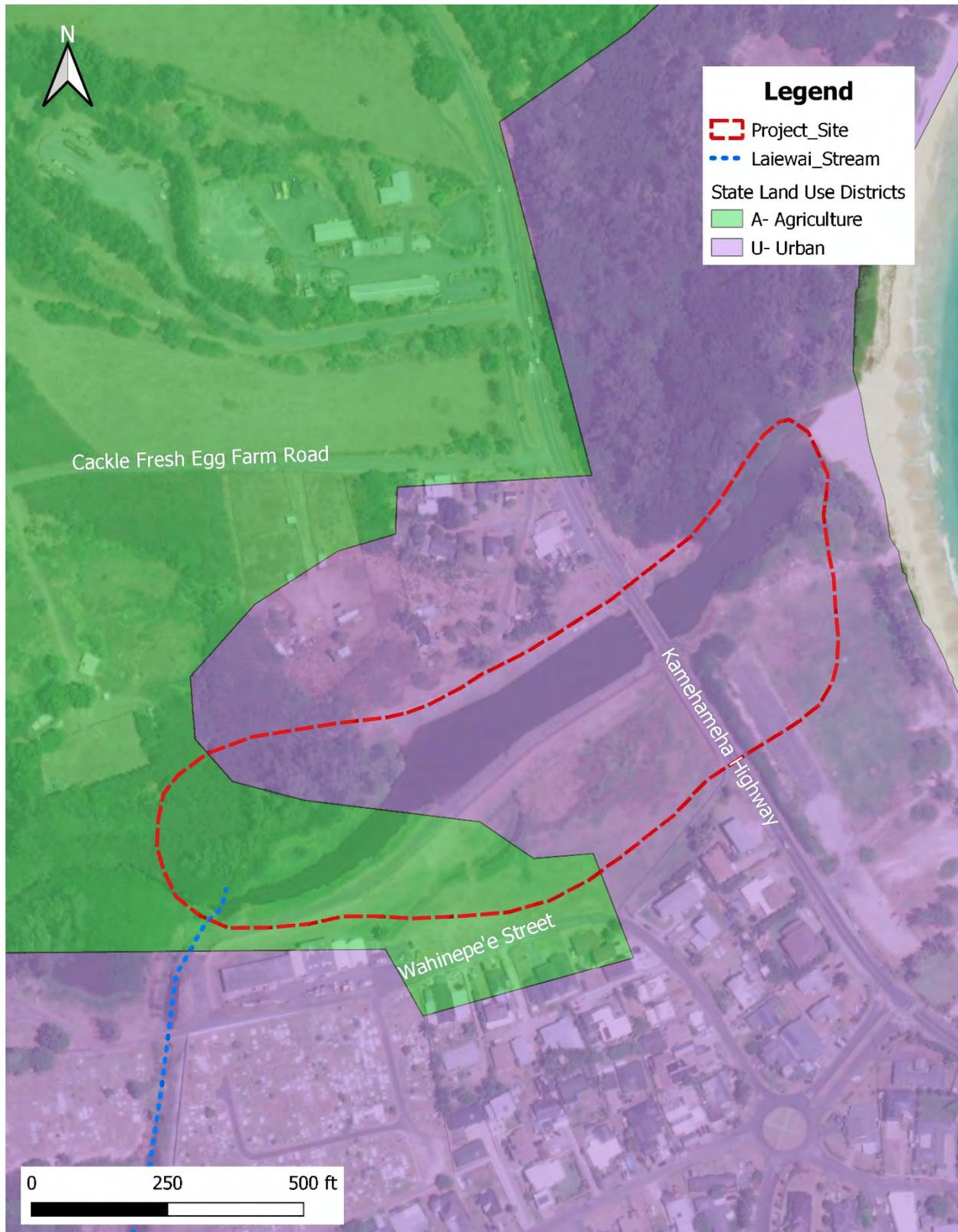


Figure 6: State Land Use Districts

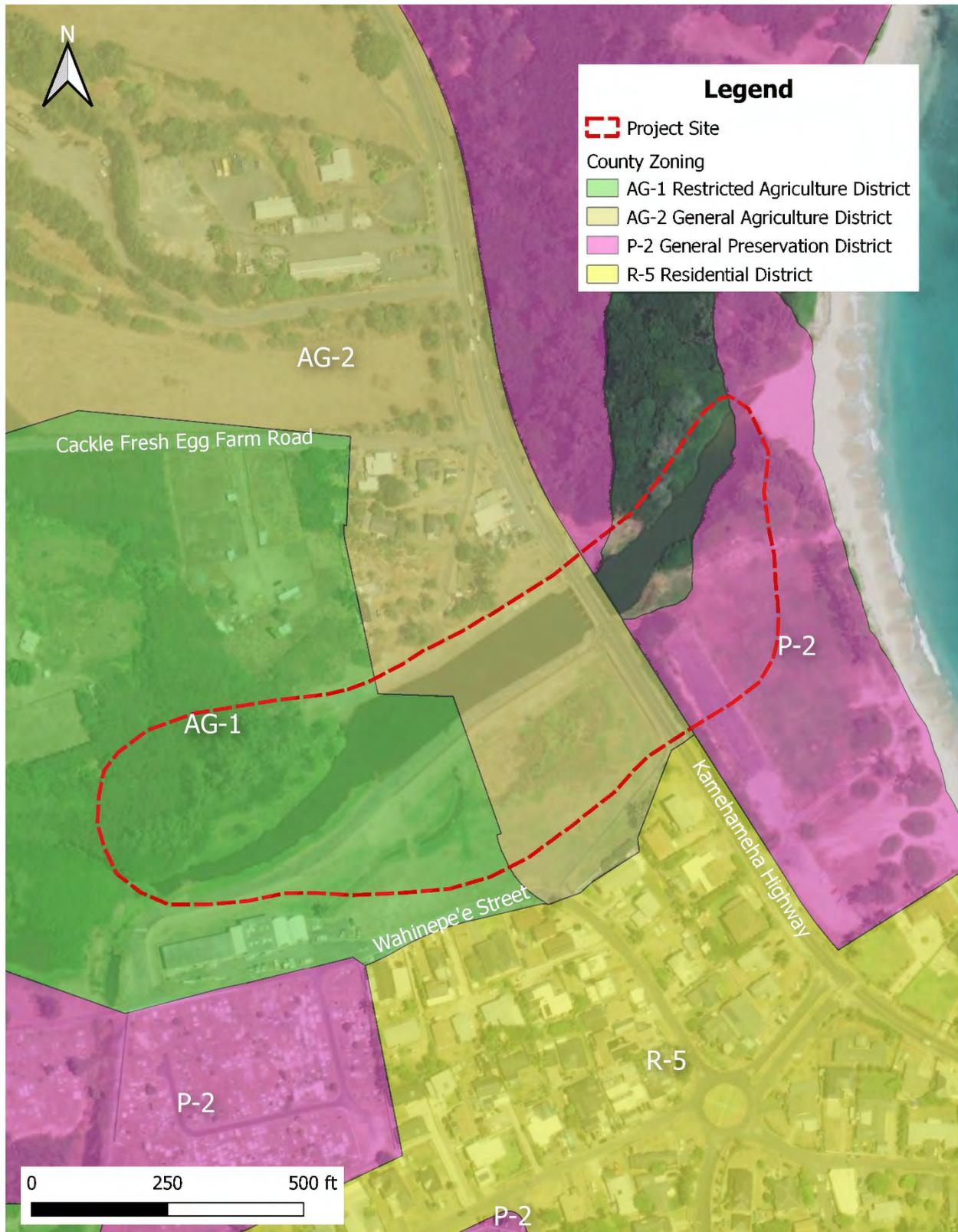


Figure 7: C&C Honolulu Zoning



Figure 8: Water quality conditions in the daytime



Figure 9: Vegetation and sediment accumulated in the stream channel

3.2. Physiography

3.2.1. Topography

The Project Site, as well as the surrounding and nearby environment, is generally flat, with the highest point of elevation no greater than 20 feet (ft) above sea level. The Dredging Limit is generally rectangular and varies in width between 60 and 87 ft and encompasses about 3.5 acres. A 2009 topographic survey conducted by ParEN Inc. indicated a depression within the Dredging Limit near the Kahawainui and Lā'ie Wai Stream intersection that measures to -3.20 ft mean sea level (msl) (Oceanit, 2010). Near the stream mouth, the elevation ranges from -2.61 to -1.98 feet msl.

3.2.2. Geology

The Project Site is located on the northeastern flanks of the Ko'olau Mountain Range which is primarily composed of younger alluvium, younger dune and beach deposits. The age of deposits is no greater than a million years old (Sherrod et al., 2007).

3.2.3. Soils

According to the United States Department of Agriculture (USDA) Soil Conservation Service's (SCS) *Soil Survey of Islands of Kaua'i, O'ahu, Maui, Moloka'i and Lāna'i, State of Hawai'i*, there are three distinct soils in the Project Site: Kaloko clay (Kfb) noncalcareous variant, Lahaina silt clay (LaC), Jaucas sand (JaC) and Beaches (BS) (USDA SCS, 2019)(see **Figure 10**).

According to Element Environmental's 2019 *Sampling Summary Report Dredged Material Evaluation for Maintenance Dredging at Kahawainui Stream, Oahu, Hawaii*, the soil samples within the Dredging Limit consisted primarily of sand, which is suitable for beach replenishment (E2 2019, Appendix A). The Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) standards for beach replenishment material are as follows:

- Material does not contain more than 6 percent fine sediment (0.074 millimeter[mm]);
- No more than 10 percent coarse sediment (4.76 mm);
- No more than 50 percent less than the diameter size of 0.125mm; and
- Sand shall be comprised of carbonate beach or dune sand.

Based on sediment sampling results taken in 2019, the lithology of the samples taken from the stream is characterized as fine to very coarse sand (0.0125 to 2 mm), making up 83 percent of the sediment composition. Grain size analysis was conducted via American Society for Testing and Materials (ASTM) method D2216. Results of the soil grain analysis are listed in Table 3. Samples were taken from eight lateral Decision Units (DU-2 through DU-9) as depicted in **Figure 11**. The methodology and designation of DUs are dependent on soil sampling methods which is further discussed in Section 3.7.1.

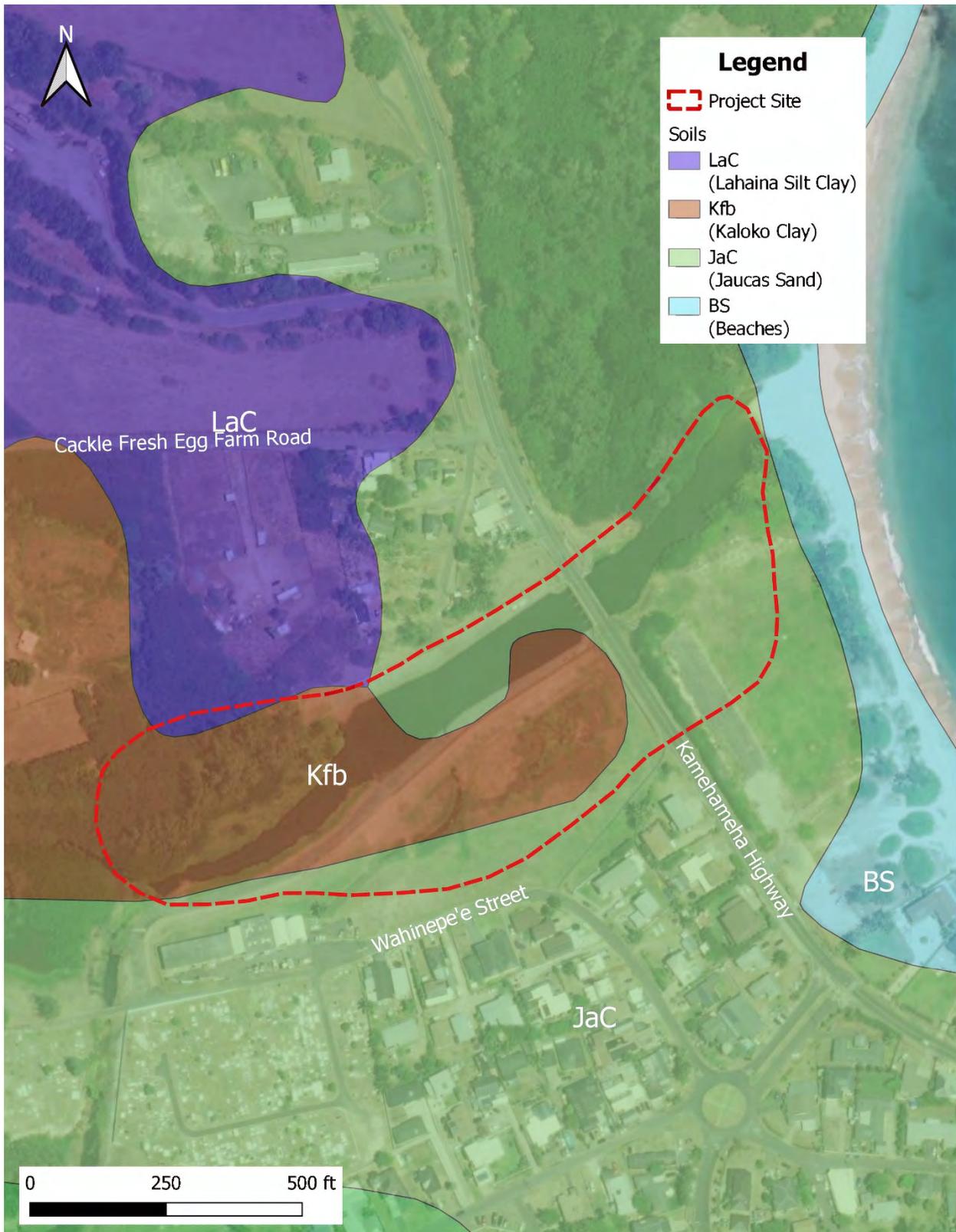


Figure 10: Soils Map



Figure 11: Decision Units determined by Element Environmental, LLC

Table 3: Sediment Sample Composition (%) by Grain Size

Compound	DU-2	DU-3	DU-4	DU-5	DU-6 *****	DU-7	DU-8	DU-9
Total Silt and Clay (0 to 0.0625mm)	2.26	3.30	4.02	8.76	2.60	4.75	5.92	12.46
Very Fine Sand (0.0625 to 0.125mm)	1.16	1.62	2.46	5.25	1.84	1.99	2.91	7.45
Fine Sand (0.125 to 0.25mm)	7.79	7.34	7.46	19.07	17.38	12.93	12.16	23.99
Medium Sand (0.25 to 0.5mm)	27.05	22.35	22.35	27.47	40.30	35.25	29.87	32.63
Coarse Sand (0.5 to 1mm)	31.75	26.32	26.32	25.07	28.34	27.64	30.99	23.44
Very Coarse Sand (1 to 2mm)	18.19	22.07	22.07	9.38	5.33	7.05	18.15	0.039
Gravel (>2mm)	11.80	17.00	17.00	5.00	4.20	10.38	ND*	ND

*ND = Non-Detected, compound not detected above laboratory method detection limit (E2, 2019).

3.2.4. Potential Effects and Mitigation

The Proposed Action is not anticipated to have any short- or long-term impacts on the area's geology. Dredging activities may affect the stream's depth, where certain areas may deepen due to the removal of sediments. However, it is anticipated in the long-term that sedimentation will increase the frequency of flooding without routine maintenance dredging every 10 to 15 years. Short-term impacts from dredging activities may include increased turbidity in the stream due to the removal of soils in the stream and slope erosion from the movement of equipment. Stockpiling and transport of dredged material may create dust, temporarily affecting the area's air quality.

As the dredged material is deemed suitable for beach replenishment, the long-term impact anticipated for onsite re-use would include enhancing shoreline areas for recreational purposes and aesthetic values. This action aligns with DLNR OCCL's land use regulation, Hawai'i Administrative Rules (HAR) §13-5-22 Land and Resource Management (A-3) *Clearing of sand or silt from stream mouths, canals, drainage pipes, or other features for state and county maintenance, provided that the sand removed shall be placed on adjacent shoreline areas unless the placement would result in significant turbidity, as determined by the department.*

As previously mentioned, samples of the dredged material from all dredging sites will be submitted to DLNR OCCL for approval for use for beach replenishment prior to placing sand along shoreline areas. In addition, BMPs will be incorporated to minimize the disturbance and movement of dredged material once placed into stockpiles to ensure that any quality sand material present in the dredged material is not contaminated with other undesirable materials.

The Proposed Action will be regulated by applicable provisions of the City's ordinances regarding sediment control and stockpiling (Revised Ordinances of Honolulu §14-13 through §14-16) and any State Historic Preservation Division (SHPD) requirements for archaeological monitoring. The impacts of Proposed Action will be minimized by incorporating temporary BMPs to preserve existing conditions of the stream and Lā'ie Bay. The use of temporary BMPs will limit the potential for surface disturbance during dredging activities and stockpiling and transport of dredged material. The following BMPs may be incorporated to mitigate erosion into the stream and Lā'ie Bay:

- Slope protection;
- Stabilized vehicle entrance;
- Grate inlet protection;
- Truck washdown areas;
- Use of compost filter socks; and
- Temporary silt and dust fences.

3.3. Hydrology

3.3.1. Rainfall

The mean annual rainfall in the vicinity of the Project Site is approximately 1,278 mm or 50.3 inches (in). The area experiences the highest precipitation in March and the lowest in June (Giambelluca et al. 2013).

3.3.2. Watershed

The Projects Site is located within the Kahawainui Watershed which is classified as a medium sized watershed at approximately 3,480 acres (*see Figure 12*). The Kahawainui Watershed starts at a lower elevation compared to nearby watersheds. It is characterized by gentle slopes and flat spaces, which make the area suitable for agricultural purposes.

3.3.3. Surface Water

Surface waters near the Project Site include the Kahawainui Stream itself, and the Lā'ie Wai Stream which intersects at the Dredging Limit. The Kahawainui Stream is a perennial waterway with waters originating from the windward side of the Ko'olau Mountain Range

and discharging into Lā'ie Bay. Classified under the Waters of the United States (WOTUS), the stream is under the authorization of USACE. The nearest coastal water is located at the point of discharge of Kahawainui Stream, into Lā'ie Bay. Lā'ie Bay receives waters from the Kahawainui and Lā'ie Wai Streams.

Kahawainui Stream is classified as Class 2 inland waters by HDOH Clean Water Branch. HAR §11-54 defines Class 2 waters as follows:

“The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation on and in these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class. No new treated sewage discharges shall be permitted within estuaries.”

Data from the 2020 State of Hawai'i Water Quality Monitoring and Assessment Report (HDOH, 2020) determined that Kahawainui Stream was not meeting criteria for its designated beneficial uses, as described above, and is therefore considered “impaired” on the Clean Water Act (CWA) Chapter 303(d) list. The report classifies waters as impaired if any of the following contaminants or pollutants have been detected during sampling and observations: enterococcus, turbidity, total suspended solids, chlorophyll *a*, total dissolved nitrogen, total dissolved phosphorous, orthophosphate and nutrients (total nitrogen, nitrate+nitrite-nitrogen, ammonium-nitrogen and total phosphorus). The stream was observed to have detectable levels of turbidity, total nitrogen, total phosphorous and nutrients in the water. The assessment led to the rating of these impairments at low priority for water quality restoration due to factors such as severity of the pollutant levels, resource availability, and timeframe of restoration. The detected pollutants may be due to agricultural runoff, streambank collapse, as well as sewage and fertilizer runoff from surrounding land uses.

3.3.4. Groundwater

The Project Site is in the Windward Sector, Ko'olau Loa aquifer system (Geologic code 30601116, status code 12211). The system is currently in operation as a potable water source and is deemed ecologically important. The water is characterized as low salinity (250–1,000 mg/L Cl⁻) and is considered irreplaceable, making it highly vulnerable to contamination (Mink and Lau, 1990).

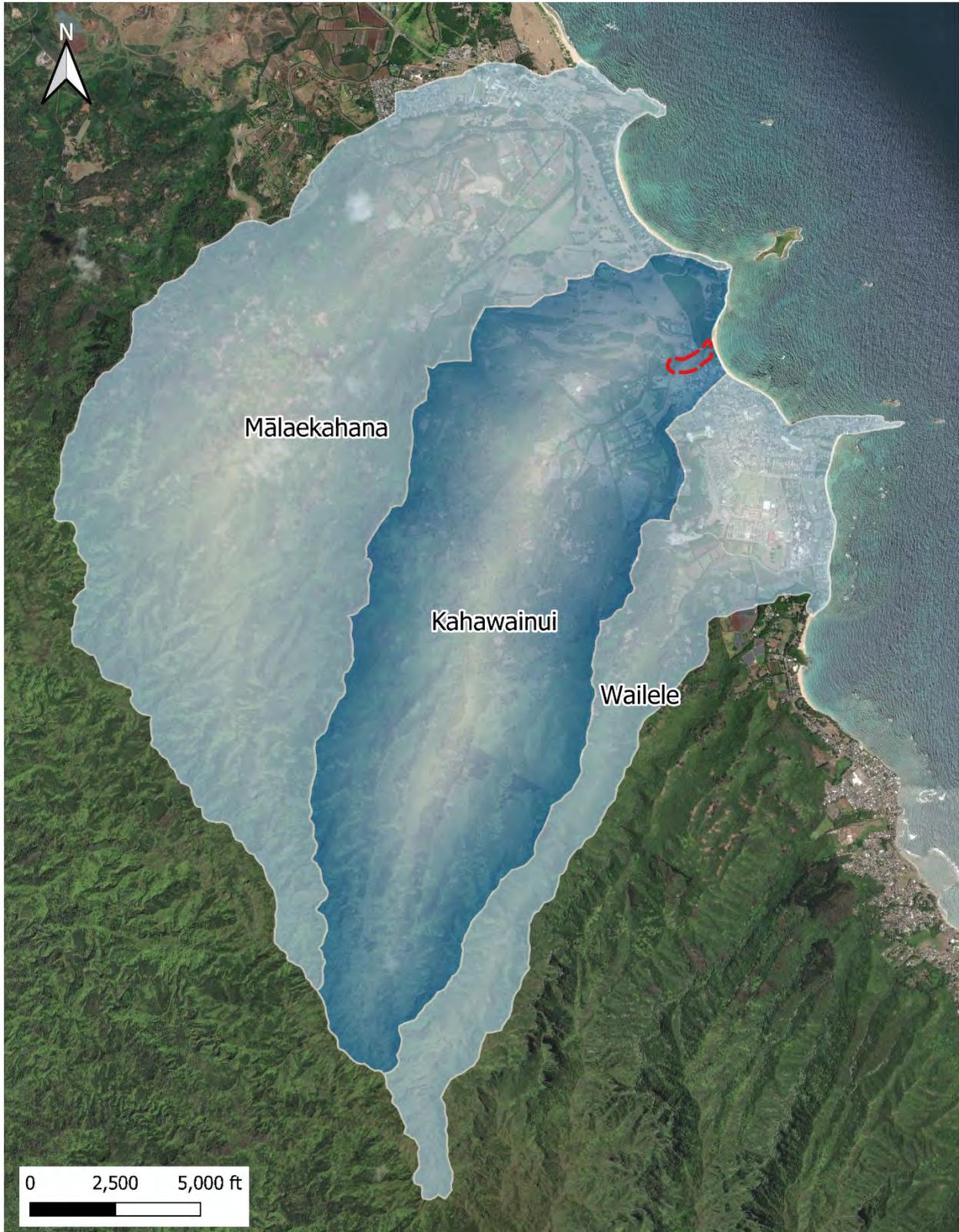


Figure 12: Watershed Map

3.3.5. Potential Effects and Mitigation

The Proposed Action is intended to reduce flooding, which is directly influenced by rainfall and stream flow. An impact in the long-term, without maintenance dredging, will include increased flood hazards following heavy rainfall events. Maintenance dredging the stream can prevent future damages and benefit the community in the long-term.

Short-term impacts to surface waters of the stream will include increased turbidity from dredging activities. Although the stream has detected levels of turbidity, the Proposed Action is not anticipated to have any significant long-term impacts to the surface waters. No short or long-term impacts to groundwater are anticipated as the Proposed Action is intended to remove excess sediment from the stream channel and not excavate into groundwater resources.

The Proposed Action would adhere to the following BMPs during dredging, stockpiling and transport of materials to preserve surface water resources:

- Erosion- and sediment-control measures will be installed before earth-moving activities begin. Water quality conditions of the stream should be maintained throughout the duration of the Proposed Action;
- Turbidity and siltation from project-related work will be minimized and contained through the appropriate use of erosion-control practices, effective silt containment devices and curtailment of work during adverse weather and tidal/flow conditions;
- Install sediment or turbidity curtains and install monitoring equipment on barges and vessels to detect if water quality standards are exceeded;
- Install nets or barriers to prevent trash from entering the stream;
- All project-related materials and equipment placed in the water should be free of pollutants;
- Fueling of land-based vehicles and equipment should take place at least 50 ft away from the water over an impervious surface; and
- No project related material (fill, revetment rock, pipe, etc.) should be stockpiled in the water or on beach habitats.

Because the Proposed Action involves WOTUS, additional permits from the USACE and HDOH will be required. These permits include the Department of Army Nationwide Permits and the §401 Water Quality Certification. Any discharges related to the dredging or operation of the Proposed Action would comply with applicable State Water Quality Standards as specified by HDOH in HAR §11-54 and §11-55. A National Pollutant Discharge Elimination System (NPDES) permit will be obtained for storm water runoff during dredging activities if soil disturbances exceed one acre of land at the Project Site. The stream is subjected to the State Water Code §174C which enforces conservation measures and resource management of Hawai'i's waters. If necessary, a Stream Channel Alteration Permit

(SCAP) will be obtained prior to the alteration of the stream bank or channel in compliance with §174C.

3.4. Air Quality

Air quality at the Project Site is generally good, as the area is mostly characterized by its agricultural and coastal character. There is minimal influence from traffic on Kamehameha Highway. No major pollutant generators, such as industrial incinerators or manufacturing plants, have been identified in the area.

3.4.1. Potential Effects and Mitigation

Emissions from heavy equipment and machinery, such as a clamshell dredger and trucks, may affect the air quality of the Project Site temporarily. However, the impacts are only anticipated in the short-term duration of the Proposed Action. Fugitive dust as a result of stockpiling and surface disturbance during transport may be anticipated as a short-term impact. No long-term impacts are anticipated for air quality for the Proposed Action.

The Proposed Action will implement appropriate dust control methods during stockpiling and transport of dredged material. The dredged material will be placed in stockpiles for desiccation and dust generation will be minimized via fine water spray. Structures such as silt and dust fences will also be used to preserve existing air quality conditions.

3.5. Acoustic Environment

The acoustic environment surrounding the Project Site factors includes noise from traffic on Kamehameha Highway and nearby recreational areas such as Hukilau Beach and Mālaekahana State Beach Park, which are generally low. The majority of existing sound impacts are related to commuting activities as vehicles travel on the bridgeway and a small takeout (Ken's Fresh Fish) is located at the vicinity of the Project Site. These activities occur throughout the week as Kamehameha Highway is the only major roadway connecting to Kahuku town. Soundscapes of Kahawainui Stream may be audible upstream, where there is more vegetation buffering and less human activities.

3.5.1. Potential Effects and Mitigation

The Proposed Action would have short-term impacts to the acoustic environment from dredging activities and operations, due to operating machinery to dredge and transport material. Noise would vary according to the action (e.g. dredging, stockpiling or transporting of materials). No long-term impacts to the acoustic environment are anticipated after completion of the Proposed Action.

Mitigation measures will include the use of noise-attenuating equipment, such as mufflers, and adherence to noise curfews. Each contractor will be responsible for maintaining noise levels within the regulatory limits, pursuant to HAR §11-46, "Community Noise Control."

Contractors will be required to obtain a noise permit if noise levels during dredging activities are expected to exceed regulatory limits.

3.6. Natural Hazards

3.6.1. Flood

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM), the Project Site itself is located in Zone "AE" which is designated for coastal areas that are subject to a 1 percent-annual-chance of flood with additional hazards due to storm-induced waves and Zone "X" which is determined to be outside the 0.2 percent-annual-chance flood plain. *See Figure 13.* Although the stream may pose a moderate to high risk during extreme flood events, no significant risk is anticipated under normal conditions.

A portion of the Project Site falls within the National Flood Insurance Program (NFIP) Special Flood Area. The Special Flood Hazard Area requires compliance with 44 Code of Federal Regulations (CFR) §60.12. The Special Flood Hazard Area is a term used by FEMA to refer to land that has a 1% chance of a flood occurring within it in any given year.

The 1985 Environmental Impact Statement (EIS) for the Kahawainui Stream had noted 12 damaging floods affecting Lā'ie town since 1879 (USACE 1985). Flood damage resulted from water intrusion in homes and loss of personal property. Before its construction, the stream had issues with overbank flooding due to inadequate channel capacity coupled with the accumulation of debris and vegetation in the channel and stream mouth.

In 1990, a portion of Kahawainui Stream was modified to mitigate flood damages to the surrounding areas. The Kahawainui flood control project conducted by USACE was authorized under §205 of the Flood Control Act of 1948 to prevent future catastrophic flooding events experienced by the Lā'ie community. The project was mostly implemented downstream where concrete structures line up the stream channel and walls from the Lā'ie Wai and Kahawainui Stream intersection to the Kamehameha Highway bridge. The project was designed to increase flow in the channel and prevent overbank flooding in the area, with a designed discharge at the mouth of the stream at 17,800 cubic feet per second.

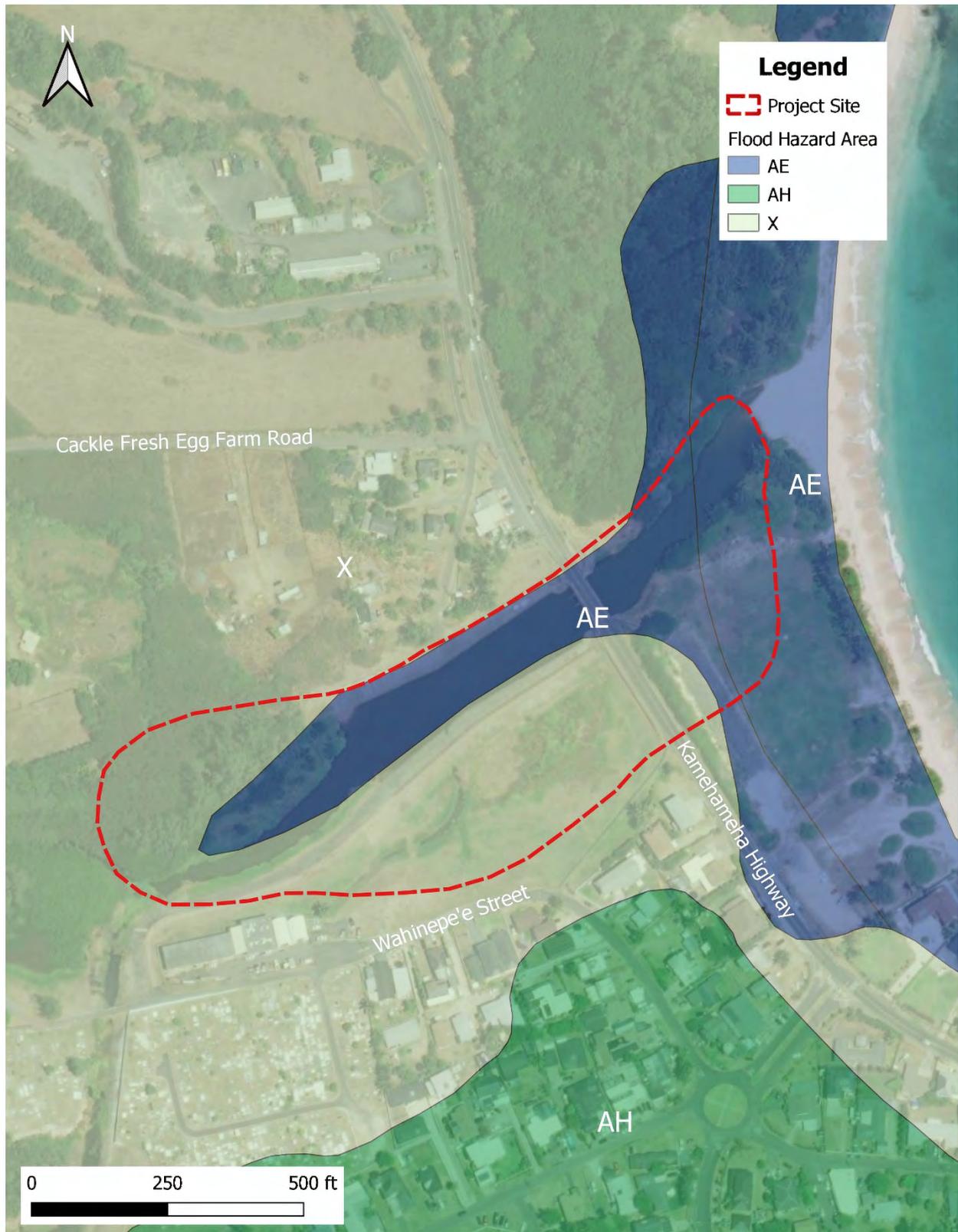


Figure 13: FEMA Flood Zones

3.6.2. Tsunami

According to the City's Tsunami Evacuation Zone map, the Project Site lies entirely within the tsunami evacuation zone and may be impacted by tsunami inundation (*see Figure 14*). The 1985 EIS noted that tsunami effects are insignificant in the Lā'ie Bay area. However, consideration should be taken in regard to the aftermath of a tsunami, particularly sediment and debris accumulation in the stream.

3.6.3. Storms and Hurricane

In Hawai'i, seasonal storms and hurricanes have the potential to cause severe damage to property, land and life, primarily occurring from the late summer and early winter months. Specific impacts of a hurricane at the Project Site are difficult to predict due to differences in atmospheric pressure, tidal stage, topography and location of the site relative to the eye of a storm. However, it has been historically noted that storms have struck the town of Lā'ie, often leaving the town with monetary damages and losses of personal properties. Similar to the effects of a tsunami, wave runup and storm surge can increase the amount of debris and sediment accumulation in the stream. Increased turbidity could also result from these events.

3.6.4. Earthquake

Earthquakes associated with volcanic or tectonic activity occur frequently in Hawai'i; however, many are too small to cause noticeable effects. The entirety of O'ahu lies within the Moloka'i Seismic Zone, which is classified as 2A Seismic Zone under the Uniform Building Code with earthquakes that may cause minor damage to structures. The major risk associated with earthquakes comes from partial or total building collapse, falling objects, debris and shattering glass. Although O'ahu has not experienced significant impacts from earthquakes in recent decades, the Honolulu coastline is considered to have moderately high vulnerability to earthquakes (Fletcher et al. 2002).



Figure 14: Tsunami Evacuation Zone

3.6.5. Sea Level Rise and Climate Change

Current projections of sea level rise anticipate a 3.2 ft sea level rise exposure area (SLR-XA) as early as 2060 (Sweet et al. 2017), leading to a series of consequential impacts such as coastal erosion, intermittent flooding, storm surges, king tides and contamination of groundwater. The vast majority of the Project Site is located within the 3.2-ft SLR-XA (*see Figure 15*).

With climate change, storms, drought and heavy rains are also expected to increase in frequency and volatility, causing more flash flooding, runoff, sedimentation and potential impacts to existing infrastructure in regions across O‘ahu. This poses a risk for the Lā‘ie community as sediment accumulation is already present in the stream, and flooding from heavy rainfall would result in more damages to the area.

3.6.6. Potential Effects and Mitigation

The Proposed Action will not change the Project Site’s exposure to tsunamis, earthquakes and hurricanes. The Proposed Action is intended to mitigate future flooding from significant rainfall events and sea level rise providing long-term benefits for the Lā‘ie community.

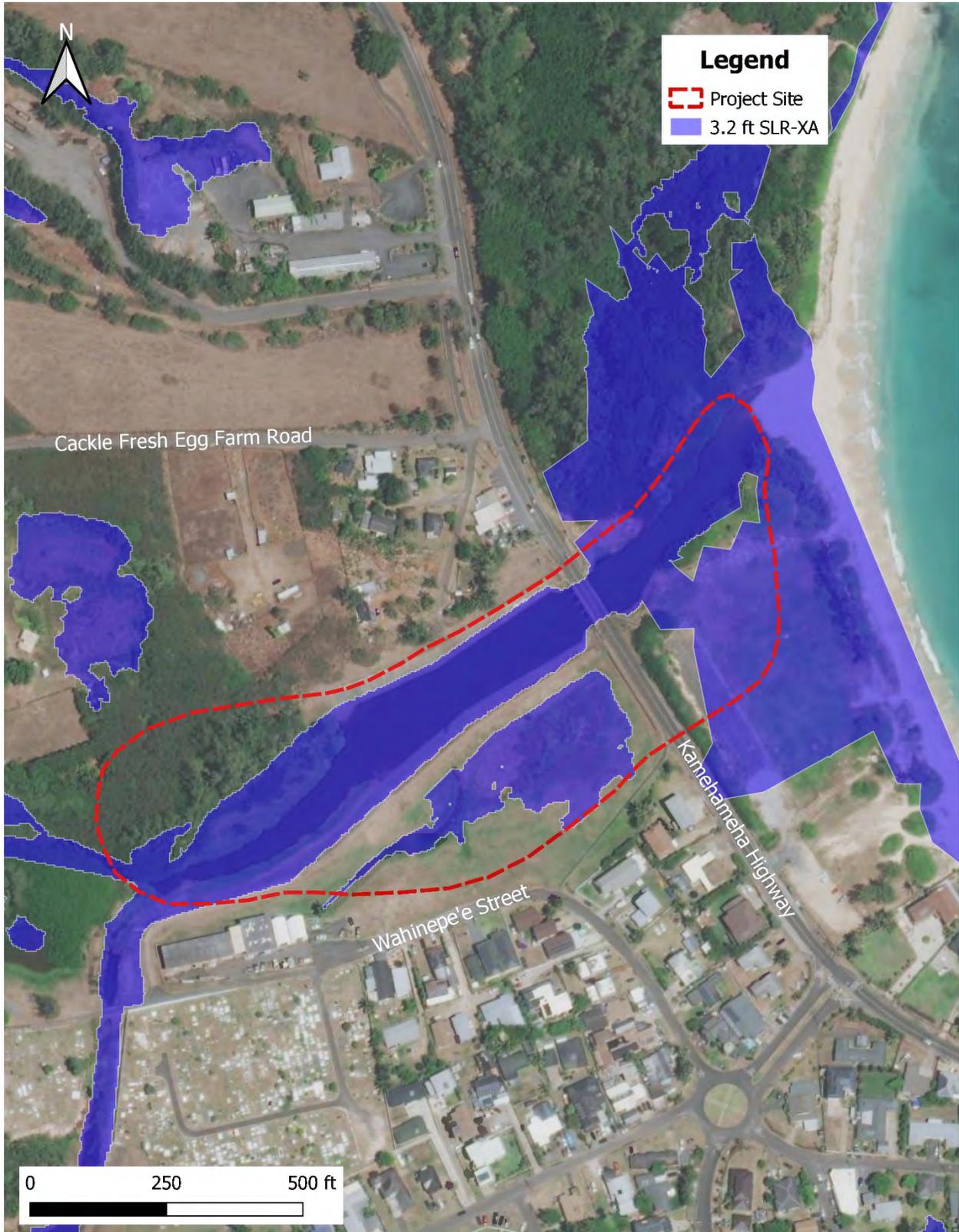


Figure 15: 3.2 ft Sea Level Rise Exposure Area

3.7. Hazardous Materials

A sediment survey was conducted by Element Environmental, LLC at the Project Site in June 2019 (E2 2019, Sampling Summary Report, Appendix A). The purpose of the survey was to characterize material in Kahawainui Stream for dredging activities and to determine appropriate reuse and disposal options. The survey analyzed sediment samples for the presence of chemicals of potential concern (COPCs) which are chemicals that may pose as a threat to human health and the environment such as the parameters noted in **Table 3**. Potential sources of these COPCs may be due to the historical application of pesticides for agricultural purposes on nearby lands, potential presence of heavy metals from a cemetery upstream of the Project Site, elevated salinity levels due to tidal fluxes and ocean proximity, and runoff from nearby residential areas, paved roadways, and a large warehouse upstream of the Project Site. See **Table 4** for survey results.

3.7.1. Soil Hazards

Sampling procedures were performed in accordance with the Hawaii Department of Health Hazard Evaluation and Emergency Response (HDOH HEER) *Guidance for Stockpile Characterization and Evaluation of Imported and Exported Fill Material, October 2017* (the “Guidance”). The project area was subdivided into eight lateral Decision Units (DUs) based on earlier bathymetric studies (see **Figure 11**). Per the Guidance, *Multi-Increment®* samples should be taken for every 400 cubic yards of material. Thirty increment sample locations were identified and collected within each of the eight DUs, yielding a total of eight *Multi-Increment®* samples with two replicates. The samples were tested for the following parameters based on the area’s historical land uses, using the appropriate U.S. Environmental Protection Agency (EPA) methods as shown in **Table 4**.

Table 4: Testing Methods

Parameter	Method
TPH-DRO, TPH-RRO (diesel and gasoline)	EPA 8015B
RCRA 8 Metals (Heavy metals)	6020/7471A
Polychlorinated biphenyls (PCBs)	EPA 8082
Organochlorine Pesticides	EPA 8081A
Chlorinated Herbicides	EPA 8151A

The samples were then compared with the HDOH Unrestricted Environmental Action Levels (EALs), where land use is unrestricted, surface water closer than 150 meters to the Project Site and groundwater is a current or potential source of drinking water. The HDOH

Unrestricted EALs provide a guideline as to whether any detected levels of COPCs would pose a human or environmental hazard.

The analysis revealed that certain heavy metals and total petroleum hydrocarbons (TPH) were present in the samples. Heavy metal constituents such as arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury, as well as TPH parameters in diesel and oil, were detected in most of the DUs (*see Table 5*). However, all concentrations were well under the limits set by the HDOH Unrestricted EALs.

The analysis of the samples collected within the Dredging Limit show that the concentration of COPCs were below limits set by the HDOH Unrestricted EALs. This indicates that the soils removed during the Proposed Action would be suitable for reuse purposes such as fill for development of schools and residential areas, at industrial and commercial sites, and for agricultural uses. The material is also a suitable source for beach replenishment as it is composed primarily of sand under the State OCCL's standards. If designated for reuse for residential developments or disposal at a waste facility such as the PVT Landfill, additional sampling and analysis of the dredged material is recommended. A letter from the HDOH HEER office dated October 30, 2019, confirmed the findings in the report and concurred with the suitability of the dredged material.

Table 5: Summary of Soil Sample Collection Results

Compound	HDOH Unrestricted EAL	DU-2	DU-3	DU-4	DU-5	DU-6	DU-7	DU-8	DU-9
Metals 6020/7471A (mg/kg)									
Arsenic	24	1.19	7.06	7.86	6.58	3.53	5.82	4.61	5.85
Barium	1,000	3.60	22.5	29.3	31.0	13.1	30.4	33.0	47.5
Cadmium	14	ND*	0.10	0.24	0.14	ND	0.12	0.15	0.23
Chromium	1,100	28.0	163	185	179	55.9	134	202	204
Lead	200	1.28	4.22	5.63	5.38	1.24	5.11	6.70	19.6
Selenium	78	0.35	2.59	3.33	3.23	1.33	2.31	2.83	3.31
Silver	78	0.61	3.43	4.29	4.74	1.47	3.42	5.12	5.13
Mercury	4.7	ND	0.04	0.04	0.05	ND	0.04	0.06	0.08
TPH 8015B (mg/kg)									
TPH as Diesel	220	ND	ND	ND	ND	ND	9.0	ND	ND
TPH as Motor Oil	500	ND	ND	46	85	31	25	110	81

*ND = Non-Detected, compound not detected above laboratory method detection limit (E2, 2019).

3.7.2. Potential Effects and Mitigation

The Proposed Action would adhere to stringent BMPs and removal, storage and disposal would be conducted in accordance with all applicable City and State requirements to minimize any potential impacts from removed soils. Because the soils found onsite are below the HDOH Unrestricted EALs, no short- or long-term adverse impacts are anticipated, and no additional mitigation measures are required. Possible reuse onsite may also be considered for beach replenishment or offsite use as fill material. In the event that any dredged and dried materials are designated for beach replenishment, such materials must be submitted to the State Office of Conservation and Coastal Lands for assessment prior to placement on the beach.

3.8. Scenic Resources

The visual character of the Project Site is defined mainly by the rural and coastal environment, devoid of any large development or urban landscape. Scenic resources downstream from the Project Site include Lā'ie Bay and Hukilau Beach. Unobstructed views of the Ko'olau Mountain range can be obtained upstream of the Project Site. Kahawainui Stream is clearly visible from the vehicular/pedestrian bridge both downstream and upstream of the Project Site.

3.8.1. Potential Effects and Mitigation

The Proposed Action would remain consistent with the visual character of the surrounding area and is not anticipated to have any significant impact to scenic resources. Visual accessibility to the Kahawainui Stream, Lā'ie Bay, Hukilau Beach, and the Ko'olau Mountain range will remain consistent with existing conditions. No significant impacts to scenic resources are anticipated, and no additional mitigation is required.

3.9. Riparian Resources

The Natural Resources Conservation Service defines riparian areas as ecosystems that occur along water bodies that are distinctly different from the surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by unbound water in the soil. Riparian ecosystems occupy the transitional area between terrestrial and aquatic ecosystems. These areas are dependent on, and affected by, the physical and biological entities that surround them.

The role of vegetation serves as an interface between terrestrial and aquatic ecosystems, and as such is complex. It controls runoff directly as well as the recharge of groundwater, which may affect stream flow downslope. Riparian vegetation can be effective in removing excess nutrients and sediment from surface runoff and shallow ground water and in shading streams to optimize light and temperature conditions for aquatic plants and animals. Vegetation also prevents or reduces soil erosion, which directly affects water quality.

Disturbance from alien influences can exacerbate the natural processes of erosion enormously. Riparian vegetation, especially trees, is also effective in stabilizing streambanks and slowing flood flows, resulting in reduced downstream flood peaks.

A Flora and Fauna Survey was conducted in June 2016 by SWCA Environmental Consultants (see Appendix B), and the following is a summary of the findings.

3.9.1. Flora

The Project Site can be characterized as an agricultural coastal setting, with much of the area altered for farming, green open spaces, and a few single-family residences with a natural coastal environment downstream towards the stream mouth and sand berm. Four types of vegetation types were observed in the survey area: coastal strand, riparian, ruderal, and ironwood grove.

At the stream mouth, coastal vegetation consisted of native species such as 'aki'aki grass (*Sporobolus virginicus*), 'ākulikuli (*Portulaca oleracea*), naupaka kahakai (*Scaevola taccada*), and pōhuehue (*Ipomoea pes-caprae*). Nonnative species were also identified such as the wedelia (*Sphagneticola trilobata*), giant lily (*Crinum asiaticum*), and tree heliotrope (*Tournefortia argentea*).

Alongside Kahawainui Stream riparian vegetation composed of herbaceous species and hydrophytic plants included the California grass (*Urochloa mutica*), *Cyperus polystachyos*, California bulrush (*Schoenoplectus californicus*), primrose willow (*Ludwigia octovalvis*), silverhead (*Blutaparion vermiculare*), 'ae'ae, mangrove (*Rhizophora mangle*), sourbush (*Pluchea carolinensis*), and hau.

Ruderal vegetation can be found in disturbed areas, such as along the Kamehameha Highway and open space areas designated for stockpiling of dredged material. This includes bermuda grass (*Cynodon dactylon*), natal redtop (*Melinis repens*), kikuyu grass (*Cenchrus clandestinus*), and pitted beardgrass (*Bothriochloa pertusa*), yellow wood sorrel (*Oxalis corniculata*), narrow-leaved plantain (*Plantago lanceolata*), spanish needle (*Bidens pilosa*), swinecress (*Coronopus didymus*), castor bean (*Ricinus communis*), parasol tree (*Macaranga tanarius*) and ivy gourd (*Coccinia grandis*).

Ironwood grove (*Casuarina equisetifolia*) as tall as 34 to 49 feet can be found in the eastern coastal side of the Project Site.

Of the 49 plants species observed, 10 species are native to Hawai'i: 'ākulikuli, kīpūkai, pōhuehue, naupaka kahakai, hau, 'ae'ae, 'uhaloa, *Cyperus polystachyos*, hala, and 'aki'aki. However, none of the species are unique. Overall, no state or federally listed threatened and endangered species or unique native Hawaiian plants were observed at the Project Site.

3.9.2. Fauna

Avifauna observed during the Flora and Fauna survey consisted of 21 bird species, of which two are federally- and state-listed animals: the Hawaiian gallinule (*Gallinula chloropus sandvicensis*) and the Hawaiian stilt (*Himantopus mexicanus knudseni*) (SWCA 2016, Appendix B). Two endangered Hawaiian stilts and three endangered Hawaiian gallinules were spotted at the stream during the survey collection. Also documented were one native species, the black-crown night heron (*Nycticorax nycticorax*), and four migratory birds. The remaining 14 species are nonnative, with five species (along with the Hawaiian gallinule, Hawaiian stilt and black-crown heron) protected under the Migratory Bird Treaty Act (MBTA). These species consist of the cattle egret (*Bubulcus ibis*), pied-billed grebe (*Podilymbus podiceps*), pacific golden plover (*Pluvialis fulva*), ruddy turnstone (*Arenaria interpres*), and the wandering tattler (*Tringa incana*). Other endangered and threatened species, such as the Hawaiian petrel and Newell's shearwater, may fly over the survey area at night.

No indigenous mammals were observed in the survey area. However, it is noted that some areas may provide a suitable roosting habitat for the Hawaiian hoary bat such as ironwood and tree species with a roosting structure.

Two indigenous species of invertebrates were observed during the survey, which includes the green darner (*Anax junius*) and the wandering glider (*Pantala flavescens*). No native fishes were observed, but previously recorded native species included 'o'opu nākea (*Awaous stamineus*), 'o'opu akupa (*Eleotris sandwicensis*), and 'o'opu naniha (*Stenogobius hawaiiensis*). No native species of mollusks and crustaceans were observed, but previously recorded were the 'ōpae kala'ole (*Atyoida bisulcata*) and 'ōpae 'oeha'a (*Macrobrachium grandimanus*).

3.9.3. Water Quality

Water quality samples were collected upstream of the sand berm near the closure of the stream mouth on March 31, 2016, between 10:30 am and 1:30 pm. In-situ physical parameters collected include temperature, dissolved oxygen (DO), salinity, and pH. Turbidity was measured in the field using a portable turbidimeter. Nutrient samples (i.e., nitrate + nitrite nitrogen, ammonia nitrogen, total nitrogen, and total phosphorus), chlorophyll α , and total suspended solids (TSS) were sampled and analyzed by Food Quality Labs (FQ Labs).

Field measurements and laboratory results were compared to the Water Quality Standards (WQS) listed in Hawai'i Administrative Rules, Title 11, Chapter 54 (HAR 11-54). WQS are generally based on a geometric mean for each parameter; therefore, a minimum of three samples must be collected to compare to the standard. Although a single data point for each parameter is insufficient to determine compliance with WQS, individual data points can provide insight into additional studies that may be needed for the waterbody.

Kahawainui Stream is listed as a 303(d) impaired waterbody by the Hawai'i DOH Clean Water Branch for the following parameters: nitrate/nitrite, turbidity, total phosphorus, and total nitrogen (Hawai'i DOH 2014). All nutrient values (NO₂+ NO₃ nitrogen, ammonia, total nitrogen, total phosphorus) results were over the established geometric means for water quality standards. In particular, ammonia (290 µg/L) and total phosphorus (600 µg/L) were vastly over the upper limits (20 µg/L and 75 µg/L, respectively). Total nitrogen exceeded the geometric mean standard, but did not exceed either of the upper limits (350 or 500 µg/L). Likewise, turbidity (9.15 NTU) was far higher than the established standards. Dissolved oxygen saturation was depressed below the 75% saturation standard; however, this may be an artifact of collection time since temperature, biochemical oxygen demand, and primary productivity are all integrally associated with oxygen saturation. Both pH (7.05) and chlorophyll α (not detected) were within acceptable levels. Currently, there is no accepted water quality standard for total suspended solids. However, based on SWCA professional opinion, a concentration greater than 2 mg/L is generally a high particulate load for a stream. Salinity and dissolved oxygen concentration water quality standards are based on deviation from "ambient conditions" and, therefore, cannot be assessed from a single sample.

3.9.4. Potential Effects and Mitigation

The Proposed Action is not anticipated to have any short or long-term impacts to flora as no alterations would occur to the landscape at the Project Site. The Proposed Action would adhere to BMPs during dredging and operation to preserve flora resources at the Project Site. Contractors would implement the following measures, wherever possible, to reduce the potential for unintended spreading of non-native plant species:

- All construction equipment and vehicles from outside of O'ahu should be washed and inspected before entering the Project Site;
- Construction equipment arriving from outside of O'ahu should be washed or visually inspected for debris, plant materials, and invasive or harmful non-native species;
- Inspection and cleaning activities should be conducted at a designated location prior to entry into the Project Site. The inspector should be a qualified botanist or entomologist that is able to identify invasive species;
- Raw materials such as gravel, rock and soil should be purchased from a local supplier on O'ahu to avoid introducing non-native species; and
- If landscaping occurs, native Hawaiian plants or non-invasive plants should be used to the maximum extent possible.

Short-term impacts on aquatic fauna and resources may be associated with dredging activities. Turbidity levels may increase in the stream as a result of sediment disturbance

from clamshell dredging. However, the stream has been noted to have significant turbidity levels based on the *2020 State of Hawai'i Water Quality Monitoring and Assessment Report* and the Proposed Action is not anticipated to substantially increase turbidity levels. This impact will be temporary as it is associated with short-term construction activities. Aquatic fauna and resources should be expected to return post-dredging activities.

The following measures were recommended during pre-consultation with the National Marine Fisheries Sciences (NMFS) Pacific Islands Regional Office (PIRO):

- Select the appropriate work platforms based on:
 - the ability to work from land;
 - use of a barge that will not increase turbidity; and
 - anchoring barges to shoreline infrastructure, moorings or anchor spuds.
- Ensure all construction equipment does not pose a risk of introducing invasive species or increase the population of invasive species at the Project Site.
- Install nets or barriers to prevent trash from entering the stream.
- Develop a Wave and Storm Contingency Plan for construction equipment.
- Conduct work at low or slack tide.
- Conduct work during calm winds. Stop working during high wind or strong current conditions.
- Work performed during coral spawning period (May to August) will require a qualified biologist on site to monitor potential sedimentation and turbidity effects to coral eggs and larvae. Work will halt once sedimentation and turbidity surpass a water quality threshold determined by the onsite biologist and resume once water quality is deemed satisfactory to the biologist judgement.
- Install sediment or turbidity curtains and install monitoring equipment on barges and vessels to detect if water quality standards are exceeded.
- Use soft or natural engineering methods to maintain natural flow volumes and velocity.
- Minimize disturbances to stream banks and place abutments outside of the floodplain.
- Utilize environmental clamshell buckets for dredging.
- Design nourishment activities to maintain or replicate natural stream channel flow.
- Revegetate shoreline areas with appropriate native species.

Although the project design does not account for discharging into the stream, DLNR's Division of Aquatic Resources (DLNR-DAR) will be notified immediately if accidental discharges do occur. Per DLNR-DAR's DEA comment letter dated April 21, 2023, photo documentation of any occurrence where above-average amounts of sediment or pollution have entered the water should be provided to DLNR to assess impacts, in the event of each occurrence. Additional consultation with the NMFS PIRO will be conducted prior to commencement of the Proposed Action.

The Proposed Action is not anticipated to have any significant impacts to avifauna and terrestrial fauna given that tree clearing and vegetation removal is not anticipated for the project design. Careful consideration will be taken for the two endangered waterbird species that were present at the Project Site: the Hawaiian stilt and Hawaiian gallinule. The following measures would be taken during the Proposed Action to prevent potential disturbances to their nesting or foraging sites at the Project Site:

- In areas where vegetated streambanks are disturbed, a qualified biologist will be present on site to conduct waterbird nest searches before any project work begins and after any subsequent delay in work of three or more days;
- If a waterbird nest with eggs or chicks is discovered in the Project Site, work will cease within 100 ft of the nest until the nest becomes inactive as determined by a qualified biologist; and
- If an endangered Hawaiian waterbird is present or lands in the Project Site, then all activities within 100 ft of the bird would cease and the bird would not be approached. Work may continue after the bird leaves the area of its own accord.

The Hawaiian petrel and Newell's shearwater may traverse the area at night within the Project Site. To avoid grounding of the seabirds, the following measures will be implemented to reduce lighting at the Project Site:

- Dredging and other operations will be restricted to daylight hours as much as practicable during the seabird peak fallout period (September 15 -to December 15) to avoid the use of nighttime lighting that could attract seabirds;
- All outdoor lights will be shielded to prevent upward radiation to reduce the potential for seabird attraction; and
- Outside lights not needed for security and safety will be turned off from dusk to dawn during the fledging fallout period.

Birds protected under the MBTA such as the black-crowned night heron, cattle egret, pied-billed grebe, Pacific-golden plover, ruddy turnstone, and the wandering tattler may nest within the Project Site. To prevent impacts to these MBTA-bird species, the Contractor shall consider the following actions:

- Have a qualified biologist onsite to monitor active nests during the Proposed Action to minimize the potential for nest disturbance or abandonment by stopping work if the birds are agitated or stressed; or
- Avoid active nest sites of other MBTA protected species until the nest is determined inactive by a qualified biologist.

Although no Hawaiian hoary bats were observed within the Project Site, the Contractor will consider the following measures to avoid any threats and impacts to the Hawaiian hoary bat:

1. Any fences erected as part of the Proposed Action or within the Project Site should have a barbless top-strand wire to prevent entanglements of the Hawaiian hoary bat; and
2. No trees taller than 15 ft shall be trimmed or removed between June 1 and September 15 for the potential of disturbing roosting juvenile bats.

If avoidance is not possible during this time frame, the Contractor will consult with appropriate State and Federal resource agencies prior to any disturbance, trimming, or removal of woody vegetation greater than 15 ft in height.

Per DLNR-DAR's DEA comment letter dated April 21, 2023, in the event that protected species such as the Hawaiian monk seal, other marine mammal, or sea-turtle is observed in close proximity to the dredging site, contractors should take appropriate action to modify activities to avoid disturbance to the regular behavior and activities of the animal. Appropriate action would include, but is not limited to, ceasing dredging activities until the animal leaves the area. BMPs to eliminate any potential for incidental entanglement of marine organisms should also be conducted, such as minimizing the number of in-water structures or components that may potentially cause entanglement (loops, holes, slack lines).

Any interaction with protected species should be reported to the NOAA Protected Species Division and the DLNR Division of Conservation and Resources Enforcement (DLNR-DOCARE):

- NOAA Marine Mammal Response Coordinators (O'ahu): 808-220-7802
- NOAA National Marine Fisheries Service – PIFSC Marine Turtle Biology and Assessment Program: (808) 725-5730
- DLNR-DOCARE: 808-643-3567

If incidental entanglement of protected species occurs, DLNR-DAR and appropriate federal agencies should be notified immediately.

DLNR-DAR also requests notification, photo documentation, and GPS coordinates in the event of an observed mortality event related to riparian biota (e.g. fish die-off).

The Proposed Action is not anticipated to have any significant impacts. High ammonia and nitrate concentrations have been reported during previous water quality sampling in Kahawainui Stream (Oceanit 2010). This study identified heightened nutrient concentrations indicating that Kahawainui Stream may be subject to excess nutrient loads from agricultural runoff, streambank collapse, sewage, and/or suburban runoff of fertilizers. Another possible reason for high nutrient values may be inefficient uptake of nutrients by aquatic vegetation. Additionally, the lack of a true estuary connection to the sea may have detrimental effects on the water quality at the sample location. The berm separating Kahawainui Stream from the Pacific Ocean prevents flushing of sediment and chemical contaminants from the system, leading to higher residence times than would be typical and greater accumulation of the silts, colloids, and other easily-suspended materials. This may exacerbate the nutrient loading of the stream and would explain the reason for the high turbidity and TSS values detected in the study.

The following BMP are recommended to protect water quality:

- Erosion-and sediment-control measures should be in place before earth-moving activities begin. Functionality should be maintained throughout the construction period.
- Turbidity and siltation from project-related work should be minimized and contained through the appropriate use of erosion-control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- All project-related materials and equipment placed in the water should be free of pollutants (including waste material, heavy metals, organic materials, debris, and any water pollutants at toxic or potentially hazardous concentrations to aquatic life).
- Fueling of land-based vehicles and equipment should take place at least 15.24 m (50 feet) away from the water, preferably over an impervious surface.
- No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.

3.10. Historic, Archaeological and Cultural Resources

3.10.1. Historic Resources

An archaeological literature review and field inspection (LRFI) was conducted by Honua Consulting on August 6, 2021 (*see Appendix C*). The LRFI consisted of a pedestrian survey of approximately 315-meter-long portion of the channelized stream as well as the stockpile

locations, and a 500-meter buffer for the denoted project area (see **Figure 16**). The LRFI has been conducted according to standards outlined in HAR §13-275 for AIS studies which is intended to assist with the project's compliance with HRS §6E-8 and consultation with SHPD.

Digital photographs were taken to record vegetation, topography, and conditions within the project area. A photo log was created in conjunction that recorded the subject of the photograph, the direction camera was pointing when the photo was taken, and other appropriate noted information. A handheld global positioning system (GPS) device was used to record transect paths and location of points of interest within the project area. The GPS device kept a location accuracy between 3 to 10 ft.

The historic resources that were observed within the Proposed Action's Project Site are noted in **Table 6**.

Table 6: Current and Potential Historic Properties Within the Project Area

Reference	Identification	Resource	Significance	Notes
Ahlo and Hommon, Bath 1985 and Dunn and Rosendahl 1992	SIHP # 50-80-02-4465	Historic House Site and Cemetery	Criteria d and e	Preservation; Adjacent to Project Area
MKE Associates and Fung Associates 2013	None	Kahawainui-Lā'iewai Bridge	Criterion c	Within the Project Area

The Kahawainui Stream-Lā'iewai Bridge on Kamehameha Highway was identified as a historic resource within the Project Site by Honua Consulting. The bridge is considered a historic property due to its architectural design dating back to the 1930s. In 2013, the bridge was assessed for eligibility for listing in the National Register of Historic Properties; however, it is not currently officially listed in the register. The bridge was observed to be in good condition with no visible damage to the exterior structure. The historic significance of the bridge was assigned Criterion c which according to HAR §13-284-6 is *an excellent example of a site type, period, method of construction, or other work of master*.

Also identified within the Project Site is a cemetery containing two plots as well as a historic house site. The site is currently preserved and has a boundary of an old fence and pipes in the ground along the southern corners. The site has been assigned an identifier (SIHP #50-80-02-4465) and was first identified in the archaeological survey conducted for the Kahawainui flood control project. The house site has been assigned criterion d which indicates that the property has the likelihood of yielding significant information in

prehistory. The cemetery plots were assigned significance criterion e, where the site may be culturally significant to an ethnic group. These structures are usually classified as religious structures, properties, or burials.

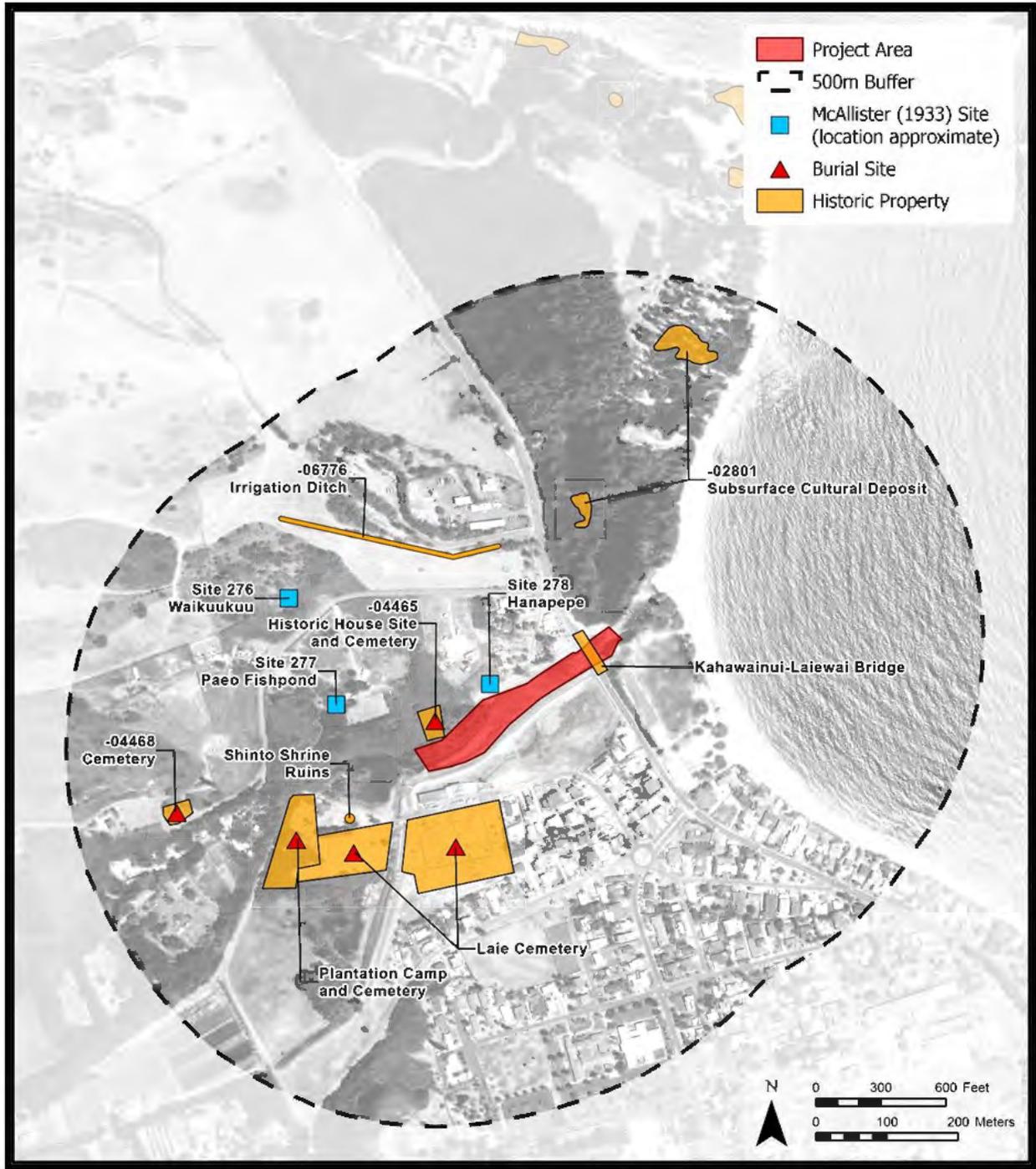


Figure 16: Historic Properties within 500 meters of the Project Area

3.10.2. Cultural Resources

In addition to the LRFI, a Cultural Impact Assessment (CIA) was prepared by Honua Consulting for the Proposed Action (*see* Appendix D). The CIA is based on land use records, historical texts, and historical records. The report was prepared in accordance with HRS §343 and HAR §11-200.1. In addition, the CIA takes into account Act 50 Hawai'i State Legislature 2000 (*Ka Pa'akai O Ka 'Āina v. Land Use Commission*) which provides an analytical framework for government agencies to ensure protection of Native Hawaiia1n rights while accommodating private development interests.

Cultural research included analysis of archived documents, oral tradition [chants (*mele* (songs), and/or *hula*)], Hawaiian language sources which included books, manuscripts, and newspaper articles. Oral histories were also gathered, some from previous studies that were considered relevant to the project were integrated into the CIA. The consultant provided information on the history, presence, cultural importance, and use of land, water, and marine resources in the area.

The Project Site is located in the Lā'iewai ahupua'a (traditional land division) within the Ko'olauloa moku (district). The ahupua'a was a well-known fishing location and was home to a large population of Native Hawaiians due to the immense marine resources. As the population grew and moved inland, production of *kalo* (taro) and *lo'i* (taro patch) cultivation became a staple activity. Evidence of these activities can be found along the lower areas Kahawainui Stream, where taro terraces were supplied with water from a large spring.

The name Lā'ie can be translated into two Hawaiian words: *lau* (leaf) and *ie* (the *ie* vine of the red-spiked pandanus tree found in the Ko'olau range). Lā'ie holds a cultural significance that can be better understood through the oral history entitled *Lā'ieikawai*. The story tells of a sustenance producing tree named *Kalalaikawai* being planted in Paliula's garden. According to Hawaiian oral traditions, that act is symbolic of female and male reproductive energy, where the union fills the land with offspring. The surrounding community identifies and takes the responsibility of perpetuating and preserving all life forms, similar to the tree of the same namesake. Many more *mo'olelo* (stories and legends) can be associated with the Lā'iewai ahupua'a, which include themes with *mo'o*, supernatural beings, 'awa cultivation and the bountiful coastal fishing grounds.

In the mid-1800s, Lā'ie was known to be a small sparsely populated village in contrast to prehistoric accounts. The village was designated as a *pu'uhonua* (a sacred sanctuary of refuge) which was later abolished along with the traditional *kapu* system by Kamehameha II in 1819. The village with a population of predominantly native Hawaiian was home to 400 people in the 1830s. During the Great Māhele which spanned from 1847 to 1855, the two ahupua'a that comprised of Lā'ie (Lā'iewai and Lā'iemalo'o) were given ownership under William C. Lunalilo, great-nephew of Kamehameha I. A total of nine *kuleana* claims were awarded in the vicinity of the Project Site and consisted of homes with several *lo'i kalo*.

In 1861, the estate of William C. Lunalilo sold lands in the Lā'iewai ahupua'a to Henry H. Howland and approximately 300 acres to Robert Morfitt in 1863. Morfitt later then sold the lands to Charles Hopkins who established Kahuku Ranch. Howland sold a portion of his lands to Thomas Dougherty setting up the foundation of the Mormon Church for Hawai'i which has a dominant presence in the community. The Lā'ie Plantation and mill was established in 1868 to cultivate sugarcane in the Mormon settlement. Irrigation ditches and flumes were constructed to accommodate plantation activities. A majority of the workforce in the Lā'ie Plantation were Native Hawaiians who were converted into Mormon practice upon leasing missionary housing within the settlement. The agricultural practices shifted over time from traditional Native Hawaiian practices to modern industry practices since the 1890s.

In the 1900s, the population has changed from primarily Hawaiian to Japanese and Chinese due to cheap plantation labor. By 1920, the population has become dominantly Filipino. The plantation later closed in 1931 due to debt and the Great Depression.

In 1955, the Mormons constructed the Church College of Hawai'i which is now Brigham Young University-Hawai'i. The university spurred the growth of Lā'ie alongside the construction of the Polynesian Cultural Center in 1963. The two developments have since transformed the Lā'ie rural Mormon town into a tourist destination. Development projects constructed to accommodate the growing population in Lā'ie sparked controversy in the 1980s. The expansion of the sewer plant had met with community opposition where they noted that the initial project destroyed portions of Nioi heiau and the expansion will further desecrate the heiau. Eventually, an agreement was reached as a cultural assessment and significance study was conducted for the heiau and surrounding area. The population of Lā'ie town has not grown significantly since and continues its operations in tourism and Mormon practices.

3.10.3. Archaeological Resources

Archaeological records were obtained from the State Historic Preservation Division (SHPD) library in Kapolei and from field surveys conducted at the Project Site, and are noted in the LRFI (Honua 2021, Appendix C). The report not only identified historic properties, but also previous archaeological studies conducted in the project area. **Table 7** provides a list of these studies and summary of findings. **Figure 17** depicts the studies in relation to the project area.

Table 7: Summary of Previous Archaeological Studies

Reference	Location	Findings (SIHP #50-08-02-)
McAllister 1993 (not depicted in map)	Oahu	Recorded five sites in the vicinity: Site 276 (Waiku'uku'u), Site 277 (Paeo Fishpond), Site 278 (Hanapepe), Site 279 (Tunnel of Manonihokahi), and Site 280 (Lā'ie)
Hammatt 1977	Mālaekahana State Park	Identified two cultural deposits. SIHP#-2801
Olson 1979	Mālaekahana and Keawaula Dune	Conducted a lithic analysis of volcanic glass from SIHP # -2801
Yent and Estioko-Griffin 1980	Mālaekahana State Recreation Area Phase I	Recorded several discontinuous subsurface cultural deposits, two human burials, and a koa object as SIHP #2801, documented postholes, firepits, marine shell midden, faunal remains, and various traditional Hawaiian artifacts related to fishing and habitation, occupation of the site was interpreted to be between 1600-1780 A.D.
Ahlo and Hommon 1981	Kahawainui Stream Flood Control Improvements	No sites recorded, lack of sites attributed to extensive land disturbance, describes a cemetery and Shinto shrine remnant, no SIHP numbers assigned
Neller 1984	Kahawainui Stream Flood Control Improvements	Letter reports disputing the results of the Ahlo and Hommon 1981 archaeological survey, suggests that a possible habitation site, a cultural deposit and the Shinto shrine should have been assigned SIHP numbers, recommends that the cemetery and Paeo Fishpond be deemed eligible for the NHRP and discusses the results of the reconnaissance survey along Kahawainui Stream and Lā'iewai Stream
Bath 1985	Kahawainui Stream, TMK: [1] 1-5- 005:005, [1] 5-5-005- 009)	Recorded two historic cemeteries and evidence of traditional Hawaiian, historic, and modern occupation in the area, radiocarbon dating of a traditional Hawaiian cultural deposit returned a date range between 1415 and 1645 A.D., later the historic house site and two cemeteries were recorded as SIHP # -4465

Jensen 1989	Punamano and Malaekahana Golf Courses	Recorded 29 archaeological sites, SIHP #s - 4068 through -4093, and SIHP #s -4230, -4231, and -4232, consist mostly of traditional Hawaiian sites including shelter overhangs, low stacked walls, enclosures, terraces, 'auwai, rock alignments, a burial, and midden among others, historic sites included an irrigation ditch, a gun emplacement and a historic dump, additional work and preservation plan recommended
Kennedy 1989	Punamano Golf Course	Identified two new sites consisting of an irrigation ditch and enclosure complex possibly associated with ranching, relocated and added one feature component to SIHP # - 4071, two feature components to SIHP # - 4072, seven feature components to SIHP # - 4076, two feature components to SIHP # - 4077, and two feature components to SIHP # - 4078, provides updated recommendations for the sites within the grading footprint of the golf course and in the vicinity
Kennedy 1990	Malaekahana Golf Course	Recorded 19 sites which included traditional Hawaiian sites consisting of overhang shelters, agricultural terraces, low mounds, shell midden and artifacts scatters, and several large sandy dune formations with possible cultural deposits or burials, historic era sites included a gun emplacement and railroad bed, additional testing was recommended for all of the sites documented, No SIHP numbers were assigned
Smith 1990	Mālaekahana State Recreation Area, Phase I	No sites recorded
Dunn and Rosendahl 1992	Lā'ie Master Plan	Recorded 23 sites comprised of 121 feature components during the project, SIHP # -4465 (historic house site and cemetery) and SIHP # -4468 (cemetery) were documented in the vicinity of the project area
Halpern and Rosendahl 1995	Lā'ie Master Plan	Conducted additional recording at SIHP # - 4458 and SIHP # -4460 (Nioi Heiau Complex)

Monahan 2005	500-Acre Area, TMKs: [1] 5-6-006:006 & 058	Recorded 43 archaeological sites, SIHP #s - 6774 through -6815, located on the mauka side of Kamehameha Highway and consisting mostly of plantation era features, traditional Hawaiian sites included habitation and agricultural sites, a cultural deposit, Wai'āpuka Pool, and a couple rock shelters, additionally two human burials were also encountered
McElroy and Duhaylonsod 2017	Kamehameha Highway from Mālaekahana Stream Bridge to the Lā'iewai Bridge, TMKs: [1] 5-5-009, [1] 5-6-001 through 006, [1] 5-6-009 por.	No sites recorded, minimal ground disturbance during the project

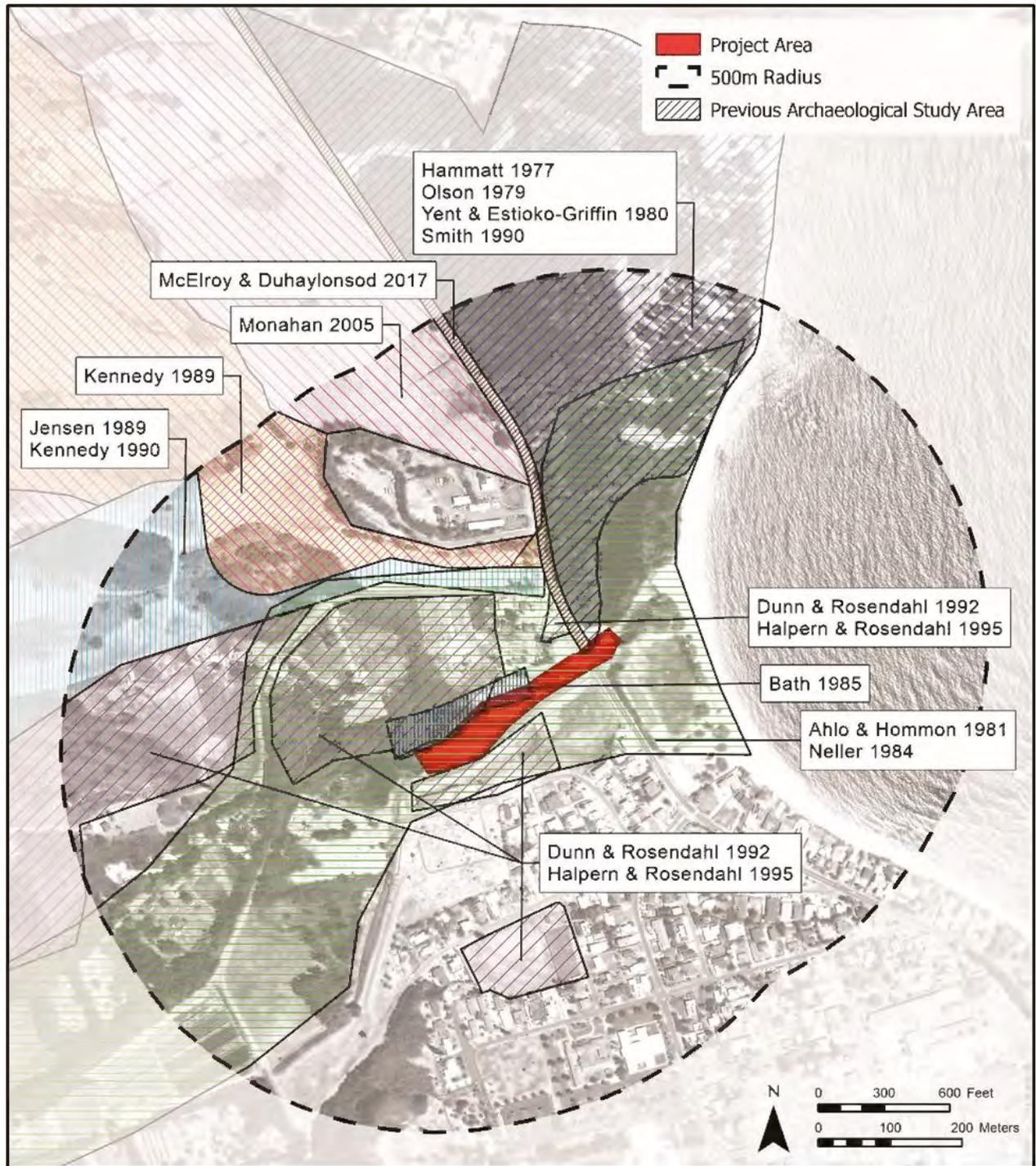


Figure 17: Previous Archaeological Surveys within 500 meters of the Project Area

3.10.4. Potential Effects and Mitigation

The Proposed Action will use the historic Kahawainui- Lā'iewai Bridge for the access and transport of dredged material. Truck hauling activities are not anticipated to degrade the bridge as the nature of the project is only temporary. To prevent any possible damages to the bridge, a buffer or exclusion zone of 3 to 5 feet will be applied around the bridge components to prevent accidental damages from dredging equipment. The Contractor shall ensure that the bridge components are protected and any damages resulting from dredging activities will be repaired to original condition or better at no cost. No short- or long-term impacts are anticipated for the historic house site and cemetery within the Project Site identified as SIHP #-4465. It is recommended the sites be delineated with orange event fencing and the establishment of a 10 ft. buffer around each. Due to the sensitivity of the nearby cemetery site, no driving or storing of equipment or materials should be permitted in the vicinity of SIHP # -4465. It may also be necessary to conduct additional archaeological survey of access points and roads associated with the stockpile locations, particularly in any areas proposed for significant surface modifications.

The CIA had noted that the Lā'iewai ahupua'a was renowned for its fishing community and lo'i cultivation. Several interviews conducted with members of the community noted that historical fishing practices were regularly occurring within the stream. The Flora and Fauna survey had noted historical records of 'o'opu present in the stream. There are concerns that the Proposed Action may stir deep layers of sediment that may contain harmful bacteria that could potentially harm the aquatic fauna and resources. This was also a concern for one of the families farming kalo along the stream. Based on the *2020 State of Hawai'i Water Quality Monitoring and Assessment Report*, no harmful bacteria such as enterococcus was observed in the stream. The Proposed Action is anticipated to have short-term impacts of increased turbidity in the stream, although levels will return to ambient conditions post dredging activities. Long-term impacts would be beneficial to the community by preventing flooding to surrounding areas and maintaining a sufficient downstream flow. Communication will be conducted with the local kalo farmers and fishermen before and during construction activities as appropriate to reduce potential impacts.

The Lā'ie region is rich with both pre-contact and post-contact histories. While the project is unlikely to have any adverse impact on pre-contact historic properties or Hawaiian cultural practices, the project has an opportunity to enrich the area through interpretive botanical, cultural and historical programs. The CIA looked comprehensively at all historical records for the region and, while area practices were identified, this assessment did not identify any current cultural practices or customs that would potentially be adversely impacted by the project activity. This conclusion was supported by the oral histories from the area.

An archaeological monitoring program, with on-call and spot monitoring, is being recommended for identification purposes and to ensure the efficacy of the avoidance and

protective measures.

- Conduct additional archaeological survey, if needed, for access points and roads associated with the stockpile locations, particularly in areas proposed for significant surface modifications;
- Consult with SHPD if any additional sites or features are identified in these areas; and
- Report on any findings in the archaeological monitoring report (AMR).

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4. PUBLIC RESOURCES

4.1 Water

There are no public water facilities at the Project Site. There is one fire hydrant located within the vicinity of the Project Site, approximately 170 ft north of the Dredging Limit. It is located across Ken's Fresh Fish takeout and Cackle Fresh Eggs Farm, makai of Kamehameha Highway.

4.1.1. Wastewater

Wastewater services at the Project Site are provided by the City and County of Honolulu Department of Environmental Services. There are no sewer mains crossing through the Project Site; however, a 2-inch high density polyethylene sewer main on Kamehameha Highway terminates just south of the Project Site, at Hukilau Beach. Another 2-inch sewer main is located on Wahinepe'e Street.

4.1.2. Stormwater

Drainage system and storm water structures such as conduits, retention basins, drain inlets are not present in the Project Site.

4.1.3. Potential Effects and Mitigation

The Proposed Action will not generate demand for the existing utilities system. No excavation and work affecting underground utilities is expected to occur at the Project Site. No short- or long-term impacts are anticipated, and no additional mitigation is required.

4.2. Transportation and Circulation

4.2.1. Traffic

The Project Site is located off Kamehameha Highway, or Route 83, which is a primary state collector road which runs from Kāne'ohe town to Hale'iwa town. The highway is a one lane roadway, with a posted speed limit of 35 miles per hour within the Project Site vicinity. The roadway networks surrounding the Project Site includes Cackle Fresh Egg Farm Road, a private roadway, and several minor streets serving residential areas including Naniloa Loop, Wahinepe'e Street and Lanihuli Street. Traffic flow on Kamehameha Highway is low to moderate with vehicular movement going towards Hukilau Beach and Mālaekahana State Recreation Park. There is little to no traffic on the minor streets and private roads.

4.2.2. Access and Circulation

Access to the Project Site is provided through various entry points off Kamehameha Highway. The Project Site can be accessed from two driveways in the north, from Wahinepe'e Street behind Ken's Fresh Fish Takeout and a private road off Cackle Fresh Egg Farm Road. The Project site can also be accessed from the south, via a driveway from Wahinepe'e Street and the public accessway at Hukilau Beach Park. Most of these access points are through

privately owned properties owned by Property Reserve, Inc. Access to privately owned roads were granted by the appropriate owners and additional right-of-entry permits will be obtained if necessary.

4.2.3. Potential Effects and Mitigation

The Proposed Action will not impact traffic and nearby facilities. Loading trucks carrying dredging equipment and hauling off sediment off-site will be operated in time intervals determined by the Contractor. This will help alleviate congestion on the two-lane Kamehameha Highway and other surrounding areas. No road closures are expected to take place during time of dredging activities; however, the Honolulu Police Department will be notified if such actions take place. This may require the use of flagmen or off-duty police officers to direct traffic and emergency vehicles to minimize the potential disturbance of the Proposed Action to traffic flow. No long-term significant impacts are anticipated, and no additional mitigation is required.

4.3. Parks and Recreation

4.3.1. Facilities

Hukilau Beach Park is located makai of the Project Site and is owned by Property Reserve, Inc. Although privately owned, the beach park is publicly accessible. Users can enjoy access to the beach and conduct recreational activities.

Mālaekahana State Recreational Area/Park is located north of the Project Site. It is owned and managed by the DLNR Division of State Parks. The Park offers recreational facilities near the Project Site. The stream is ranked by the Hawai'i Stream Assessment as having substantial recreational resources for activities such as hunting, swimming, body surfing, fishing, picnicking and camping.

4.3.2. Potential Effects and Mitigation

Access to nearby parks and recreational areas may be temporarily impacted during the transport and hauling of dredged material. The public access to Hukilau Beach will be used as a truck haul route and users may expect increased congestion of the accessway. However, these impacts are only anticipated during the duration of the Proposed Action and no long-term significant impacts are anticipated.

4.4. Medical and Emergency Services

4.4.1. Hospitals

After-hour care, private medical facilities and emergency response facilities are located within close proximity to the Project Site. The closest hospital is Kahuku Medical Center, located approximately 2.0 miles northwest of the Project Site on Pualalea Street. Another facility within close vicinity is the Kaiser Permanente Kahuku Clinic, although it is open for scheduled appointments only.

4.4.2. Honolulu Emergency Services Department

Emergency medical services would be provided by the Emergency Medical Services (EMS) Division of the City and County of Honolulu Emergency Services Department. The Project Site is served by District 3, which includes the eastern and northern regions of O‘ahu. The EMS, in coordination with the Honolulu Fire Department, would be responsible for responding to medical emergencies at the Project Site.

4.4.3. Potential Effects and Mitigation

The Proposed Action would not create a significant increase in the demand in emergency services already responding to the surrounding neighborhoods. No short- or long-term significant impacts are anticipated, and no additional mitigation is required.

4.5. Fire

4.5.1. Honolulu Fire Department

Fire services at the Project Site would be provided by the City and County of Honolulu Fire Department (HFD). There are two fire stations in close proximity to the Project Site, including Kahuku Station 13, approximately 1.7 miles northwest, and Hau‘ula Station 15, 2.6 miles south. The Project Site is easily accessible from Kamehameha Highway as well as the entryway into Wahinepe‘e Street and the Hukilau Beach parkway for fire truck access. A fire hydrant is located within 170 ft of the Dredging Limit.

4.5.2. Potential Effects and Mitigation

The Proposed Action is not anticipated to pose any risks related to fire, nor will it increase the demand for HFD services. No short- or long-term significant impacts are anticipated, and no additional mitigation is required.

4.6. Police

4.6.1. Honolulu Police Department

Police services would be provided by the City and County of Honolulu Police Department (HPD). The Project Site falls within District 4 – Kahuku, which is served by the Kahuku Police Substation, located approximately two miles northwest of the Project Site.

4.6.2. Potential Effects and Mitigation

Although no road closures are expected to take place during time of dredging activities, the Contractor will notify HPD if such actions take place. This may require the use of flagmen or off-duty police officers to direct traffic and emergency vehicles to minimize the potential disturbance of the Proposed Action to traffic flow. The Contractor would be responsible for communicating and scheduling HPD support as necessary. The Contractor would also be responsible for using necessary safety devices (e.g. signs, lights, barricades, etc.) to ensure public safety. No short- or long-term significant impacts are anticipated, and no additional mitigation is required.

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5. RELATIONSHIP TO PUBLIC AND LAND USE POLICIES

5.1. Federal

5.1.1. National Environmental Policy Act

The National Environmental Policy Act (NEPA), signed into law in 1970, requires federal agencies to determine potential environmental impacts as a result of their proposed actions. Under §102 Title I of NEPA, federal agencies are required to prepare detailed statements such as an Environmental Impact Statement (EIS) or Environmental Assessment (EA) on the environmental impacts, alternatives, and mitigations considered for federal actions affecting the environment. “Federal actions” are defined by Electronic Code of Federal Regulations (CFR) §1508.18(a) as *new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by Federal agencies[.]*

As the Proposed Action involves the nexus for federal action through the processing of federal permits for WOTUS, a NEPA EA shall be prepared by the appropriate federal agency, which in this case is the U.S. Army Corps of Engineers. Such permits include the following Department of Army (DA) Nationwide Permits (NWP):

- NWP 3 – Maintenance;
- NWP 19 – Minor Dredging;
- NWP 31 – Maintenance of Existing Flood Control Facilities; and
- NWP 35 – Maintenance Dredging of Existing Basins.

This EA will supplement the NEPA EA and will be processed in accordance with the Hawai‘i Environmental Policy Act HRS §343 and HAR §11-200.1.

5.1.2. Clean Water Act

The Clean Water Act (CWA) of 1972 regulates water quality standards for surface waters under WOTUS. Under the CWA, it is unlawful to discharge any pollutant into surface waters unless a permit is obtained, such as an NPDES permit. In a case where discharge may result from an activity, §401 of the CWA mandates that a Water Quality Certification (WQC) shall be obtained. In addition, §404 of the CWA regulates activities associated with the discharge of dredged material into surface waters in which an individual or general permit shall be processed and reviewed with the USACE. An individual permit is warranted if significant adverse effects are anticipated from the project. Because the Proposed Action will not significantly impact aquatic resources within the Project Site, general permits or certifications issued on a nationwide basis (i.e. Blanket §401 WQC) will be obtained and reviewed by the State agency as delegated by the EPA. The basis of the permit is to assure that no significant impacts would be anticipated to the aquatic environment and other resources such as wetland streams and other bodies of water.

The Proposed Action is anticipated to invoke the NPDES permit, DA NWP and the §401 WQC, which will be processed by the HDOH Clean Water Branch. On March 2, 2018, the HDOH Clean Water Branch issued the Blanket §401 WQC (modified on February 28, 2020) which covers certain DA NWP, allowing applicants to bypass the need to submit applications, documents, or reports to the branch. Coverage under the Modified Blanket §401 WQC assures that the Proposed Action will not violate State water quality standards.

5.1.3. Rivers and Harbors Act

The Rivers and Harbors Act (RHA) of 1899 prohibits the obstruction of navigable waters under WOTUS unless it is a lawful structure with Congressional approval. Structures or work within navigable waters will require a §10 permit if the work affects the condition of the water. Under §10 of the RHA, excavation, fill, dredging, re-channelization or other activities intended to alter or modify the conditions of any navigable water would require a §10 permit.

Because the Proposed Action entails dredging within the stream, a §10 permit shall be obtained and processed by USACE prior to commencement of the project.

5.1.4. Endangered Species Act

The Endangered Species Act (ESA) of 1973 aims conservation efforts towards protecting and recovering vulnerable species and their habitats. Species facing the risk of extinction are considered “endangered” and species with the likelihood of being endangered are deemed “threatened”. All endangered and threatened plant or animal species are covered under the ESA. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

The Flora and Fauna survey conducted for the Proposed Action identified two endangered species, which are the Hawaiian stilt and Hawaiian gallinule. Appropriate measures to limit the disturbance of their habitats will be implemented throughout the duration of the Proposed Action, as discussed in Section 3.9.3. The measures shall be confirmed with the USFWS to determine no adverse impacts to the existence of both endangered waterbird species and their habitat. The findings shall be included in the NEPA EA prepared by the USACE. This shall also satisfy the requirement of the Fish and Wildlife Coordination Act §662(a) which requires federal agencies to coordinate with the USFWS for the modification of any stream or water body.

The Flora and Fauna survey did not identify any endangered aquatic fauna or resources. However, the Proposed Action is required to comply with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as the work may affect the essential fish habitat (EFH). The EFH in the Hawaiian Islands encompasses the marine water column that spans from the shoreline to the outer boundary to the Exclusive Economic Zone, which is suitable for the “spawning, breeding, feeding, and growth” of federally managed fish (NOAA PIRO

2020). Work affecting the EFH shall undergo an EFH assessment and consultation with the NMFS under provisions of the MSA, in which the Proposed Action will adhere to.

5.1.5. National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 provides the basis for federal agencies to consider the effects of any federal action on historic properties. If a federal action has the potential to affect historic properties, §106 of the NHPA is applied. The §106 process involves consultation between the federal agency, State Historic Preservation Officer (SHPO) and other stakeholders who have economic, social, or cultural ties to the affected historic resource. An assessment of the effects of the Proposed Action on the resource would be based on criteria established by 36 CFR 800 of the Advisory Council on Historic Preservation. If any adverse impacts have been identified, the parties shall develop alternatives to mitigate the impacts to the historic resource.

The LRFI conducted by Honua Consulting for the Proposed Action yielded two historic properties within the Project Site: the historic house site and cemetery (SIHP -4465) and the Kahawainui-Lā'iewai Bridge. Neither of the properties are listed in the National Register of Historic Properties. Stakeholders were identified and consulted on the impacts of the Proposed Action. No adverse impacts were identified in the LRFI and appropriate mitigation measures are noted in Section 3.10.4. In addition, the LRFI has been conducted according to standards outlined in HAR §13-276 for AIS studies which is intended to assist with the project's compliance with HRS §6E-8 and consultation with SHPD.

5.2. State of Hawai'i

5.2.1. Hawai'i State Plan

The Hawai'i State Plan (the "State Plan") is a broad policy document that guides all activities, programs and decisions made by local and State agencies (DPED 1986). The purpose of the State Plan is to: (1) improve the planning process; (2) increase the effectiveness of government and private actions; (3) improve coordination among agencies and levels of government; (4) provide for the wise use of Hawai'i's resources; and (5) guide the future development of the state. Part I of the State Plan references Overall Theme, Goals, Objectives and Policies while Part III references the Priority Guidelines. Because Part II pertains primarily to internal government affairs it is not applicable to the Proposed Action and was not addressed.

The Proposed Action's conformance with the objectives and policies of the State Plan is discussed further below.

5.2.1.1. Part I. Overall Theme, Goals, Objectives and Policies

HRS 226-4: State Goals

Policy 2: A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems and uniqueness, that enhances the mental and physical well-being of the people.

Discussion: The Proposed Action would support State goals by enhancing the safety and well-being of the Lā'ie community by preventing damaging floods. The Proposed Action would provide the desired physical environment characterized by a stable natural system, in which Kahawainui Stream will remain to protect the community from flooding.

HRS 226-6: Policies for the Economy in General

Policy 11: Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.

Policy 12: Encourage innovative activities that may not be labor-intensive but may otherwise contribute to the economy of Hawai'i.

Policy 13: Foster greater cooperation and coordination between the government and private sectors in developing Hawai'i's employment and economic growth opportunities.

Policy 15: Maintain acceptable working conditions and standards for Hawai'i's workers.

Policy 19: Promote and protect intangible resources in Hawai'i, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.

Discussion: The Proposed Action would support the economy through the provision of job opportunities in the duration of dredging activities. Coordination between the City and private contractors will be necessary for the removal of dredged material. The Proposed Action will preserve the scenic beauty of Kahawainui Stream and the Lā'ie community by employing protective measures to contain damaging floods.

HRS 226-11: Policies for the Physical Environment-Land-Based, Shoreline and Marine Resources

Policy 2: Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

Policy 3: Take into account the physical attributes of areas when planning and designing activities and facilities.

Policy 4: Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

Policy 6: Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai'i.

Policy 8: Pursue compatible relationships among activities, facilities and natural resources.

Discussion: The Proposed Acton would ensure the compatibility between land-based activities and natural resources. Dredging activities would only affect the natural environment and ecological systems in the stream temporarily, however ambient conditions will recover post dredging activities. The Project design takes into account the physical attributes of areas within the Project Site. Mitigation measures to protect rare or endangered plant and animal species are provided in Section 3.9.3.

HRS 226-12: Policies for the Physical Environment-Scenic, Natural Beauty and Historic Resources

Policy 1: Promote the preservation and restoration of significant natural and historic resources.

Policy 3: Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes and other natural features.

Policy 4: Protect those special areas, structures and elements that are an integral and functional part of Hawai'i's ethnic and cultural heritage.

Policy 5: Encourage the design of developments and activities that complement the natural beauty of the islands.

Discussion: The Proposed Action would support the objectives and policies for protecting scenic, natural, and historic beauty of the Project Site and surrounding area. The Proposed Action would support the restoration of Kahawainui Stream by conducting maintenance dredging in the channel. As part of the EA process, a CIA and LRFI were conducted to identify significant cultural and historic resources. Mitigation measures to protect structures identified as historically and culturally significant are discussed in Section 3.10.4.

HRS 226-13: Policies for the Physical Environment – Land, Air, and Water Quality

Policy 2: Promote the proper management of Hawai'i's land and water resources.

Policy 3: Promote effective measures to achieve desired quality in Hawai'i's surface, ground and coastal waters.

Policy 4: Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.

Policy 5: Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions and other natural or man-induced hazards and disasters.

Discussion: The Proposed Action would support the management of water resources by implementing measures to maintain standard water quality conditions. There is no anticipated discharge from dredging activities, preserving aquatic conditions of nearby coastal waters such as Lā'ie Bay. However, the Proposed Action will comply with State water quality standards NPDES permit programs and conditions. *See* Section 3.3. Air quality levels will be maintained through employment industry BMPs and project phasing. *See* Section 3.4. The purpose of the Proposed Action is to prevent flooding to nearby areas, reducing threat to life and property in the Lā'ie community.

HRS-226-15: Policies for Facility Systems – Solid and Liquid Wastes

Policy 2: Promote the re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.

Discussion: The Proposed Action will consider the re-use of dredged material for beach replenishment. The dredged material is suitable for replenishment as it primarily consists of sand and is not considered a hazardous waste. *See* 3.2.3 and Section 3.7.

HRS 226-26: Policies for Socio-cultural Advancement – Public Safety

Policy b(1): Ensure that public safety programs are effective and responsive to community needs.

Discussion: The HPD was contacted as part of the EA pre-consultation process and notified of the DEA publication. Their comments were included in the EA to ensure that safety measures are taken during the Proposed Action. *See* Section 4.7. Their comments have been included in Appendix E.

5.2.1.2. Part III. Priority Guidelines

HRS 226-104 Population Growth and Land Resources

Guideline b(10): Identify critical environmental areas in Hawai'i to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and quality; and scenic resources.

Guideline b(13): Protect and enhance Hawai'i's shoreline, open spaces, and scenic resources.

Discussion: As part of the EA process, a Flora and Fauna survey was conducted to identify critical habitat areas for endangered species. Two endangered waterbird species were identified and appropriate mitigation measures will be taken to protect the endangered species noted in Section 3.9.3. In addition, a CIA and LRFI was conducted to identify historic and cultural sites at the Project area in which two sites were identified. Mitigation measures of these historic sites are discussed in Section 3.10.4. Scenic resources will be preserved and be not impacted by the Proposed Action as discussed in Section 3.8.1.

HRS 226-108: Sustainability

Guideline 1: Encouraging balanced economic, social, community, and environmental priorities.

Guideline 5: Promoting decisions based on meeting the needs of the present without comprising the needs of future generations.

Discussion: The purpose of the Proposed Action is to prevent flooding of the stream to the surrounding community. This balances the economic, social, community and environmental priorities of by reducing costs from flooding damages, ensuring safety for the local community and surrounding environment. Maintaining the stream helps meet the needs of the present generation as well as the future generations.

HRS 226-109: Climate Change Adaptation

Guideline 5: Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains and wetlands, that have inherent capacity to avoid, minimize, or mitigate the impacts of climate change.

Guideline 10: Encourage planning and management of the natural and built environments that effectively integrate climate change policy.

Discussion: The Proposed Action encourages the preservation and management of Kahawainui Stream by maintaining flood control measures to mitigate the impacts of climate change, such as increased storms and heavy rainfall events.

5.2.2. Hawai'i State Functional Plan

The State Plan directs appropriate State agencies to prepare Functional Plans which address statewide needs, problems and issues and recommend policies and actions to mitigate those problems. The Functional Plans are prepared to further define and implement statewide goals, objectives, policies and priority guidelines contained in the HSP. Thirteen Functional Plans were prepared to implement the State Plan provisions in the areas of agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism and transportation.

The Proposed Action's conformance with the purposes of the Functional Plans is discussed further below.

Historic Preservation State Functional Plan

Purpose: Preservation of historic properties, records, artifacts, and oral histories; provide public with information/education on the ethnic and cultural heritages and history of Hawai'i.

Discussion: The Proposed Action will support the Historic Preservation State Functional Plan. As part of the EA process, an LRFI report was prepared and identified two historically significant properties within the Project Site. Recommendations from the report will be used to avoid impacts to any potential resources that may be found on-site during construction. See Section 3.10.4 for mitigation measures to preserve historic sites.

5.2.3. State Land Use Law

The State Land Use Law, HRS §205, is intended to preserve, protect and encourage the development of lands in the State for uses that are best suited to the public health and welfare of Hawai'i's people. Under HRS §205, all lands in the State of Hawai'i are classified by the State Land Use Commission (LUC) into one of four major categories of State Land Use Districts. These districts are identified as the Urban District, Agricultural District, Conservation District and Rural District. Permitted uses within the districts are prescribed under HRS §205-2 and the LUC's Administrative Rules prescribed under HAR §15-15-3.

The Project is situated in the Urban and Agriculture State Land Use Districts. The Proposed Action is consistent with the Urban and Agriculture State Land Use Districts permissible land uses. The Urban District generally includes lands characterized by "city-like" concentrations of people, structures and services, whereas the Agriculture District is characterized by large lots used for farming and other agricultural activities. Urban District land uses in Honolulu are designated to the City's Department of Planning and Permitting and are governed under the Land Use Ordinance. Uses in Urban Districts are typically those pertaining to development and associated activities, which the Proposed Action involves to a certain extent in terms of maintaining a development (i.e., the Kahawainui flood control project). However, the Proposed Action will not require a City land use permit as the work within the Project Site is only temporary and no major alterations or permanent structures are anticipated post dredging. Within State Districts, land uses pertaining to farming, agricultural operations and open spaces are permitted. The Proposed Action is permissible in accordance with §HRS 205-4.5(8) *Retention, restoration, rehabilitation, or improvement of buildings or sites of historic or scenic interest*. The Proposed Action is aimed to improve flooding conditions within the area, enhancing the scenic quality of the Project Site.

Per DLNR OCCL's DEA comment letter dated April 13, 2023, should the project determine it is necessary to include the sand berm of the Kahawainui Stream mouth, the project would

be regulated under HAR §13-5-22 P-13 Land and Resource Management (A-3). This would not require a permit from the DLNR or the Board of Land and Natural Resources. The DLNR OCCL may provide a letter of “No Objection” if requested for documentation that the project has been reviewed. In addition, the sand cleared from the stream mouth would be required to be placed on the adjacent shoreline.

5.2.4. Hawai‘i Coastal Zone Management Plan

The National Coastal Zone Management (CZM) Program was created through passage of the Coastal Zone Management Act of 1972. The U.S. Congress enacted the CZM Act to assist states in better managing coastal and estuarine environments. The Act provides grants to states that develop and implement federally approved CZM plans. The goal of the CZM Act is to “preserve, protect, develop and where possible, to restore or enhance the resources of the nation’s coastal zone.” Hawai‘i’s CZM Act, adopted as HRS §205A, provides a basis for protecting, restoring, and responsibly developing coastal communities and resources. In Hawai‘i, the “coastal zone management area” means all lands of the State and the area extending seaward from the shoreline to the limit of the State’s police power and management authority, including the territorial sea.

As the Proposed Action involves the nexus for federal action through the processing of federal permits for WOTUS, CZM Act federal consistency review will be required by the State Office of Planning and Sustainable Development (OPSD). The DDC will consult with OPSD on the polices and procedures applicable to CZM Act federal consistency.

The Proposed Action’s conformance with the objectives and policies of the State of Hawai‘i CZM Plan is discussed further below.

HRS 205A-2(1): Recreational Resources

Policy B(vi): Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters.

Discussion: The Kahawainui Stream was identified as an impaired water body according to the HDOH *State of Hawai‘i Water Quality Monitoring and Assessment Report*. The Proposed Action will temporarily affect water quality in the stream but is not anticipated to have long-term effects post dredging. An NPDES permit as well as a modified blanket WQC will be obtained to meet State water quality standards. Additional mitigation measures to maintain water quality in the stream is discussed further in Section 3.3.5. Dredging activities will terminate mauka of the stream mouth and will not affect the waters of Lā‘ie Bay.

HRS 205A-2(2): Historic Resources

Policy A: Identify and analyze significant archaeological resources.

Policy B: Maximize information retention through preservation of remains and artifacts or salvage operations.

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

Discussion: The Proposed Action will protect historic and archaeological resources. As part of the EA process, an LRFI report was prepared and identified two historic sites within the Project Site. Recommendations from the report will be used to avoid impacts to the existing sites and any potential resources are discussed in Section 3.10.4.

HRS 205A-2(3): Scenic and Open Resources

Policy A: Identify valued scenic resources in the coastal zone management area.

Policy B: Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.

Policy C: Preserve, maintain and, where desirable, improve and restore shoreline open space and scenic resources.

Discussion: The Proposed Action will preserve the integrity of Kahawainui Stream and Lā'ie Bay. Dredging activities will not impact the visual environment of the stream and nearby scenic areas. See Section 3.8.

HRS 205A-2(4): Coastal Ecosystems

Policy C: Preserve valuable ecosystems, including reefs, of significant biological or economic importance.

Policy D: Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversion, channelization and similar land water uses, recognizing competing water needs.

Discussion: The Proposed Action will comply with State water quality standards to preserve valuable aquatic resources. Dredging activities will terminate mauka of the stream mouth and will not affect the waters of Lā'ie Bay.

HRS 205A-2(5): Economic Uses

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

Discussion: The Proposed Action consists of maintenance dredging for the Kahawainui Stream, which may provide indirect benefits to the State's economy by way of reducing the potential for flooding to surrounding areas and maintaining sufficient downstream flow of the stream. Maintenance dredging of the Kahawainui Stream will reduce the potential of

overbank and catastrophic flooding due to major storm events and thus will reduce the potential damage and services that would be required during and after flood events.

HRS 205A-2(6): Coastal Hazards

Policy A: Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence and point and nonpoint source pollution hazards.

Policy D: Prevent coastal flooding from inland projects.

Discussion: The Proposed Action is aimed at developing flood control measures to prevent flooding to the surrounding areas. As part of the EA process, information about the area's susceptibility to flooding and other natural hazards is further discussed in Section 3.6.

HRS 205A-2(7): Managing Development

Policy A: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Discussion: During the EA process, public agencies, organizations, and nearby landowners were consulted about the project during the pre-consultation phase and were also notified of the publication of the DEA. All comments received and responses provided during the pre-consultation phase can be found in Appendix E. Table 11 provides a summary of the comments received and responses provided on the DEA; and a copy of the DEA comment and response letters can be found in Appendix F.

HRS 205A-2(8): Public Participation

Policy A: Stimulate public awareness, education, and participation in coastal management.

Discussion: As previously noted, public agencies, organizations, and nearby landowners were consulted about the project during the EA process and were informed of the Proposed Action and need for the dredging activities to maintain downstream flow and to reduce the potential for flooding of the Kahawainui Stream and the surrounding areas.

HRS 205A-2(9): Beach and Coastal Dune Protection

Policy A: Protect beaches and coastal dunes for:

- (i) Public use and recreation;
- (ii) The benefit of coastal ecosystems; and
- (iii) Use as natural buffers against coastal hazards; and

Policy B: Coordinate and fund beach management and protection.

Discussion: The Proposed Action will preserve the integrity of Kahawainui Stream, Lā'ie Bay, and Hukilau Beach and will not adversely impact these beaches and recreational areas as the dredging activities will terminate mauka of the stream mouth. In addition, the project will comply with State water quality standards to preserve valuable aquatic resources.

HRS 205A-2(10): Marine Resources

Policy A: Ensure the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial.

Discussion: The Proposed Action will not affect any coastal resources as dredging activities terminate mauka of the sand berm at the stream mouth. However, as part of the EA process, the NMFS provided pre-consultation comments and was notified of the DEA. Their comments have been incorporated in Sections 3.3.5 and 5.1.4 and are included in Appendix E.

5.2.5. State Commission on Water Resource Management

In 1987, the Hawai'i State Legislature called for the Commission on Water Resource Management (CWRM) to implement a program for the development, conservation, protection, control and regulation of water resources. The following year an amendment to the water code required the commission to identify rivers, stream or portions of rivers and streams which should be protected and preserved as part of a public trust. CWRM and the National Park Service (NPA) created the Hawaii Stream Assessment (HSA) to inventory riparian resources and make better water protection and management decisions. HSA was used to designate rivers and streams that should be protected.

Rivers and streams were ranked based on aquatic, riparian, cultural and recreational resources present. The HSA assessment determined Kahawainui was determined to possess substantial cultural (see Section 3.10) and recreational (see Section 4.3) resources, with limited aquatic resources (see Section 3.3). While around ten percent of the stream runs through native forest and had palustrine wetlands present, it was not determined to be an outstanding or substantial riparian resource.

5.3. City and County of Honolulu

5.3.1. O'ahu General Plan

The O'ahu General Plan (the "General Plan") is a statement of objectives and policies for the long-range social, economic, environmental and design objectives of the City planning process over a 20-year time frame. The General Plan was recently revised and adopted by the City Council on December 1, 2021 as Resolution 21-023, CD1, and signed by Mayor Rick Blangiardi on January 14, 2022. The General Plan is intended to guide all levels of government, private enterprise, neighborhood, and citizen groups, organizations, and individual citizens in eleven (11) areas of concern including: Population; Balanced Economy; Natural environment and resource stewardship; Housing and communities; Transportation

and utilities; Energy Systems; Physical development and urban design; Public safety and community resilience; Health and education; Culture and recreation; and Government operations and fiscal management.

Updates made to the Revised General Plan include a greater consideration for concerns such as climate change and sea level rise. The Proposed Action's consistency with the objectives and policies of the currently adopted O'ahu General Plan is further discussed below.

III. Natural Environment and Resource Stewardship

Policy A(1): Protect O'ahu's natural environment, especially the shoreline, valleys, ridges, watershed areas, and wetlands from incompatible development.

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

Policy A(3): Preserve, protect, and restore stream flows and stream habitats to support aquatic and environmental processes and riparian, scenic, recreational, and Native Hawaiian cultural resources.

Policy A(6): Design and maintain surface drainage and flood-control systems in a manner which will help preserve natural and cultural resources.

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

Policy A(8): Protect plants, birds, and other animals that are unique to the State of Hawai'i and O'ahu, and protect their habitats.

Policy B(1): Protect the Island's significant natural resources: its mountains and craters; forests and watershed areas; wetlands, rivers, and streams; shorelines, fishponds, and bays; and reefs and offshore islands.

Discussion: The Proposed Action will adhere to stringent BMPs during dredging and operation to prevent impacts to surface and groundwater resources. As part of the EA process, a Flora and Fauna survey was conducted. Mitigation measures were included in the EA to prevent any adverse impacts on the Project Site's natural environment. *See* Section 3.9.

V. Transportation & Utilities

Policy B(9): Require the safe use and disposal of hazardous waste.

Discussion: Testing results of the dredged material samples yielded levels below the HDOH EALs, which are not considered hazardous waste. Proper storage, handling and disposal practices will be adhered to. *See* Section 3.7.

VIII. Public Safety and Community Resilience

Policy A(1): Provide a safe environment for residents and visitors on O'ahu.

Policy B(1): Keep up-to-date and enforce all City and County safety regulations.

Policy B(3): Participate with State and Federal agencies in the funding and construction of flood-control projects, and prioritize the use of ecologically sensitive flood-control strategies whenever feasible.

Policy B(6): Reduce hazardous traffic conditions.

Discussion: The HPD was contacted as a part of the EA pre-consultation process and were notified of the DEA publication. Their responses are incorporated in Section 4.6.2 and are included in Appendix E.

X. Culture and Recreation

Policy B(2): Identify, and to the extent possible, preserve and restore buildings, sites and areas of social, cultural, historic, architectural and archaeological significance.

Policy B(3): Cooperate with the State and Federal governments in developing and implementing a comprehensive preservation program for social, cultural, historic, architectural and archaeological resources.

Policy D(12): Provide for safe and secure use of public parks, beaches and recreation facilities.

Discussion: As part of the EA process, an LRFI report was prepared and identified two historic sites within the Project Site. Recommendations from the report will be used to avoid impacts to the existing sites and any potential resources are discussed in Section 3.10.4. Dredging activities are not anticipated to go past the sand berm at stream mouth, ensuring the safe use of Hukilau Beach, Mālaekahana State Recreation Area and Lā'ie Bay.

5.3.2. Ko'olau Loa Sustainable Communities Plan

The Project Site is in the Ko'olau Loa Sustainable Communities Plan (the "Community Plan"), which extends from Kualoa Beach to Turtle Bay Resort. The Community Plan aims to preserve the region's rural character and its natural and cultural resources by limiting housing and commercial development. The Community Plan was recently revised and adopted in November 2020. The Community Plan will continue its vision of maintaining Ko'olau Loa's distinct country character defined by its small towns and natural and scenic resources.

The Proposed Action is not expected to increase housing and commercial development, nor will it negatively impact the area's natural and scenic resources. The Proposed Action seeks to protect the health, safety, and welfare of the public by preserving lands and nearby areas susceptible to flooding.

The Proposed Action is in compliance with the following policies and guidelines within the Community Plan:

Guidelines 3.1.2.4 Natural Gulches, Streams, and Drainageways

- To the extent possible, limit any modifications to natural gulches and streams, except for measures which are necessary for flood protection. If modifications are needed, they should minimize impacts on biological habitats and natural resources, complement the existing rural character and aesthetic quality, and maintain existing water quality and the rate and volume of freshwater run-off into near-shore waters. Drainageway modifications may include stream-side vegetation and rip-rap boulder lining of stream banks, channelization should be a last resort and should be limited to v-shaped bottom channels and/or other appropriate measures that preserve the environmental habitat qualities and capabilities to maintain a stream flow during low rainfall periods.

Discussion: The Proposed Action will maintain the aesthetic and biological qualities of the Project Site. As part of the EA process, a Flora and Fauna survey was conducted to identify ecologically important species and habitats. BMPs will be utilized to limit the disturbance of soil and surfaces. The purpose of the Proposed Action is to provide flood protection for the surrounding environment and communities. Water quality conditions will be maintained, and no discharge is anticipated to enter near-shore waters.

Drainage systems

Policies 4.6.1

- Improve drainage systems in the region to provide adequate protection from flooding to protect the quality of nearshore waters.
- When drainage ways must be modified for flood control purposes, select approaches and solutions which, to the extent possible:
 - Improve existing habitat capability;
 - Maintain existing rural and aesthetic qualities and enhance the regional open space network;
 - Avoid degradation of existing coastline and estuarine area or nearshore water quality;
 - Avoid degradation of the quality of water entering nearshore waters; and
 - Avoid increase in the volume or rate of freshwater intrusion into nearshore waters.

Guidelines 4.6.2

- Maintenance. Regularly maintain and clean drainage ways and flood mitigation structures of debris to ensure that they achieve the purpose for which they were designed.

Discussion: The Community Plan specifically states that current drainageways within the community require maintenance and consideration with concern to flooding. The project scope of dredging ensures that the capacity is at its full potential without causing degradation to the coastline and ensuring the quality and protection of water resources.

5.3.3. Land Use Ordinance

The Land Use Ordinance (LUO) establishes zoning regulations to regulate and review land uses and development standards in accordance with the City's land use policies, such as the General Plan and Community Plan. The Project Site is located within Agricultural AG-1 and AG-2 zones as well as P-2 Preservation zone. Within an AG-1 zone, lands are mainly restricted to the conservation and preservation of agricultural lands for the uses pertaining only to production of food, feed, storage, fiber crops and horticultural plants (LUO Sec. 21-3.50(b)). Lands in AG-1 are generally state-designated agricultural district and are more than 5 acres in size. Likewise, AG-2 lands have similar function and features compared to AG-1 zones, except lands are typically less than 5 acres in size (LUO Sec. 21-3.50(e)(3)). In a P-2 zone, lands are typically suited for visual relief and outdoor space (LUO Sec. 21-3.40(e)). The Proposed Action does not necessarily fall into any use enumerated in Table 21-3 as it is mainly routine maintenance. As the stream is a natural feature and the Proposed Action is intended to benefit the safety and well-being of the surrounding environment, the Proposed Action is in conformance with the LUO.

5.3.4. Special Management Area

The Special Management Area (SMA), established in 1975 with the passing of Act 176 or the Shoreline Protection Act, is land that is associated with the shoreline or coastal water. Under HRS Chapter 205A, developments within the SMA undergo special controls to "avoid permanent losses of valuable resources" and "ensure adequate access to public owned or used beaches, recreation areas, and natural reserves." The SMA permit is under the authority of the County in which the development takes place.

The Proposed Action is within the SMA and is subject to the conditions of the Revised Ordinances of Honolulu (ROH) Chapter 25. A formal letter of determination was received from the Department of Planning and Permitting on December 21, 2015, stating that the Proposed Action was exempt from SMA permit requirements. The determination was based on the consensus that development does not include "routine maintenance dredging of existing streams, channels, and drainageways" per ROH Chapter 25-1.3(2)(c). The Proposed Action is not anticipated to have any significant impacts on the SMA.

6. PERMITS AND APPROVALS

The Proposed Action will be subject to the following list of permits and approvals:

Table 8: Permits and Approvals

Entity/Agency	Permit/Approval
Federal	
United States Army Corps of Engineers	Department of Army Nationwide Permits (Section 404 and Section 10)
United States Army Corps of Engineers	National Environmental Policy Act
State	
HDOH Clean Water Branch	Section 401 Water Quality Certification
	National Pollutant Discharge Elimination System
DLNR Commission on Water Resource Management	Stream Channel Alteration Permit
Office of Planning and Sustainable Development	Coastal Zone Management Consistency
HDOH Indoor and Radiological Health Branch	Community Noise Permit
Hawaii Department of Transportation	Occupancy & Use of State Highway Right-of-Way
City and County	
Department of Planning and Permitting	Special Management Area (Exemption)
Department of Planning and Permitting	Stockpiling Permit
Department of Transportation Services	Street Usage Permit

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7. SUMMARY OF IMPACTS AND MITIGATION MEASURES

This chapter summarizes the impacts and proposed mitigation measures to avoid or minimize any adverse effects to any environmental resources. Any BMPs required by State and Local agencies as part of the permitting process are discussed in the resource-specific section.

Table 9: Impacts and Proposed Mitigation Measures

Short-term Impacts		
Resource	Impact(s)	Proposed Mitigation Measures
Soils	Fugitive dust and erosion in the stream.	Use of BMPs: temporary silt and dust fences, slope protection, stabilized vehicle entrance, grate inlet protection, truck washdown areas and use of compost filter socks.
Surface Water	Increased turbidity	Erosion-control practices, effective silt containment devices and curtailment of work during adverse weather and tidal/flow conditions.
Air Quality	Fugitive dust and increased greenhouse gas emissions.	Temporary silt and dust fences. Work and use of greenhouse gas emitting machinery are temporary, no additional mitigation is required.
Acoustic Environment	Noise from dredging activities	Use of noise-attenuating equipment, such as mufflers, and adherence to noise curfews.
Scenic Resources	Temporary installment of barriers, BMPs and dredging machinery	Work and associated structures are temporary, no additional mitigation is required.
Fauna	Work affecting nesting habitats and aquatic conditions in the stream.	Use of erosion-control practices and BMPs in the stream. Work during daylight hours and use of sea-bird friendly lights for migratory birds. Halting work in the presence of endangered waterbirds. No removal of trees greater than 15 ft for roosting bats.

Short-term Impacts		
Cultural Resources	Temporary conditions of the stream affecting fishing and taro farming operations.	Use of erosion control practices and BMPs in stream.
Traffic	Increased traffic due to transport of dredged material	Implementing time intervals for truck haul routes. If needed, use of flaggers or off-duty police officers to direct traffic and emergency vehicles
Park facilities	Access to Hukilau Beach used as truck haul route	Implementing time intervals for truck haul routes.
Long-term Impacts		
Resource	Impact	Proposed Mitigation Measures
Flood	Benefits the community in the long-term by preventing flooding in the surrounding area. Social and economic long-term benefits from preventing damages.	Continued maintenance dredging in the stream.

8. DETERMINATION

A Finding of No Significant Impact (FONSI) determination is warranted for the Proposed Action. Potential impacts of the Proposed Action have been evaluated in accordance with the significance criteria, pursuant to HAR §11-200.1-13. The following findings and reasons indicate that the Proposed Action will have no significant adverse impacts on the environment based on the thirteen significance criteria and are presented as follows:

1. **Irrevocably commit a natural, cultural, or historic resource;**
The Proposed Action would not irrevocably commit any natural, cultural or historic resources at the Project Site. The Proposed Action will implement BMPs and mitigation measures to avoid or minimize potential impacts that would result in significant losses or destruction to natural, cultural and historic resources.
2. **Curtail the range of beneficial uses of the environment;**
The Proposed Action would remain consistent with uses surrounding the Project Site and would not curtail future beneficial uses of the environment.
3. **Conflict with the State's environmental policies or long-term environmental goals established by law;**
The Proposed Action would not conflict with the State's environmental policies and objectives or long-term environmental goals. BMPs and mitigation measures would be implemented to avoid or minimize potential impacts associated with construction or operation activities at the Project Site.
4. **Have a substantial adverse effect on the economic welfare, social welfare or cultural practices of the community and State;**
The Proposed Action would not adversely impact traditional and cultural practices. Mitigation measures would be implemented to protect the identified historic sites within the Project Site and existing conditions of Kahawainui Stream for cultural practices, such as fishing and kalo farming.
5. **Have a substantial adverse effect on public health;**
The Proposed Action would not contribute any adverse effects on public health. Short-term impacts to noise and air quality would be minimized through BMPs, and the Proposed Action will be conducted in compliance with applicable City and State policies and regulations as discussed throughout the EA.
6. **Involve adverse secondary impacts, such as population changes or effects on public facilities;**
The Proposed Action is intended to reduce the risk of flooding to the Laie community. Therefore, it would have positive impacts on the existing members of the community and public facilities in the surrounding area. The Proposed Action would not cause substantial adverse secondary impacts to the social environment or public resources.

- 7. Involve a substantial degradation of environmental quality;**
The Proposed Action would not degrade environmental quality at the Project Site or surrounding area. The Proposed Action entails conducting routine maintenance dredging in the Kahawainui Stream to maintain ideal conditions that reduce flooding impacts to the surrounding environment.
- 8. Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;**
The Proposed Action would not have a substantial adverse effect upon the environment and does not involve future commitments beyond the current project scope.
- 9. Have a substantial adverse effect on a rare, threatened or endangered species, or its habitat;**
The Proposed Action would not cause significant impact to rare, threatened or endangered species or habitats on the Project Site. Suitable nesting habitat identified for two endangered species, the Hawaiian stilt and gallinule. Although suitable roosting and foraging habitat was identified in the Project Site, the Hawaiian Hoary Bat was not observed on-site during the project survey. BMPs in monitoring and mitigation would be implemented to avoid and protect potential impacts to these species and suitable habitats.
- 10. Have a substantial adverse effect on air or water quality or ambient noise levels;**
Although short-term impacts are anticipated from dredging activities, the Proposed Action would not create adverse effects on air, water or noise conditions at the Project Site. BMPs such as, erosion control and dust mitigation would be implemented to avoid or minimize short-term impacts of construction activities. Long-term impacts to ambient noise would be consistent with the existing uses and activities in the surrounding area. Potential impacts from dredging operations would remain in compliance with all applicable City and State regulations.
- 11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;**
The Proposed Action does not anticipate substantial adverse effects or risk of damage from natural hazards at the Project Site. The purpose of the Proposed Action is to maintain flood control measures in the Kahawainui Stream to prevent flooding to the surrounding area. The Proposed Action is not anticipated to suffer damages as the action involves temporary dredging activities for maintenance purposes.
- 12. Have a substantial adverse effect on scenic vistas and view planes, during day or night, identified in county or state plans or studies; or**
The Proposed Action would not significantly impact surrounding scenic resources, such as Lā'ie Bay or Kahawainui Stream. The Proposed Action is intended to provide

maintenance dredging in the stream and will not include permanent structures post dredging activities. Scenic views will be restored upon completion of the project.

13. Requires substantial energy consumption or emit substantial greenhouse gases.

The Proposed Action would not require substantial energy consumption or emit substantial greenhouse gases. Short-term greenhouse gas emissions may result from dredging operations, which include the machinery operated to dredge material in the stream, to the vehicles transporting the dredged material. Emission of greenhouse gases from the Proposed Action will cease upon completion of the project.

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9. AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED

The following stakeholders were consulted in the HRS §343 environmental review process.

Table 10: Consulted Stakeholders

Agency/ Organization/ Individual	Notification of Pre-consultation	Responded to Pre-consultation	Notification of DEA Publication	Responded to DEA
Department of the Interior, Geological Survey Pacific Islands Water Science Center	X		X	X
Department of the Interior Fish and Wildlife Service	X	X	X	
Department of Commerce National Marine Fisheries Service Pacific Islands Regional Office	X	X	X	
Department of the Interior National Parks Service Pacific Islands Support Office	X		X	
Department of Agriculture National Resources Conservation Service Pacific Islands Area Office	X		X	
Department of the Army, Army Corps of Engineers Pacific Ocean Division	X		X	
Department of the Navy Pacific Division, Naval Facilities Engineering Command	X		X	
Department of Homeland Security Coast Guard Commander, 14th Coast Guard District	X		X	
Environmental Protection Agency Region IX, Pacific Islands Contact Office	X		X	

Agency/ Organization/ Individual	Notification of Pre-consultation	Responded to Pre-consultation	Notification of DEA Publication	Responded to DEA
Department of Agriculture	X		X	
Department of Accounting and General Services	X	X	X	
Department of Business, Economic Development and Tourism	X		X	
Department of Business, Economic Development and Tourism Office of Planning	X	X	X	X
Department of Defense	X		X	
Department of Education	X	X	X	X
Department of Hawaiian Home Lands	X		X	
Department of Health Environmental Health Administration	X		X	
Department of Land and Natural Resources	X	X	X	X
Department of Land and Natural Resources State Historic Preservation Division	X		X	
Department of Land and Natural Resources Division of Aquatic Resources	X		X	X
Department of Land and Natural Resources Engineering Division	X	X	X	X
Department of Land and Natural Resources Commission on Water Resource Management	X	X		
Department of Land and Natural Resources Office of Conservation & Coastal Lands	X	X	X	X
Department of Land and Natural Resources	X	X	X	X

Agency/ Organization/ Individual	Notification of Pre-consultation	Responded to Pre-consultation	Notification of DEA Publication	Responded to DEA
Division of Forestry and Wildlife				
Department of Transportation	X	X	X	X
University of Hawai'i Water Resources Research Center	X		X	
University of Hawai'i Environmental Center	X		X	
University of Hawai'i Marine Program	X		X	
Office of Hawaiian Affairs	X		X	
Hawaii State Capitol Senate District 23	X		X	
Hawaii State Capitol House District 47	X		X	
Board of Water Supply	X	X	X	X
Department of Design and Construction	X	X	X	
Department of Environmental Services	X		X	
Department of Facility Maintenance	X		X	X
Honolulu Fire Department	X		X	X
Department of Planning and Permitting	X	X	X	X
Department of Parks and Recreation	X	X	X	
Honolulu Police Department	X	X	X	X
Department of Transportation Services	X		X	
City Council District 2	X		X	
Hawaiian Electric Company	X		X	X
Hawaiian Telcom	X		X	
Spectrum	X	X	X	X

Agency/ Organization/ Individual	Notification of Pre-consultation	Responded to Pre-consultation	Notification of DEA Publication	Responded to DEA
Hawai'i State Main Library & Document Center	X		X	
Joseph F. Smith Library	X		X	
Ko'olauloa Neighborhood Board No. 28	X		X	
Lā'ie Community Association	X		X	
Ko'olaupoko Hawaiian Civic Club	X		X	
Brigham Young University-Hawai'i	X		X	
Polynesian Cultural Center	X		X	
Laie Hawaii Temple	X		X	
Cackle Fresh Egg Farm	X		X	

Table 11 below provides a summary of the comments received on the Draft Environmental Assessment (DEA) and responses provided. A copy of the DEA comment letters, and response letters are included in Appendix F.

Table 11: Summary of DEA Comments and Responses

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
March 28, 2023	Geological Survey Pacific Islands Water Science Center	Our office received a draft Environmental Assessment Public Notice for the dredging of Kahawainui Stream. While we do not have any environmental concerns to report related to this project, we do have some infrastructure on Kahawainui Stream Lā'iewai Bridge that I was hoping to bring to your attention in order to prevent any damage during the dredging project. The attached photo shows our equipment which includes a 2-inch diameter by 10-feet long	DDC acknowledges the U.S. Geological Survey, Pacific Islands Water Science Center's (PIWSC) comment regarding existing equipment on the Kamehameha Highway bridgeway. The PIWSC's equipment has been noted in Section 1.4 to avoid damage during all dredging activities.	Section 1.4

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		<p>PVC bracketed to the bring. This equipment can also be seen in Figure 31 in draft Environmental Assessment Report. We operate this equipment in cooperation with the US Army Corps of Engineers to provide peak stage information on Kahawainui Stream.</p> <p>If you could please inform your team to try to avoid any damage to the PVC pipe and brackets that would be greatly appreciated.</p>		
April 4, 2023	Honolulu Fire Department	<p>The Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:</p> <ol style="list-style-type: none"> 1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (NFPA 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended) A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1). 2. The fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3. 3. An approved water supply capable of supplying the 	<p>DDC acknowledges the HFD's provisions required for projects. However, the Proposed Action will not involve any buildings or structures that would be subject to the HFD's listed provisions, as the project will only consist of dredging activities at the Kahawainui Stream. Access to the staging areas will be provided off Kamehameha Highway through Wahinepee Street, Hukilau Beach, Cackle Fresh Egg Farm Road, and a private roadway. Fire department access along these roads will not be hindered by project activities. In addition, the project is not anticipated to pose any risks related to fire, nor will it increase the demand for HFD services.</p>	Sections 1.4 and 4.5

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		<p>required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.</p> <p>4. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting and route them to the HFD for review and approval.</p> <p>The abovementioned provisions are required by the HFD. This project may necessitate additional requirements be met as determined by other agencies.</p>		
April 6, 2023	Hawaiian Electric Company	<p>Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has no objection to the project. Should Hawaiian Electric have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Kahawainui Stream Maintenance Dredging project comes to fruition, please continue to keep us informed.</p>	<p>DDC acknowledges that the Hawaiian Electric Company (HECO) has no objection to the project. Should there be any existing HECO easements and facilities in the project area, continued access for maintenance will be kept as is.</p>	N/A
April 12, 2023	Board of Water Supply	<p>Thank you for the opportunity to comment on the proposed stream dredging project. The Honolulu Board of Water Supply does not have any water facilities within the project area. All water services should be provided by the private water system serving the area.</p>	<p>DDC acknowledges that the Board of Water Supply does not have any water facilities within the project area.</p>	N/A

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
April 17, 2023	State of Hawai'i, Office of Planning and Sustainable Development	<p>The Office of Planning and Sustainable Development (OPSD) has the following comments to offer:</p> <ol style="list-style-type: none"> <u>Previous Comments</u> We confirm that the Draft EA has addressed some of our previous comments listed in our Early Consultation Response letter, DTS 202106251019HE, dated July 8, 2021. Our previous comments that were satisfactorily addressed in the Draft EA include: <ul style="list-style-type: none"> Confirming that the proposed action is exempt from Special Management Area Use permitting, and Details potential impacts and planned mitigation measures for polluted stormwater runoff, erosion and debris controls, and accounts for water quality concerns. <u>Coastal Zone Management Act (CZMA), Federal Consistency</u> We acknowledge that Table 8, page 75 of the Draft EA lists federal consistency as a needed approval by OPSD. We recommend that the applicant, the City and County of Honolulu, Department of Design and Construction (CCH-DDC), consult with our office on the policies and procedures applicable to CZMA federal consistency. <u>Hawai'i Coastal Zone Management (CZM) Program</u> We note that Section 5.2.4, pages 66-68 of the Draft EA include analysis on the project and the applicable provisions of the Hawai'i Revised Statute (HRS) § 205A-2, as amended. However, the analysis does not include an evaluation on HRS § 	<p>The DDC acknowledges OPSD's comments and provides the following responses:</p> <ol style="list-style-type: none"> DDC acknowledges OPSD's comment stating that the office's previous comments in the Early Consultation Response Letter dated July 8, 2021 had been adequately addressed in the DEA. Section 5.2.4 of the FEA has been revised to note that CZM Act federal consistency review will be required by OPSD, and that the DDC will consult with OPSD on the policies and procedures applicable to the review. Section 5.2.4 of the FEA has been revised to include an evaluation on the project against the policies of the CZM Program listed under HRS §205A-2 (5), (7), and (9). 	Section 5.2.4

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		<p>205A-2 (5), (7) and (9). Pursuant to HRS § 205A-4, in implementing the objectives of the CZM program, agencies shall consider ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, and economic development. If CCH-DDC finds that the provisions listed above are not applicable to this dredging and maintenance project, the analysis in the Final Environmental Assessment should state this and detail the rationale behind this conclusion.</p> <p>The objectives and supporting policies of the Hawai'i CZM Program serve as the foundation of the enforceable policies of the State of Hawai'i, as listed in HRS § 205A-2. Disclosure of impacts on CZM objectives and supporting policies, as it relates to HRS Chapter 343 requirements, will aid the State in determining impacts to the resources of the coastal zone, and mitigation measures on the subject lands involved for this proposed action.</p>		
April 20, 2023	City and County of Honolulu, Department of Planning and Permitting	We reviewed our previous comments, dated July 6, 2021, and find that they have been adequately addressed in the DEA. Therefore, we have no further comments at this time.	DDC acknowledges that the Department of Planning and Permitting's (DPP) previous comments from a letter dated July 6, 2021 has been adequately addressed in the Draft EA, and that the DPP has no further comments at this time.	N/A
April 21, 2023	State of Hawai'i, Department of Land and Natural Resources, Land Division	The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to DLNR's various	DDC acknowledges the comments received by the Division of Aquatic Resources, Engineering Division, and Office of Conservation and Coastal	N/A

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		divisions for their review and comment. Enclosed are responses/comments received from our (a) Division of Aquatic Resources, (b) Engineering Division, and (c) Office of Conservation and Coastal Lands.	Lands, and will provide separate response letters to the divisions and offices.	
April 21, 2023	State of Hawai'i, Department of Land and Natural Resources, Division of Aquatic Resources	<p>Riparian Impacts: As per the Environmental Notice, previously recorded native goby species included oopu nakea (<i>Awaous stamineus</i>), oopu akupa (<i>Eleotris sandwichensis</i>), and oopu naniha (<i>Stenogobius hawaiiensis</i>). Opaе kalaole (<i>Atyoida bisulcate</i>) and opaе oehaa (<i>Macrobrachium grandimanus</i>) have also been previously noted in the area. It is important to ensure that these, and other potential native species are protected from the effects of excessive sedimentation and altered water quality.</p> <p>All of these native stream fauna share an amphidromous life cycle which means they have a dependence on connectivity to the ocean. The adult animals lay their eggs in the stream and as the larvae hatch they are swept down stream into the ocean, where they grow into post-larvae/juveniles before migrating back upstream. Therefore, it is important that during the dredging operation and activities continuous stream flow is maintained and the avoidance of creating barriers that could block this downstream and upstream movement of these animals. Best Management Practices (BMPs) for prevention of excessive sedimentation should be followed. These</p>	The DDC acknowledges the DLNR-DAR's comments regarding riparian and marine impacts and mitigation measures. Section 3.9.4 of the FEA includes BMPs and mitigation measures for prevention of excessive sedimentation. This section has also been updated to include the requirement to notify DLNR-DAR if any above-average amounts of sediment or pollution enter the water, and if there is an observed mortality event related to riparian biota (e.g. fish die-off). In addition, the required actions and authorities to contact in the event that protected species such as the Hawaiian monk seal, other marine mammal, or sea-turtle is observed in close proximity to the project site has been added to Section 3.9.4. BMPs to eliminate potential incidental entanglement of marine organisms have also been included in Section 3.9.4.	Section 3.9.4

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		<p>could include using sediment control measures such as silt fences, sediment basins, and sediment curtains to trap sediment and prevent it from being released downstream. Using proper dredging techniques to minimize the amount of sediment disturbed during the dredging operation. For example, a suction dredge can be used instead of a clamshell dredge, as it can be more precise and require less disturbance. Timing the dredging operation to avoid periods of high flow, such as during heavy rain events or spring runoff. High flow periods can increase sediment transport and erosion rates downstream. Minimizing disturbance of stream banks during the dredging operation, as bank erosion can contribute to sedimentation rates downstream. After the dredging operation is complete, restoring stream banks and vegetation to stabilize the soil and prevent erosion.</p> <p>DAR would like to request prompt notification and photo-documentation of any occurrence where above-average amounts of sediment or pollution have entered the water in order to assess impact, if any.</p> <p>DAR would also like to request notification, photo documentation, and GPS coordinates in the event of an observed mortality event related to riparian biota (e.g. fish die-off).</p> <p>Marine Impacts: In addition to minimizing sedimentation and disturbance, interactions with marine species should be</p>		

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		<p>considered due to the close proximity of the activities to the ocean and shoreline. In the event that protected species such as the Hawaiian monk seal, other marine mammal or sea-turtle is observed in close proximity to the dredging site, contractors should take appropriate action to modify activities in order to avoid disturbance to the regular behavior and activities of the animal. Appropriate action would include but is not limited to ceasing construction activity until the animal leaves the area.</p> <p>Any interaction between a protected species and the activity proposed should be report to the NOAA Protected Species Division and State of Hawai'i DOCARE: NOAA Marine Mammal Response Coordinators (O'ahu): 808-220-7802 NOAA National Marine Fisheries Service – PIFSC Marine Turtle Biology and Assessment Program: (808) 725-5730 State of Hawai'i Department of Land and Natural Resources (DLNR) Division of Conservation and Resources Enforcement (DOCARE): 808-643-3567 DAR recommends that best management practices be utilized to eliminate any potential for incidental entanglement of any marine organism. Entanglement prevention practices will include but are not limited to: minimizing the amount of in-water structures or components that may potentially cause entanglement during research operations (loops, holes, slack</p>		

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		lines). If incidental entanglement of protected species occurs DAR and the appropriate federal agency should be notified immediately.		
April 10, 2023	State of Hawai'i, Department of Land and Natural Resources, Engineering Division	We have no additional comments.	DDC acknowledges that the DLNR Engineering Division has no additional comments.	N/A
April 13, 2023	State of Hawai'i, Department of Land and Natural Resources, Office of Conservation and Coastal Lands	<p>According to the information provided in the Draft Environmental Assessment for the subject property, the maintenance dredging will take place outside of the Conservation District and will not include clearing of the sand berm at the stream mouth.</p> <p>In the event that the City and County of Honolulu Department of Design and Construction (DDC) determines that it is necessary to include the sand berm in the dredging project, then the activity will be regulated under Hawai'i Administrative Rules §13-5-22 <i>P-13 LAND AND RESOURCE MANAGEMENT (A-3) Clearing of sand or silt from stream mouths, canals, drainage pipes or other features for state or county maintenance, provided that the sand removed shall be placed on adjacent shoreline areas unless the placement would result in significant turbidity, as determined by the department.</i></p> <p>If sand is cleared from the mouth of Kahawainui Stream, it must be placed on the adjacent shoreline.</p> <p>Any dredged and dried materials from the currently identified dredging limit which are designated for beach</p>	<p>DDC acknowledges OCCL's comment regarding required provisions under HAR §13-5-22 should the sand berm be included in the dredging activities. In addition, Section 1.4 of the FEA has been updated to note that any dredged and dried materials designated for beach replenishment must be submitted to OCCL for assessment prior to placement on the beach. Section 3.2.3 of the FEA has also been updated to note that BMPs will be implemented to reduce the potential of mixing undesired materials with any quality sand material collected during dredging and proposed for beach replenishment.</p> <p>Section 5.2.3 has been updated to note that if the sand berm at the stream mouth were to be included in the dredging limits, the project would be regulated under HAR §13-5-22, which would not require a permit. It has also been noted that if sand from the stream mouth is dredged, it will</p>	Sections 1.4, 3.2.3, and 5.2.3

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		replenishment per section 1.4 of the DEA must be submitted to OCCL for assessment prior to placement on the beach.	be placed on the adjacent shoreline.	
April 24, 2023	State of Hawai'i, Department of Education	The Hawai'i State Department of Education previously provided the enclosed comments, dated June 28, 2021, and has no additional comments.	DDC acknowledges that the State Department of Education (DOE) has previously provided a comment letter dated June 28, 2021, which stated that the project will not impact DOE schools. DDC also acknowledges that the DOE has no additional comments at this time.	N/A
April 28, 2023	Honolulu Police Department	The Honolulu Police Department recommends that all necessary signs, lights, barricades, and other safety equipment be installed and maintained by the contractor during the project. The impact of the ingress and egress of construction vehicles, equipment, and deliveries should be evaluated to ensure the traffic flow is not adversely affected.	DDC acknowledges the Honolulu Police Department's (HPD) recommendation to install necessary signs, lights, barricades, and other safety equipment during the project. HPD's recommendation has been noted in Section 4.6.2 of the FEA. The Proposed Action will not impact traffic and nearby facilities. Loading trucks carrying dredging equipment and hauling off sediment off-site will be operated in time intervals determined by the Contractor. This will help alleviate congestion on the two-lane Kamehameha Highway and other surrounding areas. No road closures are expected to take place	Sections 4.2 and 4.6.2

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
			<p>during time of dredging activities; however, the HPD will be notified if such actions take place. This may require the use of flagmen or off-duty police officers to direct traffic and emergency vehicles to minimize the potential disturbance of the Proposed Action to traffic flow.</p>	
<p>May 1, 2023</p>	<p>Charter Communications</p>	<p>The locations of existing routes and crossings were shown on the provided plans. The exact locations, and routing of all CATV facilities must be verified in the field due to construction variances. The location of the proposed project may influence Spectrum’s existing CATV plant in your work area.</p> <p>However, if the work or repairs being performed requires special machinery, with a specific height requirement, the contractor performing the work, will be required to notify our office prior to performing any work. Spectrum may need to reattach or move or plant system, if we must relocate our existing plant system, charges may apply.</p> <p>Currently, Spectrum utilizes HECO’s aerial infrastructure to provide our CATV services in the area that passes through your project location. Before any digging toning may be required. Call “One Call Center” at 866 423-7287 to set up toning.</p> <p>This information has been provided to help minimize delays and prevent damage to</p>	<p>DDC acknowledges Charter Communication’s comments regarding Spectrum’s existing aerial CATV facilities within the project area. Charter Communication’s office will be notified should the project require equipment that may interfere with aerial facilities. In addition, should any digging toning be required, the “One Call Center” will be contacted to set up toning.</p>	<p>Section 1.4</p>

Date of Letter	Agency/ Organization	Comment	Response	Referenced Section of Final EA
		existing CATV structures within the project area.		
May 1, 2023	City and County of Honolulu, Department of Facility Maintenance	Thank you for the opportunity to review and give input on the subject project. We have no comment at this time and we support the Department of Design and Construction (DDC) maintenance dredging project of Kahawainui Stream.	DDC acknowledges that the Department of Facility Maintenance has no comments at this time, and appreciates the department's support of the project.	N/A
May 5, 2023	State of Hawai'i, Department of Transportation	Thank you for your letter dated March 22, 2023, regarding the Draft Environmental Assessment Publication Notice. We have no further comments at this time.	DDC acknowledges that the State Department of Transportation has no further comments at this time.	N/A

10. REFERENCES

- Department of Planning and Economic Development. 1986. *The Hawai'i State Plan*. Hawai'i State Plan Council. (DPED 2019)
- Department of Public Works. 1996. *Final Environmental Assessment for Kahawainui Stream Flood Control Project*. Division of Engineering. (DPW 1996)
- Element Environmental. 2019. *Sampling Summary Report Dredged Material Evaluation for Maintenance Dredging at Kahawainui Stream, Oahu, Hawaii*. (E2 2019)
- Fletcher, C.H., E.E. Grossman, B.M Richmond, A.E. Gibbs. 2002. Atlas of Natural Hazards in the Hawaiian Coastal Zone. USGS Geologic Investigations Series I2761. United States Printing Office. (Fletcher et al. 2002)
- Hawaii Department of Health. 2020. State of Hawai'i Water Quality Monitoring and Assessment Report. Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to §303(d) and §305(b), Clean Water Act (P.L. 97-117). Clean Water Branch. (HDOH 2020)
- Honua Consulting. 2021. *Archaeological Literature Review and Field Inspection Report for the Kahawainui Stream Dredging Project, Lā'ie Ahupua'a, Ko'olaupua District, O'ahu Island TMKs: [1] 5-5-005:022 (por.), portions of [1] 5-5-009:007, 008, 009, 010, 011, 047, & 061, and [1] 5-6-001:004 (por.)*. (Honua 2021)
- Mink, John and Lau, Stephen. 1990. *Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii*. Water Resources Center, University of Hawaii at Manoa. (Mink et al. 1990)
- National Oceanic and Atmospheric Administration Pacific Islands Regional Office. 2020. *Essential Fish Habitat in Hawai'i Brochure*. (NOAA PIRO 2020)
- Oceanit. 2010. *Final Dredging Report, Kahawainui Stream Dredging, Lā'ie, Ko'olaupua, Oahu, Hawaii*. (Oceanit 2010)
- Sherrod, D.R., J.M Stinton, S.E. Watkins, and K.M. Brunt . 2007. *Geologic Map of the State of Hawai'i*. United States Geological Survey.
- SWCA. 2016. *Biological Resources Survey Report for Kahawainui Stream Dredging Project*. SWCA Project No. 31120. (SWCA 2016)
- Sweet, W.V., R.E. Kopp, C.P. Weaver, J. Obeysekera, R.M. Horton, E.R. Thieler and C. Zervas, 2017. *Global and Regional Sea Level Rise Scenarios for the United States*. NOAA

Technical Report NOS CO-OPS 083. NOAA/NOS Center for Operational Oceanographic Products and Services. (Sweet et al. 2017)

U.S. Army Corps of Engineers. 1985. *Final Detailed Project Report and Environmental Impact Statement for Kahawainui Stream.* Department of the Army. (USACE 1985)

Webster, P.J, G.J. Holland, J.A. Curry, and H.-R. Chang. 2005. *Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment.* Science 309:1844-1846. (Webster et al. 2005)

APPENDIX A: SAMPLING SUMMARY REPORT

SAMPLING SUMMARY REPORT DREDGED MATERIAL EVALUATION FOR MAINTENANCE DREDGING AT KAHAWAINUI STREAM, OAHU, HAWAII

Prepared for

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Prepared by

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98-030 Hekaha St., Unit 9
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July 2019

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
µg	microgram
ASTM	American Society for Testing and Materials
COC	chain-of-custody
COPC	contaminant of potential concern
cy	cubic yard
DOH	State of Hawaii Department of Health
DRO	diesel range organics
DU	decision unit
HEER	Hazard Evaluation and Emergency Response
E2	Element Environmental, LLC
EAL	Environmental Action Level
EDD	electronic data deliverable
Eurofins	Eurofins Calscience, Inc.
LCS	laboratory control sample
mg	milligram
ml	milliliter
NA	not applicable or not available
POC	point-of-contact
PCBs	polychlorinated biphenyls
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RRO	Residual range organics
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
SM	Standard Method
TCLP	toxicity characteristic leaching procedure
TGM	Technical Guidance Manual
TPH	total petroleum hydrocarbon
USCS	Unified Soil Classification System
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

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1 INTRODUCTION

Kahawainui Stream is located in Laie on the windward side of Oahu in the Koolauloa District (See Figure 1). The project site is located on the northeast side of the island of Oahu within the Kahawainui Watershed, which covers approximately 3,186 acres (4.978 square miles) between the ocean and the ridge of the Koolau Mountain Range. The watershed encompasses several tributary streams defined by gulches in the upper mauka regions. The project site is situated south of Omao Gulch and north of Ihiihi Gulch. The stream is spanned by an existing concrete bridge along Kamehameha Highway which, according to the City's GIS database, is owned by the State of Hawaii and maintained by the City and County of Honolulu. The outlet of the stream is usually blocked by a sand berm along the shoreline of the ocean.

In response to historical flood damages in the Laie area, the USACE and City & County of Honolulu constructed the Kahawainui Flood Control project in 1990. This project included construction of a 550-foot long concrete channel, a 450-foot long excavated earth channel, 500 linear feet of concrete floodwalls and 1,420 linear feet of levees. This project also included raising the elevation of two roadways. Maintenance dredging has not been performed on the stream since this flood control project was completed and is now required in order to prevent flooding.

This report describes pre-dredge sediment sampling that was conducted in March 2019 in order to determine the suitability of the dredge sediment for disposal or reuse. Planned maintenance dredging will remove silt and debris to restore the flow capacity and to prevent localized flooding caused by the buildup of material. The proposed dredge area extends from the mouth of the stream at the Pacific Ocean to the intersection of Laie Wai Stream (approximately 1,500 feet) (Figure 1).

1.1 Project Summary

The methods utilized during completion of this project are detailed in this report and were conducted in accordance with the project-specific sampling and analysis plan (SAP) (E2, 2017). The purpose of this project was to characterize material to be dredged from the Kahawainui Stream project area in order to help determine the most appropriate reuse/disposal option for the dredged material. Potential reuse alternatives are discussed later in this report based on the results of the sediment sampling and analyses. This project did not include testing sediment for ocean disposal.

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NOT TO SCALE

REFERENCES: GOOGLE EARTH.



PROJECT LOCATION

FIGURE
1

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1.2 Background and History

1.2.1 Sediment Management

Periodic dredging of the Kahawainui Stream is critical to the function of the stream channel to maintain sufficient flow capacity to prevent flooding of the adjacent surrounding areas. An important component to dredge related projects is determining an efficient, environmentally sound, feasible, and cost-effective management strategy for the material to be dredged. The findings of this investigation, specifically, the chemical characteristics of the material, will be used to evaluate potential management options.

1.2.2 Previous Sediment Characterization at Kahawainui Stream

Chemical Testing & Sediment Surveys Kahawainui Stream, Island of Oahu, Hawaii, 2010

In August 2009, Oceanit collected a single composite sample of sediment from the dredge area. The composite sample was comprised of 12 sediment increments collected from random locations throughout the dredge site. The sample was tested for Resource Conservation and Recovery Act (RCRA) metals and organochlorinated pesticides, none of which were detected above State of Hawaii Department of Health (DOH) Environmental Action Levels (EALs).

1.2.3 Potential Contaminant Sources and Migration Routes

There are no known contaminant sources in the vicinity of the site. There are, however, several potential contaminant sources that may have contributed to contamination of depositional sediment:

1. The majority of the land on either side of Kahawainui Stream is currently, and has historically been, used for agricultural purposes. The most likely chemical impact would be remnant pesticides and arsenic from agricultural application present in sediment deposits.
2. There is a cemetery located adjacent to the streambank just upstream of the project site area. Typical contaminants that would be indicative of such an area include heavy metals, particularly arsenic.
3. Due to the close proximity of the site to the Pacific Ocean, sediment, especially in the most down stream portions of the site, could have elevated levels of salinity. It is possible that tidal flux facilitates higher salinity seawater migrating upstream through at least a portion of the area to be dredged.

4. In addition, Laie Wai Stream flows into Kahawainui Stream, another possible migration route for potential contamination from surrounding agricultural land.
5. A large warehouse building and residential housing extends up to the banks of Kahawainui Stream upstream of the site. Storm water runoff from the housing area and ancillary asphalt-paved roadways could possibly enter Kahawainui Stream through surface water runoff.

2 PROJECT ORGANIZATION

2.1 Project Management

Belt Collins Hawaii LLC (Belt) was the prime contractor who subcontracted Element Environmental, LLC (E2) to complete this project. Ms. Kristen Yoshida with Belt served as the prime contractor point-of-contact (POC) for this project. Matthew Neal was the Project Manager for E2 and was responsible for oversight, planning and implementing the project as well as coordination with Belt and with the DOH Hazard Evaluation and Emergency Response (HEER) office. E2 worked closely with the DOH HEER office during development of the Sampling and Analysis Plan (SAP) and ultimately gained DOH HEER approval of the plan prior to commencement of field activities.

2.2 Team Responsibilities

E2 provided overall project management, prepared the DOH HEER-approved SAP, conducted the field sampling and prepared this summary report. Eurofins Calscience, Inc. (Eurofins) performed the analytical chemistry for the sediment samples.

Table 1
Project Team Contact Information

Organization	POC	Contact Information
Belt Collins Hawaii LLC	Kristen Yoshida	2153 North King Street, Suite 200 Honolulu, HI 96819-4554 kyoshida@bchdesign.com
Element Environmental, LLC	Matthew Neal	98-030 Hekaha Street, Unit 9 Aiea, Hawaii 96701 (808) 479-6075 mneal@e2hi.com
Eurofins Calscience, Inc.	Carla Hollowell	7440 Lincoln Way Garden Grove, California 92841 (714) 895-5494 carlahollowell@eurofinsUS.com

2.3 Laboratory Project Management

Eurofins Calscience provided laboratory analysis for this project. Eurofins met the following minimum technical requirements as specified in the negotiated subcontract with E2:

- Adhered to the methods outlined in the statement of work, including industry standard laboratory methods as per the DOH guidance.
- The laboratory followed DOH HEER Technical Guidance Manual (TGM) guidance on laboratory processing and analysis of *Multi-Increment*[®] samples. This includes guidance, on drying, sieving, and representatively subsampling of the bulk *Multi-Increment*[®] samples received. A minimum of 10-gram lab subsamples will be used for metals and all other contaminants of concern (5-gram subsamples acceptable for mercury).
- Delivered electronic data files as specified.
- Met all reporting requirements.
- Implemented QA/QC procedures required by the DOH.
- Allowed E2 to perform laboratory and data audits, if necessary.
- Followed documentation, chain-of-custody (COC), and sample logbook procedures.
- Met turnaround times for deliverables.
- Sediment samples were archived to allow for further analyses if required.

3 SUMMARY OF FIELD ACTIVITIES

The sampling design designated the collection of sediment samples within the proposed dredging footprint at Kahawainui Stream (Figure 2). The area sampled in this project extends from the mouth of Kahawainui Stream upstream to the Kahawainui Stream - Laiewai Stream intersection. *Multi-Increment*[®] sediment samples were collected at 240 increment locations positioned within eight DUs plus two replicate samples of 30 increments each collected within one of the DUs. Field activities were conducted between March 7 and March 12, 2019. Select photographs of the field activities are included in Appendix A, while copies of the field notes are included in Appendix B.

3.1 Site Layout and DU Establishment

For the purposes of sampling and analysis activities, the project area was subdivided into eight lateral DUs (Figure 2). The number of DUs is based on the DOH HEER Office *Guidance for Stockpile Characterization and Evaluation of Imported and Exported Fill Material, October 2017*. The DU lateral boundaries were delineated based primarily on the depth of sediment measured in the 2017 bathymetry survey (Belt Collins, July 2017) and observations made during the field effort prior to conducting the field sampling. During sample collection, observed vertical stratification was observed to be insignificant, thus vertical samples were not collected. The total volume of material to be dredged is estimated at roughly 2,900 cubic yards (based on the 2017 bathymetric survey). The 2017 HEER guidance suggests collection of a *Multi-Increment*[®] sample for every 400 cubic yards of material in order to characterize fill to be used on schools and/or high density residential areas (an *Multi-Increment*[®] sample was collected for each approximate 370 cubic yards of material). It is estimated that, based on the most recent bathymetry survey as well as measurements collected during the sediment sample collection, sediment depths range from approximately 0.5 to 3.0 feet in thickness in the dredge area. Sediment samples were collected to a maximum depth of 3.0 feet within the dredge area. Specifically, DU locations and boundaries were based on the following:

- Potential contaminant source entry points to the stream;
- Sediment depths;
- Stream configuration; and
- Sediment volume estimates.

DU locations were placed to represent the material that will ultimately be dredged. Depth interval boundaries were determined in the field based on observations of

sediment cores in order to ensure collection of representative samples. Table 2 provides a summary of the DUs established during this project.

Table 2
Sample DU Summary

DU	Location and Description
DU-2	Located at the downstream end of the stream, just upstream of the beach strand.
DU-3	Located just downstream of the Kamehameha Highway bridge.
DU-4	Located just upstream of the Kamehameha Highway bridge in the concrete-lined portion of the stream.
DU-5	Located upstream of DU-4, in the concrete-lined portion of the stream.
DU-6	Located just upstream of the concrete-lined portion of the stream, where the stream channel narrows.
DU-7	Located at the upper-most point of the project area and extending to the intersection of the Kahawainui Stream and the Laie Wai Stream.
DU-8	Located on the north side of the stream in the marshy, vegetated area adjacent to the narrow channel and DUs 6 and 7.
DU-9	Located on the south stream bank adjacent to the narrow channel and DUs 6 and 7.

3.2 Site Access and Vegetation Clearance

Prior to deployment of the sampling vessel and skiff, an access ramp adjacent to the Hukilau Beach Park was cleared of vegetation and debris to allow access of sampling vessel. The sampling vessel and skiff were moored in the center of the stream for the duration of the project.



REFERENCES: Google Earth.

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3.3 Sample Collection

Multi-Increment[®] sediment samples from the eight lateral DUs were comprised of composited material from a single depth interval at 30 increment locations within each of the eight lateral DUs (Figure 2). A total of eight primary *Multi-Increment*[®] sediment samples and two replicates were submitted for laboratory analyses. The following information was collected from each increment location:

- Water depth
- Sediment core length
- Stream bottom material

GPS coordinates were collected from the corners of each DU and recorded in the field logbook. Sample increment locations were determined in the field based on accessibility, bottom obstructions, etc.

Sediment was collected from increment locations using a small, generator-powered vibracore device that was fashioned in the field by the field crew as well as push cores. The vibracore and/or push core were driven into the sediment until refusal. Upon retrieval of the sampling tube, the sediment core was extracted from the tube into a sediment tray, at which time the sediment core was classified and the depth intervals designated for sample collection. The sampling equipment was deployed from a 16-foot sampling platform pontoon boat equipped with an A-frame, hoist and generator. A 12-foot aluminum skiff boat was used as a tender. Sampling equipment was decontaminated by rinsing with site water between DUs to avoid the possibility of cross contamination.

Adequate sediment volumes were collected to allow for all testing described in the SAP (approximately 3 L per *Multi-Increment*[®] sample). Sediment samples were collected to depths of up to 3.0 feet below the sediment surface, depending on the location, or refusal. When refusal was encountered, the increment location was moved until sufficient increment volume was attained. Each increment was collected by placing sediment from the entire length of the depth interval into a bulk sampling tray. Upon completion of collection of all 30 increments for each *Multi-Increment*[®] sample from each DU, the bulk sample was processed in the field (any vegetation and large gravel material was removed) and representatively subsampled into a manageable-sized *Multi-Increment*[®] sediment sample for submittal to the analytical laboratory. Subsampling was conducted in accordance with the DOH TGM, Section 5.7.1. The entire DU core mass was spread out evenly over the entire sampling tray, and representative subsamples were

collected by taking 30-50 increments in a systematic random fashion across the entire bulk sample.

Table 2 below provides a sediment sample summary:

Table 3
Sediment Sample Summary

DU/ Sample ID	Depth Interval Range (feet)	Average Sediment Depth Measured	Lithology	*Approximate DU Surface Area (ft ²)	*Approximate DU Volume (Yard ³)
DU-2	0-3.0	1.65	Course Sand	12,228	747
DU-3	0-3.0	1.45	Course Sand	16,728	898
DU-4	0-2.16	0.93	Course Sand	14,900	513
DU-5	0-2.91	0.81	Medium Sand	10,800	324
DU-6	0-1.16	0.33	Medium Sand	21,000	256
DU-7	0-2.0	0.67	Medium Sand	9,000	223
DU-8	0-2.0	0.94	Course Sand	15,756	548
DU-9	0-1.33	0.42	Medium Sand	10,300	160

Note:

*Surface area and volume estimates were calculated using depth intervals observed during the sampling effort. Estimates should be considered rough approximations.

Lithology is the predominant soil type identified by the grain size analyses.

3.3.1 Sample Handling

As each *Multi-Increment*[®] sample was collected, a scientist examined and classified the sediment from the DU. A representative sample from each DU was photographed and the pertinent data and observations were logged in the field notebook.

Sediment for chemical analysis was collected in the field and placed in sealable plastic bags, labeled (project name, date, sampler identifier, analysis, and preservative where applicable), logged into a field COC form, and placed into a cooler with ice. Samples remained on ice at 4 degrees Celsius (°C) until delivered via courier service to the

appropriate laboratory. Samples for chemical analysis were delivered to Eurofins in Garden Grove, California.

3.3.2 Sample Delivery

Prior to delivery to the analytical laboratory, sample containers were placed in a second sealable plastic bag and securely packed inside the cooler with gel ice. COC forms were filled out (see Section 4.3). The original signed COC forms was placed in a sealable plastic bag and placed inside the cooler and the cooler lids were securely taped shut. Samples were delivered to the appropriate analytical laboratories for analysis, as listed in Table 3.

Table 4
Analytical Laboratories, Points of Contact, and Shipping Information

Laboratory	Volume per Sample	Analyses Performed	POC	Shipping Information
Eurofins	3 L sediment	Sediment chemistry (See Section 4, table 3 for details)	Carla Hollowell (714) 895-5494	7440 Lincoln Way Garden Grove, CA 92841

3.3.3 Decontamination of Field and Sample Processing Equipment

All sampling equipment was cleaned prior to sampling. Between DUs, core barrels and sampling equipment (bowls, spoons, spatulas, mixers, and other utensils) were scrubbed with brushes as necessary to remove gross sediment and rinsed with site water. Rinse water and any remnant sediment from the sampling process was returned to the stream within each DU.

3.3.4 Waste Disposal

Any incidental sediment remaining after sampling was washed overboard at the collection site prior to moving to the next DU. All disposable sampling materials and personnel protective equipment used in sample processing (such as disposable coveralls, gloves, and paper towels) were placed into heavy duty garbage bags. Disposable supplies were removed from the vessel by sampling personnel and disposed as municipal solid waste.

3.3.5 Documentation

All phases of the sampling program were documented in a field logbook, on COC forms, and in photographs, as described in the project SAP.

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4 PHYSICAL AND CHEMICAL ANALYTICAL RESULTS

Chemical parameters measured for this project were selected to provide data for potential chemicals of concern in the proposed dredged material from Kahawainui Stream. All analytical methods used followed USEPA and ASTM standard methods. In addition, all contaminant concentrations were reported by the lab on a dry weight basis for comparison to DOH EALs. Full analytical data summary tables are included in Appendix C, while the full laboratory reports, including COC forms, are included in Appendix D. Specific contaminants groups that were tested are listed in Table 4.

Table 5

Chemical and Physical Parameters and Analytical Methods for Project Sediment Samples

Parameter	Method
Grain Size and Moisture Content	ASTM-D2216
TPH-DRO, TPH-RRO	EPA 8015B
Metals	6020/7471A
PCBs	EPA 8082
Organochlorine Pesticides	EPA 8081A
Chlorinated Herbicides	EPA 8151A

4.1 Analytical Results

None of the sediment samples collected contained concentrations of contaminants greater than the DOH unrestricted EAL for soil. Total petroleum hydrocarbons (TPH)-diesel range organics (DRO), polychlorinated biphenyls (PCBs), organochlorine pesticides and chlorinated herbicides were not detected above laboratory method detection limits. Trace concentrations of metals and TPH-residual range organics (RRO) were detected in multiple samples; however, concentrations were well below respective DOH EALs.

4.2 Quality Assurance and Quality Control

Laboratory QC results are included with the laboratory analytical reports in Appendix D. All data is considered acceptable for the purposes of this project.

Collection of *Multi-Increment*[®] sample replicates enables sampling precision to be evaluated. In order to ensure a representative value for comparison to DOH EALs, a statistical calculation of the variation between measured contaminant concentrations and

the estimated mean concentration is determined. In order to determine the precision of the *Multi-Increment*[®] sample data, the relative standard deviation (RSD) between the primary and both replicated samples is calculated and reported as a percent in the following manner:

$$\frac{\text{Standard Deviation of the 3 replicates}}{\text{Mean of the 3 replicates}} \times 100\%$$

An RSD of 35% or less typically indicates a good level of precision between replicates. According to the DOH TGM, an RSD of greater than 35% does not necessarily mean that the data is not usable, particularly if the average concentration levels of the contaminants within the DU are much greater or much lower than the EAL. Overall, concentrations of contaminants were low in all of the samples collected, including in the replicates. The RSDs of the contaminant concentrations that were detected in each of the three replicate samples were all below 35%, indicating a good level of precision between the replicates. RSD calculations are included in Appendix C in the Data QA/QC Summary Table.

5 INTERPRETATION OF ANALYTICAL RESULTS

5.1 Interpretation of Data

The purpose of this sampling project was to determine the suitability of proposed dredged material for offsite reuse and/or disposal. The testing resolution completed during this project was based on the 2017 DOH Stockpile Guidance. The average DU included approximately 400 cubic yards of material, which is adequate resolution for determination of suitability of dredge material for reuse at areas of similar size and volume as the DUs sampled, approximately 0.5 acres and 0.5-1.5 feet in thickness. The sampling resolution completed during this project is not adequate to determine if dredge material is suitable for unrestricted reuse, as the DOH requires that an *Multi-Increment*[®] sample be collected for every 100 cubic yards of material if material is to be cleared for unrestricted use.

Given that analytical results from the sediment samples indicate low concentrations (concentrations well below DOH Unrestricted EALs) of the contaminants of potential concern (COPCs), and based on the 2017 DOH Stockpile Guidance, the dredge material is suitable for reuse at the same general scale as the DU sizes presented in Table 2 and on Figure 2 at the following area types:

- Schools;
- High Density (high-rise) Residential Developments;
- Residential parcels of approximately 0.5 acres or greater;
- Industrial/commercial sites;
- Agricultural areas; and
- Beach replenishment areas.

It is important to note that if reuse of the dredge spoils at a residential area (e.g., smaller than approximately 0.5 acre parcel size) is intended, additional sampling and testing may be necessary.

Should some or all of the sediment be disposed at a waste facility such as PVT landfill, additional sampling and analysis may be required, dependent on the volume of sediment to be disposed and the profiling requirements of the landfill.

Based on observations made during the field effort, as well as the results of the soil grain size analyses, the dredge material would be most suited for beach replenishment, as it is comprised primarily of sand.

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6 REFERENCES

- Element Environmental, LLC. 2016. *Final Sampling and Analysis Plan, Dredged Material Evaluation for Maintenance Dredging at Kahawainui Stream, Oahu, Hawaii*. November.
- USACE and USEPA (U.S. Environmental Protection Agency), 2009. *Environmental Residue-Effects Database (ERED)*. <http://www.wes.army.mil/el/ered/>.
- USEPA and USACE, 1993. *Evaluation for Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual*.
- DOH HEER, 2008. *DOH HEER Office, Technical Guidance Manual for Implementation of the Hawaii State Contingency Plan, and Updates*. November.
- DOH HEER Office, *EALs, Fall 2017*.
- DOH HEER, 2017. *Guidance for the Evaluation of Imported and Exported Fill Material, Including Contaminant Characterization of Stockpiles*. October.

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APPENDIX A

PROJECT PHOTOGRAPHS



Photo 1: Looking upstream from just below the Kamehameha Highway Bridge. View of survey vessel and support skiff.



Photo 2: View of downstream end of project site, near stream mouth and beach.



Photo 3: View of upstream end of project site, survey vessel and sampling crew working in DU-9.



Photo 4: Sampling crew working in DU-8. Note that a portion of DU-8 consisted of thick vegetation mat and sediment buildup above water surface.



Photo 5: Collection of sediment sample from DU-8 using push core technique.



Photo 6: Typical sediment bulk sample consisting of combined increments of sediment.

APPENDIX B

FIELD NOTES

Kehawaini Stream



Rite in the Rain[®]

ALL-WEATHER

FIELD

Nº 351FX

150052

March 2018

2 5.7-19

0800 - 2nd AB arrive onsite -
 begin prep of vessels +
 gear for sediment sample
 collection
 Personnel onsite - M Neal,
 M. Herbert, M. Pulv B Rig
 T. So (in);
 M. J. Drake feeds, scattered
 clouds

1050 B-gear sample DU-3.

Core 14 - 2nd increment.

Core Length 30"

0-12" sand - very on surface
 12"-30" clay
 color dark greenish gray
 no odor

Proceed to collect 2 Sample
 intervals from DU-3 - one from
 the sand interval and one from
 the clay/sediment.

Increment	Depth	Temp	Salinity	Transmittance	Notes
1	4.5	20"	12"	8"	
2	4.5	30"	12"	18"	
3	3.2	14"	14"	-	
4	2.8	12"	12"	-	
5	4.5	36"	18"	-	
6	5.0	12"	12"	-	
7	4.8	14"	14"	-	
8	4.5	14"	14"	-	
9	4.2	24"	24"	-	
10	4.5	18"	18"	-	
11	3.8	18"	18"	-	
12	5.0	20"	20"	8"	
13	4.3	11"	10"	-	
14	3.8	18"	13"	5"	
15	4.0	12"	-	12"	
16	4.0	6"	6"	rocks	
17	4.0	12"	12"	rocks	
18	2.5	16"	12"	4"	
19	3.0	6"	-	6"	
20	4.0	12"	12"	-	
21	3.0	20"	20"	-	
22	3.0	18"	14"	4"	
23	2.8	27"	27"	-	
24	4.5	12"	12"	-	
25	4.5	6"	6"	-	

3/7/9 continued

DU-3 contin.

Insect	Wght	Core length	Seed	Clg
26	3.0	18"	18"	—
27	3.5	20"	14"	4"
28	3.8	25"	22"	5"
29	3.8	30"	30"	—
30	3.5	26"	26"	—

DU-3 observation. Fine clay
below sand along sides of channel
from about center of DU
towards Mauka.

14:30

shot DU-2

N 21.65486° W 157.92900

Inc.	H ₂ O dpth	Core length	Seed	Clg
1	2.5	37"	37"	—
2	2.8	12"	12"	—
3	3.0	30"	30"	—
4	3.0	18"	18"	—
5	3.5	24"	24"	—
6	3.0	12"	12"	—
7	4.5	12"	12"	—
8	3.7	14"	14"	—

3/7/9 cont.

DU-2 continued

Inc.	H ₂ O dpth	Core length	2nd	Clg
9	2.5	19"	19"	—
10	2.5	23"	23"	—
11	3.5	19"	19"	—
12	3.0	6"	6"	—
13	4.0	18"	18"	—
14	2.8	14"	14"	—
15	3.0	27"	27"	—
16	3.5	14"	14"	—
17	5.8	10"	10"	—
18	4.0	14"	14"	—
19	3.0	32"	32"	—
20	3.0	30"	30"	—
21	4.0	18"	18"	—
22	4.5	4"	4"	—
23	3.5	22"	22"	—
24	4.0	2"	2"	—
25	2.5	23"	23"	—
26	3.0	26"	26"	—
27	4.5	19"	19"	—
28	4.5	26"	26"	—
29	3.5	36"	34"	—
30	3.5	30"	30"	—

3-8-19

OS10 - Arrive onsite - E₂ MD, MH
 Δ3 TS, BR, MP

Proceed to pump vessel +
 Bag - collection in DU-4

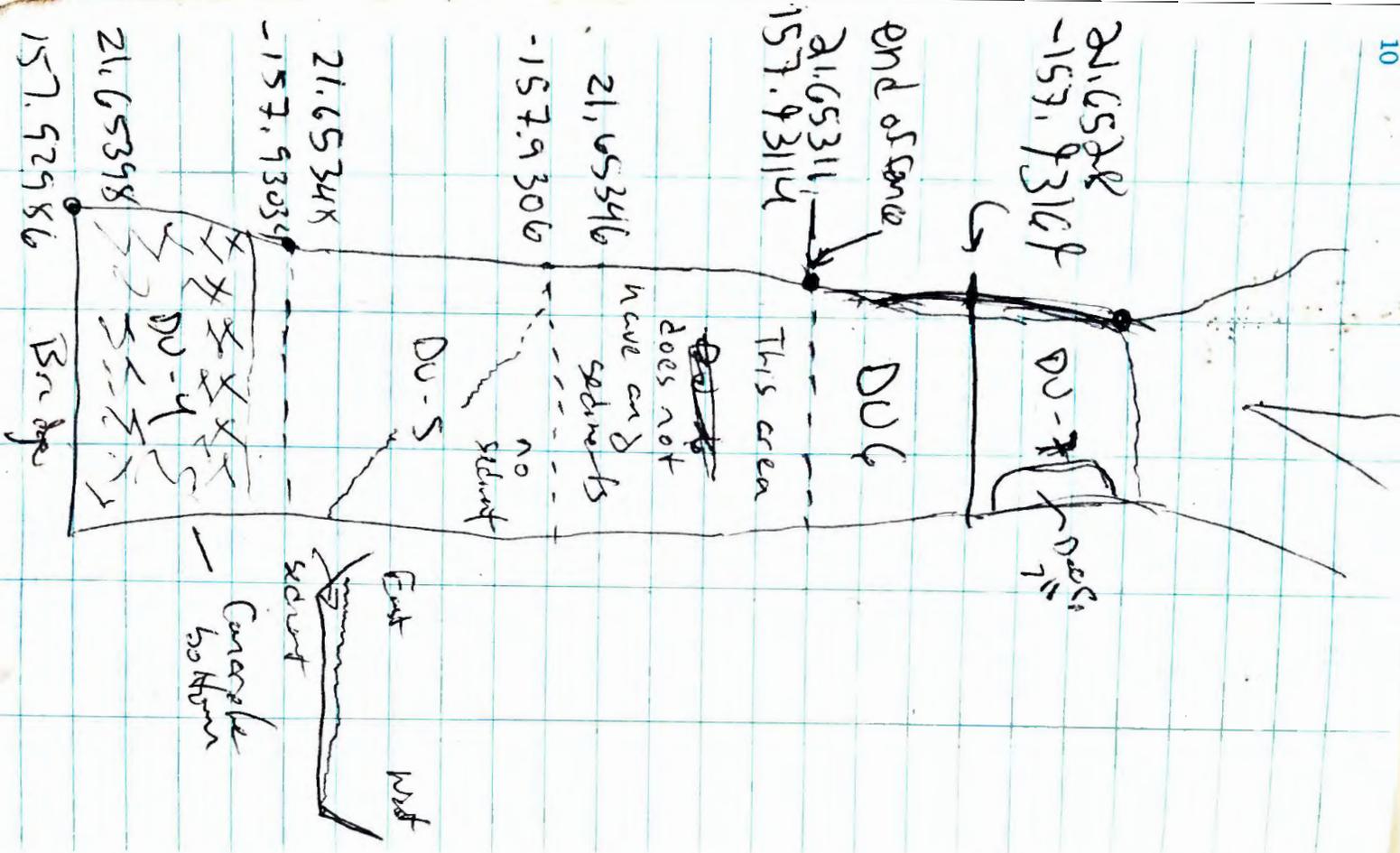
DU-4 N, 21.65348 157.93034

Inc	water depth	core length	Sand	silt/clay
1	4.0	12"	—	12"
2	4.5	10"	5"	5"
3	4.0	12"	12"	—
4	4.5	10"	10"	—
5	3.0	6"	6"	—
6	2.8	24"	24"	—
7	4.0	16"	16"	—
8	3.0	4"	4"	—
9	3.0 3.4	24"	20"	4"
10	3.0	6"	6"	—
11	2.8	12"	12"	—
12	2.9	14"	7"	7"
13	2.5	14"	—	14"
14	2.0	10"	—	10"
15	2.5	26"	16"	10"

3/8/19 cont.

DU-4 Inc	water depth	core length	Sand	clay
16	3.0	10"	10"	—
17	3.2	14"	9"	5"
18	3.5	5"	5"	—
19	3.0	4"	4"	—
20	3.0	4"	4"	—
21	3.0	10"	10"	—
22	2.5	14"	14"	—
23	2.0	24"	—	24"
24	2.0	14"	—	14"
25	2.0	14"	—	14"
26	3.2	3"	3" rocky	—
27	3.0	4"	4"	—
28	3.5	4"	4"	—
29	3.5	14"	14"	—
30	2.7	14"	2"	12"

DU-4 observations under
 bridge area concrete bottom
 some silt sediment in center
 no sediment on East side
 Just upstran of bridge, water
 shallows from 4.5 to 3 ft
 in center, no concrete bottom



3/8/19 cont

1. DU-4 observations cont
 ~ 1/2 way up. DU4 upstream more silt on overbank, concrete bottom of shoreline expands some 15' ft into the channel on both banks. ~ 6' ft deep concrete in channel. more silt on East bank than West bank, 24" silt vs 6" sand across concrete bottom extends into shoreline on the most upstream part of DU. Shoreline are ~ 5' ft deep to concrete in center.

10:45 - start DU-5

INC	water depth	concrete layer	ETES SAND	CLAY
1	2.3	12"	—	12"
2	2.0	15"	4"	14"
3	3.3	9"	4"	—
4	3.0	14"	12"	2"
5	3.3	4"	4"	—
6	3.0	4"	4"	—

3/8/19 continued
DU-5

Inc	Wet depth	Core length	Sand	Silt/ clay
7	3.3	8"	8"	—
8	3.1	3"	3"	rocks
9	3.6	18"	—	18"
10	2.0	14"	—	14"
11	2.0	8"	—	8"
12	2.0	6"	—	6"
13	3.8	4"	4"	—
14	3.0	3"	3"	—
15	2.5	12"	—	12"
16	1.7	12"	—	12"
17	1.5	12"	—	12"
18	2.0	11"	—	11"
19	1.5	4"	—	4"
20	1.5	10"	5"	5"
21	1.5	10"	2"	8"
22	1.8	10"	5"	5"
23	2.0	14"	—	14"
24	1.9	18"	—	18"
25	1.7	22"	—	22"
26	3.0	19"	—	19"
27	3.0	12"	10"	2"
28	3.0	6"	6"	—
29	3.5	6"	6"	—
30	3.5	8"	8"	—

3/8/19 continued

DU-5 continued in general observation that DU-5 closely resembles the documented upper portion of DU4. Center of DU concrete encased ~ 4ft.

12:15 - Complete sampling for the day total of 2 our reports.

12:30 - Leave site for Monday

~~3-8-19
VPS~~

14 3/11/7

0900 - Arrive outside, prep vessel, prepare for continuous sediment sampling.
E2 mmo/ AB BR, MP, TS

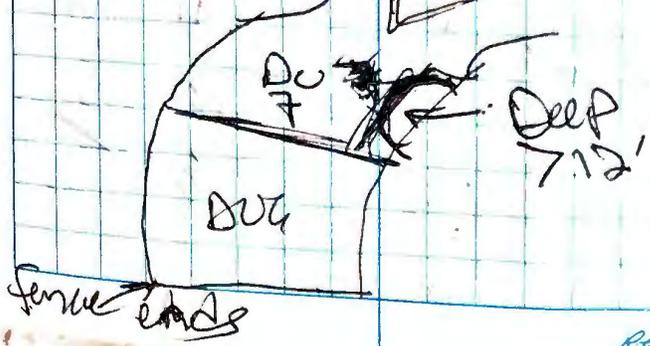
0945 - Proceed to 1st DU, commence sampling.

DUG 21.05311, -157.93114
- Start at end of fence
- see page 10 for image/map

Inc. Water Depth Core length % Sand % Silt/Clay

1	1.3'	6"	0	0"
2	2'	6"	0	0"
3	2.7'	6"	0	0"
4	2.9'	6"	0	0"
5	2.0'	6"	0	0"
6	2.0'	6"	0	0"
7	2.0'	6"	0	0"
8	2.0'	6"	0	0"
9	2.0'	6"	0	0"
10	2.0'	6"	0	0"
11	2.0'	6"	0	0"
12	2.1'	3"	3%	0"

Inc	Water Depth	Core length	Sand	Silt/Clay
1	2.0'	2"	2"	0
11	2.5'	12"	12"	0
14	2.4'	3"	1.5"	1.5"
15	2.4'	3"	1.5"	0
16	2.5'	1.5"	1.5"	0
17	2.0'	3"	3"	0
18	2.0'	2"	2"	0
19	2.5'	2"	2"	0
20	1.8'	8"	2"	0
21	2.2'	2"	2"	0
22	2.2'	14"	14"	0
23	2.5'	3"	3"	0
24	2.4'	6"	3"	3"
25	2.3'	2.5"	2.5"	0
26	2.5'	2"	2"	0
27	2.0'	1.5"	1.5"	0
28	2.0'	30"	0	30"
29	2.0'	2.5"	2.5"	0
30	2.0'	2.0"	2.5"	0



Return to base

Incu	D ₁₀	7-15.3.93129	7-15.3.93129	7-15.3.93129	Silt/Clay
25	2.8'	2.1"	2.1"	2.1"	0
24	2.5'	2.1"	2.1"	2.1"	0
23	2.5'	2.1"	2.1"	2.1"	0
22	3.5'	3.1"	3.1"	3.1"	0
21	5.5'	5.1"	5.1"	5.1"	0
20	5.5'	5.1"	5.1"	5.1"	0
19	5.5'	5.1"	5.1"	5.1"	0
18	6.0'	6.1"	6.1"	6.1"	0
17	6.0'	6.1"	6.1"	6.1"	0
16	6.0'	6.1"	6.1"	6.1"	0
15	6.0'	6.1"	6.1"	6.1"	0
14	4.0'	4.1"	4.1"	4.1"	0
13	2.5'	2.1"	2.1"	2.1"	0
12	2.5'	2.1"	2.1"	2.1"	0
11	2.5'	2.1"	2.1"	2.1"	0
10	2.5'	2.1"	2.1"	2.1"	0
9	4.0'	4.1"	4.1"	4.1"	0
8	3.5'	3.1"	3.1"	3.1"	0
7	3.5'	3.1"	3.1"	3.1"	0
6	3.5'	3.1"	3.1"	3.1"	0
5	3.5'	3.1"	3.1"	3.1"	0
4	3.5'	3.1"	3.1"	3.1"	0
3	3.5'	3.1"	3.1"	3.1"	0
2	3.5'	3.1"	3.1"	3.1"	0
1	3.5'	3.1"	3.1"	3.1"	0

Incu	Water Depth	CON Length	Sand	Silt/Clay
26	3.5'	8"	8"	15"
27	2.8'	15"	15"	0
28	3.1'	17"	17"	0
29	3.0'	8"	8"	0
30	2.5'	2"	2"	0

1300 - bank

DU-7 observations: hard-packed sand predominant - small deep channel area along west bank (7M' deep) soft silt in upstream-most portion of the DU - just downstream of the stream Y.

1350 - Rahum - proceed to DU-5 to collect 2 replicate samples

DUS Rep # 2 - 13150 shut

Time	HD Depth	Core	Sand	SHT/Day
10:00	2.0'	2"	Ø	24"
10:05	2.5'	3"	Ø	24"
10:10	3.0'	4"	Ø	24"
10:15	3.5'	5"	Ø	24"
10:20	4.0'	6"	Ø	24"
10:25	4.5'	7"	Ø	24"
10:30	5.0'	8"	Ø	24"
10:35	5.5'	9"	Ø	24"
10:40	6.0'	10"	Ø	24"
10:45	6.5'	11"	Ø	24"
10:50	7.0'	12"	Ø	24"
10:55	7.5'	13"	Ø	24"
11:00	8.0'	14"	Ø	24"
11:05	8.5'	15"	Ø	24"
11:10	9.0'	16"	Ø	24"
11:15	9.5'	17"	Ø	24"
11:20	10.0'	18"	Ø	24"
11:25	10.5'	19"	Ø	24"
11:30	11.0'	20"	Ø	24"
11:35	11.5'	21"	Ø	24"
11:40	12.0'	22"	Ø	24"
11:45	12.5'	23"	Ø	24"
11:50	13.0'	24"	Ø	24"
11:55	13.5'	25"	Ø	24"
12:00	14.0'	26"	Ø	24"
12:05	14.5'	27"	Ø	24"
12:10	15.0'	28"	Ø	24"
12:15	15.5'	29"	Ø	24"
12:20	16.0'	30"	Ø	24"
12:25	16.5'	31"	Ø	24"
12:30	17.0'	32"	Ø	24"
12:35	17.5'	33"	Ø	24"
12:40	18.0'	34"	Ø	24"
12:45	18.5'	35"	Ø	24"
12:50	19.0'	36"	Ø	24"
12:55	19.5'	37"	Ø	24"
13:00	20.0'	38"	Ø	24"
13:05	20.5'	39"	Ø	24"
13:10	21.0'	40"	Ø	24"
13:15	21.5'	41"	Ø	24"
13:20	22.0'	42"	Ø	24"
13:25	22.5'	43"	Ø	24"
13:30	23.0'	44"	Ø	24"
13:35	23.5'	45"	Ø	24"
13:40	24.0'	46"	Ø	24"
13:45	24.5'	47"	Ø	24"
13:50	25.0'	48"	Ø	24"
13:55	25.5'	49"	Ø	24"
14:00	26.0'	50"	Ø	24"
14:05	26.5'	51"	Ø	24"
14:10	27.0'	52"	Ø	24"
14:15	27.5'	53"	Ø	24"
14:20	28.0'	54"	Ø	24"
14:25	28.5'	55"	Ø	24"
14:30	29.0'	56"	Ø	24"
14:35	29.5'	57"	Ø	24"
14:40	30.0'	58"	Ø	24"
14:45	30.5'	59"	Ø	24"
14:50	31.0'	60"	Ø	24"
14:55	31.5'	61"	Ø	24"
15:00	32.0'	62"	Ø	24"
15:05	32.5'	63"	Ø	24"
15:10	33.0'	64"	Ø	24"
15:15	33.5'	65"	Ø	24"
15:20	34.0'	66"	Ø	24"
15:25	34.5'	67"	Ø	24"
15:30	35.0'	68"	Ø	24"
15:35	35.5'	69"	Ø	24"
15:40	36.0'	70"	Ø	24"
15:45	36.5'	71"	Ø	24"
15:50	37.0'	72"	Ø	24"
15:55	37.5'	73"	Ø	24"
16:00	38.0'	74"	Ø	24"
16:05	38.5'	75"	Ø	24"
16:10	39.0'	76"	Ø	24"
16:15	39.5'	77"	Ø	24"
16:20	40.0'	78"	Ø	24"
16:25	40.5'	79"	Ø	24"
16:30	41.0'	80"	Ø	24"
16:35	41.5'	81"	Ø	24"
16:40	42.0'	82"	Ø	24"
16:45	42.5'	83"	Ø	24"
16:50	43.0'	84"	Ø	24"
16:55	43.5'	85"	Ø	24"
17:00	44.0'	86"	Ø	24"
17:05	44.5'	87"	Ø	24"
17:10	45.0'	88"	Ø	24"
17:15	45.5'	89"	Ø	24"
17:20	46.0'	90"	Ø	24"
17:25	46.5'	91"	Ø	24"
17:30	47.0'	92"	Ø	24"
17:35	47.5'	93"	Ø	24"
17:40	48.0'	94"	Ø	24"
17:45	48.5'	95"	Ø	24"
17:50	49.0'	96"	Ø	24"
17:55	49.5'	97"	Ø	24"
18:00	50.0'	98"	Ø	24"
18:05	50.5'	99"	Ø	24"
18:10	51.0'	100"	Ø	24"
18:15	51.5'	101"	Ø	24"
18:20	52.0'	102"	Ø	24"
18:25	52.5'	103"	Ø	24"
18:30	53.0'	104"	Ø	24"
18:35	53.5'	105"	Ø	24"
18:40	54.0'	106"	Ø	24"
18:45	54.5'	107"	Ø	24"
18:50	55.0'	108"	Ø	24"
18:55	55.5'	109"	Ø	24"
19:00	56.0'	110"	Ø	24"
19:05	56.5'	111"	Ø	24"
19:10	57.0'	112"	Ø	24"
19:15	57.5'	113"	Ø	24"
19:20	58.0'	114"	Ø	24"
19:25	58.5'	115"	Ø	24"
19:30	59.0'	116"	Ø	24"
19:35	59.5'	117"	Ø	24"
19:40	60.0'	118"	Ø	24"
19:45	60.5'	119"	Ø	24"
19:50	61.0'	120"	Ø	24"
19:55	61.5'	121"	Ø	24"
20:00	62.0'	122"	Ø	24"
20:05	62.5'	123"	Ø	24"
20:10	63.0'	124"	Ø	24"
20:15	63.5'	125"	Ø	24"
20:20	64.0'	126"	Ø	24"
20:25	64.5'	127"	Ø	24"
20:30	65.0'	128"	Ø	24"
20:35	65.5'	129"	Ø	24"
20:40	66.0'	130"	Ø	24"
20:45	66.5'	131"	Ø	24"
20:50	67.0'	132"	Ø	24"
20:55	67.5'	133"	Ø	24"
21:00	68.0'	134"	Ø	24"
21:05	68.5'	135"	Ø	24"
21:10	69.0'	136"	Ø	24"
21:15	69.5'	137"	Ø	24"
21:20	70.0'	138"	Ø	24"
21:25	70.5'	139"	Ø	24"
21:30	71.0'	140"	Ø	24"
21:35	71.5'	141"	Ø	24"
21:40	72.0'	142"	Ø	24"
21:45	72.5'	143"	Ø	24"
21:50	73.0'	144"	Ø	24"
21:55	73.5'	145"	Ø	24"
22:00	74.0'	146"	Ø	24"
22:05	74.5'	147"	Ø	24"
22:10	75.0'	148"	Ø	24"
22:15	75.5'	149"	Ø	24"
22:20	76.0'	150"	Ø	24"
22:25	76.5'	151"	Ø	24"
22:30	77.0'	152"	Ø	24"
22:35	77.5'	153"	Ø	24"
22:40	78.0'	154"	Ø	24"
22:45	78.5'	155"	Ø	24"
22:50	79.0'	156"	Ø	24"
22:55	79.5'	157"	Ø	24"
23:00	80.0'	158"	Ø	24"
23:05	80.5'	159"	Ø	24"
23:10	81.0'	160"	Ø	24"
23:15	81.5'	161"	Ø	24"
23:20	82.0'	162"	Ø	24"
23:25	82.5'	163"	Ø	24"
23:30	83.0'	164"	Ø	24"
23:35	83.5'	165"	Ø	24"
23:40	84.0'	166"	Ø	24"
23:45	84.5'	167"	Ø	24"
23:50	85.0'	168"	Ø	24"
23:55	85.5'	169"	Ø	24"
24:00	86.0'	170"	Ø	24"
24:05	86.5'	171"	Ø	24"
24:10	87.0'	172"	Ø	24"
24:15	87.5'	173"	Ø	24"
24:20	88.0'	174"	Ø	24"
24:25	88.5'	175"	Ø	24"
24:30	89.0'	176"	Ø	24"
24:35	89.5'	177"	Ø	24"
24:40	90.0'	178"	Ø	24"
24:45	90.5'	179"	Ø	24"
24:50	91.0'	180"	Ø	24"
24:55	91.5'	181"	Ø	24"
25:00	92.0'	182"	Ø	24"
25:05	92.5'	183"	Ø	24"
25:10	93.0'	184"	Ø	24"
25:15	93.5'	185"	Ø	24"
25:20	94.0'	186"	Ø	24"
25:25	94.5'	187"	Ø	24"
25:30	95.0'	188"	Ø	24"
25:35	95.5'	189"	Ø	24"
25:40	96.0'	190"	Ø	24"
25:45	96.5'	191"	Ø	24"
25:50	97.0'	192"	Ø	24"
25:55	97.5'	193"	Ø	24"
26:00	98.0'	194"	Ø	24"
26:05	98.5'	195"	Ø	24"
26:10	99.0'	196"	Ø	24"
26:15	99.5'	197"	Ø	24"
26:20	100.0'	198"	Ø	24"
26:25	100.5'	199"	Ø	24"
26:30	101.0'	200"	Ø	24"

with rocks

DUS Rep # 3 - 14147

Time	HD Depth	Core	Sand	SHT/Day
10:00	2.0'	18"	Ø	18"
10:05	2.5'	13"	Ø	13"
10:10	3.0'	20"	Ø	15"
10:15	3.5'	18"	Ø	18"
10:20	4.0'	14"	Ø	14"
10:25	4.5'	14"	Ø	14"
10:30	5.0'	14"	Ø	14"
10:35	5.5'	14"	Ø	14"
10:40	6.0'	14"	Ø	14"
10:45	6.5'	14"	Ø	14"
10:50	7.0'	14"	Ø	14"
10:55	7.5'	14"	Ø	14"
11:00	8.0'	14"	Ø	14"
11:05	8.5'	14"	Ø	14"
11:10	9.0'	14"	Ø	14"
11:15	9.5'	14"	Ø	14"
11:20	10.0'	14"	Ø	14"
11:25	10.5'	14"	Ø	14"
11:30	11.0'	14"	Ø	14"
11:35	11.5'	14"	Ø	14"
11:40	12.0'	14"	Ø	14"
11:45	12.5'	14"	Ø	14"
11:50	13.0'	14"	Ø	14"
11:55	13.5'	14"	Ø	14"
12:00	14.0'	14"	Ø	14"
12:05	14.5'	14"	Ø	14"
12:10	15.0'	14"	Ø	14"
12:15	15.5'	14"	Ø	14"
12:20	16.0'	14"	Ø	14"
12:25	16.5'	14"	Ø	14"
12:30	17.0'	14"	Ø	14"
12:35	17.5'	14"	Ø	14"
12:40	18.0'	14"	Ø	14"
12:45	18.5'	14"	Ø	14"
12:50	19.0'	14"	Ø	14"
12:55	19.5'	14"	Ø	14"
13:00	20.0'	14"	Ø	14"
13:05	20.5'	14"	Ø	14"
13:10	21.0'	14"	Ø	14"
13:15	21.5'	14"	Ø	14"
13:20	22.0'	14"	Ø	14"
13:25	22.5'	14"	Ø	14"
13:30	23.0'	14"	Ø	14"
13:35	23.5'	14"	Ø	14"
13:40	24.0'	14"	Ø	14"
13:45	24.5'	14"	Ø	14"
13:50	25.0'	14"	Ø	14"
13:55	25.5'	14"	Ø	14"
14:00	26.0'	14"	Ø	14"
14:05	26.5'	14"	Ø	14"
14:10	27.0'	14"	Ø	14"
14:15	27.5'	14"	Ø	14"
14:20	28.0'	14"	Ø	14"
14:25	28.5'	14"	Ø	14"
14:30	29.0'	14"	Ø	14"
14:35	29.5'	14"	Ø	14"
14:40	30.0'	14"	Ø	14"
14:45	30.5'	14"	Ø	14"
14:50	31.0'	14"	Ø	14"
14:55	31.5'	14"	Ø	14"
15:00	32.0'	14"	Ø	14"
15:05	32.5'	14"	Ø	14"
15:10	33.0'	14"	Ø	14"
15:15	33.5'	14"	Ø	14"
15:20	34.0'	14"	Ø	14"
15:25	34.5'	14"	Ø	14"
15:30	35.0'	14"	Ø	14"
15:35	35.5'	14"	Ø	14"
15:40	36.0'	14"	Ø	14"
15:45	36.5'	14"	Ø	14"
15:50	37.0'	14"	Ø	14"
15:55	37.5'	14"	Ø	14"
16:00	38.0'	14"	Ø	14"

Inc.	Depth	Core	Spand	Sift
17	2.4"	10"	Ø	10"
18	2.5"	2"	Ø	Ø
19	2.5"	13"	Ø	13"
20	2.5"	14"	Ø	13"
21	2.5"	13"	Ø	10"
22	2.5"	12"	Ø	8"
23	2.5"	13"	Ø	11"
24	2.5"	12"	Ø	10"
25	2.5"	12"	Ø	10"
26	2.5"	12"	Ø	Ø
27	2.5"	12"	Ø	Ø
28	2.5"	12"	Ø	Ø
29	2.5"	12"	Ø	Ø
30	2.5"	12"	Ø	Ø

⊕ = with Rocks

3/11/19 21

ID	Sample DATE	LOG TIME	Notes
DU-2	3/7/19		
DU-3	3/7/19		
DA-4	3/8/19		
DU-5	3/8/19		
DU-5 rep 2	3/11/19		
DU-5 rep 3	3/11/19		
DA-6	3/11/19		
DU-7	3/11/19		
DU-8	3/12/19		
DU-9	3/12/19		

↑
Trip rate

1530 - Complete collection of DU-5 replicates
1600 - Leave site for the day

~~Mary N
3/11/19~~

07:50 - Arrive onsite - prep road for continued soil work
Sample list:
E2, W2, M1, AB, W-P, BRTS

09:15 Mobilize towards overbank starting on DU-8 west bank
PUSHED in of concrete hole.

11:43 complete DU-8

11:45 mobilize to East bank & inspect narrow fringe of overbank DU-9

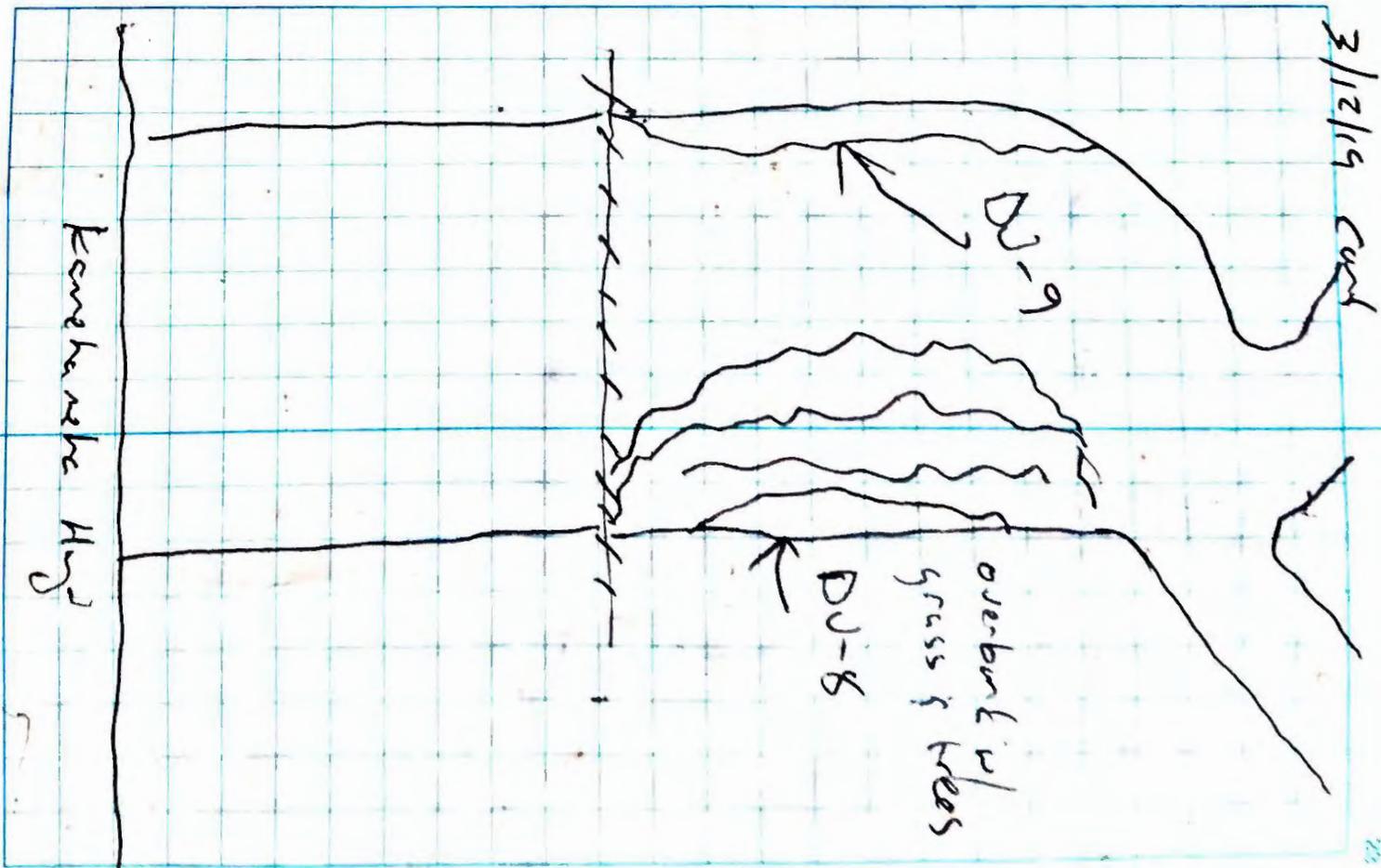
11:50 M1 sample of DU-8

12:00 start collecting DU-9

12:30 Complete DU-9, sub sample

1500 Proceed to down lens site

~~Page~~



DD 4

3/12/19 cont.

Inch	Bottom depth	Sand	Clay
1	15"	14"	1"
2	12"	11"	1"
3	8"	7"	1"
4	24"	24"	20"
5	12"	11"	1"
6	14"	13"	1"
7	16"	8"	8"
8	10"	5"	5"
9	6"	2"	4"
10	7"	2"	5"
11	4"	0"	4"
12	9"	0"	9"
13	12"	3"	9"
14	14"	6"	8"
15	13"	2"	11"
16	6"	0"	6"
17	24"	12"	12"
18	9"	0"	9"
19	16"	0"	16"
20	5"	0"	5"
21	16"	8"	8"
22	9"	3"	8"
23	3"	0"	3"
24	24"	20"	4"

3/12/19 cont.

DD-8 cont.

Inch	Bottom depth	Sand	Clay
25	15"	8"	9"
26	10"	2"	8"
27	4"	0"	4"
28	12"	6"	6"
29	5"	1"	4"
30	6"	0"	6"

DD-9

Inch	Bottom depth	Sand	Clay
1	14"	9"	10"
2	5"	2"	3"
3	5"	2"	5"
4	8"	2"	6"
5	4"	1"	3"
6	6"	0"	6"
7	3"	0"	3"
8	7"	0"	4"
9	3"	0"	3"
10	2"	0"	2"

3/12/19 cont.

Inc	core length	Sand	clay
11	9"	1"	2"
12	5"	0	5"
13	2"	0	2"
14	7"	0"	7"
15	6"	0"	6"
16	8"	0	8"
17	7"	0	7"
18	3"	0	3"
19	16"	0	10"
20	2"	0	2"
21	5"	0	5"
22	4"	0	4"
23	4"	0"	4"
24	2"	0"	2"
25	1"	0"	1"
26	4"	0	4"
27	3"	0	3"
28	16"	2"	8"
29	6"	0"	6"
30	6"	6"	6"

APPENDIX C

ANALYTICAL DATA SUMMARY TABLES

**KAHAWAINUI STREAM SEDIMENT
DATA SUMMARY TABLE
MAY 2019**

SAMPLE ID	DU-2			DU-3			DU-4			DU-5			DU-5 REP 2			DU-5 REP 3			DU-6			DU-7			DU-8			DU-9					
	SAMPLE COLLECTION DATE				3/7/2019			3/7/2019			3/8/2019			3/8/2019			3/11/2019			3/11/2019			3/11/2019			3/11/2019			3/12/2019			3/12/2019	
Compound	HDOH Unrestricted EAL	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers		
GRAIN SIZE ASTM D-2216 (M) AND MOISTURE CONTENT (%)																																	
Moisture	NS	36	0.10		39	0.10		47	0.10		52	0.10		61	0.10		62	0.10		45	0.10		49	0.10		52	0.10		46	0.10			
Clay (less than 0.00391mm)	NS	0.49	0.010		0.73	0.010		0.79	0.010		1.46	0.0100		0.94	0.010		1.65	0.0100		0.46	0.010		0.88	0.010		0.94	0.010		2.67	0.0100			
Silt (0.00391 to 0.0625mm)	NS	1.77	0.0100		2.57	0.0100		3.23	0.0100		7.30	0.0100		6.04	0.0100		11.26	0.01000		2.15	0.0100		3.87	0.0100		4.99	0.0100		9.79	0.0100			
Total Silt and Clay (0 to 0.0625mm)	NS	2.26	0.0100		3.30	0.0100		4.02	0.0100		8.76	0.0100		6.98	0.0100		12.91	0.01000		2.60	0.0100		4.75	0.0100		5.92	0.0100		12.46	0.01000			
Very Fine Sand (0.0625 to 0.125mm)	NS	1.16	0.0100		1.62	0.0100		2.46	0.0100		5.25	0.0100		6.85	0.0100		9.71	0.0100		1.84	0.0100		1.99	0.0100		2.91	0.0100		7.45	0.0100			
Fine Sand (0.125 to 0.25mm)	NS	7.79	0.0100		7.34	0.0100		7.46	0.0100		19.07	0.01000		24.97	0.01000		28.59	0.01000		17.38	0.01000		12.93	0.01000		12.16	0.01000		23.99	0.01000			
Medium Sand (0.25 to 0.5mm)	NS	27.05	0.01000		22.35	0.01000		20.76	0.01000		27.47	0.01000		30.10	0.01000		30.90	0.01000		40.30	0.01000		35.25	0.01000		29.87	0.01000		32.63	0.01000			
Coarse Sand (0.5 to 1mm)	NS	31.75	0.01000		26.32	0.01000		26.50	0.01000		25.07	0.01000		18.94	0.01000		15.40	0.01000		28.34	0.01000		27.64	0.01000		30.99	0.01000		23.44	0.01000			
Very Coarse Sand (1 to 2mm)	NS	18.19	0.01000		22.07	0.01000		19.44	0.01000		9.38	0.0100		12.16	0.01000		0.080	0.010		5.33	0.0100		7.05	0.0100		18.15	0.01000		0.039	0.010			
Gravel (greater than 2mm)	NS	11.80	0.01000		17.00	0.01000		19.36	0.01000		5.00	0.0100		ND	0.010		2.40	0.0100		4.20	0.0100		10.38	0.01000		ND	0.010		ND	0.010			
METALS 6020/7471A (mg/kg)																																	
Arsenic	24	1.19	0.100	B	7.06	0.100	B	7.86	0.100	B	6.58	0.100		6.80	0.100	B	6.96	0.100		3.53	0.100	B	5.82	0.100	B	4.61	0.100	B	5.85	0.100	B		
Barium	1,000	3.60	0.100		22.5	0.100		29.3	0.100		31.0	0.100		30.2	0.100		44.7	0.100		13.1	0.100		30.4	0.100		33.0	0.100		47.5	0.100			
Cadmium	14	ND	0.100		0.101	0.100		0.244	0.100		0.141	0.100		0.145	0.100		0.173	0.100		ND	0.100		0.116	0.100		0.145	0.100		0.225	0.100			
Chromium	1,100	28.0	0.100		163	0.100		185	0.100		179	0.100		200	0.100		216	0.100		55.9	0.100		134	0.100		202	0.100		204	0.100			
Lead	200	1.28	0.100		4.22	0.100		5.63	0.100		5.38	0.100		6.04	0.100		7.39	0.100		1.24	0.100		5.11	0.100		6.70	0.100		19.6	0.100			
Selenium	78	0.353	0.100		2.59	0.100		3.33	0.100		3.23	0.100	B	3.32	0.100	B	3.61	0.100	B	1.33	0.100		2.61	0.100		2.83	0.100		3.31	0.100			
Silver	78	0.614	0.100		3.43	0.100		4.29	0.100		4.74	0.100		5.48	0.100		6.35	0.100		1.47	0.100		3.42	0.100		5.12	0.100		5.13	0.100			
Mercury	4.7	ND	0.0299		0.0405	0.0314		0.0418	0.0358		0.0543	0.0394		0.0771	0.0486		0.0864	0.0505		ND	0.0346		0.0381	0.0371		0.0597	0.0398		0.0792	0.0355			
TPH 8015B (M) (mg/kg)																																	
TPH as Diesel	220	ND	7.6		ND	8.0		ND	9.3		ND	10		ND	12		ND	13		ND	9.0		ND	9.6		ND	10		ND	9.1			
TPH as Motor Oil	500	ND	25		ND	25		46	25	HD	85	25	HD	130	25	HD	120	25	HD	31	25	HD	45	25	HD	110	25	HD	81	25	HD		
ORGANOCHLORINE PESTICIDES 8081A (ug/kg)																																	
4,4'-Dichlorobenzophenone	NS	ND	10		ND	10		ND	10		ND	10		ND	10		ND	9.9		ND	10												
Aldrin	3,900	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Alpha-BHC	29	ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0			
Beta-BHC	29	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Delta-BHC	29	ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0			
Gamma-BHC	29	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Chlordane	17,000	ND	10		ND	10		ND	10		ND	10		ND	10		ND	9.9		ND	10												
Dieldrin	2,500	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Trans-nonachlor	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
2,4'-DDD	2,200	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
2,4'-DDE	1,900	ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0			
2,4'-DDT	1,800	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
4,4'-DDD	2,200	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
4,4'-DDE	1,900	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0		ND	1.0		ND	1.0		2.5	1.0			
4,4'-DDT	1,800	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endosulfan I	13,000	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endosulfan II	13,000	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endosulfan Sulfate	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endrin	3,800	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endrin Aldehyde	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Endrin Ketone	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Heptachlor	1,300	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Heptachlor Epoxide	200	ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0			
Methoxychlor	16,000	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	0.99		ND	1.0												
Toxaphene																																	

**KAHAWAINUI STREAM SEDIMENT
DATA SUMMARY TABLE
MAY 2019**

SAMPLE ID		DU-2			DU-3			DU-4			DU-5			DU-5 REP 2			DU-5 REP 3			DU-6			DU-7			DU-8			DU-9		
SAMPLE COLLECTION DATE		3/7/2019			3/7/2019			3/8/2019			3/8/2019			3/11/2019			3/11/2019			3/11/2019			3/11/2019			3/12/2019			3/12/2019		
Compound	HDOH Unrestricted EAL	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers												
Alpha Chlordane	17,000	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0													
Gamma Chlordane	17,000	ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0		ND	2.0													
Cis-nonachlor	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0													
Oxychlordane	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0													
Mirex	NS	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0													
Hexachlorobenzene	220	ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0		ND	1.0													
PCBS 8082 (ug/kg)																															
Aroclor-1016	1,200	ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1221		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1232		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1242		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1248		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1254		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1260		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1262		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
Aroclor-1268		ND	50		ND	49		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50		ND	50				
CHLORINATED HERBICIDES 8151A (ug/kg)																															
Dalapon	110	ND	390		ND	410		ND	470		ND	520		ND	640		ND	660		ND	450		ND	490		ND	520		ND	460	
Dicamba	NS	ND	16		ND	16		ND	19		ND	21		ND	25		ND	26		ND	18		ND	19		ND	21		ND	19	
MCPP	NS	ND	16000		ND	16000		ND	19000		ND	21000		ND	25000		ND	26000		ND	18000		ND	19000		ND	21000		ND	19000	
MCPA	NS	ND	16000		ND	16000		ND	19000		ND	21000		ND	25000		ND	26000		ND	18000		ND	19000		ND	21000		ND	19000	
Dichlorprop	2.1	ND	160		ND	160		ND	190		ND	210		ND	250		ND	260		ND	180		ND	190		ND	210		ND	190	
2,4-D	340	ND	160		ND	160		ND	190		ND	210		ND	250		ND	260		ND	180		ND	190		ND	210		ND	190	
2,4,5-TP (Silvex)	870	ND	16		ND	16		ND	19		ND	21		ND	25		ND	26		ND	18		ND	19		ND	21		ND	19	
2,4,5-T	3,600	ND	16		ND	16		ND	19		ND	21		ND	25		ND	26		ND	18		ND	19		ND	21		ND	19	
2,4-DB	NS	ND	160		ND	160		ND	190		ND	210		ND	250		ND	260		ND	180		ND	190		ND	210		ND	190	
Dinoseb	NS	ND	78		ND	82		ND	93		ND	100		ND	130		ND	130		ND	90		ND	97		ND	100		ND	93	

NOTES:

HDOH Unrestricted EAL from 2017 update, Table B, groundwater is a current or potential drinking water source and surface water is closer than 150 meters.

NS - No HDOH EAL

ND - Compound not detected above laboratory method detection limit

B - Analyte was present in the associated method blank

HD - The chromatographic pattern was inconsistent with the profile of the reference fuel standard

**KAHAWAINUI STREAM SEDIMENT
DATA SUMMARY TABLE
MAY 2019**

SAMPLE ID		DU-5			DU-5 REP 2			DU-5 REP 3			RSD (%)
SAMPLE COLLECTION DATE		3/8/2019			3/11/2019			3/11/2019			
Compound	HDOH Unrestricted EAL	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	Result	MDL	Data Qualifiers	
METALS 6020/7471A (mg/kg)											
Arsenic	24	6.58	0.100		6.80	0.100	B	6.96	0.100		2.81
Barium	1,000	31.0	0.100		30.2	0.100		44.7	0.100		23.09
Cadmium	14	0.141	0.100		0.145	0.100		0.173	0.100		11.4
Chromium	1,100	179	0.100		200	0.100		216	0.100		9.36
Lead	200	5.38	0.100		6.04	0.100		7.39	0.100		16.34
Selenium	78	3.23	0.100	B	3.32	0.100		3.61	0.100	B	5.86
Silver	78	4.74	0.100		5.48	0.100		6.35	0.100		14.59
Mercury	4.7	0.054	0.0394		0.0771	0.0486		0.0864	0.0505		22.75
TPH 8015B (M) (mg/kg)											
TPH as Motor Oil	500	85	25	HD	130	25	HD	120	25	HD	21.16

NOTES:

HDOH Unrestricted EAL from 2017 update, Table B, groundwater is a current or potential drinking water source and surface water is closer than 150 meters.

ND - Compound not detected above laboratory method detection limit

B - Analyte was present in the associated method blank

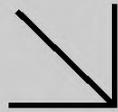
HD - The chromatographic pattern was inconsistent with the profile of the reference fuel standard

An RSD of 35% or lower typically indicates a good correlation between replicates.

APPENDIX D
LABORATORY ANALYTICAL REPORTS



Calscience



WORK ORDER NUMBER: 19-03-1092

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Element Environmental

Client Project Name: Kahawainui Stream / 150052

Attention: Matt Neal
98-030 Hekaha Street
Unit 9
Aiea, HI 96701-4900

Approved for release on 05/08/2019 by:
Carla Hollowell
Project Manager

ResultLink ▶

Email your PM ▶

Eurofins Calscience (Calscience) certifies that the test results provided in this report meet all NELAC Institute requirements for parameters for which accreditation is required or available. Any exceptions to NELAC Institute requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is attached to this report. The results in this report are limited to the sample(s) tested and any reproduction thereof must be made in its entirety. The client or recipient of this report is specifically prohibited from making material changes to said report and, to the extent that such changes are made, Calscience is not responsible, legally or otherwise. The client or recipient agrees to indemnify Calscience for any defense to any litigation which may arise.

Client Project Name: Kahawainui Stream / 150052
 Work Order Number: 19-03-1092

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Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 03/14/19. They were assigned to Work Order 19-03-1092.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of ≤ 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Sample Summary

Client: Element Environmental	Work Order: 19-03-1092
98-030 Hekaha Street, Unit 9	Project Name: Kahawainui Stream / 150052
Aiea, HI 96701-4900	PO Number:
	Date/Time Received: 03/14/19 11:45
	Number of Containers: 30

Attn: Matt Neal

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
DU-2	19-03-1092-1	03/07/19 16:30	1	Sediment
DU-3	19-03-1092-2	03/07/19 13:30	1	Sediment
DU-4	19-03-1092-3	03/08/19 10:30	1	Sediment
DU-5 Rep 2	19-03-1092-4	03/11/19 15:00	1	Sediment
DU-6	19-03-1092-5	03/11/19 12:40	1	Sediment
DU-7	19-03-1092-6	03/11/19 15:00	1	Sediment
DU-8	19-03-1092-7	03/12/19 11:50	1	Sediment
DU-9	19-03-1092-8	03/12/19 12:30	1	Sediment
DU-5 Rep 3	19-03-1092-9	03/11/19 15:30	1	Sediment
DU-5	19-03-1092-10	03/08/19 11:53	1	Sediment
DU-2	19-03-1092-11	03/07/19 16:30	1	Sediment
DU-3	19-03-1092-12	03/07/19 13:30	1	Sediment
DU-4	19-03-1092-13	03/08/19 10:30	1	Sediment
DU-5 Rep 2	19-03-1092-14	03/11/19 15:00	1	Sediment
DU-6	19-03-1092-15	03/11/19 12:40	1	Sediment
DU-7	19-03-1092-16	03/11/19 15:00	1	Sediment
DU-8	19-03-1092-17	03/12/19 11:50	1	Sediment
DU-9	19-03-1092-18	03/12/19 12:30	1	Sediment
DU-5 Rep 3	19-03-1092-19	03/11/19 15:30	1	Sediment
DU-5	19-03-1092-20	03/08/19 11:53	1	Sediment
DU-2	19-03-1092-21	03/07/19 16:30	1	Sediment
DU-3	19-03-1092-22	03/07/19 13:30	1	Sediment
DU-4	19-03-1092-23	03/08/19 10:30	1	Sediment
DU-5 Rep 2	19-03-1092-24	03/11/19 15:00	1	Sediment
DU-6	19-03-1092-25	03/11/19 12:40	1	Sediment
DU-7	19-03-1092-26	03/11/19 15:00	1	Sediment
DU-8	19-03-1092-27	03/12/19 11:50	1	Sediment
DU-9	19-03-1092-28	03/12/19 12:30	1	Sediment
DU-5 Rep 3	19-03-1092-29	03/11/19 15:30	1	Sediment
DU-5	19-03-1092-30	03/08/19 11:53	1	Sediment

Return to Contents

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: Kahawainui Stream / 150052

Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-11-A	03/07/19 16:30	Sediment	GC 50	03/20/19	03/21/19 16:13	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	7.6	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	99	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-12-A	03/07/19 13:30	Sediment	GC 50	03/20/19	03/21/19 16:33	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	8.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	100	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-13-A	03/08/19 10:30	Sediment	GC 50	03/20/19	03/21/19 16:53	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	9.3	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	99	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-14-A	03/11/19 15:00	Sediment	GC 50	03/20/19	03/21/19 17:13	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	12	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	94	61-145		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-15-A	03/11/19 12:40	Sediment	GC 50	03/20/19	03/21/19 17:33	190320B10B

Comment(s): - Results are reported on a dry weight basis.
 - Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	9.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	91	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-7	19-03-1092-16-A	03/11/19 15:00	Sediment	GC 50	03/20/19	03/21/19 17:53	190320B10B

Comment(s): - Results are reported on a dry weight basis.
 - Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	9.6	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	92	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-17-A	03/12/19 11:50	Sediment	GC 50	03/20/19	03/21/19 19:13	190320B10B

Comment(s): - Results are reported on a dry weight basis.
 - Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	10	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	91	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-18-A	03/12/19 12:30	Sediment	GC 50	03/20/19	03/21/19 19:33	190320B10B

Comment(s): - Results are reported on a dry weight basis.
 - Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	9.1	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	93	61-145		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-19-A	03/11/19 15:30	Sediment	GC 50	03/20/19	03/21/19 19:53	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	13	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	91	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-20-A	03/08/19 11:53	Sediment	GC 50	03/20/19	03/21/19 20:13	190320B10B

Comment(s): - Results are reported on a dry weight basis.
- Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	10	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	93	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-14-353-123	N/A	Solid	GC 50	03/20/19	03/21/19 11:32	190320B10B

Comment(s): - Motor Oil Range Organics (C17-C44) uses a Diesel Range Organics (C10-C28) standard for quantitation and quality control.

Parameter	Result	RL	DF	Qualifiers
TPH as Diesel	ND	5.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	90	61-145		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-21-C	03/07/19 16:30	Sediment	GC 49	04/01/19	04/01/19 20:31	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	ND	25	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	128	61-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-22-C	03/07/19 13:30	Sediment	GC 49	04/01/19	04/01/19 20:52	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	ND	25	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	136	61-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-23-C	03/08/19 10:30	Sediment	GC 49	04/01/19	04/01/19 21:13	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	46	25	1.00	HD

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	75	61-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-24-C	03/11/19 15:00	Sediment	GC 49	04/01/19	04/01/19 21:34	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	130	25	1.00	HD

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	84	61-145	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-25-C	03/11/19 12:40	Sediment	GC 49	04/01/19	04/01/19 21:54	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	31	25	1.00	HD

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	131	61-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3550B
Method: EPA 8015B (M)
Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-7	19-03-1092-26-C	03/11/19 15:00	Sediment	GC 49	04/01/19	04/01/19 22:16	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	45	25	1.00	HD
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	143	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-27-C	03/12/19 11:50	Sediment	GC 49	04/01/19	04/01/19 22:37	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	110	25	1.00	HD
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	101	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-28-C	03/12/19 12:30	Sediment	GC 49	04/01/19	04/01/19 22:57	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	81	25	1.00	HD
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	75	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-29-C	03/11/19 15:30	Sediment	GC 49	04/01/19	04/01/19 23:18	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	120	25	1.00	HD
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	125	61-145		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-30-C	03/08/19 11:53	Sediment	GC 49	04/01/19	04/01/19 23:39	190401B04

Parameter	Result	RL	DF	Qualifiers
TPH as Motor Oil	85	25	1.00	HD
Surrogate	Rec. (%)	Control Limits	Qualifiers	
n-Octacosane	124	61-145		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental 98-030 Hekaha Street, Unit 9 Aiea, HI 96701-4900	Date Received: 03/14/19 Work Order: 19-03-1092 Preparation: EPA 3550B Method: EPA 8015B (M) Units: mg/kg
Project: Kahawainui Stream / 150052	Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-420-3146	N/A	Solid	GC 49	04/01/19	04/01/19 15:03	190401B04

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
TPH as Motor Oil	ND	25	1.00	
 <u>Surrogate</u>	 <u>Rec. (%)</u>	 <u>Control Limits</u>	 <u>Qualifiers</u>	
n-Octacosane	115	61-145		



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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-21-D	03/07/19 16:30	Sediment	ICP/MS 05	03/27/19	03/28/19 20:52	190327L02

Parameter	Result	RL	DF	Qualifiers
Arsenic	1.19	0.100	1.00	B
Barium	3.60	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	28.0	0.100	1.00	
Lead	1.28	0.100	1.00	
Selenium	0.353	0.100	1.00	
Silver	0.614	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-22-D	03/07/19 13:30	Sediment	ICP/MS 05	03/27/19	03/28/19 20:55	190327L02

Parameter	Result	RL	DF	Qualifiers
Arsenic	7.06	0.100	1.00	B
Barium	22.5	0.100	1.00	
Cadmium	0.101	0.100	1.00	
Chromium	163	0.100	1.00	
Lead	4.22	0.100	1.00	
Selenium	2.59	0.100	1.00	
Silver	3.43	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-23-D	03/08/19 10:30	Sediment	ICP/MS 05	03/27/19	03/28/19 20:58	190327L02

Parameter	Result	RL	DF	Qualifiers
Arsenic	7.86	0.100	1.00	B
Barium	29.3	0.100	1.00	
Cadmium	0.244	0.100	1.00	
Chromium	185	0.100	1.00	
Lead	5.63	0.100	1.00	
Selenium	3.33	0.100	1.00	
Silver	4.29	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-24-D	03/11/19 15:00	Sediment	ICP/MS 05	03/27/19	03/28/19 21:01	190327L02

Parameter	Result	RL	DF	Qualifiers
Arsenic	6.80	0.100	1.00	B
Barium	30.2	0.100	1.00	
Cadmium	0.145	0.100	1.00	
Chromium	200	0.100	1.00	
Lead	6.04	0.100	1.00	
Selenium	3.32	0.100	1.00	
Silver	5.48	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-25-D	03/11/19 12:40	Sediment	ICP/MS 05	03/27/19	03/28/19 21:13	190327L03

Parameter	Result	RL	DF	Qualifiers
Arsenic	3.53	0.100	1.00	B
Barium	13.1	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	55.9	0.100	1.00	
Lead	1.24	0.100	1.00	
Selenium	1.33	0.100	1.00	
Silver	1.47	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-7	19-03-1092-26-D	03/11/19 15:00	Sediment	ICP/MS 05	03/27/19	03/28/19 21:15	190327L03

Parameter	Result	RL	DF	Qualifiers
Arsenic	5.82	0.100	1.00	B
Barium	30.4	0.100	1.00	
Cadmium	0.116	0.100	1.00	
Chromium	134	0.100	1.00	
Lead	5.11	0.100	1.00	
Selenium	2.61	0.100	1.00	
Silver	3.42	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-27-D	03/12/19 11:50	Sediment	ICP/MS 05	03/27/19	03/28/19 21:18	190327L03

Parameter	Result	RL	DF	Qualifiers
Arsenic	4.61	0.100	1.00	B
Barium	33.0	0.100	1.00	
Cadmium	0.145	0.100	1.00	
Chromium	202	0.100	1.00	
Lead	6.70	0.100	1.00	
Selenium	2.83	0.100	1.00	
Silver	5.12	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-28-D	03/12/19 12:30	Sediment	ICP/MS 05	03/27/19	03/28/19 21:21	190327L03

Parameter	Result	RL	DF	Qualifiers
Arsenic	5.85	0.100	1.00	B
Barium	47.5	0.100	1.00	
Cadmium	0.225	0.100	1.00	
Chromium	204	0.100	1.00	
Lead	19.6	0.100	1.00	
Selenium	3.31	0.100	1.00	
Silver	5.13	0.100	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-29-D	03/11/19 15:30	Sediment	ICP/MS 05	03/27/19	03/28/19 21:24	190327L04

Parameter	Result	RL	DF	Qualifiers
Arsenic	6.96	0.100	1.00	
Barium	44.7	0.100	1.00	
Cadmium	0.173	0.100	1.00	
Chromium	216	0.100	1.00	
Lead	7.39	0.100	1.00	
Selenium	3.61	0.100	1.00	B
Silver	6.35	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-30-D	03/08/19 11:53	Sediment	ICP/MS 05	03/27/19	03/28/19 21:27	190327L04

Parameter	Result	RL	DF	Qualifiers
Arsenic	6.58	0.100	1.00	
Barium	31.0	0.100	1.00	
Cadmium	0.141	0.100	1.00	
Chromium	179	0.100	1.00	
Lead	5.38	0.100	1.00	
Selenium	3.23	0.100	1.00	B
Silver	4.74	0.100	1.00	

Method Blank	099-15-254-733	N/A	Solid	ICP/MS 05	03/27/19	03/28/19 20:34	190327L02
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Parameter	Result	RL	DF	Qualifiers
Arsenic	0.103	0.100	1.00	
Barium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Selenium	ND	0.100	1.00	
Silver	ND	0.100	1.00	

Method Blank	099-15-254-734	N/A	Solid	ICP/MS 05	03/27/19	04/02/19 12:19	190327L03
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Parameter	Result	RL	DF	Qualifiers
Arsenic	0.106	0.100	1.00	
Barium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Selenium	ND	0.100	1.00	
Silver	ND	0.100	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-15-254-735	N/A	Solid	ICP/MS 05	03/27/19	04/02/19 12:22	190327L04

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Arsenic	ND	0.100	1.00	
Barium	ND	0.100	1.00	
Cadmium	ND	0.100	1.00	
Chromium	ND	0.100	1.00	
Lead	ND	0.100	1.00	
Selenium	0.219	0.100	1.00	
Silver	ND	0.100	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 7471A Total
Method: EPA 7471A
Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-11-C	03/07/19 16:30	Sediment	Mercury 07	03/28/19	03/28/19 15:46	190328L03

Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0299	1.00	

DU-3	19-03-1092-12-C	03/07/19 13:30	Sediment	Mercury 07	03/28/19	03/28/19 15:48	190328L03
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Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	0.0405	0.0314	1.00	

DU-4	19-03-1092-13-C	03/08/19 10:30	Sediment	Mercury 07	03/28/19	03/28/19 15:51	190328L04
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Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	0.0418	0.0358	1.00	

DU-5 Rep 2	19-03-1092-14-C	03/11/19 15:00	Sediment	Mercury 07	03/28/19	03/28/19 15:53	190328L04
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Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	0.0771	0.0486	1.00	

DU-6	19-03-1092-15-C	03/11/19 12:40	Sediment	Mercury 07	03/28/19	03/28/19 15:55	190328L05
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Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0346	1.00	

DU-7	19-03-1092-16-C	03/11/19 15:00	Sediment	Mercury 07	03/28/19	03/28/19 16:02	190328L05
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Comment(s): - Results are reported on a dry weight basis.

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	0.0381	0.0371	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 7471A Total
Method: EPA 7471A
Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-17-C	03/12/19 11:50	Sediment	Mercury 07	03/28/19	03/28/19 16:04	190328L06

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Mercury	0.0597	0.0398	1.00	

DU-9	19-03-1092-18-C	03/12/19 12:30	Sediment	Mercury 07	03/28/19	03/28/19 16:07	190328L06
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Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Mercury	0.0792	0.0355	1.00	

DU-5 Rep 3	19-03-1092-19-C	03/11/19 15:30	Sediment	Mercury 07	03/28/19	03/28/19 16:09	190328L07
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Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Mercury	0.0864	0.0505	1.00	

DU-5	19-03-1092-20-C	03/08/19 11:53	Sediment	Mercury 07	03/28/19	03/28/19 16:11	190328L07
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Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Mercury	0.0543	0.0394	1.00	

Method Blank	099-16-278-530	N/A	Solid	Mercury 07	03/28/19	03/28/19 15:07	190328L03
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Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.0197	1.00	

Method Blank	099-16-278-531	N/A	Solid	Mercury 07	03/28/19	03/28/19 15:09	190328L04
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Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.0200	1.00	

Method Blank	099-16-278-532	N/A	Solid	Mercury 07	03/28/19	03/28/19 15:11	190328L05
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Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.0200	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A
 Units: mg/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-16-278-533	N/A	Solid	Mercury 07	03/28/19	03/28/19 15:14	190328L06

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0197	1.00	

Method Blank	099-16-278-534	N/A	Solid	Mercury 07	03/28/19	03/28/19 15:16	190328L07
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Mercury	ND	0.0197	1.00	

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: N/A
 Method: ASTM D4464 (M)
 Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-11-C	03/07/19 16:30	Sediment	LPSA 1	N/A	03/25/19 18:08	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.49	
Silt (0.00391 to 0.0625mm)	1.77	
Total Silt and Clay (0 to 0.0625mm)	2.26	
Very Fine Sand (0.0625 to 0.125mm)	1.16	
Fine Sand (0.125 to 0.25mm)	7.79	
Medium Sand (0.25 to 0.5mm)	27.05	
Coarse Sand (0.5 to 1mm)	31.75	
Very Coarse Sand (1 to 2mm)	18.19	
Gravel (greater than 2mm)	11.80	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-12-C	03/07/19 13:30	Sediment	LPSA 1	N/A	03/25/19 18:19	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.73	
Silt (0.00391 to 0.0625mm)	2.57	
Total Silt and Clay (0 to 0.0625mm)	3.30	
Very Fine Sand (0.0625 to 0.125mm)	1.62	
Fine Sand (0.125 to 0.25mm)	7.34	
Medium Sand (0.25 to 0.5mm)	22.35	
Coarse Sand (0.5 to 1mm)	26.32	
Very Coarse Sand (1 to 2mm)	22.07	
Gravel (greater than 2mm)	17.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-13-C	03/08/19 10:30	Sediment	LPSA 1	N/A	03/25/19 18:33	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.79	
Silt (0.00391 to 0.0625mm)	3.23	
Total Silt and Clay (0 to 0.0625mm)	4.02	
Very Fine Sand (0.0625 to 0.125mm)	2.46	
Fine Sand (0.125 to 0.25mm)	7.46	
Medium Sand (0.25 to 0.5mm)	20.76	
Coarse Sand (0.5 to 1mm)	26.50	
Very Coarse Sand (1 to 2mm)	19.44	
Gravel (greater than 2mm)	19.36	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: N/A
 Method: ASTM D4464 (M)
 Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-14-C	03/11/19 15:00	Sediment	LPSA 1	N/A	03/25/19 18:45	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.94	
Silt (0.00391 to 0.0625mm)	6.04	
Total Silt and Clay (0 to 0.0625mm)	6.98	
Very Fine Sand (0.0625 to 0.125mm)	6.85	
Fine Sand (0.125 to 0.25mm)	24.97	
Medium Sand (0.25 to 0.5mm)	30.10	
Coarse Sand (0.5 to 1mm)	18.94	
Very Coarse Sand (1 to 2mm)	12.16	
Gravel (greater than 2mm)	ND	

DU-6	19-03-1092-15-C	03/11/19 12:40	Sediment	LPSA 1	N/A	03/25/19 18:54	
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Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.46	
Silt (0.00391 to 0.0625mm)	2.15	
Total Silt and Clay (0 to 0.0625mm)	2.60	
Very Fine Sand (0.0625 to 0.125mm)	1.84	
Fine Sand (0.125 to 0.25mm)	17.38	
Medium Sand (0.25 to 0.5mm)	40.30	
Coarse Sand (0.5 to 1mm)	28.34	
Very Coarse Sand (1 to 2mm)	5.33	
Gravel (greater than 2mm)	4.20	

DU-7	19-03-1092-16-C	03/11/19 15:00	Sediment	LPSA 1	N/A	03/25/19 19:04	
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Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.88	
Silt (0.00391 to 0.0625mm)	3.87	
Total Silt and Clay (0 to 0.0625mm)	4.75	
Very Fine Sand (0.0625 to 0.125mm)	1.99	
Fine Sand (0.125 to 0.25mm)	12.93	
Medium Sand (0.25 to 0.5mm)	35.25	
Coarse Sand (0.5 to 1mm)	27.64	
Very Coarse Sand (1 to 2mm)	7.05	
Gravel (greater than 2mm)	10.38	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: N/A
 Method: ASTM D4464 (M)
 Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-17-C	03/12/19 11:50	Sediment	LPSA 1	N/A	03/25/19 19:12	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	0.94	
Silt (0.00391 to 0.0625mm)	4.99	
Total Silt and Clay (0 to 0.0625mm)	5.92	
Very Fine Sand (0.0625 to 0.125mm)	2.91	
Fine Sand (0.125 to 0.25mm)	12.16	
Medium Sand (0.25 to 0.5mm)	29.87	
Coarse Sand (0.5 to 1mm)	30.99	
Very Coarse Sand (1 to 2mm)	18.15	
Gravel (greater than 2mm)	ND	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-18-C	03/12/19 12:30	Sediment	LPSA 1	N/A	03/25/19 19:22	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	2.67	
Silt (0.00391 to 0.0625mm)	9.79	
Total Silt and Clay (0 to 0.0625mm)	12.46	
Very Fine Sand (0.0625 to 0.125mm)	7.45	
Fine Sand (0.125 to 0.25mm)	23.99	
Medium Sand (0.25 to 0.5mm)	32.63	
Coarse Sand (0.5 to 1mm)	23.44	
Very Coarse Sand (1 to 2mm)	0.039	
Gravel (greater than 2mm)	ND	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-19-C	03/11/19 15:30	Sediment	LPSA 1	N/A	03/25/19 19:30	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	1.65	
Silt (0.00391 to 0.0625mm)	11.26	
Total Silt and Clay (0 to 0.0625mm)	12.91	
Very Fine Sand (0.0625 to 0.125mm)	9.71	
Fine Sand (0.125 to 0.25mm)	28.59	
Medium Sand (0.25 to 0.5mm)	30.90	
Coarse Sand (0.5 to 1mm)	15.40	
Very Coarse Sand (1 to 2mm)	0.080	
Gravel (greater than 2mm)	2.40	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: N/A
Method: ASTM D4464 (M)
Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-20-C	03/08/19 11:53	Sediment	LPSA 1	N/A	03/25/19 19:40	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	1.46	
Silt (0.00391 to 0.0625mm)	7.30	
Total Silt and Clay (0 to 0.0625mm)	8.76	
Very Fine Sand (0.0625 to 0.125mm)	5.25	
Fine Sand (0.125 to 0.25mm)	19.07	
Medium Sand (0.25 to 0.5mm)	27.47	
Coarse Sand (0.5 to 1mm)	25.07	
Very Coarse Sand (1 to 2mm)	9.38	
Gravel (greater than 2mm)	5.00	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-21-B	03/07/19 16:30	Sediment	GC 51	03/28/19	04/01/19 12:13	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	80	25-145		
Decachlorobiphenyl	115	24-168		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3541
Method: EPA 8081A
Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-22-B	03/07/19 13:30	Sediment	GC 51	03/28/19	04/01/19 12:28	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	76	25-145		
Decachlorobiphenyl	123	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-23-B	03/08/19 10:30	Sediment	GC 51	03/28/19	04/01/19 12:42	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	74	25-145		
Decachlorobiphenyl	126	24-168		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-24-B	03/11/19 15:00	Sediment	GC 51	03/28/19	04/01/19 12:56	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	68	25-145		
Decachlorobiphenyl	157	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-25-B	03/11/19 12:40	Sediment	GC 51	03/28/19	04/01/19 13:10	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	79	25-145		
Decachlorobiphenyl	112	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3541
Method: EPA 8081A
Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-7	19-03-1092-26-B	03/11/19 15:00	Sediment	GC 51	03/28/19	04/01/19 13:25	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	83	25-145		
Decachlorobiphenyl	127	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-27-B	03/12/19 11:50	Sediment	GC 51	03/28/19	04/01/19 13:39	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	76	25-145		
Decachlorobiphenyl	157	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-28-B	03/12/19 12:30	Sediment	GC 51	03/28/19	04/01/19 13:53	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	2.5	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	83	25-145		
Decachlorobiphenyl	164	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-29-B	03/11/19 15:30	Sediment	GC 51	03/28/19	04/01/19 14:07	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	9.9	1.00	
Aldrin	ND	0.99	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	0.99	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	0.99	1.00	
Chlordane	ND	9.9	1.00	
Dieldrin	ND	0.99	1.00	
Trans-nonachlor	ND	0.99	1.00	
2,4'-DDD	ND	0.99	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	0.99	1.00	
4,4'-DDD	ND	0.99	1.00	
4,4'-DDE	ND	0.99	1.00	
4,4'-DDT	ND	0.99	1.00	
Endosulfan I	ND	0.99	1.00	
Endosulfan II	ND	0.99	1.00	
Endosulfan Sulfate	ND	0.99	1.00	
Endrin	ND	0.99	1.00	
Endrin Aldehyde	ND	0.99	1.00	
Endrin Ketone	ND	0.99	1.00	
Heptachlor	ND	0.99	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	0.99	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	0.99	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	0.99	1.00	
Oxychlordane	ND	0.99	1.00	
Mirex	ND	0.99	1.00	
Hexachlorobenzene	ND	0.99	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
2,4,5,6-Tetrachloro-m-Xylene	73	25-145		
Decachlorobiphenyl	228	24-168	2,7	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3541
 Method: EPA 8081A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-30-B	03/08/19 11:53	Sediment	GC 51	03/28/19	04/01/19 14:22	190328L09

Parameter	Result	RL	DF	Qualifiers
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
Surrogate	Rec. (%)	Control Limits	Qualifiers	
2,4,5,6-Tetrachloro-m-Xylene	69	25-145		
Decachlorobiphenyl	155	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.



Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3541
Method: EPA 8081A
Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-858-624	N/A	Solid	GC 51	03/28/19	04/01/19 11:02	190328L09

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
4,4'-Dichlorobenzophenone	ND	10	1.00	
Aldrin	ND	1.0	1.00	
Alpha-BHC	ND	2.0	1.00	
Beta-BHC	ND	1.0	1.00	
Delta-BHC	ND	2.0	1.00	
Gamma-BHC	ND	1.0	1.00	
Chlordane	ND	10	1.00	
Dieldrin	ND	1.0	1.00	
Trans-nonachlor	ND	1.0	1.00	
2,4'-DDD	ND	1.0	1.00	
2,4'-DDE	ND	2.0	1.00	
2,4'-DDT	ND	1.0	1.00	
4,4'-DDD	ND	1.0	1.00	
4,4'-DDE	ND	1.0	1.00	
4,4'-DDT	ND	1.0	1.00	
Endosulfan I	ND	1.0	1.00	
Endosulfan II	ND	1.0	1.00	
Endosulfan Sulfate	ND	1.0	1.00	
Endrin	ND	1.0	1.00	
Endrin Aldehyde	ND	1.0	1.00	
Endrin Ketone	ND	1.0	1.00	
Heptachlor	ND	1.0	1.00	
Heptachlor Epoxide	ND	2.0	1.00	
Methoxychlor	ND	1.0	1.00	
Toxaphene	ND	20	1.00	
Alpha Chlordane	ND	1.0	1.00	
Gamma Chlordane	ND	2.0	1.00	
Cis-nonachlor	ND	1.0	1.00	
Oxychlordane	ND	1.0	1.00	
Mirex	ND	1.0	1.00	
Hexachlorobenzene	ND	1.0	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
2,4,5,6-Tetrachloro-m-Xylene	74	25-145		
Decachlorobiphenyl	94	24-168		

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-21-B	03/07/19 16:30	Sediment	GC 58	03/26/19	03/28/19 21:58	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	107	24-168	
2,4,5,6-Tetrachloro-m-Xylene	83	25-145	

DU-3	19-03-1092-22-B	03/07/19 13:30	Sediment	GC 58	03/26/19	03/28/19 22:16	190326L06
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Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	49	1.00	
Aroclor-1221	ND	49	1.00	
Aroclor-1232	ND	49	1.00	
Aroclor-1242	ND	49	1.00	
Aroclor-1248	ND	49	1.00	
Aroclor-1254	ND	49	1.00	
Aroclor-1260	ND	49	1.00	
Aroclor-1262	ND	49	1.00	
Aroclor-1268	ND	49	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	115	24-168	
2,4,5,6-Tetrachloro-m-Xylene	88	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-23-B	03/08/19 10:30	Sediment	GC 58	03/26/19	03/28/19 22:34	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	117	24-168	
2,4,5,6-Tetrachloro-m-Xylene	91	25-145	

DU-5 Rep 2	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
	19-03-1092-24-B	03/11/19 15:00	Sediment	GC 58	03/26/19	03/28/19 22:52	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	131	24-168	
2,4,5,6-Tetrachloro-m-Xylene	99	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-25-B	03/11/19 12:40	Sediment	GC 58	03/26/19	03/28/19 23:10	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	112	24-168	
2,4,5,6-Tetrachloro-m-Xylene	91	25-145	

DU-7	19-03-1092-26-B	03/11/19 15:00	Sediment	GC 58	03/26/19	03/28/19 23:28	190326L06
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Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	109	24-168	
2,4,5,6-Tetrachloro-m-Xylene	87	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-27-B	03/12/19 11:50	Sediment	GC 58	03/26/19	03/28/19 23:46	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	121	24-168	
2,4,5,6-Tetrachloro-m-Xylene	96	25-145	

DU-9	19-03-1092-28-B	03/12/19 12:30	Sediment	GC 58	03/26/19	03/29/19 00:04	190326L06
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Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	114	24-168	
2,4,5,6-Tetrachloro-m-Xylene	90	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-29-B	03/11/19 15:30	Sediment	GC 58	03/26/19	03/29/19 00:22	190326L06

Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	124	24-168	
2,4,5,6-Tetrachloro-m-Xylene	100	25-145	

DU-5	19-03-1092-30-B	03/08/19 11:53	Sediment	GC 58	03/26/19	03/29/19 00:40	190326L06
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Parameter	Result	RL	DF	Qualifiers
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	106	24-168	
2,4,5,6-Tetrachloro-m-Xylene	84	25-145	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-535-5139	N/A	Solid	GC 58	03/26/19	03/27/19 18:49	190326L06

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Aroclor-1016	ND	50	1.00	
Aroclor-1221	ND	50	1.00	
Aroclor-1232	ND	50	1.00	
Aroclor-1242	ND	50	1.00	
Aroclor-1248	ND	50	1.00	
Aroclor-1254	ND	50	1.00	
Aroclor-1260	ND	50	1.00	
Aroclor-1262	ND	50	1.00	
Aroclor-1268	ND	50	1.00	

<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>
Decachlorobiphenyl	73	24-168	
2,4,5,6-Tetrachloro-m-Xylene	89	25-145	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 8151A
Method: EPA 8151A
Units: ug/kg

Project: Kahawainui Stream / 150052

Page 1 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-11-B	03/07/19 16:30	Sediment	GC 40	03/22/19	03/27/19 00:21	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	390	1.00	
Dicamba	ND	16	1.00	
MCPP	ND	16000	1.00	
MCPA	ND	16000	1.00	
Dichlorprop	ND	160	1.00	
2,4-D	ND	160	1.00	
2,4,5-TP (Silvex)	ND	16	1.00	
2,4,5-T	ND	16	1.00	
2,4-DB	ND	160	1.00	
Dinoseb	ND	78	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	110	44-146	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-3	19-03-1092-12-B	03/07/19 13:30	Sediment	GC 40	03/22/19	03/27/19 00:44	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	410	1.00	
Dicamba	ND	16	1.00	
MCPP	ND	16000	1.00	
MCPA	ND	16000	1.00	
Dichlorprop	ND	160	1.00	
2,4-D	ND	160	1.00	
2,4,5-TP (Silvex)	ND	16	1.00	
2,4,5-T	ND	16	1.00	
2,4-DB	ND	160	1.00	
Dinoseb	ND	82	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	75	44-146	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 8151A
Method: EPA 8151A
Units: ug/kg

Project: Kahawainui Stream / 150052

Page 2 of 6

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-4	19-03-1092-13-B	03/08/19 10:30	Sediment	GC 40	03/22/19	03/27/19 01:07	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	470	1.00	
Dicamba	ND	19	1.00	
MCPP	ND	19000	1.00	
MCPA	ND	19000	1.00	
Dichlorprop	ND	190	1.00	
2,4-D	ND	190	1.00	
2,4,5-TP (Silvex)	ND	19	1.00	
2,4,5-T	ND	19	1.00	
2,4-DB	ND	190	1.00	
Dinoseb	ND	93	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	98	44-146	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 2	19-03-1092-14-B	03/11/19 15:00	Sediment	GC 40	03/22/19	03/27/19 01:30	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	640	1.00	
Dicamba	ND	25	1.00	
MCPP	ND	25000	1.00	
MCPA	ND	25000	1.00	
Dichlorprop	ND	250	1.00	
2,4-D	ND	250	1.00	
2,4,5-TP (Silvex)	ND	25	1.00	
2,4,5-T	ND	25	1.00	
2,4-DB	ND	250	1.00	
Dinoseb	ND	130	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	68	44-146	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 8151A
Method: EPA 8151A
Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-6	19-03-1092-15-B	03/11/19 12:40	Sediment	GC 40	03/22/19	03/27/19 01:53	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	450	1.00	
Dicamba	ND	18	1.00	
MCPP	ND	18000	1.00	
MCPA	ND	18000	1.00	
Dichlorprop	ND	180	1.00	
2,4-D	ND	180	1.00	
2,4,5-TP (Silvex)	ND	18	1.00	
2,4,5-T	ND	18	1.00	
2,4-DB	ND	180	1.00	
Dinoseb	ND	90	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	80	44-146	

DU-7	19-03-1092-16-B	03/11/19 15:00	Sediment	GC 40	03/22/19	03/27/19 02:16	190322L03
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Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	490	1.00	
Dicamba	ND	19	1.00	
MCPP	ND	19000	1.00	
MCPA	ND	19000	1.00	
Dichlorprop	ND	190	1.00	
2,4-D	ND	190	1.00	
2,4,5-TP (Silvex)	ND	19	1.00	
2,4,5-T	ND	19	1.00	
2,4-DB	ND	190	1.00	
Dinoseb	ND	97	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	70	44-146	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 8151A
 Method: EPA 8151A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-8	19-03-1092-17-B	03/12/19 11:50	Sediment	GC 40	03/22/19	03/27/19 02:39	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	520	1.00	
Dicamba	ND	21	1.00	
MCPPP	ND	21000	1.00	
MCPA	ND	21000	1.00	
Dichlorprop	ND	210	1.00	
2,4-D	ND	210	1.00	
2,4,5-TP (Silvex)	ND	21	1.00	
2,4,5-T	ND	21	1.00	
2,4-DB	ND	210	1.00	
Dinoseb	ND	100	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	71	44-146	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-9	19-03-1092-18-B	03/12/19 12:30	Sediment	GC 40	03/22/19	03/27/19 03:02	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	460	1.00	
Dicamba	ND	19	1.00	
MCPPP	ND	19000	1.00	
MCPA	ND	19000	1.00	
Dichlorprop	ND	190	1.00	
2,4-D	ND	190	1.00	
2,4,5-TP (Silvex)	ND	19	1.00	
2,4,5-T	ND	19	1.00	
2,4-DB	ND	190	1.00	
Dinoseb	ND	93	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	72	44-146	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 8151A
 Method: EPA 8151A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-19-B	03/11/19 15:30	Sediment	GC 40	03/22/19	03/27/19 03:26	190322L03

Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	660	1.00	
Dicamba	ND	26	1.00	
MCPP	ND	26000	1.00	
MCPA	ND	26000	1.00	
Dichlorprop	ND	260	1.00	
2,4-D	ND	260	1.00	
2,4,5-TP (Silvex)	ND	26	1.00	
2,4,5-T	ND	26	1.00	
2,4-DB	ND	260	1.00	
Dinoseb	ND	130	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	68	44-146	

DU-5	19-03-1092-20-B	03/08/19 11:53	Sediment	GC 40	03/22/19	03/27/19 03:49	190322L03
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Comment(s): - Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qualifiers
Dalapon	ND	520	1.00	
Dicamba	ND	21	1.00	
MCPP	ND	21000	1.00	
MCPA	ND	21000	1.00	
Dichlorprop	ND	210	1.00	
2,4-D	ND	210	1.00	
2,4,5-TP (Silvex)	ND	21	1.00	
2,4,5-T	ND	21	1.00	
2,4-DB	ND	210	1.00	
Dinoseb	ND	100	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
2,4-Dichlorophenylacetic acid	72	44-146	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 8151A
 Method: EPA 8151A
 Units: ug/kg

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	095-01-033-1651	N/A	Solid	GC 40	03/22/19	03/26/19 18:59	190322L03

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qualifiers</u>
Dalapon	ND	250	1.00	
Dicamba	ND	10	1.00	
MCPPP	ND	10000	1.00	
MCPA	ND	10000	1.00	
Dichlorprop	ND	100	1.00	
2,4-D	ND	100	1.00	
2,4,5-TP (Silvex)	ND	10	1.00	
2,4,5-T	ND	10	1.00	
2,4-DB	ND	100	1.00	
Dinoseb	ND	50	1.00	
<u>Surrogate</u>	<u>Rec. (%)</u>	<u>Control Limits</u>	<u>Qualifiers</u>	
2,4-Dichlorophenylacetic acid	58	44-146		

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: N/A
Method: ASTM D-2216 (M)
Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-2	19-03-1092-11-D	03/07/19 16:30	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		36	0.10		1.00		
DU-3	19-03-1092-12-D	03/07/19 13:30	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		39	0.10		1.00		
DU-4	19-03-1092-13-D	03/08/19 10:30	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		47	0.10		1.00		
DU-5 Rep 2	19-03-1092-14-D	03/11/19 15:00	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		61	0.10		1.00		
DU-6	19-03-1092-15-D	03/11/19 12:40	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		45	0.10		1.00		
DU-7	19-03-1092-16-D	03/11/19 15:00	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		49	0.10		1.00		
DU-8	19-03-1092-17-D	03/12/19 11:50	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		52	0.10		1.00		
DU-9	19-03-1092-18-D	03/12/19 12:30	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1
<u>Parameter</u>		<u>Result</u>	<u>RL</u>		<u>DF</u>		<u>Qualifiers</u>
Moisture		46	0.10		1.00		

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Analytical Report

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: N/A
 Method: ASTM D-2216 (M)
 Units: %

Project: Kahawainui Stream / 150052

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Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5 Rep 3	19-03-1092-19-D	03/11/19 15:30	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1

Parameter	Result	RL	DF	Qualifiers
Moisture	62	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
DU-5	19-03-1092-20-D	03/08/19 11:53	Sediment	N/A	03/19/19	03/20/19 09:30	J0320MOIB1

Parameter	Result	RL	DF	Qualifiers
Moisture	52	0.10	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-05-014-8350	N/A	Solid	N/A	03/19/19	03/20/19 09:30	J0320MOIB1

Parameter	Result	RL	DF	Qualifiers
Moisture	ND	0.10	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

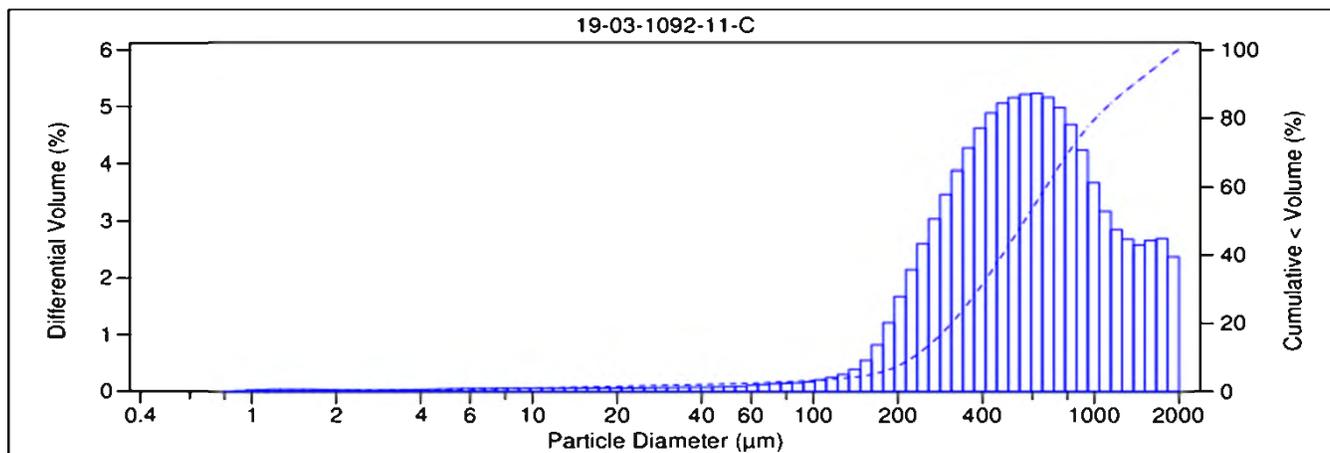
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-2		Very Coarse Sand	1.035

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
11.80	18.19	31.75	27.05	7.79	1.16	1.77	0.49	2.26



V.3.0

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

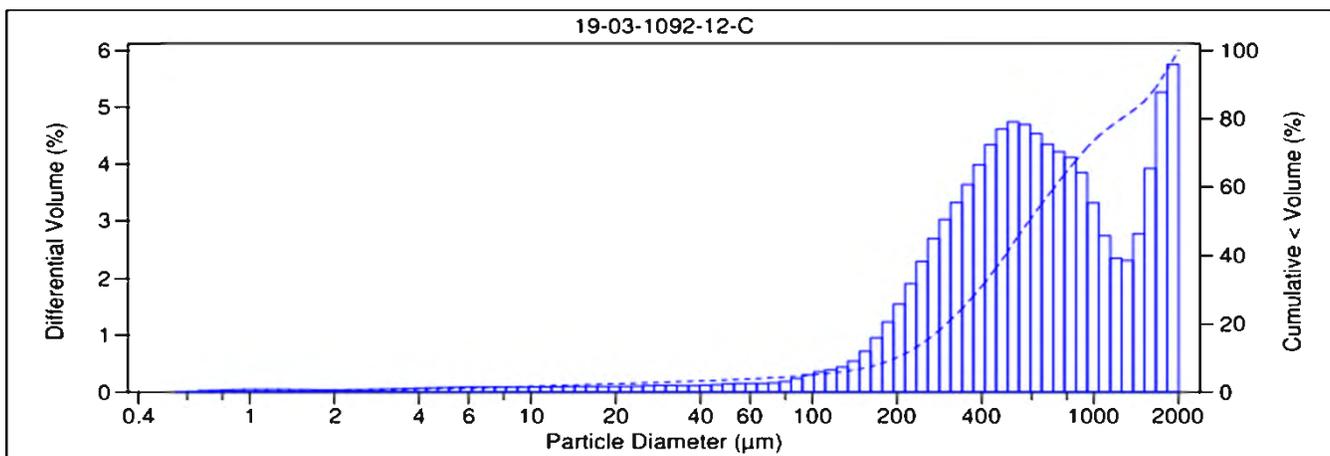
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

Page 2 of 10

Sample ID	Depth ft	Description	Mean Grain Size mm
DU-3		Very Coarse Sand	1.262

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
17.00	22.07	26.32	22.35	7.34	1.62	2.57	0.73	3.30



V.3.0

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

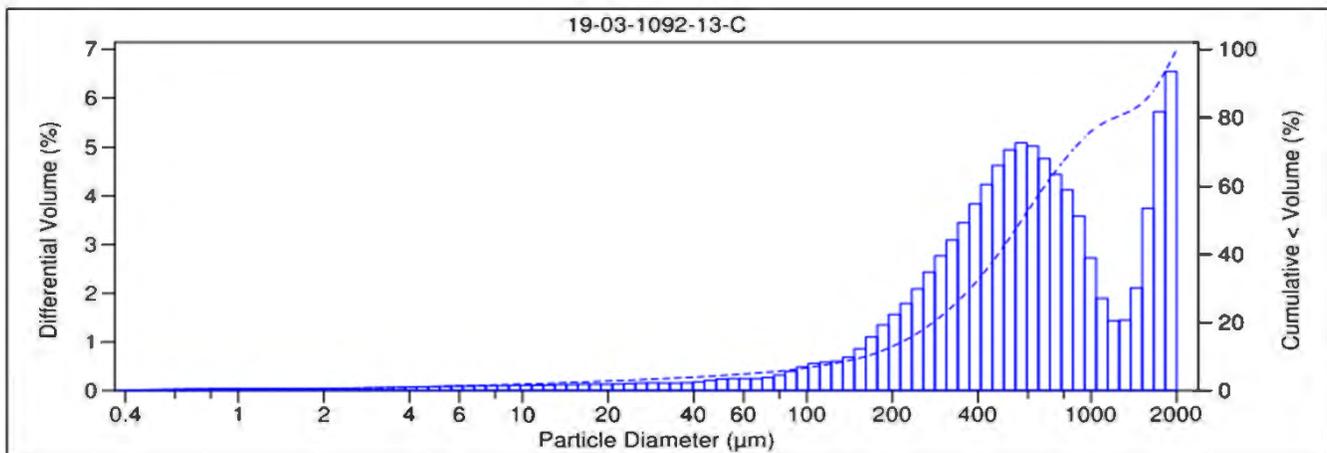
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-4		Very Coarse Sand	1.313

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
19.36	19.44	26.50	20.76	7.46	2.46	3.23	0.79	4.02



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

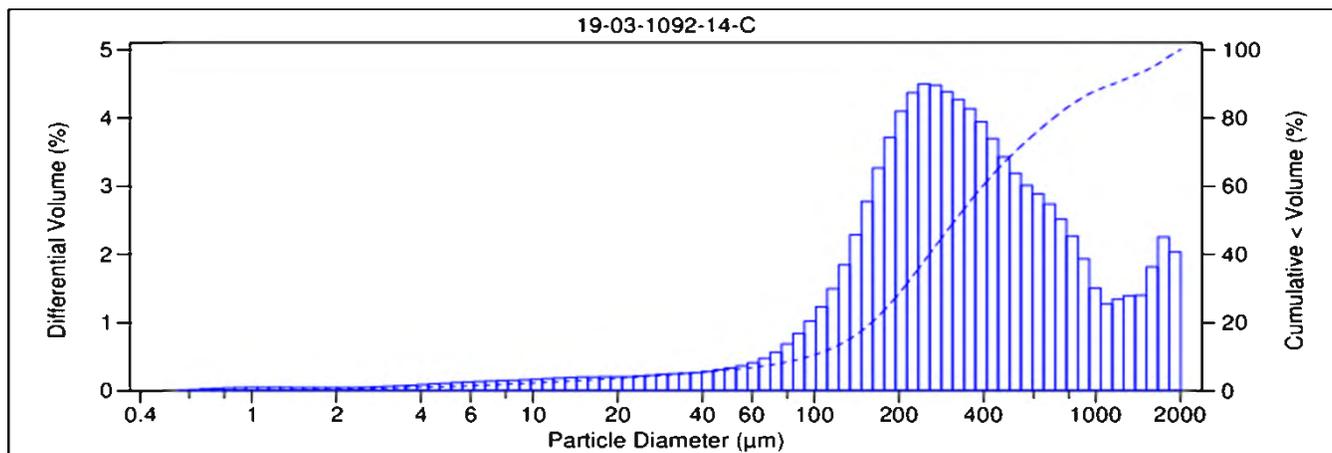
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-5 Rep 2		Medium Sand	0.475

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
0.00	12.16	18.94	30.10	24.97	6.85	6.04	0.94	6.98



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

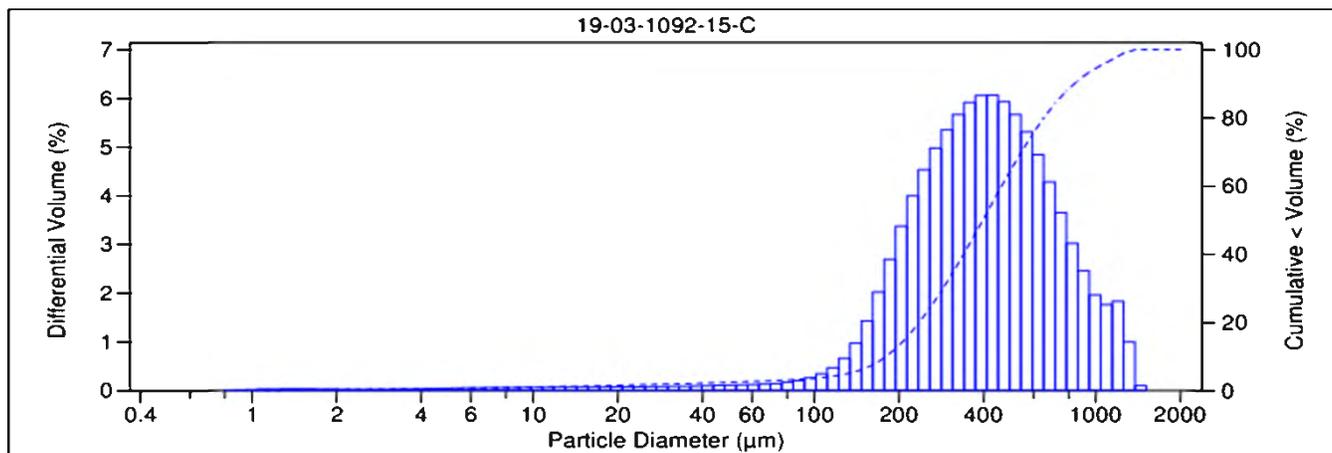
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-6		Coarse Sand	0.583

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
4.20	5.33	28.34	40.30	17.38	1.84	2.15	0.46	2.60



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

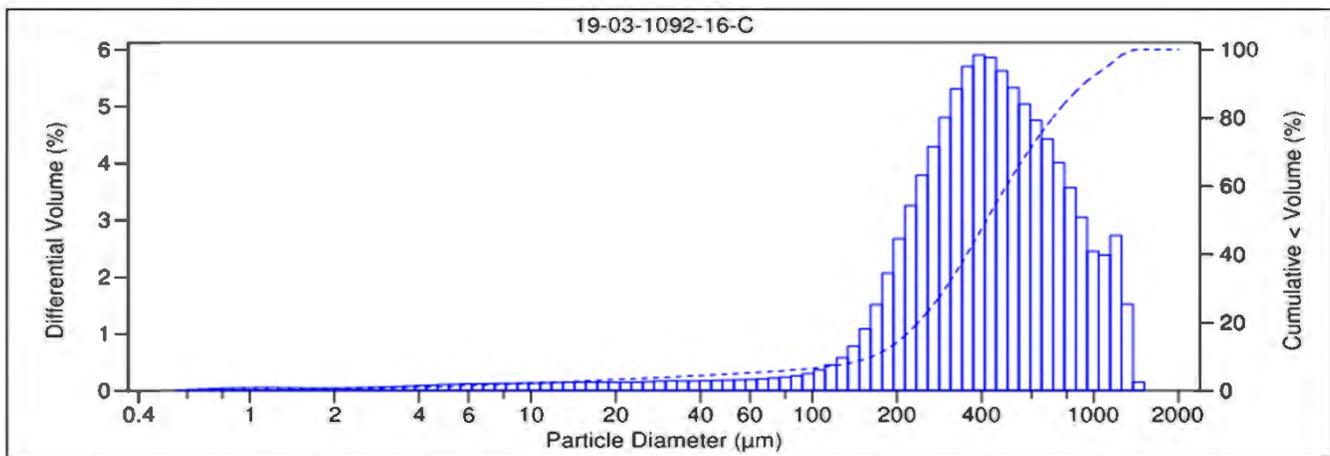
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-7		Coarse Sand	0.793

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
10.38	7.05	27.64	35.25	12.93	1.99	3.87	0.88	4.75



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

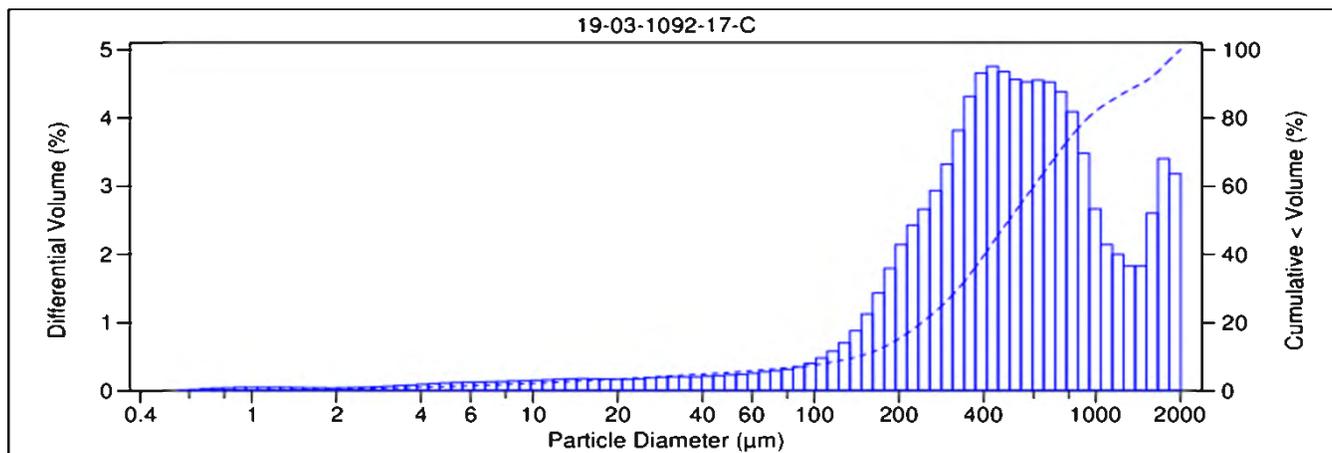
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-8		Coarse Sand	0.628

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
0.00	18.15	30.99	29.87	12.16	2.91	4.99	0.94	5.92



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

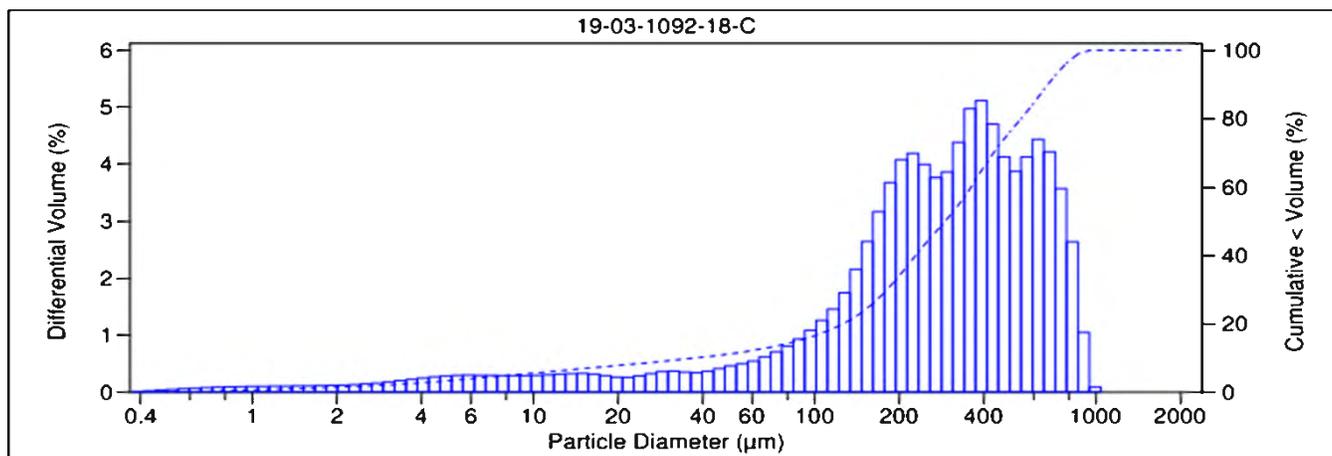
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 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-9		Medium Sand	0.330

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
0.00	0.04	23.44	32.63	23.99	7.45	9.79	2.67	12.46



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

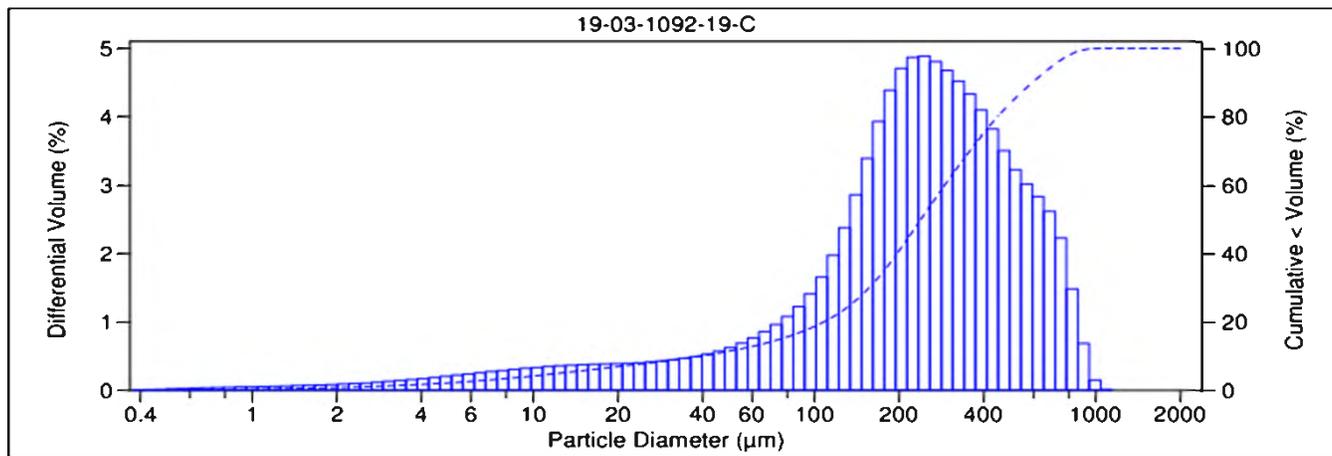
Date Sampled: 03/11/19
 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-5 Rep 3		Medium Sand	0.356

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
2.40	0.08	15.40	30.90	28.59	9.71	11.26	1.65	12.91



PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

Element Environmental

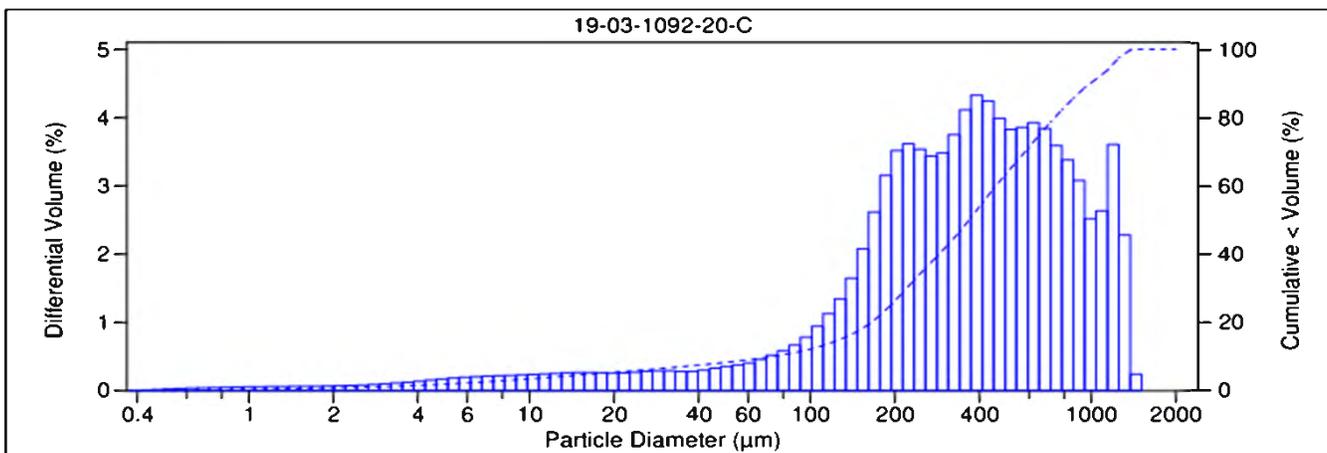
Date Sampled: 03/08/19
 Date Received: 03/14/19
 Work Order No: 19-03-1092
 Date Analyzed: 03/25/19
 Method: ASTM D4464M

Project: Kahawainui Stream / 150052

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Sample ID	Depth ft	Description	Mean Grain Size mm
DU-5		Coarse Sand	0.604

Particle Size Distribution, wt by percent								Total Silt & Clay
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	
5.00	9.38	25.07	27.47	19.07	5.25	7.30	1.46	8.76



V 3.0

Quality Control - Spike/Spike Duplicate

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
19-03-1495-1	Sample	Solid	GC 50	03/20/19	03/21/19 12:52	190320S10
19-03-1495-1	Matrix Spike	Solid	GC 50	03/20/19	03/21/19 12:12	190320S10
19-03-1495-1	Matrix Spike Duplicate	Solid	GC 50	03/20/19	03/21/19 12:32	190320S10

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	ND	400.0	408.6	102	410.3	103	64-130	0	0-15	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - Spike/Spike Duplicate

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
19-03-1919-1	Sample	Solid	GC 49	04/01/19	04/01/19 16:28	190401S04
19-03-1919-1	Matrix Spike	Solid	GC 49	04/01/19	04/01/19 15:45	190401S04
19-03-1919-1	Matrix Spike Duplicate	Solid	GC 49	04/01/19	04/01/19 16:07	190401S04

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Motor Oil	ND	400.0	449.3	112	494.7	124	64-130	10	0-15	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - Spike/Spike Duplicate

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3541
Method: EPA 8081A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
DU-5 Rep 2	Sample	Sediment	GC 51	03/28/19	04/01/19 12:56	190328S09
DU-5 Rep 2	Matrix Spike	Sediment	GC 51	03/28/19	04/01/19 11:45	190328S09
DU-5 Rep 2	Matrix Spike Duplicate	Sediment	GC 51	03/28/19	04/01/19 11:59	190328S09

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Aldrin	ND	5.000	6.917	138	6.385	128	50-135	8	0-25	3
Alpha-BHC	ND	5.000	4.864	97	4.450	89	50-135	9	0-25	
Beta-BHC	ND	5.000	7.723	154	6.856	137	50-135	12	0-25	3
Delta-BHC	ND	5.000	20.60	412	19.38	388	50-135	6	0-25	3
Gamma-BHC	ND	5.000	5.366	107	4.906	98	50-135	9	0-25	
Dieldrin	ND	5.000	14.36	287	13.02	260	50-135	10	0-25	3
4,4'-DDD	ND	5.000	5.436	109	5.084	102	50-135	7	0-25	
4,4'-DDE	ND	5.000	5.655	113	5.922	118	50-135	5	0-25	
4,4'-DDT	ND	5.000	6.780	136	6.623	132	50-135	2	0-25	3
Endosulfan I	ND	5.000	5.759	115	5.716	114	50-135	1	0-25	
Endosulfan II	ND	5.000	5.178	104	4.831	97	50-135	7	0-25	
Endosulfan Sulfate	ND	5.000	8.549	171	6.969	139	50-135	20	0-25	3
Endrin	ND	5.000	5.168	103	5.007	100	50-135	3	0-25	
Endrin Aldehyde	ND	5.000	5.246	105	4.810	96	50-135	9	0-25	
Endrin Ketone	ND	5.000	12.62	252	10.33	207	50-135	20	0-25	3
Heptachlor	ND	5.000	7.639	153	6.133	123	50-135	22	0-25	3
Heptachlor Epoxide	ND	5.000	8.978	180	10.17	203	50-135	12	0-25	3
Methoxychlor	ND	5.000	8.287	166	7.546	151	50-135	9	0-25	3
Alpha Chlordane	ND	5.000	5.851	117	6.451	129	50-135	10	0-25	
Gamma Chlordane	ND	5.000	7.381	148	9.254	185	50-135	23	0-25	3

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - Spike/Spike Duplicate

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
19-03-1056-25	Sample	Solid	GC 58	03/26/19	03/27/19 20:42	190326S06
19-03-1056-25	Matrix Spike	Solid	GC 58	03/26/19	03/27/19 19:24	190326S06
19-03-1056-25	Matrix Spike Duplicate	Solid	GC 58	03/26/19	03/27/19 19:42	190326S06

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Aroclor-1016	ND	100.0	70.50	70	78.00	78	50-135	10	0-20	
Aroclor-1260	ND	100.0	59.50	60	67.00	67	50-135	12	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - Spike/Spike Duplicate

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 8151A
 Method: EPA 8151A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
19-03-1293-1	Sample	Solid	GC 40	03/22/19	03/26/19 20:31	190322S03
19-03-1293-1	Matrix Spike	Solid	GC 40	03/22/19	03/26/19 19:45	190322S03
19-03-1293-1	Matrix Spike Duplicate	Solid	GC 40	03/22/19	03/26/19 20:08	190322S03

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
2,4-D	ND	400.0	277.0	69	302.0	76	32-146	9	0-37	
2,4,5-T	ND	40.00	24.00	60	25.00	62	27-147	4	0-37	
2,4-DB	ND	400.0	290.0	72	310.0	78	31-151	7	0-42	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - PDS/PDSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
DU-2	Sample	Sediment	ICP/MS 05	03/27/19 00:00	03/28/19 20:52	190327S02
DU-2	PDS	Sediment	ICP/MS 05	03/27/19 00:00	03/28/19 20:43	190327S02
DU-2	PDSD	Sediment	ICP/MS 05	03/27/19 00:00	03/28/19 20:46	190327S02

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	PDSD Conc.	PDSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	1.186	25.00	29.19	112	29.82	115	75-125	2	0-20	
Barium	3.598	25.00	41.31	151	41.81	153	75-125	1	0-20	5
Cadmium	ND	25.00	25.60	102	26.17	105	75-125	2	0-20	
Chromium	27.97	25.00	152.7	499	150.2	489	75-125	2	0-20	5
Lead	1.279	25.00	31.23	120	31.10	119	75-125	0	0-20	
Selenium	0.3534	25.00	29.19	115	28.69	113	75-125	2	0-20	
Silver	0.6138	12.50	13.79	105	13.84	106	75-125	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - PDS/PDSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
DU-6	Sample	Sediment	ICP/MS 05	03/27/19 00:00	03/28/19 21:13	190327S03
DU-6	PDS	Sediment	ICP/MS 05	03/27/19 00:00	04/02/19 12:49	190327S03
DU-6	PDSD	Sediment	ICP/MS 05	03/27/19 00:00	04/02/19 12:52	190327S03

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	PDSD Conc.	PDSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	3.527	25.00	29.36	103	30.41	108	75-125	4	0-20	
Barium	13.11	25.00	36.05	92	36.29	93	75-125	1	0-20	
Cadmium	ND	25.00	26.39	106	26.24	105	75-125	1	0-20	
Chromium	55.94	25.00	71.29	61	71.47	62	75-125	0	0-20	5
Lead	1.241	25.00	26.96	103	26.94	103	75-125	0	0-20	
Selenium	1.330	25.00	26.22	100	28.24	108	75-125	7	0-20	
Silver	1.468	12.50	10.87	75	10.83	75	75-125	0	0-20	


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Quality Control - PDS/PDSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
DU-5 Rep 3	Sample	Sediment	ICP/MS 05	03/27/19 00:00	03/28/19 21:24	190327S04
DU-5 Rep 3	PDS	Sediment	ICP/MS 05	03/27/19 00:00	04/02/19 12:57	190327S04
DU-5 Rep 3	PDSD	Sediment	ICP/MS 05	03/27/19 00:00	04/02/19 13:00	190327S04

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	PDSD Conc.	PDSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	6.957	25.00	31.18	97	30.62	95	75-125	2	0-20	
Barium	44.69	25.00	62.71	72	63.13	74	75-125	1	0-20	5
Cadmium	0.1726	25.00	27.14	108	26.76	106	75-125	1	0-20	
Chromium	215.8	25.00	206.7	4X	203.2	4X	75-125	4X	0-20	Q
Lead	7.394	25.00	32.40	100	32.37	100	75-125	0	0-20	
Selenium	3.612	25.00	26.00	90	26.21	90	75-125	1	0-20	
Silver	6.353	12.50	11.80	44	11.61	42	75-125	2	0-20	5

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - Sample Duplicate

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: N/A
 Method: ASTM D-2216 (M)

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	Duplicate Batch Number
DU-2	Sample	Sediment	N/A	03/19/19 00:00	03/20/19 09:30	J0320MOID1
DU-2	Sample Duplicate	Sediment	N/A	03/19/19 00:00	03/20/19 09:30	J0320MOID1

<u>Parameter</u>	<u>Sample Conc.</u>	<u>DUP Conc.</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Moisture	36.20	38.00	5	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-353-123	LCS	Solid	GC 50	03/20/19	03/21/19 11:52	190320B10B

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
TPH as Diesel	400.0	410.2	103	61-145	

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Quality Control - LCS

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3550B
 Method: EPA 8015B (M)

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-420-3146	LCS	Solid	GC 49	04/01/19	04/01/19 15:23	190401B04
<u>Parameter</u>		<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
TPH as Motor Oil		400.0	437.4	109	75-123	

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-733	LCS	Solid	ICP/MS 05	03/27/19	03/28/19 20:37	190327L02
099-15-254-733	LCSD	Solid	ICP/MS 05	03/27/19	03/28/19 20:40	190327L02

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	25.31	101	24.90	100	80-120	2	0-20	
Barium	25.00	24.23	97	23.76	95	80-120	2	0-20	
Cadmium	25.00	25.67	103	24.98	100	80-120	3	0-20	
Chromium	25.00	28.23	113	27.37	109	80-120	3	0-20	
Lead	25.00	25.82	103	24.93	100	80-120	3	0-20	
Selenium	25.00	21.68	87	21.16	85	80-120	2	0-20	
Silver	12.50	11.52	92	11.69	93	80-120	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-734	LCS	Solid	ICP/MS 05	03/27/19	04/02/19 12:25	190327L03
099-15-254-734	LCSD	Solid	ICP/MS 05	03/27/19	04/02/19 12:27	190327L03

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	25.87	103	26.64	107	80-120	3	0-20	
Barium	25.00	25.92	104	26.26	105	80-120	1	0-20	
Cadmium	25.00	27.51	110	27.58	110	80-120	0	0-20	
Chromium	25.00	29.32	117	29.65	119	80-120	1	0-20	
Lead	25.00	26.81	107	26.53	106	80-120	1	0-20	
Selenium	25.00	26.09	104	26.67	107	80-120	2	0-20	
Silver	12.50	12.31	99	12.33	99	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3050B
 Method: EPA 6020

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-254-735	LCS	Solid	ICP/MS 05	03/27/19	04/02/19 12:30	190327L04
099-15-254-735	LCSD	Solid	ICP/MS 05	03/27/19	04/02/19 12:33	190327L04

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Arsenic	25.00	26.28	105	25.96	104	80-120	1	0-20	
Barium	25.00	25.94	104	26.57	106	80-120	2	0-20	
Cadmium	25.00	27.59	110	27.80	111	80-120	1	0-20	
Chromium	25.00	29.35	117	30.07	120	80-120	2	0-20	
Lead	25.00	27.03	108	26.75	107	80-120	1	0-20	
Selenium	25.00	25.69	103	26.79	107	80-120	4	0-20	
Silver	12.50	12.24	98	12.35	99	80-120	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-278-530	LCS	Solid	Mercury 07	03/28/19	03/28/19 15:18	190328L03
099-16-278-530	LCSD	Solid	Mercury 07	03/28/19	03/28/19 15:34	190328L03

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.7511	90	0.7450	89	82-124	1	0-16	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-278-531	LCS	Solid	Mercury 07	03/28/19	03/28/19 15:21	190328L04
099-16-278-531	LCSD	Solid	Mercury 07	03/28/19	03/28/19 15:37	190328L04

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.7393	89	0.7315	88	82-124	1	0-16	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-278-532	LCS	Solid	Mercury 07	03/28/19	03/28/19 15:23	190328L05
099-16-278-532	LCSD	Solid	Mercury 07	03/28/19	03/28/19 15:39	190328L05

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.7599	91	0.8253	99	82-124	8	0-16	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-278-533	LCS	Solid	Mercury 07	03/28/19	03/28/19 15:25	190328L06
099-16-278-533	LCSD	Solid	Mercury 07	03/28/19	03/28/19 17:46	190328L06

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.7531	90	0.7487	90	82-124	1	0-16	

Return to Contents

RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 7471A Total
 Method: EPA 7471A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-278-534	LCS	Solid	Mercury 07	03/28/19	03/28/19 15:28	190328L07
099-16-278-534	LCSD	Solid	Mercury 07	03/28/19	03/28/19 15:44	190328L07

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.8350	0.7714	92	0.7172	86	82-124	7	0-16	

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RPD: Relative Percent Difference. CL: Control Limits

Quality Control - LCS/LCSD

Element Environmental
98-030 Hekaha Street, Unit 9
Aiea, HI 96701-4900

Date Received: 03/14/19
Work Order: 19-03-1092
Preparation: EPA 3541
Method: EPA 8081A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number				
099-12-858-624	LCS	Solid	GC 51	03/28/19	04/01/19 11:16	190328L09				
099-12-858-624	LCSD	Solid	GC 51	03/28/19	04/01/19 11:31	190328L09				
Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Aldrin	5.000	3.083	62	3.642	73	50-135	36-149	17	0-25	
Alpha-BHC	5.000	3.579	72	3.989	80	50-135	36-149	11	0-25	
Beta-BHC	5.000	4.077	82	4.380	88	50-135	36-149	7	0-25	
Delta-BHC	5.000	4.540	91	4.802	96	50-135	36-149	6	0-25	
Gamma-BHC	5.000	3.928	79	4.265	85	50-135	36-149	8	0-25	
Dieldrin	5.000	4.211	84	4.658	93	50-135	36-149	10	0-25	
4,4'-DDD	5.000	4.639	93	5.209	104	50-135	36-149	12	0-25	
4,4'-DDE	5.000	4.340	87	4.901	98	50-135	36-149	12	0-25	
4,4'-DDT	5.000	5.493	110	6.184	124	50-135	36-149	12	0-25	
Endosulfan I	5.000	4.444	89	4.916	98	50-135	36-149	10	0-25	
Endosulfan II	5.000	4.562	91	5.098	102	50-135	36-149	11	0-25	
Endosulfan Sulfate	5.000	4.225	84	5.058	101	50-135	36-149	18	0-25	
Endrin	5.000	4.442	89	4.946	99	50-135	36-149	11	0-25	
Endrin Aldehyde	5.000	2.930	59	3.387	68	50-135	36-149	14	0-25	
Endrin Ketone	5.000	4.918	98	5.311	106	50-135	36-149	8	0-25	
Heptachlor	5.000	4.212	84	4.714	94	50-135	36-149	11	0-25	
Heptachlor Epoxide	5.000	4.239	85	4.696	94	50-135	36-149	10	0-25	
Methoxychlor	5.000	4.622	92	5.254	105	50-135	36-149	13	0-25	
Alpha Chlordane	5.000	4.216	84	4.680	94	50-135	36-149	10	0-25	
Gamma Chlordane	5.000	4.146	83	4.602	92	50-135	36-149	10	0-25	

Total number of LCS compounds: 20

Total number of ME compounds: 0

Total number of ME compounds allowed: 1

LCS ME CL validation result: Pass

Quality Control - LCS

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 3545
 Method: EPA 8082

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-12-535-5139	LCS	Solid	GC 58	03/26/19	03/27/19 19:06	190326L06

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
Aroclor-1016	100.0	88.50	88	50-135	
Aroclor-1260	100.0	91.50	92	50-135	

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Quality Control - LCS

Element Environmental
 98-030 Hekaha Street, Unit 9
 Aiea, HI 96701-4900

Date Received: 03/14/19
 Work Order: 19-03-1092
 Preparation: EPA 8151A
 Method: EPA 8151A

Project: Kahawainui Stream / 150052

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Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
095-01-033-1651	LCS	Solid	GC 40	03/22/19	03/26/19 19:22	190322L03

<u>Parameter</u>	<u>Spike Added</u>	<u>Conc. Recovered</u>	<u>LCS %Rec.</u>	<u>%Rec. CL</u>	<u>Qualifiers</u>
2,4-D	400.0	332.0	83	49-127	
2,4,5-T	40.00	36.00	90	31-145	
2,4-DB	400.0	337.0	84	48-132	

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<u>Qualifiers</u>	<u>Definition</u>
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.



Calscience

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494
For courier service / sample drop off information, contact us26_sales@eurofinsus.com or call us.

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY

19-03-1092

DATE: 02/19/19
PAGE: 1 OF 1

LABORATORY CLIENT: Element Environmental LLC
ADDRESS: 98-030 Hekaha St., Unit 9
CITY: Aiea STATE: HI ZIP: 96701
TEL: 808-479-6075 E-MAIL: mneal@e2hi.com

CLIENT PROJECT NAME / NUMBER: Kahawainui Stream/ 150052 P.O. NO.: 150052
PROJECT CONTACT: Matt Neal SAMPLER(S): (PRINT) M. Neal

REQUESTED ANALYSES

Please check box or fill in blank as needed.

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS STANDARD
 COELT EDF GLOBAL ID: LOG CODE:
SPECIAL INSTRUCTIONS: Please report on a dry waight basis.

TPH-DRO	TPH-PFO	Pesticides 1312/8081	PCBs 8082	PCRA 8 metals 6020A/7471A	ISM processing	herbicides 8151A														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														
X	X	X	X	X	X	X														

LAB USE ONLY	SAMPLE ID	SAMPLING		MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered
		DATE	TIME					
1	DU-2	3/7/2019	16:30	Sediment	1	X		
2	DU-3	3/7/2019	13:30	Sediment	1	X		
3	Du-4	3/8/2019	10:30	Sediment	1	X		
4	DU-5 Rep 2	3/11/2019	15:00	Sediment	1	X		
5	DU-6	3/11/2019	12:40	Sediment	1	X		
6	DU-7	3/11/2019	15:00	Sediment	1	X		
7	DU-8	3/12/2019	11:50	Sediment	1	X		
8	DU-9	3/12/2019	12:30	Sediment	1	X		
9	DU-5 Rep 3	3/11/2019	15:30	Sediment	1	X		
10	DU-5	3/8/2019	11:53	Sediment	1	X		

Relinquished by: (Signature) [Signature] Received by: (Signature/Affiliation) [Signature] Date: 3/14/19 Time: 11:45
Relinquished by: (Signature) Received by: (Signature/Affiliation) Date: Time:
Relinquished by: (Signature) Received by: (Signature/Affiliation) Date: Time:



1092

ORIGIN ID: NAXA (808) 479-6075
MATT NEAL
ELEMENT ENVIRONMENTAL LLC
89-030 HEKAHA ST
SUITE #9
AIEA, HI 96701
UNITED STATES US

SHIP DATE: 13MAR19
ACTWGT: 88.60 LB
CAD: 0146956/CAFE3211
DIMS: 24x15x14 IN
BILL SENDER

Part # 155297-435 RBD8

TO **SAMPLE RECEIVING**
EUROFINS / CAL SCIENCE
7440 LINCOLN WAY

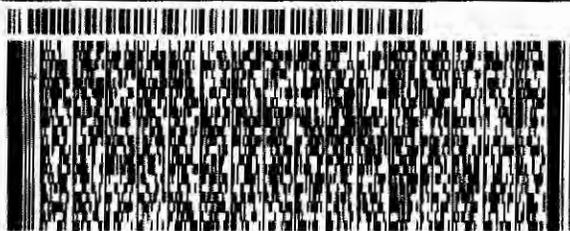
7440 LINCOLN WAY

GARDEN GROVE CA 928411427

(714) 896-6484
PO: 150052

REF: KAHAWAINUI STREAM

EXP 02/19



FedEx
Express

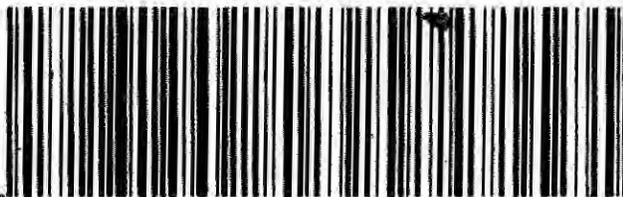


THU - 14 MAR 10:30A
PRIORITY OVERNIGHT

TRK# 4707 1911 3247
0201

WZ APVA

92841
CA-US SNA



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SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Element

DATE: 03/17/2019

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.5°C); Temperature (w/o CF): 3.5 °C (w/ CF): 3.0 °C; Blank Sample

Sample(s) outside temperature criteria (PM/APM contacted by: _____)

Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: Air Filter

Checked by: 836

CUSTODY SEAL:

Cooler Present and Intact Present but Not Intact Not Present N/A

Checked by: JM

Sample(s) Present and Intact Present but Not Intact Not Present N/A

Checked by: 1017

SAMPLE CONDITION:

	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COC document(s) received complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sampling date <input type="checkbox"/> Sampling time <input type="checkbox"/> Matrix <input type="checkbox"/> Number of containers			
<input type="checkbox"/> No analysis requested <input type="checkbox"/> Not relinquished <input type="checkbox"/> No relinquished date <input type="checkbox"/> No relinquished time			
Sampler's name indicated on COC	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with COC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and in good condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper containers for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sufficient volume/mass for analyses requested	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Samples received within holding time	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aqueous samples for certain analyses received within 15-minute holding time			
<input type="checkbox"/> pH <input type="checkbox"/> Residual Chlorine <input type="checkbox"/> Dissolved Sulfide <input type="checkbox"/> Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Proper preservation chemical(s) noted on COC and/or sample container	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Unpreserved aqueous sample(s) received for certain analyses			
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Total Metals <input type="checkbox"/> Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Container(s) for certain analysis free of headspace.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Volatile Organics <input type="checkbox"/> Dissolved Gases (RSK-175) <input type="checkbox"/> Dissolved Oxygen (SM 4500)			
<input type="checkbox"/> Carbon Dioxide (SM 4500) <input type="checkbox"/> Ferrous Iron (SM 3500) <input type="checkbox"/> Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CONTAINER TYPE:

(Trip Blank Lot Number: _____)

- Aqueous:** VOA VOAh VOAna₂ 100PJ 100PJna₂ 125AGB 125AGBh 125AGBp 125PB 125PBz_{na} (pH__9)
 250AGB 250CGB 250CGBs (pH__2) 250PB 250PBn (pH__2) 500AGB 500AGJ 500AGJs (pH__2) 500PB
 1AGB 1AGBna₂ 1AGBs (pH__2) 1AGBs (O&G) 1PB 1PBna (pH__12) _____ _____ _____
Solid: 4ozCGJ 8ozCGJ 16ozCGJ Sleeve (____) EnCores® (____) TerraCores® (____) _____ _____ _____
Air: Tedlar™ Canister Sorbent Tube PUF _____ **Other Matrix** (Sediment): Z _____ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO₃, **na** = NaOH, **na₂** = Na₂S₂O₃, **p** = H₃PO₄, Labeled/Checked by: 1017

s = H₂SO₄, **u** = ultra-pure, **x** = Na₂SO₃+NaHSO₄.H₂O, **z_{na}** = Zn (CH₃CO₂)₂ + NaOH Reviewed by: 1053

SAMPLE ANOMALY REPORT

DATE: 03/14/2019

SAMPLES, CONTAINERS, AND LABELS:

- Sample(s) NOT RECEIVED but listed on COC
- Sample(s) received but NOT LISTED on COC
- Holding time expired (list client or ECI sample ID and analysis)
- Insufficient sample amount for requested analysis (list analysis)
- Improper container(s) used (list analysis)
- Improper preservative used (list analysis)
- pH outside acceptable range (list analysis)
- No preservative noted on COC or label (list analysis and notify lab)
- Sample container(s) not labeled
- Client sample label(s) illegible (list container type and analysis)
- Client sample label(s) do not match COC (comment)
 - Project information
 - Client sample ID
 - Sampling date and/or time
 - Number of container(s)
 - Requested analysis
- Sample container(s) compromised (comment)
 - Broken
 - Water present in sample container
- Air sample container(s) compromised (comment)
 - Flat
 - Very low in volume
 - Leaking (not transferred; duplicate bag submitted)
 - Leaking (transferred into ECI Tedlar™ bags*)
 - Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Comments

(-6) collection time per label is 13:00

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

Reported by: 1017

Reviewed by: 1053

** Record the total number of containers (i.e., vials or bottles) for the affected sample.

APPENDIX B: FLORA AND FAUNA SURVEY

Biological Resources Survey Report for Kahawainui Stream Dredging Project

Prepared for

Belt Collins Hawaii LLC

Prepared by

SWCA Environmental Consultants

June 2016



BIOLOGICAL RESOURCES SURVEY REPORT FOR KAHAWAINUI STREAM DREDGING PROJECT

Prepared for

Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawai'i 96819

Prepared by

SWCA Environmental Consultants
Bishop Square ASB Tower
1001 Bishop Street, Suite 2800
Honolulu, Hawai'i 96813
(808) 548-7899
www.swca.com

SWCA Project No. 31120

June 28, 2016

EXECUTIVE SUMMARY

Belt Collins Hawaii LLC requested that SWCA Environmental Consultants (SWCA) perform a terrestrial and stream biological resources survey in support of the City and County of Honolulu's (City's) proposed Kahawainui Stream dredging project located in Lā'ie, Island of O'ahu (Figure 1). The intent of the maintenance dredging project is to improve the flooding capacity of the City-owned portion of the Kahawainui Stream between its confluence with Lā'iewai Stream and the mouth of Kahawainui Stream.

This report summarizes the findings of the biological resources survey conducted by SWCA on March 21 and March 31, 2016. A pedestrian survey was conducted to record all vascular plant species and vegetation types. Terrestrial fauna surveys consisted of 4 hours of observations between 12:30 and 4:30 pm. Stream fauna surveys consisted of an in-water mask and snorkel survey, but was supplemented with visual observations from the banks and benthic dredge sampling due to low visibility from turbid water. Water quality samples were collected near the sand berm near the closure of the stream mouth. Surveys of the marine environment and marine species were not included in SWCA's survey.

Two federally and state listed animals—the Hawaiian gallinule (*Gallinula chloropus sandvicensis*) and the Hawaiian stilt (*Himantopus mexicanus knudseni*)—were observed by SWCA during the survey. Additionally, although not observed during the fauna survey, the Hawaiian coot (*Fulica alai*) and the Hawaiian hoary bat (*Lasiurus cinereus semotus*) have a high potential of using the survey area habitat based on current distribution and habitat requirements. The Hawaiian goose (*Branta sandvicensis*) and Hawaiian duck (*Anas wyvilliana*) are unlikely to occur due to low numbers of the Hawaiian goose and Hawaiian duck inbreeding. Two listed seabird species—the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and threatened Newell's shearwater (*Puffinus auricularis newelli*)—may also fly over the survey area at night while travelling to and from their upland nesting sites to the ocean. Recommendations to avoid and minimize impacts to these listed species are provided. All other listed species with potential to occur on the Island of O'ahu are not likely to occur in the survey area because it is either outside the range of the species or appropriate habitat does not occur.

No native stream animals were observed during the survey. The degraded biodiversity of the observed aquatic community and anoxic indicators found in the benthic samples suggest the survey area of Kahawainui Stream may be poor habitat for native aquatic fauna.

This study identified heightened nutrient concentrations (particularly ammonia and total phosphorus) indicating that Kahawainui Stream may be subject to excess nutrient loads from agricultural runoff, streambank collapse, sewage, and/or suburban runoff of fertilizers, as well as potentially inefficient uptake of nutrients by aquatic vegetation. Additionally, the berm separating Kahawainui Stream from the Pacific Ocean prevents flushing of sediment and chemical contaminants.

The vegetation type and plant species identified during the survey are not considered unique. None of the 10 native plant species observed are federally and state threatened or endangered plants, proposed listed plants, or candidate plants. Therefore, the proposed project is not expected to have a significant, adverse impact on botanical resources.

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APPENDICES

Appendix A. Checklist of Plants Observed During Flora Surveys for the Kahawainui Stream Dredging Project on March 31, 2016

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1. INTRODUCTION

The City and County of Honolulu (City) Department of Design and Construction has contracted Belt Collins Hawaii LLC (Belt Collins) and its subconsultants to prepare plans and specifications for maintenance dredging of a City-owned portion of Kahawainui Stream, Lā'ie, Island of O'ahu. Belt Collins requested that SWCA Environmental Consultants (SWCA) conduct a terrestrial and stream biological resources survey to assess potential project impacts and to provide recommendations with regard to avoidance and minimization of impacts to native and listed species, if present. This report summarizes the findings of the biological resources survey conducted by SWCA biologists on March 21, 2016, and March 31, 2016.

The intent of the maintenance dredging project is to improve the flooding capacity of the portion of the Kahawainui Stream between its confluence with Lā'iewai Stream and the mouth of Kahawainui Stream. The project does not include dredging of the sand berm at the stream mouth. The streambanks and immediate vicinity may be used for: staging equipment and materials; transporting equipment; or to dry, sort, or crush the dredged spoils.

2. DESCRIPTION OF THE SURVEY AREA

2.1. Location and Vicinity

Kahawainui Stream is located in Lā'ie, in the District of Ko'olau Loa, on the windward side of O'ahu (Figure 1). The survey area encompasses approximately 3.1 hectares (7.7 acres). It includes the lower reach and estuarine segments of Kahawainui Stream, beginning at the confluence of Lā'iewai and Kahawainui Streams, and continuing under Lā'iewai Bridge and Kamehameha Highway (Route 83) before terminating at the sand-berm separating the mouth of Kahawainui Stream from Lā'ie Bay. Elevations in the survey area range from sea level to 1.8 meters (m) (0–6 feet) above mean sea level.

Kahawainui Stream has been modified from its natural course as part of various flood-control projects. The portion of the stream within the survey area currently has concrete-lined banks from 150 m (492 feet) upstream to 15 m (49 feet) downstream of the Lā'iewai Bridge. Although the upstream channel width is 18.3 m (60 feet), the channel broadens to approximately 26.4 m (87 feet), based on the design of the concrete lining. Both upstream and downstream of the channelized segment, the stream has earthen vegetated embankments with natural substrate channel.

The land surrounding the survey area comprises residential, agricultural, and recreational use areas. On the makai (seaward) side of the bridge, Malaekahana State Recreation Area and Hukilau Beach Park border the left (north) and right (south) bank of the survey area, respectively. On the mauka (landward) side of the bridge, there is a chicken farm to the north of Kahawainui Stream and a cemetery and residential area to the south. A number of small wetlands are located less than 120 m (393 feet) to the north and northwest of the stream confluence. James Campbell National Wildlife Refuge is located approximately 5.6 kilometers (km) (3.5 miles) to the north of the survey area.

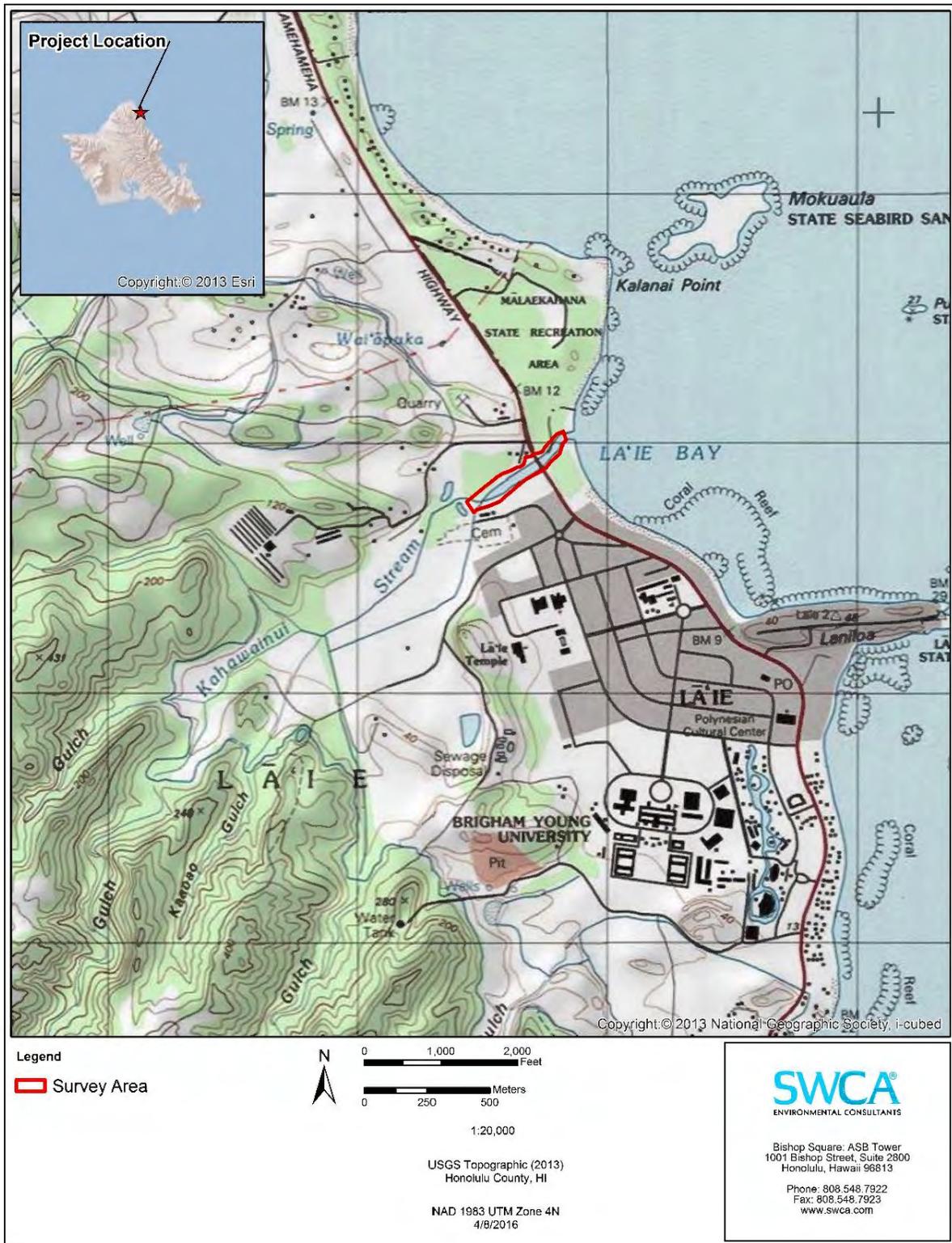


Figure 1. Location of the survey area.

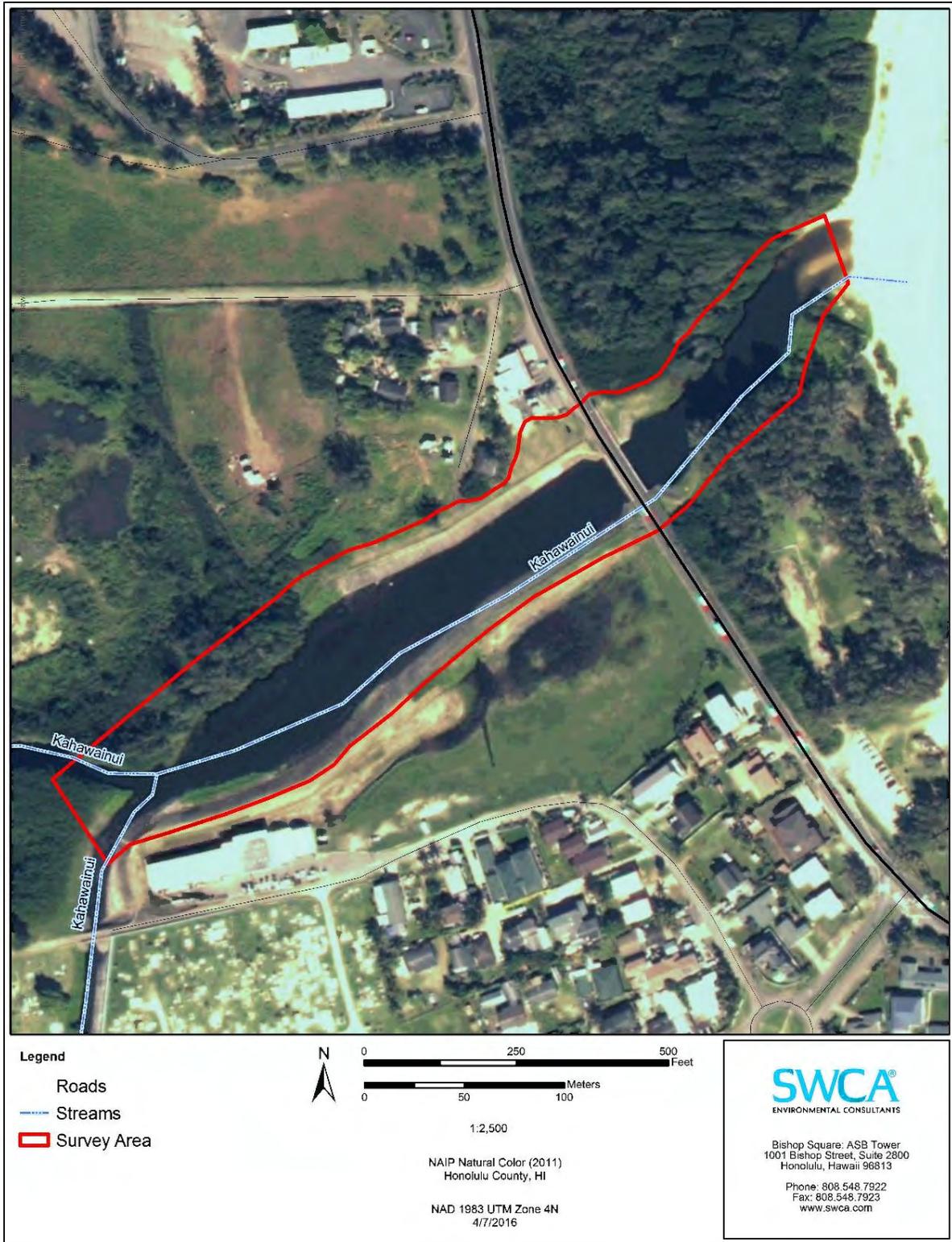


Figure 2. Survey area.

2.2. Geology and Soils

The survey area is at the foot of the Ko‘olau Mountains. It is underlain by gravel, alluvium, and beach deposits (Sherrod et al. 2007). The Natural Resources Conservation Service (NRCS) identifies three soil types in the survey area: Kaloko clay, noncalcareous variant; Lahaina silty clay, 7%–15% slopes; and Jaucas sand, 0%–15% slopes (Foote et al. 1972; NRCS 2013).

2.3. Climate and Hydrology

Mean annual rainfall for this area is approximately 1,278 millimeters (50.3 inches). Rainfall is typically highest in March and lowest in June (Giambelluca et al. 2013). The closest rainfall gage to the site (Kii KFWHI1) experienced below average rainfall for 2016 through the end of March (National Oceanic and Atmospheric Administration/National Weather Service, Weather Forecast Office Honolulu 2016).

The survey area is in the Kahawainui Watershed, which encompasses roughly 13.8 square km (5.3 square miles). The total length of the Kahawainui Stream is approximately 32 km (19.9 miles) (Parham et al. 2008).

3. METHODS

SWCA reviewed available scientific and technical literature regarding natural resources in and near the survey area. This literature review encompassed a thorough search of refereed scientific journals, technical journals and reports, environmental assessments and environmental impact statements, relevant government documents, and unpublished data that provide insight into the natural history and ecology of the area. SWCA also reviewed available geospatial data, aerial photographs, topographic maps of the survey area, and The U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System of listed species believed to or known to occur in Hawai‘i.

The aquatic and wildlife survey was conducted by SWCA biologists Dr. Robert Kinzie III and Bryson Luke on March 21, 2016. The botanical survey and water quality sampling were conducted by Botanist Danielle Frohlich and Specialist Lilly Stoilova on March 31, 2016.

3.1. Flora

A pedestrian survey was conducted in the survey area to record all vascular plant species along the stream within 30 m of the streambank. Areas more likely to support native plants (e.g., rocky outcrops and shady areas) were more intensively examined.

Plants recorded during the survey are indicative of the season (“rainy” vs. “dry”) and the environmental conditions at the time of the survey. As environmental conditions change, it is likely that plant community composition, species, and abundances will undergo temporal or seasonal changes.

3.2. Terrestrial Fauna

Terrestrial fauna surveys consisted of a pedestrian survey between 12:30 to 4:30 pm. Visual and auditory observations were included in the survey. All birds, mammals, reptiles, amphibians, and invertebrate species seen or heard and any sign (scat or tracks) were noted.

Acoustic surveys for the endangered Hawaiian hoary bat or ‘ōpe‘ape‘a (*Lasiurus cinereus semotus*) were not conducted; however, areas of suitable habitat for foraging and roosting were noted when present. All survey area habitat was assessed for suitability for protected species.

3.3. Aquatic Fauna

An in-water mask and snorkel survey was performed within the survey area, beginning at the beach berm separating Kahawainui Stream from the Pacific Ocean and ending at the confluence of Kahawainui Stream and Lā‘iewai Stream. Species observed were recorded and identified to the lowest taxonomic level. Because of the low visibility from turbid water, only one instream transect was completed. A visual survey along the banks and three benthic dredge samples were performed to supplement the instream survey. The dredge samples were taken from the stream confluence, the bridge, and the beach berm. Dredge samples were performed using a 3.5-liter (0.92-gallon) Ekman SS Grab Sampler. Samples were photo-documented and contents were described.

Marine fauna surveys, including the endangered Hawaiian monk seal (*Neomonachus schauinslandi*), green sea turtle (*Chelonia mydas*), and hawksbill sea turtle (*Eretmochelys imbricata*), were not included in this study.

3.4. Water Quality

Water quality samples were collected upstream of the sand berm near the closure of the stream mouth on March 31, 2016, between 10:30 am and 1:30 pm. In-situ physical parameters collected include temperature, dissolved oxygen (DO), salinity, and pH. Turbidity was measured in the field using a portable turbidimeter. Nutrient samples (i.e., nitrate + nitrite nitrogen, ammonia nitrogen, total nitrogen, and total phosphorus), chlorophyll α , and total suspended solids (TSS) were sampled and analyzed by Food Quality Labs (FQ Labs). The water samples and parameters (Table 1) were collected at least 10 inches below the water surface.

Temperature, pH, DO, and salinity were measured using a YSI 556 portable meter. Before initiating field work, the probes were calibrated according to the manufacturer’s specifications to ensure accuracy. The probes were fully submerged at the sample site, and data were recorded once a stable value was measured. Turbidity was measured on-site using a calibrated HF Scientific DRT-15CE portable turbidimeter. A grab sample was collected and aliquots were decanted and analyzed.

Nitrate + nitrite nitrogen, ammonia nitrogen, total nitrogen, total phosphorus, chlorophyll α , and TSS samples were collected by submerging sample containers provided by the analytical laboratory into the water column and collecting a sample free of floating debris and sediment. All samples were labeled with the sample identification number, date, time, and name of sampler, then placed in a cooler with ice and cooled to 7 degrees Celsius. A chain-of-custody form was completed for the samples. Samples were then delivered to FQ Labs for analysis.

All parameters were collected on the same day for the purpose of describing the water quality for the environmental assessment. Other information recorded at this time included tide height during sampling, weather conditions and recent weather events, and other activities that may have impacted water quality of the one-time water sample.

Table 1. Parameters, Field Equipment, and Analytical Methods

Parameter	Instrument or Analytical Method	Sample Type	Laboratory
Temperature	YSI 556 Meter	In situ	Field measured
DO	YSI 556 Meter	In situ	Field measured
Salinity	YSI 556 Meter	In situ	Field measured
pH	YSI 556 Meter	In situ	Field measured
Turbidity	DRT-15CE Turbidimeter	Grab	Field measured
Nitrate + nitrite nitrogen	EPA 300.1	Grab	FQ Labs
Ammonia nitrogen	EPA 350.1	Grab	FQ Labs
Total nitrogen	Calculation	Grab	FQ Labs
Total phosphorus	SM 4500-P E	Grab	FQ Labs
Chlorophyll %	SM 10200 H	Grab	FQ Labs
TSS	EPA160.2	Grab	FQ Labs

Field measurements and laboratory results were compared to the Water Quality Standards (WQS) listed in Hawai‘i Administrative Rules, Title 11, Chapter 54 (HAR 11-54). WQS are generally based on a geometric mean for each parameter; therefore, a minimum of three samples must be collected to compare to the standard. Although a single data point for each parameter is insufficient to determine compliance with WQS, individual data points can provide insight into additional studies that may be needed for the waterbody.

4. RESULTS

Two federally and state-listed endangered waterbirds—the Hawaiian gallinule (*Gallinula chloropus sandvicensis*) and the Hawaiian stilt (*Himantopus mexicanus knudseni*)—were observed by SWCA during the survey. The endangered Hawaiian coot (*Fulica alai*) and the endangered Hawaiian hoary bat may also forage, nest, and/or roost in the survey area (see section 4.2). Habitat does exist for the Hawaiian goose (*Branta sandvicensis*) and Hawaiian duck (*Anas wyvilliana*), but these species are unlikely to occur due to low numbers of the Hawaiian goose and Hawaiian duck inbreeding. Additionally, the federal and state-listed Hawaiian petrel (*Pterodroma sandwichensis*) and Newell’s shearwater (*Puffinus auricularis newelli*) may fly over the survey area at night when traveling to and from their nest grounds. No additional federally or state-listed threatened or endangered plant or animal species or proposed listed or candidate species were found during the surveys. The survey area does not encompass any designated or proposed critical habitat for threatened or endangered species.

4.1. Flora

No state or federally listed threatened, endangered, proposed listed, or candidate plant species, or rare native Hawaiian plant species, were observed in the survey area. In all, 49 plant species were recorded in the survey area during the survey. Of these, 10 species are native to the Hawaiian Islands: ‘ākulikuli (*Sesuvium portulacastrum*), kīpūkai (*Heliotropium curassavicum*), pōhuehue (*Ipomoea pes-caprae* subsp. *brasiliensis*), naupaka kahakai (*Scaevola taccada*), hau (*Hibiscus tiliaceus*), ‘ae‘ae (*Bacopa monnieri*),

‘uhaloa (*Waltheria indica*), *Cyperus polystachyos*, hala (*Pandanus tectorius*), and ‘aki‘aki (*Sporobolus virginicus*). None of these species are considered rare (Wagner et al. 1999).¹ Appendix A provides a list of all plant species observed by SWCA biologists in the survey area.

The vegetation in the survey area consists of four vegetation types: coastal strand, riparian, ruderal, and ironwood grove.

Coastal Strand:

Coastal strand vegetation occurs as a band close to the stream at the ocean end of the survey area. It is influenced by salt spray, wind, high light intensity, high temperature, and shifting sands. As a result, the plants found here are adapted to these environmental stresses. This vegetation type is typified by native species such as ‘aki‘aki grass, ‘ākulikuli, naupaka kahakai, and pōhuehue (Figure 3). Also found in the coastal strand are non-native species such as wedelia (*Sphagneticola trilobata*), giant lily (*Crinum asiaticum*), and tree heliotrope (*Tournefortia argentea*), all of which may have originally been planted but now appear to be spreading.

Riparian

Riparian vegetation occurring alongside Kahawainui Stream is composed mostly of grasses and other herbaceous species with hydrophytic tree and shrub species dominating other localized portions. This area is subject to periodic inundation during which some of the vegetation is swept away. The herbaceous vegetation is characterized by species such as California grass (*Urochloa mutica*), *Cyperus polystachyos*, California bulrush (*Schoenoplectus californicus*), primrose willow (*Ludwigia octovalvis*), silverhead (*Blutaparon vermiculare*), and ‘ae‘ae (Figure 4). Mangrove (*Rhizophora mangle*), sourbush (*Pluchea carolinensis*), and hau make up the woody species (see Figure 3), and maunaloa vine (*Canavalia cathartica*) is occasionally seen twining through the mid-story.

Ruderal

This vegetation type occurs as a band along the highway right-of-way or in other disturbed areas that are periodically mowed and maintained (Figure 5). This mowed portion is composed of a mixture of non-native grasses, weedy herbaceous species, and the occasional fast-growing shrubs and trees along the borders. The grasses that are common to abundant on these mowed areas are Bermuda grass (*Cynodon dactylon*), natal redtop (*Melinis repens*), kikuyu grass (*Cenchrus clandestinus*), and pitted beardgrass (*Bothriochloa pertusa*). Among the more frequently observed herbaceous species are yellow wood sorrel (*Oxalis corniculata*), narrow-leaved plantain (*Plantago lanceolata*), Spanish needle (*Bidens pilosa*), and swinecress (*Coronopus didymus*). Shrubs and small trees seen along the road include castor bean (*Ricinus communis*) and parasol tree (*Macaranga tanarius*). Ivy gourd (*Coccinia grandis*) is locally common and drapes around the mid-story of the shrub and tree species.

Ironwood Grove

A grove of ironwood (*Casuarina equisetifolia*) is found in the eastern, coastal side of the survey area. These trees reach between 10.5 and 15.0 m (34 and 49 feet) in height. The understory in the ironwood grove is generally devoid of vegetation save a few herbaceous species, such as Chinese violet (*Asystasia gangetica*), ‘aki‘aki grass, and Spanish needle (*Bidens pilosa*), and is covered with a layer of needle litter.

¹ The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012). Common/Hawaiian names are provided first, followed by scientific names in parenthesis. If no common or Hawaiian name is known, only the scientific name is provided.



Figure 3. View of vegetation facing mauka, toward the highway. Species seen in this area include coastal strand species, such as naupaka kahakai, pōhuehue, and 'ākulikuli, and riparian vegetation, such as hau and mangrove.



Figure 4. Riparian vegetation on the mauka portion of the site. These species undergo regular inundation during heavy rain events. Species in this area include California grass, California bulrush, hau, and silverhead.



Figure 5. Vegetation south of the stream and mauka of the bridge consisting of grasses and herbaceous species, which undergo regular mowing and other human disturbances.

4.2. Terrestrial Fauna

4.2.1. Avifauna

In all, 21 bird species were documented during the survey, including two federal and state endangered species, one indigenous species, and four migratory birds (Table 2). The bird species observed are species commonly found in Hawai‘i’s urban areas, gardens, and waterways. Two endangered Hawaiian stilts were seen loafing within the channelized portion of the stream. Three endangered Hawaiian gallinules were observed along the vegetated streambanks between the channelized portion of the stream and the confluence with Lā‘iewai Stream. The remaining 14 bird species are non-native introductions common to developed areas on O‘ahu. In addition, eight bird species are protected under the Migratory Bird Treaty Act (MBTA) (see Table 2). This includes one individual of the black-crowned night heron (*Nycticorax nycticorax*) and pied-billed grebe (*Podilymbus podiceps*), and between 5–8 individuals of the remaining MBTA bird species.

Table 2. Birds Observed by SWCA in and Around the Survey Area

Common Name	Scientific Name	Status	MBTA
Black-crown night heron	<i>Nycticorax nycticorax</i>	I	X
Cattle egret	<i>Bubulcus ibis</i>	NN	X
Common mynah	<i>Acridotheres tristis</i>	NN	
Common waxbill	<i>Estrilda astrild</i>	NN	
Hawaiian duck-mallard hybrid*	<i>Anas</i> sp.	NN	
Hawaiian gallinule	<i>Gallinula chloropus sandwichensis</i>	E, End	X
Hawaiian stilt	<i>Himantopus mexicanus knudseni</i>	E, End	X
House sparrow	<i>Passer domesticus</i>	NN	
Japanese white-eye	<i>Zosterops japonicus</i>	NN	
Java sparrow	<i>Padda oryzivora</i>	NN	
Pacific golden plover	<i>Pluvialis fulva</i>	M	X
Pied-billed grebe	<i>Podilymbus podiceps</i>	M	X
Red junglefowl	<i>Gallus gallus</i>	NN	
Red-crested cardinal	<i>Paroaria coronata</i>	NN	
Red-vented bulbul	<i>Pycnonotus cafer</i>	NN	
Red-whiskered bulbul	<i>Pycnonotus jocosus</i>	NN	
Ruddy turnstone	<i>Arenaria interpres</i>	M	X
Spotted dove	<i>Streptopelia chinensis</i>	NN	
Wandering tattler	<i>Tringa incana</i>	M	X
White-rumped shama	<i>Copsychus malabaricus</i>	NN	
Zebra dove	<i>Geopelia striata</i>	NN	
Total species		21	

Status: E = Endemic, End = Endangered, I = Indigenous, M = Migrant, NN = non-native established species.

*These were observations of ducks that are likely hybrids of the native Hawaiian duck (*Anas wyvilliana*) and the introduced mallard (*Anas platyrhynchos*).

MBTA = Migratory Bird Treaty Act.

Habitat does exist for the endangered Hawaiian goose and endangered Hawaiian duck, but these species are unlikely to occur due to low numbers of the Hawaiian goose and Hawaiian duck inbreeding. Additionally, the endangered Hawaiian petrel and threatened Newell's shearwater may fly over the survey area at night when traveling to and from their nest grounds. No additional federally or state-listed threatened or endangered plant or animal species or proposed listed or candidate species were found during the surveys. The survey area does not encompass any designated or proposed critical habitat for threatened or endangered species.

4.2.1. Mammals

The small Indian mongoose (*Herpestes javanicus*) is the only mammal detected in the survey area, although feral pig (*Sus scrofa*), feral cat (*Felis catus*), house mouse (*Mus musculus*), and rat (*Rattus* spp.) are likely to occur in the survey area.

Acoustic surveys for Hawaiian hoary bats were not conducted, but any areas of suitable habitat for roosting and foraging were noted during the survey. The Hawaiian hoary bat has been documented roosting in ironwood and could roost in other tree species that have appropriate roost structure such as hau and tropical almond (*Terminalia catappa*). In addition, the Hawaiian hoary bat could forage over the Kahawainui Stream and all the vegetation types in the survey area.

4.2.2. Insects and Other Invertebrates

Three dragonflies were observed during the survey and include the indigenous green darner (*Anax junius*) and wandering glider (*Pantala flavescens*) and non-native Chinese dragonfly (*Crocothemis servilia*). One non-native damselfly, Rambur's fork-tail (*Ischnura ramburii*), was also observed. No other native invertebrate species were recorded during the survey.

4.3. Aquatic Fauna

The Kahawainui Stream water was turbid throughout the survey area at the time of survey, leading to poor visibility and limited-efficacy snorkel survey transects. The mouth of Kahawainui Stream is currently closed in by a sand berm with little to no observable stream flow and no surface-water connection to the Pacific Ocean.

Supplemental benthic dredge samples were taken at the confluence, the bridge, and the beach berm. All samples smelled strongly of hydrogen sulfide, an indicator of anoxic conditions in the substrate. Samples contained no living benthic macro-organisms. Bed substrate transitioned from dark red-brown clayey mud at the stream confluence upstream, to black clayey mud at the bridge, to gleyed sand and mud at the beach berm. The sample with the highest percentage of decayed vegetative matter was at the bridge (twigs, leaf litter), whereas the lowest percentage of decayed vegetative matter was at the beach berm (ironwood needles, mangrove leaves). The decayed vegetative matter was black in color, another indicator of anoxic conditions.

4.3.1. Fish

Tilapia (*Oreochromis/Sarotherodon* spp.) were the most common species observed throughout the survey area, but the relative population density at Kahawainui Stream was less than other similar coastal drainages on O'ahu. Mosquitofish (*Gambusia affinis*) and the jeweled cichlid (*Hemichromis elongatus*) were present in small numbers near the beach berm. A small marine goby was also observed at the berm but could not be identified. Native fish species previously recorded in this area but not observed during the aquatic survey include 'o'opu nākea (*Awaous stamineus*), 'o'opu akupa (*Eleotris sandwicensis*), and 'o'opu naniha (*Stenogobius hawaiiensis*) (Parham et al. 2008).

4.3.2. Mollusks and Crustaceans

Grapsid crabs, including thin-shelled rock crab or 'a'ama (*Grapsus tenuicrustatus*), were commonly observed along the concrete support columns at the bridge, as well as suspended in the California grass near the beach berm. Crustaceans previously recorded in this estuary but not observed during the aquatic survey include the non-native Tahitian prawn (*Macrobrachium lar*), as well as the native 'ōpae kala'ole (*Atyoida bisulcata*) and 'ōpae 'oeha'a (*Macrobrachium grandimanus*) (Parham et al. 2008). Introduced rosy wolf-snail (*Euglandina rosea*) and apple snail (*Pomacea canaliculata*) were also previously reported at Kahawainui Stream, but not observed during this survey.

4.3.3. Reptiles and Amphibians

The bull frog (*Lithobates catesbeiana*) and cane toad (*Bufo marinus*) were heard during the aquatic survey, although no mature individuals or tadpoles were visually observed. No terrestrial reptiles or amphibians are native to Hawai‘i.

Although sea turtles, including the listed green sea turtle (*Chelonia mydas*), have been occasionally recorded in the estuarine segments of some Hawaiian stream systems, no surface water connection between Kahawainui Stream and the Pacific Ocean was observed during this survey. Beach and marine surveys for sea turtles and other marine species were not included in this study, and were not observed in the survey area.

4.4. Water Quality

Kahawainui Stream is listed as a 303(d) impaired waterbody by the Hawai‘i DOH Clean Water Branch for the following parameters: nitrate/nitrite, turbidity, total phosphorus, and total nitrogen (Hawai‘i DOH 2014). The results for the in-situ and collected water samples are provided in Table 3. Although this report provides comparisons with the HAR 11-54 WQS (Table 4), as described in section 3.4, the single dataset collected by SWCA can only provide background information about the waterbody and is not sufficient for determining compliance with the WQS. Different WQS are provided for streams (salinity below 0.5 part per thousand [ppt]) and estuaries/brackish coastal waters (salinity above 0.5 ppt). Although the salinity values during the survey were below 0.5 ppt, estuarine WQS are used due to the physical location of the site.

Table 3. Results for Water Quality Grab Samples and In-situ Parameters

Parameter	Result		Method Detection Level
Depth (inches)	~9	~15	NA
Time	10:33 AM	10:36 AM	NA
Temperature (°C)	26.04	26.05	NA
Salinity (‰)	0.23	0.25	NA
DO (mg/L)	5.8	5.37	NA
DO Saturation (%)	69.5	65.1	NA
pH	7.05	7.60	NA
Estimated tide (feet)	0.42	0.42	NA
Turbidity (NTU)	9.15		NA
TSS (mg/L)	12.0		1.0
Nitrate + Nitrite Nitrogen (mg/L)	Not detected		
Ammonia Nitrogen (mg/L)	0.29		0.20
Total Nitrogen (mg/L)	0.32		
Total Phosphorus (mg/L)	0.60		0.04
Chlorophyll α (ppb)	Not detected		5.0

Table 4. HAR 11-54 Water Quality Standards

Parameter	Water Quality Standard
Temperature (°C)	Shall not vary more than 1 degree Celsius from ambient condition
DO (%)	Not less than 75% saturation
Salinity (‰)	Shall not vary more than 10% from ambient conditions
pH	7.0–8.6
Turbidity (NTU)	Geometric mean not to exceed 1.5 Not to exceed 3 more than 10% of the time Not to exceed 5 more than 2% of the time
TSS (mg/L)	n/a
Nitrate + Nitrite Nitrogen (µg/L)	Geometric mean not to exceed 8.0 Not to exceed 25 more than 10% of the time Not to exceed 35 more than 2% of the time
Ammonia Nitrogen (µg/L)	Geometric mean not to exceed 6.0 Not to exceed 10 more than 10% of the time Not to exceed 20 more than 2% of the time
Total Nitrogen (µg/L)	Geometric mean not to exceed 200.0 Not to exceed 350 more than 10% of the time Not to exceed 500 more than 2% of the time
Total Phosphorous (µg/L)	Geometric mean not to exceed 25.0 Not to exceed 50 more than 10% of the time Not to exceed 75 more than 2% of the time
Chlorophyll α (µg/L)	Geometric mean not to exceed 2.0 Not to exceed 5 more than 10% of the time Not to exceed 10 more than 2% of the time

All nutrient values (NO₂ + NO₃ nitrogen, ammonia, total nitrogen, total phosphorus) results were over the established geometric means for water quality standards. In particular, ammonia (290 µg/L) and total phosphorus (600 µg/L) were vastly over the upper limits (20 µg/L and 75 µg/L, respectively). Total nitrogen exceeded the geometric mean standard, but did not exceed either of the upper limits (350 or 500 µg/L). Likewise, turbidity (9.15 NTU) was far higher than the established standards. Dissolved oxygen saturation was depressed below the 75% saturation standard; however, this may be an artifact of collection time since temperature, biochemical oxygen demand, and primary productivity are all integrally associated with oxygen saturation. Both pH (7.05) and chlorophyll α (not detected) were within acceptable levels.

Currently, there is no accepted water quality standard for total suspended solids. However, based on SWCA professional opinion, a concentration greater than 2 mg/L is generally a high particulate load for a stream.

Salinity and dissolved oxygen concentration water quality standards are based on deviation from “ambient conditions” and, therefore, cannot be assessed from a single sample.

5. DISCUSSION AND RECOMMENDATIONS

5.1. Flora

The vegetation types and species identified during the survey are not considered unique, and none of the native plant species recorded at the site are threatened or endangered, proposed for listing, or candidate plants. Nearly 80% of the plant species seen in the survey area are not native to the Hawaiian Islands. Therefore, the proposed project is not expected to have a significant, adverse impact on botanical resources.

Weedy non-native plant species are common in the survey area. Most of these weedy species are widespread in Hawai'i, and their control is not expected to result in a significant decrease in their number or distribution. However, construction activities are known to spread invasive species to new areas through the movement of vehicles and materials. For this reason, SWCA recommends the following invasive species minimization measures to avoid the unintentional introduction or transport of new terrestrial invasive species to O'ahu:

- All construction equipment and vehicles arriving from outside O'ahu should be washed and inspected before entering the project area.
- Construction materials arriving from outside of O'ahu should also be washed and/or visually inspected (as appropriate) for excessive debris, plant materials, and invasive or harmful non-native species (plants, amphibians, reptiles and insects).
- Inspection and cleaning activities should be conducted at a designated location prior to entry of the construction site. The inspector should be a qualified botanist and/or entomologist that is able to identify invasive species that are of concern relevant to the point of origin of the equipment, vehicle, or material.
- When possible, raw materials (e.g., gravel, rock, soil) should be purchased from a local supplier on O'ahu to avoid introducing non-native species not present on the island.
- If landscaping occurs as part of the project, native Hawaiian plants or non-invasive plants should be used to the maximum extent possible. Additional information on selecting appropriate (non-invasive) plants for landscaping can be obtained from the following online sources:
 - <http://www.nativeplants.Hawaii.edu/>
 - <http://www.plantpono.org/non-invasive-plants.php>
 - http://www.hear.org/alternativestoinvasives/pdfs/mcaac_hpwra_a2i_list.pdf
 - <http://www.hear.org/oisc/oahuearlydetectionproject/pdfs/oedposterwhatnottoplant.pdf>

5.2. Terrestrial Fauna

Table 5 lists federally and state-listed species that have the potential to occur in the survey area, as well as each species' status, range or habitat association, and a rating of potential for occurrence in the survey area. Based on current distribution and habitat requirements, four listed species—the Hawaiian coot, Hawaiian gallinule, Hawaiian stilt, and Hawaiian hoary bat—have high potential to use the habitat of the survey area. Recommendations to avoid or minimize potential impacts to these species are discussed in the sections below.

Table 5. Federally and State Listed Species with Potential to Occur in the Survey Area.

Species	Status	Range or Habitat Association†	Potential for Occurrence in the Survey Area
Hawaiian stilt or ae'o (<i>Himantopus mexicanus knudseni</i>)	Endangered	Prefers a variety of aquatic habitats but is limited by water depth and vegetation cover. This species likes to loaf around in open mudflats, sparsely vegetated pickleweed mats, and open pasturelands. Specific water depths of 13 centimeters (5 inches) are required for optimal foraging. Nesting sites are adjacent to or on low islands within bodies of fresh, brackish, or salt water.	High. This species was observed in the survey area during the survey. Suitable forage and nest habitat occurs in the riparian vegetation and in the surface water.
Hawaiian coot or 'alae ke'oke'o (<i>Fulica alai</i>)	Endangered	Found in fresh water and brackish water marshes and ponds. On O'ahu, this species is associated with coastal wetlands. Nests are built on floating vegetation.	High. May occur in the survey area in wetland and stream habitat. Suitable forage and nest habitat occurs in the riparian vegetation.
Hawaiian gallinule or 'alae 'ula (<i>Gallinula chloropus sandvicensis</i>)	Endangered	Found in fresh water marshes, taro patches, irrigation ditches, reservoirs, and wet pastures. This species favors dense emergent vegetation near open water, floating or barely emergent mats of vegetation, and water depths of less than 1 m (3 feet). They prefer fresh water over saline or brackish water. The O'ahu population is widely spread but is mostly found between Hale'iwa and Waimānalo.	High. This species was observed in the survey area during the survey. Suitable forage and nest habitat occurs in the riparian vegetation and in the surface water.
Hawaiian duck or koloa (<i>Anas wyvilliana</i>)	Endangered	Found in lowland wetlands, river valleys, and mountain streams. They nest on the ground.	Low. Research shows that most or all Hawaiian ducks on O'ahu have hybridized with feral mallards (Fowler et al. 2009).
Hawaiian goose or nēnē (<i>Branta sandvicensis</i>)	Endangered	Frequents scrubland, grassland, golf courses, sparsely vegetated slopes, and open lowland country. They do not require standing or flowing water for successful breeding but will use it when available. Their current distribution has been highly influenced by captive-bred releases into the wild.	Low. Although suitable habitat (Ruderal vegetation) is present in the area, this species is unlikely to occur and was only recently documented on O'ahu at James Campbell National Wildlife Refuge, 5.6 km (3.5 miles) away from the survey area.
Hawaiian hoary bat or 'ope'ape'a (<i>Lasiurus cinereus semotus</i>)	Endangered	This species is found primarily from sea level to 2,288 m (7,500 feet), although it has been observed near the island's summits above 3,963 m (13,000 feet). Most of the available documentation suggests that this elusive bat roosts among trees in areas near forests. Observations have occurred on the Islands of Hawai'i, Maui, Moloka'i, O'ahu, and Kaua'i.	High. The survey area contains habitats such as ironwood for roosting. In addition, bats may forage over the stream.
Hawaiian petrel or 'ua'u (<i>Pterodroma sandwichensis</i>)	Endangered	Breeding season is from March to October, during which time this species nests in some of the main Hawaiian Islands. They nest in burrows, primarily in remote montane locations, along large rock outcrops, under cinder cones, under old lichen-covered lava, or in soil beneath dense vegetation. Burrows are generally 3 to 6 feet long (from entrance to nest chamber), although some may be as long as 15 feet.	Low. Hawaiian petrels may fly over the survey area while transiting between nest sites and the ocean, but they are not likely to land or use habitat because nesting habitat does not exist in the survey area.

Table 5. Federally and State Listed Species with Potential to Occur in the Survey Area.

Species	Status	Range or Habitat Association†	Potential for Occurrence in the Survey Area
Newell's shearwater or 'a'o (<i>Puffinus auricularis newelli</i>)	Threatened	During their 9-month breeding season from April through November, this species nests in burrows under ferns on forested mountain slopes and needs an open downhill flight path through which it can become airborne. These burrows are used year after year and usually by the same pair of birds. Today, Newell's shearwater breed on Kaua'i, the Island of Hawai'i, Moloka'i, and Lehua. Breeding may occur on O'ahu, but has not been confirmed (Mitchell et al. 2005).	Low. Newell's shearwater may fly over the survey area while transiting between nest sites and the ocean, but are not likely to land or use habitat because nesting habitat does not exist in the survey area.

† Definitions of potential for occurrence: *None* = habitat for this species does not occur; *Low* = habitat for this species is very low quality, but occurrences of this species cannot be completely discounted; *Moderate* = this species could occur on this habitat, but the habitat is of moderate quality or would be used only occasionally for activities such as roosting and foraging; *High* = this species or a sign indicating the presence of this species was seen; this species has been otherwise documented in this area.

The endangered Hawaiian goose and Hawaii duck have low potential to occur in the survey area (see Table 5). These species are not discussed further in this report because they are unlikely to occur. There are only three individual Hawaiian geese known to occur on O'ahu, and research has shown that most or all of the Hawaiian ducks have hybridized with feral mallards (*Anas* sp.), and it is unlikely that pure Hawaiian ducks exist on O'ahu (Fowler et al. 2009). In the unlikely event that these species are observed on-site during construction, the USFWS should be notified, and work would cease within 30 m (100 feet) until individuals have left on their own accord.

5.2.1. Waterbirds

The Hawaiian stilt was observed in the survey area. Based on known distribution and habitat requirements, this species could forage and/or nest near the survey area in the coastal strand and riparian vegetation types and stream habitat. Hawaiian stilts mostly use open wetland habitats with minimal vegetative cover and water depths of less than 9.4 inches (24 cm), as well as tidal mudflats (Robinson et al. 1999). The breeding season for the Hawaiian stilt is between February and August (Robinson et al. 1999).

The Hawaiian gallinule was also observed in the survey area. Based on known distribution and habitat requirements, this species could forage and/or breed near the survey area in the wetland and stream habitats. Hawaiian gallinule use fresh water marshes, taro patches, irrigation ditches, reservoirs, and wet pastures. This species favors dense emergent vegetation near open water, floating or barely emergent mats of vegetation, and water depths of less than 1 m (3 feet). They prefer fresh water over saline or brackish water. Nesting occurs throughout the year. The O'ahu population is widely spread, but is mostly found between Hale'iwa and Waimānalo.

Although not observed during the fauna survey, the Hawaiian coot may occur in the survey area. Based on known distribution and habitat requirements, these species could forage and/or breed near the survey area in the wetland and stream habitats. Hawaiian coots prefer fresh water ponds or wetlands, brackish wetlands, and human-made impoundments. They forage in water less than 30 centimeters (12 inches) deep, and nest in open water with emergent aquatic vegetation or heavy stands of grass (Brisbin et al. 2002; USFWS 2011). Breeding for Hawaiian coots is not restricted to a particular season.

The following measures are recommended prior or during construction activities to avoid or minimize potential impacts to listed waterbirds:

- In areas where vegetated streambanks are disturbed, a qualified biologist should be present on site to conduct waterbird nest searches before any project work begins and after any subsequent delay in work of 3 or more days (during which birds may attempt nesting).
- If a waterbird nest with eggs or chicks/ducklings is discovered in the project area during construction, work will cease within 30 m (100 feet) of the nest until the chicks/ducklings have fledged. Incubation plus fledgling ranges from 50 to 100 days depending on the waterbird species.
- If an endangered Hawaiian waterbird is present or lands in the area during on-going activities, then all activities within 30 m (100 feet) of the bird would cease, and the bird would also not be approached. Work may continue after the bird leaves the area of its own accord.

5.2.2. Seabirds

The Hawaiian petrel and Newell's shearwater may fly over the survey area at night while travelling to and from their upland nesting sites and the ocean. The Hawaiian petrel is no longer thought to breed on O'ahu (Harrison 1990). Recent radar studies suggest the Newell's shearwater may nest on O'ahu (Day and Cooper 2008). No suitable nesting sites for these species are present in the survey area.

Major threats to the Hawaiian petrel and Newell's shearwater include the attraction of adults and newly fledged juveniles to bright lights while transiting between their nest sites and the ocean. Juvenile birds are particularly vulnerable to light attraction and are sometimes grounded when they become disoriented by lights (Mitchell et al. 2005). Many of these grounded birds are vulnerable to mammalian predators or to being struck by vehicles.

The following measures are recommended to avoid and minimize light attraction of these seabirds to the project site:

- Construction activity should be restricted to daylight hours as much as practicable during the seabird peak fallout period (September 15–December 15) to avoid the use of nighttime lighting that could attract seabirds.
- All outdoor lights should be shielded to prevent upward radiation. This has been shown to reduce the potential for seabird attraction (Reed et al. 1985; Telfer et al. 1987). A selection of acceptable seabird-friendly lights can be found online at the Kauai Seabird Habitat Conservation website (<http://kauaiseabirdhcp.com/>; 2013).
- Outside lights that are not needed for security and safety should be turned off from dusk through dawn during the fledgling fallout period (September 15–December 15).

5.2.3. Hawaiian Hoary Bat

The Hawaiian hoary bat may occur in the survey area. Hawaiian hoary bats are known to occur on O'ahu in native, non-native, agricultural, and developed landscapes (U.S. Department of Agriculture 2009; USFWS 1998). Hawaiian hoary bats have been documented roosting in ironwood trees, and may roost in other trees such as hau and tropical almond. However, direct impacts to bats would only occur if a juvenile bat that is too young to fly but too large to be carried by a parent were present in a tree that was cut down. Although the chances of adversely affecting Hawaiian hoary bats as a result of the proposed project are small, the following measures are recommended as a conservative impact avoidance measure:

- Any fences that are erected as part of the project should have barbless top-strand wire to prevent entanglements of the Hawaiian hoary bat on barbed wire. No fences in the survey area were

observed with barbed wire during the survey; however, if fences are present, the top strand of barbed wire should be removed or replaced with barbless wire.

- No trees taller than 4.6 m (15 feet) should be trimmed or removed as a result of this project between June 1 and September 15, when juvenile bats that are not yet capable of flying may be roosting in the trees.

5.2.4. Birds Protected by the Migratory Bird Treaty Act

In addition to the endangered Hawaiian coot and Hawaiian stilt, SWCA observed six bird species protected under the MBTA during this survey. These species consist of the black-crowned night heron, cattle egret, pied-billed grebe, Pacific-golden plover, ruddy turnstone, and wandering tattler. Of these, the black-crowned night heron and cattle egret are the only two that nest in Hawai‘i. All others are migrants and occur only during the non-breeding season.

During the non-breeding season, construction at the site may temporarily displace individuals of these species, but long-term and population-level impacts are not expected. These birds (likely limited to a few individuals) are expected to find suitable foraging habitat at nearby areas.

Direct impacts on MBTA-protected birds such as the black-crowned night heron and cattle egret could occur if active nests are disturbed or damaged during various construction activities that may take place, such as vegetation removal. To prevent direct impacts to the MBTA-protected birds, the following measures are recommended:

- Active nests should be undisturbed until chicks have fledged. A qualified biologist should be present on site to monitor active nests during construction to minimize potential for nest abandonment by stopping nearby work if the birds are agitated or stressed. Avian stress is typically conveyed by adult birds by making repeated alarm calls from the nest, leaving the nest and making alarm calls from a distance, or dive-bombing humans and equipment. Under prolonged stress, one or both adults may abandon the nest rendering it unsuccessful, or pre-fledged chicks may attempt to abandon the nest prematurely, becoming injured in the process.

5.3. Aquatic Fauna

The most common aquatic species found in the survey area were non-native tilapia. Tilapia are able to tolerate a wider range of aquatic conditions than most native species, including turbid water and the low water-oxygen typically found in stagnant or slow-flowing coastal drainages. Tilapia and other introduced aquatic fauna may further impact the native aquatic community through predation, spread of disease, and/or competition for resources. Heat generated from concrete-lined channels may exacerbate the depleted DO. No native amphidromous stream animals were observed during this survey. A connection between the stream mouth and the ocean would be required for larval migration/juvenile recruitment into the Kahawainui Stream system.

The degraded habitat quality and depauperate biodiversity of the aquatic community as well as indicators of anoxic conditions in the benthic samples suggest that the survey area of Kahawainui Stream may be poor habitat for native aquatic fauna. Dredging activity will likely result in large amounts of sediment suspension, and measures should be placed to prevent sediment runoff into marine coral reef communities at Lā‘ie Bay. Provided the sand berm remains intact, it is unlikely for sediment runoff to enter the bay and coral reef communities are not expected to be impacted. Aquatic fauna may be temporarily displaced upstream, but should be expected to return post-dredging.

5.4. Water Quality

High ammonia and nitrate concentrations have been reported during previous water quality sampling in Kahawainui Stream (Oceanit 2010). This study identified heightened nutrient concentrations indicating that Kahawainui Stream may be subject to excess nutrient loads from agricultural runoff, streambank collapse, sewage, and/or suburban runoff of fertilizers. Another possible reason for high nutrient values may be inefficient uptake of nutrients by aquatic vegetation.

Additionally, the lack of a true estuary connection to the sea may have detrimental effects on the water quality at the sample location. The berm separating Kahawainui Stream from the Pacific Ocean prevents flushing of sediment and chemical contaminants from the system, leading to higher residence times than would be typical and greater accumulation of the silts, colloids, and other easily-suspended materials. This may exacerbate the nutrient loading of the stream and would explain the reason for the high turbidity and TSS values detected in the study.

The following best management practices are recommended to protect water quality:

- Erosion- and sediment-control measures should be in place before earth-moving activities begin. Functionality should be maintained throughout the construction period.
- Turbidity and siltation from project-related work should be minimized and contained through the appropriate use of erosion-control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- All project-related materials and equipment placed in the water should be free of pollutants (including waste material, heavy metals, organic materials, debris, and any water pollutants at toxic or potentially hazardous concentrations to aquatic life).
- Fueling of land-based vehicles and equipment should take place at least 15.24 m (50 feet) away from the water, preferably over an impervious surface.
- No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.

6. LITERATURE CITED

- Brisbin, Jr., I. Lehr, and T.B. Mowbray. 2002. American Coot (*Fulica americana*), In *The Birds of North America Online*, No. 697a, edited by A. Poole. Ithaca, New York: Cornell Laboratory of Ornithology. Available at: <http://bna.birds.cornell.edu/bna/species/697a/articles/introduction>. Accessed April 8, 2016.
- Day, R.H. and B.A. Cooper. 2008. *Results of Endangered Seabird and Hawaiian Hoary Bat Surveys on Northern Oahu Island, Hawaii, October 2007 and July 2008*. Report prepared for First Wind. Fairbanks, Alaska, and Forest Grove, Oregon: ABR, Inc. – Environmental Research & Services.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. *Soil Survey of the Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i, and Lana‘i, State of Hawai‘i*. U.S. Department of Agriculture, Soil Conservation Service.
- Fowler, A.C., J.M. Eadie, and A. Engilis. 2009. Identification of Endangered Hawaiian Ducks (*Anas wyvilliana*), Introduced North American Mallards (*Anas platyrhynchos*) and Their Hybrids using Multilocus Genotypes. *Conservation Genetics* 10:1747–1758.
- Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.L. Chen, P.S. Chu, J.K. Eischeid, and D.M. Delparte. 2013. Online Rainfall Atlas of Hawai‘i. *Bull. Amer. Meteor. Soc.* 94, 313–316, doi: 10.1175/BAMS-D-11-00228.1. Available at: <http://rainfall.geography.hawaii.edu>. Accessed on March 24, 2016.
- Harrison, C. 1990. *Seabirds of Hawaii. Natural History and Conservation*. Ithaca, New York: Cornell University Press.
- Hawai‘i State Department of Health (DOH). 2014. *2014 State of Hawai‘i Water Quality Monitoring and Assessment Report*. Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections 303(D) and 305(B), Clean Water Act (Public Law 97-117).
- Kaua‘i Seabird Habitat Conservation Program. 2013. Lighting For Homes And Businesses. Available at: <http://www.kauai-seabirdhpc.info/lighting-homes-businesses/>. Accessed April 17, 2016.
- Mitchell, C., C. Ogura, D.W. Meadows, A. Kane, L. Strommer, S. Fretz, L. Leonard, and A. McClung. 2005. *Hawaii’s Comprehensive Wildlife Conservation Strategy*. Submitted to the National Advisory Acceptance Team, October 1, 2005. Honolulu, Hawai‘i: Department of Land and Natural Resources.
- National Oceanic and Atmospheric Administration/National Weather Service, Weather Forecast Office Honolulu. 2016. Hydrology in Hawai‘i. Available at: <http://www.prh.noaa.gov/hnl/hydro/pages/mar16sum.php>. Accessed on April 7, 2016.
- Natural Resources Conservation Service (NRCS). 2013. Web Soil Survey. Available at: <http://websoilsurvey.nrcs.usda.gov/>. Accessed April 6, 2016.
- Oceanit. 2010. Final Dredging Report, Kahawainui Stream Dredging. Prepared for City and County of Honolulu.
- Parham, J.E., G.R. Higashi, E.K. Lapp, D.G.K. Kuamoo, R.T. Nishimoto, S. Hau, J.M. Fitzsimons, D.A. Polhemus, and W.S. Devick. 2008. *Atlas of Hawaiian Watersheds & Their Aquatic*

- Resources. Copyrighted website published by the Hawaii Division of Aquatic Resources, Department of Land and Natural Resources. Available at: www.hawaiiwatershedatlas.com. Accessed on March 24, 2016.
- Reed, J.R., J.L. Sincock, and J.P. Hailman. 1985. Light attraction in endangered procellariiform birds: Reduction by shielding upward radiation. *The Auk* 102:377–383.
- Robinson, J.A., J.M. Reed, J.P. Skorupa, and L.W. Oring. 1999. Black-necked stilt (*Himantopus mexicanus*). In *The Birds of North America*, No. 449, edited by A. Poole and F. Gill. Philadelphia, Pennsylvania: The Birds of North America, Inc.
- Sherrod, D.R., J.M. Sinton, S.E. Watkins, and K.M. Brunt. 2007. *Geologic Map of the State of Hawai‘i*. U.S. Geological Survey Open-File Report 2007-1089, 83 p., 8 plates, scales 1:100,000 and 1:250,000, with GIS database.
- Staples, G.W. and D.R. Herbst. 2005. *A Tropical Garden Flora: Plants Cultivated in the Hawaiian Islands and Other Tropical Places*. Honolulu, Hawai‘i: Bishop Museum Press.
- Telfer, T.C., J.L. Sincock, G.V. Byrd, and J.R. Reed. 1987. Attraction of Hawaiian seabirds to lights: conservation efforts and effects of moon phase. *Wildlife Society Bulletin* 15:406–413.
- U.S. Department of Agriculture. 2009. *Bats of the U.S. Pacific Islands*. Biology Technical Note No. 20. Natural Resources Conservation Service, Pacific Islands Area.
- U.S. Fish and Wildlife Service (USFWS). 1998. *Recovery Plan for the Hawaiian Hoary Bat (Lasiurus cinereus semotus)*. Portland, Oregon: U.S. Fish and Wildlife Service, Region 1.
- . 2011. *Recovery Plan for Hawaiian Waterbirds, Second Revision*. Portland, Oregon.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. *Manual of the Flowering Plants of Hawai‘i*. Volumes I and II. Revised edition. Honolulu: University of Hawai‘i Press.
- Wagner, W.L., and D.R. Herbst. 2003. *Supplement to the Manual of the Flowering Plants of Hawai‘i*. Version 3.1 (12 Dec 2003). Available at: <http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/ManualSupplement3.pdf>. Accessed April 16, 2016.
- Wagner, W.L., D.R. Herbst, N. Khan, and T. Flynn. 2012. *Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai‘i and Hawai‘i’s Ferns and Fern Allies*. Version 1.3. Available at: http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/Hawaiian_vascular_plant_updates_1_3.pdf. Accessed April 16, 2016.

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Appendix A.

**Checklist of Plants Observed During Flora Surveys for the Kahawainui Stream
Dredging Project on March 31, 2016**

Table A1 provides an inventory checklist of plant species observed by SWCA on March 31, 2016, during surveys for the Kahawainui Stream Dredging Project. The plant names are arranged alphabetically by family and then by species into two groups: monocots and dicots. The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012).

Table A1. Checklist of Plants Observed During Flora Surveys for the Kahawainui Stream Dredging Project on March 31, 2016

Family	Scientific Name and Authorship	Hawaiian/Common Name	Status
MONOCOTS			
Arecaceae	<i>Cocos nucifera</i> L.	niu, ololani, coconut	P
Commelinaceae	<i>Commelina diffusa</i> Burm.f.	honohono, honohono wai, mākolokolo, dayflower	X
Cyperaceae	<i>Cyperus polystachyos</i> Rottb.	manyspike flatsedge	I
Cyperaceae	<i>Schoenoplectus californicus</i> (C.A.Mey.) Palla	California bulrush, kaluhā, ‘aka‘akai (Ni‘ihau)	X
Liliaceae	<i>Crinum asiaticum</i> L.	giant lily	X
Pandanaceae	<i>Pandanus tectorius</i> Parkinson ex Z	hala, pū hala, screwpine	I?
Poaceae	<i>Bothriochloa pertusa</i> (L.) A.Camus	pitted beardgrass	X
Poaceae	<i>Cenchrus clandestinus</i> (Hochst. ex Chiov.) Morrone	kikuyu grass	X
Poaceae	<i>Chloris barbata</i> Sw.	swollen fingergrass, mau‘u lei	X
Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass, mānienie, mānienie haole	X
Poaceae	<i>Melinis repens</i> (Willd.) Zizka	Natal redtop, Natal grass	X
Poaceae	<i>Sporobolus virginicus</i> (L.) Kunth	‘aki‘aki, ‘aki, mahiki, māhikihiki, mānienie, mānienie ‘aki‘aki, mānienie māhikihiki, mānienie maoli, seashore rushgrass	I
Poaceae	<i>Urochloa maxima</i> (Jacq.) R.D.Webster	Guinea grass	X
Poaceae	<i>Urochloa mutica</i> (Forssk.) T.Q.Nguyen	California grass, Para grass	X
DICOTS			
Acanthaceae	<i>Asystasia gangetica</i> (L.) T.Anderson	Chinese violet, coromandel	X
Aizoaceae	<i>Sesuvium portulacastrum</i> (L.) L.	‘ākulikuli, sea purslane	I
Amaranthaceae	<i>Blutaparon vermiculare</i> (L.) Mears	silverhead	X
Asteraceae	<i>Bidens pilosa</i> L.	Spanish needle, beggartick, kī, kī nehe, kī pipili, nehe	X
Asteraceae	<i>Pluchea carolinensis</i> (Jacq.) G.Don	sourbush, marsh fleabane	X
Asteraceae	<i>Sonchus oleraceus</i> L.	sow thistle, pualele	X

Table A1. Checklist of Plants Observed During Flora Surveys for the Kahawainui Stream Dredging Project on March 31, 2016

Family	Scientific Name and Authorship	Hawaiian/Common Name	Status
Asteraceae	<i>Sphagneticola trilobata</i> (L.) Pruski	wedelia	X
Boraginaceae	<i>Heliotropium curassavicum</i> L.	kīpūkai, nena, seaside heliotrope, lau po'opo'ohina (Ni'ihau)	I
Boraginaceae	<i>Tournefortia argentea</i> L.f.	tree heliotrope	X
Brassicaceae	<i>Coronopus didymus</i> (L.) Sm.	swinecress	X
Casuarinaceae	<i>Casuarina equisetifolia</i> L.	ironwood	X
Combretaceae	<i>Terminalia catappa</i> L.	tropical almond, Indian almond, false kamani, kamani haole, kamani 'ula	X
Convolvulaceae	<i>Ipomoea obscura</i> (L.) Ker Gawl.	morning glory	X
Convolvulaceae	<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i> (L.) Ooststr.	pōhuehue, puhuehue, beach morning glory	I
Cucurbitaceae	<i>Coccinia grandis</i> (L.) Voigt	ivy gourd, scarlet-fruited gourd	X
Euphorbiaceae	<i>Macaranga tanarius</i> (L.) Müll.Arg.	parasol tree	X
Euphorbiaceae	<i>Ricinus communis</i> L.	castor bean, pā'aila, ka'apehā, kamākou, kolī, lā'au 'aila	X
Fabaceae	<i>Canavalia cathartica</i> Thouars	maunaloa	X
Fabaceae	<i>Indigofera spicata</i> Forssk.	creeping indigo	X
Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	koa haole, ēkoa, lilikoa	X
Fabaceae	<i>Macroptilium atropurpureum</i> (DC.) Urb.	–	X
Fabaceae	<i>Medicago lupulina</i> L.	black medick, nonesuch	X
Fabaceae	<i>Mimosa pudica</i> var. <i>unijuga</i> (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, pua hilahila	X
Goodeniaceae	<i>Scaevola taccada</i> (Gaertn.) Roxb.	naupaka kahakai, huahekili, naupaka kai, auaka (Ni'ihau)	I
Malvaceae	<i>Hibiscus tiliaceus</i> L.	hau	I
Nyctaginaceae	<i>Boerhavia coccinea</i> Mill.	–	X
Onagraceae	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	primrose willow, kāmole, alohalua, kāmole lau li'i, kāmole lau nui	P?
Oxalidaceae	<i>Oxalis corniculata</i> L.	yellow wood sorrel, 'ihi 'ai, 'ihi 'awa, 'ihi maka 'ula, 'ihi mākole	P?
Plantaginaceae	<i>Plantago lanceolata</i> L.	narrow-leaved plantain, English plantain, buckhorn	X
Plantaginaceae	<i>Plantago major</i> L.	broad-leaved plantain, common plantain, laukahi, kūhēkili	X
Portulacaceae	<i>Portulaca oleracea</i> L.	pigweed, 'ākulikuli kula, 'ākulikuli lau li'i, 'ihi	X

Table A1. Checklist of Plants Observed During Flora Surveys for the Kahawainui Stream Dredging Project on March 31, 2016

Family	Scientific Name and Authorship	Hawaiian/Common Name	Status
Rhizophoraceae	<i>Rhizophora mangle</i> L.	American mangrove, red mangrove	X
Scrophulariaceae	<i>Bacopa monnieri</i> (L.) Wettst.	‘ae’ae	I
Sterculiaceae	<i>Waltheria indica</i> L.	‘uhaloa, ‘ala‘ala pū loa, hala ‘uhaloa, hi‘aloha, kanakaloha	I?
Urticaceae	<i>Pilea microphylla</i> (L.) Liebm.	artillery plant, rockweed	X

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**APPENDIX C: ARCHAEOLOGICAL LITERATURE REVIEW AND FIELD
INSPECTION REPORT**

**Archaeological Literature Review and Field Inspection
for the Kahawainui Stream Dredging Project,
Lā‘ie Ahupua‘a, Ko‘olauloa District, O‘ahu Island
TMKs: [1] 5-5-005:022 (por.), portions of [1] 5-5-009:007,
008, 009, 010, 011, 047, & 061, and [1] 5-6-001:004 (por.)**



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Honolulu, Hawai‘i

August 2021

Management Summary

This Literature Review and Field Inspection (LRFI) report was prepared by Honua Consulting, LLC at the request of Belt Collins Hawaii LLC for the Kahawainui Stream Dredging Project located in Lā'ie Ahupua'a, Ko'olaupia District, O'ahu Island, Tax Map Keys (TMKs): [1] 5-5-005:022 (portion [por.]), portions of [1] 5-5-009:007, 008, 009, 010, 011, 047, and 061, and [1] 5-6-001:004 (por.). The project area consists of a channelized portion of Kahawainui Stream owned by the City and County of Honolulu and is defined as the area of proposed ground disturbance, measuring 3.00 acres (12,140 square meters [sq. m.] or 130,680 square feet [sq. ft.]). The project area is situated roughly at the confluence of Lā'iewai and Kahawainui Streams to the west and approximately 1,500 ft. mauka (inland) of the stream mouth and sand berm to the east. The proposed project will dredge an approximately 315 meter long portion of Kahawainui Stream. Dredging activities will remove approximately 2,955 cubic yards of sediment within the stream by using an excavator directly in the stream at low tide or clamshell dredging from the shore or from a platform. The dredge material will be moved to three designated stockpile areas (Stockpile Locations 1-3) for drying on adjacent land parcels, privately owned by Property Reserves Inc. Following drying, the material will be transported off-site for reuse or disposal.

The objectives of the LRFI were to determine the project area's land-use history, to identify any historic properties or component features in the project area, to evaluate the proposed project's potential effect on historic properties, and to make recommendations about mitigation. This study is not an archaeological inventory survey (AIS); however, it has been conducted according to standards outlined in Hawai'i Administrative Rules (HAR) § 13-276 for AIS studies, and is intended to assist with the project's compliance with Hawai'i Revised Statutes (HRS) § 6E-8 and consultation with the State Historic Preservation Division (SHPD).

Lā'ie was known traditionally to have been a famous fishing location due to the abundant coastal and nearshore resources of the area. Lā'ie would have had a substantial traditional Hawaiian population based on the extensive lo'i (irrigated terraces) along Kahawainui Stream and other agricultural features in the area, the two heiau in the vicinity, and Paeo Fishpond nearby. The nearby kula (pasture) lands were used for native gardens and habitation. The ahupua'a of Lā'iewai, which contains the project area, was retained by Kamehameha I following his conquest of O'ahu and was subsequently given to the half-brother of Kamehameha, Kalaimamahū, then to his daughter Kekāuluohi, and later to her son William C. Lunalilo during the Māhele. The unclaimed lands of Lā'iewai were awarded to William C Lunalilo as Āpana 35 of LCA 8559B in 1850. Following the opening of lands to foreigners, the area was used for ranching and Lā'iewai and neighboring Lā'iemalo'o were sold to Latter-day Saints Mission President Francis A. Hammond in 1865. The Lā'ie Plantation and mill were established in 1868 and the focus of cultivation shifted from cotton and corn to sugarcane. Sugarcane cultivation modified large portions of the surrounding area through the latter half of the 19th century and early 20th century and continued until 1931 when the plantation was shut down. The area went into decline following the great depression but bounced back following World War II due to construction of the Church College of Hawaii in 1955 (later named Brigham Young University-Hawai'i) and construction of the Polynesian Cultural Center in 1963 which brought in additional Mormons and transformed the area primarily into a tourist destination. The Lā'ie area continues to be a prime destination for tourists visiting the island although it has remained relatively rural and has grown little over the last few decades.

The Kahawainui Stream-Lā‘iewai Stream Bridge (commonly referred to as the Kahawainui Stream-Lā‘iewai Bridge) on Kamehameha Highway, crosses through the project area. It was constructed in 1933 and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts with an asphalt covered concrete deck supported by abutments. The parapets and end caps have been painted white and a wooden plank pedestrian walkway with a horizontal wood railing has been bolted to the mauka side (MKE Associates and Fung Associates 2013:68). In 2013, the bridge was documented in poor condition but was assessed as eligible for listing on the National Register¹, as it retains integrity of location and significance under Criterion C for its association with early developments in concrete bridge construction in Hawai‘i and as a good example of a 1930’s-era reinforced concrete bridge based on its use of materials, method of construction, craftsmanship, and design (MKE Associates and Fung Associates 2013:69). Additionally, the former coastal road ran through the central portion of the project area prior to construction of Kamehameha Highway and the former Ko‘olau Railway track and bridge ran through the makai (seaward) or eastern-most extent.

The project area in its current configuration was constructed as part of the Kahawainui Stream Flood Control Project which was built jointly by the U.S. Army Corps of Engineers Honolulu District and the City and County of Honolulu in 1990. The project consisted of the construction of 550 feet of concrete channel, 500 feet of concrete floodwalls, 1,420 feet of levees, and the raising of two roadways in elevation in an attempt to mitigate flood damage along the Lā‘ie coastal plain. The project area has remained unchanged since that time.

An archaeological survey was conducted within the project area in 1981 for flood control improvements, which became the Kahawainui Stream Flood Control Project (Ahlo and Hommon 1981). No sites were documented within the project area during the survey, but a historic house and cemetery site was identified along the western portion of the northern boundary of the project area. The site was tested and mapped during additional fieldwork for the flood control improvements project and its boundaries were further defined (Bath 1985). In 1992, the site was assigned SIHP #50-80-02-4465 and is currently defined as two cemetery plots, a historic house site, and an associated scatter of historic artifacts. The current study observed that SIHP # -4465 is relatively well defined on the landscape and has low vegetation due to being maintained.

The current field inspection included a 100% pedestrian survey of the channelized portion of Kahawainui Stream, which is the area of ground disturbance for the project. Additionally, pedestrian survey was conducted at the three separate dredge stockpile locations (Stockpile Locations 1-3). A single site, Honua 1, was identified during the project and consists of the Kahawainui Stream-Lā‘iewai Bridge. The current study agrees with the prior recommendation of the site, as it retains integrity of location and significance under Criterion C (c)². Otherwise,

¹ National Register criteria for evaluation includes integrity of location, design, setting, materials, workmanship, feeling, and association and: a.) that are associated with events that have made a significant contribution to the broad patterns of our history; or b.) that are associated with the lives of persons significant in our past; or c.) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or d.) that have yielded, or may be likely to yield, information important in prehistory or history.

² In accordance with HAR § 13-284-6, the State of Hawai‘i adheres to all National Register criteria for evaluation and includes one additional significance criteria: e.) have an important value to the native Hawaiian people or to another ethnic group of that state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events, or oral accounts—these associations being important to the group’s history and cultural identity.

nothing of archaeological note was observed or collected from the project area or stockpile areas during the survey. The lack of sites in the area is attributed to use of the area for sugar cane cultivation and modifications to the area to channelize Kahawainui Stream.

Based on background research and the field results it is recommended that steps be taken to mitigate possible damage to SIHP # -4465 and Honua 1 during project activities. This will require the sites to be delineated with orange event fencing and the establishment of a 10 ft. buffer around each. Due to the sensitivity of the nearby cemetery site, no driving or storing of equipment or materials should be permitted in the vicinity of SIHP # -4465. It may also be necessary to conduct additional archaeological survey of access points and roads associated with the stockpile locations, particularly in any areas proposed for significant surface modifications.

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Introduction

1.1 Project Background

This Literature Review and Field Inspection (LRFI) report was prepared by Honua Consulting, LLC at the request of Belt Collins Hawaii LLC for the Kahawainui Stream Dredging Project located in Lā'ie Ahupua'a, Ko'olaupia District, O'ahu Island, Tax Map Keys (TMKs): [1] 5-5-005:022 (portion [por.]), portions of [1] 5-5-009:007, 008, 009, 010, 011, 047, and 061, and [1] 5-6-001:004 (por.). The project area consists of a channelized portion of Kahawainui Stream owned by the City and County of Honolulu and is defined as the area of proposed ground disturbance, measuring 3.00 acres (12,140 square meters [sq. m.] or 130,680 square feet [sq. ft.]). The project area is situated roughly at the confluence of Lā'iewai and Kahawainui Streams to the west and approximately 1,500 ft. mauka (inland) of the stream mouth and sand berm to the east. The project area and is shown on a USGS (Figure 1), an aerial photo (Figure 2), a TMK (Figure 3), and a preliminary site plan (Figure 4).

The proposed project will dredge an approximately 315 meter long portion of Kahawainui Stream. Dredging activities will remove approximately 2,955 cubic yards of sediment within the stream by using an excavator directly in the stream at low tide or clamshell dredging from the shore or from a platform. The dredge material will be moved to three designated stockpile areas (Stockpile Locations 1-3) for drying on adjacent land parcels, privately owned by Property Reserves Inc. Following drying, the material will be transported off-site for reuse or disposal.

The Kahawainui Stream-Laiewai Stream Bridge (commonly referred to as the Kahawainui Stream-Lā'iewai Bridge) crosses through the project area and carries Kamehameha Highway over Kahawainui Stream. It was constructed in 1933 and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts (MKE Associates and Fung Associates 2013:68). The bridge has an asphalt covered concrete deck supported by abutments and a wooden plank pedestrian walkway with a wood railing bolted to the mauka (inland) side. In 2013, the bridge was documented in poor condition but was assessed as eligible for listing on the National Register, as it retains integrity of location and significance under Criterion C for its association with early developments in concrete bridge construction in Hawai'i and as a good example of a 1930's-era reinforced concrete bridge based on its use of materials, method of construction, craftsmanship, and design (MKE Associates and Fung Associates 2013:69).

The objectives of the LRFI were to determine the project area's land-use history, to identify any historic properties or component features in the project area, to evaluate the proposed project's potential effect on historic properties, and to make recommendations about mitigation. Fieldwork for this project was performed under the archaeological permit number 21-24 issued to Honua Consulting by the State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR) in accordance with Hawai'i Administrative Rules (HAR) Chapter 13-282. This study is not an archaeological inventory survey (AIS); however, it has been conducted according to standards outlined in Hawai'i Administrative Rules (HAR) § 13-276 for AIS studies, and is intended to assist with the project's compliance with Hawai'i Revised Statutes (HRS) § 6E-8 and consultation with the State Historic Preservation Division (SHPD).

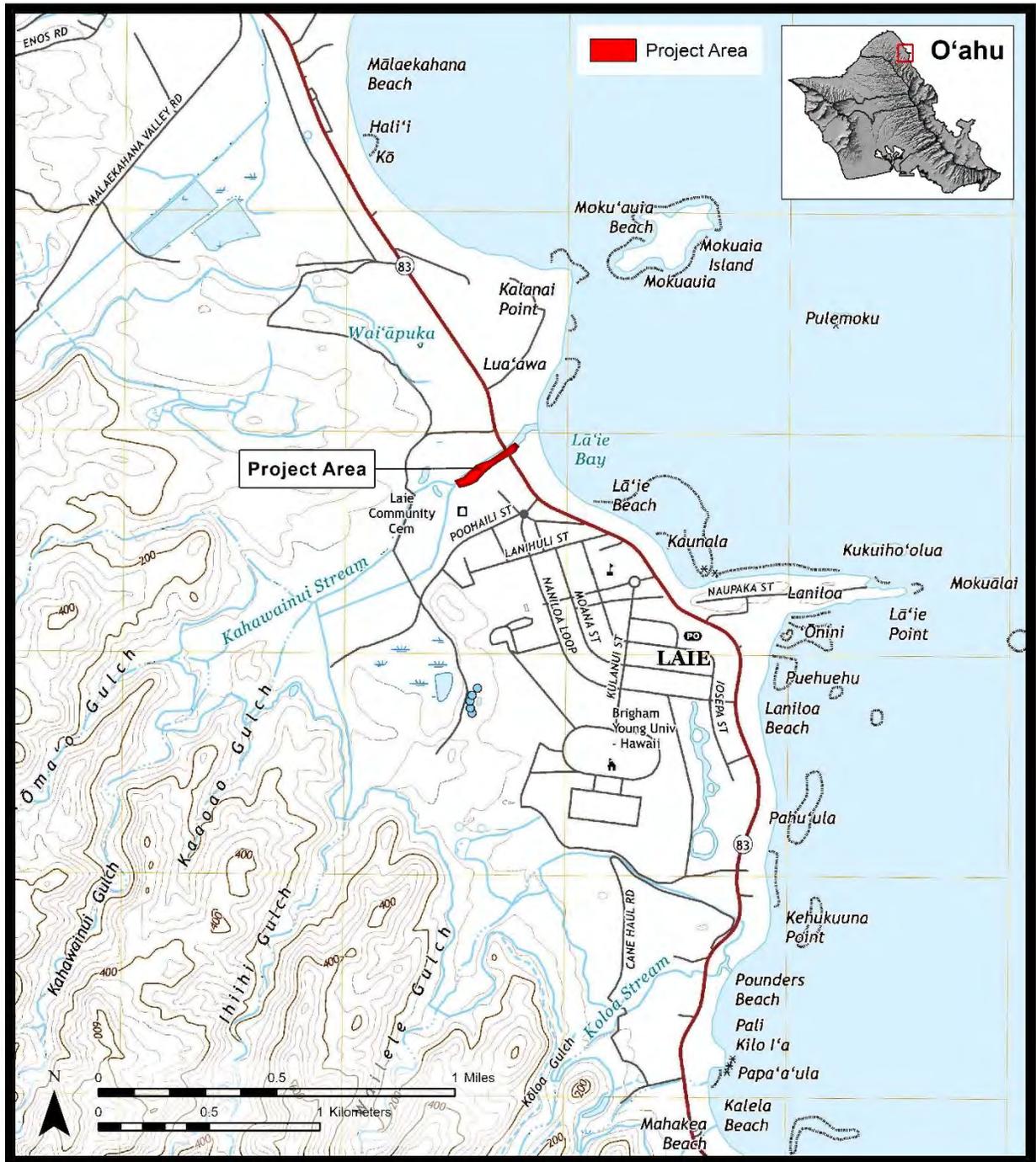


Figure 1. Portion of a 2017 U.S. Geological Survey (USGS) topographic map showing the project area

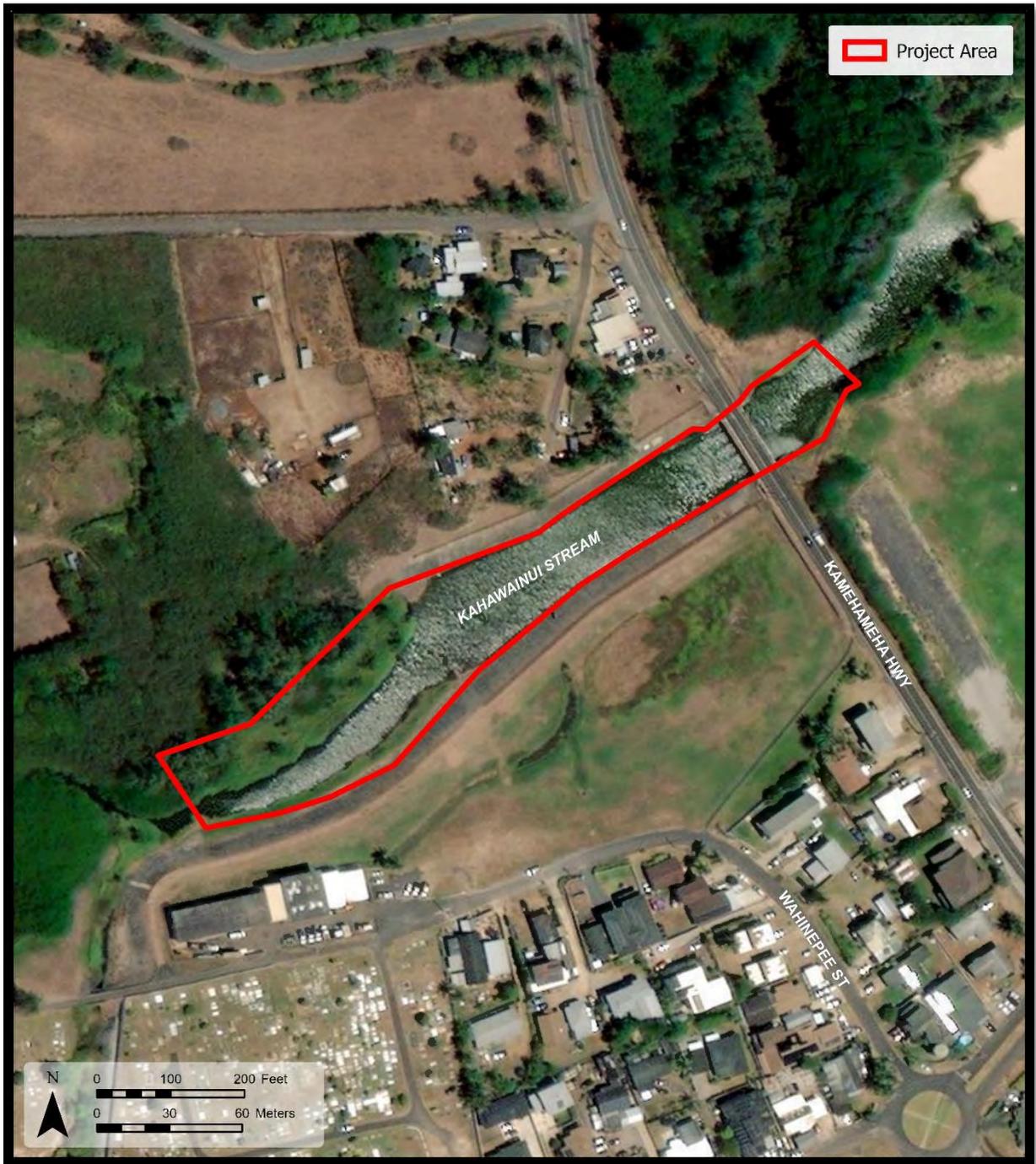


Figure 2. Aerial photo showing the location of the project area (Source: ESRI Imagery)

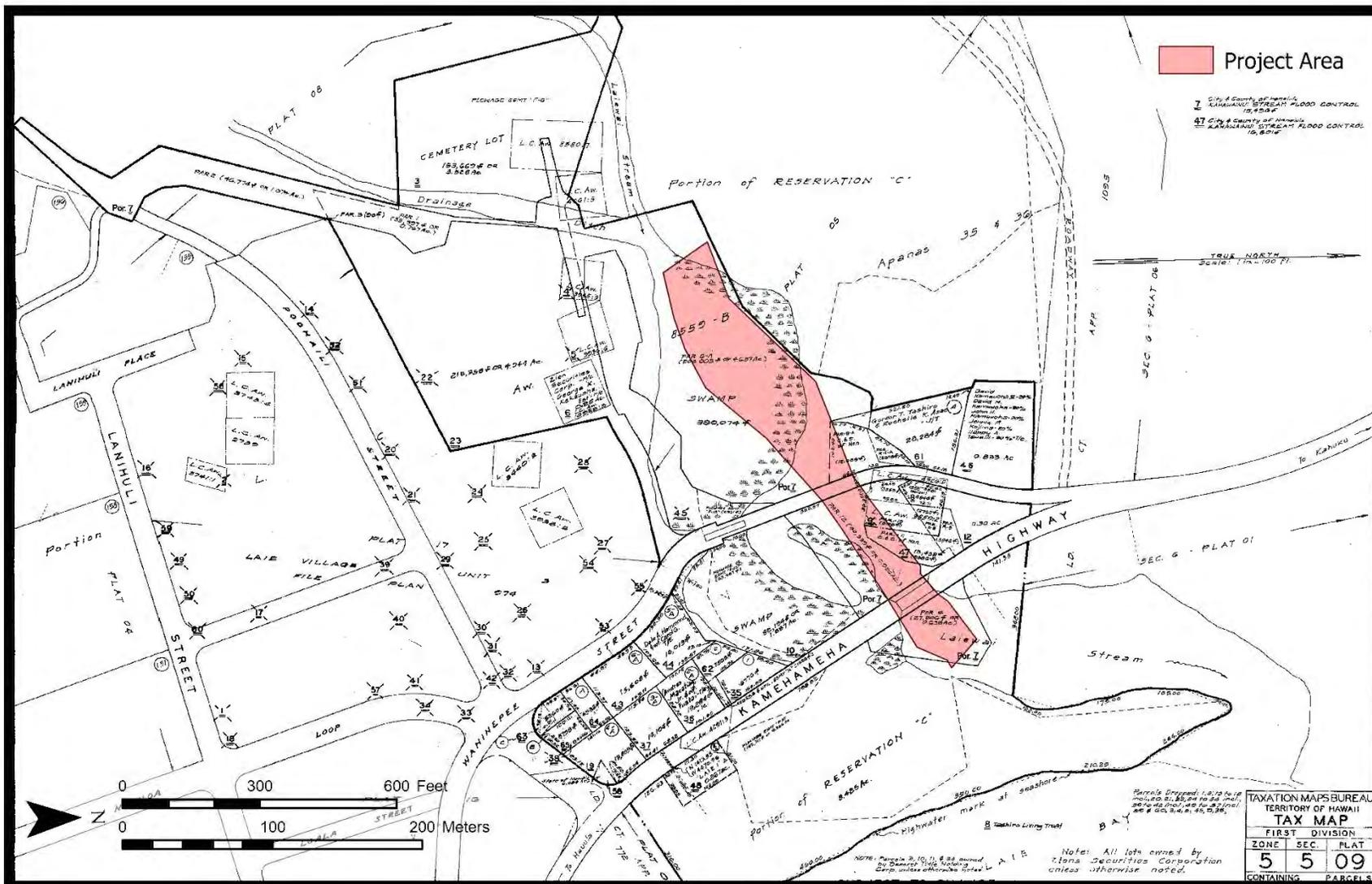


Figure 3. Portion of Tax Map Key (TMK): [1] 5-6-009 showing the project area

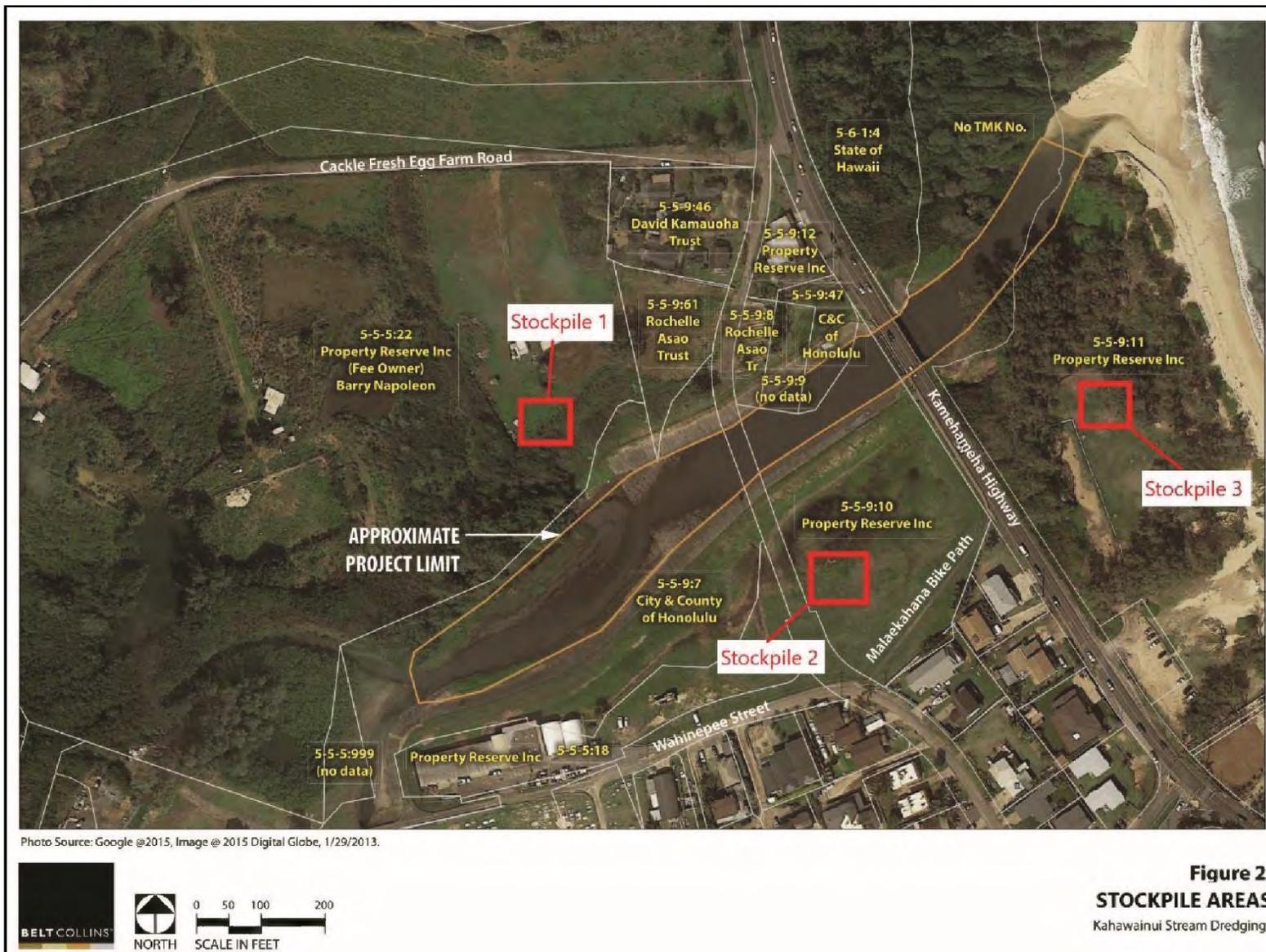


Figure 2
STOCKPILE AREAS
Kahawainui Stream Dredging

Figure 4. Preliminary site plan showing the project area and proposed stockpile areas (provided by client)

1.2 Environmental Setting

1.2.1 Natural Environment

The project area is situated within the ahupua‘a (traditional land division) of Lā‘iewai along the coastal plain of the northern windward coast of O‘ahu, at the northern extent of the town of Lā‘ie. Lā‘iewai Ahupua‘a is within Ko‘olauloa District and is bordered by Mālaekahana Ahupua‘a to the north, Lā‘iemalo‘o Ahupua‘a to the south, Lā‘ie Bay to the east, and Waimea Ahupua‘a to the west. Lā‘iewai contains fertile lands along Lā‘iewai Stream and Kahawainui Stream and numerous additional streams were formerly present in the area. This part of O‘ahu is dominated by northeastern trade winds. The project area receives approximately 51 inches (130 centimeters [cm]) of rain annually, particularly during the rainy season between November and March (Giambelluca et al. 2013).

The project area consists of a channelized portion of Kahawainui Stream running adjacent to the former stream location. The project area is at an elevation of approximately 3 ft. (0.9 m.) to 5 ft. (1.5 m) above mean sea level at the bottom of the channel and 6 ft. (1.8 m.) to 9 (2.7 m.) ft. along the levees on both sides. The project area is located in an area of marshy clay and Jaucus sand created by ocean tides and deposition from Kahawainui Stream. The marshlands and low-lying areas were graded and filled in the 1930’s to create Kamehameha Highway.

Two soil types have been identified within the project area and include the non-calcareous variant of Kaloko Clay (KfB) and Jaucus Sand (JaC) on slopes ranging from 0 to 15 percent (Foote et al. 1972) (Figure 5). The non-calcareous Kaloko Clay is present in the area of the former stream channel in the western portion of the project area. This soil type occurs in drainageways and slight depressions on the coastal plains of O‘ahu and consists of a dark gray clay surface layer, underlain by a gray or grayish-brown prismatic clay which overlies massive clay and silty clay. The permeability of the soil is slow, runoff is ponded to very slow, and the erosion hazard is none to slight. This soil is generally used for pasture and sugarcane cultivation with vegetation consisting of kiawe, klu, bermudagrass, and annuals (Foote et al. 1972:58).

Jaucus Sand (JaC) on 0 to 15 percent slopes is present within the eastern half of the project area and consists of excessively drained calcareous soils that occur as narrow strips on coastal plains adjacent to the ocean that developed in wind and water deposited sand from coral and seashells. The soil is pale brown to very pale brown, single-grain, and can extend up to 60 inches below the ground surface. The permeability of the soil is rapid, runoff is very slow to slow, and water erosion hazard is slight. However, wind erosion is a severe hazard in places where the surface vegetation has been removed. This soil is generally used for pasture, sugarcane, truck crops, alfalfa, recreational areas, wildlife habitat, and urban development with vegetation consisting of kiawe, koa haole, bristly foxtail, bermudagrass, fingergrass, and Australian saltbush (Foote et al. 1972:48).

1.2.2 Built Environment

The project area is almost completely developed and consists of a channelized portion of Kahawainui Stream paralleling the former streambed and a tall chain-link fence defines the majority of the boundary. The Kahawainui Stream-Lā‘iewai Bridge was constructed in 1933 and crosses through the eastern portion of the project area. A former railbed and railroad bridge for the

Koolau Railroad, now destroyed, would have run parallel and to the makai (seaward) or east side of the bridge, through the eastern-most portion of the project area. The former coastal road ran through the central portion of the project area prior to construction of Kamehameha Highway, and it is likely other earlier roads and trails would have crossed through the project area as well.

The current concrete channelized stream channel and earthen fill levees were completed in 1990 as part of the Kahawainui Stream Flood Control Project and constructed jointly by the U.S. Army Corps of Engineers Honolulu District and the City and County of Honolulu. Un-channelized portions of the project area included the eastern-most end of the project area and the far west and northwestern extent of the project area. Recent siltation has occurred in these areas and secondary vegetation and marsh grasses were present. Above-ground electrical utilities run through the project area and wooden power poles parallel either side of Kamehameha Highway. No other utilities are known to be present within the project area.

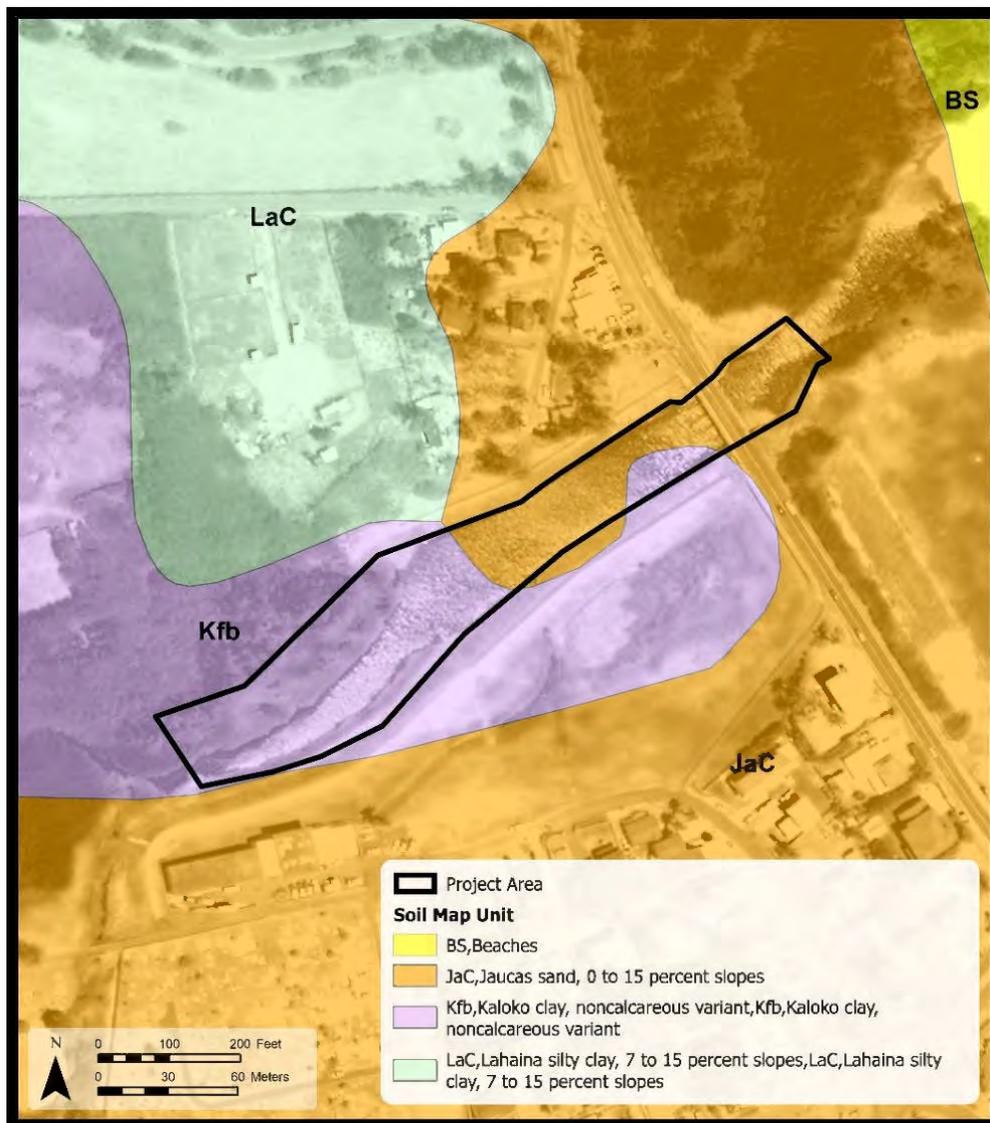


Figure 5. 2020 Digital Globe Imagery map with soil series overlay showing anticipated soils within the project area (Foote et al. 1972)

Traditional and Historical Background

Background research was conducted using materials obtained from the State Historic Preservation Division (SHPD) library in Kapolei and the Honua Consulting database. On-line materials consulted included the Ulukou Electronic Hawaiian Database (www.ulukou.com, Soehren 2002-2019), Papakilo Database (www.papakilodatabase.com), the State Library on-line (<http://www.librarieshawaii.org/Serials/databases.html>), and Waihona ‘Aina Mahele database (<http://www.waihona.com>). Hawaiian terms and place names were translated using the on-line Hawaiian Dictionary (Nā Puke Wehewehe ‘Ōlelo Hawai‘i, www.wehewehe.com) and *Place Names of Hawaii* (Pukui et al. 1974). Historic maps were obtained from the State Archives, State of Hawai‘i Land Survey Division website (<http://ags.hawaii.gov/survey/map-search/>), and UH-Mānoa Maps, Aerial Photographs, and GIS (MAGIS) website (<http://guides.library.manoa.hawaii.edu/magis>).

Maps were geo-referenced for this report using ArcGIS Pro desktop. GIS is not 100% precise and historic maps were created with inherent flaws; therefore, geo-referenced maps should be understood to have some built-in inaccuracy.

1.3 Traditional Background

The history of Hawai‘i is recorded through mo‘olelo (oral-historical accounts) and early historical (i.e., written) records, historic maps and land documents. The following provides a brief summary of mo‘olelo and inoa ‘āina (place names) of the area, and describes how the land has been utilized over time.

The project area is located within the ahupua‘a (traditional land division) of Lā‘iewai. Lā‘ie has a rich and interesting cultural history, and many mo‘olelo and legends are associated with this ahupua‘a. The name Lā‘ie is said to derive its origin from two Hawaiian words, the first being lau (leaf) and the second being ie, referring to the ie vine of the red-spiked climbing pandanus tree which wreaths forest trees of the mauka regions of the Ko‘olau range. This red-spiked climbing pandanus is sacred to Kāne as well as Laka (Beckwith 1970).

Lā‘ie, comprised of the traditional ahupua‘a of Lā‘iewai and Lā‘iemalo‘o, was known during traditional times to have been a famous fishing location (Handy and Handy 1978). Initial occupation of Lā‘ie likely centered along the coast and consisted of utilization of the rich marine resources. As populations increased, occupation and land use expanded inland for lo‘i production, which is reported to have become quite extensive. Scattered stone terrace remnants are extant along Kahawainui, Koloa, Wailele, and other streams (Handy 1940). Two heiau (traditional places of worship) are also present in the area and include Nioi Heiau, located on a small ridge near the present day sewage treatment plant, and Mo‘ohekili Heiau (destroyed) which was formerly present makai of the Latter-day Saints Laie Hawaii Temple.

Evidence of widespread taro production can be found across the ahupua‘a. According to Wallace (2001), there were taro (kalo, *Colocasia esculenta*) terraces along the lower areas of Kahawainui Stream in a place called Waieli. These terraces were supplied with water from a large spring located in the area. Further up Kahawainui Stream were many terraces used for taro and other food cultivation, including mango and breadfruit. There are additional terraces along the Koloa Stream, which is filled with extensive evidence of cultivation and habitation. All these findings indicate

that Lā‘ie may have had a dense population at one time. Several place names, mostly geographic features of the area are included in Table 1.

Table 1. List of Inoa ‘Āina (Place Names) in the vicinity of Lā‘ie

Inoa ‘Āina	Description
Akaki‘i	a stream, translates “negative of a photograph” (Pukui and Elbert 1986:13)
Kaihihi	a stream, possibly translates “dizzy, dizziness”, “to refuse to pay loses or forfeit”, and “a fine meshed fish net” (Pukui and Elbert 1986:115)
Kahawainui	a stream, translates “great river or stream” (Pukui and Elbert 1986:111)
Kaho‘oleinapea	a stream (Wallace 2001)
Kaluakauila	a stream (Wallace 2001)
Kawaipapa	a stream (Wallace 2001)
Kawauwai	a stream (Wallace 2001)
Keauakaluapaaa	an island of the coast of Lā‘ie (Rice 1923)
Kihewamoku	an island of the coast of Lā‘ie (Rice 1923)
Koloa	a stream, translates “long cane with a crook” or “to make a prolonged sound, roar” (Pukui and Elbert 1986:163)
Kokololio	a stream (Wallace 2001)
Kuamo‘o	a terrace, translates “backbone” (Wallace 2001)
Lā‘ie	a town, modern land division containing Lā‘iewai and Lā‘iemalo‘o ahupua‘a, translates “leaf” of the ‘ie‘ie (red-spiked climbing screw pine, <i>Freycinetia arborea</i>) (Pukui and Elbert 1986:191)
Lā‘iemalo‘o	a traditional ahupua‘a
Lā‘iewai	a traditional ahupua‘a
Mahanu	a terrace, translates “rest and breathe” (Wallace 2001)
Makali‘i	a terrace, translates “Pleiades” (Wallace 2001)
Mālaekahana	a traditional ahupua‘a and also named after Chiefess Mālaekahana (Beckwith 1970)
Malualai	an island of the coast of Lā‘ie (Rice 1923)
Mokuaaniwa	an island of the coast of Lā‘ie (Rice 1923)
Naue-loli	a terrace, translates “move and change” (Wallace 2001)
Po‘o-haili	a terrace, translates “head recalls” (Wallace 2001)
Pulemoku	an island of the coast of Lā‘ie (Rice 1923)
Wailele	a stream (Wallace 2001)

Several mo‘olelo pertaining to the Lā‘ie region have been recorded and include themes associated with mo‘o, supernatural beings, ‘awa cultivation, and the bountiful coastal fishing grounds. Interestingly, mention is made of Kaua‘i chiefs in several of the stories which may indicate possible familial or marriage connections to the area. The following mo‘olelo were compiled in *Hawaiian Legends* by William Hyde Rice and in *Hawaiian Mythology* by Martha Beckwith and are based on compilations from early Hawaiian language newspapers and by a variety of authors including Samuel Kamakau and David Kalākaua (Rice 1923 and Beckwith 1970).

Legend of Manuwahi

At Laie lived Manuwahi, Free Gift, with his son, Ka-haku-loa, The-Lord-of-a-Long-Land; his grandson, Kaiawa, Bitter Sea, and his great-grandson, Kauhalekua, The-Village-on-the-Ridge. These men were the keepers of the akua at Laie. Manuwahi and his children were hairless and were possessed of supernatural powers.

Manuwahi planted black and white awa far up the mountains for the use of the akua. Every awa root planted was given one of these names, Kaluaka, The-Hole-That-Gives-a-Shadow; Kumumu, Blunt-Edged; Kahiwa, Best-Awa, or Kumilipo, The-Root-of-Unconsciousness. This was done so that Manuwahi, when sending one of his sons for a piece of awa could designate the exact one he wished.

When the awa was given to him, Manuwahi would prepare it, and then summon the akua from the North, South, East, West, as well as from above and below, to drink of it. They prayed in this wise, before they drank:

Gods of the morning,
 Gods of the night
 Look at your progeny:
 Grant them health,
 Grant them long life;
 Amama ua noa—it is free!

It happened that during that during this time, Kamehameha I, had come to conquer Oahu. He had succeeded in subduing all the island except Malae-kahana, between Laie and Kahuku. Determined to add this place to his conquests, the king sent one of his body guard, Ka-hala-iu, In-the-Shadow-of-the-Hala-Tree, with many of his bravest soldiers to subdue Malae-kahana.

Ka-hala-iu marched as far as Hanapepe the first day, where he spent the night. Early the next morning he set out and meeting Manuwahi, whom he did not recognize, asked him where the powerful kahuna of Malae-kahana lived.

Manuwahi answered, “Pass over the river and you will see a spring and nearby a hut with trees about it. This is his home.”

Ka-hala-iu did as he was told and had soon surrounded the hut with his soldiers. When Manuwahi’s son came out Ka-hala-iu asked him,

“Where is your father?”

“Did you meet a bald-headed man?” asked the boy in turn.

“Yes,” replied Ka-hala-iu.

“Well, that was my father. Why did you come here?”

“I came to kill your father by the orders of King Kamehameha,” answered the King’s man. Deciding it would profit them nothing to kill the son, the soldiers departed for Hanapepe by the makai side of the hill and failed to meet Manuwahi, who had returned to his home by the mauka side.

The next morning the King’s body-guard again surrounded with his soldiers the home of the kahuna. Manuwahi came out and asked, “What are you here for? Did you come for battle?”

“Yes,” answered the fearless soldier, “We came to kill you.”

Whereupon Manuwahi called to his assistance all the akua from the North, South, East and West as well as those from above and below. They came at once and gave battle to the soldiers of the king. The akua fought by biting and scratching their assailants and before long they had killed all but Ka-hala-iu.

Ka-hala-iu cried out, “Spare my life, kahuna of the gods, and I will stay with you.”

“What can you do if you stay with me?” asked Manuwahi.

“I will plant awa for you. I came from Hawaii, where I lived by planting awa,” answered Ka-hala-iu.

But Manuwahi said, “I do not need you. Go back and tell your king that even his bravest soldiers were not able to conquer Malae-kahana. Tell him that all but you were killed by the akua there.”

When Kamehameha had heard these words he sent Ka-hala-iu back with another body of soldiers with orders that he must conquer Malae-kahana.

In the meantime, Manuwahi had moved with his sons up to the cave of Kaukana-leau, where the natives made their stone adzes. There the King’s soldiers met them. As before, Manuwahi called all the akua to his aid. Again the soldiers were quickly put to death and only Ka-hala-iu was left. So Malae-kahana was not conquered.

Ka-hala-iu respected and admired Manuwahi so much that he was very anxious to remain with him, and so he asked again to be allowed to remain as an awa grower. Manuwahi consented this time and gave him one side of the valley to cultivate in awa.

One day as Ka-hala-iu was preparing the side hill for its cultivation, he noticed that on the opposite side of the valley, trees and bushes were falling in every direction, as if a whirlwind were uprooting them. This frightened him very much, as he could not understand the phenomenon, so he ran in great haste to Manuwahi, and asked what it meant. Manuwahi told him that his akua were helping in the clearing of the side hill, and that if he wished them to help him, they would gladly do so. Ka-hala-iu was only too happy to have help, so he called upon the akua, and in a short time both sides of the valley were cleared, and were growing luxuriantly with the most beautiful awa.

After the battle, between Ka-hala-iu and the akua for the possession of Mala-kahana, Manu-ka, Frightener-of-Birds, one of Manuwahi's sons, moved to Kaneohe, where he died some time later. He was buried makai of the present road. The natives dug a very large grave, but before they could cover the body, the akua brought red dirt from Ewa, in a cloud, which filled the grave, and made a red hill above it, which can be seen to this day. There is no other red dirt in that district. (Rice 1923:113-115)

Romance of Laieikawai

Laie-i-ka-wai and her twin sister Laie-lohelohe are born at Laie on Oahu of Kahauokapaka the father, chief of the northern lands of the island, and Malaekahana the mother. Since the father has vowed to let no daughter born to his wife live until she bears him a son, the mother conceals the birth of the twins and gives them to her own relatives to rear, Laie-lohelohe to Ka-puka-i-haoa to bring up at the heiau at Ku-kani-loko, and Laie-i-ka-wai to Waka, who first hides her in a cave near Laie which can be reached only by diving into the pool which conceals the entrance, and then takes her to the uplands of Puna. Here she builds a tapu house for her ward thatched with bird feathers, and gives her birds to wait upon her and mists to hid her from sight of men until such time as a suitable lover shall appear to make her his wife.

The first whose suit seems acceptable is Kauakahi-ali'i, ruling chief of Kauai and husband of Ka-ili-o-ka-lau-o-ke-koa (skin like the leaf of the koa). The reappearance of his wife whom he had mourned for dead prevents the appointed meeting, but on his return to Kauai he relates the adventure and the young chiefs of that island are stirred by the story. Aiwohikupua meets her nightly in dream and goes to woo her, but even the presence of his four sweet-scented kupua sisters, named after the four varieties of maile vine whose scent they inherit, cannot shake her refusal. Enraged by the insult, he abandons the sisters in the forest. His fifth and favorite sister, Ka-hala-o-mapuana (the fragrant hala blossom) refuses to abandon them. Through her clever management she attracts the attention of Laie-i-ka-wai and the five are adopted as sisters and made the guardians of Paliuli. They drive off their brother upon his second attempt to win the chiefess, and a guardian mo'o named Kiha-nui-lulu-moku (great mo'o shaking the island) completes the discomfiture. Another and more favored young chief from Kauai named Hauailike is also expelled by the watchful youngest sister.

Waka now arranges a match with Ke-kalukalu-o-ke-wa, younger brother of Ka-ili-o-ka-lau-o-ke-koa and successor with her to Kauakahi as ruling chief of Kauai. Just as the formal marriage (hoao) is about to be consummated, a young rascal from Puna named Hala-aniani, aided by his sorceress sister, carries her off on his surfboard in place of the legitimate lover. Waka finds them sleeping together and abandons the girl in a rage, stripping her of mist and bird guardians and of the house thatched with feathers whose protection her loose conduct has forfeited. The five sisters and the great mo'o, however, refuse to abandon their mistress. Since the Kauai chief has made her twin sister Laie-lohelohe his wife in place of their disgraced mistress, they determine to retrieve her fortunes by providing a more splendid match, and the clever youngest sister is dispatched, with the great mo'o as

carrier, to fetch their oldest brother who lives as a god in a tapu house in the very center of the sun in the highest heavens. While she is away on this errand the group leave Paliuli and travel about the island and, meeting an old family guardian and seer named Hulu-maniani, make their home with him as adopted daughters at Honopuwai-akua on Kauai.

Throughout the course of the story this old seer (kaula) has been following around the islands after the rainbow sign which hovers over the place where Laie-i-ka-wai is hidden, determined to make this new divinity his chief and thus provide for his own old age.

Ka-onohi-o-ka-la (eyeball of the sun) looks favorably upon his sister's proposal and, putting off his nature as a god, he descends to earth, strips the enemies of Laie-i-ka-wai of their lands and power and, leaving Ke-kalukalu-o-ke-wa and the twin sister rulers over Kauai, gives to each of the sisters rule over one of the other islands of the group and takes Laie-i-ka-wai up on a rainbow to live with him in Kahakaekaea. All goes well until, on one of his visits to earth to see that all goes well there, he notices the budding beauty of his sister-in-law. He presses his attentions and succeeds in securing her. His wife in the heavens wonders what important affairs keep him so long on earth. In the temple at Kahakaekaea stands the gourd Lau-ka-palili which reveals to one who looks within what is going on below. Laie-i-ka-wai discovers her husband's infidelity and reports him to his parents, who live with her in the heavens. They banish him to become a wandering spirit, the first lapu (ghost) in Hawaii. Laie-i-ka-wai returns to earth and lives like a god with her sister. Today she is worshipped as Ka-wahine-o-ka-liula (Lady of the twilight, mist, or mirage) (Beckwith 1970:526-528).

Laniloa, The Mo'ō

Laniloa is the name given to a point of land which extends into the ocean from Laie. In ancient times this point was a mo'ō, standing upright, ready to kill the passerby.

After Kana and his brother had rescued their mother from Molokai and had taken her back to Hawaii, Kana set out on a journey around the islands to kill all the mo'ō. In due time he reached Laie, where the mo'ō was killing many people. Kana had no difficulty in destroying this monster. Taking its head, he cut it into five pieces and threw them into the sea, where they can be seen today as the five small islands lying off Malaekahana: Malualai, Keauakalupaaa, Pulemoku, Mokuaniwa and Kihewamoku.

At the spot where Kana severed the head of the mo'ō is a deep hole which even to this day has never been fathomed. (Rice 1923:112)

Story of Punaikoae

The mo'ō woman Kalmainu'u lives in a cave at Makaleha in Laie, Waialua District, on Oahu. Going forth one day in search of a husband she finds the young Kauai chief Puna-ai-koae (Puna-tropic-bird eater) surfing on the waves of Ka-lehua-weha, lures him to her own board and carries him away to Kaena point, where they land and, ascending the Waianae mountains to Pu'u-ka-pele, descend to the

stream of Wailea on the west side of which her cave is still seen today. After several months of love making and feasting Puna longs again for surf riding and his wife fetches a board from the corner of the cave but warns him against speaking to anyone while he is away. On his way to the sea two relatives of the mo‘o woman, Hinalea and Aikilolo, hail him and warn him of his wife’s true nature. They tell him that the board he carries is in reality her mo‘o tongue and that unless he can escape he must ultimately perish. He returns secretly to the cave and spies upon his wife in her mo‘o form. Because of her nature as a spirit she knows what has happened and prepares to eat him, but since he shows no fear when she shows him her terrible forms, she forgives him and goes forth to slay his informants. They evade her for a time by creeping into a crack of the sea floor. Kuao and Ahilea tell her how to set a trap to catch them. Thus the basket trap for catching hinalea fish came to be invented, and Kalamainu‘u is still an aumakua for catching hinalea fish in that vicinity. (Beckwith 1970:194)

Legend of Manonihokahi

Near the water hole in Malae-kahana, between Laie and Kahuku, lived a man called Mano-niho-kahi who was possessed of the power to turn himself into a shark. Mano-niho-kahi appeared as other men except that he always wore a tapa cloth which concealed the shark’s mouth in his back.

Whenever he saw women going to the sea to fish or to get limu he would call out, “Are you going into the sea to fish?”

Upon hearing that they were, he would hasten in a roundabout way to reach the sea, where he would come upon them and, biting them with his one shark’s tooth, kill them.

This happened many times. Many women were killed by Mano-niho-kahi. At last the chief of the region became alarmed and ordered all the people to gather together on the plain. Standing with his kahuna, the chief commanded all the people to disrobe. All obeyed but Mano-niho-kahi, Shark-with-One-Tooth. So his tapa was dragged off and there on his back was seen the shark’s mouth. He was put to death at once and there were no more deaths among the women. (Rice 1923:111)

Tradition of the Mullet of Kaihuopalaai

One of the notable traditions of and includes descriptions of valuable resources in neighboring ahupua‘a. The tradition was originally published in 1866 under the title “Ka Amaama o Kaihuopalaai” and offers an explanation as to why the famed migration of the ‘anae holo (traveling mullet) around O‘ahu occurs annually. It was published again in the native language newspaper *Nupepa Ka Oiaio* between November 8, 1895 and February 14, 1896 by native historian, Moses Manu under the title “He Moolelo Kaa Hawaii no ka Puihi o Laumeki, ka Mea i Like me ka Ilio Puapualenalena” (The Hawaiian tradition of Pūhi Laumeki [A Deified Eel] and how the ‘Anae-holo Came to Travel around O‘ahu) (Manu 1895). The mo‘olelo (newspaper article) cites numerous wahi pana (legendary places), features of the land, important events, resources, and residents of Honouliuli Ahupua‘a. The narratives include important descriptions of lands fronted by Ke Awalau o Pu‘uloa as the source of the ‘anae holo for fisheries around the island of O‘ahu.

Nupepa Ka Oiaio

November 8, 1895

It is perhaps not unusual for the Hawaiian people to see this type of long fish, an eel, about all the shores and points, and in the rough seas, and shallow reefs and coral beds of the sea. There is not only one type of eel that is written about, but numerous ones that were named, describing their character and the type of skin which they had. In the ancient times of our ancestors, some of the people of old, worshipped eels as Gods, and restrictions were placed upon certain types of eels. There are many traditions pertaining to eels. It is for this fish that the famous saying “An eel of the sea caverns, whose chin sags.”³

Indeed, this is the fish that was desired by Keinohoomanawanui, the eels of the fishpond of Hanaloa, when he was living with his friend, Kalelealuaka, above Kahalepoi at Waipio uka, when Kakuhihewa was the king of Oahu. It was necessary for us to speak of the stories above, as we now begin our tradition.

It is said in this account of Laumeki, that his true form was that of an eel. His island was Oahu, the district was Ewa, Honouliuli was the land. Within this land division, in its sheltered bay, there is a place called Kaihuopalaai. It is the place of the anae (mullet), which are known about Honolulu, and asked for by the people, with great desire.

Kaihuopalaai was human by birth, but he was also a kupua [dual-formed being], who was born at Honouliuli. His youngest sister was known by the name of Kaihukuuna. In the days that her body matured and filled out, she and some of her elders left Ewa and went to dwell in the uplands of Laiemaloo, at Koolauloa, where she met her husband. The place known by the name Kaihukuuna, at Laiemaloo, is the boundary of the lands to which the anae of Honouliuli travel.

At the time that Kaihukuuna was separated from her elder brother and parents, Kaihuopalaai had matured and was well known for his fine features, and his red-hued cheeks. He was known as the favorite of his parents and all the family. There was a young woman, who like Kaihuopalaai, was also favored by her family. Her name was Kaohai, and she lived at the place where the coconut grove which stands at the estuary of Waikele and Waipio. Thus, these two fine children of the land of the fish that quiet voices (*Ka ia hamau leo*), that is Ewa, were married in the traditional manner.

In their youth, the two lived as husband and wife in peace. And after a time, Kaohai showed signs of carrying a child. This brought great joy to the parents and elders of these two youth. When the time came for Kaohai to give birth, her child was born, a beautiful daughter, who also had the same red-hued nature as her father. While Kaohai was cleaning the child and caring for the afterbirth, she looked carefully at her daughter and saw a deep red-spotted mark that looked like an eel, encircling the infant. Everyone was looking at the mark, contemplating its meaning,

³ An expression that was used to describe a prosperous person (Pukui 1983, #1545).

and Kaohai was once again taken with birth pains. It was then understood that perhaps there would be a twin born as well. But when the birth occurred, an eel was seen moving about in the blood, on the side of Kaohai's thigh. This greatly frightened the family and attendants, they fled, taking the child who had been born in a human-form, with them. Kaihuopalaai also separated himself from his wife. Kaohai remained with the blood stains upon her, and no one was left to help her.

It was the eel which had been born to her, that helped to clean Kaohai. He worked like a human, and Kaohai looked at the fish child which had been born to her, and she could find no reason to criticize or revile him. Kaohai then called to her husband, Kaihuopalaai, telling not to be afraid, and he returned. They both realized the wondrous nature of this child and cared for him at a good place, in the calm bay of Honouliuli. They named this eel child, Laumeki, and his elder sister, born in human-form, was named Kapapaapuhi. This eel became a cherished child, and was cared for as a God. Laumeki, the one who had been consecrated, asked that the first-born, his sister, also be cared for in the same manner, and a great affection was shared between the children born from the loins of one mother.

November 15, 1895

Thus, it is told in this tradition, that this is the eel Laumeki. It is he who caused the anae to remain at Honouliuli, and why they are known as “Ka anae o Kaihuopalaai” (The mullet of Kaihuopalaai). With the passing of time, the forms of this eel changed. At one time, he was red with spots, like the eel called puhi paka, at other times he was like the laumilo eel.

A while after the birth of Laumeki, another child was born to Kaohai, a son. He was named Mokumeha, and he was given to Wanue, an elder relative of Kaihuopalaai's, to be raised. There are at Honouliuli, Ewa, places named for all of these people. The natives of that land are familiar with these places. For this Wanue, it is recalled in a song:

The thoughts are set upon the sea at Wanue,
I am cold in the task done here...

The eel-child Laumeki, followed the fish around in the expanse of the sea, and on the waves of this place. This was a work of love and care, done for his parents and family, that they would have no difficulties. In those days, this eel lived in the sea at a place where a stone islet is seen in the bay of Honouliuli, and he would not eat the fish which passed before him. He did these things for his parents and sister Kapapaapuhi.

Laumeki was very watchful of his family, protecting them from sharks, barracudas, and the long billed marlin of the sea which entered into the sheltered bay of Honouliuli, the land of his birth. Because of his nature, Laumeki did many wondrous things. It was Laumeki who trapped the Puhi lala that had lived out in the sea, in the pond of Hanaloa. This Puhi lala was the one who bragged about his deeds, and when he was trapped his eyes glowed red like the flames of an earthen oven.

It is perhaps worthy here, my readers that we leave Laumeki and speak of Mokumeha and his journey around Oahu. At the time when the sun rested atop the head [describing Mokumeha's maturity], and his fine features developed. He was very distinguished looking. At that time, he determined to travel around the island of Oahu. He asked his parents and guardian permission, and it was agreed that he could make the journey.

Mokumeha departed from Honouliuli and traveled to Waianae, and then went on to Laiemaloo, at Koolauloa, the place where the youngest sister of his father dwelt. She [Kaihukuuna] was pounding kapa with her beater and thinking about her elder brother. She rose and went to the door of her house and saw a youth walking along the trail. Seeing the youth, her thoughts returned once again to her brother Kaihuopalaai and his wife Kaohai. The features of this youth in every way, looked like those of his father, and upon seeing him, tears welled up in Kaihukuuna's eyes. She called to the youth inquiring about his journey, and he responded, answering each of the questions. The moment the youth said the name of his parents, and the land from which he came, Kaihukuuna wept and greeted her nephew in the custom of the people of old.

This greatly startled her husband who was out in the cultivated gardens tending to his crops. He thought that perhaps one of his own family members had arrived at the house. When he reached their house, he saw the strange youth and he quickly went to prepare food for their guest. In no time, everything was prepared, and he then went to his wife asking her to stop her crying, and invite the visitor to eat of the food that had been prepared. He told his wife, "Then, the talking and crying can resume." She agreed and they sat down together and ate, and had a pleasant time talking.

Kaihukuuna then asked Mokumeha about the nature of his trip, and he explained that he was traveling around Oahu on a sight-seeing trip. Kaihukuuna told him, "It is wonderful that we have met you and can host you here." She then asked him to consider staying with her and her husband at Laiemaloo, where all of his needs would be met. "We have plenty of food and if you desire a wife, we can arrange that as well." Mokumeha declined the invitation, explaining his desire to continue the journey and then return to Honouliuli.

November 22, 1895

Now it is true that at this place, Laiemaloo, there was grown great quantities of plant foods, but the one thing that it was lacking was fish. Mokumeha, his aunt, and her husband, Pueo, spoke about this, and it was determined that Pueo should go to Ewa. Mokumeha instructed him to seek out Kaihuopalaai, Kaohai, Kapapaapuhi, and Laumeki, and to ask for fish. He told them that "Laumeki will be able to lead the fish to you here at Laiemaloo."

Pueo departed for Honouliuli [various sites and features are described along the way]... and he met with Kaihuopalaai. Kaihuopalaai's love for his sister welled up within him, and it was agreed that fish would be given to her and her family. But rather than sending fish home with Pueo in a calabash—fish which would be

quickly consumed, causing Pueo to continually need to make the journey between Laiemaloo and Honouliuli—Kaihuopalaai said that he would “give the fish year round.”

November 22, 1895

When Kaihuopalaai finished speaking, Pueo exclaimed, “This is just what your son said you would do!” Kaihuopalaai and Pueo then went to the house of Kapapaapuhi, who, when she learned that Pueo was her uncle, leapt up and greeted him. They discussed the request for fish, and ate while speaking further. Kaihuopalaai then asked, “Where do you come from?” Pueo answered, “Laiemaloo,” and he described the land to her.

The next day, Kapapaapuhi and Pueo went on a canoe out to the stone islet where Laumeki lived. They took with them food, and as they drew near the stone, the water turned choppy like the water of the stormy winter season. The head of Laumeki rose out of his pit and remained on the surface of the water. Kapapaapuhi offered him the awa and food she had brought with her. This eel was cared for just as a chief was cared for. When he had eaten his food and was satisfied, he rested on the surface. Kapapaapuhi explained to Pueo that he too would need to care for and feed Laumeki, in order to obtain the fish he needed. Kapapaapuhi then called out to Laumeki, “Here is an elder of ours, tomorrow you will go with him and take the fish of our parents with you.”

December 6, 1895

The next day, Pueo rose while it was still dark, and the stars, Aea, Kapawa and Kauopae were still in the heavens. He prepared the foods needed for Laumeki, and prepared the canoes. He and his wife’s family and attendants then went towards Laumeki’s house, where he was resting. When Laumeki saw the canoes coming toward him from Lae o Kahuka, he rose up before them. Together, they passed Kapakule, the place where the sharks were placed in ancient times as play things of the natives of Puuloa. When the canoes and people aboard reached the place where the waves of Keaalii break, Laumeki cared for them, to ensure that no harm would befall them. This place is right at the entrance of Puuloa.

As the rays of the sun scattered out upon the water’s surface, the people on the canoes saw the red-hues upon the water and upon those who paddled the double-hulled canoes. Pueo then saw something reflecting red, beyond the paddlers, and below the water’s surface. Pueo realized that it was Laumeki with the anae fish. The anae traveled with Laumeki outside of Kumumau, and past Ahua. They continued on past the Harbor of Kalihi at Kahakaaulana, with the fish being urged on, by the people back at Kalaekao, Puuloa, and Laumeki was at the front, leading the fish at Mamala... They continued on around Kawaihoa, Makapuu, and traveled passed Koolaupoko, and on past Laniloa at Laiemaloo, Koolauloa...

December 27, 1895

...This is how the mullet came to regularly travel between the place called Kaihukuuna at Laiemaloo and Honouliuli at Ewa...

January 10 and 17, 1896

...Mokumeha and Laumeki returned to Honouliuli, and Mokumeha offered a prayer chant to his elder brother:

O eel,
 O Laumeki,
 Who passed before the point,
 Dwelling in the pit,
 Eel of the cavern,
 You of the kauila (body) form,
 That is the form of the Laumilo,
 Your wooden body,
 It is Laumeki.
 Amen, it is freed...

...While Laumeki was resting at Honouliuli, Mokumeha set off once again to visit various locations around the island of Oahu. He bid aloha to his family and walked across the broad plain of Ewa. He arrived at Kapukaki, which is the boundary of the land of the streaked seas, that land in the calm, reddened by the dirt carried upon the wind. This is where Ewa ends and Kona begins... (Manu 1895)

1.4 Historical Background

1.4.1 Lā'ie in the Early Post-Contact Period

Prior to the introduction of ranching and commercial agriculture, ten streams flowed through the Lā'ie area. Their names included Kaho'oleinapea, Kaluakauila, Kahawainui, Kaihihi, Kawaipapa, Kawauwai, Wailele, Koloa, Akaki'i, and Kokololio. There were more streams flowing through the ahupua'a of Lā'ie than through any of the other surrounding ahupua'a (including Kaipapau, Hau'ula, Malaekahana, Keana, and Kahuku).

Early accounts of Lā'ie state that it was a small, sparsely populated village with the distinction of being a pu'uhonua – a sacred sanctuary of refuge and was likely due to the two heiau present in the area. Pu'uhonua were abolished in 1819 when Kamehameha II abolished the traditional kapu system, which provided such sanctuaries. There is no further evidence that Lā'ie was ever used again as a pu'uhonua (Wallace 2001).

Missionaries began spreading out across the islands including the north shore and windward coast to convert the native and foreign born after the fall of the kapu system. They set up schools and chapels along the windward coast and provide some of the first information on the population and demographics of the area at that time. At this time the area was primarily Hawaiian and grew little over the next few decades due to a number of factors including introduced diseases and the settlement of Hawaiians in population centers like Honolulu. In the 1830s, it was reported that the population of Lā'ie was only about 400 people. In 1853, twelve years before the Mormon church purchased Lā'ie, the population had only increased to 450 (Hill 1978).

1.4.2 The Māhele (1847-1855)

In the years between 1847 and 1855, the lands of Hawai‘i were divided under the Māhele. Prior to Western contact, all land in the Hawaiian Islands was held by the chiefs as descendants of the gods—no one owned the land. After Western contact, some foreigners were granted gifts of land for services to Kamehameha I and/or his heirs. With a growing number of foreigners arriving and establishing business interests or in service of the mission stations, many petitioned for fee-simple title to land upon which they lived or worked. In 1848, Kauikeaouli-Kamehameha III agreed to the Māhele ‘Āina, which defined the land interests of the King, some two hundred and fifty-two high-ranking Ali‘i and Konohiki (including several foreigners who had been befriended by members of the Kamehameha line), and the Government.

As a result of the Māhele, all lands in the Kingdom of Hawai‘i and associated fisheries came to be placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) Konohiki Lands. The “Enabling” or “Kuleana Act” of the Māhele (December 21, 1849) further defined the frame-work by which *hoa‘āina* (native tenants) could apply for, and be granted fee-simple interest in “Kuleana” lands (cf. Kamakau, 1961:403-403). The Kuleana Act reconfirmed the rights of *hoa‘āina* to: access, subsistence and collection of resources from mountains to the shore, which were necessary to sustain life within their given *ahupua‘a*. Though not specifically stated in this Act, the rights of piscary (to fisheries and fishing) had already been granted and were protected by earlier Kingdom laws.

Land Commission Awards (LCAs) were awarded to native Hawaiians, naturalized foreigners, long-term resident foreigners, and people of foreign descent born in the islands who actively lived on and worked their lands and could prove occupancy before 1845. LCAs provide basic information on how awarded lands were utilized. The two *ahupua‘a* that comprise *Lā‘ie*, *Lā‘iewai* and *Lā‘iemalo‘o*, were retained by Kamehameha I following his conquest of O‘ahu. They were subsequently given to the half-brother of Kamehameha, Kalaimamahū, then to his daughter *Kekāuluohi*, and later to her son William C. Lunalilo during the Māhele. *Lā‘iewai Ahupua‘a*, which includes the project area, was awarded to William C Lunalilo as *Āpana 35* of LCA 8559B in 1850 (Figure 6).

The distribution of the more than 60 LCAs in the *Lā‘ie* area indicate that much of the fertile lands of the area were under cultivation around the lower portion of *Kōloa Stream*, the lower portion of *‘A‘akaki‘i Gulch*, and along *Kahawainui Stream* and its many tributaries. The LCA claims include house lots, numerous *taro lo‘i* (*taro patches*) irrigated by *‘auwai* (*ditch*) systems interspersed with *kula* lands and habitation sites. *Taro* was the dominant crop grown in the area, but others mentioned in the LCA documentation included *‘awa* (*kava*, *Piper methysticum*), coffee, gourd, and various melons and grasses. A total of 9 *kuleana* claims were awarded in the vicinity of the project area and consisted almost entirely of house lots with a couple *lo‘i kalo* focused mainly along the south bank of *Kahawainui Stream*.

Portions of two LCAs are located within the project area and include LCA 3859, *Āpana 2* to *Pahumoa* and LCA 4326, *Āpana 5* to *Koalaukani*, both of which consisted of house lots. The various LCA are shown in relation to the project area on a 1931 Territory of Hawaii map of the *Lā‘ie-Mālaekahana* area (Figure 7). A listing of LCAs within and in the vicinity of the project area is included as Table 2. Detailed documentation for LCA 3859 and 4326 is presented in Appendix B.



Figure 7. Portion of a 1931 Territory of Hawaii map of Lā'ie and Mālaekahana showing the location of the project area in relation to various LCA (Bayless 1931)

1.4.3 Mid-to Late 19th Century Development of Lā‘ie

Following the Māhele and the smallpox epidemic of 1853, the native population along the valleys and plains of the windward coast and north shore began to decrease rapidly. With the opening of large tracts of land to foreigners and the end of commercial whaling in the 1860’s the economic driver of the islands began to change to ranching and commercial agriculture.

In 1861, the estate of William C. Lunalilo sold the lands of Lā‘iewai and Lā‘iemalo‘o to Henry H. Howland. He sold an approximately 300 acre portion of Lā‘iewai to Robert Moffitt in 1863, who in turn sold the land to Charles Hopkins that same year. It should also be noted that Howland sold some land in Lā‘ie to Thomas Dougherty which would eventually become the foundation for the Mormon Church in Hawai‘i. Hopkins added the property to his already extensive land holdings which included the entire ahupua‘a of Kahuku and the majority of the land in Mālaekahana (Maly and Rosendahl 1995).

The Kahuku Ranch was established by Hopkins on his land holdings and focused mainly on cattle and sheep ranching. The ranch was sold to Herman A. Widemann in 1872, followed by Julius L. Richardson in 1874, and James Campbell in 1876. A 275-acre portion of the Kahuku Ranch was present within Lā‘iewai Ahupua‘a and is shown just to the northwest of the project area on an 1881 Hawaiian Government survey map of the island of O‘ahu (Covington 1881) (Figure 8). By the 1880’s ranching in the area was widespread and the ranch lands of Lā‘ie consisted of barren tree-less open country utilized for raising livestock⁴. The ranch operated under the control of James Campbell until 1899 when it was leased to Benjamin F. Dillingham (Maly and Rosendahl 1995). The ranch continued operations through the mid-1900’s when it was closed.

The history of the Mormon church in Hawai‘i began in 1850 when eight missionaries were dispatched to the islands by Brigham Young to establish a colony with the goal of converting the foreign born and native population. The Pālāwai Basin on Lāna‘i was chosen as the site for the new colony in 1853 but by 1864 the mission on Lāna‘i had faltered and a new colony was proposed. In 1865, Latter-day Saints Mission President Francis A. Hammond purchased an approximately 6,000 acre plantation called “Lā‘ie” from Thomas Dougherty to establish a mission settlement. The Lā‘ie Plantation and mill were established in 1868 when the focus of cultivation shifted from cotton and corn to sugarcane. Infrastructure including a flume, irrigation ditches, and a larger more efficient mill were constructed in the area over the next few decades (Maly and Rosendahl 1995). The first Latter-day Saints chapel, named ‘Īhemolele, was constructed of stone in 1883. An 1884 Hawaiian Government survey map of Lā‘ie shows the project area in relation to the Mormon settlement, government road, and sugar cane fields at that time (Figure 9).

Up until the turn of the century, Hawaiians were the dominant workforce at the Lā‘ie settlement. This was mainly due to the practice of leasing land to converts on which they could cultivate traditional crops of their choosing. In the 1880’s and 1890’s Hawaiians began to move from their thatched houses into the mission houses in the settlement (Figure 10). The settlement of Lā‘ie during this time and a legend from the vicinity of the project area are mentioned in Henry M. Whitney’s (1895) book *The Tourists Guide Through the Hawaiian Islands* as follows:

⁴ Information taken from kama‘āina interviews conducted from June to September 1970 by Clinton Kanahele with the assistance of William Sproat

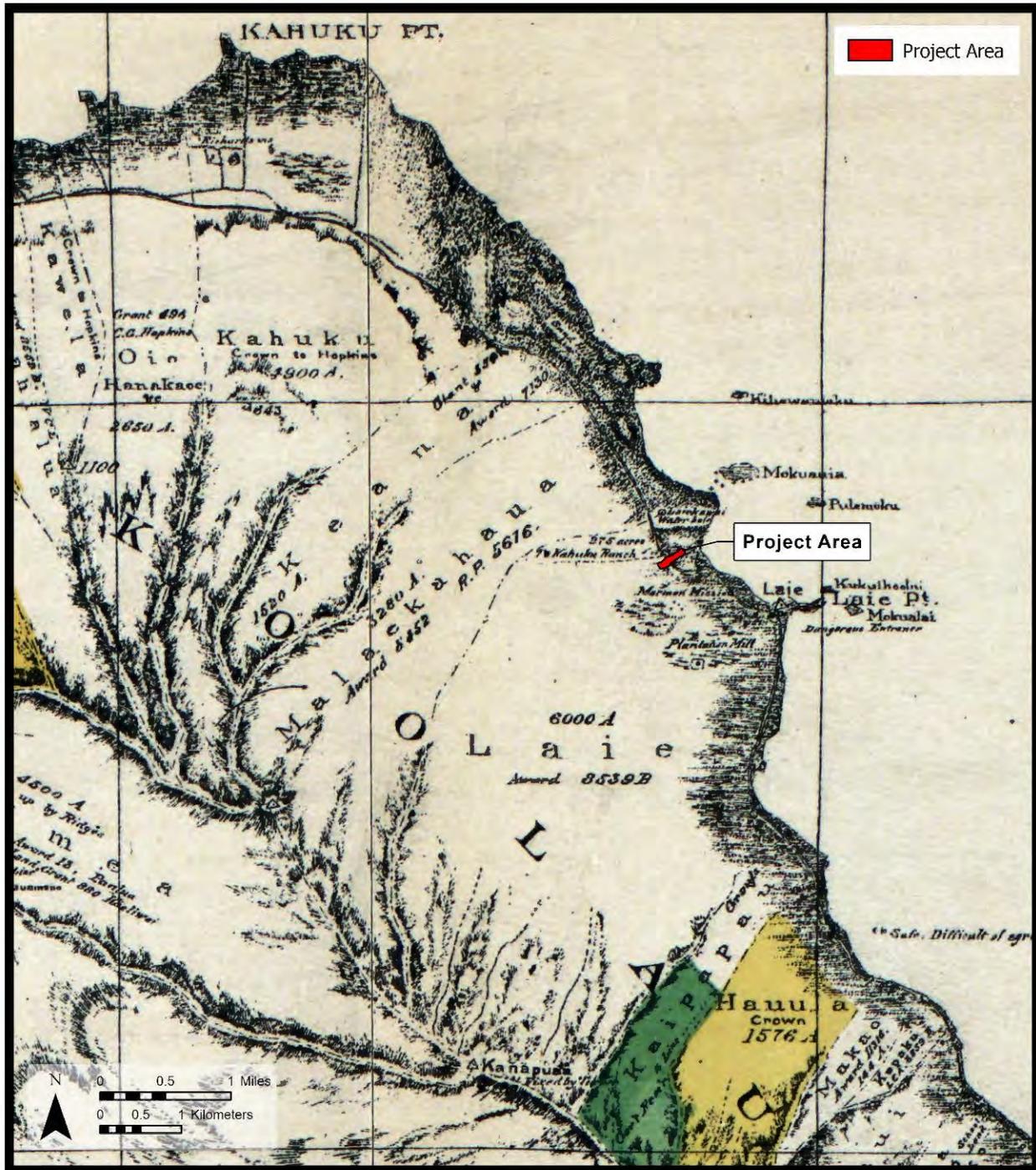


Figure 8. Portion of an 1881 Hawaiian Government survey map of O’ahu showing the location of the project area in relation to the Kahauku Ranch (Covington 1881) (Registered Map (RM) 1381)

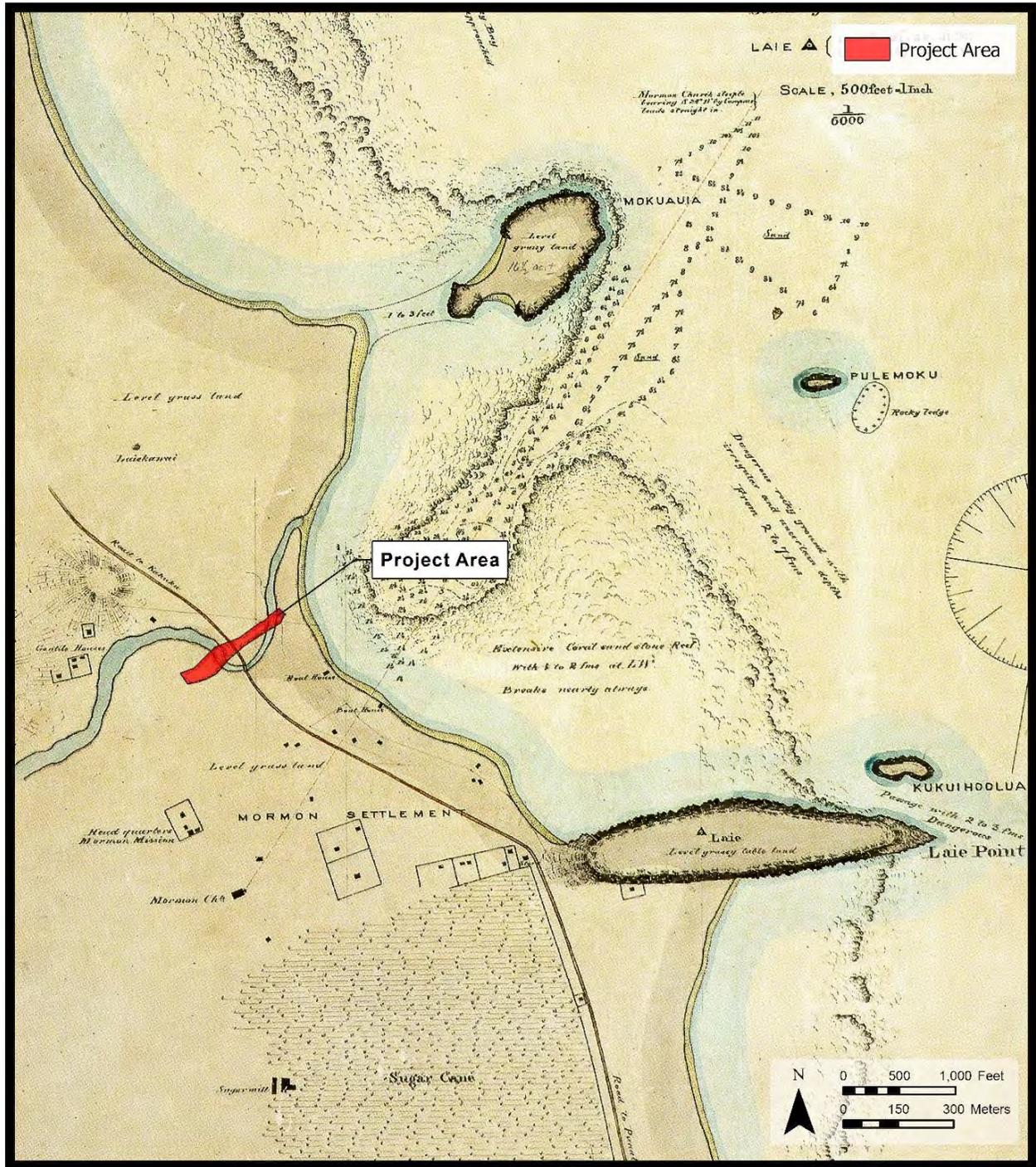


Figure 9. Portion of an 1884 Hawaiian Government survey map of Lā'ie Bay showing the Mormon settlement, government road, and sugar cane fields in relation to the project area (Gresley-Jackson 1884) (RM 1347)

Laie,—thirty-two miles from Honolulu, is a colony and the headquarters of the Mormons on these Islands. The settlement possesses a small sugar plantation, (with a somewhat primitive mill) a cattle ranch, a number of taro patches and lands for sweet potatoes and other products. A number of white Mormons, under a head man from Salt Lake City, occupy the mission premises, which are situated on a hill overlooking the whole settlement. These have the supervision of the entire estate in various capacities, and are also sent out as missionaries round the islands. There is a considerable and quite a prosperous native settlement, all Mormons. The converts have land given them, rent free, and are assisted in building their houses. Polygamy is not allowed either among whites or natives, and the settlement is conducted on lines satisfactory to the most ultra portion of Mormon opponents.

The Mormons first came to the islands in 1850. They have a large number of converts in all parts of the group, estimated at one-tenth in 1890. The Temple at Laie, will accommodate considerably over 1,000 people. A valley behind the mission-house contains several artesian wells and is cultivated in rice by Chinese. An artesian well also supplies the plantation with water.

One mile farther on, and near the road, is the famous water-hole, in which the woman fleeing the warriors of Kamehameha dived and disappeared. They coming and supposing her to be drowned, bathed at their leisure and talked freely of their plans. The woman, meanwhile hidden in a cave, the entrance to which was below the surface of the water, listened to their talk, and after they had left, came out of her hiding place, making her way to the mountains where her friends, the braves of Oahu, were concealed, revealed to them the plans and purposes of the enemy. (Whitney 1895:46-47)

By the turn of the century many changes had taken place within the settlement of Laie. The old mission home was torn down and a new mission home was constructed, and the sugar mill had been shut down and all sugarcane was being sent to the Kahuku mill for processing. Additionally, Chinese families began moving into the area and began digging artesian wells to cultivate rice. These changes and the influx of cheap foreign labor would cause drastic change to the ethnic demographic of the workers at the plantation in the early decades of the 20th century (Berge 1986).



Figure 10. Overview photo of the Lanihuli Mission house, 1899 (Courtesy of the Brigham Young University Archives and Special Collections)

1.4.4 20th Century and Modern Development of Lā‘ie and the Project Area

Due to land use changes and the introduction of cheap plantation labor, the demographic of the laborers at the Lā‘ie Plantation changed from primarily Hawaiian to Japanese and Chinese in the first couple decades of the 20th century. During this time the sugar plantation thrived, and the town grew significantly due in part to construction of the Ko‘olau Railway from Kahuku to Lā‘ie in 1903 which connected the plantation to the main OR&L line from Honolulu (Conde and Best 1973) (Figure 11). The current Lā‘ie Hawai‘i Latter-day Saints Temple location was on the site of the former temple and was dedicated in 1919⁵.

By 1920, the Lā‘ie Plantation had fallen into deep debt and Filipino laborers had become the dominant ethnic group. With rising costs and shrinking profits, the Lā‘ie Plantation closed in 1931. The Great Depression and the years that followed devastated the area’s agricultural economy and the robust water infrastructure became decrepit. E.S. Craighill Handy describes the remnants of traditional Hawaiian and historic agriculture in Lā‘ie as observed in the late 1930’s in the *Hawaiian Planter Volume I*:

There are many streams in this ahupua‘a. Kahooleinapea is the first stream reached after leaving the ahupua‘a of Malaekahana. Here terraces are still in use. The old terrace area named Waieli, along the lower reaches of Kahawainui Stream is now under cane cultivation; it was once watered from a spring. Farther up Kahawainui Stream there were formerly many terraces, according to Kekela Kalua. About 2.5 miles up Wailele Stream there are evidences of old taro terraces.

Along Koloa Stream, beginning at a point about 2 miles inland on its twisting course, there are abandoned groups of terraces at intervals, many of them now half hidden in the jungle growth. Just below the old water gates, on the south side of the stream, there is a group of 15 small terraces, all with stone facings, and nearer the gates, on the north side, a smaller group of five or six. Immediately beyond a sharp curve in the stream bed, and evenly spaced at intervals on either side of the stream, are 15 or more very old mango trees planted in lines. At this point, on the left bank, going upstream, the valley widens into a beautiful flat area which was evidently an extensive dwelling site. There are about eight old breadfruit trees on the hillside and more huge old mangos. This flat area, extending upstream to the sheer cliff wall at the next stream bend, is terraced with low stone lines. Here there are 11 terraces, from 15 to 40 feet wide and from 20 to 30 feet long, now partly overgrown but very distinctly outlined. They could not be replanted unless the mangos were destroyed as the whole surface of the soil is webbed with a network of tree roots. The stream makes a horseshoe bend at this point, and beyond are more mangos planted in lines for a distance of several hundred yards; and at the upper end of the site is a small house platform. Around the next curve is an area of three small lo‘i; beyond this there is no further evidence of planting, the stream becoming more and more winding and the valley more and more narrow. Kakela Kalua of Laie says that this was formerly konohiki land, and now belongs to the Mormons.

⁵ <https://about.byuh.edu/brief-history>

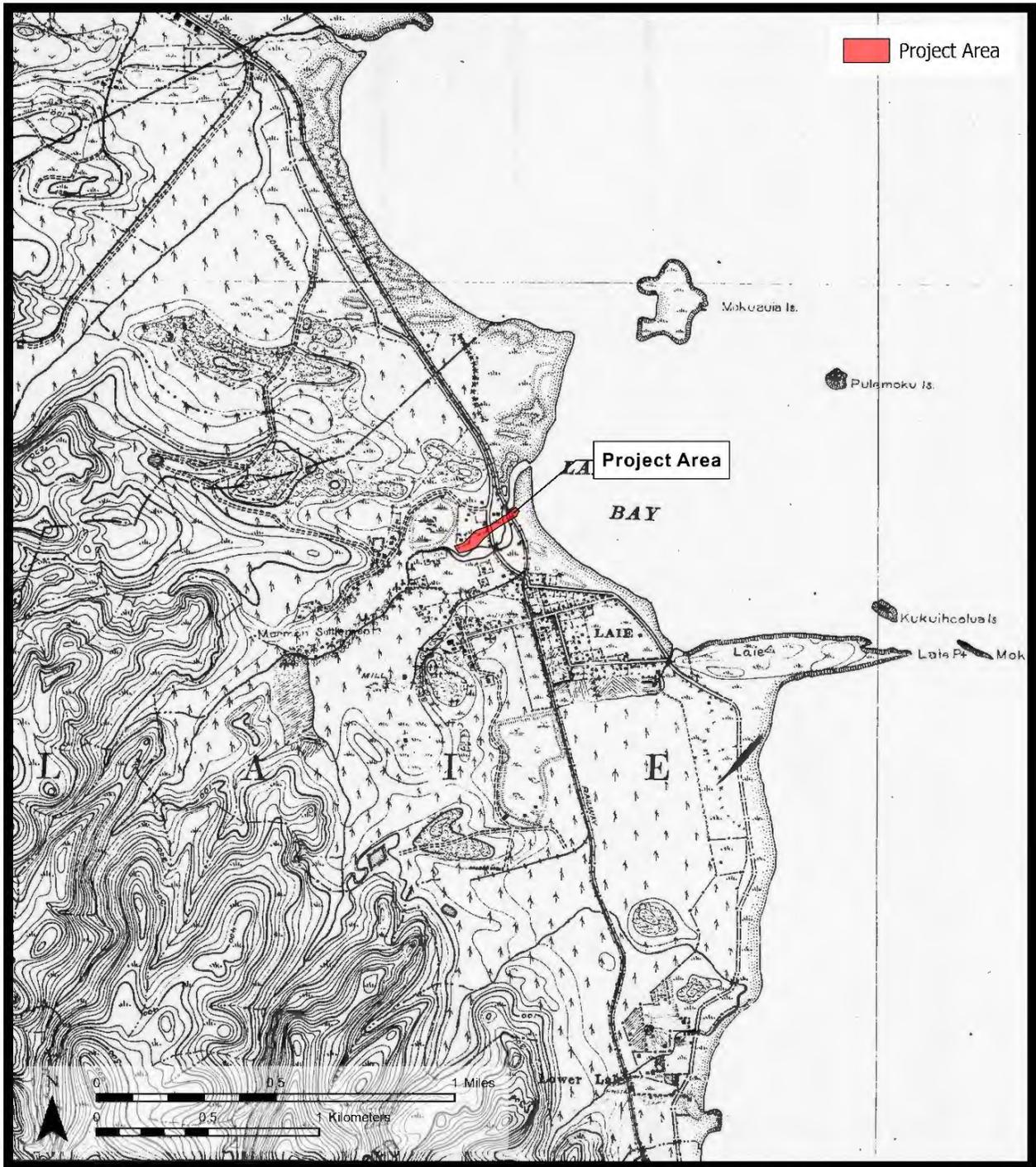


Figure 11. Portion of a 1913 U.S. Army Kahuku Quadrangle Map showing the project area in relation to Lā'ie town, the Koolau Railroad, Kahawainui Stream, and the former coastal road (US Army 1913)

The comparatively flat land between the hills and the seacoast in Laie was divided into many clearly named small districts in the old days—a considerable portion of it, back from the beach strip, having been planted in wet taro. Kekuku, 75-year old kamaaina of the place, says that one of the largest single areas formerly under taro cultivation was the land, over 60 acres in extent, lying back of the present Mormon Temple, and known as Kapuna (the spring) because it was watered by one large and several lesser springs. Kekuku’s family owned much of the Laie land for generations. McAllister says that the flat lowland on the Hauulu side of the Mormon Temple, now drained and planted in cane, was “formerly a famous taro land. The old Hawaiian name for the land is now lost, and it is known as Kanaana, an adaptation of Canaan, the Land of Promise of the Isrealites. In with the taro were extremely large fish... About this taro land the old Hawaiian settlement was located.”

According to Kekuku, there was another terrace area in the flatland named Kaholi, seaward of Kapuna, now abandoned. There is also a large area farther seaward known as Kuamoo, which is now planted in wet taro. Naueluli, more seaward still, had terraces formerly, as did Maklii to the west. Inland and west of Kapuna, the largest old terrace plantation is Poohaili, a mound where mango trees stand, surrounded by terraces, eight of which are still cultivated. Mahanu, inland from the Mormon Temple is marked by old coconut trees and is the upper end of the terrace area; here the kula begins. (Handy 1940:89-91)

Lā‘ie town continued to grow following World War II and the Mormons constructed the Church College of Hawaii in 1955 which would later become Brigham Young University-Hawai‘i. The completion of the university spurred growth in Lā‘ie as did the construction of the Polynesian Cultural Center in 1963 which transformed the area and turned Lā‘ie from a rural Mormon town to a prime tourist destination. Lā‘ie continued to grow through the 1970’s, 80’s, and 90’s but not without controversy. By 1995 the growing population of Lā‘ie, then around 5,000 people, needed an expansion to the existing sewer plant which was constructed in 1980. It was believed that the initial project had damaged and destroyed portions of Nioi Heiau and that the expansion would be a further desecration of the heiau⁶. An agreement was eventually reached which culminated in a cultural assessment and cultural significance study for Nioi Heiau and the surrounding area (Maly and Rosendahl 1995). Lā‘ie has grown relatively little since that time and the town is focused primarily on tourism with many members of the Mormon church working and living in the area.

Historic Development and Channelization of the Project Area

The Kahawainui Stream- Lā‘iewai Bridge crosses through the project area and was constructed by the Territory of Hawai‘i as part of Kamehameha Highway in 1933. It consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts with an asphalt covered concrete deck supported by abutments. The former government coastal road ran through the central portion of the project area and the former Ko‘olau Railway track ran through the eastern-most portion. They are shown in relation to the project area in a 1928 aerial photograph of the Lā‘ie area (Figure 12). The 1935 and 1943 USGS quadrangle maps show that the area remained relatively rural and unchanged during that time period likely due in part to the

⁶ *The Honolulu Advertiser*, Sunday, October 22, 1995, pg. A2

after-effects of the great depression and the on-going effects of World War II (Figure 13 and Figure 14).

A 1949 aerial photograph shows the growth of Lā‘ie town to the north and the construction of residential houses within the central portion of the project area (Figure 15). A 1958 aerial photograph shows additional houses or structures within the central portion of the project area and the right of way for the Ko‘olau Railway track and bridge still running through the eastern-most portion of the project area (Figure 16). A 1965 USGS map of the Lā‘ie area shows that the Ko‘olau Railway track and bridge running through the eastern-portion of the project had been removed sometime between 1958 and 1965 (Figure 17). By the 1970’s the structures in the central portion of the project area were mostly no longer present, as shown in a 1975 aerial photograph of the project area and vicinity (Figure 18).

The project area in its current configuration was constructed as part of the Kahawainui Stream Flood Control Project which was built jointly by the U.S. Army Corps of Engineers Honolulu District and the City and County of Honolulu in 1990. The project was authorized under Section 205 of the Flood Control Act of 1948 and designed to mitigate flood damage along the Lā‘ie coastal plain. The project cost a total of \$5,246,115 and consisted of the construction of 550 feet of concrete channel, 500 feet of concrete floodwalls, 1,420 feet of levees, and the raising of two roadways in elevation⁷. A 1995 aerial photograph shows the extent of the channelized portion of Kahawainui Stream in relation to the project area (Figure 19). No changes have been made to the project area since that time and aside from siltation and vegetation growth it remains relatively the same as constructed.

⁷ Project Information obtained from the U.S. Army Corps of Engineers Honolulu District Website via <https://www.poh.usace.army.mil/Missions/Civil-Works/Civil-Works-Projects/Kahawainui-Stream/>

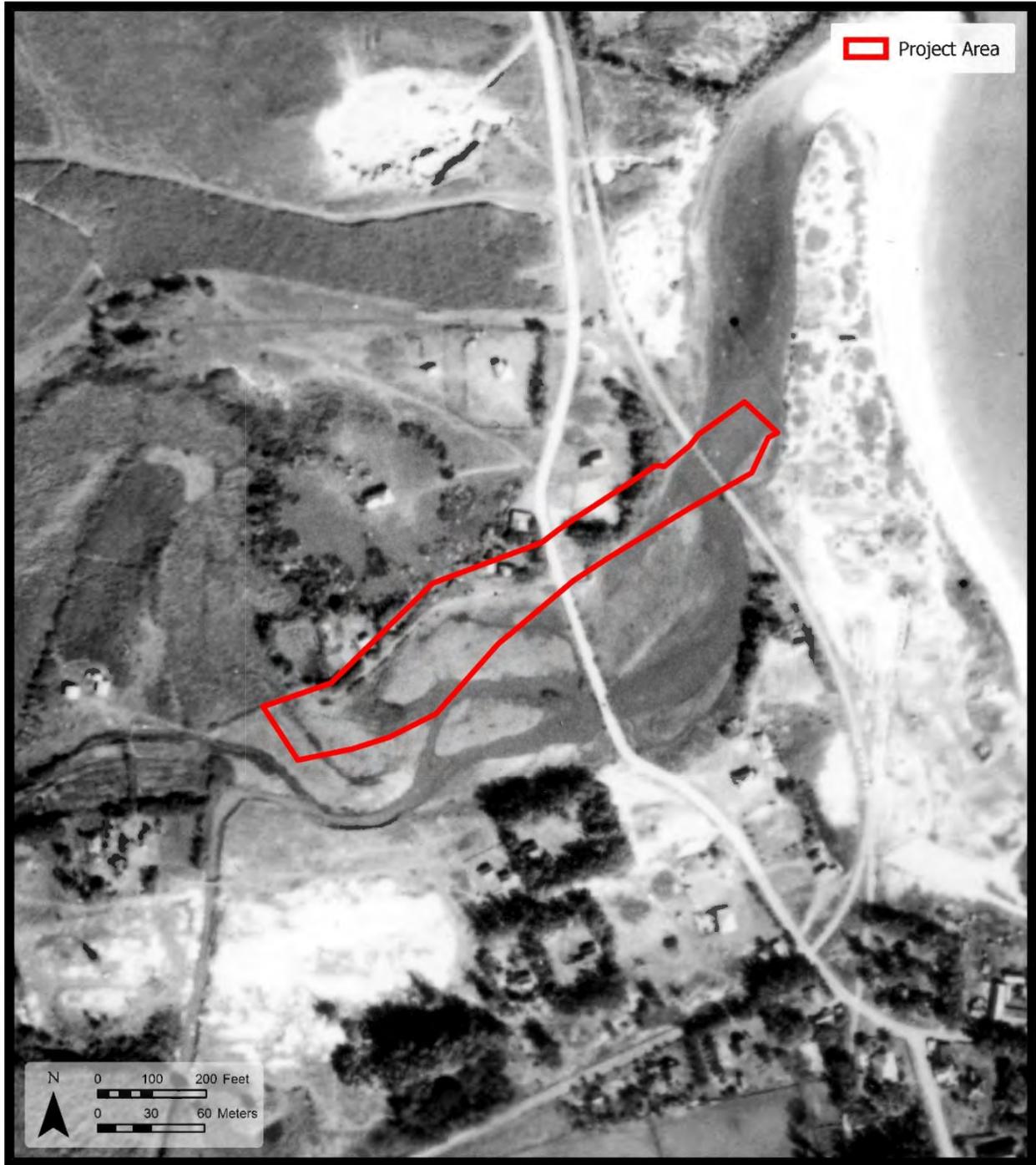


Figure 12. Portion of a 1928 USGS aerial photograph of showing the project area (USGS 1928)



Figure 13. Portion of a 1935 USGS Laie-Kaipapau Quad map showing the project area and vicinity (USGS 1935)

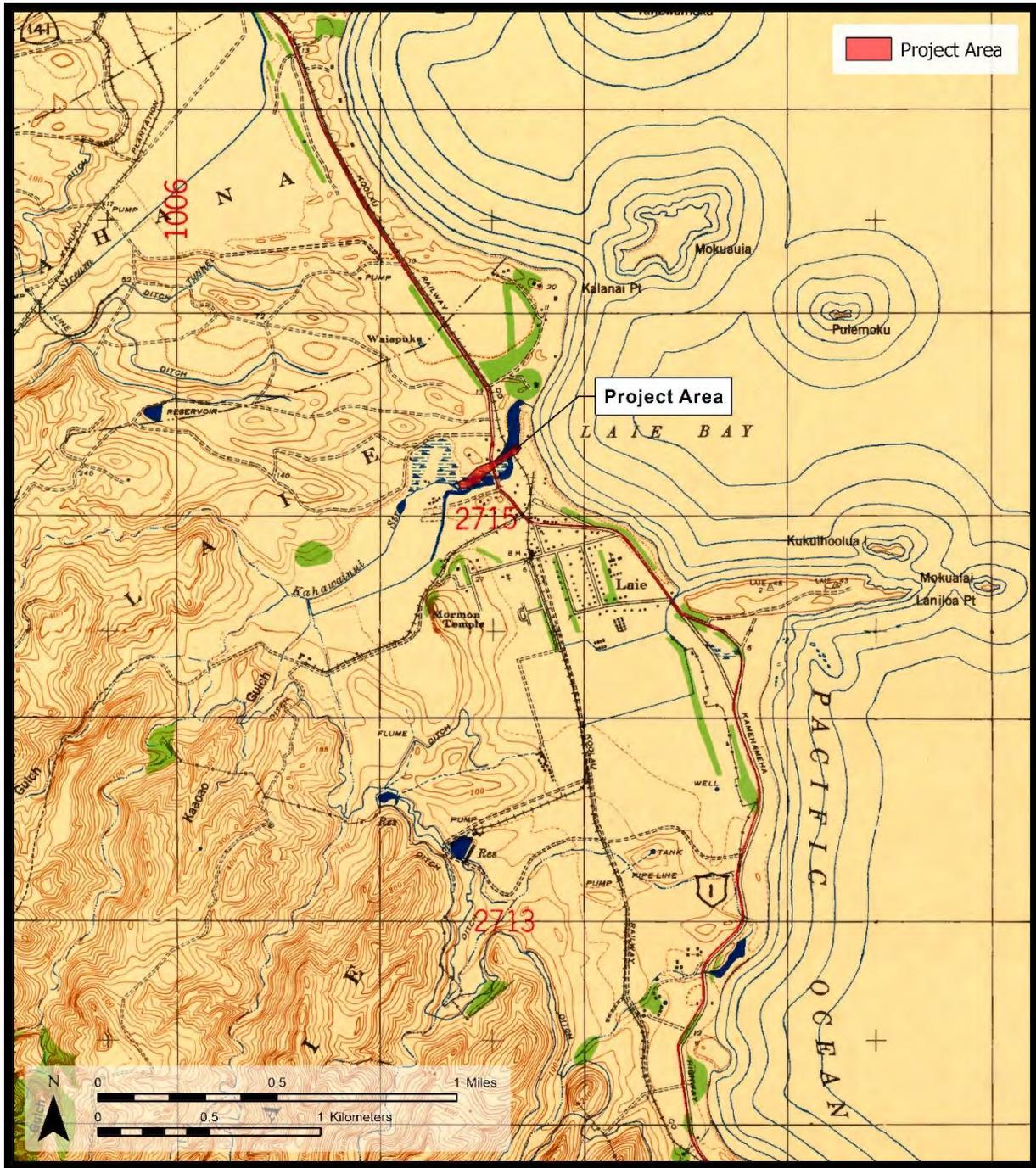


Figure 14. Portion of a 1943 USGS Kahuku Quad map showing the project area and vicinity (USGS 1943)

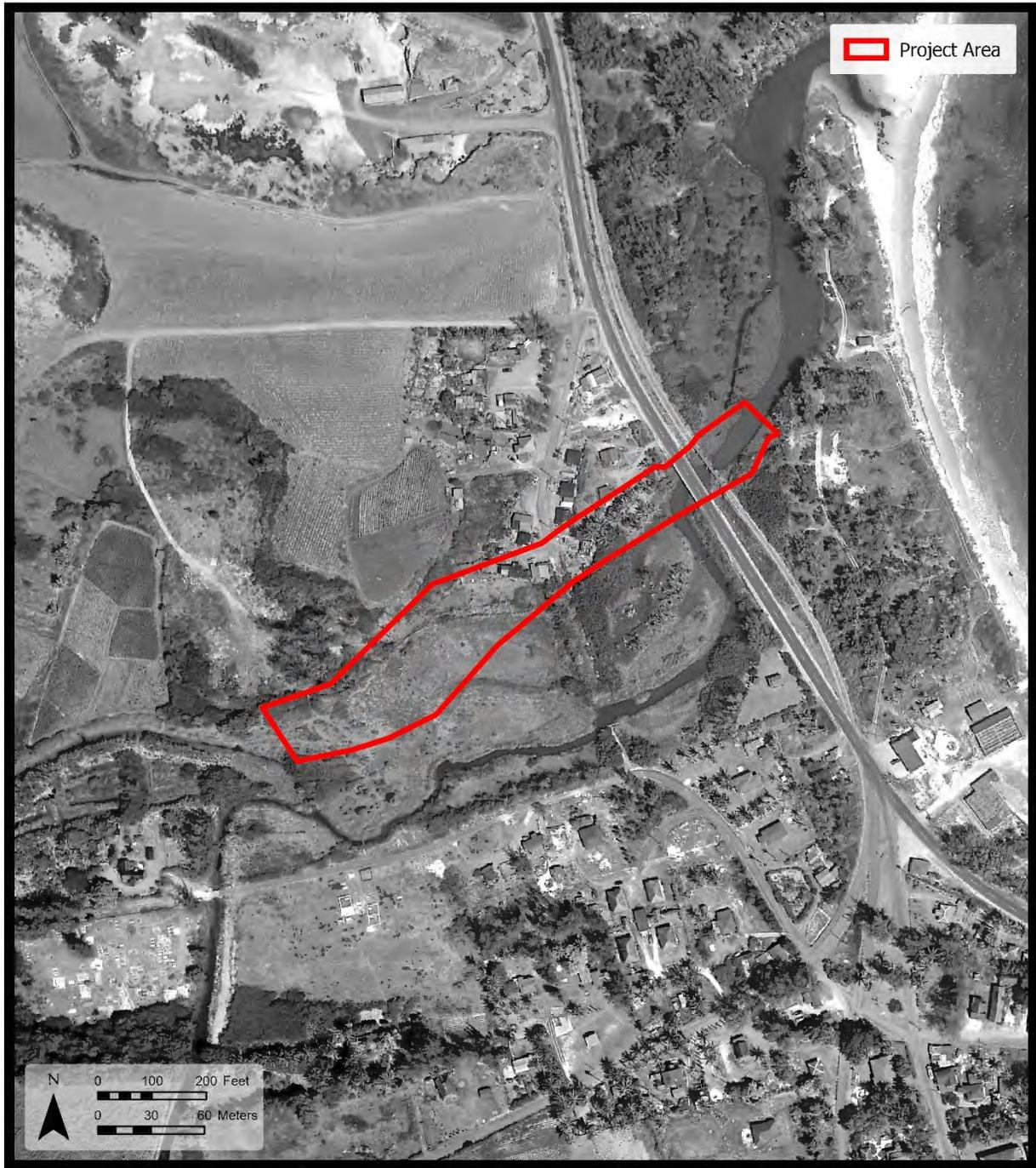


Figure 15. Portion of a 1949 USGS aerial photograph showing the project area and vicinity (USGS 1949)

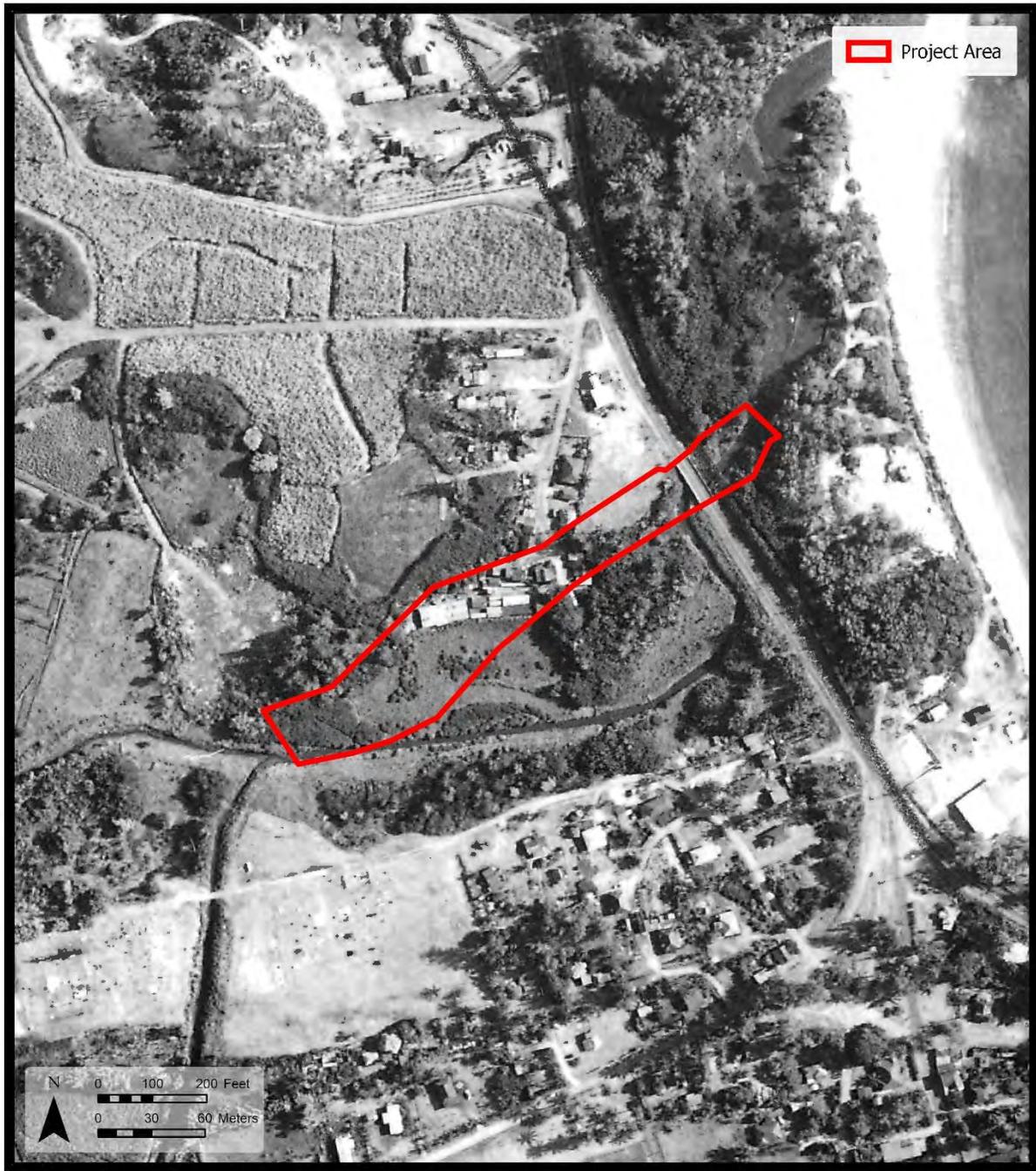


Figure 16. Portion of a 1958 USGS aerial photograph showing the project area and vicinity

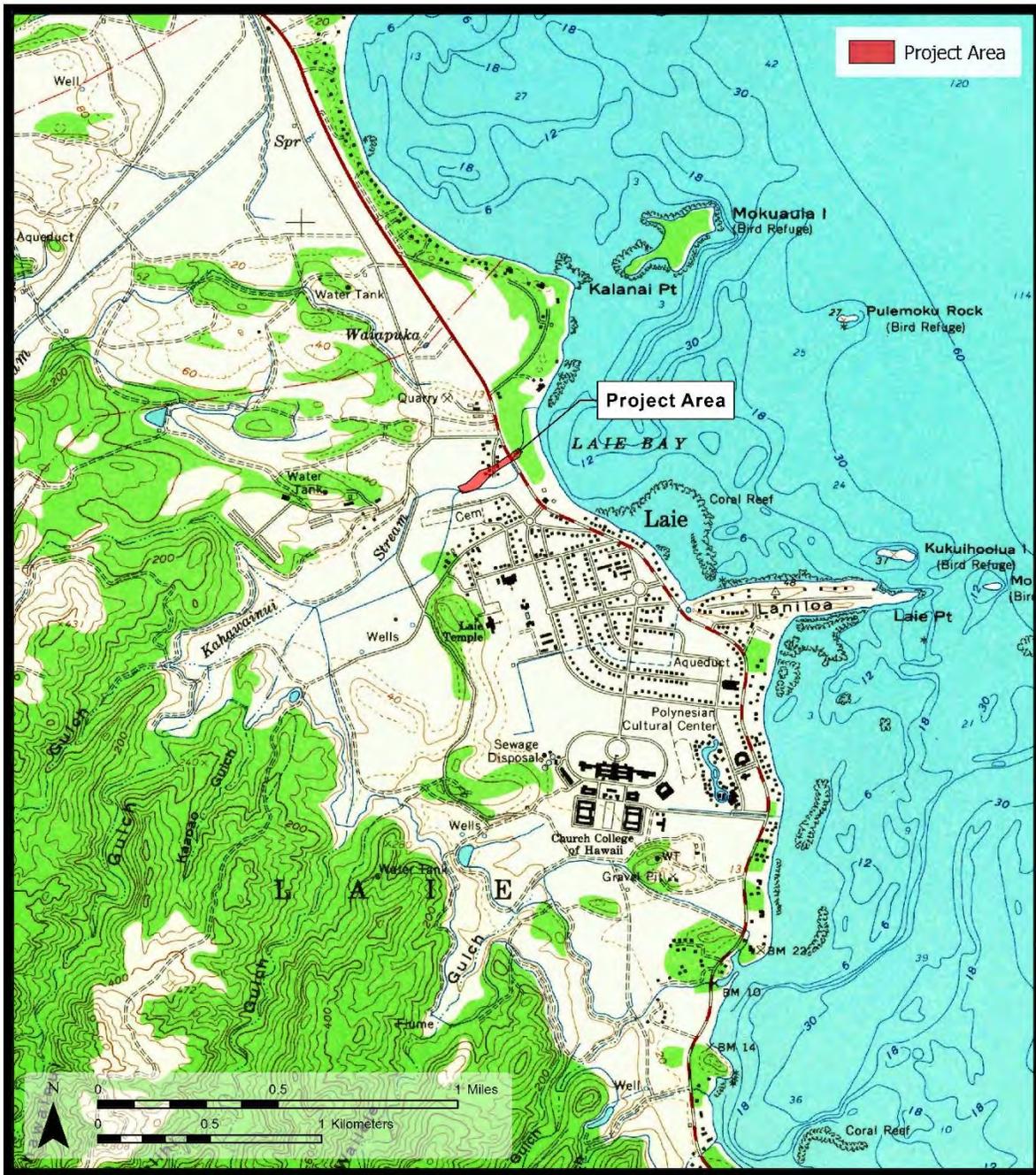


Figure 17. Portion of a 1965 USGS Kahuku Quadrangle map showing the project area and vicinity

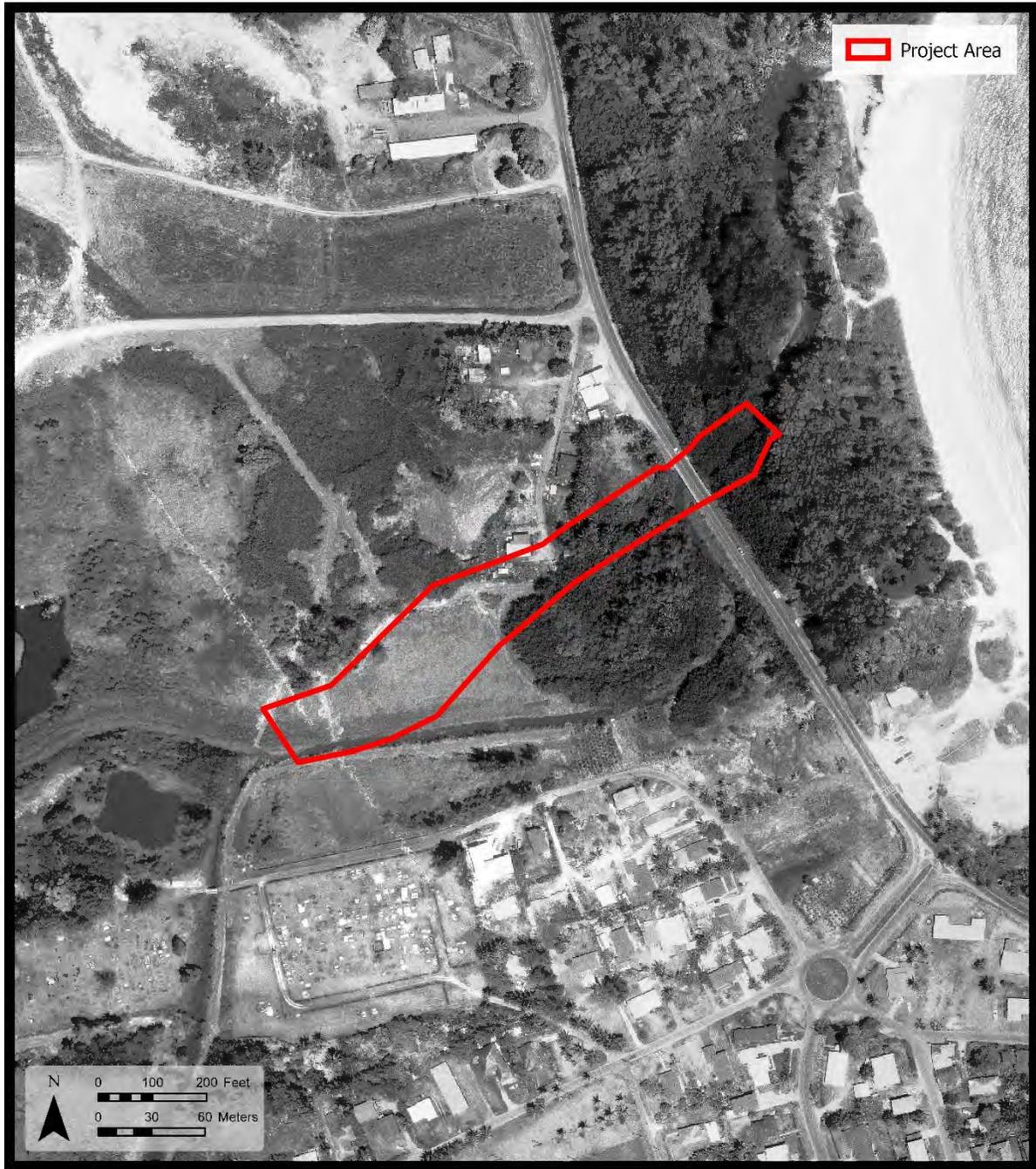


Figure 18. Portion of a 1975 USGS aerial photograph showing the project area and vicinity



Figure 19. Portion of a 1995 aerial photograph showing the configuration of the project area following channelization of Kahawainui Stream as part of the 1990 Kahawainui Stream Flood Control Project (USGS 1995)

Previous Archaeology

Previous archaeological studies within the current project area were conducted in the early 1980's and include an archaeological survey for flood control improvements to Kahawainui Stream, State Historic Preservation Division comments, recommendations, and further information on the flood control improvements survey, and an architectural assessment for the Kahawainui Stream-Lā'iewai Bridge (Ahlo and Hommon 1981, Neller 1984, and MKE Associates, LLC, and Fung Associates, Inc. 2013). The architectural assessment documented the Kahawainui Stream-Lā'iewai Bridge in poor condition, and it was deemed eligible for listing on the National Register under Criterion C. No sites were previously recorded in the project area during the archaeological survey or are presently known to exist in the project area. All archaeological sites and studies within a 500 meter radius are shown in Figure 20 and Figure 21 and are listed in Table 3.

1.5 Previous Studies Within the Project Area

1.5.1 Ahlo and Hommon 1981

In 1981, Science Management Inc. conducted an archaeological survey for flood control improvements to Kahawainui Stream that included the current project area (Ahlo and Hommon 1981). The study indicates that no formal archaeological sites were documented during the project, but the remnants of a former Shinto shrine, a cultural deposit, a possible habitation site, and two historic cemeteries were described. No SIHP numbers were assigned. The lack of sites was attributed to extensive land disturbances in the area.

1.5.2 Neller 1984

In 1984, the State Historic Preservation Division provided comments on the Ahlo and Hommon (1981) archaeological survey for improvements to Kahawainui Stream (Neller 1984). The letter report disputed the results of the archaeological survey and suggests that a possible habitation site, a cultural deposit and the Shinto shrine should have been assigned SIHP numbers. The report also recommends that the cemetery and Paeo Fishpond be deemed eligible for the National Register of Historic Places. Additionally, the results of the reconnaissance survey along Kahawainui Stream and Lā'iewai stream are further discussed.

1.5.3 MKE Associates, LLC and Fung Associates, Inc. 2013

In 2013, the State of Hawai'i conducted the Hawaii State Historic Bridge Inventory and Evaluation which included the Kahawainui Stream-Lā'iewai Bridge which crosses through the makai portion of the project area (MKE Associates and Fung Associates 2013). The study provides detailed information on the bridge and provides significance and integrity evaluations for NHRP eligibility. The Kahawainui Stream-Lā'iewai Bridge was constructed in 1933 and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts with an asphalt covered concrete deck supported by abutments. The parapets and end caps have been painted white and a wooden plank pedestrian walkway with a horizontal wood railing has been bolted to the mauka side. In 2013, the bridge was documented in poor condition but was assessed for significance as retaining integrity of location and eligible under Criterion C for its

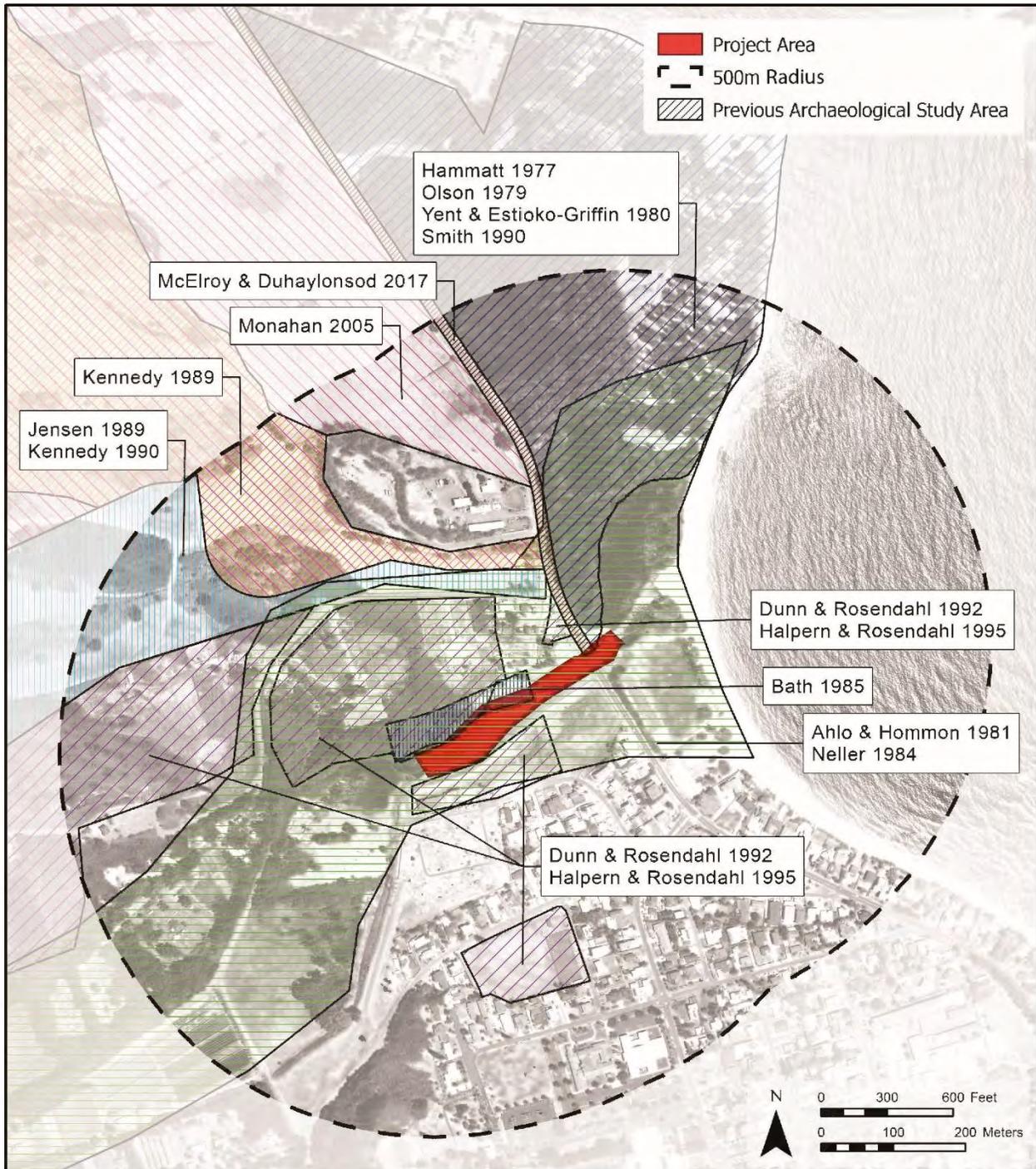


Figure 20. Portion of a 2013 USGS showing previous archaeological studies within a 500 meter radius of the project area

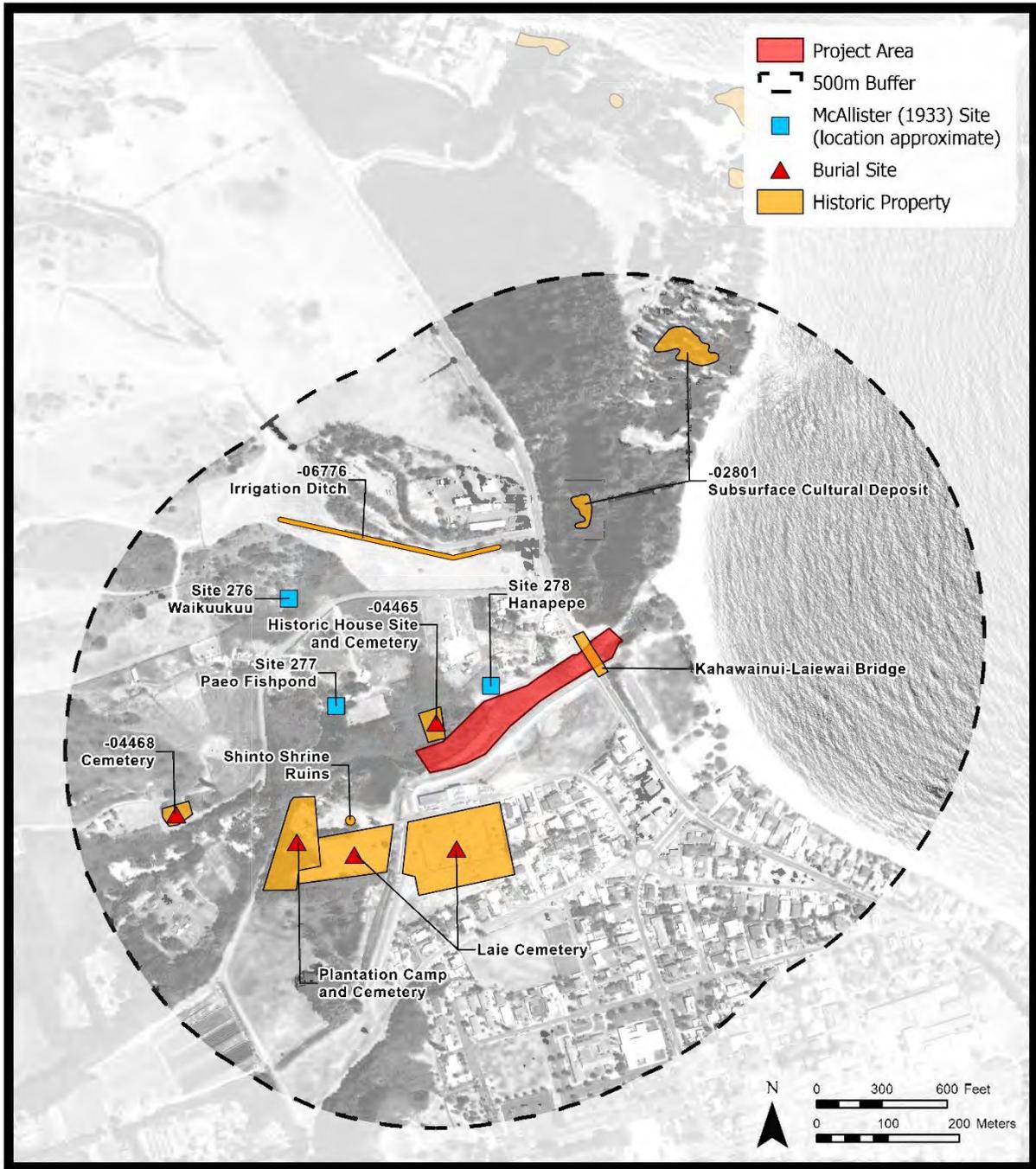


Figure 21. Portion of a 2013 Kaneohe USGS showing historic properties within a 500 meter radius of the project area

Table 3. Table of Previous Archaeological Studies Within and in the Vicinity of the Project Area

Author(s)	Type of Study	Location	Findings (SIHP #50-80-02-)
McAllister 1933 (not on Figure 20)	Island-Wide Survey	O‘ahu	Recorded five sites in the vicinity: Site 276 (Waiku‘uku‘u), Site 277 (Paeo Fishpond), Site 278 (Hanapepe), Site 279 (Tunnel of Manonihokahi), and Site 280 (Lā‘ie) (Sites 277, 279, and 280 are not shown on Figure 21)
Hammatt 1977	Archaeological Investigation	Mālaekahana State Park	Identified two cultural deposits, no SIHP numbers assigned (later assigned SIHP # -2801)
Olson 1979	Volcanic Glass Research Report	Mālaekahana and Keawaula Dune	Conducted a lithic analysis of volcanic glass from SIHP # -2801
Yent and Estioko-Griffin 1980	Archaeological Investigation	Mālaekahana State Recreation Area Phase I	Recorded several discontinuous subsurface cultural deposits, two human burials, and a koa as SIHP #2801, documented postholes, firepits, marine shell midden, faunal remains, and various traditional Hawaiian artifacts related to fishing and habitation, occupation of the site was interpreted to be between 1600-1780 A.D.
Ahlo and Hommon 1981	Archaeological Survey	Kahawainui Stream Flood Control Improvements; Within the PA	No sites recorded, lack of sites attributed to extensive land disturbance, describes a cemetery and Shinto shrine remnant, no SIHP numbers assigned

Author(s)	Type of Study	Location	Findings (SIHP #50-80-02-)
Neller 1984	Historic Preservation and Cultural Resource Comments and Comments on the Archaeological Reconnaissance	Kahawainui Stream Flood Control Improvements; Within the PA	Letter reports disputing the results of the Ahlo and Hommon 1981 archaeological survey, suggests that a possible habitation site, a cultural deposit and the Shinto shrine should have been assigned SIHP numbers, recommends that the cemetery and Paeo Fishpond be deemed eligible for the NHRP and discusses the results of the reconnaissance survey along Kahawainui Stream and Lā'iewai Stream
Bath 1985	Archaeological Testing and Mapping	Kahawainui Stream, TMK: [1] 1-5-005:005, [1] 5-5-005-009)	Recorded two historic cemeteries and evidence of traditional Hawaiian, historic, and modern occupation in the area, radiocarbon dating of a traditional Hawaiian cultural deposit returned a date range between 1415 and 1645 A.D., later the historic house site and two cemeteries were recorded as SIHP # -4465
Jensen 1989	Archaeological Inventory Survey (AIS)	Punamano and Malaekahana Golf Courses	Recorded 29 archaeological sites, SIHP #s -4068 through -4093, and SIHP #s -4230, -4231, and -4232, consist mostly of traditional Hawaiian sites including shelter overhangs, low stacked walls, enclosures, terraces, 'auwai, rock alignments, a burial, and midden among others, historic sites included an irrigation ditch, a gun emplacement and a historic dump, additional work and preservation plan recommended

Author(s)	Type of Study	Location	Findings (SIHP #50-80-02-)
Kennedy 1989	Archaeological Assessment	Punamano Golf Course	Identified two new sites consisting of an irrigation ditch and enclosure complex possibly associated with ranching, relocated and added feature one feature component to SIHP # -4071, two feature components to SIHP # -4072, seven feature components to SIHP # -4076, two feature components to SIHP # -4077, and two feature components to SIHP # -4078, provides updated recommendations for the sites within the grading footprint of the golf course and in the vicinity
Kennedy 1990	AIS	Malaekahana Golf Course	Recorded 19 sites which included traditional Hawaiian sites consisting of overhang shelters, agricultural terraces, low mounds, shell midden and artifacts scatters, and several large sandy dune formations with possible cultural deposits or burials, historic era sites included a gun emplacement and railroad bed, additional testing was recommended for all of the sites documented, No SIHP numbers were assigned
Smith 1990	Subsurface Testing	Mālaekahana State Recreation Area, Phase I	No sites recorded
Dunn and Rosendahl 1992	AIS	Lā'ie Master Plan	Recorded 23 sites comprised of 121 feature components during the project, SIHP # -4465 (historic house site and cemetery) and SIHP # -4468 (cemetery) were documented in the vicinity of the project area
Halpern and Rosendahl 1995	AIS Addendum	Lā'ie Master Plan	Conducted additional recording at SIHP # -4458 and SIHP # -4460 (Nioi Heiau Complex)

Author(s)	Type of Study	Location	Findings (SIHP #50-80-02-)
Monahan 2005	Archaeological Inventory Survey	500-Acre Area, TMKs: [1] 5-6-006:006 & 058	Recorded 43 archaeological sites, SIHP #s -6774 through -6815, located on the mauka side of Kamehameha Highway and consisting mostly of plantation era features, traditional Hawaiian sites included habitation and agricultural sites, a cultural deposit, Wai‘āpuka Pool, and a couple rock shelters, additionally two human burials were also encountered
McElroy and Duhaylonsod 2017	Archaeological Monitoring Report	Kamehameha Highway from Mālaekahana Stream Bridge to the Lā‘iewai Bridge, TMKs: [1] 5-5-009, [1] 5-6-001 through 006, [1] 5-6-009 por.	No sites recorded, minimal ground disturbance during the project

association with early developments in concrete bridge construction in Hawaii and as a good example of a 1930’s era reinforced concrete bridge based on its use of materials, method of construction, craftsmanship, and design (MKE Associates and Fung Associates 2013:69). The complete Hawaii State Historic Bridge Inventory form for the Kahawainui Stream-Lā‘iewai Bridge is included as Appendix A.

1.6 Nearby Archaeological Studies

Numerous archaeological studies have been conducted in Lā‘ie and Mālaekahana and several have been conducted in the lands adjacent to the project area. The studies were mostly large inventory and reconnaissance surveys in support of agricultural developments, proposed golf course developments, road improvements, and investigations at the Mālaekahana State Recreation Area and the Lā‘ie master plan and beach park. These studies documented well over 50 archaeological sites in the vicinity and consist of a mix of traditional Hawaiian sites of various types and historic-era agricultural features associated with the Lā‘ie Plantation and subsistence agriculture in the area. The types of sites documented include traditional Hawaiian and historic-era agricultural complexes, a large discontinuous subsurface cultural deposit along the Mālaekahana coastline, a fishpond, two heiau (one destroyed), lo‘i, terraces, ‘auwai, mounds, walls, rock alignments, rock shelters and caves, a historic dump, a historic gun emplacement, irrigation ditches, and ranch related infrastructure. The few traditional Hawaiian burials that have been encountered in the area have been located mostly along the coastline and at Makahoa Point. Several historic cemeteries are present in the surrounding area, one of which borders the northwestern portion of the project area.

Due to use of the area for agriculture in the traditional Hawaiian period and being used and modified throughout the historic period for commercial and subsistence agriculture, radiocarbon dating of agricultural deposits in the area has remained relatively elusive. Radiocarbon dates from the surrounding area and coastal Mālaekahana area have been interpreted to indicate possible use of the area as early as the 14th and 15th century with growth in the 17th and 18th century prior to western contact (Yent and Estioko-Griffin 1980, Bath 1985, and Monahan 2005). Due to the rural nature and lack of development in the area, the majority of the sites in the vicinity are preserved.

1.6.1 McAllister 1933

In the early 1930's, the Bishop Museum conducted the first systematic island-wide archaeological survey of the island of O'ahu (McAllister 1933). Several sites were described in the vicinity of the project area and include a pu'u honua, a deep crevice called Waikiu'uku'u, Pa'eo fishpond, an akua stone of a female fish deity, and a tunnel through which the legendary Manonihokahi is said to have passed in the form of a shark (McAllister 1933). They are described in detail by McAllister (1933) below:

Site 276. Waikuukuu, Kahuku side of the old Paeo fishpond, about 100 feet up+ on the low ridge.

A narrow but deep crevice in the ground with water at the bottom. This is affected by the tides and the depth of the water in Waiapuka may be judged by the height of the water in this opening. The place is now being used for dumping garbage.

Site 277. Paeo fishpond, mountain side of the bridge on the Kahuku side of Laie.

This was a large horseshoe-shaped pond that was famous for the size of its fish. It is now dry and overgrown with weeds. On the Kahuku bank is a chalice-shaped stone about 3 feet high, where Hauwahine, the goddess (moo) of the pond, is said to have been frequently seen combing her long black hair. This was a very sacred stone and could not be approached, nor would the old Hawaiians use the pond when a blanket of leaves and other refuse (aamoo) covered the water, for it was believed that then Hauwahine was present. When the water was clear, Hauwahine had departed to Kailua.

Site 278. Hanapepe, elevation near the first bridge on the Kahuku side of Laie.

A portion of this elevation was once a very sacred place where the akua stone, Kamehaikana, was worshipped. This is said to have been a female fish god, and the first fish were brought as an offering.

Site 279. Tunnel through which Manonihokahi once passed in going to the sea, until a few years ago in evidence in the settlement of Laie.

To all appearances Manonihokahi was an ordinary man, living near the mouth of the tunnel, but in reality he was a kupua (wizard). He questioned the people who were passing, and when he discovered where they would be fishing alone he would slip through the tunnel in his shark form and kill them. This continued until the natives became suspicious and his true nature was discovered. Later he was killed and up to the time when the hole was filled a

few years ago, the people living in the vicinity could judge the height of the tides by the water in the hole.

Site 280. Land of Laie which several of the Hawaiians of Laie told me had formerly been a puuhonua (place of refuge). This statement is partially verified by Pogue, who says: “At Laie on Oahu was an old city of refuge. They called the boundary on the Kahana side “Pa-paakoko” or “Fence that held the blood”.

1.6.2 Hammatt 1977

In 1977, Hallett H. Hammatt conducted a soil analysis study at the Mālaekahana State Recreation Area (Hammatt 1977). The study identified two cultural deposits and further archaeological investigations were recommended.

1.6.3 Olson 1979

In 1979, the University of Hawaii Archaeological Laboratory conducted a lithic analysis of volcanic glass flakes collected during investigations at the Mālaekahana State Recreation Area (Olson 1979). An analysis was conducted for volcanic glass collected from a cultural deposit that would later be assigned as a portion of SIHP #50-80-02-2801. The study analyzed 15 volcanic glass flakes and determined 12 were produced by via human percussion.

1.6.4 Yent and Estioko-Griffin 1980

In 1980, the Department of Land and Natural Resources, State Parks Division conducted archaeological investigations at SIHP #50-80-02-2801 (Yent and Estioko-Griffin 1980). SIHP # -2801 was assigned during the project to cultural resources initially identified during the 1977 (Hammatt) soil analysis study of the Mālaekahana State Recreation Area. Cultural resources included several discontinuous subsurface cultural deposits as well as human burials and a k‘oa located at Kalanai Point. The site was interpreted to cover the makai side of Kamehameha Highway between Kahawainui Stream and the ocean. The cultural deposit contained postholes, firepits, marine shell midden, faunal remains, and various traditional Hawaiian artifacts related to fishing and habitation. Human skeletal remains consisting of a child and infant were documented in association with the k‘oa at Kalanai Point. The site was interpreted to have been occupied during three time periods between 1600 and 1780 A.D., although later the reliability of those results was called into question.

1.6.5 Bath 1985

In 1985, Department of Land and Natural Resources archaeologist Joyce Bath conducted testing and mapping for an area along Kahawainui Stream adjacent and to the north of the current project area (Bath 1985). The work was carried out as a follow up to previous work and recommendations associated with flood control improvements to Kahawainui Stream (Ahlo and Hommon 1981 and Neller 1984). The project documented a total of four features documented as Features A through D. They included a small cemetery fenced with barbed wire recorded as Feature A, a historic house site and cemetery recorded as Feature B, a rock alignment at the base of escarpment recorded as Feature C, and a cave in the escarpment documented as Feature D. A total of six test units were excavated at Features A and B. The test excavations documented evidence of traditional Hawaiian, historic, and modern occupation in the area and a human coffin burial was documented in Unit 2

at Feature B. The excavation was terminated at the coffin, and it was backfilled undisturbed. Radiocarbon dating of a traditional Hawaiian cultural deposit encountered during the project returned a date range between 1415 and 1645 A.D. The cemetery documented as Feature A was recorded during a later survey as SIHP #50-80-02-4468 and the historic house site and cemetery documented as Feature B was recorded as SIHP #50-80-02-4465. SIHP # -4465 is preserved adjacent to the northwest portion of the project area.

1.6.6 Jensen 1989

In 1989, Paul H. Rosendahl PhD. Inc (PHRI) conducted an archaeological inventory survey for the proposed Punamano and Malaekahana Golf Courses (Jensen 1989). The survey documented six sites in Mālaekahana recorded as SIHP #s 50-80-02-4088 through -4093. They included three rock shelter overhangs, two cave habitations, an agricultural ditch and tunnel, and a platform possibly containing a human burial. The survey documented 23 sites in Punamanō recorded as SIHP #s 50-80-02-4068 through -4087 and SIHP #s 50-80-02-4230, -4231, 4232. They consisted mostly of traditional Hawaiian sites and included several shelter overhangs, low stacked walls, enclosures, terraces, ‘auwai, rock alignments, a burial, and midden among others. Historic era sites included an irrigation ditch, a gun emplacement, and a historic dump. Following the survey, additional testing and data recovery was recommended prior to construction and preparation of a preservation plan for sites to be preserved in the final design of the golf course.

1.6.7 Kennedy 1989

In 1989, Archaeological Consultants of Hawaii (ACH) conducted an archaeological assessment and reevaluation report for the proposed Punamano Golf Course (Kennedy 1989). The study presents a reevaluation of sites previously documented within the Punamanō portion of the Jensen (1989) archaeological inventory survey for the Punamano and Malaekahana Golf Courses. The study identified two new sites consisting of an irrigation ditch and enclosure complex possibly associated with ranching. The study also relocated and added feature components to several previously recorded sites within the proposed golf course. These included adding a single feature component to SIHP # -4071, two feature components to SIHP # -4072, seven feature components to SIHP # -4076, two feature components to SIHP # -4077, and two feature components to SIHP # -4078. The study also provides updated recommendations for the sites within the grading footprint of the golf course and in the vicinity.

1.6.8 Kennedy 1990

In 1990, ACH conducted an archaeological inventory survey for the proposed Malaekahana Golf Course (Kennedy 1990). The pedestrian survey identified 19 sites which included traditional Hawaiian sites consisting of overhang shelters, agricultural terraces, low mounds, shell midden and artifacts scatters, and several large sandy dune formations with possible cultural deposits or burials. Historic era sites included a gun emplacement and railroad bed. Following the survey, additional testing was recommended for all of the sites documented. The sites were given temporary site numbers during the survey and no SIHP numbers were assigned.

1.6.9 Smith 1990

In 1990, the Division of State Parks conducted subsurface testing consisting of auger coring for sewer and water improvements associated with Phase 1 of the Mālaekahana State Recreation Area

(Smith 1990). No cultural materials or deposits were encountered in any of the auger cores excavated during the project.

1.6.10 Dunn and Rosendahl 1992

In 1992, PHRI conducted an archaeological inventory survey for the Lā‘ie Master Plan project and included several parcels in Mālaekahana and Lā‘ie (Dunn and Rosendahl 1992). The survey identified 23 sites consisting of 121 feature components. Two sites were documented within a 500 m radius of the area and included a cemetery and historic house site and cemetery documented during a previous survey as Features A and B (Bath 1985). Feature A, a cemetery, was assigned SIHP # -4468 and Feature B, a historic house site and cemetery located adjacent to the current project area was assigned SIHP # -4465. The other types of sites and features documented the project included traditional Hawaiian sites consisting of a large cave with rock alignments, artifacts, and shell midden, several overhang shelters, a boundary marker, a terrace, a retaining wall, agricultural complexes, and a habitation cave with human skeletal remains. In addition to the house sites historic sites documented included an irrigation ditch and tunnel and a bulldozer push pile.

1.6.11 Halpern and Rosendahl 1995

In 1995, PHRI conducted an addendum archaeological inventory survey to the previous survey for the Lā‘ie Master Plan project (Halpern and Rosendahl 1995). The addendum survey details additional excavations, mapping, and the further defining of the boundaries of SIHP # -4558 and SIHP # -4460, the Nioi Heiau Complex. Following the survey, preservation was recommended for both sites.

1.6.12 Monahan 2005

In 2005, Scientific Consulting Services Inc. (SCS) conducted an archaeological inventory survey for an approximately 500 acre area in Mālaekahana and Lā‘ie (Monahan 2005). The survey documented 43 archaeological sites recorded as SIHP #'s 50-80-02-6774 through 50-80-02-6815, located on the mauka side of Kamehameha Highway, and consisting mostly of plantation era features. Traditional Hawaiian sites included habitation and agricultural sites, a cultural deposit, Wai‘āpuka Pool, and a couple rockshelters. Additionally, two human burials were encountered during the project. A single site was documented within the 500 m radius of the project area and included a historic irrigation ditch documented as SIHP #50-80-02-6776. The results of radiocarbon analysis of samples from the project produced dates ranging from the 14th through 17th century.

1.6.13 McElroy 2017

In 2017, Keala Pono Archaeological Consulting, LLC conducted archaeological monitoring for the resurfacing of Kamehameha Highway between the Mālaekahana Stream Bridge and the Kahawainui Stream-Lā‘iewai Bridge (McElroy and Duhaylonsod 2017). The excavations during the project extended to a maximum depth of 40 cm below surface and documented asphalt over road base and fill materials over natural Jaucus sand. No artifacts or cultural deposits were documented during monitoring.

1.7 Nearby Historic Properties

A total of four historic properties are located within a 500 meter radius of the project area (Figure 21). A listing of sites with information including site type, site significance and recommendations is included as Table 4. Bishop Museum archaeologist J. Gilbert McCallister identified the first archaeological sites in the area during his island-wide survey of O‘ahu in 1930 (McCallister 1933). Five sites, recorded as Sites 276 through 280, were documented in the vicinity of the project area. They include Site 276 (Waiku‘uku‘u), Site 277 (Paeo Fishpond), Site 278 (Hanapepe), Site 279 (Tunnel of Manonihokahi), Site 280 (Lā‘ie).

In 1981, an archaeological survey was conducted survey for flood control improvements to Kahawainui Stream that included the current project area (Ahlo and Hommon 1981). The study documented a Shinto shrine, a subsurface cultural deposit, and several historic cemetery locations, one of which is located adjacent to the project area. No SIHP numbers were assigned to any of the sites documented during the project but two of the cemeteries were later documented as SIHP #s -4465 and -4468, with -4468 being adjacent to the project area. The state historic preservation division provided comments on the fieldwork in a 1984 letter report and recommended further work in the area and that site numbers be assigned for some of the cultural resources documented during the survey (Neller 1984). In 1985, the Department of Land and Natural Resources conducted testing and mapping of two cemetery areas (SIHP #s -4465 and -4468) and the boundaries of the sites were further defined (Bath 1985). Once again, no SIHP numbers were assigned.

The two cemetery areas from the 1985 testing were relocated and assigned SIHP #s -4465 and -4468 during an archaeological survey for the Lā‘ie Master Plan project in 1992 (Dunn and Rosendahl 1992). SIHP # -4465 is the closest site to the project area and consists of two historic cemetery plots and a historic house site. The site is currently maintained and preserved along the northwestern boundary of the project area and delineated by an old fence and pipes in the ground at the southern corners. The other cemetery, SIHP # -4468 is located approximately 400 meters to the west.

Another nearby site consists of SIHP # -6776, an irrigation ditch documented to the north of the project area during an archaeological inventory survey for a 500 acre parcel in Mālaekahana and Lā‘ie in 2005 (Monahan 2005). The survey documented a total of 43 archaeological sites recorded as SIHP #'s 50-80-02-6774 through 50-80-02-6815. They were located on the mauka side of Kamehameha Highway and consisted mostly of plantation era features. Traditional Hawaiian sites included habitation and agricultural sites, a cultural deposit, Wai‘āpuka Pool, and a couple rock shelters. Additionally, two human burials were encountered during the project.

The last site in the vicinity is a discontinuous subsurface cultural deposit recorded as SIHP # -2801. It is located north-northeast of the project between the highway and the ocean in coastal Mālaekahana and was originally documented as a dual component cultural deposit during soil coring for Phase I of the Mālaekahana Recreation Area in 1977 (Hammatt 1977). Follow up conducted by the Department of Land and Natural Resources, State Parks Division documented several discontinuous subsurface cultural deposits as well as human burials and a k‘oa located at Kalanai Point. The site was interpreted to cover the makai side of Kamehameha Highway between Kahawainui Stream and the ocean. The cultural deposit contained postholes, firepits, marine shell midden, faunal remains, and various traditional Hawaiian artifacts related to fishing and habitation. Human skeletal remains consisting of a child and infant were documented in association with the

k'oa at Kalanai Point. The site was interpreted to have been occupied during three time periods between 1600 and 1780 A.D., although later the reliability of those results was called into question (Yent and Estioko-Griffin 1980).

Table 4. List of current and potential historic properties in a 500 meter radius of the project area

Reference	SIHP # 50-80-02	Site Type	Site Significance / Values	Recommendation	Notes
Hammatt 1977, Yent and Estioko-Griffin 1980	-2801	Subsurface Cultural Deposit	Unknown	--	Discontinuous cultural deposit along coastal Mālaekahana
Ahlo and Hommon, Bath 1985 and Dunn and Rosendahl 1992	-4465	Historic House Site and Cemetery	Criteria d and e	Preservation	Adjacent to the PA
Ahlo and Hommon, Bath 1985 and Dunn and Rosendahl 1992	-4468	Cemetery	Criteria d and e	Preservation	--
Monahan 2005	-6776	Irrigation Ditch	Unknown	--	--
MKE Associates and Fung Associates 2013	--	Kahawainui-Lā'iewai Bridge	Criterion c	--	Within the PA
Ahlo and Hommon 1980	--	Lā'ie Cemetery	--	--	--
Ahlo and Hommon 1980	--	Plantation Camp and Cemetery	--	--	--
Ahlo and Hommon 1980	--	Shinto Shrine Ruins	--	--	--

Archaeological Field Inspection

Fieldwork for this project was conducted on August 6, 2021 by Nathan J. DiVito, B.A under the supervision of Rosanna Thurman, M.A. (principal investigator). Fieldwork required approximately 4 person-hours to complete. Fieldwork for this project was performed under the archaeological permit number 21-24 issued to Honua Consulting by the SHPD/DLNR in accordance with HAR Chapter 13-282.

1.8 Methodology

The archaeological field inspection consisted of a 100% pedestrian survey of an approximately 315 meter long portion of the channelized stream to be dredged and three dredge material stockpile and drying areas. It included a visual inspection for any constructed surface architecture and observation of the ground surface and soil exposures for artifacts and/or exposed cultural deposits. The pedestrian survey transects were oriented parallel to the Kahawainui Stream and throughout the three stockpile locations (Figure 22).

Digital photographs were taken throughout the project to record the vegetation, topography and condition of the project area and vicinity. An associated photo log was maintained, which recorded the subject of the photograph, the direction the camera was pointing, and other information as appropriate. A hand-held Trimble GeoXT 6000 device was used to record transect paths and the location of points of interest on the property. The Trimble maintained an accuracy ranging between 1-3 m (3-10 ft.) and recorded data was post-processed for accuracy.

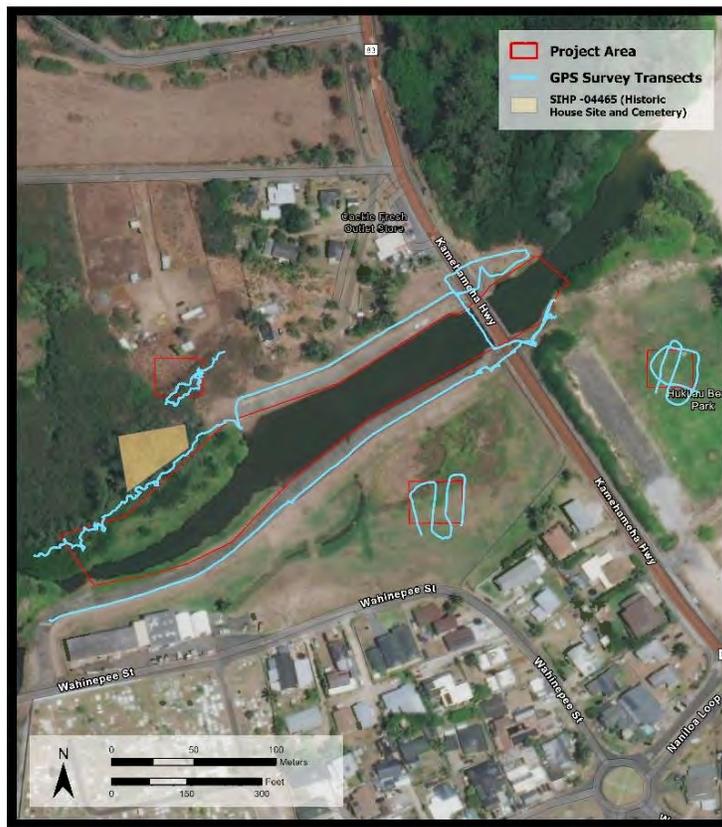


Figure 22. Aerial photo showing pedestrian survey tracks within the project area

1.9 Survey Results

The project area consisted of an approximately 315 meter long portion of Kahawainui Stream that was channelized in 1990 as part of the Kahawainui Stream Flood Control Project (Figure 23 and Figure 24). The project area consisted of the area proposed to be dredged. The project area is bound on the east by the Mālaekahana State Recreation Area and Lā‘ie Beach Park, on the north by undeveloped land, a residential neighborhood, and the Mālaekahana State Recreation Area, on the west by an undeveloped area near the confluence of the channelized drainage and original stream, and on the south by a grassy manicured low-lying area that used to be the old stream bed prior to channelization of the stream. In addition to the survey of the project area, a surface inspection was conducted for each of the three proposed dredge material stockpile and drying locations nearby (Stockpile Locations 1-3). Due to the project area being constructed recently, no surface architecture, artifacts, or anything else of archaeological note was observed or collected within the project area, other than the historic bridge running through the northern portion of the project area which was recorded as Honua 1.

1.9.1 Channelized Kahawainui Stream

The majority of the project area consisted of the channelized portion of Kahawainui Stream and consisted of an approximately 45 meter wide formed concrete channel with 3 meter high levees along the southern side and along the middle portion of the northern boundary. The stream channel is fenced with a permanent chain link fence along the portions closest to the highway. Siltation has occurred along the length of the channel, but the concrete structural elements of the channel appear to be intact. The two portions of the project area that are not channelized with concrete include along the western half of the northern boundary, and a small area east of the Kahawainui Stream-Lā‘iewai Bridge that was the former right-of-way for the Ko‘olau railway and rail bridge stream crossing.

The undeveloped portion of the project area located along the western-most portion of the northern boundary had secondary vegetation consisting mostly of grasses and mangroves (Figure 25 and Figure 26). In this area, the project boundary was relatively well defined by the vegetation and elevation contrast between the marshy land of the stream channel and the land it was cut into. Near this area, SIHP # -4465 was relocated and consisted of two cemetery plots each consisting of at least two graves each, a historic house site with rock alignments, and a historic artifact scatter adjacent to a coral outcrop on the east side (Figure 27, Figure 28 and Figure 29). The western side of SIHP # -4465 appears to have been formerly defined by a wooden fence. Modern pipes are present at the corners of the site along the southern boundary, adjacent to the project area.

The area to the west and outside the project area, between SIHP # -4465 and the original portion of Kahawainui Stream, was hummocky and broken historic bottle glass and modern rubbish covered the surface. Excavations from bottle hunters were observed throughout the area. A large 2.5 meter high exposure was observed along the river and indicates that the area along the old stream had been filled with at least 2 meters of material containing bottle glass and ceramics dating to the 1940’s and 1950’s (Figure 30).



Figure 23. Overview photo of the project area from the western boundary looking east



Figure 24. Overview photo of the project area from the Kahawainui Stream-Lā'iewai Bridge looking west



Figure 25. Overview photo of swampland and grasses within the undeveloped portion of the project, from the northwest boundary looking east-southeast



Figure 26. Overview photo of mangroves that define the northwest boundary of the project area looking southwest, note the change in elevation and vegetation within and outside of the stream channel



Figure 27. Overview photo of SIHP # -4465 showing two grave alignments in the foreground and the historic house site alignments in the middle of the frame, looking north



Figure 28. Overview photo of historic headstones at SIHP # -4465 looking northwest



Figure 29. Overview photo of historic artifact scatter associated with SIHP # -4465 looking north



Figure 30. Overview photo of an eroded soil bank located outside the project area, showing fill material used along the original portion of Kahawainui Stream, looking north

Honua 1 (The Kahawainui Stream-Lā'iewai Bridge)

The Kahawainui Stream-Lā'iewai Bridge carries Kamehameha Highway across Kahawainui Stream and was constructed by the Territory of Hawai'i in 1933. It crosses through the eastern portion of the project area and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts with an asphalt covered concrete deck supported by abutments (Figure 31). A wooden plank and wooden rail pedestrian walkway has been attached to the bridge on the western side and a recent 2016 Hawaii state survey datum is set into the concrete on the north side. The electrical utilities in the area are above ground wooden power poles with wires that parallel both sides of the highway. The survey of the bridge consisted of a thorough visual inspection of the bridge, stream bank, and surrounding area for exposed cultural deposits, features, and artifacts. The bridge was observed in good condition with no visible damage of any kind. The bridge was assessed as significant under Criterion C during a 2013 architectural survey and was recorded as site Honua 1 during the current project. Additionally, no remnants of the former railway or railway bridge were observed on the banks of the stream to the east of the bridge.



Figure 31. Overview photos of the west (*top*) and east (*bottom*) sides of the Kahawainui Stream-Lā'iewai Bridge

1.9.2 Dredge Stockpile Locations

In addition to the survey of the project area, three proposed dredge stockpile and drying locations identified in this report as Stockpile Locations 1-3 were surveyed during the project. Due to previous development and grading within the stockpile locations nothing of archaeological note was observed or collected during the survey of each area.

Stockpile Location 1 measured approximately 27 by 22 meters in size and was located to the north of the project area. One half of the area consisted of a cleared hummocky graded area with modern rubbish and secondary vegetation consisting primarily of koa haole (Figure 32). The other half of Stockpile Location 1 had a fenced horse enclosure with horse and a no trespassing sign and was not surveyed during the inspection.

Stockpile Location 2 measured approximately 30 by 25 meters and was located to the south of the project area in a grassy manicured field that was the former location of Kahawainui Stream (Figure 33). The area has several concrete drainages with headwalls and functions as a drainage area for housing and buildings to the south.

Stockpile Location 3 measured approximately 26 by 22 meters and was located to the southeast of the project area in a grassy manicured field within Lā‘ie Beach Park (Figure 34). The area currently functions as a grassy greenspace for the park.



Figure 32. Overview photo of Stockpile Location 1 looking northwest



Figure 33. Overview photo of Stockpile Location 2 looking northeast



Figure 34. Overview of Stockpile Location 3 looking south

Summary

This Literature Review and Field Inspection (LRFI) report was prepared by Honua Consulting, LLC at the request of Belt Collins Hawaii LLC for the Kahawainui Stream Dredging Project located in Lā'ie Ahupua'a, Ko'olaupia District, O'ahu Island, Tax Map Keys (TMKs): [1] 5-5-005:022 (portion [por.]), portions of [1] 5-5-009:007, 008, 009, 010, 011, 047, and 061, and [1] 5-6-001:004 (por.). The project area consists of a 3-acre channelized portion of Kahawainui Stream owned by the City and County of Honolulu and is defined as the area of proposed ground disturbance. The project area is situated roughly at the confluence of Lā'iewai and Kahawainui Streams to the west and approximately 1,500 ft. mauka (inland) of the stream mouth and sand berm to the east. The proposed project will dredge an approximately 315 meter long portion of Kahawainui Stream. Dredging activities will remove approximately 2,955 cubic yards of sediment within the stream by using an excavator directly in the stream at low tide or clamshell dredging from the shore or from a platform. The dredge material will be moved to three designated stockpile areas (Stockpile Locations 1-3) for drying on adjacent land parcels owned by Property Reserves Inc. Following drying, the material will be transported off-site for reuse or disposal.

The objectives of the LRFI were to determine the project area's land-use history, to identify any historic properties or component features in the project area, to evaluate the proposed project's potential effect on historic properties, and to make recommendations about mitigation. This study is not an AIS; however, it has been conducted according to standards outlined in HAR § 13-276 for AIS studies, and is intended to assist with the project's compliance with HRS § 6E-8 and consultation with the State Historic Preservation Division (SHPD).

Lā'ie was known traditionally to have been a famous fishing location due to the abundant coastal and nearshore resources of the area. Lā'ie would have had a substantial traditional Hawaiian population based on the extensive lo'i terraces along Kahawainui Stream and other agricultural features in the area, the two heiau in the vicinity, and Paeo Fishpond nearby. The nearby kula (pasture) lands were used for native gardens and habitation. The ahupua'a of Lā'iewai, which contains the project area, was retained by Kamehameha I following his conquest of O'ahu and was subsequently given to the half-brother of Kamehameha, Kalaimamahū, then to his daughter Kekāuluohi, and later to her son William C. Lunalilo during the Māhele. The unclaimed lands of Lā'iewai were awarded to William C Lunalilo as Āpana 35 of LCA 8559B in 1850. Following the opening of lands to foreigners, the area was used for ranching and Lā'iewai and Lā'iemalo'o were sold to Latter-day Saints Mission President Francis A. Hammond in 1865. The Lā'ie Plantation and mill were established in 1868 and the focus of cultivation shifted from cotton and corn to sugarcane. Sugarcane cultivation modified large portions of the surrounding area through the latter half of the 19th century and early 20th century and continued until 1931 when the plantation was shut down. The area went into decline following the great depression but bounced back following World War II due to construction of the Church College of Hawaii in 1955 (later named Brigham Young University-Hawai'i) and construction of the Polynesian Cultural Center in 1963 which brought in additional Mormons and transformed the area primarily into a tourist destination. The Lā'ie area continues to be a prime destination for tourists visiting the island although it has remained relatively rural and has grown little over the last few decades.

The Kahawainui Stream-Lā'iewai Bridge crosses through the project area and carries Kamehameha Highway over Kahawainui Stream. It was constructed in 1933 and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts

with an asphalt covered concrete deck supported by abutments. The parapets and end caps have been painted white and a wooden plank pedestrian walkway with a horizontal wood railing has been bolted to the mauka side (MKE Associates and Fung Associates 2013:68). Additionally, the former coastal road ran through the central portion of the project area prior to construction of Kamehameha Highway and the former Ko‘olau Railway track and bridge ran through the makai or eastern-most extent.

The project area in its current configuration was constructed as part of the Kahawainui Stream Flood Control Project which was built jointly by the U.S. Army Corps of Engineers Honolulu District and the City and County of Honolulu in 1990. The project consisted of the construction of 550 feet of concrete channel, 500 feet of concrete floodwalls, 1,420 feet of levees, and the raising of two roadways in elevation in an attempt to mitigate flood damage along the Lā‘ie coastal plain. The project area has remained unchanged since that time.

In 1981, the project area was the subject of archaeological survey for flood control improvements that would become the Kahawainui Stream Flood Control Project (Ahlo and Hommon 1981). No sites were documented within the project area during the survey, but a historic house and cemetery site was identified along the western portion of the northern boundary of the project area. The site was tested and mapped during additional fieldwork for the flood control improvements project and its boundaries were further defined (Bath 1985). In 1992, the site was assigned SIHP #50-80-02-4465 and is currently defined as two cemetery plots, a historic house site, and an associated scatter of historic artifacts. The current study observed that SIHP # -4465 is relatively well defined on the landscape and has low vegetation due to being maintained.

The current field inspection consisted of a pedestrian survey of the channelized portion of Kahawainui Stream, which is the area of ground disturbance for the project. Additionally, pedestrian survey was conducted at three separate dredge stockpile locations. A single site, Honua 1, was identified during the project and consists of the Kahawainui Stream-Lā‘iewai Bridge. Otherwise, nothing of archaeological note was observed or collected from the project area or stockpile areas during the survey. The lack of sites in the area is attributed to use of the area for sugar cane cultivation and modifications to the area to channelize Kahawainui Stream.

Significance Assessments and Recommendations

Significance Assessments

Historic properties are assessed based on age, integrity, and significance. Qualifying historic properties must typically be at least 50 years old. Integrity of a historic property is based on the location, design, setting, materials, workmanship, feeling, and association. As outlined in HAR § 13-284-6 (Evaluation of significance), a historic property must meet one of five broad categories to be significant (Criteria a-e). The significance of each historic property is assessed for:

- a Historic property reflects major trends or events in the history of the state or nation.
- b Historic property is associated with the lives of persons significant in our past.
- c Historic property is an excellent example of a site type, period, method of construction, or work of a master.
- d Historic property has yielded or may be likely to yield information important in prehistory or history.
- e Historic property has cultural significance to an ethnic group, including, but not limited to, religious structures, burials, traditional cultural properties, cultural practices, and/or beliefs important to the groups history and cultural identity.

A single historic property, designated Honua 1, was documented in the eastern portion of the project area. The site consists of the Kahawainui Stream-Lā'iewai Bridge which carries Kamehameha Highway across Kahawainui Stream. It was constructed by the Territory of Hawai'i in 1933 and consists of a five span concrete slab bridge with concrete solid panel parapets with flat caps and curved end posts with an asphalt covered concrete deck supported by abutments (see Figure 31). In 2013, the bridge was documented in poor condition but was assessed as eligible for listing on the National Register, as it retains integrity of location and significance under Criterion C for its association with early developments in concrete bridge construction in Hawai'i and as a good example of a 1930's-era reinforced concrete bridge based on its use of materials, method of construction, craftsmanship, and design (MKE Associates and Fung Associates 2013:69).

Honua 1 has been re-assessed and the current study agrees with the prior recommendation of the site. It retains integrity of location and significance under Criterion C (c) for its association with early developments in concrete bridge construction in Hawai'i and as a good example of a 1930's-era reinforced concrete bridge.

Recommendations

We recommend that steps be taken to mitigate potential damage to SIHP # -4465, a cemetery and house site adjacent to the north side of the project area, and Honua 1, the Kahawainui Stream-Lā'iewai Bridge. It is recommended for the proposed project to maintain a 10 ft. buffer around both sites, to be demarcated by use of a high visibility material such as orange web fencing. Due to the sensitivity of the nearby cemetery site, no driving or storing of equipment or materials should be permitted within the boundary or proposed buffer of SIHP # -4465.

It is also important to note that it may be necessary to conduct additional archaeological survey of access points and roads associated with the stockpile locations, particularly in areas proposed for significant surface modifications.

References Cited

Ahlo, Hamilton and Robert J. Hommon

1981 *An Archaeological Reconnaissance Survey of the Flood Control Study Area, Kahawainui Stream, Laie, Oahu, Hawaii*. Science Management Inc., Honolulu, HI.

Bath, Joyce

1985 *Archaeological Testing and Mapping at Kahawainui Stream in Lā'ie, O'ahu, Hawai'i (TMK: 1-5-5-005, 1-5-5009)*. Department of Land and Natural Resources, Honolulu, HI.

Barrera, William M., Jr,

1981 *Cultural Resources Reconnaissance of the Kahuku Agricultural Park Project Area*. Chiniago Inc. Kamuela, HI.

1984 *Malaekahana, O'ahu: Archaeological Survey at Proposed Well Locations*. Chiniago Inc. Kamuela, HI.

Beckwith, Martha Warren

1970 *Hawaiian Mythology*. University of Hawaii Press, Honolulu, HI.

Berge, Dale L.

1986 *Laie Plantation Sugar Mill (1868-1900): Archaeology and History*, Mormon Pacific Historical Society: Volume 7, Article 6. Brigham Young University-Hawai'i, Lā'ie, HI.

Conde, J.C and Gerald M. Best

1973 *Sugar Trains Narrow Gauge Rails of Hawaii*. Glenwood Publishers, Newark, NJ.

Dagher, Cathleen

1993 *Inadvertent Discovery of a Human Burial at Makahoa Point, Malaekahana, Ko'olauloa, O'ahu*. State Historic Preservation Division, Honolulu, HI.

Dunn, Amy and Paul H. Rosendahl

1992 *Archaeological Inventory Survey, Laie Master Plan Project, Lands of Malaekahana and Laie, Koolauloa District, Island of Oahu*. Paul H. Rosendahl PhD. Inc., Hilo, HI.

Estioko-Griffin, Agnes and Martha Yent

1986 *Auger Coring at Malaekahana State Park, Phase II*. Department of Land and Natural Resources, Division of State Parks, Recreation and Historic Sites, Honolulu, HI.

Evans, Thomas J.K.

1928 *Sheet No 1 Kamehameha Highway Traverse From Waiahole to Kualoa Koolaupoko - Oahu*. Hawaiian Territorial Survey, Registered Map 2815, Honolulu, HI. Accessed via <http://ags.hawaii.gov/survey/map-search/>.

Foote, Donald E., E. L. Hill, S. Nakamura and F. Stephen

1972 *Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Molokai and Lanai, State of Hawaii*. U.S. Department of Agriculture, U.S. Government Printing Office, Washington, D.C.

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte

2013 *Rainfall Atlas of Hawai'i, Interactive Map*. Geography Department, University of Hawai'i-Mānoa. Accessed at <<http://rainfall.geography.hawaii.edu/interactivemap.html>>.

Halpern, Michael and Paul H. Rosendahl

1995 *Addendum: Archaeological Inventory Survey, Lā'ie Master Plan Project, Lands of Mālaekahana and Lā'ie, Ko'olaupoko District, Island of O'ahu*. Paul H. Rosendahl PhD. Inc., Hilo, HI.

Hammatt, Hallett H.

1977 *Soil Analysis for Archaeological Investigation of Malaekahana State Park*. Hallett H. Hammatt, Honolulu, HI.

1996 *Archaeological Reconnaissance for Proposed Malaekahana Exploratory Wells Malaekahana O'ahu*. Cultural Surveys Hawai'i Inc., Kailua, HI.

Hammatt, Hallett H. and Michael T. Pfeffer

1992 *Archaeological Reconnaissance of Kahuku Agricultural Park*. Cultural Surveys Hawai'i Inc., Kailua, HI.

Handy, E.S. Craighill

1940 *The Hawaiian Planter: His Plants, Methods and Areas of Cultivation*. Bernice Pauahi Bishop Museum Bulletin 161. Bishop Museum Press, Honolulu, HI.

Handy, E.S. Craighill, E.G. Handy, and Mary Kawena Pukui

1972 *Native Planters in Old Hawaii, Their Life, Lore, and Environment*. Bernice Pauahi Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu, HI.

Hawai'i TMK Service

Tax Map Key [1] 1-1-12. On file at Hawai'i TMK Service, 222 Vineyard Street, Suite 401, Honolulu, HI.

Hill, John L.

1978 *Master Plan of Laie*. Brigham Young University-Hawai'i, Lā'ie, HI.

Jensen, Peter M.

1989 *Archaeological Inventory Survey, Punamano and Malaekahana Golf Courses, Lands of Ulupehu, Punalau, Kahauku, Malaekahana, and Laie, Koolauloa District, Island of Oahu*. Paul H. Rosendahl PhD. Inc., Hilo, HI.

Kalama, S.P.

1850 *Waikane, Koolau, Oahu*. Hawaiian Government Survey, Registered Map 0064, Honolulu, HI. Accessed via <http://ags.hawaii.gov/survey/map-search/>.

Kamakau, Samuel Mānaiakalani

1964 *Ka Po'e Kahiko: The People of Old*. Bishop Museum Press, Honolulu, HI.

1991 *Tales and Traditions of the People of Old, Nā Mo'olelo a ka Po'e Kahiko*. Bishop Museum Press, Honolulu, HI.

Kennedy, Joseph

1989 *Archaeological Inventory Survey for the Proposed Malaekahana Golf Course, a Portion of the Country Courses at Kahuku*. Archaeological Consultants of Hawai'i, Hale'iwa, HI.

1990 *Archaeological Assessment and Reevaluation Report Concerning the Recently Surveyed Proposed Punamano Golf Course, a Portion of the Country Courses at Kahuku*. Archaeological Consultants of Hawai'i, Hale'iwa, HI.

Maly, Kepā and Paul H. Rosendahl

1995 *Cultural Assessment Study Lā‘ie Wastewater Reclamation Facility (Lwrf) Project. Cultural Significance of “Nioi Heiau” and Other Sites Within its Immediately Adjoining Lands Vol. 1 Ethnographic Study for Amended Supplemental EIS (TMK 1-5-5-005, 1-5-5-006)*. Paul H. Rosendahl PhD. Inc., Hilo, HI.

McAllister, J.G.

1933 *Archaeology of Oahu*. Bernice P. Bishop Museum, Bulletin 104. Bishop Museum Press. Honolulu, HI.

McElroy, Windy and Dietrix Duhaylonsod

2017 *Final—Archaeological Monitoring Report for Kamehameha Highway Resurfacing from Mālaekahana Stream Bridge to Kahawainui Stream - Lā‘iewai Bridge, Mālaekahana and Lā‘iewai Ahupua‘a, Ko‘olauloa District, O‘ahu, TMKs:[1] 5-5-009, 5-6-001 through 006, and 5-6-009 (por.)*. Keala Pono Archaeological Consulting, Kāne‘ohe, HI.

Monahan, Christopher M.

2005a *An Archaeological Assessment Report of Approximately 10.5 Acres of Land (Lā‘ie Inn Redevelopment) in Lā‘ie Ahupua‘a, Ko‘olauloa District, Island of O‘ahu, Hawai‘i [TMK:[1] 5-5-2:42, 43, and 87; TMK 5-5-6:8 (por.), 13, 19, 21, 24, 25, 26 and 31] With and Addendum Added in Revision*. Scientific Consulting Services Inc., Honolulu, HI.

2005b *An Archaeological Inventory Survey Report on an Approximately 500-Acre Area in Mālaekahana and Lā‘ie Ahupua‘a, Ko‘olauloa District, O‘ahu Island, Hawai‘i [TMK:(1) 5-6-006:006 and 058]*. Scientific Consulting Services Inc., Honolulu, HI.

Monsarrat, M.D.

1897a *Waikane Koolau Poko Oahu*. Territorial Government Survey, Registered Map 1945, Honolulu, HI. Accessed via <http://ags.hawaii.gov/survey/map-search/>

1897b *Portion of Waikane Koolaupoko Oahu Showing Hui Divisions*. Territorial Government Survey, Registered Map 1946, Honolulu, HI. Accessed via <http://ags.hawaii.gov/survey/map-search/>

Neller, Earl

1984a *Comments on the Kahawainui Stream Flood Control Study from the Perspective of Historic Preservation and Cultural Resources Management*. Department of Land and Natural Resources, Honolulu, HI.

1984b *Comments on the Kahawainui Stream Flood Control Study’s Archaeological Reconnaissance Survey, Including the Results of an Archaeological Reconnaissance Survey Along Laiewai Stream, Laie, Oahu (TMK: 5-5-05 and 09)*. Department of Land and Natural Resources, Honolulu, HI.

O’Hare, Constance R., Douglas F. Borthwick, and Hallett H. Hammatt

2010 *Draft: Archaeological Field Inspection and Literature Review for the HDOT Lā‘ieloa Bridge Replacement Project, Lā‘ie Ahupua‘a, Ko‘olauloa District, Island of O‘ahu TMK:[1] 5-5-003:201, 202, 205, 5-5-011:007, 008, 043, 065, 066, 067, 068, 070, 5-5-013:075, 076, 078, 079, 080, 092, 5-5-014:001, 5-5-015:033*. Cultural Surveys Hawai‘i Inc., Kailua, HI.

Olson, L.G.

1979 *Volcanic Glass Research Report: Malaekahana & Keawaula Dune*. University of Hawaii Archaeology Laboratory. Honolulu, HI.

Pukui, Mary Kawena, Sameul H. Elbert and Esther T. Mookini

1974 *Place Names of Hawaii*. The University of Hawai‘i Press, Honolulu, HI.

Rice, William Hyde

1923 *Hawaiian Legends*. Bulletin 3. Bernice Pauahi Bishop Museum, Honolulu, HI.

Smith, M.

1990 *Subsurface Testing at Malaekahana State Recreation Area, Phase I, Sewer and Water Improvements (Job No. 85-OP-F2), Laie and Malaekahana, Koolauloa, Oahu*. Division of State Parks, Honolulu, HI.

Sterling, Elspeth P. and Catherine C. Summers

1978 *Sites of Oahu*. Bishop Museum Press, Honolulu, HI.

Ulukau

2020 Hawaiian Dictionaries. Ulukau Hawaiian Electronic Library. Accessed at < <https://wehewehe.org/> >.

U.S. Geological Survey (USGS)

1928 U.S. Geological Survey 7.5 minute topographic map, Waikane Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/maps/hawaiiquadindexes>.

1936 U.S. Geological Survey 7.5 minute topographic map, Waikane Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/maps/hawaiiquadindexes>.

1943 U.S. Geological Survey 7.5 minute topographic map, Waikane Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/maps/hawaiiquadindexes>.

1959 U.S. Geological Survey Orthophoto, Kaneohe Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/aerials/digital>.

1968 U.S. Geological Survey Orthophoto, Kaneohe Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/aerials/digital>.

1978 U.S. Geological Survey Orthophoto, Kaneohe Quadrangle. Accessed via <https://guides.library.manoa.hawaii.edu/aerials/digital>.

2013 U.S. Geological Survey 7.5 minute topographic map, Kaneohe Quadrangle. Available at USGS Information Services, Box 25286, Denver, Colorado.

Wallace, W.K.

2001 *Lā‘ie: Land and People in Transition*. World Communities—A Multidisciplinary Reader. Compiled by Lu Hsun Pearson, Honolulu, HI.

Yent, Martha and Agnes Estioko-Griffin

1980 *Archaeological Investigations at Malaekahana (50-80-02-2801), Windward Oahu*. Department of Land and Natural Resources, Division of State Parks, Recreation and Historic Sites, Honolulu, HI.

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Appendix A: Kahawainui Stream-Lā‘iewai Bridge Evaluation (2013)

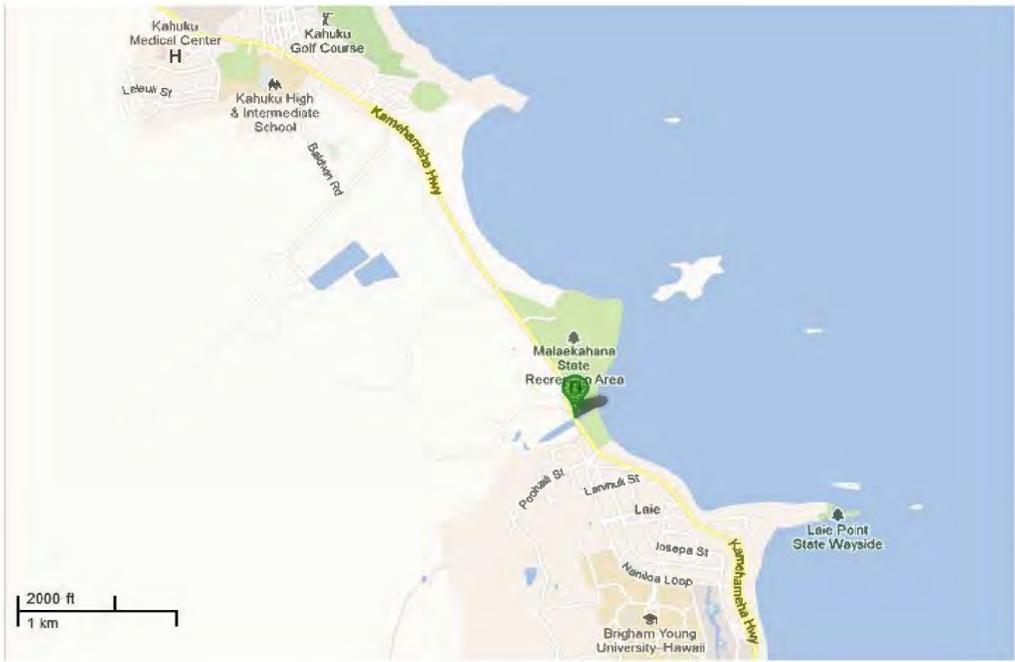
Inventory Form

(State)

General Information	
Bridge Number: 003000830301785	Route No: 83
Popular Name: Kahawainui Stream-Laiewai	
Feature Crossed: Kahawainui Sream	
Feature Carried: Kamehameha Highway	
Milepost: 17.85 mi.	Island: Oahu
Longitude: 157d-55m-47.68s	Latitude: 21d-39m-14.39s
Location: 0.17 Miles Northwest of Naniloa Loop	
Historic Name: Kahawainui Stream-Laiewai	
Designer/Engineer:	
Builder/Contractor:	



Location Map:



003000830301785 Kahawainui Stream-Laiewai

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Statewide Historic Bridge Inventory form for the Kahawainui Stream-Lā‘iewai Bridge pg. 1 (MKE Associates, LLC and Fung Associates, Inc. 2013:4-67)

Construction Information

Bridge Type: Concrete Slab	Construction Date: 1933	Replaced? No
Altered? Yes	Alteration Date(s): 1991	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1991.		

Bridge Information

Number of Spans: 5	Max Span: 18.0 ft.	Total Length: 90.9 ft.	Deck Width: 27.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	Criteria: C	State/National Registered? No
Current Function: Bridge		Historic Function: Bridge
Area of Significance: Engineering		

Narrative Description:

The Kahawainui Stream-Laiewai Bridge carries Kamehameha Highway across the Kahawainui Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1991. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

003000830301785 Kahawainui Stream-Laiewai

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

003000830301785 *Kahawainui Stream-Laiewai*

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Statewide Historic Bridge Inventory form for the Waikāne Stream Bridge pg. 3 (MKE Associates, LLC and Fung Associates, Inc. 2013:4-69)

3859 Pahumoa Laie Januani 5, 1848
 I ka poe Luna Hoona Aloha o kou
 He kai aku nei au i kou kuleana mo
 Aina o Hopuni, 6 loi kalo Iiti aia i Kaeawa
 o ke kula nui o Hopuni Iiti Kala aia i
 Keokileheleke Iiti Kala aia i Puhakaka
 I mala Awa aia i Kahuakaniela I loi aia i
 Pashia mai a Kamehameha I mai kou
 kuleana ana Na Pahumoa

LCA 3859 to Pahumoa (Native Register Reel 2, Vol. 4, pg. 179)

N^o 3859. Pahumoa. (Deceased). 261.
 Keliuwaiwaiale, sworn sayr. Pahumoa died in 1848,
 leaving the land to Hoaa.
 Witness knows the land claimed by Pahumoa in Laie.
 It consists of 8 Kalo patches & a House site. The 8 patches
 form one piece, bounded on Hauula side by Kamakakaia's land,-
 Mauka by Mahiole's land,-
 Waialua side by Keliuwaiwaiale's,- Makai by Hakai-
 alan's land. The House site is Makai, it is not en-
 closed. Claimant lived on the land from his youth.
 The Honolulu's Agent consented to this claim.

LCA 3859 to Pahumoa (Foreign Testimony Reel 3, Vol. 11, pg. 261)

Laid 21 Sept 1850. 261

Claim No. 3859. Pahumoa, deceased
 Kelivainaiolo, sworn says Pahumoa
 died in 1848, leaving the land to Hoaa.
 Mitu knows the land claimed by Pahumoa
 in Laid. It consists of 8 patches of
 Kalo, and a house site. The 8 patches form
 one piece bounded on Hanuula side by
 Namakakai's & Mahumali's lands. ¹ ²
 by Mahiole's land, - Maialua side by Kelivainaiolo's land, - Makai by Hakaialani's
 land. The house site is makai, it is
 not enclosed. Claimant lived on the
 land from his youth.
 Kelivainaiolo, Agent of the Honohike
 consented to this claim.

LCA 3859 to Pahumoa (Foreign Testimony Reel 3A, Vol. 11, pg. 261)

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Heleu 426. Koalaukanu ✓

Kaia Koolauloa Oahu.

Apana 1. 2 Kai Kalo. Ehoomaka ana ma ke kahi Akae a e holo ana
 He 34° He 200 fanku e fiki ana i ke ke Honohiki, alaila He 73° He 165 fanku
 e fiki ana i ke Kai, alaila He 37° He 130 fanku, e fiki ana i ke Kahua
 alaila He 39° He 123 fanku e fiki ana i ke Hanaukanai, alaila He 74° He
 50 fanku e fiki ana i ke Hanaukanai a hiki i kahi i hoomakai. 0 2/100 Eka.

Apana 2. 2 Kai Kalo. Ehoomaka ana ma ke kahi Akae a e holo ana
 He 68° He 200 fanku e fiki ana i ke Kai He 23° He 73 fanku e fiki ana
 i ke ke Honohiki, He 71° He 90 fanku e fiki ana i ke ke Honohiki, He 22° He
 40 fanku e fiki ana i ke ke Honohiki, He 70° He 90 fanku e fiki ana i ke ke
 Honohiki, He 9° He 110 fanku e fiki ana i ke Kai a hiki i kahi i hoomakai.
0 1/100 Eka.

Apana 3. Aina Kala. Ehoomaka ana ma ke kahi Akae He 22° He 175 fanku
 e fiki ana i ke Hanaukanai, alaila He 80° He 345 fanku e fiki ana i ke ke
 Honohiki, alaila e fiki ana i ka fiki a hiki i kahi i hoomakai. 0 1/100 Eka.

Apana 4. Aina Kala. Ehoomaka ana ma ke kahi Akae a e holo ana
 He 5° He 260 fanku e fiki ana i ke Honohiki, He 49° He 230 fanku e
 fiki ana i ke Kahua alaila e fiki ana i ka fiki a hiki i kahi i hoomakai.
2 1/100 Eka.

Apana 5. Kahala Ehoomaka ana ma ke kahi Hon Akae a e holo ana
 He 100 fanku e fiki ana i ke ke Honohiki He 250 fanku e fiki ana i
 ke Kahua Hon 100 fanku e fiki ana i ke ke Honohiki He 250 fanku
 e fiki ana i ke ke Honohiki a hiki i kahi i hoomakai. 1/4 Eka.

A. D. Swann
 Aina ana ana

Uhu fan loa. 6 00

H. S. Lee. Son. S. J. Kahanulani. G. M. Robertson. J. S. Smith.
 Honolulu Feb 25. 1851.

LCA 4326 to Koalaukanu (Mahele Award Book Reel 6, Vol. 6, pg. 366)

Mahele 4326 Koalaukanu

Ap 1 2 La Kila C hamahele ana ma ke kila kila a e kila ana Ke 35 Ke 200 paku
 e fili ana e ke ke kilahele abaka Ke 15 Ke 25 paku e fili ana e ke ke kila 15 Ke 25 paku
 e fili ana e ke ke kilahele abaka 15 Ke 25 paku e fili ana e ke ke kilahele abaka 15 Ke 25
 paku e fili ana e ke ke kilahele abaka e kila e kila e kilahele 15 Ke 25 C ka

Ap 2 2 La Kila C hamahele ana ma ke kila kila a e kila ana Ke 35 Ke 200 paku
 e fili ana e ke ke kilahele abaka Ke 15 Ke 25 paku e fili ana e ke ke kilahele abaka 15 Ke 25 paku
 ana e ke ke kilahele abaka Ke 15 Ke 25 paku e fili ana e ke ke kilahele abaka 15 Ke 25 paku e fili
 ana e ke ke kilahele abaka 15 Ke 25 paku e fili ana e ke ke kilahele abaka e kila e kila e kilahele 15 Ke 25 C ka

Ap 3 ana Kila C hamahele ana ma ke kila kila a e kila ana Ke 35 Ke 200 paku e fili ana
 e ke ke kilahele abaka 15 Ke 25 paku e fili ana e ke ke kilahele abaka e fili ana e ke
 paku e kila e kila e kilahele 15 Ke 25 C ka

Ap 4 ana Kila C hamahele ana ma ke kila kila a e kila ana Ke 35 Ke 200
 paku e fili ana e ke ke kilahele abaka 15 Ke 25 paku e fili ana e ke ke kilahele abaka e fili ana
 e ke ke kilahele abaka e kila e kila e kilahele 15 Ke 25 C ka

Ap 5 Kilahele C hamahele ana ma ke kila kilahele ana a e kila ana Ke 35 Ke 200 paku
 e fili ana e ke ke kilahele abaka Ke 15 Ke 25 paku e fili ana e ke ke kilahele abaka 15 Ke 25 paku e fili ana
 e ke ke kilahele abaka 15 Ke 25 paku e fili ana e ke ke kilahele abaka e kila e kilahele 15 Ke 25 C ka

Ulu Lau Lau 156

*W. Lee
 Louani
 J. Kibaulahas
 Esq. Boston
 J. H. Smith*

Koalaukanu June 25 1857

LCA 4326 to Koalaukanu (Mahele Award Book Reel 6, Vol. 7, pg. 366)

4326 Na Koalaukani Saie Samuā 15. 1848

U
 E na Luna Poona Kuleana
 Aina. Owan o Koalaukani ka mea kuleana
 ma Saie nei, Ika ili Aina o Kapunā, 4 lo
 i Kula. Eia ma aao, A. Aina o Kanakani,
 Fōik. ho Keas Aina. Poem. Aina o Kōi. Kon.

LCA 4326 to Koalaukanu Page 1 (Native Register Reel 2, Vol. 4, pg. 259)

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ka Aina o Kanakani. Eia ma wahi Kule
 ana kauliili. Ika ili Aina o Keakupuao,
 1 lo, 4 Kula, 1 Kula pa Hale, No ke kauliili
 o keia mau Kuleana ou, aole pono ke hai aku
 ina aao ia oukou e nei Luna Poona Kule
 ana Aina, no ke kauliili loa. O kōi mōho
 ana mai ma keia wahi mau Kuleana,
 Mai kōi mau Kuleana nei, i hiki ia
 Kamehameha 3 i keia wa.

Na Koalaukani.

LCA 4326 to Koalaukanu Page 2 (Native Register Reel 2, Vol. 4, pg. 259)

N^o 4326. Koalaukanu. (Deceased).
 Kauhane, sworn says, he knows the land claimed by Koalaukanu in Laie. Four of the kalo patches are cultivated. They form 2 pieces.
 The first piece, of 2 patches, is bounded on Hauula side by Pukibaka's land, - Mauka by Kanaukanu's, - Waiialua side by Paiaolulu's, - Makai by the Kouohiki.
 The second piece, of 2 patches, is bounded on Hauula side by Koi's land, - Mauka by the Kouohiki, - Waiialua side by Kanaukanu's, - Makai by Keano's.
 Claimant has also 2 pieces of kula land, planted with wauka. The first piece is bounded on all sides by the Kouohiki.
 The second piece is bounded Makai by Keano's land, - on all the other sides by the Kouohiki.

over

LCA 4326 to Koalaukanu Page 1 (Foreign Testimony Reel 3 Vol. 11, pg. 309)

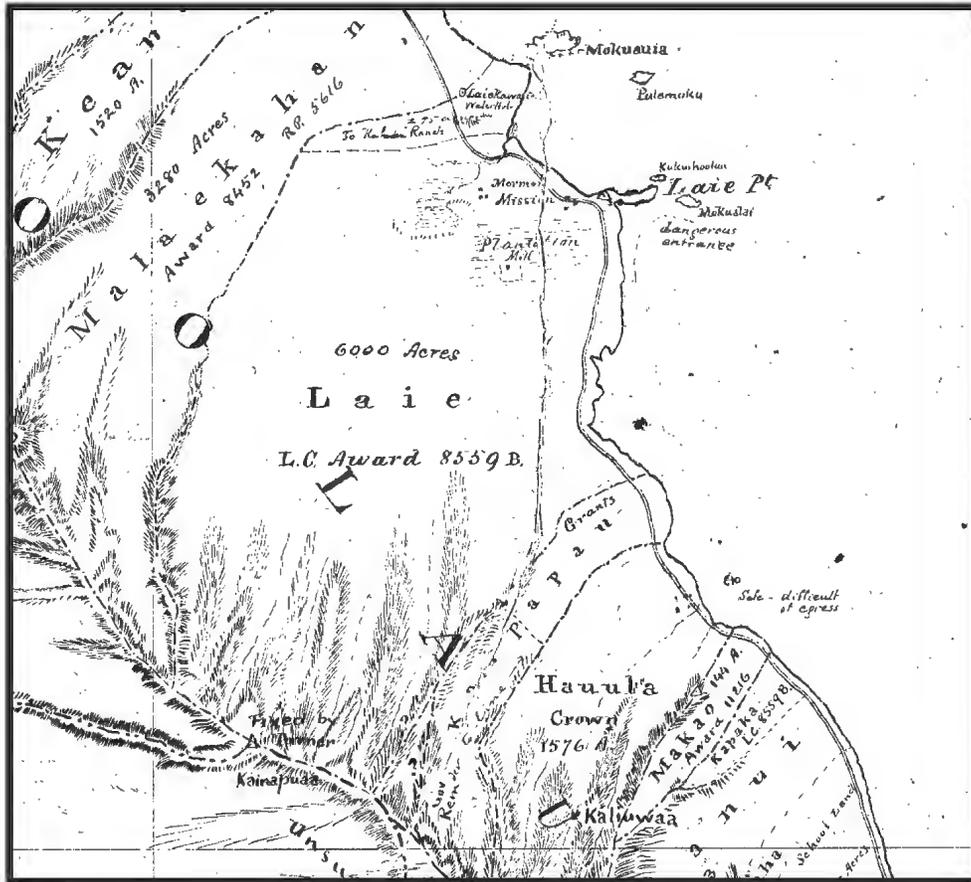
The House site is distinct from the land - not enclosed. Claimant held the land for over 20 years. He died in 1848, leaving his land to Kauhane, his child, who now claims it.
 The Agent of the Kouohiki had no other objection to this claim than to N^o 3696, page 281.

LCA 4326 Koalaukanu Page 2 (Foreign Testimony Reel 3 Vol. 11, pg. 309)

No 4326. Law 24 Sept 1850. ³⁰⁹
 Koalaukani - deceased.
 Kauhane, sworn says he knows the land
 claimed by Koalaukani in Law. Four of
 the Kale patches are cultivated. They form
 2 pieces. The first piece of 2 patches is bounded
 on Haunala side by Puhibaka's land, Mauka
 by Kanaikana, - Waialua side by Paiaoluh's
 land, - Makai the Kouohiki. The second piece
 of 2 patches is bounded on Haunala side by
 2 Kei's land, - Mauka the Kouohiki, - Waialua
 side by Kanaikana's land, - Makai Kei's
 land. Claimant has also 2 pieces of Kula land
 planted with wauke. The first piece is bound
 on all sides by the Kouohiki. The second
 piece is bounded on 3 sides by the Kouohiki,
 & Makai by Hano's land.
 The house site is distinct from the land.
 It is not enclosed. Claimant held the
 land for over 20 years. He died in 1848,
 leaving his land to Kanaifu his child,
 who now claims it.
 The Agent of the Kouohiki had no other
 objection to this claim than to No 3096.

LCA 4326 to Koalaukanu (Foreign Testimony Reel 3A Vol. 11, pg. 309)

APPENDIX D: CULTURAL IMPACT ASSESSMENT



Cultural Impact Assessment
for the Kahawainui Stream Dredging Project,
Lā'ie Ahupua'a, Ko'olauloa District, O'ahu Island
 TMKs: [1] 5-5-005:022 (por.), [1] 5-5-009:007, 008, 009, 010, 011, 047, 061 (por.) and [1] 5-6-001:004 (por.)

Prepared for



Prepared by



August 2021

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Kepa Maly

Onaona Maly

Note on Hawaiian language usage

In keeping with other Hawaiian scholars, we do not italicize Hawaiian words. Hawaiian is both the native language of the pae'āina of Hawai'i and an official language of the State of Hawai'i. Some authors will leave Hawaiian words italicized if part of a quote; we do not. In the narrative, we use diacritical markings to assist our readers, except in direct quotes, in which we keep the markings used in the original text. We provide translations contextually when appropriate.

Front Cover Credit

State of Hawaii (Territory Government)

1876 Hawaii Government Survey Map, No. 1380.

Summary

At the request of Belt Collins Hawaii (BCH), Honua Consulting, LLC prepared a Cultural Impact Assessment (CIA) for the proposed Kahawainui Stream dredging project to support an Environmental Assessment completed by Belt Collins Hawaii. The City and County of Honolulu owns the subject parcel.

The Project is located on TMKs: (1) 5-5-5:022 (por.), 5-5-009:007 (por.), 008 (por.), 009 (por.), 010 (por.), 011 (por.), 047(por.), 061 (por.), and 5-6-001:004 (por.), at the intersection of Lā'ie Wai Stream and 1,500 feet upstream of the stream mouth and sand berm.

Research in preparation of this report consisted of a thorough search of Hawaiian language documents, including but not limited to the Bishop Museum mele index and Bishop Museum archival documents, including the Hawaiian language archival caché. All Hawaiian language documents were reviewed by Hawaiian language experts to search for relevant information to include in the report. Documents considered relevant to this analysis are included herein, and translations are provided when appropriate to the discussion. Summaries of interviews and information on other oral testimonies are also provided herein.

Based on the information gathered and the assessment of the resources conducted, the project is not anticipated to have any adverse impacts on cultural resources, traditions, customs, or practices, although the project would benefit from more communication with the surrounding area and its residents and implementation of best management practices (BMPs) to limit the impact of the project activity on the project area and its surrounding ecological resources.

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Abbreviations and Acronyms

APE: Area of Potential Effect
BMP: Best Management Practices
BLT: Belt Collins Hawaii
CIA: Cultural Impact Assessment
DLNR: Department of Land and Natural Resources
DOH HEER: Hawai'i Department of Health Hazard Evaluation and Emergency Response
EA: Environmental Assessment
EAL: Environment action level
EIS: Environmental Impact Statement
HAR: Hawaii Administrative Rules
HC&S: Hawaiian Commercial & Sugar Company
HRS: Hawaii Revised Statutes
HSL: Hawaii State Legislature
ILK: Indigenous local knowledge
LCA: Land commission award
NARA: National Archive and Records Administration
NCSS: National Cooperative Soil Series
OHA: Office of Hawaiian Affairs
SHPD: State Historic and Preservation Division
TEK: Traditional ecosystem knowledge
TMK: Tax Map Key
USGS: United States Geological Survey

1.0 Introduction

At the request of Belt Collins Hawaii (BCH), Honua Consulting, LLC prepared a Cultural Impact Assessment (CIA) for the proposed Kahawainui Stream dredging project to support an Environmental Assessment completed by Belt Collins Hawaii. The City and County of Honolulu owns the subject parcel.

1.1 Project Description

The Project is located on Tax Map Keys (TMKs): (1) 5-5-5:022 (por.), 5-5-009:007 (por.), 008 (por.), 009 (por.), 010 (por.), 011 (por.), 047(por.), 061 (por.), and 5-6-001:004 (por.), at the intersection of Lā'ie Wai Stream and 1,500 feet upstream of the stream mouth and sand berm (the "Project Site", Figure 1).



Figure 1. Location Map



Figure 2. Portion of a 2017 U.S. Geological Survey (USGS) topographic map showing the project area

The project area is situated within Lā'iewai Ahupua'a (traditional land division) along the coastal plain of the northern windward coast of O'ahu on the northern extent of the town of

Lā'ie. Lā'iewai Ahupua'a is within the Ko'olauloa District and bordered by Mālaekahana Ahupua'a to the north, Lā'iemalo'o Ahupua'a to the south, Waimea Ahupua'a to the west, and Lā'ie Bay to the east. Lā'iewai mostly consists of the fertile lands along Kahawainui Stream although numerous streams were formerly present present in the area.

The proposed Project consists of dredging approximately 2,955 cubic yards of sediment within the cross section denoted as the Project Site (Figure 1 and Figure 2 – Approximate Project Limit), using either clamshell dredging from shore, on a platform, or directly in the stream at low tide and with an excavator with a high carriage. The resultant material will be placed in designated stockpile areas located on adjacent parcels owned by Property Reserves, Inc for drying. See Figure 3 – Stockpile Areas. The dried material will be then transported for offsite reuse or disposal. Previous sediment testing was conducted in the Project Site, in accordance with the Hawai'i Department of Health Hazard Evaluation and Emergency Response (DOH HEER) Guidance for Stockpile Characterization and Evaluation of Imported and Exported Fill Material, October 2017. None of the sediment samples contained contaminants exceeding concentrations greater than the DOH HEER Tier 1 Environment Action Levels (EALs) and are not considered hazardous waste.

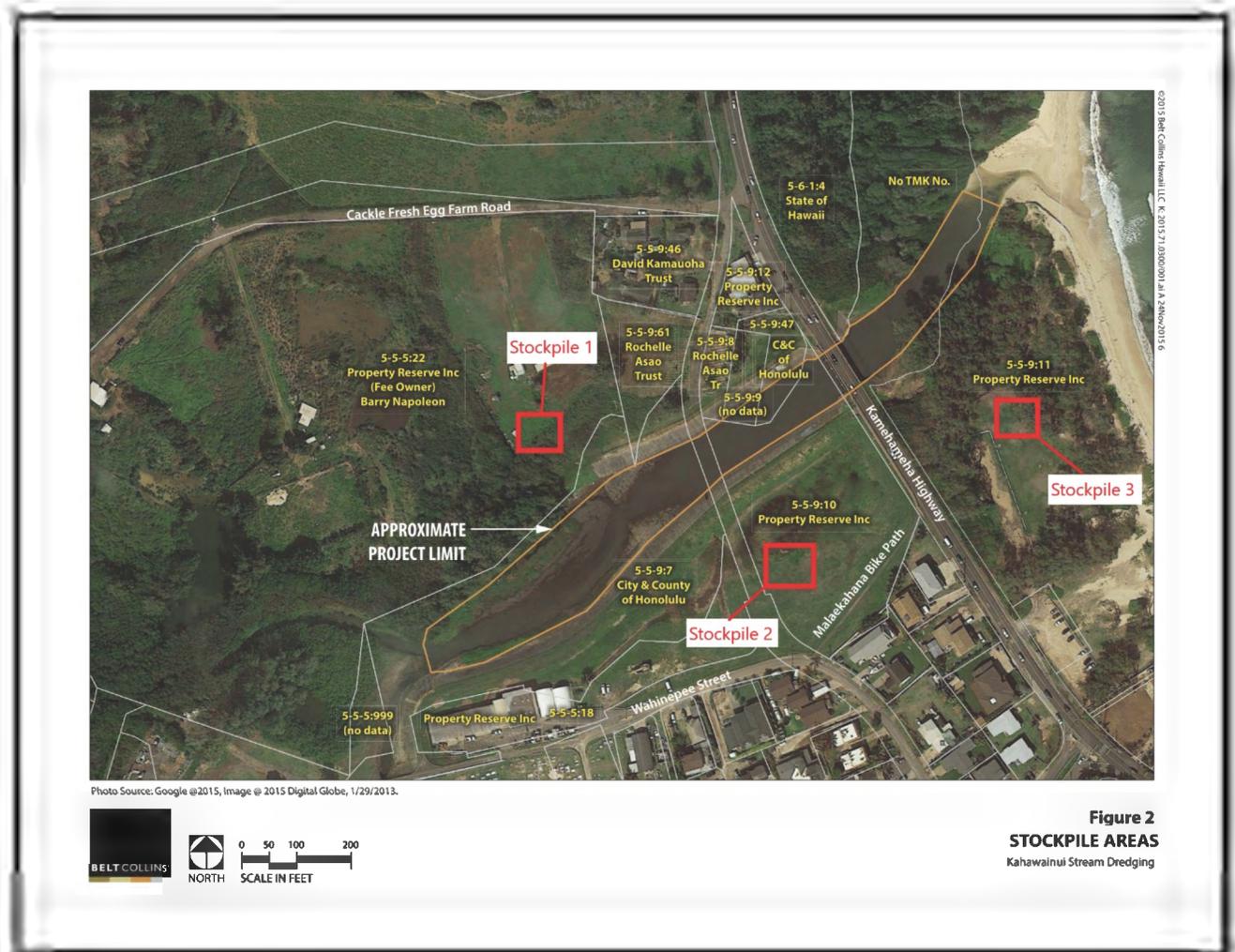


Figure 2
STOCKPILE AREAS
 Kahawainui Stream Dredging

Figure 3. Project Area and Stockpile Areas

1.2 Regulatory Background

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to protect and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. To assist decision makers in the protection of cultural resources, Chapter 343, Hawaii Revised Statutes (HRS) and Hawaii Administrative Rules (HAR) § 11-200 rules for the environmental impact assessment process require project proponents to assess proposed actions for their potential impacts to cultural properties, practices, and beliefs.

This process was clarified by the Hawaii State Legislature (HSL) in Act 50, HSL 2000. Act 50 recognized the importance of protecting Native Hawaiian cultural resources and required that Environmental Impact Statements (EIS) include the disclosure of the effects of a proposed action on the cultural practices of the community and state, and the Native Hawaiian community in particular. Specifically, the Environmental Council suggested the CIAs should include information relating to practices and beliefs of a particular cultural or ethnic group or groups. Such information may be obtained through public scoping, community meetings, ethnographic interviews, and oral histories.

It is also important to note that while similar in their areas of studies, archaeological surveys and cultural impact assessments are concerned with distinct and different foci. Archaeological studies are primarily concerned with historic properties and tangible heritage, whereas cultural impact assessments look at cultural practices, and beliefs, which can be associated with a specific location, but as also often intangible in nature.

1.3 Compliance

The State and its agencies have an affirmative obligation to preserve and protect the reasonable exercise of customarily and traditionally exercised rights of Hawaiians to the extent feasible.¹ State law further recognizes that the cultural landscapes provide living and valuable cultural resources where Native Hawaiians have and continue to exercise traditional and customary practices, including but not limited to hunting, fishing, gathering, and religious practices. In *Ka Pa'akai*, the Hawai'i Supreme Court provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary Native Hawaiian rights while reasonably accommodating competing private development interests. This is accomplished through:

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

¹ Article XII, Section 7 of the Hawai'i State Constitution, *Ka Pa'akai O Ka 'Āina v. Land Use Commission*, 94 Haw. 31 [2000](*Ka Pa'akai*), Act 50 HSL 2000.

The CIA is presently being prepared under HRS Chapter 343 and Act 50 HSL 2000. The appropriate information has been collected concerning the ahupua'a of Lā'ie (or Lā'iewai), focusing on areas near or adjacent to the project area, and a thorough analysis of this project and potential impacts to cultural resources, historical resources, and archaeological sites is included in this assessment.

The present analyses of archival documents, oral traditions [chants, mele (songs), and/or hula), and Hawaiian language sources including books, manuscripts, and newspaper articles, are focused on identifying recorded cultural and archaeological resources present on the landscape, including: Hawaiian and non-Hawaiian place names; landscape features (ridges, gulches, cinder cones); archaeological features (kuleana parcel walls, house platforms, shrines, heiau (places of worship), etc.); culturally significant areas (viewsheds, unmodified areas where gathering practices and/or rituals were performed); and significant biocultural resources. Oral histories, including interviews with cultural and lineal descendants, are instrumental in procuring information about the project area's transformation through time and changing uses. Oral histories from previous studies were researched and relevant information from these resources were integrated into the document.

The study area for impacts to cultural resources and historic properties includes the project area and localized surroundings. This CIA also reviews some of the resources primarily covered by the Environmental Assessment (EA) and State Historic and Preservation Division (SHPD) Review. It primarily researches and reviews the range of biocultural resources identified through historical documents, traditional knowledge, information found in the Hawaiian language historical caché, and oral histories and knowledge collected from cultural practitioners and experts.

2.0 Methodology

The approach to developing the CIA is as follows:

- I. Gather Best Information Available
 - A. Gather historic cultural information from stories and other oral histories about the affected area to provide cultural foundation for the report;
 - B. Inventory as much information as can be identified about as many known cultural, historic, and natural resources, including previous archaeological inventory surveys, CIAs, etc. that may have been completed for the possible range of areas;
 - C. Update the information with interviews with cultural or lineal descendants or other knowledgeable cultural practitioners.
- II. Identification of Potential Impacts to Cultural Resources
- III. Develop Reasonable Mitigation Measures to Reduce Potential Impacts
 - A. Involve the community and cultural experts in developing culturally appropriate mitigation measures;
 - B. Develop specific Best Management Practices (BMPs), if any are required, for conducting the project in a culturally appropriate and/or sensitive manner as to mitigation and/or reduce any impacts to cultural practices and/or resources.

While numerous studies have been conducted on this area, few have effectively utilized Hawaiian language resources and Hawaiian knowledge about this area. This appears to have impacted modern understanding of this location, as many of the relevant documents are native testimonies given by kānaka Hawai'i (Hawaiians) who lived on this land have been excluded from past studies. Therefore, efforts to identify and include historic accounts, including those from Hawaiian language resources, were included in this methodology.

While hundreds of place names and primary source historical accounts (from both Hawaiian and English language narratives) are cited on the following pages, it is impossible to tell the whole story of these lands in any given manuscript. A range of history, spanning the generations, has been covered. Importantly, the resources herein are a means of connecting people with the history of their communities – that they are part of that history. Knowledge of place will, in turn, promote appreciation for place and encourage acts of stewardship for the valued resources that we pass on to the future.

While conducting the research, primary references included, but were not limited to: land use

records, including the Hawaiian L.C.A. records from the Māhele 'Āina (Land Division) of 1848; the Boundary Commission Testimonies and Survey records of the Kingdom and Territory of Hawai'i; and historical texts authored or compiled by – D. Malo (1951); S.N. Haleole (1862-1863); J.P. I'i (1959); Kupahu (1865); S.M. Kamakau (1961, 1964, 1976, 1991); Wm. Ellis (1963); records of the American Board of Commissioners of Foreign Missions (A.B.C.F.M.) (1820–1860); Chas. Wilkes (1836-1842); Alexander & Preston (1892–1894); A. Fornander (1916–1919 and 1996); Isabella Bird (1964); G. Bowser (1880); and many other native and foreign writers. The study also includes several native accounts from Hawaiian language newspapers (compiled and translated from Hawaiian to English by K. Maly), and historical records authored by nineteenth century visitors, and residents of the region.

Historical and archival resources were located in the collections of the Hawai'i State Archives, Survey Division, Land Management Division, Survey Division, and Bureau of Conveyances; the Bishop Museum Library and Archives; the Hawaiian Historical Society and the Hawaiian Mission Children's Society Library; University of Hawai'i-Hilo Mo'okini Library; the National Archives and Records Administration (NARA), Maryland; the Library of Congress, Washington D.C.; the National Oceanic and Atmospheric Administration National Library, Maryland; the Smithsonian Institution Natural History and National Anthropological Archives libraries, Washington, D.C.; the Houghton Library at Harvard; the United States Geological Survey (USGS) Library, Denver; the Paniolo Preservation Society and Parker Ranch collections; private family collections; and in the collection of Kumu Pono Associates LLC. This information is generally cited in categories by chronological order of the period depicted in the narratives.

Puakea Nogelmeier (2010) discusses the adverse impacts of methodology that fails to properly research and consider Hawaiian language resources. He strongly cautions against a monorhetorical approach that marginalizes important native voices and evidence from consideration, specifically in the field of archaeology. For this reason, Honua Consulting consciously employs a polyrhetorical approach, whereby all data, regardless of language, is researched and considered (Nogelmeier, 2010). To fail to access these millions of pages of information within the Hawaiian language caché could arguably be a violation of Act 50, as such an approach would fundamentally fail to gather the best information available, especially considering the voluminous amounts of historical accounts available for native tenants in the Hawaiian language.

Hawaiian culture views natural and cultural resources as largely being one and the same: without the resources provided by nature, cultural resources could and would not be procured. From a Hawaiian perspective, all natural and cultural resources are interrelated, and all natural and cultural resources are culturally significant. Kepā Maly, ethnographer and Hawaiian language scholar, points out, "In any culturally sensitive discussion on land use in

Hawaii, one must understand that Hawaiian culture evolved in close partnership with its natural environment. Thus, Hawaiian culture does not have a clear dividing line of where culture ends and nature begins” (Maly, 2001:1). As a leading researcher and scholars on Hawaiian culture, Kepā Maly, along with his wife, Onaona, have conducted numerous ground-breaking studies on cultural histories throughout Hawai'i.

This study also specifically looks to identify intangible resources. Tangible and intangible heritage are inextricably linked (Bouchenaki, 2003). Intangible cultural resources, also identified as intangible cultural heritage (ICH), are critical to the perpetuation of cultures globally. It has been noted, “At present, we are aware on a daily basis of the definitive loss – throughout the world – of language, knowledge, knowhow, customs, and ideas, leading to the progressive impoverishment of human society” (Lenzerini, 2011). Lenzerini continue to warn:

the rich cultural variety of humanity is progressively and dangerously tending towards uniformity. In cultural terms, uniformity means not only loss of cultural heritage – conceived as the totality of perceptible manifestations of the different human groups and communities that are exteriorized and put at the others' disposal – but also standardization of the different peoples of the world and of their social and cultural identity into a few stereotyped ways of life, of thinking, and of perceiving the world. Diversity of cultures reflects diversity of peoples; this is particularly linked to ICH, because such a heritage represents the living expression of the idiosyncratic traits of the different communities. Preservation of cultural diversity, as emphasized by Article 1 of the UNESCO Universal Declaration on Cultural Diversity, ‘is embodied in the uniqueness and plurality of the identities of the groups and societies making up humankind’. Being a ‘source of exchange, innovation and creativity’, cultural diversity is vital to humanity and is inextricably linked to the safeguarding of ICH. Mutual recognition and respect for cultural diversity – and, *a fortiori*, appropriate safeguarding of the ICH of the diverse peoples making up the world – is essential for promoting harmony in intercultural relations, through fostering better appreciation and understanding of the differences between human communities.

Therefore, tradition and practice, as elements of Hawaiian ICH, are essential to the protection of Hawaiian rights and the perpetuation of the Hawaiian culture.

It is within this context that traditional or customary practices are studied. The concept of traditional or customary practices can often be a challenging one for people to grasp. Traditional or customary practices can be defined as follows:

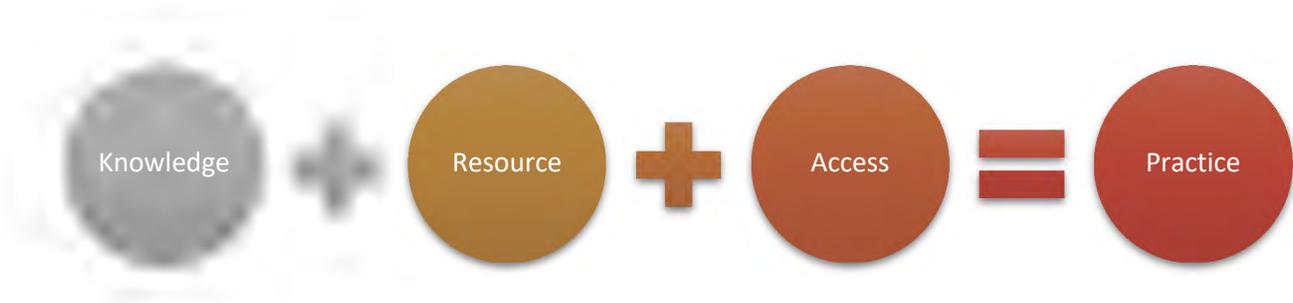


Figure 4. Diagram of elements that contribute to traditional or customary practices

The first element is knowledge. This has been referred to as traditional ecological knowledge (TEK), indigenous local knowledge (ILK), or ethnoscience. In the context of this study, it is the information, data, knowledge, or expertise Native Hawaiians or local communities possessed or possess about an area's environment. In a traditional context, this would have included information Hawaiians possessed in order to have the skills to utilize the area's resources for a range of purposes, including, but not limited to, travel, food, worship or habitation. This element is largely intangible.

The second element are the resources themselves. These are primarily tangible resources, either archaeological resources (i.e., habitation structures, walls, etc.) or natural resources (i.e., plants, animals, etc.). These can also be places, such as a sacred or culturally important sites or wahi pana (storied places). Sometimes these wahi pana are general locations, this does not diminish their importance or value.

The third element is access. The first two elements alone are not enough to allow for traditional or customary practices to take place. The practitioners must have access to the resource in order to be able to practice their traditional customs. Access does not just mean the ability to physically access a location, but it also means access to resources. For example, if a particular plant is used for medicinal purposes, there needs to be enough of that plant available to practitioners for us. Therefore, an action that would adversely impact the population of a particular plant with cultural properties would impact practitioners' ability to access that plant. By extension, it would adversely impact the traditional or customary practice.

Traditional or customary practices are, therefore, the combination of knowledge(s), resource(s) and access.

2.1 Traditional Knowledge, or Ethnoscience, and the Identification of Cultural Resources

The concept of ethnoscience was first established in the 1960s and has been defined "the field of inquiry concerned with the identification of the conceptual schemata that indigenous

peoples use to organize their experience of the environment” (Roth, 2019). Ethnoscience includes a wide range of subfields, includes, but is not limited to, ethnoecology, ethnobotany, ethnozoology, ethnomedicine and ethnopedology.

Traditional Native Hawaiian practitioners were scientists and expert natural resource managers by necessity. Without modern technological conveniences to rely on, Hawaiians developed and maintained prosperous and symbiotic relationships with their natural environments for thousands of years. Their environments were their families, their homes and their laboratories. They knew the names of every wind and every rain. The elements taught and inspired. The ability of indigenous people to combine spirit and science led to the formation unique land based methodologies that spurred unsurpassed innovation. Therefore, identifying significant places requires a baseline understanding of what made places significant for Hawaiians.

Hawaiians were both settlers and explorers. Beatrice H. Krauss’ *Plants in Hawaiian Culture* explains: “Exploration of the forests revealed trees, the timber of which was valuable for building houses and making canoes. The forests also yielded plants that could be used for making and dying tapa, for medicine, and for a variety of other artifacts” (1993). Analysis of Native plants and resource management practices reveals the depth to which Hawaiians excelled in their environmental science practices:

[Hawaiians] demonstrated great ability in systematic differentiation, identification, and naming of the plants they cultivated and gathered for use. Their knowledge of the gross morphology of plants, their habits of growth, and the requirements for greatest yields is not excelled by expert agriculturists of more complicated cultures. They worked out the procedures of cultivation for every locality, for all altitudes, for different weather conditions and exposures, and for soils of all types. In their close observations of the plants they grew, they noted and selected mutants (sports) and natural hybrids, and so created varieties of the plants they already had. Thus over the years after their arrival in the Islands, the Hawaiians added hundreds of named varieties of taro, sweet potatoes, sugarcane, and other cultivated plants to those they had brought with them from the central Pacific (Krauss, 1993).

It was the Native Hawaiians who reinforced through their natural resource management practices the biodiversity that exists in Hawai`i today.

The present analyses of archival documents, oral traditions (oli [chants], mele [songs], and/or hula [dance]), and Hawaiian language sources including books, manuscripts, and newspaper articles, are focused on identifying recorded cultural resources present on the landscape,

including: Hawaiian and non-Hawaiian place names; landscape features (ridges, gulches, cinder cones); archaeological features (kuleana parcel walls, house platforms, shrines, heiau [places of worship], etc.); culturally significant areas (viewsheds, unmodified areas where gathering practices and/or rituals were performed); and significant biological, physiological, or natural resources. This research also looks to document the wide range of Hawaiian science that existed within the geographic extent.

2.2 Mo'olelo 'Āina: Native Traditions of the Land

Among the most significant sources of native mo'olelo are the Hawaiian language newspapers which were printed between 1838 and 1948, and the early writings of foreign visitors and residents. Most of the accounts that were submitted to the papers were penned by native residents of areas being described and noted native historians. Over the last 30 years, Kepā Maly has reviewed and compiled an extensive index of articles published in the Hawaiian language newspapers, with particular emphasis on those narratives pertaining to lands, customs, and traditions. Those accounts describe native practices, the nature of land use at specific locations, and native lore. Thus, readers are given a means of understanding how people related to their environment and sustained themselves on the land.

2.3 Historic Maps

There are also numerous, informative historic maps for the region. Surveyors of the eighteenth and nineteenth centuries were skilled in traversing land areas and capturing important features and resources throughout Hawaii's rich islands. Historic maps were carefully studied, and the features detailed therein were aggregated and categorized to help identify specific places, names, features, and resources throughout the study area. From these, among other documents, new maps were created that more thoroughly capture the range of resources in the area.

2.4 Archaeological Studies

This Literature Review and Field Inspection (LRFI) was prepared by Honua Consulting, LLC at the request of Belt Collins Hawaii LLC for the Kahawainui Stream Dredging Project located in Lā'ie Ahupua'a, Ko'olaupia District, O'ahu Island, Tax Map Keys (TMKs): [1] 5-5-005:022 (por.), [1] 5-5-009:007, 008, 009, 010, 011, 047, 061, and [1] 5-6-001:004 (por.).

The Kahawainui Stream-Laiwai Bridge crosses through the project area and carries Kamehameha Highway over Kahawainui Stream. It was constructed in 1933 and consists of a five-span concrete slab bridge with concrete solid panel parapets with flat caps and curved

end posts with an asphalt covered concrete deck supported by abutments. The parapets and end caps have been painted white and a wooden plank pedestrian walkway with a horizontal wood railing has been bolted to the mauka side (MKE Associates and Fung Associates 2013:68). In 2013, the bridge was documented in poor condition but was assessed for significance as retaining integrity of location and eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii and as a good example of a 1930's era reinforced concrete bridge based on its use of materials, method of construction, craftsmanship, and design (MKE Associates and Fung Associates 2013:69).

2.5 Biological Studies

An updated biological survey was completed for the project. There are no endangered or threatened flora in the area. The impact to flora was covered in the EA. Of terrestrial flora, four listed species in the EA – 'alae ke'oke'o (the Hawaiian coot), 'alae 'ula (Hawaiian gallinule), ae'o (Hawaiian stilt) , and 'ope'ape'a (Hawaiian hoary bat) – have a high potential to use the habitat of the survey area. Regarding aquatic fauna, the EA found that the most common species in the survey area were non-native tilapia. Due to the degraded habitat quality, the area may be a poor habitat for native aquatic fauna.

2.6 Ethnographic Methodology

Information from lineal and cultural descendants is instrumental in procuring information about the project area's transformation over time and its changing uses. Area practitioners were identified and contacted via telephone requesting interviews. Practitioners and residents, including residents who grew up on the stream and have extensive knowledge about the resource were interviewed for this CIA.

3.0 Description of Project Area

The project area consists of a channelized portion of Kahawainui Stream running adjacent to the former stream location inland from the ocean at an elevation of approximately 3 feet (ft.) (0.9 m.) to 5 ft. (1.5 m) above mean sea level at the bottom of the channel and 6 ft. (1.8 m.) to 9 (2.7 m.) ft. along the levees on both sides. The project area is located in an area of marshy clay and jaucus sand created by ocean tides and deposition from Kahawainui Stream. The marshlands and low-lying areas were graded and filled in the 1930's to create Kamehameha Highway.

3.1 Existing Conditions

The project area is situated within Lā'iewai Ahupua'a (traditional land division) along the coastal plain of the northern windward coast of O'ahu on the northern extent of the town of Lā'ie. Lā'iewai Ahupua'a is within the Ko'olauloa District and bordered by Mālaekahana Ahupua'a to the north, Lā'iemalo'o Ahupua'a to the south, Waimea Ahupua'a to the west, and Lā'ie Bay to the east. Lā'iewai mostly consists of the fertile lands along Kahawainui Stream although numerous streams were formerly present present in the area. This part of O'ahu is dominated by northeastern trade winds and the project area receives approximately 51 inches (130 centimeters [cm]) of rain annually, particularly during the rainy season between November and March (Giambelluca et al. 2013).

3.2 Background – Traditional Names

Background research for the literature review was conducted using materials obtained from the State Historic Preservation Division (SHPD) library in Kapolei and the Honua Consulting LLC. report library. On-line materials consulted included the Ulukau Electronic Hawaiian Database (www.ulukau.com, Soehren 2002-2010), Papakilo Database (www.papakilodatabase.com), the State Library on-line (<http://www.librarieshawaii.org/Serials/databases.html>), and Waihona 'Aina Mahele database (<http://www.waihona.com>). Hawaiian terms and place names were translated using the on-line Hawaiian Dictionary (Nā Puke Wehewehe 'Ōlelo Hawai'i) (www.wehewehe.com) and Place Names of Hawaii (Pukui et al. 1974). Historic maps were obtained from the State Archives, State of Hawai'i Land Survey Division website (<http://ags.hawaii.gov/survey/map-search/>), UH-Mānoa Maps, Aerial Photographs, and GIS (MAGIS) website (<http://guides.library.manoa.hawaii.edu/magis>). Maps were geo-referenced for this report using ArcGIS 10.3. GIS is not 100% precise and historic maps were created with inherent flaws; therefore, geo-referenced maps should be understood to have some built-in inaccuracy.



3.2.1 Place Names and Mo'olelo

The entire property area and project area are located within the ahupua'a (traditional land division) of Lā'iewai. Lā'ie has a rich and interesting cultural history, and many mo'olelo and legends are associated with this ahupua'a. The name Lā'ie is said to derive its origin from two Hawaiian words, the first being lau (leaf) and the second being ie, referring to the ie vine of the red-spiked climbing pandanus tree which wreaths forest trees of the mauka regions of the Ko'olau range. This red-spiked climbing pandanus is sacred to Kāne as well as Laka (Beckwith 1970).

Several Hawaiian place names are known for features of the Lā'ie region and environment. Historic maps of the area show place names in the near vicinity. Table 1 lists place names in the vicinity of the project area, a description of the locations, their English translations, and sources of information. Selected names are also discussed below.

Table 1. List of Inoa 'Āina (Place Names) in the vicinity of Lā'ie

Inoa 'Āina	Description
Akaki'i	a stream, translates "negative of a photograph" (Pukui and Elbert 1986:13)
Kaihihi	a stream, possibly translates "dizzy, dizziness", "to refuse to pay loses or forfeit", and "a fine meshed fish net" (Pukui and Elbert 1986:115)
Kahawainui	a stream, translates "great river or stream" (Pukui and Elbert 1986:111)
Kaho'oleinapea	a stream (Wallace 2001)
Kaluakauila	a stream (Wallace 2001)
Kawaipapa	a stream (Wallace 2001)
Kawauwai	a stream (Wallace 2001)
Keauakaluapaaa	an island of the coast of Lā'ie (Rice 1923)
Kihewamoku	an island of the coast of Lā'ie (Rice 1923)
Koloa	a stream, translates "long cane with a crook" or "to make a prolonged sound, roar" (Pukui and Elbert 1986:163)
Kokololio	a stream (Wallace 2001)
Kuamo'o	a terrace, translates "backbone" (Wallace 2001)
Lā'ie	a town, modern land division containing Lā'iewai and Lā'iemalo'o ahupua'a, translates "leaf" of the 'ie'ie (red-spiked climbing screw pine, <i>Freycinetia arborea</i>) (Pukui and Elbert 1986:191)
Lā'iemalo'o	a traditional ahupua'a
Lā'iewai	a traditional ahupua'a

Inoa 'Āina	Description
Mahanu	a terrace, translates “rest and breathe” (Wallace 2001)
Makali'i	a terrace, translates “Pleiades” (Wallace 2001)
Mālaekahana	a traditional ahupua'a and also named after Chiefess Mālaekahana (Beckwith 1970)
Malualai	an island of the coast of Lā'ie (Rice 1923)
Mokuaaniwa	an island of the coast of Lā'ie (Rice 1923)
Naue-loli	a terrace, translates “move and change” (Wallace 2001)
Po'o-haili	a terrace, translates “head recalls” (Wallace 2001)
Pulemoku	an island of the coast of Lā'ie (Rice 1923)
Wailele	a stream (Wallace 2001)

Several mo'olelo pertaining to the Lā'ie region have been recorded and include themes associated with mo'ō, supernatural beings, 'awa cultivation, and the bountiful coastal fishing grounds. Interestingly, mention is made of Kaua'i chiefs in several of the stories which may indicate possible familial or marriage connections to the area. The following mo'olelo were compiled in *Hawaiian Legends* by William Hyde Rice and in *Hawaiian Mythology* by Martha Beckwith and are based on earlier compilations from early Hawaiian language newspapers and by a variety of authors including Samuel Kamakau and David Kalākaua (Rice 1923 and Beckwith 1970).

3.3 Pre-Contact Period of Lā'ie

What is known as Lā'ie today was traditionally two separate ahupua'a within the moku (district) of Ko'olauloa. The two ahupua'a, Lā'iewai and Lā'iemalo'o, were famed fishing locations (Handy and Handy 1972). Like across much of this part of O'ahu, maka'āinana (commoners) primarily occupied the coastal area to make use of the abundant marine resources. As the population grew, occupation and land use expanded inland for lo'i production, which became quite extensive and continues, although in lesser amounts, today. Scattered stone terrace remnants are extant along Kahawainui, Koloa, Wailele, and other streams (Handy 1940).

The name Lā'ie is said to derive its origin from two Hawaiian words, the first being lau (leaf) and the second being ie, referring to the ie vine of the red-spiked climbing pandanus tree which wreaths forest trees of the mauka regions of the Ko'olau range. This red-spiked climbing pandanus is sacred to Kāne as well as Laka (Beckwith 1970).

Evidence of widespread taro production can be found across the ahupua'a. According to Wallace (2001), there were taro terraces along the lower areas of the Kahawainui stream in a place called Waieli. These terraces were supplied with water from a large spring located in the area. Further up the Kahawainui stream were many terraces used for taro and other food cultivation, including mango and breadfruit. There are additional terraces along the Koloa stream, which is filled with extensive evidence of cultivation and habitation. All these findings indicate that Lā'ie may have had a dense population at one time.

Further according to Wallace (2001):

“Several large taro terraces that were famous anciently and have survived only in memory in the area are: Naue-loli (move-[and]-change), Kuamo'o (backbone), Mahanu (rest-[and]-breathe), Makali'i (Pleiades), Po'o-haili (head-recalls). All of these areas were closely tied to water, to the springs, and to the land at La'ie.”

The name Lā'ie becomes more environmentally significant through the Hawaiian oral history entitled Lā'ieikawai. In this history, the term ikawai (in the water) also belongs to the food-producing tree called kalalaikawai, which was planted in the place called Paliula's garden. According to Hawaiian oral traditions, the planting of the kalalaikawai tree in the garden of Paliula is symbolic of the reproductive energy of male and female, whose union in turn fills the land with offspring (Beckwith 1970). From its close association with nature through its name, and through its oral traditions and history, the community of Lā'ie takes upon itself a keen identity and responsibility of perpetuating life and preserving all life forms (Wallace 2001). A series of mo'olelo about Lā'ie is provided below.

3.3.1 Legend of Manuwahi

At Laie lived Manuwahi, Free Gift, with his son, Ka-haku-loa, The-Lord-of-a-Long-Land; his grandson, Kaiawa, Bitter Sea, and his great-grandson, Kauhale-kua, The-Village-on-the-Ridge. These men were the keepers of the akua at Laie. Manuwahi and his children were hairless and were possessed of supernatural powers.

Manuwahi planted black and white awa far up the mountains for the use of the akua. Every awa root planted was given one of these names, Kaluaka, The-Hole-That-Gives-a-Shadow; Kumumu, Blunt-Edged; Kahiwa, Best-Awa, or Kumilipo,

The-Root-of-Unconsciousness. This was done so that Manuwahi, when sending one of his sons for a piece of awa could designate the exact one he wished.

When the awa was given to him, Manuwahi would prepare it, and then summon the akua from the North, South, East, West, as well as from above and below, to drink of it. They prayed in this wise, before they drank:

Gods of the morning,
Gods of the night
Look at your progeny:
Grant them health,
Grant them long life;
Amama ua noa—it is free!

It happened that during that during this time, Kamehameha I, had come to conquer Oahu. He had succeeded in subduing all the island except Malae-kahana, between Laie and Kahuku. Determined to add this place to his conquests, the king sent one of his body guard, Ka-hala-iu, In-the-Shadow-of-the-Hala-Tree, with many of his bravest soldiers to subdue Malae-kahana. Ka-hala-iu marched as far as Hanapepe the first day, where he spent the night. Early the next morning he set out and meeting Manuwahi, whom he did not recognize, asked him where the powerful kahuna of Malae-kahana lived. Manuwahi answered, “Pass over the river and you will see a spring and nearby a hut with trees about it. This is his home.”

Ka-hala-iu did as he was told and had soon surrounded the hut with his soldiers. When Manuwahi's son came out Ka-hala-iu asked him, “Where is your father?”

“Did you meet a bald-headed man?” asked the boy in turn.

“Yes,”replied Ka-hala-iu.

“Well, that was my father. Why did you come here?”

“I came to kill your father by the orders of King Kamehameha,” answered the King's man. Deciding it would profit them nothing to kill the son, the soldiers departed for Hanapepe by the makai side of the hill and failed to meet Manuwahi, who had returned to his home by the mauka side.

The next morning the King's body-guard again surrounded with his soldiers the home of the kahuna. Manuwahi came out and asked, "What are you here for? Did you come for battle?"

"Yes," answered the fearless soldier, "We came to kill you."

Whereupon Manuwahi called to his assistance all the akua from the North, South, East and West as well as those from above and below. They came at once and gave battle to the soldiers of the king. The akua fought by biting and scratching their assailants and before long they had killed all but Ka-hala-iu. Ka-hala-iu cried out, "Spare my life, kahuna of the gods, and I will stay with you."

"What can you do if you stay with me?" asked Manuwahi.

"I will plant awa for you. I came from Hawaii, where I lived by planting awa," answered Ka-hala-iu.

But Manuwahi said, "I do not need you. Go back and tell your king that even his bravest soldiers were not able to conquer Malae-kahana. Tell him that all but you were killed by the akua there."

When Kamehameha had heard these words he sent Ka-hala-iu back with another body of soldiers with orders that he must conquer Malae-kahana. In the meantime, Manuwahi had moved with his sons up to the cave of Kaukana-leau, where the natives made their stone adzes. There the King's soldiers met them. As before, Manuwahi called all the akua to his aid. Again the soldiers were quickly put to death and only Ka-hala-iu was left. So Malae-kahana was not conquered.

Ka-hala-iu respected and admired Manuwahi so much that he was very anxious to remain with him, and so he asked again to be allowed to remain as an awa grower. Manuwahi consented this time and gave him one side of the valley to cultivate in awa.

One day as Ka-hala-iu was preparing the side hill for its cultivation, he noticed that on the opposite side of the valley, trees and bushes were falling in every direction, as if a whirlwind were uprooting them. This frightened him very much, as he could not understand the phenomenon, so he ran in great haste to

Manuwahi, and asked what it meant. Manuwahi told him that his akua were helping in the clearing of the side hill, and that if he wished them to help him, they would gladly do so. Ka-hala-iu was only too happy to have help, so he called upon the akua, and in a short time both sides of the valley were cleared, and were growing luxuriantly with the most beautiful awa.

After the battle, between Ka-hala-iu and the akua for the possession of Mala-kahana, Manu-ka, Frightener-of-Birds, one of Manuwahi's sons, moved to Kaneohe, where he died some time later. He was buried makai of the present road. The natives dug a very large grave, but before they could cover the body, the akua brought red dirt from Ewa, in a cloud, which filled the grave, and made a red hill above it, which can be seen to this day. There is no other red dirt in that district. (Rice 113-115)

3.3.2 Romance of Laieikawai

Laie-i-ka-wai and her twin sister Laie-lohelohe are born at Laie on Oahu of Kahauokapaka the father, chief of the northern lands of the island, and Malaekahana the mother. Since the father has vowed to let no daughter born to his wife live until she bears him a son, the mother conceals the birth of the twins and gives them to her own relatives to rear, Laie-lohelohe to Ka-puka-i-haoa to bring up at the heiau at Ku-kani-loko, and Laie-i-ka-wai to Waka, who first hides her in a cave near Laie which can be reached only by diving into the pool which conceals the entrance, and then takes her to the uplands of Puna. Here she builds a tapu house for her ward thatched with bird feathers, and gives her birds to wait upon her and mists to hid her from sight of men until such time as a suitable lover shall appear to make her his wife.

The first whose suit seems acceptable is Kauakahi-ali'i, ruling chief of Kauai and husband of Ka-ili-o-ka-lau-o-ke-koa (skin like the leaf of the koa). The reappearance of his wife whom he had mourned for dead prevents the appointed meeting, but on his return to Kauai he relates the adventure and the young chiefs of that island are stirred by the story. Aiwohikupua meets her nightly in dream and goes to woo her, but even the presence of his four sweet-scented kupua sisters, named after the four varieties of maile vine whose scent they inherit, cannot shake her refusal. Enraged by the insult, he abandons the sisters in the forest. His fifth and favorite sister, Ka-hala-o-mapuana (the fragrant hala blossom) refuses to abandon them. Through her clever

management she attracts the attention of Laie-i-ka-wai and the five are adopted as sisters and made the guardians of Paliuli. They drive off their brother upon his second attempt to win the chiefess, and a guardian mo'ō named Kiha-nui-lulu-moku (great mo'ō shaking the island) completes the discomfiture. Another and more favored young chief from Kauai named Hauailike is also expelled by the watchful youngest sister.

Waka now arranges a match with Ke-kalukalu-o-ke-wa, younger brother of Kaili-o-ka-lau-o-ke-koa and successor with her to Kauakahi as ruling chief of Kauai. Just as the formal marriage (hoao) is about to be consummated, a young rascal from Puna named Hala-aniani, aided by his sorceress sister, carries her off on his surfboard in place of the legitimate lover. Waka finds them sleeping together and abandons the girl in a rage, stripping her of mist and bird guardians and of the house thatched with feathers whose protection her loose conduct has forfeited. The five sisters and the great mo'ō, however, refuse to abandon their mistress. Since the Kauai chief has made her twin sister Laie-lohelohe his wife in place of their disgraced mistress, they determine to retrieve her fortunes by providing a more splendid match, and the clever youngest sister is dispatched, with the great mo'ō as carrier, to fetch their oldest brother who lives as a god in a tapu house in the very center of the sun in the highest heavens. While she is away on this errand the group leave Paliuli and travel about the island and, meeting an old family guardian and seer named Hulu-maniani, make their home with him as adopted daughters at Honopuwai-akua on Kauai. Throughout the course of the story this old seer (kaula) has been following around the islands after the rainbow sign which hovers over the place where Laie-i-ka-wai is hidden, determined to make this new divinity his chief and thus provide for his own old age.

Ka-onohi-o-ka-la (eyeball of the sun) looks favorably upon his sister's proposal and, putting off his nature as a god, he descends to earth, strips the enemies of Laie-i-ka-wai of their lands and power and, leaving Ke-kalukalu-o-ke-wa and the twin sister rulers over Kauai, gives to each of the sisters rule over one of the other islands of the group and takes Laie-i-ka-wai up on a rainbow to live with him in Ka-hakaekaea. All goes well until, on one of his visits to earth to see that all goes well there, he notices the budding beauty of his sister-in-law. He presses his attentions and succeeds in securing her. His wife in the heavens wonders what important affairs keep him so long on earth. In the temple at Kahakaekaea stands the gourd Lau-ka-palili which reveals to one who looks

within what is going on below. Laie-i-ka-wai discovers her husband's infidelity and reports him to his parents, who live with her in the heavens. They banish him to become a wandering spirit, the first lapu (ghost) in Hawaii. Laie-i-ka-wai returns to earth and lives like a god with her sister. Today she is worshipped as Ka-wahine-o-ka-liula (Lady of the twilight, mist, or mirage) (Beckwith 1970:526-528).

3.3.3 Laniloa, The Mo'o

Laniloa is the name given to a point of land which extends into the ocean from Laie. In ancient times this point was a mo'o, standing upright, ready to kill the passerby.

After Kana and his brother had rescued their mother from Molokai and had taken her back to Hawaii, Kana set out on a journey around the islands to kill all the mo'o. In due time he reached Laie, where the mo'o was killing many people. Kana had no difficulty in destroying this monster. Taking its head, he cut it into five pieces and threw them into the sea, where they can be seen today as the five small islands lying off Malaekahana: Malualai, Keauakaluapaaa, Pulemoku, Mokuaaniwa and Kihewamoku.

At the spot where Kana severed the head of the mo'o is a deep hole which even to this day has never been fathomed. (Rice 1923:112)

3.3.4 Story of Punaaiikoe

The mo'o woman Kalmainu'u lives in a cave at Makaleha in Laie, Waialua District, on Oahu. Going forth one day in search of a husband she finds the young Kauai chief Puna-ai-koae (Puna-tropic-bird eater) surfing on the waves of Ka-lehua-weha, lures him to her own board and carries him away to Kaena point, where they land and, ascending the Waianae mountains to Pu'u-ka-pele, descend to the stream of Wailea on the west side of which her cave is still seen today. After several months of love making and feasting Puna longs again for surf riding and his wife fetches a board from the corner of the cave but warns him against speaking to anyone while he is away. On his way to the sea two relatives of the mo'o woman, Hinalea and Aikilolo, hail him and warn him of his wife's true nature. They tell him that the board he carries is in reality her mo'o

tongue and that unless he can escape he must ultimately perish. He returns secretly to the cave and spies upon his wife in her mo'o form. Because of her nature as a spirit she knows what has happened and prepares to eat him, but since he shows no fear when she shows him her terrible forms, she forgives him and goes forth to slay his informants. They evade her for a time by creeping into a crack of the sea floor. Kuao and Ahilea tell her how to set a trap to catch them. Thus the basket trap for catching hinalea fish came to be invented, and Kalamainu'u is still an aumakua for catching hinalea fish in that vicinity. (Beckwith 1970:194)

3.3.5 Legend of Manonihokahi

Near the water hole in Malae-kahana, between Laie and Kahuku, lived a man called Mano-niho-kahi who was possessed of the power to turn himself into a shark. Mano-niho-kahi appeared as other men except that he always wore a tapa cloth which concealed the shark's mouth in his back.

Whenever he saw women going to the sea to fish or to get limu he would call out, "Are you going into the sea to fish?"

Upon hearing that they were, he would hasten in a roundabout way to reach the sea, where he would come upon them and, biting them with his one shark's tooth, kill them.

This happened many times. Many women were killed by Mano-niho-kahi. At last the chief of the region became alarmed and ordered all the people to gather together on the plain. Standing with his kahuna, the chief commanded all the people to disrobe. All obeyed but Mano-niho-kahi, Shark-with-One-Tooth. So his tapa was dragged off and there on his back was seen the shark's mouth. He was put to death at once and there were no more deaths among the women. (Rice 1923:111)

3.3.6 Tradition of the Mullet of Kaihuopalaai

One of the notable traditions of and includes descriptions of valuable resources in neighboring ahupua'a. The tradition was originally published in 1866 under the title "Ka Amaama o Kaihuopalaai" and offers an explanation as to why the famed migration of the 'anae holo (traveling mullet) around O'ahu occurs annually. It was published again in the

native language newspaper *Nupepa Ka Oiaio* between November 8, 1895 and February 14, 1896 by native historian, Moses Manu under the title “He Moololo Kaa Hawaii no ka Puihi o Laumeki, ka Mea i Like me ka Ilio Puapualenalena” (The Hawaiian tradition of Pūhi Laumeki [A Deified Eel] and how the ‘Anae-holo Came to Travel around O’ahu) (Manu 1895). The mo’olelo (newspaper article) cites numerous wahi pana (legendary places), features of the land, important events, resources, and residents of Honouliuli Ahupua’a. The narratives include important descriptions of lands fronted by Ke Awalau o Pu’uloa as the source of the ‘anae holo for fisheries around the island of O’ahu.

Nupepa Ka Oiaio

November 8, 1895

It is perhaps not unusual for the Hawaiian people to see this type of long fish, an eel, about all the shores and points, and in the rough seas, and shallow reefs and coral beds of the sea. There is not only one type of eel that is written about, but numerous ones that were named, describing their character and the type of skin which they had. In the ancient times of our ancestors, some of the people of old, worshipped eels as Gods, and restrictions were placed upon certain types of eels. There are many traditions pertaining to eels. It is for this fish that the famous saying “An eel of the sea caverns, whose chin sags.”²

Indeed, this is the fish that was desired by Keinohoomanawanui, the eels of the fishpond of Hanaloa, when he was living with his friend, Kalelealuaka, above Kahalepoi at Waipio uka, when Kakuhihewa was the king of Oahu. It was necessary for us to speak of the stories above, as we now begin our tradition.

It is said in this account of Laumeki, that his true form was that of an eel. His island was Oahu, the district was Ewa, Honouliuli was the land. Within this land division, in its sheltered bay, there is a place called Kaihuopalaai. It is the place of the anae (mullet), which are known about Honolulu, and asked for by the people, with great desire.

Kaihuopalaai was human by birth, but he was also a kupua [dual-formed being], who was born at Honouliuli. His youngest sister was known by the name of Kaihukuuna. In the days that her body matured and filled out, she and some of her elders left Ewa and went to dwell in the uplands of Laiemaloo, at Koolauloa, where she met her husband. The place known by the name Kaihukuuna, at Laiemaloo, is the boundary of the lands to which the anae of Honouliuli travel.

² An expression that was used to describe a prosperous person (Pukui 1983, #1545).

At the time that Kaihukuuna was separated from her elder brother and parents, Kaihuopalaai had matured and was well known for his fine features, and his red-hued cheeks. He was known as the favorite of his parents and all the family. There was a young woman, who like Kaihuopalaai, was also favored by her family. Her name was Kaohai, and she lived at the place where the coconut grove which stands at the estuary of Waikele and Waipio. Thus, these two fine children of the land of the fish that quiet voices (Ka ia hamau leo), that is Ewa, were married in the traditional manner.

In their youth, the two lived as husband and wife in peace. And after a time, Kaohai showed signs of carrying a child. This brought great joy to the parents and elders of these two youth. When the time came for Kaohai to give birth, her child was born, a beautiful daughter, who also had the same red-hued nature as her father. While Kaohai was cleaning the child and caring for the afterbirth, she looked carefully at her daughter and saw a deep red-spotted mark that looked like an eel, encircling the infant. Everyone was looking at the mark, contemplating its meaning, and Kaohai was once again taken with birth pains. It was then understood that perhaps there would be a twin born as well. But when the birth occurred, an eel was seen moving about in the blood, on the side of Kaohai's thigh. This greatly frightened the family and attendants, they fled, taking the child who had been born in a human-form, with them. Kaihuopalaai also separated himself from his wife. Kaohai remained with the blood stains upon her, and no one was left to help her.

It was the eel which had been born to her, that helped to clean Kaohai. He worked like a human, and Kaohai looked at the fish child which had been born to her, and she could find no reason to criticize or revile him. Kaohai then called to her husband, Kaihuopalaai, telling not to be afraid, and he returned. They both realized the wondrous nature of this child and cared for him at a good place, in the calm bay of Honouliuli. The named this eel child, Laumeki, and his elder sister, born in human-form, was named Kapapaapuhi. This eel became a cherished child, and was cared for as a God. Laumeki, the one who had been consecrated, asked that the first-born, his sister, also be cared for in the same manner, and a great affection was shared between the children born from the loins of one mother.

November 15, 1895

Thus, it is told in this tradition, that this is the eel Laumeki. It is he who caused the anae to remain at Honouliuli, and why they are known as "Ka anae o Kaihuopalaai" (The mullet of Kaihuopalaai). With the passing of time, the forms

of this eel changed. At one time, he was red with spots, like the eel called puhi paka, at other times he was like the laumilo eel.

A while after the birth of Laumeki, another child was born to Kaohai, a son. He was named Mokumeha, and he was given to Wanue, an elder relative of Kaihuopalaai's, to be raised. There are at Honouliuli, Ewa, places named for all of these people. The natives of that land are familiar with these places. For this Wanue, it is recalled in a song:

The thoughts are set upon the sea at Wanue,
I am cold in the task done here...

The eel-child Laumeki, followed the fish around in the expanse of the sea, and on the waves of this place. This was a work of love and care, done for his parents and family, that they would have no difficulties. In those days, this eel lived in the sea at a place where a stone islet is seen in the bay of Honouliuli, and he would not eat the fish which passed before him. He did these things for his parents and sister Kapapaapuhi.

Laumeki was very watchful of his family, protecting them from sharks, barracudas, and the long billed marlin of the sea which entered into the sheltered bay of Honouliuli, the land of his birth. Because of his nature, Laumeki did many wondrous things. It was Laumeki who trapped the Puhi lala that had lived out in the sea, in the pond of Hanaloa. This Puhi lala was the one who bragged about his deeds, and when he was trapped his eyes glowed red like the flames of an earthen oven.

It is perhaps worthy here, my readers that we leave Laumeki and speak of Mokumeha and his journey around Oahu. At the time when the sun rested atop the head [describing Mokumeha's maturity], and his fine features developed. He was very distinguished looking. At that time, he determined to travel around the island of Oahu. He asked his parents and guardian permission, and it was agreed that he could make the journey.

Mokumeha departed from Honouliuli and traveled to Waianae, and then went on to Laiemaloo, at Koolauloa, the place where the youngest sister of his father dwelt. She [Kaihukuuna] was pounding kapa with her beater and thinking about her elder brother. She rose and went to the door of her house and saw a youth walking along the trail. Seeing the youth, her thoughts returned once again to her brother Kaihuopalaai and his wife Kaohai. The features of this youth in every way, looked like those of his father, and upon seeing him, tears welled up

in Kaihukuuna's eyes. She called to the youth inquiring about his journey, and he responded, answering each of the questions. The moment the youth said the name of his parents, and the land from which he came, Kaihukuuna wept and greeted her nephew in the custom of the people of old.

This greatly startled her husband who was out in the cultivated gardens tending to his crops. He thought that perhaps one of his own family members had arrived at the house. When he reached their house, he saw the strange youth and he quickly went to prepare food for their guest. In no time, everything was prepared, and he then went to his wife asking her to stop her crying, and invite the visitor to eat of the food that had been prepared. He told his wife, "Then, the talking and crying can resume." She agreed and they sat down together and ate, and had a pleasant time talking.

Kaihukuuna then asked Mokumeha about the nature of his trip, and he explained that he was traveling around Oahu on a sight-seeing trip. Kaihukuuna told him, "It is wonderful that we have met you and can host you here." She then asked him to consider staying with her and her husband at Laiemaloo, where all of his needs would be met. "We have plenty of food and if you desire a wife, we can arrange that as well." Mokumeha declined the invitation, explaining his desire to continue the journey and then return to Honouliuli.

November 22, 1895

Now it is true that at this place, Laiemaloo, there was grown great quantities of plant foods, but the one thing that it was lacking was fish. Mokumeha, his aunt, and her husband, Pueo, spoke about this, and it was determined that Pueo should go to Ewa. Mokumeha instructed him to seek out Kaihuopalaai, Kaohai, Kapapaapuhi, and Laumeki, and to ask for fish. He told them that "Laumeki will be able to lead the fish to you here at Laiemaloo."

Pueo departed for Honouliuli [various sites and features are described along the way]... and he met with Kaihuopalaai. Kaihuopalaai's love for his sister welled up within him, and it was agreed that fish would be given to her and her family. But rather than sending fish home with Pueo in a calabash—fish which would be quickly consumed, causing Pueo to continually need to make the journey between Laiemaloo and Honouliuli—Kaihuopalaai said that he would "give the fish year round."

November 22, 1895

When Kaihuopalaai finished speaking, Pueo exclaimed, "This is just what your

son said you would do!” Kaihuopalaai and Pueo then went to the house of Kapapaapuhi, who, when she learned that Pueo was her uncle, leapt up and greeted him. They discussed the request for fish, and ate while speaking further. Kaihuopalaai then asked, “Where do you come from?” Pueo answered, “Laiemaloo,” and he described the land to her.

The next day, Kapapaapuhi and Pueo went on a canoe out to the stone islet where Laumeki lived. They took with them food, and as they drew near the stone, the water turned choppy like the water of the stormy winter season. The head of Laumeki rose out of his pit and remained on the surface of the water. Kapapaapuhi offered him the awa and food she had brought with her. This eel was cared for just as a chief was cared for. When he had eaten his food and was satisfied, he rested on the surface. Kapapaapuhi explained to Pueo that he too would need to care for and feed Laumeki, in order to obtain the fish he needed. Kapapaapuhi then called out to Laumeki, “Here is an elder of ours, tomorrow you will go with him and take the fish of our parents with you.”

December 6, 1895

The next day, Pueo rose while it was still dark, and the stars, Aea, Kapawa and Kauopae were still in the heavens. He prepared the foods needed for Laumeki, and prepared the canoes. He and his wife's family and attendants then went towards Laumeki's house, where he was resting. When Laumeki saw the canoes coming toward him from Lae o Kahuka, he rose up before them. Together, they passed Kapakule, the place where the sharks were placed in ancient times as play things of the natives of Puuloa. When the canoes and people aboard reached the place where the waves of Keaalii break, Laumeki cared for them, to ensure that no harm would befall them. This place is right at the entrance of Puuloa.

As the rays of the sun scattered out upon the water's surface, the people on the canoes saw the red-hues upon the water and upon those who paddled the double-hulled canoes. Pueo then saw something reflecting red, beyond the paddlers, and below the water's surface. Pueo realized that it was Laumeki with the anae fish. The anae traveled with Laumeki outside of Kumumau, and past Ahua. They continued on past the Harbor of Kalihi at Kahakaaulana, with the fish being urged on, by the people back at Kalaekao, Puuloa, and Laumeki was at the front, leading the fish at Mamala... They continued on around Kawaihoa, Makapuu, and traveled passed Koolaupoko, and on past Laniloa at Laiemaloo, Koolaupoko...

December 27, 1895

...This is how the mullet came to regularly travel between the place called Kaihukuuna at Laiemaloo and Honouliuli at Ewa...

January 10 and 17, 1896

...Mokumeha and Laumeki returned to Honouliuli, and Mokumeha offered a prayer chant to his elder brother:

O eel,
O Laumeki,
Who passed before the point,
Dwelling in the pit,
Eel of the cavern,
You of the kauila (body) form,
That is the form of the Laumilo,
Your wooden body,
It is Laumeki.
Amen, it is freed...

...While Laumeki was resting at Honouliuli, Mokumeha set off once again to visit various locations around the island of Oahu. He bid aloha to his family and walked across the broad plain of Ewa. He arrived at Kapukaki, which is the boundary of the land of the streaked seas, that land in the calm, reddened by the dirt carried upon the wind. This is where Ewa ends and Kona begins... (Manu 1895)

3.4 Early Historic Period to Mid-1800s

The earliest information about Lā'ie states that it was a small, sparsely populated village with the distinction of being a pu'uhonua – a sacred sanctuary of refuge. In any case, pu'uhonua were abolished in 1819 when Kamehameha II abolished the traditional kapu system, which provided such sanctuaries. There is no further evidence that Lā'ie was ever used again as a pu'uhonua (Wallace 2001).

Missionaries began spreading out across the islands including the north shore and windward coast to convert the native and foreign born after the fall of the kapu system. They set up schools and chapels along the windward coast and provide some of the first information on

the population and demographics of the area at that time. At this time the area was primarily Hawaiian and grew little over the next few decades due to a number of factors including introduced diseases and the settlement of Hawaiians in population centers like Honolulu. In the 1830s, it was reported that the population of Lā'ie was only about 400 people. In 1853, twelve years before the Mormon church purchased Lā'ie, the population had only increased to 450 (Hill 1978).

There were 10 streams that flowed through the ahupua'a of Lā'ie before 1865. Their names were: Kaho'oleinapea, Kaluakauila, Kahawainui, Kaihihi, Kawaipapa, Kawauwai, Wailele, Koloa, Akaki'i, and Kokololio. There were more streams flowing through the ahupua'a of Lā'ie than through any of the other surrounding ahupua'a (including Kaipapau, Hau'ula, Malaekahana, Keana, and Kahuku).

In 1846 to 1848, the traditional Hawaiian framework of landownership – by King, ali'i nui, and konohiki – was restructured through the Great Mahele into its respective ahupua'a. Lā'ie followed the pattern of ahupua'a as a pie-shaped land division allowing the inhabitants of the area to hunt and collect timber in the mountains, to farm in the midlands, and to fish in the ocean. However, only the valleys in the foothills had ample fresh water in Lā'ie (Wallace 2001).

3.4.1 The Māhele (1847-1855)

In the years between 1847 and 1855, the lands of Hawai'i were divided under the Māhele. Prior to Western contact, all land in the Hawaiian Islands was held by the chiefs as descendants of the gods—no one owned the land. After Western contact, some foreigners were granted gifts of land for services to Kamehameha I and/or his heirs. With a growing number of foreigners arriving and establishing business interests or in service of the mission stations, many petitioned for fee-simple title to land upon which they lived or worked. In 1848, Kamehameha III agreed to the Māhele 'Āina, which defined the land interests of the King, some two hundred and fifty-two high-ranking Ali'i and Konohiki (including several foreigners who had been befriended by members of the Kamehameha line), and the Government.

As a result of the Māhele, all lands in the Kingdom of Hawai'i and associated fisheries came to be placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) Konohiki Lands. The “Enabling” or “Kuleana Act” of the Māhele (December 21, 1849) further defined the framework by which hoā'āina (native tenants) could apply for, and be granted fee-simple interest in “Kuleana” lands (cf. Kamakau, 1961:403-

403). The Kuleana Act reconfirmed the rights of *hoa'āina* to: access, subsistence and collection of resources from mountains to the shore, which were necessary to sustain life within their given *ahupua'a*. Though not specifically stated in this Act, the rights of piscary (to fisheries and fishing) had already been granted and were protected by earlier Kingdom laws. Land Commission Awards (LCAs) were awarded to native Hawaiians, naturalized foreigners, long-term resident foreigners, and people of foreign descent born in the islands who actively lived on and worked their lands and could prove occupancy before 1845. LCAs provide basic information on how awarded lands were utilized. The two *ahupua'a* that comprise Lā'ie, Lā'iewai and Lā'iemalo'o, were retained by Kamehameha I following his conquest of O'ahu. They were subsequently given to the half-brother of Kamehameha, Kalaimamahū, then to his daughter Kekāuluohi, and later to her son William C. Lunalilo during the Māhele. Lā'iewai Ahupua'a, which includes the project area, was awarded to William C Lunalilo as Āpana 35 of LCA 8559B in 1850 (Figure 5).

The distribution of the more than 60 LCAs in the Lā'ie area indicate that much of the fertile lands of the area were under cultivation around the lower portion of Kōloa Stream, the lower portion of 'A'akaki'i Gulch, and along Kahawainui Stream and its many tributaries. The LCA claims include house lots, numerous taro lo'i (taro patches) irrigated by 'auwai (ditch) systems interspersed with kula lands and habitation sites. Taro was the dominant crop grown in the area, but others mentioned in the LCA documentation included 'awa, coffee, gourd, and various melons and grasses. A total of 9 kuleana claims were awarded in the vicinity of the project area and consisted almost entirely of house lots with a couple lo'i kalo focused mainly along the south bank of Kahawainui Stream. Portions of two LCAs are located within the project area and include LCA 3859, Āpana 2 to Pahumoa and LCA 4326, Āpana 5 to Koalaukani, both of which consisted of house lots. The various LCA are shown in relation to the project area on a 1931 Territory of Hawaii map of the Lā'ie Mālaekahana area (Figure 6). A listing of LCAs in the vicinity of the project area is included as Table 2.

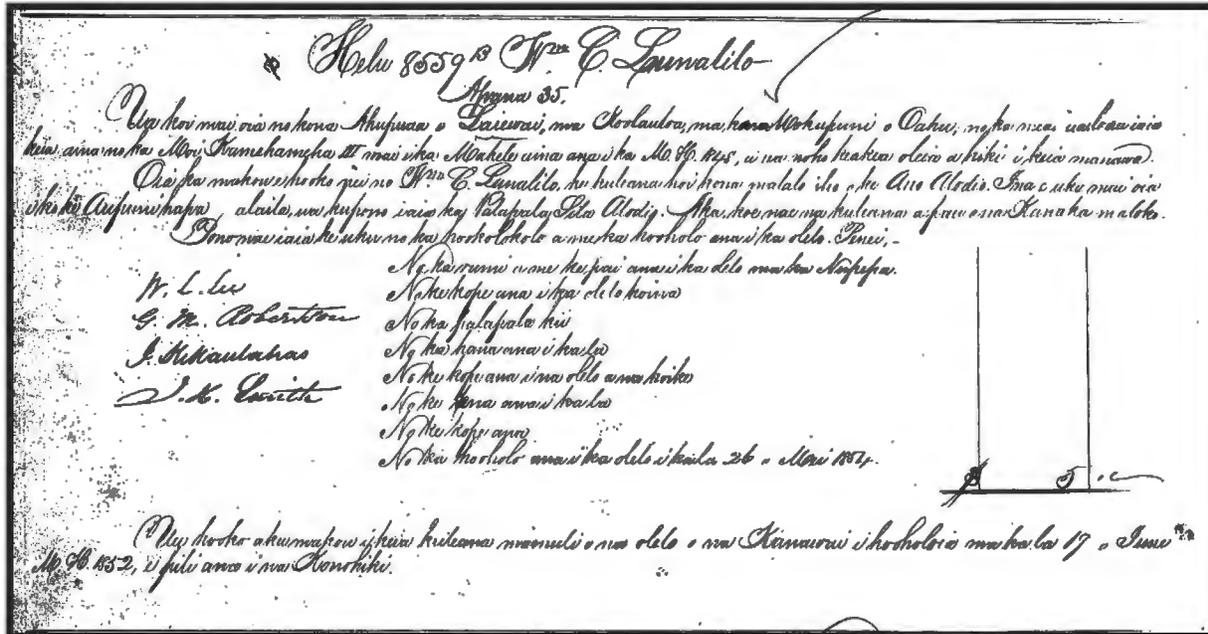


Figure 5. LCA 8559B Āpana 35 awarded to William C Lunalilo for Lā'iewai Ahupua'a

Table 2. List of Land Commission Awards in the vicinity of the project area

LCA or Royal Patent	Claimant	Location	Description
LCA 3789	Opala	Lā'ie	1 lo'i
LCA 3859, Āpana 2	Pahumoa	Lā'ie	House lot
LCA 3873, Āpana 4	Paakahi	Lā'ie	1 lo'i
LCA 3933, Āpana 5	Napaeko	Lā'ie	House lot
LCA 3945, Āpana 3	Napahu	Lā'ie	House lot
LCA 4061, Āpana 5	Kuku	Lā'ie	House lot
LCA 4326, Āpana 5	Koalaukanu	Lā'ie	House lot
LCA 8580, Āpana 5	Keliwawaiole	Lā'ie	House lot
LCA 10428, Āpana 3	Ulukou	Lā'ie	House lot

1 **3.4.1 LDS Acquisition**

2
3 Following the Māhele and the smallpox epidemic of 1853, the native population along the
4 valleys and plains of the windward coast and north shore began to decrease rapidly. With the
5 opening of large tracts of land to foreigners and the end of commercial whaling in the 1860's
6 the economic driver of the islands began to change to ranching and commercial agriculture.

7
8 In 1861, the estate of William C. Lunalilo sold the lands of Lā'iewai and Lā'iemalo'o to Henry
9 H. Howland. He sold an approximately 300-acre portion of Lā'iewai to Robert Moffitt in 1863
10 who in turn sold the land to Charles Hopkins that same year. It should also be noted that
11 Howland also sold some land in Lā'ie to Thomas Dougherty which would eventually become
12 the foundation for the Mormon Church in Hawai'i. Hopkins added the property to his already
13 extensive land holdings which included the entire ahupua'a of Kahuku and the majority of the
14 land in Mālaekahana (Maly and Rosendahl 1995).

15
16 The Kahuku Ranch was established by Hopkins on his land holdings and focused mainly on
17 cattle and sheep ranching. The ranch was sold to Herman A. Widemann in 1872, followed by
18 Julius L. Richardson 1874, and James Campbell in 1876. A 275-acre portion of the Kahuku
19 Ranch was present within Lā'iewai Ahupua'a and is shown just to the northwest of the project
20 area on an 1881 Hawaiian Government survey map of the island of O'ahu (Covington 1881).
21 By the 1880's ranching in the area was widespread and the ranch lands of Lā'ie consisted of
22 barren tree-less open country utilized for raising livestock³. The ranch operated under the
23 control of James Campbell until 1899 when it was leased to Benjamin F. Dillingham (Maly and
24 Rosendahl 1995). The ranch continued operations through the mid-1900's when it was
25 closed.

26
27 The history of the Mormon church in Hawai'i began in 1850 when eight missionaries were
28 dispatched to the islands by Brigham Young to establish a colony with the goal of converting
29 the foreign born and native population. The Pālāwai Basin on Lāna'i was chosen as the site
30 for the new colony in 1853 but by 1864 the "Lāna'i experiment" had failed and a new colony
31 was proposed. In 1865 Latter-day Saints Mission President Francis A. Hammond purchased
32 an approximately 6,000-acre plantation called "Lā'ie" from Thomas Dougherty to establish a
33 mission settlement. The Lā'ie Plantation and mill were established in 1868 when the focus of
34 cultivation shifted from cotton and corn to sugarcane. Infrastructure including a flume and
35 irrigation ditches were constructed in the area in the next few decades and a larger more

³ Information taken from kama'āina interviews conducted from June to September 1970 by Clinton Kanahale with the assistance of William Sproat

1 efficient mill was constructed (Maly and Rosendahl 1995). The first Latter-day Saints chapel,
2 named 'Ihemolele, was constructed of stone in 1883. An 1884 Hawaiian Government survey
3 map of Lā'ie shows the project area in relation to the Mormon settlement, government road,
4 and sugar cane fields at that time (**Error! Reference source not found.**).

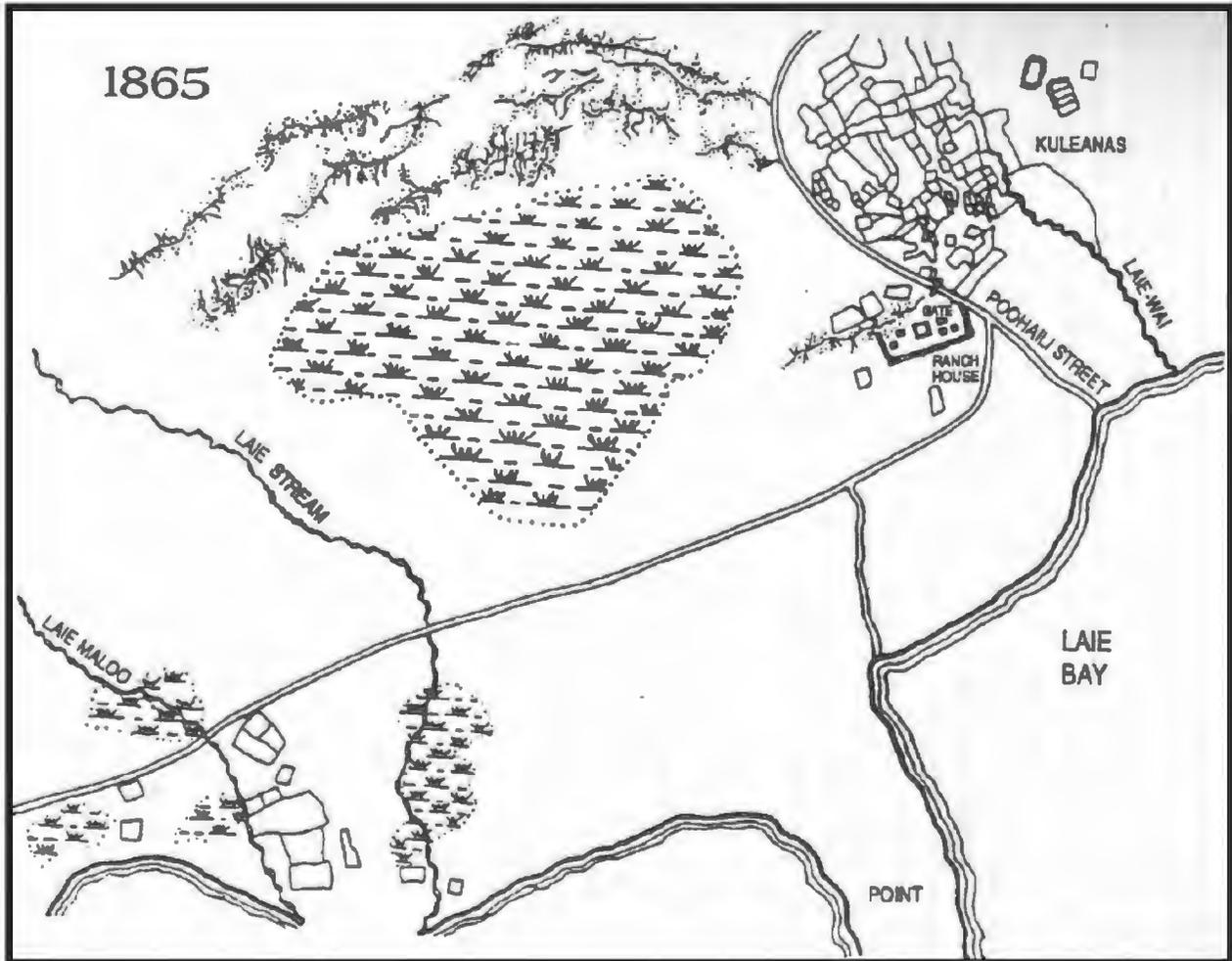
5
6 Up until the turn of the century Hawaiians were the dominant workforce at the Lā'ie
7 settlement. This was mainly due to the practice of leasing land to converts on which they
8 could cultivate traditional crops of their choosing. In the 1880's and 1890's Hawaiians
9 began to move from their thatched houses into the mission houses in the settlement. The
10 settlement of Lā'ie during this time and a legend from the vicinity of the project area are
11 mentioned in Henry M. Whitney's 1895 book *The Tourists Guide Through the Hawaiian*
12 *Islands* as follows:

13
14 Laie,—thirty-two miles from Honolulu, is a colony and the headquarters of the
15 Mormons on these Islands. The settlement possesses a small sugar
16 plantation, (with a somewhat primitive mill) a cattle ranch, a number of taro
17 patches and lands for sweet potatoes and other products. A number of white
18 Mormons, under a head man from Salt Lake City, occupy the mission
19 premises, which are situated on a hill overlooking the whole settlement. These
20 have the supervision of the entire estate in various capacities, and are also
21 sent out as missionaries round the islands. There is a considerable and quite
22 a prosperous native settlement, all Mormons. The converts have land given
23 them, rent free, and are assisted in building their houses. Polygamy is not
24 allowed either among whites or natives, and the settlement is conducted on
25 lines satisfactory to the most ultra portion of Mormon opponents.

26
27 The Mormons first came to the islands in 1850. They have a large number of
28 converts in all parts of the group, estimated at one-tenth in 1890. The Temple
29 at Laie, will accommodate considerably over 1,000 people. A valley behind
30 the mission-house contains several artesian wells and is cultivated in rice by
31 Chinese. An artesian well also supplies the plantation with water.

32
33 One mile farther on, and near the road, is the famous water-hole, in which the
34 woman fleeing the warriors of Kamehameha dived and disappeared. They
35 coming and supposing her to be drowned, bathed at their leisure and talked
36 freely of their plans. The woman, meanwhile hidden in a cave, the entrance to
37 which was below the surface of the water, listened to their talk, and after they
38 had left, came out of her hiding place, making her way to the mountains

1 where her friends, the braves of Oahu, were concealed, revealed to them the
2 plans and purposes of the enemy. (Whitney 1895:46-47)
3
4 By the turn of the century many changes had taken place within the settlement of Laie. The
5 old mission home was torn down and a new mission home was constructed, and the sugar
6 mill had been shut down and all sugarcane was being sent to the Kahuku mill for
7 processing. Additionally, Chinese families began moving into the area and began digging
8 artesian wells to cultivate rice. These changes and the influx of cheap foreign labor would
9 cause drastic change to the ethnic demographic of the workers at the plantation in the early
10 decades of the 20th century (Berge 2010).
11
12



13
14 *Figure 7. 1865 Lā'ie Map*
15

1 In 1970, Clinton Kanahale⁴ interviewed Gus Kaleohano regarding life in Lā'ie in the late 20th
2 century. Mr. Kaleohano was born in Lā'ie in 1883, and when asked about Lā'ie during his
3 childhood, he recounted the following:

4

CK: Kou wa kamalii heaha ke ano o keia aina o Laie nei?

CK: When you were a boy, how was Laie like then?

GK: Kula panao, kula hanai holoholona, hanai pipi.

GK: Barren, ranch land for animals, for raising cattle.

CK: Aole kumulaau a kakou ke ike nei keia manawa?

CK: No trees like those we see here now?

GK: Aole kumulaau; kula ka aina, hanai holoholona, hanai ka pipi (panoa ka aina). Panoa ka aina, panao ka aina. Ka wa i hoouna ia o Iosepa Kamika ai i kona mau la opio, kona hiki mua ana mai, a ike oia i ke aina, kula panao. Aole hale misiona o ia manawa. Noho me na poe kahiko o ka aina o Laie, a malama ia aku, a ua hookipa ia.

GK: No trees; just open country for raising animals, raising cattle (the land was barren). When Joseph Smith was sent here in his days of youth, when he first arrived, he saw this land, a barren range. There was no mission home at the time. Stayed with the natives of the land of Laie, who took care of him and entertained him.

5

6

7 In an interview (1970) of Mr. John Broad (Lā'ie community member) by Clinton Kanahale, Mr.
8 Broad recounts the Hawaiian and Samoan LDS communities in Utah being beckoned back to
9 Hawai'i by LDS President Joseph F Smith.

10

JB: Hele mai oia e haiolelo mai ia makou. Olelo mai oia pili ana o ka halelaa e kukulu ia ana inei o Hawaii. Olelo mai oia ka poe e makemake ana e hoi i Hawaii, makemake ia lakou e hoomakaukau e hoi ia Hawaii. "No ka mea ua hele mai nei oukou ineinei i ka aina haole mamuli o ka hana i ka halelaa, a

JB: He came to address us. He disclosed that a temple would soon be erected here in Hawaii. He said to the people who wanted to return to Hawaii they were being asked to prepare to return to Hawaii. "Because you have come here to this haole country for the purpose of the temple, and this place was

⁴ From June to September of 1970, Clinton Kanahale, with the assistance of William Sproat, interviewed twenty individuals whose exceptional knowledge of Hawaiian language, history, and culture would prove valuable to future generations and help to "preserve the Hawaiian language." The subjects of the interviews range from Hawaiian culture, to the history of specific places such as Lā'ie to the personal experiences of Native Hawaiians throughout their lives.

ua wae ia keia aina na oukou e noho ai, a e
kanu ka meakanu, hanai na holoholona i
mea ai, i hiki ai oukou ke hele i ka halelaa
ineinei i Loko Paakai. Keia manawa ai ka
halelaa. E hoi i keia manawa. Makemake au
ia oukou e hoi, e hoi, e hoi hou oukou i
Hawaii no ka mea, no ka mea no oukou
kumu i hele mai ineinei ne oukou
makemake.”

chosen for you people to stay on, to grow
crops, raise livestock for food, so that you
people might go to the temple here in Salt
Lake City. This time you will have a temple.
Return home now. I want you people to
return, to return, to return again to Hawaii
because, because the temple was the reason
for your coming here, if you want to return.

1
2
3



4
5
6

Figure 8. Lanihuli Mission House, 1899

1 **3.5 1890s to Present**
2

3 The last century brought extensive changes to the traditional rural, agricultural area. There
4 was a marked shift from the traditional agricultural practices developed by Native Hawaiians
5 to a more modernized agricultural industry that emerged from growth of the foreign population
6 in the islands.

7 **3.5.1 Sugarcane and Plantation Economy**
8

9 In 1898, the first large water pump was installed on the plantation on an artesian well. With
10 the installation of the pump, the sugar production of the LDS plantaiton became far too large
11 for the community's milling capacity. Between 1895 and 1917, the sugar output in Lā'ie
12 increased ten-fold. Shortly after, sugar production in Lā'ie was turned over to the Kahuku
13 Sugar Plantation (Baldrige 1979). Sugar became the economic mainstay of Lā'ie for many
14 years.

15
16 A series of recorded interviews (Safsten & Baldrige 1981) conducted by Ron Saften and
17 Kenneth Baldrige from BYU – Hawai'i Campus illuminate Lā'ie's early 20th century plantation
18 narrative. The interviewee, Mr. Eldon Morrell, was an LDS missionary at the time, and would
19 later go on to be a fixture in the community as an educator. Mr. Morrell details the Lā'ie
20 plantation life in detail, including the cultivation of taro by Hawaiian families well into the 20th
21 century. The cultivation of taro by Hawaiian families in the 1920s is further detailed in another
22 one of Baldrige's interviews (1979) of local community member Arnold K. H. Kekahuoha. Mr.
23 Morrell's interview (Safsten & Baldrige, 1981) also references Filipino, Puerto Rican, Chinese,
24 and Japanese communities who worked on the plantations, consistent with the broader
25 plantation narrative across Hawai'i.
26



1
2 *Figure 9. Lā'ie Plantation Workers, ca. 1890 - 1920*

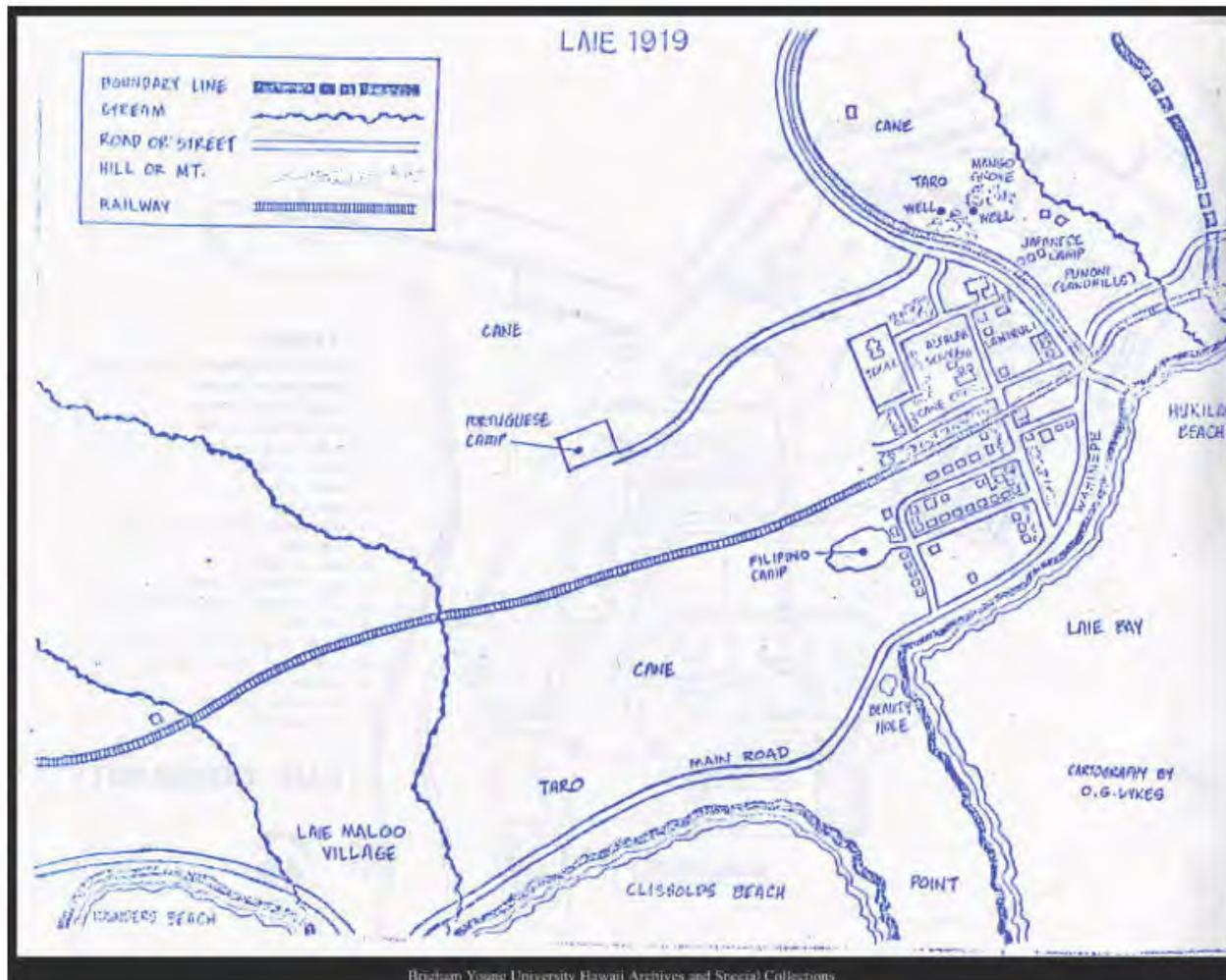
3



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1
2 *Figure 10. Burning Cane Fields ca. 1890 - 1920*

3



1
2 *Figure 11. 1919 Lā'ie Map*

3
4 **3.6 20th Century History**

5
6 Due to land use changes and the introduction of cheap plantation labor the demographic of
7 the laborers at the Lā'ie Plantation changed from primarily Hawaiian to Japanese and
8 Chinese in the first couple decades of the 20th century. During this time the sugar plantation
9 thrived, and the town grew significantly due in part to construction of the Ko'olau Railway
10 from Kahuku to Lā'ie in 1903 which connected the plantation to the main OR&L line to
11 Honolulu (Conde and Best 1973). The current Lā'ie Hawai'i Latter-day Saints Temple
12 location was on the site of the former temple and was dedicated in 1919⁵.

13
⁵ BYU-Hawaii, n.d., Available at <https://about.byuh.edu/brief-history>

1 By 1920, the Lā'ie Plantation had fallen into deep debt and Filipino laborers had become the
2 dominant ethnic group. With rising costs and shrinking profits, the Lā'ie Plantation closed in
3 1931. The Great Depression and the years that followed devastated the area's agricultural
4 economy and the robust water infrastructure became decrepit. E.S. Craighill Handy describes
5 the remnants of traditional Hawaiian and historic agriculture in Lā'ie as observed in the late
6 1930's in the *Hawaiian Planter Volume I*:

7
8 There are many streams in this ahupua'a. Kahooleinapea is the first stream
9 reached after leaving the ahupua'a of Malaekahana. Here terraces are still in
10 use. The old terrace area named Waieli, along the lower reaches of Kahawainui
11 Stream is now under cane cultivation; it was once watered from a spring.
12 Farther up Kahawainui Stream there were formerly many terraces, according to
13 Kekela Kalua. About 2.5 miles up Wailele Stream there are evidences of old
14 taro terraces.

15
16 Along Koloa Stream, beginning at a point about 2 miles inland on its twisting
17 course, there are abandoned groups of terraces at intervals, many of them now
18 half hidden in the jungle growth. Just below the old water gates, on the south
19 side of the stream, there is a group of 15 small terraces, all with stone facings,
20 and nearer the gates, on the north side, a smaller group of five or six.
21 Immediately beyond a sharp curve in the stream bed, and evenly spaced at
22 intervals on either side of the stream, are 15 or more very old mango trees
23 planted in lines. At this point, on the left bank, going upstream, the valley
24 widens into a beautiful flat area which was evidently an extensive dwelling site.
25 There are about eight old breadfruit trees on the hillside and more huge old
26 mangos. This flat area, extending upstream to the sheer cliff wall at the next
27 stream bend, is terraced with low stone lines. Here there are 11 terraces, from
28 15 to 40 feet wide and from 20 to 30 feet long, now partly overgrown but very
29 distinctly outlined. They could not be replanted unless the mangos were
30 destroyed as the whole surface of the soil is webbed with a network of tree
31 roots. The stream makes a horseshoe bend at this point, and beyond are more
32 mangos planted in lines for a distance of several hundred yards; and at the
33 upper end of the site is a small house platform. Around the next curve is an
34 area of three small lo'i; beyond this there is no further evidence of planting, the
35 stream becoming more and more winding and the valley more and more narrow.
36 Kakela Kalua of Laie says that this was formerly konohiki land, and now belongs
37 to the Mormons.

38
39 The comparatively flat land between the hills and the seacoast in Laie was
40 divided into many clearly named small districts in the old days—a considerable
41 portion of it, back from the beach strip, having been planted in wet taro. Kekuku,
42 75-year old kamaaina of the place, says that one of the largest single areas
43 formerly under taro cultivation was the land, over 60 acres in extent, lying back
44 of the present Mormon Temple, and known as Kapuna (the spring) because it

1 was watered by one large and several lesser springs. Kekuku's family owned
2 much of the Laie land for generations. McAllister says that the flat lowland on
3 the Hauulu side of the Mormon Temple, now drained and planted in cane, was
4 "formerly a famous taro land. The old Hawaiian name for the land is now lost,
5 and it is known as Kanaana, an adaptation of Canaan, the Land of Promise of
6 the Isrealites. In with the taro were extremely large fish... About this taro land
7 the old Hawaiian settlement was located."
8

9 According to Kekuku, there was another terrace area in the flatland named
10 Kaholi, seaward of Kapuna, now abandoned. There is also a large area farther
11 seaward known as Kuamoo, which is now planted in wet taro. Naueluli, more
12 seaward still, had terraces formerly, as did Maklii to the west. Inland and west
13 of Kapuna, the largest old terrace plantation is Poohaili, a mound where mango
14 trees stand, surrounded by terraces, eight of which are still cultivated. Mahanu,
15 inland from the Mormon Temple is marked by old coconut trees and is the
16 upper end of the terrace area; here the kula begins. (Handy 1940:89-91)
17
18

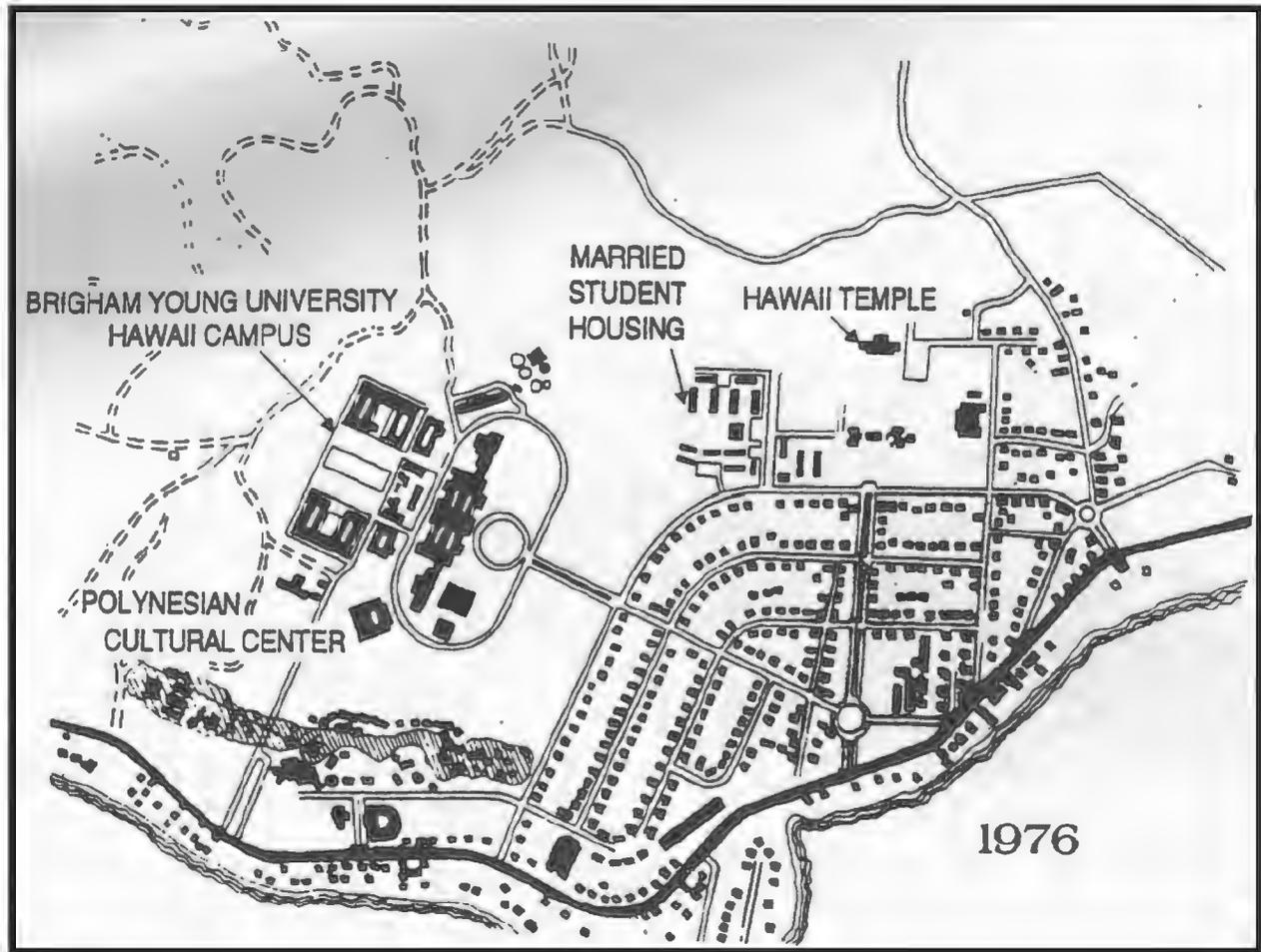


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19
20 *Figure 12. Ko'olau Railroad, ca. 1906 - 1946*

1 Lā'ie town continued to grow following World War II and the Mormons constructed the Church
2 College of Hawaii in 1955 which would later become Brigham Young University-Hawai'i. The
3 completion of the university spurred growth in Lā'ie as did the construction of the Polynesian
4 Cultural Center in 1963 which transformed the area and turned Lā'ie from a rural Mormon
5 town to a prime tourist destination. Lā'ie continued to grow through the 1970's, 80's, and
6 90's but not without controversy. By 1995 the growing population of Lā'ie, then around 5,000
7 people, needed an expansion to the existing sewer plant which was constructed in 1980. It
8 was believed that the initial project had damaged and destroyed portions of Nioi heiau and
9 that the expansion would be a further desecration of the heiau⁶. An agreement was eventually
10 reached which culminated in a cultural assessment and cultural significance study for Nioi
11 heiau and the surrounding area (Maly and Rosendahl 1995). Lā'ie has grown relatively little
12 since that time and the town is focused primarily on tourism with many members of the
13 Mormon church working and living in the area.

⁶ *The Honolulu Advertiser*, Sunday, October 22, 1995, pg. A2



1
2 Figure 13. 1976 Lā'ie Map
3

1 4.0 Ethnographic Interviews

2 Four ethnographic interviews were conducted for this CIA. Through this process, practitioners,
3 including area residents and farmers, were identified and interviewed. Summaries of the
4 interviews are provided below.

5 4.1 Interview with Josephine Ah Puck

6
7 **Interviewer:** Mathew Sproat

8 **Interviewee:** Josephine Ah Puck

9 **Date:** 8/18/2021

10 **Location:** via phone

11 12 **Biography**

13 Ms. Ah Puck is a customer service manager at Hawaiian airlines. She was born in Honolulu
14 but raised in Lā'ie. She still lives in Lā'ie, in the same house in which she grew up.

15 16 **Overview**

17 Ms. Ah Puck is associated with the project area through her personal narrative in the area.
18 Since Ms. Ah Puck was raised her entire life in the area, she possesses an intimate knowledge
19 of Lā'ie. This narrative extends beyond Ms. Ah Puck to her children (whom she raised in Lā'ie),
20 and her parents, who also grew up in the community.

21 22 **General Discussion**

23 Ms. Ah Puck shared a story from when her father was a superintendent for the City and County
24 of Honolulu. He worked at the Lā'ie yard in the area. To prevent flooding in the community,
25 they would have to dig through the sand to allow water to flow into the ocean. Through the
26 years, they found that this was the only place that could be relieved to prevent houses from
27 flooding. Since then, there are more homes in the area surrounding the stream. Ms. Ah Puck
28 also shared that when she was a child, there was more debris in the stream during rain events
29 such as trees and logs. She noted that she doesn't see that happening as much anymore.

30
31 Ms. Ah Puck shared a story from her mother, who lived near the graveyard as a child. Her
32 mother told stories of seeing fireballs fly in the area. Further, she noted that near the stream
33 at Hukilau Beach, there was an ancient fishing house where they would keep nets and boats.

34 35 **Cultural Resources**

36 Ms. Ah Puck informed the interviewer that the stream runs from the mountain and empties
37 into the ocean. When she was a child, they could find 'o'opu in the stream during heavy rain

1 events. She would also go with her father and uncles to the beach where they would fish for
2 shrimp. Ms. Ah Puck was not able to identify any plants in the area.

3
4 Ms. Ah Puck explained that there are graveyards connected by a bridge on both sides of the
5 stream. She posited that dredging may create an issue of access to the graveyard. Since her
6 mother's grave is located in this graveyard, she would have an issue with a situation that
7 would prevent her from being able to access the space.

8 9 **Traditions and Customs**

10 Ms. Ah Puck informed the interviewer that she knows a family who uses the water from the
11 stream to grow kalo. The family also sells the kalo to the community. During harvest, people
12 will come to help the family with the work. Ms. Ah Puck explained that this is a cultural practice.
13 A person outside the community also comes to the kalo farm to teach people how to make
14 poi pounders.

15 16 **Impacts**

17 When asked about the ecosystem, Ms. Ah Puck said that there could be an effect on the
18 aquatic life. She recalled that there is tilapia and crabs in the area, and often sees traps.
19 Regarding cultural resources, the mouth of the stream is a spot known to fisherman to have
20 moi, which feed in the area. People also fish on the nearby beach, including her own family.
21 Sometimes they invite community members and tourists to learn how to gather fish. These
22 cultural practices could be impacted, according to Ms. Ah Puck.

23
24 Again, Ms. Ah Puck explained that access to the graveyard is important. She raised concerns
25 about the possibility that the project could bar access.

26 27 **Mitigation Measures & Recommendations**

28 Ms. Ah Puck explained that she hasn't seen a community project in the area. She noted that
29 there are some lilies growing in the stream that could be removed and wondered if it was
30 possible that the removal of the lilies could serve as an alternative to dredging.

1 **4.2 Interview with Peter Lua**

2
3 **Interviewer:** Mathew Sproat

4 **Interviewee:** Peter Lua

5 **Date:** 8/18/2021

6 **Location:** via phone

7
8 **Biography**

9 Mr. Lua identifies as a farmer. He was born and raised in Lā'ie, just one house away from the
10 cemetery and next to Kahawainui stream. His parents were kalo farmers. He currently lives in
11 Punalu'u, where he has been a farmer for around forty years.

12
13 **Overview**

14 Having been born and raised in the area, Mr. Lua possesses an intimate knowledge of the
15 project area. In particular, he provided insight regarding the history, environmental health,
16 and use of the Kahawainui stream from when he was a child.

17
18 **Cultural Resources**

19 Mr. Lua recounted that he used to swim in the old kalo patches behind Lā'ie. The water here
20 ran through the Kahawainui stream. At one point, the stream supplied a lot of food for the
21 community. Today, Mr. Lua said that there is little aquatic life left in the area; there used to
22 be plentiful opae ula and 'o'opu in the stream. He went into the water recently and its condition
23 isn't good, describing it as polluted.

24
25 **Traditions and Customs**

26 Mr. Lua said that the community, including his family, used to fish regularly in the project area.

27
28 **Impacts**

29 Mr. Lua believes that the river needs to be clear in order to protect the properties upstream.
30 However, he was unsure if dredging was the best option. Rather, the stream should be
31 continually cleaned over time.

32
33 **Mitigation Measures & Recommendations**

34 None provided.

35

36

1 4.3 Interview with Matthew Sproat

2
3 **Interviewer:** Trisha Kehaulani Watson

4 **Interviewee:** Mathew Sproat

5 **Date:** 8/18/2021

6 **Location:** In person

7 8 **Biography**

9 Mr. Sproat says that he wears many hats across his professions. Primarily, he is a Hawaiian
10 musician. He is also a cultural practitioner and wood worker (specializing in Native Hawaiian
11 woods). Regarding cultural practices, Mr. Sproat is a fisherman, hunter, and farmer. He was
12 born and raised in Hau'ula. He currently lives in Kaimukī.

13 14 **Overview**

15 Mr. Sproat is associated with the project area through his personal narrative. He grew up in
16 Hau'ula, which is next to Lā'ie. The mouth of Kahawainui stream and associated Hukilau
17 beach has been known to him since he was a child. He described going to Hukilau beach often
18 as a child to swim and fish.

19 20 **Cultural Resources**

21 Mr. Sproat detailed the various fish that are known in the area, including moi, 'ō'io, and awa.
22 He also noted that the environment would be conducive for 'o'opu, but has never seen any.
23 As such, fishing is a common cultural practice at Hukilau beach. He also explained that the
24 area has hau, a native tree (but noted that hau is not endangered). Mr. Sproat also explained
25 that native aquatic birds are known to live in the area, including 'alae 'ula and 'ua'u.

26 27 **Traditions and Customs**

28 Mr. Sproat explained that Hukilau beach is known for its plentiful fish. He explained that some
29 of the old-time fisherman would set nets out into the ocean and then dig a trench from the
30 river mouth into the ocean. The water would then flow and take with it all the fish from the
31 river mouth, attracting predatory fish to the area. Moi was very popular in the area, as was
32 'ō'io and awa.

33
34 Mr. Sproat also noted that Gunstock Ranch extended down to the stream. As such, ranching
35 is a known traditional practice in the area.

36 37 **Impacts**

38 Mr. Sproat said he has 80-85% confidence that there are 'o'opu in the area, since it's a good
39 environment and ecosystem for them. He is unsure if the project, which consists of dredging,
40 would affect any 'o'opu in the area. Beyond that, he is further unsure if the project will affect
41 any of the broader aquatic life in the area.

42
43 His biggest concern is if dredging would lift up harmful bacteria in deeper layers of sediment
44 that could potentially be harmful to wildlife and the environment. This has happened in other

1 areas across O'ahu. Since Hukilau is technically a bay, the water may not get fully washed out
2 by ocean currents.

3

4 **Mitigation Measures & Recommendations**

5 Regular maintenance (including clearing the stream of debris after storm events) instead of a
6 one-time fix was suggested by Mr. Sproat as a mitigation measure. Her explained that this is
7 a shared sentiment by many in the area's surrounding communities.

8

9

1 **4.4 Interview with Sherry Kahawai**

2
3 **Interviewer:** Mathew Sproat

4 **Interviewee:** Sherry Kahawai

5 **Date:** August 27, 2021

6 **Location:** In person

7
8 **Biography**

9 Ms. Kahawai is a teacher at Hau'ula elementary school. She was born and raised in Lā'ie, and
10 more broadly the North Shore her entire life. She lives in Lā'ie today. The property Ms. Kahawai
11 lived on in the project area was owned by her husband's family along Kahawainui stream.
12 They recently moved to a house in Hau'ula.

13
14 **Overview**

15 As a kalo farmer along Kahawainui stream, Ms. Kahawai knows the project area intimately.
16 She possesses a robust knowledge about the local environment.

17
18 **General Discussion**

19 Ms. Kahawai's is associated with the project area through the many years she lived on her
20 husband's family's property along the Kahawainui stream.

21
22 **Cultural Resources**

23 Ms. Kahawai was not familiar with any cultural resources in or around the project area.
24 Primarily, she noted that the stream sometimes dries up completely. Therefore, she believes
25 this probably deters native fishes from frequently using the stream as a habitat. She noted
26 that when the water is flowing, it is usually extremely dirty due to the upstream impacts (such
27 as farming). Ms. Kahawai mentioned that she has seen 'alae 'ula in the area.

28
29 **Traditions and Customs**

30 Ms. Kahawai noted that they are kalo farmers, and that kalo farming has historically been
31 associated with the area.

32
33 **Impacts**

34 Ms. Kahawai did not know of any impacts that would be caused to the area from the project.
35 The project would not impact their livelihoods as kalo farmers. However, she raised questions
36 about the impacts to the area closer to the ocean. She is curious if the dredging will expose
37 the environment to harmful bacteria that are deeper in the sediment. Also, will the dredging
38 and excavators on the banks affect fishers on the shoreline?

1
2
3
4
5
6
7

Mitigation Measures & Recommendations

Ms. Kahawai recommended that the project include community engagement. The community needs to be aware of what the project is and what it aims to do.

1 **5.0 Impact Assessment**

2 **Introduction**

3 **5.1 Impacts to Flora**

4 There are no endangered or threatened flora in the area. The impact to flora was covered in
5 the EA; there are no anticipated impacts to rare flora of cultural significance.

6 **5.2 Impacts to Fauna**

7 Of terrestrial flora, four listed species in the EA – ‘alae ke’oke’o (the Hawaiian coot), ‘alae ‘ula
8 (Hawaiian gallinule), ae’o (Hawaiian stilt) , and ‘ope‘ape‘a (Hawaiian hoary bat) – have a high
9 potential to use the habitat of the survey area. As such, the EA provides recommendations to
10 avoid or minimize potential impacts to these species.

11
12 Regarding aquatic fauna, the EA found that the most common species in the survey area were
13 non-native tilapia. Due to the degraded habitat quality, the area may be a poor habitat for
14 native aquatic fauna. However, the EA does recommend that since dredging activity will result
15 in large amounts of sediment suspension, measures should be placed to prevent sediment
16 runoff into marine coral reef communities in Lā'ie Bay. However, the EA notes that assuming
17 the sand berm remains intact, it is unlikely for sediment runoff to enter the bay and coral reef
18 communities are not expected to be impacted.

19 **5.3 Impacts to Historic Sites**

20 Honua Consulting, LLC conducted a literature review and field investigation (LRFI) of the
21 project area which assessed previous archaeology and included a 100% pedestrian survey of
22 the project area. Based on this assessment, it is unlikely the project will impact to historic
23 sites.

24 **5.4 Impacts to Intangible Cultural Resources**

25 The area of potential effect (APE) has been largely disturbed due to previous agricultural use
26 and extensive industrial use. Therefore, the project activities are unlikely to have any impact
27 to intangible cultural resources in the area.

1 **5.5 Impacts to Cultural Practices**

2 This project is unlikely to have any potential impact to the traditional and customary practices
3 that take place in the surrounding region. If historic resources or iwi kūpuna are inadvertently
4 discovered during project work, area cultural descendants should be engaged to care of the
5 iwi.

6 **5.6 Cumulative and Indirect Impacts**

7 There are no anticipated cumulative or indirect cultural impacts to the area.

8 **5.7 Mitigation and Best Management Practices**

9 Due to the negligible impacts to cultural resources, there are no mitigation measures
10 recommended or necessary at this time. Standard archaeology best practices should be
11 implemented. In the event of the inadvertent discovery of cultural resources, cultural monitors
12 or practices should be consulted as appropriate to ensure the proper treatment of any cultural
13 resources and the allowance of appropriate cultural practices.

14
15

1 6.0 *Ka Pa'akai* Analysis

2 It has long been the law of the land that the State of Hawai'i has an "obligation to protect the
3 reasonable exercise of customary and traditionally exercised rights of Hawaiians to the extent
4 feasible" *Public Access Shoreline Hawai'i v. Hawai'i County Planning Commission* ("PASH")
5 79 Hawaii 425, 450 n. 43, 903 P.2d 1246, 1271 n. 43 (1995). In 2000, in the *Ka Pa'akai*
6 decision, the Court established a framework "to help ensure the enforcement of traditional
7 and customary Native Hawaiian rights while reasonably accommodating competition private
8 development interests." 94 Hawai'i 31, 35, 7 P.3d 1068, 1972 (2000).

9
10 Based on the guidelines set forth in *Ka Pa'akai*, the Hawai'i Supreme Court provided
11 government agencies an analytical framework to ensure the protection and preservation of
12 traditional and customary Native Hawaiian rights while reasonably accommodating competing
13 private development, or other, interests. The Court has stated: "that in order to fulfill its duty
14 to preserve and protect customary and traditional Native Hawaiian rights to the extent feasible,
15 as required by Article XII, Section 7 of the Hawai'i Constitution, an administrative agency must,
16 at minimum, make specific findings of fact and conclusions of law as to the following:

- 17
18 1) The identification of valued cultural, historical, or natural resources in the project area,
19 including the extent to which traditional and customary Native Hawaiian rights are
20 exercised in the project area.
- 21 2) The extent to which those resources—including traditional and customary Native
22 Hawaiian rights—will be affected or impaired by the proposed action; and
- 23 3) The feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if
24 they are found to exist. *Ka Pa'akai*, 94, Hawaii at 47, 7 P.3d at 1084. Cited in *Matter*
25 *of Contested Case Hearing Re Conservation District Use Application (CDUA) HA-3568*
26 *for the Thirty Meter Telescope at the Mauna Kea Science Reserve, Ka'ohē Mauka,*
27 *Hāmākua, Hawai'i*, 143 Hawai'i 379, 431 P.3d 752 (2018) ("*Mauna Kea II*").

28
29 In order to complete a thorough CIA that complies with statutory and case law, it is necessary
30 to fully consider information available from, and provided by, Native Hawaiian cultural
31 practitioners and cultural descendants from the project area. From thorough research, data
32 was extrapolated that provides a comprehensive look at the cultural resources in this 'āina.
33 Through this research, the factors from *State v Hanapi* are met. These factors are: "to
34 establish that his or her conduct is constitutionally protected as a native Hawaiian right, he or
35 she must show, at minimum, the following three factors. First, he or she must qualify as a
36 "native Hawaiian" within the guidelines set out in PASH . . . [as] "those persons who are
37 'descendants of native Hawaiians who inhabited the islands prior to 1778,' ... regardless of

1 their blood quantum.” Second, once a defendant qualifies as a native Hawaiian, he or she
2 must then establish that his or her claimed right is constitutionally protected as a customary
3 or traditional native Hawaiian practice.... Finally, a defendant claiming his or her conduct is
4 constitutionally protected must also prove that the exercise of the right occurred on
5 undeveloped or “less than fully developed property.”” 89 Hawai'i 177, 185-86, 970 P.2d. 485,
6 493-94 (1998).

7
8 The *Ka Pa'akai* analysis is largely a legal analysis, as the applicable tests are legal standards.
9 Therefore, a strong analysis was conducted by someone with sufficient legal training.
10 Additionally, at the core of a thoughtful *Ka Pa'akai* analysis is a comprehensive understanding
11 of traditional and customary practices. In breaking down the Court's tests, it is important to
12 the different elements that contribute to each test.

13
14 The first test - “The identification of valued cultural, historical, or natural resources in the
15 project area, including the extent to which traditional and customary Native Hawaiian rights
16 are exercised in the project area” - actually consists of two separate elements. First, the
17 simple identification and existence of valued cultural, historical, or natural resources. These
18 resources are tangible in nature. They can include sacred places, culturally valuable plants,
19 or a religious or historic site. This assessment how sought to exhaustively identified the great
20 multitude of resources that may exist in the project area or adjacent areas. This was
21 completed in part through this CIA and in part through the accompanying LRFI.

22
23 As to this test, this assessment shows there are potentially resources within the project area,
24 including historic sites and some biological resources.

25
26 The second element of this first test is access. Access requires two things to occur. One is the
27 existence of a resource. Whether a plant, an animal, a place, or site, the resource must exist
28 in order a practitioner to access it. The second thing is physical access. This includes, but it is
29 not limited to, the ability to physically access a plant, animal, site, or location associated with
30 a particular practice. This can also include the traditional and customary route or path taken
31 to access the resource. This can also include cultural protocols that existed in accessing a
32 resource. These are often temporal, in that access protocols can be at a certain time of day
33 or year. Makahiki would be a good example of a traditional custom that has specific cultural
34 protocols associated with access. In the case of Makahiki, the custom takes place at a certain
35 time of year.

36
37 Therefore, the first test under *Ka Pa'akai* should include not only a listing of resources, but
38 the identification of ways in which those resources are accessed and utilized in association

1 with a traditional and customary practice. There are no existing or potential impacts to access
2 resulting from this project.

3
4 Therefore, the second test – “The extent to which those resources—including traditional and
5 customary Native Hawaiian rights—will be affected or impaired by the proposed action” – also
6 looks at two separate elements. The first, does the proposed action and its alternatives have
7 an adverse impact on the existence of resources? This would include the alteration,
8 destruction, modification, or harm of sites, including biological resources, sacred places,
9 burial sites, etc. It also includes a loss of species. Any adverse impact or harm to resources is
10 alone an affect or impairment caused by the proposed action.

11
12 Under this element, adverse impacts to historic sites or culturally utilized natural resources
13 would all be identified adverse impacts. Under this same element, any indirect or cumulative
14 effects would create an adverse impact under *Ka Pa'akai* if those actions harmed resources.
15 Both the LRFI and CIA looked to identify any such potential adverse impacts and none were
16 identified.

17
18 In addition to this, any action that impacts traditional and customary access to resources,
19 even if there is not direct adverse impact to the resource itself, would result in an affect or
20 impairment resulting from the proposed action. Therefore, the limitations on access that could
21 result from development or use of the project area could create an adverse impact under *Ka*
22 *Pa'akai*. As noted above, there are no potential access issues identified.

23
24 The third part of the *Ka Pa'akai* framework aims to identify “[t]he feasible action, if any, to be
25 taken to reasonably protect Native Hawaiian rights if they are found to exist.” Determining
26 whether or not action has been suitably “feasible” is a matter for the State. These feasible
27 actions could include continued access to the project as needed to conduct cultural practices.
28 There are farming and fishing practices within the larger region of the project, but there are
29 no adverse impacts anticipated from the project activities. Nonetheless, communication with
30 area practitioners, particularly kalo farmers, would be appropriate. The BMPs recommended
31 in the EA should also be employed.

32

7.0 Conclusion

The Lā'ie region is rich with both pre-contact and post-contact histories. While the project is unlikely to have any adverse impact on pre-contact historic properties or Hawaiian cultural practices, the project has an opportunity to enrich the area through interpretive botanical, cultural and historical programs. This study looked comprehensively at all historical records for the region and, while area practices were identified, this assessment did not identify any current cultural practices or customs that would potentially be adversely impacted by the project activity. This conclusion was supported by the oral histories from the area.

The State and its agencies have an affirmative obligation to preserve and protect the reasonable exercise of customarily and traditionally exercised rights of Hawaiians to the extent feasible. This is partially implemented through the completion of thorough and appropriately focused cultural impact assessments, which can effectively research and identify these practices so that they can be appropriated protected. *Ka Pa'akai* calls for a good faith effort on the part of the state to identify cultural resources, including traditional and customary practices, in the area. This CIA conducted an exhaustive and good faith effort to identify such resources and practices. While there are certainly such resources and practices within the larger geographic extent of Lā'ie, there are none in the immediate project area or within the area that will be impacted by the proposed project. Therefore, per Act 50 and under the *Ka Pa'akai* analysis, potential effects to cultural resources or practices are negligible due to the absence of ongoing traditional or customary practices in the immediate project area and the project activities are not anticipated to impact local traditions or customs.

8.0 References

- American Board of Commissioners of Foreign Christian Missions (A.B.C.F.M.) 1820-1890. Journals and Letters cited in text from Collection of the Houghton Library, Harvard University (Digitized in the collection of Kumu Pono Associates LLC).
- Alexander, W.D. 1891. A Brief History of Land Titles in the Hawaiian Kingdom. Hawaiian Almanac and Annual for 1891. Honolulu, HI.
- Baldridge, K. 1979. Old Laie. Laie, HI: Brigham Young University – Hawaii Campus, Behavioral and Social Science Division.
- Beckwith, M. 1970. Hawaiian Mythology. Honolulu, HI: University of Hawaii Press.
- Berge, D. 1986. Laie Plantation Sugar Mill (1868-1900): Archaeology and History, Mormon Pacific Historical Society: Volume 7, Article 6. Brigham Young University – Hawaii, Laie. HI.
- Board of Commissioners. 1929. Indices of Awards made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. Honolulu, HI.
- Bouchenaki, M. 2003. *The interdependency of the tangible and intangible cultural heritage*. In: 14th ICOMOS General Assembly and International Symposium: 'Place, memory, meaning: preserving intangible values in monuments and sites', 27 – 31 oct 2003, Victoria Falls, Zimbabwe. [Conference or Workshop Item]
- Boundary Commission Testimonies. 1864-1920. Digitized collection from Microfilms of the Hawai'i State Archives (Kumu Pono Associates LLC).
- Bowser, G. 1880. The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide. Honolulu, HI. (Cited in Maly and Maly, 2001.)
- Conde, J.C. and Best, G.M. 1973. Sugar Trains. Felton, California.
- Fornander A. 1878. An Account of the Polynesian Race: Its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I. London, UK: Trubner & Company.

- _____. 1916-1919. Fornander Collection of Hawaiian Antiquities and Folklore. (9 vols.). Honolulu, HI: Bishop Museum Press.
- _____. 1916. He Kaa no Pikoiakaalala. Collection of Hawaiian Antiquities and Folk-lore. (Vol. IV)
- _____. 1918. He Kaa no Namakaokapaoo. Collection of Hawaiian Antiquities and Folk-lore (Vol. V)
- _____. 1996. Ancient History of the Hawaiian People. Mutual Publishing, Australia.
- Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte. 2013. Rainfall Atlas of Hawai'i, Interactive Map. Geography Department, University of Hawai'i-Mānoa. Accessed at <<http://rainfall.geography.hawaii.edu/interactivemap.html>>.
- Handy, E.S.C. 1940. The Hawaiian Planter: His Plants, Methods and Areas of Cultivation. B.P. Bishop Museum Bulletin 161. Bishop Museum Press, Honolulu.
- Handy, E.S.C., Handy, E.G., and Pukui, M.K. 1972. Native Planters in Old Hawaii, Their Life, Lore, and Environment. B.P. Bishop Museum Bulletin 233. B.P. Bishop Museum Press.
- Hawaiian Commerical & Sugar Company (HC&S) 2017. Our History. Hawaiian Commercial & Sugar Company. Available at: <http://hcsugar.com/who-we-are/our-history/>.
- Hill, John L. 1978. Master Plan of Laie. Brigham Young University-Hawai'i, Lā'ie, HI.
- Īī, J.P., and Pukui, M.K. (translator). 1959. Fragments of Hawaiian History. Honolulu: Bishop Museum Press.
- Lenzerini, F. 2011. Intangible Cultural Heritage: The Living Culture of Peoples, European Journal of International Law, Volume 22, Issue 1, 101-120
- Kamakau, S.M. 1968. Ka Po'e Kahiko: The People of Old. Bishop Museum Special Publication 51. Honolulu, HI: Bishop Museum Press.
- _____. 1976. The Works of the People of Old. Bishop Museum Special Publication 61. Honolulu, HI: Bishop Museum Press.

- _____. 1991. Tales and Traditions of the People of Old, Nā Mo'olelo a ka Po'e Kahiko. Honolulu, HI: Bishop Museum Press.
- _____. 1992. Ruling Chiefs of Hawaii. Honolulu, HI: Kamehameha Schools Press.
- Kahanele, K. 1970. Clinton Kanehele Interviewing John E. Broad. Laie, HI. Brigham Young University – Hawaii Campus, Clinton Kanahale Collection.
- Kanahale, K. 1970. Clinton Kanahale Interviewing Gus Kaleohano. Laie, HI. Brigham Young University – Hawaii Campus, Clinton Kanahale Collection.
- Krauss, B.H. 1993. Plants in Hawaiian Culture. Honolulu, HI: University of Hawaii Press.
- Māhele 'Āina Documents.1848-1856. Records of the: Native/Foreign Register, Native/Foreign Testimony and Mahele Award Books. Digitized from Microfilms of the Hawai'i State Archives (In collection of Kumu Pono Associates LLC).
- Malo, D. 1951. Hawaiian Antiquities (Mo'olelo Hawai'i). Honolulu, HI: Bishop Museum Press.
- Maly, K. 2001. Mālama Pono i ka 'Āina – An Overview of the Hawaiian Cultural Landscape. Hilo, HI: Kumu Pono Associates.
- Maly, K. and P.H. Rosendahl 1995 Cultural Assessment Study Lā'ie Wastewater Reclamation Facility (Lwrf) Project, Cultural Significance of “Nioi Heiau” and Other Sites Within its Immediately Adjoining Lands Vol. I.
- Manu, M. (K. Maly, translator). 1894-1895. “He Moolelo Kaa Hawaii no Laukaieie...”
Nupepa Ka Oiaio, Jan. 5, 1894 – Sep. 13, 1895.
- _____. 1895-1896 “He Moolelo Kaa Hawaii no ka Pui o Laumeki, ka Mea i Like me ka Ilio Puapualenalena.” *Nupepa Ka Oiaio*, Nov. 8, 1895 – Feb. 14, 1896.
- McAllister, J.G. 1933. Archaeology of Oahu. B.P. Bishop Museum Bulletin 104. Honolulu: Bishop Museum Press (Reprinted 1971. New York: Kraus Reprint Co.)
- National Cooperative Soil Survey (NCSS) 2017. National Cooperative Soil Survey Characterization Database. Available at: <http://ncsslabsdatamart.sc.egov.usda.gov/>
- Nogelmeier, M. P., 2010: Mai Pa'a I Ka Leo: Historical voice in Hawaiian primary materials, looking forward and listening back. Bishop Museum Press, 286 pp.

Pukui, M.K. 1983. 'Ōlelo No'eau: Hawaiian Proverbs & Poetical Sayings. Bernice P. Bishop Museum Special Publication No. 17. Honolulu, HI: Bishop Museum Press.

Pukui, M.K. and Elbert, S.H. 1971. Hawaiian Dictionary. Honolulu, HI: University of Hawaii Press.

_____. 1986. Hawaiian Dictionary. Honolulu, HI: University of Hawai'i Press.

Pukui, M.K., Elbert, S.H., and Mookini, E.T. 1974. Place Names of Hawaii (Revised and expanded edition). Honolulu, HI: University of Hawaii Press.

Roth, W. 2019. Ethnoscience. In P. Atkinson, S. Delamont, A. Cernat, J.W. Sakshaug, & R.A. Williams (Eds.), SAGE Research Methods Foundations. <https://www.doi.org/10.4135/9781526421036744802>

Rice W. H. 1923. Hawaiian Legends. Bernice Pauahi Bishop Museum. 2nd edition.

Safsten, R., and Baldrige, K. 1981. LDS Church in Hawaii. Laie, HI: Brigham Young University - Hawaii Campus, Behavioral and Social Sciences Division

Wallace, W. K. 2001. La'ie: Land and People in Transition. World Communities - A Multidisciplinary Reader. Compiled by Lu Hsun. Pearson.

Whitney, H.M. 1895. The Tourist's Guide Through the Hawaiian Islands, Honolulu, HI.

Wilkes, C. 1970. Narrative of the United States Exploring Expedition During the Years 1838-1842, Under the Command of C. Wilkes, U.S.N., vol. 4. Lea and Blanchard, Philadelphia, Pennsylvania.

Reference Maps

1873	Honouliuli Ahupuaa. Register Map No. 405. W.D. Alexander.
1878	Honouliuli Taro Lands. Register Map No. 630. Wm. Monsarrat.
1913	Honolulu-Puuloa Fisheries. Register Map No. 2848. Wm. Monsarrat
1932	Honouliuli Taro Lands. Land Court Application No. 1069 (Map 2). J.B. Mann.

State of Hawai'i

Ms. Files cited in text from the collections of the:
Hawai'i State Archives

Department of Land and Natural Resources – Land Division
Department of Land and Natural Resources – State Survey Division

Appendix I: Glossary of Hawaiian Terms

The following list of terms were used frequently throughout this report. All definitions were compiled using Pukui and Elbert's *Hawaiian Dictionary* (1986).

Ahupua'a	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (pua'a), or because a pig or other tribute was laid on the altar as tax to the chief.
'Āina	Land, earth.
Akua	1. God, goddess, spirit, ghost. 2. Divine, supernatural, godly.
Ala	Path, road, trail.
Ali'i	1. Chief, chiefess, ruler, monarch. 2. Royal, regal. 3. To act as chief, reign.
'Aumakua	Family or personal gods, deified ancestors who might assume the shape of sharks, owls, hawks, dogs, plants, etc. A symbiotic relationship existed; mortals did not harm or eat them, and the 'aumakua warned or reprimanded mortals in dreams, visions, and calls.
'Aumākua	Plural of 'aumakua.
'Auwai	Irrigation ditch, canal.
Hālau	1. Long house, as for canoes or hula instruction; meeting house. 2. Large, numerous; much.
Hale pili	House thatched with pili grass.
Heiau	Pre-Christian place of worship, shrine. Some heiau were elaborately constructed stone platforms, other simple earth terraces.
Ho'i	1. To leave, go or come back; to cause to come back. 2. To enter, as an institution or last resting place. 3. A parting chant to which hula dancers dance as they leave the audience. 4. Marriage of a chief with the daughter of a brother or sister; to do so (a means of increasing offspring).
Hula	A Polynesian dance form accompanied by chant or song.
'Ili	Land section, next in importance to ahupua'a and usually a subdivision of an ahupua'a.
'Ili kūpono	A nearly independent 'ili land division within an ahupua'a, paying tribute to the ruling chief and not to the chief of the ahupua'a. Transfer of the ahupua'a from one chief to another did not include the 'ili kūpono located within its boundaries.
Kanaka	Human being, man, person, individual, party, mankind, population.
Kānaka	Plural of kanaka.
Kāne	Male, husband, male sweetheart, man; brother-in-law of a woman.

Kanikau	1. Dirge, lamentation, chant of mourning, lament. 2. To chant, wail, mourn.
Kapu	1. Taboo, prohibition. 2. Special privilege or exemption from ordinary taboo. 3. Sacredness, prohibited, forbidden, sacred, holy, consecrated. 4. No trespassing, keep out.
Kuleana	Right, privilege, concern, responsibility, title, business, property, estate, portion, jurisdiction, authority, liability, interest, claim, ownership, tenure, affair, province.
Kupuna	Grandparent, ancestor, relative or close friend of the grandparent's generation, grandaunt, granduncle.
Kūpuna	Plural of kupuna.
Limu	A general name for all kinds of plants living under water, both fresh and salt, also algae growing in any damp place in the air, as on the ground, on rocks, and on other plants; also mosses, liverworts, lichens.
Lo'i	Irrigated terrace, especially for taro, but also for rice and paddy.
Loko i'a	Traditional Hawaiian fishpond.
Makai	On the seaside, toward the sea, in the direction of the sea.
Mālama	To take care of, tend, attend, care for, preserve, protect, beware, save, maintain.
Mauka	Inland, upland, towards the mountain.
Mele	1. Song, anthem, or chant of any kind. 2. Poem, poetry. 3. To sing, chant.
Mele māka'ika'i	Travel chant.
Mō'i	King, sovereign, monarch, majesty, ruler, queen.
Moku	1. District, island, islet, section, forest, grove, clump, fragment. 2. To be cut, severed, amputated, broken in two.
Mo'o	Lizard, reptile of any kind, dragon, serpent.
Mo'olelo	Story, tale, myth, history, tradition, literature, legend, journal, log, yard, fable, essay, chronicle, record, article.
Mo'owahine	Female lizard deity.
Nī'au-pi'o	Offspring of the marriage of a high-born brother and sister, or half-brother and half-sister.
'Ōlelo no'eau	Proverb, wise saying, traditional saying.
Oli	Chant that was not danced to, especially with prolonged phrases chanted in one breath, often with a trill at the end of each phrase; to chant thus.
Pi'o	Marriage of full brother and sister of nī'au-pi'o rank, presumably the highest possible rank. Their offspring had the rank of naha, which is less than pi'o but probably more than nī'au-pi'o. Later pi'o included marriage with half-sibling.

Pueo	Hawaiian short-eared owl (<i>Asio flammeus sandwichensis</i>), regarded often as a benevolent 'aumakua.
'Ūniki	Graduation exercises, as for hula, lua fighting, and other ancient arts (probably related to niki, to tie, as the knowledge was bound to the student).
Wahi pana	A sacred and celebrated/legendary place.
Wahine	Woman, lady, wife; sister-in-law, female cousin-in-law of a man.
Wao	1. Realm. 2. A general term for inland region usually forested but not precipitous and often uninhabited.

**APPENDIX E: PRE-CONSULTATION COMMENT LETTERS AND
RESPONSES**

DAVID Y. IGE
GOVERNOR



CURT T. OTAGURO
COMPTROLLER
AUDREY HIDANO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)21.112

JUN 10 2021

William Kucharski
BCH Design, A Bowers + Kubota Company
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Kucharski:

Subject: Pre-Consultation for an Environmental Assessment
Proposed Design and Construction
Maintenance Dredging at Kahawainui Stream
Laie, Oahu, Hawaii
TMK: various

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Gayle Takasaki of the Planning Branch at 586-0584.

Sincerely,

A handwritten signature in blue ink, appearing to read "Christine I. Kinimaka".

CHRISTINE I. KINIMAKA
Public Works Administrator

GT:mo



A Bowers + Kubota Company

January 24, 2022
2015.71.0300 / 22P-011

Ms. Christine L. Kinimaka
Public Works Administrator
State of Hawai'i
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawai'i 96810-0119

Dear Ms. Kinimaka,

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

We are in receipt of your letter dated June 10, 2021, stating that the State of Hawai'i Department of Accounting and General Services does not have any pre-consultation comments on the forthcoming Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

Thank you again for participating in the HRS Chapter 343 environmental review process. Your letter and this response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company

William Kucharski
Project Manager

WK:kc



BOARD OF WATER SUPPLY

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



June 15, 2021

RICK BLANGIARDI, MAYOR

BRYAN P. ANDAYA, Chair
KAPUA SPROAT, Vice Chair
RAY C. SOON
MAX J. SWORD
NA'ALEHU ANTHONY

JADE T. BUTAY, Ex-Officio
ROGER BABCOCK, Jr., Ex-Officio

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

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

Mr. William Kucharski
BCH Design, A Bowers + Kubota Company
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4454

Dear Mr. Kucharski:

Subject: Your Letter Dated June 2, 2021 Requesting Comments on the Environmental Assessment Pre-Consultation for the Proposed Department of Design and Construction Maintenance Dredging at Kahawainui Stream in Laie Near Wahinepee Street - Tax Map Key: 5-5-009: 007, 009, 010, 011, and 047

Thank you for the opportunity to comment on the proposed stream dredging project.

The Honolulu Board of Water Supply does not have any water facilities within the project area. All water services should be provided by the private water system serving the area.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

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

BELT COLLARS HAWAII

2021 JUN 10 AM 9:03

RECEIVED

January 19, 2022
2015.71.0300 / 22P-001

Mr. Ernest Y. W. Lau, P.E.
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Lau:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your letter dated June 15, 2021, stating that the Honolulu Board of Water Supply does not have any water facilities within the Project Area. We acknowledge that water services are to be provided by a private water system serving the area.

Thank you for participating in the HRS Chapter 343 environmental review process. Your letter and this response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email wkucharski@bowersandkubota.com.

Sincerely Yours,
BCH a Bowers + Kubota Company



William Kucharski
Project Manager

WK:kc

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET - HONOLULU, HAWAII 96813
TELEPHONE: (808) 528-4111 • INTERNET: www.honolulu.gov



9103 ʻŌHĀŌHŌ
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MĀHELE

1000 ʻŌHĀŌHŌ
MĀHELE

ʻŌHĀŌHŌ EO-DK

June 15, 2021

SENT VIA EMAIL

Mr. William Kucharski
kahawainui_stream@bowersandkubota.com

Dear Mr. Kucharski:

This is in response to your letter of June 2, 2021, requesting input on the Pre-Consultation, Environmental Assessment, for the proposed maintenance dredging of the Kahawainui Stream located in Laie.

The Honolulu Police Department recommends that adequate notification be made regarding potential road closures, as any impacts to pedestrian and/or vehicular traffic along Kamehameha Highway may lead to complaints from the public.

If there are any questions, please call Major Crizalmer Caraang of District 4 (Kaneohe, Kailua, Kahuku) at 723-8639.

Thank you for the opportunity to review this project.

Sincerely,

A handwritten signature in black ink, appearing to read "Darren Chun".

DARREN CHUN
Assistant Chief of Police
Support Services Bureau



A Bowers + Kubota Company

2153 NORTH KING STREET
SUITE 200
HONOLULU, HAWAII 96819

TEL_808.521.5361 | FAX_808.538.7819

BCHDESIGN.COM | BOWERSANDKUBOTA.COM

January 19, 2022
2015.71.0300 / 22P-006

Mr. Darren Chun, Assistant Chief of Police
City and County of Honolulu
Honolulu Police Department
801 South Beretania Street
Honolulu, HI 96813

Dear Mr. Chun:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your memorandum dated June 15, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

- 1. The Honolulu Police Department recommends adequate notification be made regarding potential road closures, as any impacts to pedestrian and/or vehicular traffic along Kamehameha Highway may lead to complaints from the public.**

The Proposed Action is not anticipated to require any road closures along Kamehameha Highway. The Contractor will be responsible for coordinating the flow of loading trucks to avoid impacts to traffic flow. The Contractor will notify the Honolulu Police Department in the event additional traffic control measures are needed.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company

William Kucharski
Project Manager

WK:kc

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

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

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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

June 16, 2021

BCH Design, A Bowers+ Kubota Company
Attn: William Kucharski
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

Log no. 3172

Dear Mr. Kucharski:

**Division of Forestry and Wildlife Comments on the Pre-Consultation for an
Environmental Assessment (EA) Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream**

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your inquiry regarding the pre-consultation of an EA for the dredging of Kahawainui Stream in Lā'ie on O'ahu, Hawai'i, TMKs: (1) 5-5-005:002 (por.), 5-5-009:007 (por.), 008 (por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), 061 (por.), and 5-6-001:004 (por.). The proposed project consists of dredging approximately 2,955 cubic yards of sediment in the Kahawainui Stream. The sediment will be placed in a stockpile on adjacent properties for drying. The dried material will then be transported for offsite reuse or disposal.

State listed waterbirds such as the Hawaiian Duck (*Anas wyvilliana*), Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*), and Hawaiian Common Gallinule (*Gallinula chloropus sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the O'ahu DOFAW Office) at (808) 973-9778.

The State listed Hawaiian Hoary Bat or 'Ōpe'ape'a (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in nearby trees. If any site clearing is required this should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW.

DOFAW recommends minimizing the movement of plant or soil material between worksites, such as in fill. Soil and plant material may contain invasive fungal pathogens, vertebrate and invertebrate pests (e.g. Little Fire Ants, Coconut Rhinoceros Beetles), or invasive plant parts that could harm our native species and ecosystems. We recommend consulting the O'ahu Invasive Species Committee at (808) 266-7994 in planning, design, and construction of the project to learn

January 24, 2022
2015.71.0300 / 22P-013

Mr. David G. Smith,
Administrator
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl St., Rm 325
Honolulu, , Hawai'i 96813

Dear Mr. David G. Smith,

Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i

Thank you for your letter dated June 16, 2021, commenting on the pre-consultation of the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

We acknowledge based on the information provided in your pre-consultation letter that there is potential for endangered and threatened species on the project site and will take effort to avoid or minimize any effects to protected species associated with the proposed action. We have also obtained the suggested information from the Pacific Islands Fish and Wildlife Office website for recommended conservation measure intended to avoid or minimize adverse effects to the noted species. Dredging and associated operations will be performed during daylight hours when practicable and outdoor lights will be turned off or shielded at night to reduce impact on seabirds during fledging fallout period. Section 3.9.3 of the DEA provides a discussion of mitigation measures that would be implemented to avoid or mitigate any potential impacts to seabirds and the listed species that may occur onsite.

We recognize the need to prevent the introduction or spread of invasive species on the island of O'ahu. Equipment and materials transported for the proposed action will be washed and inspected to prevent the movement of soil, plant material, and invertebrates between worksites. Section 3.9.3 of the DEA provides a discussion of mitigation measures that will be implemented as applicable to prevent the unintentional spread or introduction of new invasive species to the site.

Mr. David G. Smith
January 24, 2022 / 22P-013
Page 2

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letter and response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company

A handwritten signature in black ink, appearing to read 'W. Kucharski', written in a cursive style.

William Kucharski
Project Manager

WK:kc

**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

RICK BLANGIARDI
MAYOR



ALEX KOZLOV, P.E.
DIRECTOR

HAKU MILLES, P.E.
DEPUTY DIRECTOR

June 28, 2021

BCH Design, A Bowers+Kubota Company
Attn: William Kucharski
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Kucharski,

Subject: Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
TMK: (1) 5-5-5:22 (por.), 5-5-9:7 (por.), 5-5-9:9 (por.),
5-5-9:10 (por.); 5-5-9:11 (por.) and 5-5-9:47 (por.)
Laie, Oahu, Hawaii

Thank you for the opportunity to review and comment. The Department of Design and Construction has no comments to offer at this time.

Should you have any further questions, please contact me at 768-8480.

Sincerely,

A handwritten signature in black ink, appearing to read "Alex Kozlov".

for Alex Kozlov, P.E.
Director

AK:krm (853557)

January 24, 2022
2015.71.0300 / 22P-012

Mr. Alex Kozlov, P.E.
Director
City and County of Honolulu
Department of Design and Construction
650 S King Street 11th Floor
Honolulu, Hawai'i 96813

Dear Mr. Kozlov,

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

We are in receipt of your letter dated June 28, 2021, stating that the City and County of Honolulu Department of Design and Construction does not have any pre-consultation comments on the forthcoming Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

Thank you again for participating in the HRS Chapter 343 environmental review process. Your letter and this response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF FACILITIES AND OPERATIONS

June 28, 2021

William Kurcharski
BCH Design, A Bowers+Kubota Company
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Re: Chapter 343, Hawaii Revised Statutes Pre-Assessment Consultation for the
Dredging of Kahawainui Stream, Laie, Oahu, Hawaii, TMK (1) 5-5-005:022 por.,
(1) 5-5-009:007 por., 009 por., 010 por., 011 por., and 047 por.

Dear Mr. Kurcharski:

Thank you for your letter dated June 2, 2021. The Hawaii State Department of Education (HIDOE) has the following comments for the preparation of a Draft Environmental Assessment for the proposed maintenance dredging of Kahawainui Stream (Project) located at Laie, Island of Oahu, TMK (1) 5-5-005:022 por., (1) 5-5-009:007 por., 009 por., 010 por., 011 por., and 047 por.

Based upon the information provided, the proposed Project will not impact HIDOE schools.

Thank you for the opportunity to comment. Should you have questions, please contact Robyn Loudermilk, School Lands and Facilities Specialist of the Facilities Development Branch, Planning Section at 784-5093 or by email at robyn.loudermilk@k12.hi.us.

Sincerely,

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:rl

January 24, 2022
2015.71.0300 / 22P-016

Mr. Roy Ikeda,
Interim Public Works Manager
Planning Section
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawai'i 96804

Dear Mr. Ikeda,

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

We are in receipt of your letter dated June 28, 2021, stating that the Hawaii State Department of Education does not have any pre-consultation comments on the forthcoming Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

Thank you again for participating in the HRS Chapter 343 environmental review process. Your letter and this response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc



United States Department of the Interior



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

In Reply Refer To:
01EPIF00-2021-TA-0325

June 30, 2021

Mr. William Kucharski
Project Manager
BCH Design, A Bowers+Kubota Company
2153 North King Street, Suite 200
Honolulu, Hawai'i 96819-4554

Subject: Technical Assistance Pre-Consultation for Environmental Assessment
Construction Maintenance and Dredging at Kahawainui Stream

Dear Mr. Kucharski:

Thank you for your recent correspondence requesting technical assistance on species biology, habitat, or life requisite requirements. The Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) appreciates your efforts to avoid or minimize effects to protected species associated with your proposed actions. We provide the following information for your consideration under the authorities of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq.*), as amended.

Due to significant workload constraints, PIFWO is currently unable to specifically address your information request. The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. Based on your project location and description, we have noted the species most likely to occur within the vicinity of the project area, in the '**Occurs In or Near Project Area**' column. Please note this list is not comprehensive and should only be used for general guidance. We have added to the PIFWO website, located at <https://www.fws.gov/pacificislands/promo.cfm?id=177175840> recommended conservation measures intended to avoid or minimize adverse effects to these federally protected species and best management practices to minimize and avoid sedimentation and erosion impacts to water quality. If your project occurs on the island of Hawai'i, we have also enclosed our biosecurity protocol for activities in or near natural areas.

If you are representing a federal action agency, please request an official species list following the instructions at our PIFWO website

INTERIOR REGION 9
COLUMBIA-PACIFIC NORTHWEST

IDAHO, MONTANA*, OREGON*, WASHINGTON
*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS

AMERICAN SAMOA, GUAM, HAWAII, NORTHERN
MARIANA ISLANDS

<https://www.fws.gov/pacificislands/articles.cfm?id=149489558>. You can find out if your project occurs in or near designated critical habitat here: <https://ecos.fws.gov/ipac/>.

Under section 7 of the ESA, it is the Federal agency's (or their non-Federal designee) responsibility to make the determination of whether or not the proposed project "may affect" federally listed species or designated critical habitat. A "may affect, not likely to adversely affect" determination is appropriate when effects to federally listed species are expected to be discountable (i.e., unlikely to occur), insignificant (minimal in size), or completely beneficial. This conclusion requires written concurrence from the Service. If a "may affect, likely to adversely affect" determination is made, then the Federal agency must initiate formal consultation with the Service. Projects that are determined to have "no effect" on federally listed species and/or critical habitat do not require additional coordination or consultation.

Implementing the avoidance, minimization, or conservation measures for the species that may occur in your project area will normally enable you to make a "may affect, not likely to adversely affect" determination for your project. If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats and defines measures to minimize and mitigate those adverse effects.

We appreciate your efforts to conserve endangered species. We regret that we cannot provide you with more specific protected species information for your project site. If you have questions that are not answered by the information on our website, you can contact PIFWO at (808) 792-9400 and ask to speak to the lead biologist for the island where your project is located.

Sincerely,

Island Team Manager
Pacific Islands Fish and Wildlife Office

Enclosures (2)

The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. For your guidance, we have marked species that may occur in the vicinity of your project, this list is not comprehensive and should only be used for general guidance.

Enclosure 1. Federal Status of Animal Species

<u>Scientific Name</u>	<u>Common Name / Hawaiian Name</u>	<u>Federal Status</u>	<u>May Occur In Project Area</u>
Mammals			
<i>Lasiurus cinereus semotus</i>	Hawaiian hoary bat/‘ōpe‘ape‘a	E	<input checked="" type="checkbox"/>
Reptiles			
<i>Chelonia mydas</i>	green sea turtle/honu - Central North Pacific distinct population segment (DPS)	T	<input checked="" type="checkbox"/>
<i>Eretmochelys imbricata</i>	hawksbill sea turtle/ honu ‘ea or ‘ea	E	<input type="checkbox"/>
Birds			
<i>Anas wyvilliana</i>	Hawaiian duck/koloa	E	<input type="checkbox"/>
<i>Branta sandvicensis</i>	Hawaiian goose/nēnē	T	<input type="checkbox"/>
<i>Fulica alai</i>	Hawaiian coot/‘alae ke‘oke‘o	E	<input checked="" type="checkbox"/>
<i>Gallinula galeata sandvicensis</i>	Hawaiian gallinule/‘alae ‘ula	E	<input checked="" type="checkbox"/>
<i>Himantopus mexicanus knudseni</i>	Hawaiian stilt/ae‘o	E	<input checked="" type="checkbox"/>
<i>Oceanodroma castro</i>	band-rumped storm-petrel Hawai‘i DPS/‘akē‘akē	E	<input checked="" type="checkbox"/>
<i>Pterodroma sandwichensis</i>	Hawaiian petrel/‘ua‘u	E	<input checked="" type="checkbox"/>
<i>Puffinus auricularis newelli</i>	Newell’s shearwater/‘a‘o	T	<input checked="" type="checkbox"/>
<i>Ardenna pacificus</i>	wedge-tailed shearwater/‘ua‘u kani	MBTA	<input type="checkbox"/>
<i>Buteo solitarius</i>	Hawaiian hawk/‘io	MBTA	<input type="checkbox"/>
<i>Gygis alba</i>	white tern/manu-o-kū	MBTA	<input type="checkbox"/>
Insects			
<i>Manduca blackburni</i>	Blackburn’s sphinx moth	E	<input type="checkbox"/>
<i>Megalagrion pacificum</i>	Pacific Hawaiian damselfly	E	<input type="checkbox"/>
<i>Megalagrion xanthomelas</i>	orangeblack Hawaiian damselfly	E	<input type="checkbox"/>
<i>Megalagrion nigrohamatum nigrolineatum</i>	blackline Hawaiian damselfly	E	<input type="checkbox"/>

Enclosure 2. Federal Status of Plant Species

Plants				
<u>Scientific Name</u>	<u>Common Name or Hawaiian Name</u>	<u>Federal Status</u>	<u>Locations</u>	<u>May Occur In Project Area</u>
<i>Abutilon menziesii</i>	ko'oloa'ula	E	O, L, M, H	<input type="checkbox"/>
<i>Achyranthes splendens</i> var. <i>rotundata</i>	'ewa hinahina	E	O	<input type="checkbox"/>
<i>Bonamia menziesii</i>	no common name	E	K, O, L, M, H	<input type="checkbox"/>
<i>Canavalia pubescens</i>	'āwikiwiki	E	Ni, K, L, M	<input type="checkbox"/>
<i>Colubrina oppositifolia</i>	kauila	E	O, M, H	<input type="checkbox"/>
<i>Cyperus trachysanthos</i>	pu'uka'a	E	K, O	<input type="checkbox"/>
<i>Gouania hillebrandii</i>	no common name	E	Mo, M	<input type="checkbox"/>
<i>Hibiscus brackenridgei</i>	ma'o hau hele	E	O, Mo, L, M, H	<input type="checkbox"/>
<i>Ischaemum byrone</i>	Hilo ischaemum	E	K, O, Mo, M, H	<input type="checkbox"/>
<i>Isodendrion pyrifolium</i>	wahine noho kula	E	O, H	<input type="checkbox"/>
<i>Marsilea villosa</i>	'ihi'ihii	E	Ni, O, Mo	<input type="checkbox"/>
<i>Mezoneuron kawaiense</i>	uhiuhi	E	O, H	<input type="checkbox"/>
<i>Nothoctrum breviflorum</i>	'aiea	E	H	<input type="checkbox"/>
<i>Panicum fauriei</i> var. <i>carteri</i>	Carter's panicgrass	E	Molokini Islet (O), Mo	<input type="checkbox"/>
<i>Panicum niuhauense</i>	lau'ehu	E	K	<input type="checkbox"/>
<i>Peucedanum sandwicense</i>	makou	E	K, O, Mo, M	<input type="checkbox"/>
<i>Pleomele (Chrysodracon)</i> <i>hawaiiensis</i>	halapepe	E	H	<input type="checkbox"/>
<i>Portulaca sclerocarpa</i>	'ihi	E	L, H	<input type="checkbox"/>
<i>Portulaca villosa</i>	'ihi	E	Le, Ka, Ni, O, Mo, M, L, H, Nihoa	<input type="checkbox"/>
<i>Pritchardia affinis</i> (<i>maideniana</i>)	loulu	E	H	<input type="checkbox"/>
<i>Pseudognaphalium</i> <i>sandwicense</i> var. <i>molokaiense</i>	'ena'ena	E	Mo, M	<input type="checkbox"/>
<i>Scaevola coriacea</i>	dwarf naupaka	E	Mo, M	<input type="checkbox"/>
<i>Schenkia (Centaurium)</i> <i>sebaeoides</i>	'āwiwi	E	K, O, Mo, L, M	<input type="checkbox"/>
<i>Sesbania tomentosa</i>	'ōhai	E	Ni, Ka, K, O, Mo, M, L, H, Necker, Nihoa	<input type="checkbox"/>
<i>Tetramolopium rockii</i>	no common name	T	Mo	<input type="checkbox"/>
<i>Vigna o-wahuensis</i>	no common name	E	Mo, M, L, H, Ka	<input type="checkbox"/>

Location key: O=O'ahu, K=Kaua'i, M=Maui, H=island of Hawai'i, L=Lāna'i, Mo=Moloka'i, Ka=Kaho'olawe, Ni=Ni'ihau, Le=Lehua

January 19, 2022
2015.71.0300 / 22P-010

Mr. Aaron Nadig, Island Team Manager
United States Department of the Interior
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Dear Mr. Nadig:

**Response to Technical Assistance
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your letter dated June 30, 2021, providing technical assistance for the pre-consultation of the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

We understand the workload constraints and will take the attached enclosure of Federal Status of Animal Species based on the Project Site and description into consideration to avoid or minimize effects to protected species associated with our Proposed Action. We have also obtained the suggested information from the Pacific Islands Fish and Wildlife Office website for recommended conservation measure intended to avoid or minimize adverse effects to the noted species as well as best management practices to minimize and avoid sedimentation and erosion impacts to water quality. We have included a Potential Effects and Mitigation section in the DEA to address these concerns, with this additional information considered.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letter and response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc



DEPARTMENT OF PARKS & RECREATION
CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

RICK BLANGIARDI
MAYOR



LAURA H. THIELEN
DIRECTOR

KEHAULANI PU'U
DEPUTY DIRECTOR

July 1, 2021

Mr. William Kucharski
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Kucharski:

Subject: Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por), 5-5-9:7 (por), 5-5-9:9 (por),
5-5-9:10 (por), 5-5-9:11 (por) and 5-5-9:47 (por)
Laie, Oahu

Thank you for the opportunity to review and comment at the Pre-Consultation Stage of an Environmental Assessment for the subject maintenance dredging of the Kahawainui Stream.

The Department of Parks and Recreation has no comment. As the proposed project will not impact any program or facility of the department you may remove us as a consulted party to the balance of the EIS process.

Sincerely,

A handwritten signature in black ink, appearing to read "Laura H. Thielen".

Laura H. Thielen
Director

LHT:jr
(854232)

January 24, 2022
2015.71.0300 / 22P-014

Ms. Laura H. Thielen
Director
City and County of Honolulu
Department of Parks and Recreation
1000 Uluhiah Street, Suite 309
Kapolei, Hawai'i 96707

Dear Ms. Thielen,

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

We are in receipt of your letter dated July 1, 2021, stating that the City and County and County of Honolulu Department of Parks and Recreation does not have any pre-consultation comments on the forthcoming Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i.

Thank you again for participating in the HRS Chapter 343 environmental review process. Your letter and this response will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 02, 2021

LD 0617

BCH Design-A Bowers + Kubota Company
Attn: William Kucharski, Project Manager
2153 North King Street, Suite 200 Via email: kahawainui_stream@bowersandkubota.com
Honolulu, HI 96813

Dear Sirs:

**SUBJECT: Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Lā'ie, Island of Oahu, Hawaii
TMKs: (1) 5-5-5:022 (por.); 5-5-009:7 (por.), 010 (por.), 011 (por.),
and 047 (por.)**

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

Attached are comments received from our (a) Engineering Division, (b) Commission on Water Resource Management, and (c) Office of Conservation and Coastal Lands. Should you have any questions, please feel free to contact Barbara Lee via email at barbara.j.lee@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments

Cc: Central Files



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 15, 2021

LD 0617

MEMORANDUM

FROM:

~~TO:~~

DLNR Agencies:

- Div. of Aquatic Resources (via email: kendall.l.tucker@hawaii.gov)
- Div. of Boating & Ocean Recreation
- Engineering Division** (via email: DLNR.Engr@hawaii.gov)
- Div. of Forestry & Wildlife (via email: Rubyrosa.T.Terrago@hawaii.gov)
- Div. of State Parks
- Commission on Water Resource Management (via email: DLNR.CWRM@hawaii.gov)
- Office of Conservation & Coastal Lands (via email: sharleen.k.kuba@hawaii.gov)
- Land Division – Oahu District (via email: DLNR.Land@hawaii.gov)

TO:

~~FROM:~~

Russell Y. Tsuji, Land Administrator *Russell Tsuji*

SUBJECT:

**Pre-Consultation for Environmental Assessment
Proposed Maintenance Dredging at Kahawainui Stream**

LOCATION:

Lā'ie, Island of Oahu, Hawaii; TMK: (1) 5-5-005:022 (por.), 5-5-009:007 (por.), -009 (por.), -010 (por.), -011 (por.), and -047 (por.)

APPLICANT:

**Bowers + Kubota Company on behalf of City and County of Honolulu,
Department of Design and Construction**

Transmitted for your review and comment is information on the above-referenced project. Please review the attached information and submit any comments by the internal deadline of **July 01, 2021** to the Land Division at DLNR.Land@hawaii.gov, and copied to barbara.j.lee@hawaii.gov.

If no response is received by the above due date, we will assume your agency has no comments at this time. If you have any questions, please contact Barbara Lee at barbara.j.lee@hawaii.gov. Thank you.

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

Signed:

Print Name:

Carty S. Chang, Chief Engineer

Division:

Engineering Division

Date:

Jun 28, 2021

Attachments

Cc: Central Files

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

LD/Russell Y. Tsuji

Ref: Pre-Consultation for Environmental Assessment

Proposed Maintenance Dredging at Kahawainui Stream

Location: Lā'ie, Island of Oahu, Hawaii

TMK(s): (1) 5-5-005: 022 (por.), 5-5-009:007 (por.), -009 (por.), -010 (por.), -011 (por.), and -047 (por.)

Applicant: Bowers + Kubota Company on behalf of City and County of Honolulu, Department of Design and Construction

COMMENTS

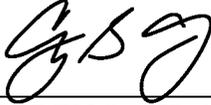
The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high-risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (<http://gis.hawaiiinfip.org/FHAT>).

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

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

Signed: _____


CARTY S. CHANG, CHIEF ENGINEER

Date: Jun 28, 2021



A Bowers + Kubota Company

January 19, 2022
2015.71.0300 / 22P-003

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

Dear Mr. Chang:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your memorandum dated June 15, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

- 1. Rules and regulations of the National Flood Insurance Program (NFIP) when development falls within a Special Flood Hazard Area. Projects are required to comply with 44CFR regulations as stipulated in section 60.12. Local community flood ordinances may stipulate higher standards than can be more restrictive and would take precedence over the minimum NFIP standards.**

The Project Site is within the NFIP Special Flood Hazard Area as it is within the FEMA's Flood Insurance Rate Maps (FIRM) Zone AE. The Proposed Action will comply with 44CFR regulations Section 60.12 as well as local community flood ordinances provided by the City and County of Honolulu's Department of Planning and Permitting.

- 2. The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation of the project. Flood Hazard Zones are designated on FEMA's FIRM.**

The Project Site is within Flood Hazard Zones AE and X. Maintenance dredging activities are proposed in Zone AE, which is within a floodway area and designated as a special flood hazard area. Other portions of the Project Site are within Zone X, which is determined to be outside of the 500-year flood.

Mr. Carty S. Chang
January 19, 2022 / 22P-003
Page 2

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at (808)-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company

A handwritten signature in black ink, appearing to read 'W. Kucharski', written in a cursive style.

William Kucharski
Project Manager

WK:kc



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

July 2, 2021

REF: RFD.5699.3

TO: Mr. Russell Tsuji, Administrator
Land Division

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

SUBJECT: Pre-Consultation for Environmental Assessment Proposed Maintenance Dredging at Kahawainui Stream

FILE NO.: RFD.5699.3

TMK NO.: (1) 5-5-005:022, (1) 5-5-009:007, (1) 5-5-009:009, (1) 5-5-009:010, (1) 5-5-009:011, (1) 5-5-009:047

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

Our comments related to water resources are checked off below.

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

- 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.
 - 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
 - 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
 - 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.
 - 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
 - 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
 - 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
 - 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.
 - 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
 - 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
 - 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- OTHER:

If you have any questions, please contact Dean Uyeno of the Commission staff at 587-0234.



A Bowers + Kubota Company

2153 NORTH KING STREET
SUITE 200
HONOLULU, HAWAII 96819

TEL_808.521.5361 | FAX_808.538.7819

BCHDESIGN.COM | BOWERSANDKUBOTA.COM

January 19, 2022
2015.71.0300 / 22P-002

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

Dear Mr. Manuel:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your letter dated July 2, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

- 1. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.**

We acknowledge that a Stream Channel Alteration Permit is required before any alteration can be made to Kahawainui Stream. Prior to starting maintenance dredging at the Project Site, a Stream Channel Alteration Permit will be acquired.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH a Bowers and Kubota Company

William Kucharski
Project Manager

WK:kc

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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

REF:OCCL:SH

Corr. OA-21-162

Jun 22, 2021

BCH Design, A Bowers+Kubota Company
Attn: William Kucharski
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

SUBJECT: RE: Pre-Consultation for Environmental Assessment: Proposed Maintenance Dredging at Kahawainui Stream

Dear Mr. Kucharski,

The Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) has received your June 15, 2021 letter inviting our office to review and comment on the Proposed Maintenance Dredging at Kahawainui Stream.

We appreciate the opportunity to provide comments and offer the following feedback:

The work as described appears to align with the following land use regulated by DLNR OCCL: HAR §13-5-22 Land and Resource Management (A-3) *Clearing of sand or silt from stream mouths, canals, drainage pipes, or other features for state or county maintenance, provided that the sand removed shall be placed on adjacent shoreline areas unless the placement would result in significant turbidity, as determined by the department.*

Because the land use requires that beach-quality sand material be placed on adjacent shoreline areas, we request that additional information be provided such that OCCL can confirm whether the material contains sediment deemed appropriate for use on the adjacent shoreline.

- First, we would like clarification regarding the extent of the project site. It is unclear from the project description where material will be dredged. The explanation states that, “[d]redging activities will be conducted in the Kahawainui Stream bed from the intersection of La‘ie Wai Stream to 1,500 feet upstream of the stream mouth and sand berm (the “Project Limit”).” La‘ie Wai Stream is not labeled on the map provided; however, a stream intersection appears on the map approximately 1,500 feet upstream of the stream mouth and sand berm, which makes the location of the project start and endpoints roughly equivalent. Based on the project map, it appears that the project area begins directly adjacent to the stream mouth and sand berm such that it is possible that some dredged material may contain beach-quality sand.

- Second, the project description states that sediment testing was conducted for dredged material within the Project Limit. We are curious if the testing included a grainsize analysis. If so, we request that the information be provided to OCCL. Otherwise, we request that a grainsize analysis be conducted representing material to be dredged such that OCCL can determine the potential of dredging of beach quality material. For your information, State quality standards for placement on a beach are stated below:
 - a) The proposed sand does not contain more than six (6) percent fines, defined as the #200 sieve (0.074 mm).
 - b) The proposed sand does not contain more than ten (10) percent coarse sediment, defined as the #4 sieve (4.76 mm) and shall be screened to remove any non-beach compatible material and rubble.
 - c) No more than 50 (fifty) percent of the fill sand has a grain diameter less than 0.125 mm as measured by #120 Standard Sieve Mesh.
 - d) The sand shall be dominantly composed of naturally occurring carbonate beach or dune sand. Crushed limestone or other man made or non-carbonate sands are unacceptable.

Thank you again for the opportunity to review the Proposed Maintenance Dredging at Kahawainui Stream. Should you have any questions on the matter, please feel free to contact Dr. Shellie Habel, Hawaii Sea Grant Extension Agent in the DLNR Office of Conservation and Coastal Lands at (808) 587-0049 or via email at Shellie.L.Habel@Hawaii.gov.

Sincerely,

SAM LEMMO

SAMUEL J. LEMMO, ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS



A Bowers + Kubota Company

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BCHDESIGN.COM | BOWERSANDKUBOTA.COM

January 14, 2022
2015.71.0300/ 22P-004

Mr. Michael Cain, Acting Administrator
State of Hawaii
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Cain:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your letter dated June 22, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

1. Extent of the Project Site.

The Project Site extends from the mouth of the Kahawainui Stream to the intersection of the Lā'ie Wai Stream (approximately 1,500 feet in length). Dredging activities are anticipated to occur adjacent to the stream mouth and sand berm. There is a possibility that the dredged material will contain beach-quality sand.

2. Sediment testing and grain size analysis.

Grain size analysis was conducted via American Society for Testing and Materials (ASTM) method D2216. Findings of the analysis yielded that the dredged material is suitable for beach replenishment, characterized mostly as medium to coarse sand (0.25 mm to 1 mm). A copy of the analysis is included below:



Figure 1: Decision Units determined by Element Environmental LLC

Table 1: Sediment Sample Composition (%) by Grain Size

Compound	DU-2	DU-3	DU-4	DU-5	DU-6 *****	DU-7	DU-8	DU-9
Total Silt and Clay (0 to 0.0625mm)	2.26	3.30	4.02	8.76	2.60	4.75	5.92	12.46
Very Fine Sand (0.0625 to 0.125mm)	1.16	1.62	2.46	5.25	1.84	1.99	2.91	7.45
Fine Sand (0.125 to 0.25mm)	7.79	7.34	7.46	19.07	17.38	12.93	12.16	23.99
Medium Sand (0.25 to 0.5mm)	27.05	22.35	22.35	27.47	40.30	35.25	29.87	32.63
Coarse Sand (0.5 to 1mm)	31.75	26.32	26.32	25.07	28.34	27.64	30.99	23.44
Very Coarse Sand (1 to 2mm)	18.19	22.07	22.07	9.38	5.33	7.05	18.15	0.039
Gravel (>2mm)	11.80	17.00	17.00	5.00	4.20	10.38	ND*	ND

*ND = Non-Detected, compound not detected above laboratory method detection limit (E2, 2019).

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
 BCH, a Bowers and Kubota Company



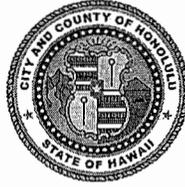
William Kucharski
 Project Manager

WK:kc

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

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RICK BLANGIARDI
MAYOR



DEAN UCHIDA
DIRECTOR
DAWN TAKEUCHI APUNA
DEPUTY DIRECTOR
EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

July 6, 2021

2021/ELOG-1115(ZS)

Mr. William Kucharski
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Kucharski:

SUBJECT: Pre-Environmental Assessment (EA) Consultation
Kahawainui Stream Dredging
Kahawainui Stream - Laie
Tax Map Keys 5-5-005: 022; and
5-5-009: 007, 009, 010, 011, and 047

This is in response to your letter, received on June 4, 2021, requesting comments for the above-mentioned EA. The proposed work involves dredging the Kahawainui Stream. Our comments are as follows:

- A stockpiling permit may be required.
- The Project is within the Special Management Area (SMA). On December 21, 2015, we determined that the proposed work is exempt from the SMA permitting requirements because it involves routine maintenance dredging of an existing stream (File No. 2015/ELOG-2526).
- Although it appears the work may extend into the shoreline setback area, a Shoreline Setback Variance is not required. The clearing of materials from the mouths of streams is not prohibited within the shoreline setback area.
- State GIS maps show that Kahawainui Stream has both cultural and riparian resources. These should be addressed in the draft EA.

Mr. William Kucharski
July 6, 2021
Page 2

- Some of the parcels involved require all permits be routed to the State Historic Preservation Division before permits can be issued. It is a good idea to request their comments as early as possible to expedite permit processing.
- The draft EA should include a thorough analysis of an alternative that eliminates the need for routine maintenance dredging. This alternative could involve a long-term flood protection scheme that incorporates a wider riparian buffer area along the stream, allowing the stream to meander and widen with heavy rainfall.

Should you have any questions, please contact Zack Stoddard, of our staff, at (808) 768-8019, or zachary.stoddard@honolulu.gov.

Very truly yours,

for 
Dean Uchida
Director



A Bowers + Kubota Company

January 24, 2022
2015.71.0300/ 22P-015

Mr. Dean Uchida, Director
City and County of Honolulu
Department of Planning and Permitting
650 S. King Street, 7th Floor
Honolulu, Hawai'i 96813

Dear Mr. Lemmo:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your letter dated July 6, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

1. A stockpiling permit may be required.

The DEA includes a list of expected permits and approvals to be attained during the Proposed Project. A stockpiling permit is on the permits and approvals table included in Section 6 of the DEA.

2. The Project is within the Special Management Area (SMA). On December 21, 2015, we determined that the proposed work is exempt from the SMA permitting requirements because it involves routine maintenance dredging of an existing stream (File No. 2015/ELOG-2526).

Thank you for the confirmation of the December 21, 2015, determination that the proposed work is exempt from the SMA permitting requirements.

3. Although it appears the work may extend into the shoreline setback area, a Shoreline Setback Variance is not required. The clearing of materials from the mouths of streams is not prohibited within the shoreline setback area.

Prohibition of clearing materials from the mouth of the stream has been noted and the Proposed Action will adhere to those protocols.

4. **State GIS maps show that Kahawainui Stream has both cultural and riparian resources. These should be addressed in the draft EA.**

The DEA will include a report from subconsultant, Honua Consulting, including a Cultural Impact Assessment (CIA). The riparian resources present at Kahawainui Stream will also be addressed in the DEA.

5. **Some of the parcels involved require all permits be routed to the State Historic Preservation Division (SHPD) before permits can be issued. It is a good idea to request their comments as early as possible to expedite permit processing.**

SHPD received a Pre-Consultation letter similar to the letter sent to DPP. Additionally, we are initiating project review under HRS 6E-8, with direction of Honua Consulting.

6. **The draft EA should include a thorough analysis of an alternative that eliminates the need for routine maintenance dredging. This alternative could involve a long-term flood protection scheme that incorporates a wider riparian buffer area along the stream, allowing the stream to meander and widen with heavy rainfall.**

The Final Detailed Projects Report and Environmental Impact Statement (EIS) prepared by the Army Corps of Engineers detailed a scenario that did not include dredging or altering the stream. Enclosed are the alternatives considered from the EIS, Alternative #2 addresses nonstructural changes to the stream, while Alternative #3 considers floodplain management.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or at email wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

II. DESIGN AND COST

1. GENERAL

Structural and non-structural alternatives were considered for Kahawainui Stream. In the final array of alternatives, three structural alternative plans and one nonstructural plan were evaluated for various levels of protection in order to determine the level of protection that maximizes net benefits. The scope of engineering investigations was planned to determine technical feasibility, to estimate costs and to evaluate the effects of the alternative plans on the environment.

Alternative 1 (Plate D-1) provides for a levee to control flows. Alternative 2 (Plate D-2) consists of a channel and levee improvements. Alternative 3 provides for floodproofing and floodplain management practices (Table D-10), and Alternative 4 (Plate D-3) consists of channel improvements.

2. DESIGN GUIDES

The hydraulic designs follow the US Army Corps of Engineers Engineering Manual EM 1110-2-1601, "Hydraulic Design of Flood Control Channels," dated 1 July 1970. This appendix, in general, follows the information specified in EFL 1110-2-230, "Hydrologic and Hydraulic Engineering for Survey Investigations," dated 15 May 1978.

3. BASELINE CONDITIONS

Elevations are based upon mean sea level datum (MSL). The designs and alternatives were prepared using the following maps and surveys:

a. Aerial photo-contour maps, sheet numbers: 528-174 and 528-169 at 1 foot = 200 feet with 5-foot contour intervals prepared by R. M. Towill for the City and County of Honolulu, undated.

b. Topographic maps of Kahawainui Stream, Oahu at 1 inch = 40 feet with 2-foot contour intervals (7 sheets dated 10 July 1982) prepared by Air Survey Hawaii under Contract No. DACW84-82-C-0010 for the US Army Corps of Engineers, Pacific Ocean Division.

c. Cross sections dated 10 August 1984 of portions of Kahawainui Stream, Oahu, at Scale 1 inch = 10 feet prepared by Wesley M. Thomas, Hawaii under Contract No. DACW83-84-D-0007 for the US Army Corps of Engineers, Pacific Ocean Division.

4. FREEBOARD ASSUMPTIONS

Freeboard is the computed vertical distance between the design water surface to the top of the channel or levee embankment. Freeboard is provided to ensure that the desired degree of protection would not be reduced by unaccounted factors. A minimum freeboard allowance of 3 feet was used for the project features. Guidances on freeboard allowance were obtained from EM 1110-2-1601 and Civil Works Engineer Bulletin 54-14.

5. WATER SURFACE PROFILES

The computational procedure for water surface profiles generally follows method 1, Engineering Manual EM 1110-2-1409, "Backwater Curves in River Channels." The water surface profiles were obtained by the computer program, "HEC-2, Water Surface Profiles," developed by the Corps Hydrologic Engineering Center and by computer program "CORPS" developed by the US Army Engineer Waterways Experiment Station.

The following parameters were selected:

a. Manning's roughness coefficient (n)

Light vegetation	.025
Medium vegetation	.035
Heavy vegetation	.045
Concrete riprap	.030

b. Contraction coefficient .3

c. Expansion coefficient .8

6. CHANNEL AND LEVEE STABILITY

Based on maximum design velocities of 24 feet per second in the flood control channel and about 7 feet per second at the bank along the levee, the channel and some areas of levee improvements would require lining to resist the scouring forces of the flow. Concrete riprap and concrete lining were utilized for the channel and concrete riprap was used for levee lining where needed as shown on Plate D-4. Appendix C addresses the foundation stability conditions and criteria utilized.

7. FLOW THROUGH BRIDGES

The water surface profile at the Laiewai Bridge was determined by the Koch-Carstanjen equation based on the momentum relation presented in EM 1110-2-1601. The upstream depth was determined using "CORPS" Computer Program with critical depth near the channel entrance. The flow classification for Laiewai Bridge was determined as Class C. The bridge and downstream depths were determined from a force curves developed from the momentum relationships above. Bridge pier extensions (Plate D-4) would be provided at the upstream end of the bridge piers to allow debris to move up the pier nose and to improve flow conditions through the bridge. For channel alternatives, a wall would be extended from each bridge abutment and would be reducing in the height to the invert level while the channel side slopes would diminish from maximum to zero length starting from the opposite side of this wall reach to develop a wedge type transition at the bridge approaches. A typical section of the abutment extension wall is shown on Plate D-4.

8. DEBRIS BASIN

A debris basin was not included in the design of the alternative plans because it was not considered essential for the operation of the project. Additional annual maintenance, however, was included for removal of debris and sediment.

9. FLOOD CONTROL ALTERNATIVES

a. Alternative 1: Levee Improvements. This alternative (see Plate D-1) provides for a levee on the right bank of the stream starting from Laiewai Bridge at Kamehameha Highway and extending approximately 2,370 feet upstream. Several levels of protection including SPF, 100-yr. and 50-yr. were investigated in order to determine the protection level that maximizes net benefits. Optimization of net benefits for this alternative occurred at the standard project flood level of protection. The levee section (see Plate D-4) for the standard project flood protection, would have a maximum height of about 15.8 feet, a crest width of 12 feet and side slopes of 2-horizontal to 1-vertical. The levee would consist of compacted earth-fill with the side slope from Station 16+30 to 28+20 lined with concrete riprap on the river side to prevent erosion of the levee by flows. The backside slope and the levee crest will be grassed. At Station 28+13, a dirt road must be elevated a maximum height of about 12.5 feet at the levee crossing for access to an existing cemetery located along both sides of the levee. A concrete I-wall supported on steel sheet piling (See Plate D-4) would be located between Stations 28+20 and 30+83. The wall would extend a total distance of about 430 linear feet and would avoid mass relocation of 67 graves which otherwise would be necessary by levee construction within this reach. The levees will stop at each end of the wall. Railings would be provided at these retaining end wall locations. The levee would continue upstream of Station 30+83 and would be grassed on both sides. The levee would also require raising of an existing road to a maximum height of about 12.8 feet at about Station 38+86. A minimum freeboard allowance of 3 feet was utilized. The areas upstream of the levee would be subject to flooding and would need to be zoned as a flood hazard area. These areas are depicted on Plate D-1. At the downstream end, flows would be ponded against the Kamehameha Highway and concrete riprap paving along the highway embankment would be provided as slope protection to stabilize the highway for this purpose. The existing bridge abutments would be extended with concrete walls along the ends of the slope protection. Pier extensions would be provided at the existing bridge piers and the bridge invert would be deepened and lined with concrete riprap to increase bridge capacity and to pass flows through the bridge. Flows would not overtop the highway. The park downstream of the Kamehameha Highway would remain as a flood hazard area.

The proposed levee will increase the extent of the floodplain on the left side of the stream where three residential structures that were not in the "without project" standard project floodplain will now be in the "with project" standard project floodplain. These structures are located just upstream of the Kamehameha Highway. These three structures will need to be floodproofed as a mitigative measure. Project lands for levee construction for Alternative 1 will require acquisition of approximately 5 acres. An additional 2.1 acres will require acquisition since the levee plan increase flood limit areas along the left bank.

b. Alternative 2: Channel and Levee Improvements. This alternative (see Plate D-2) provides for channel improvements and a levee along the right bank. The levee would continue from the channel to the upstream project limit. The improvements would modify approximately 1,500 feet of existing stream. The downstream project limits would end at the existing stream about 140 feet below Kamehameha Highway. This plan also optimizes net benefits at the standard project flood level.

The levees would be about 1,760 feet in length and would have a maximum height of about 12.6 feet. The levees will consist of compacted earth-fill with the side slope along the stream lined with concrete riprap downstream of Station 27+70 to prevent erosion of the levee by the floodflows. The backside slope and the levee crest would be grassed. As discussed in alternative 1, a concrete I-wall would be provided between stations 27+70 and 30+33 and would retain the levee at both ends. The levee upstream of Station 30+33 would be grassed. A minimum freeboard allowance of 3 feet was utilized. As in Alternative 1, the levee would require that a road be raised to a maximum height of about 10.0 feet near station 27+63 for access to cemetery areas, and that another road be raised to a maximum height of about 10.1 feet near station 38+35.

The existing stream would be realigned upstream of the highway and replaced with a trapezoidal channel with 3 to 1 side slopes from the bridge to Station 21+00 for a length of about 490 feet. The channel would be concrete lined from the bridge at Station 16+14 to Station 17+50 and concrete riprap lined from Station 17+50 to Station 21+00. Two feet deep invert cut off walls would be placed between linings. The channel invert will be V-shaped to concentrate low flows. Above station 21+00, the floodplain would be graded to concentrate low flows with a swale and to guide flows from the existing stream to the channel improvements. The upstream end of the channel improvement is widened from an 80-foot base width at Station 19+00 to 150 feet at Station 21+00 to reduce flow depths and upstream right bank levee height requirements. Along the left bank, the channel would be in cut. The channel top would require fill at the design channel height along the right bank. Minimum freeboard allowance of 3 feet was utilized for the channel. The Laiewai Bridge would be modified by cleaning and excavating the stream under the bridge to an invert centerline elevation of -3.2 ft MSL and the invert under the bridge would be lined with concrete riprap. The bridge abutments would be extended to station 16+50 to form a wedge type transition to the upstream channel improvements. Bridge pier extensions would be provided to improve flow considerations and reduce debris impacts. Flows would not overtop the highway. The channel improvements would require relocation of one residential structure and three sheds which are situated on the left bank and center of the channel above Kamehameha Highway.

Flows would pass through the modified bridge and another wedge transition downstream of the Kamehameha Highway and into the existing Kahawainui Stream. Flows exceeding the stream capacity of about 400 cfs below the project limits would overflow the stream banks within the park site and discharge as sheet flows to the ocean. This park area would remain in a flood hazard zone.

An equipment turn around area would be provided in the upper levee area to aid in the ease of maintenance by the City and County of Honolulu.

Project lands and easements for the channel and levee alternative will require about 5.3 acres of land.

c. Alternative 3 (Nonstructural Plan): Flood Proofing and Floodplain Management Plan.

The nonstructural plan provides for floodproofing and floodplain management measures. Several levels of protection were analyzed including the Standard Project Flood, 100-year (1 percent) frequency and the 50-year (2 percent) frequency flood events.

The analyses and evaluations were based on field surveys conducted in October and November 1982, topographic maps, aerial photographs, State tax key maps and prior experiences by others described in reports indicated in the list of references. A breakdown of the number of structures that are involved are as follows:

NUMBER OF STRUCTURES

<u>Total Structures in Watershed</u>	<u>Total Structures in Selected Floodplain SPF</u>	<u>100-Year</u>	<u>50-Year</u>
441 (approximate)	441	441	441

The main types of structures in the study area are:

- Wood frame on post and beam
- Wood frame on concrete slab
- Concrete block on a concrete slab

In determining the nonstructural plan, the following assumptions were made:

- a. Wood frame on post and beam structures are easy to raise; and can be raised up to 9 feet above existing grade,
- b. Concrete block or a concrete slab structure can resist a hydrostatic head up to 3.0 feet, and
- c. The relocating of damageable goods within a commercial structure is a viable alternative until the 1 percent flood elevation is 2 feet above a structure's first floor.
- d. A wood frame on concrete slab structure, with a 3-foot difference between the 1 percent event elevation and the first floor, should be removed, replaced with a new structure, or protected by a brick veneer wall.
- e. Wood frame on concrete block structures are assumed to behave identically to wood frame on post and beam structures.

The following indicates the distribution of structures by flooding depths.

DISTRIBUTION OF STRUCTURES BY FLOODING DEPTHS

<u>No. of Structures Inundated</u>	<u>Depth of Flooding Above 1st Floor</u>	<u>Concrete On Grade</u>	<u>On Posts</u>	<u>Woodframe on Slab</u>	<u>Total</u>
50-year flood	Less than 0	5	41	3	49
	0 - .5'	2	14	1	17
	.6 - 1'	7	15	1	23
	1.1' - 2'	36	32	6	74
	2.1' - 3'	30	35	11	76
	3.1' - 4'	55	20	9	84
	Greater than 4'	43	9	8	60
100-year flood	Less than 0	3	28	3	34
	0 - .5'	1	12	0	13
	.6 - 1'	3	12	1	16
	1.1' - 2'	11	25	2	38
	2.1' - 3'	38	37	9	84
	3.1' - 4'	36	32	12	80
	Greater than 4'	86	20	12	118
SPF	Less than 0	1	20	3	24
	0 - .5'	2	7	0	9
	.6 - 1'	1	13	0	14
	1.1' - 2'	5	20	1	46
	2.1' - 3'	25	33	5	63
	3.1' - 4'	40	38	10	88
	Greater than 4'	104	35	20	159

The nonstructural plan provides for:

<u>Method</u>	<u>Number of Structures</u>		
	<u>SPF</u>	<u>100-Yr</u>	<u>50-Yr</u>
Temporary or permanent closures	60	68	96
Raising the first floor elevation	162	159	139
Replacing/removing the structure	179	157	118
Relocating damageable items	7	7	6
Providing flood walls	<u>18</u>	<u>18</u>	<u>28</u>
TOTAL	418	409	387

This should be considered as a minimum plan, as a closer inspection of the individual structures and personal desires of the owner may require the use of a different specific floodproofing plan. Photographs of each structure were taken and are on file at the Honolulu District Office, U.S. Army Corps of Engineers, for future reference.

d. Alternative 4: Channel Plan. This alternative consists of channel improvements. (See Plate D-3). The channel would begin at about 136 feet downstream of Kamehameha Highway and would end about 3,850 feet upstream at the confluence of Kahawainui Stream with Ihiihi Gulch. Terminating the channel below this location would necessitate the use of long containment levee structures and/or diversion structures since the floodplain widens drastically below this confluence. However, levee ties to high grounds at the channel entrance would be needed at the upstream channel limit to preclude end run flow conditions. The channel improvement features are shown on Plate D-4. The channel would be lined with concrete riprap and is trapezoidal in shape with a base width of 80 feet and side slopes of 3-horizontal to 1-vertical. The upstream end of the channel improvements is widened from an 80-foot wide base at Station 48+00 to a 180-foot wide base at Station 53+00 to guide flood flows into the improved channel. A minimum freeboard of 3 feet is provided for the channel. The stream at the Laiewai Bridge at Kamehameha Highway would be deepened to elevation -6.2 MSL and the new invert would be lined with concrete riprap. Bridge pier and abutment extensions will be provided similar to Alternative 2. Portions of the downstream park adjoining the stream would also remain as flood hazard area.

e. Selected Plan. Based on alternative plans developed and optimization of net benefits determined under Principles and Guidelines, the plan with the highest net benefits is Alternative 2, (Channel and Levee Plan) at the standard project flood level of protection. Discussion of net benefits would be provided under "Economic Evaluation" in Appendix E. The recommended plan is determined in the main report under "The Selected Plan" and "Conclusions and Recommendations". The Recommended Plan is provided on Plate D-5. The design profile for the recommended plan is shown on Plate D-6.



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

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR

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DTS 202106251019HE

July 8, 2021

Mr. William Kucharski
Project Manager
BCH Design, A Bowers+Kubota Company
2153 N. King Street, Suite 200
Honolulu, HI 96819-4554

Dear Mr. Kucharski:

Subject: Pre-Consultation for an Environmental Assessment Proposed Department of Design and Construction Maintenance Dredging at Kahawainui Stream; Lā'ie, O'ahu, Hawai'i;
TMK: (1) 5-5-005: 022 (por), 5-5-009: 007 (por), 5-5-009: 009 (por), 5-5-009: 010 (por), 5-5-009: 011 (por), and 5-5-009: 047 (por)

Thank you for the opportunity to provide comments for the preparation of a Draft Environmental Assessment (Draft EA) for the maintenance dredging project of Kahawainui Stream in Lā'ie, O'ahu. The pre-consultation review material was transmitted to our office via letter dated June 2, 2021.

It is our understanding that City and County of Honolulu (CCH), Department of Design and Construction (DDC) is proposing routine maintenance and dredging be conducted in the Kahawainui Stream, which empties into Lā'ie Bay. This will be followed by the stockpiling of dredged stream debris and collected sediment on privately owned land for drying and transport.

The purpose of this project is to maintain sufficient flow of the stream and prevent flooding into downstream urban areas. It is anticipated that the dredged soil and sediment will consist of approximately 2,955 cubic yards. The sediment and debris will be collected in either a clamshell dredging platform, or directly in the stream at low tide, with an excavator with a high carriage.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. Hawai'i Coastal Zone Management (CZM) Program

The CZM area is defined as "all lands of the State and the area extending seaward from the

shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" (HRS § 205A-1).

In implementing the objectives and supporting policies of the Hawai'i CZM program, agencies shall consider ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, and economic development. As this project requires the approval of a governmental agency, the Draft EA should include analysis on the project's consistency with the objectives and supporting policies of the Hawai'i CZM Program, HRS § 205A-2, as amended. Compliance with HRS § 205A-2 is an important component for satisfying the requirements of HRS Chapter 343.

2. Special Management Area (SMA) / Shoreline Setbacks

If the proposed routine maintenance dredging action involves the county designated SMA, or shoreline area as defined by HRS Chapter 205A, the DDC shall consult with the CCH, Department of Planning and Permitting, as to whether the proposed dredging action is exempt from a SMA permit requirement pursuant HRS § 205A-22 and county SMA ordinance, or is allowable in the shoreline area pursuant to HRS § 205A-44(a) and county shoreline setback ordinance.

3. Coastal Zone Management Act (CZMA) Federal Consistency

The national CZMA requires that federal actions be consistent with approved state coastal programs enforceable policies. Federal actions include activities that require federal permits or approvals. We note that elements of the proposed action may require a Department of the Army Permit from the U.S. Army Corps of Engineers. This federal permit may necessitate the need for a CZMA federal consistency review.

OP is the lead state agency with the authority to conduct CZMA federal consistency reviews. Please contact our office regarding the policies and procedures on conducting a federal consistency review.

4. Stormwater Runoff, Erosion, and Water Resources

Pursuant to Hawai'i Administrative Rules (HAR) § 11-200.1-18(d)(7) identification and analysis of impacts and alternatives considered; although this proposed action intends to remove soil, debris, and sediment from lands upslope, the impact on the nearshore marine resources along the north shore of O'ahu should be considered. Protection of these resources post dredging and mitigation measures that could be used once the dredging and bank stabilization is completed should be evaluated.

Issues that may be examined include, but are not limited to, project site characteristics in relation to flood and erosion prone areas, potential vulnerability of water resources, and the shoreline. Pursuant to HAR § 11-200.1-18(d)(8), developing mitigation measures and

Mr. William Kucharski
July 8, 2021
Page 3

erosion controls upstream, once the dredging project is complete, and limiting future impact for downstream surface water resources and the coastal ecosystem would do much to address future concerns of coastal inundation, land based pollutants entering Lā'ie Bay, and impact to the marine ecosystem.

If you have any questions regarding this comment letter, please contact Joshua Hekeia of our office at (808) 587-2845.

Mahalo,

Mary Alice Evans

Mary Alice Evans
Director

January 19, 2022
2015.71.0300/ 22P-008

Ms. Mary Alice Evans, Director
State of Hawaii
Office of Planning and Sustainable Development
235 S. Beretania Street, 6th Floor
Honolulu, Hawaii 96813

Dear Ms. Evans:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your memorandum dated July 8, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu (CCH) Department of Design and Construction Maintenance Dredging (DDC) at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

1. Hawaii Coastal Zone Management (CZM) Program

Due to the Project's proximity to the shoreline, the DEA will include an analysis on the Project's consistency with the objectives and policies of the Hawaii CZM Program, HRS Chapter 205A-2.

2. Special Management Area (SMA) / Shoreline Setbacks

Consultation with the CCH Department of Planning and Permitting determined that the proposed dredging action is exempt from an SMA permit requirement pursuant HRS 205A-22 and county SMA ordinance. The Proposed Action is allowable in the shoreline area pursuant HRS 205A-44(a) and county shoreline setback ordinance.

3. Coastal Zone Management Act (CZMA) Federal Consistency

The Proposed Action will require a Department of Army Permit from the U.S. Army Corps of Engineers (USACE). The USACE will reach out to the Office of Planning for a CZM Federal Consistency Determination or Certification prior to commencement of the Proposed Action.

4. Stormwater Runoff, Erosion, and Water Resources

The DEA will identify impacts of the Proposed Action to nearshore marine resources along the north shore of O'ahu pursuant to Hawai'i Administrative Rules (HAR) 11-

Ms. Mary Alice Evans
January 19, 2022 / 22P-008

200.1-18(d)(7). Mitigation measures to protect marine resources and environment will be implemented during and post dredging activities and evaluated accordingly in accordance with (HAR) 11-200.1-18(d)(8).

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc

DAVID Y. IGE
GOVERNOR



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

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A. S. ARAKI-REGAN
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

IN REPLY REFER TO:
DIR 0529
HWY-OM 2.21-0427

July 8, 2021

EMAIL: kahawainui_stream@bowerandkubota.com

Mr. William Kucharski
Project Manager
BCH Design, A Bowers and Kubota Company
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Kucharski:

Subject: Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream,
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por), 5-5-9:9 (por), 5-5-10 (por),
5-5-9:11 (por) and 5-5-9:47 (por)
Laie, Oahu, Hawaii

Thank you for your letter dated June 2, 2021 referencing your notice of your proposed project.

Please ensure that the appropriate Hawaii Department of Transportation permissions and permits are obtained to cross, use, and close lane(s) on Kamehameha Highway.

Please advise us when the draft environmental assessment is complete.

Should you have further questions, please contact Ryan Nakata, Maintenance Engineer of our Highways Division, Oahu District at (808) 831-6700 ext. 134 or email at ryan.a.nakata@hawaii.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jade T. Butay".

JADE T. BUTAY
Director of Transportation

SL:lm

Date: 06/04/2021

State of Hawaii
DEPARTMENT OF TRANSPORTATION

Log No: DIR 0529

Suspense: 06/25/2021

FROM: DIRECTOR

Subject: PRE-CONSULTATION FOR AN ENVIRONMENTAL ASSESSMENT,
PROPOSED DEPARTMENT OF DESIGN AND CONSTRUCTION,
MAINTENANCE DREDGING AT KAHAWAINUI STREAM, LAIE, OAHU, HAWAII

TO: STP

- | | |
|---|--------------------------------|
| <input type="checkbox"/> DIR | <input type="checkbox"/> AIR |
| <input type="checkbox"/> DEP C | <input type="checkbox"/> HAR |
| <input type="checkbox"/> DEP A | <input type="checkbox"/> HWY |
| <input type="checkbox"/> DEP H | <input type="checkbox"/> BUS |
| <input type="checkbox"/> DEP TRN | <input type="checkbox"/> BUS P |
| <input type="checkbox"/> DEP C2 | <input type="checkbox"/> BUS O |
| <input type="checkbox"/> DEP P | <input type="checkbox"/> COM |
| <input type="checkbox"/> DEP | <input type="checkbox"/> CSC |
| <input type="checkbox"/> PER | <input type="checkbox"/> EDC |
| <input type="checkbox"/> PMM | |
| <input type="checkbox"/> PPR | |
| <input checked="" type="checkbox"/> STP | |
| <input type="checkbox"/> | |

FOR: COMMENT & RECOMMENDATIONS

- Appropriate Attention & Action
- Arrange Meeting
- Investigate & Report Back
- Comments & Recommendations
- Draft Reply
- Final Reply for Gov's Sig
- Direct Action/Reply
- Information
- See Me
- Signature
- Submit Copy of Response
- File
- Review
- Return
- Phone Call
- Follow-up Interim Reply

5

STP
RHH

(nr)

DO NOT REMOVE FROM CORRESPONDENCE

COORDINATION/REVIEW TRANSMITTAL

DATE: 6/8/21

DIR LOG NO. 0529

TO: HWY

CC:

FROM: STP *AP*

SUSPENSE: 7/2/21

SUBJECT: Dredging at Kahawainui Stream - Pre-Consultation for an Environmental Assessment

FOR:

- Comments and Recommendations (STP to prepare response)**
- Appropriate Attention and Action
(Division office to prepare response and send a copy to STP)**
- Information and File**

OTHER DIVISIONS REVIEWING MATERIAL: AIR HAR HWY

SPECIAL INSTRUCTIONS: STP has no record of prior review of the subject project.

COMMENTS: The City and County of Honolulu Department of Design and Construction is proposing to conduct routine maintenance dredging at the Kahawainui Stream, and stockpiling of dredged material on adjacent parcels for drying and transport.

BN: *N7*



A Bowers + Kubota Company

January 19, 2022
2015.71.0300 / 22P-005

Mr. Jade T. Butay, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street, Room 509
Honolulu, HI 96813

Dear Mr. Butay:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your memorandum dated July 8, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

- 1. Please ensure that the appropriate Hawaii Department of Transportation permissions and permits are obtained to cross, use, and close lane(s) on Kamehameha Highway.**

The Contractor will obtain the necessary permits for crossing and use of Kamehameha Highway prior to commencement of the Proposed Action. No road closures are anticipated along Kamehameha Highway.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH , a Bowers and Kubota Company

William Kucharski
Project Manager

WK:kc

From: [Anne Chung - NOAA Federal](#)
To: [Kahawainui Stream EA](#); [Gerry Davis - NOAA Federal](#); [Malia Chow - NOAA Federal](#); [Speerstra, Linda CIV USARMY CEPOH \(US\)](#)
Subject: NMFS EFH pre-consultation response for Kahawainui Stream dredging
Date: Friday, July 16, 2021 10:44:18 AM
Attachments: [21P-059 Email NMFS \(2\).pdf](#)

Aloha,

On June 17, 2021, the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office (PIRO), Habitat Conservation Division (HCD), received a pre-consultation letter (attached) for an Environmental Assessment (EA) from BCH and the City and County of Honolulu Department of Design and Construction (DDC) for comments and technical assistance for maintenance dredging in the Kahawainui Stream on the island of O‘ahu, Hawai‘i.

Our response provided below is intended to help you comply with the essential fish habitat (EFH) provision of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; Section 305(b)(2) as described by 50 CFR 600.920), which will be required as part of the U.S. Army Corps of Engineers, Honolulu District, Regulatory Branch’s (hereafter, USACE; CC’d here) permitting process. This technical assistance does not fulfill any federal responsibilities and does not constitute an EFH consultation. In addition to being the federal regulatory agency responsible for implementing the MSA, PIRO oversees consultations for compliance with the Endangered Species Act (ESA) and other statutory mandates. Compliance with the EFH provisions of the MSA can also be achieved through pursuance to the Fish and Wildlife Coordination Act (FWCA, 16 U.S.C. 661-666c). For all questions related to consultations with us in the future, please contact us through the email address EFHESAconsult@noaa.gov.

Project Description

The proposed project would entail dredging of 2,955 cubic yards of sediment from the Kahawainui Stream from the intersection with the Lōi‘e Wai Stream to 1,500 feet upstream of the stream mouth. The purpose of the project is to maintain sufficient stream flow and prevent flooding into adjacent areas. Dredging would occur either with a clamshell from shore, on a platform, or directly in the stream at low tide with an excavator. The resultant material will be placed in designated stockpile areas located upland for drying. Sediment testing has been conducted and none of the samples from the stream contained contaminants exceeding state Environment action Levels (EALs) and are not considered hazardous waste.

PIRO Habitat Mandates

Magnuson-Stevens Fishery Conservation and Management Act

A consultation with NMFS is required when a federal agency works in an area that will adversely affect EFH (i.e., the federal agency is directly conducting the work, funding work, or permitting work) (Section 305(b)(2) as described by 50 CFR 600.920). The EFH consultation process entails the federal action agency contacting NMFS and providing an EFH assessment (EFHA), which contains key information: a description of the proposed action, a determination from the federal agency as to how the action will affect EFH, an assessment of those adverse effects, and proposed ways to offset or mitigate for the adverse effects, if applicable. An adverse effect to EFH is anything that reduces the quality and or quality of EFH. It may include direct, indirect, and site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of an action. NMFS will then review the EFHA and may provide conservation recommendations to avoid, minimize, offset for or otherwise mitigate expected adverse effects.

EFH consultations are scalable and commensurate to the severity and type of adverse effects to EFH. The greater the adverse effect, the greater the scrutiny in making a determination. As the order of effect increases, qualitative, semi-quantitative, and quantitative EFH Assessments are appropriate, sequentially. Often, once EFH resources need to be quantified, PIRO is likely to request an “expanded” EFH consultation as opposed to “abbreviated” (50 CFR 600.920(h)(i)), unless sufficient quantification of unavoidable losses has been provided. Although we have provided you with our most recent EFH Draft Consultation Guidance document to assist with the EFH consultation process, below we provide detail specific to your proposal that should be included within the EFHA for this beach nourishment consultation.

In the main Hawaiian Islands, EFH has been designated in the marine water column from the surface to a depth of 1,000 meters, from the shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 700 meters. These waters and submerged lands are designated as EFH because they support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council’s, Pelagic and Hawai‘i Archipelago Fishery Ecosystem Plans (hereafter, Hawai‘i FEP). The MUS and life stages found in these waters include: eggs, larvae, juveniles, and adults of Bottomfish MUS; eggs, larvae, juveniles, and adults of Crustacean MUS; and eggs, larvae, juveniles, and adults of Pelagic MUS. Specific types of habitat considered as EFH include coral reefs, patch reefs, hard substrate, seagrass beds, soft substrate, artificial or man-made structures, mangrove, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean.

For clarity, federal agencies may incorporate the EFHA into documents prepared for other purposes, such as Endangered Species Act Biological Assessments, National Environmental Policy Act documents, or public notices. If an EFHA is contained in another document, it must still include all of the mandatory contents as per the EFH guidelines. It must also be clearly identified in the table of contents and text of the document as an EFHA. Alternatively, an EFHA may incorporate by reference other relevant environmental assessment documents that have already been completed. The referenced document must be provided to NMFS with the EFHA.

The EFHA process can also be combined with existing environmental consultation and review processes. The EFH guidelines at 50 CFR 600.920(f) enable Federal action agencies to use existing consultation or environmental review procedures to satisfy the MSA consultation requirements if the procedures meet the following criteria: 1) the existing process must provide NMFS with timely notification of actions that may adversely affect EFH; 2) notification must include an assessment of the proposed action’s impacts on EFH that meet the requirements for EFHA discussed in section 600.920(e); and 3) NMFS must have made a finding pursuant to section 600.920(f)(3) that the existing process satisfies the requirements of section 305(b)(2) of the MSA. For the purposes of this beach nourishment proposed action, the EFHA should be integrated with the FWCA (see below) coordination process. In situations where a Federal action may adversely affect designated EFH for Federally managed fisheries, EFH Conservation Recommendations can be considered within the FWCA reporting recommendations.

Fish and Wildlife Coordination Act

The FWCA (16 U.S.C. 661-666c) mandates that wildlife, including fish, receive equal consideration and be coordinated with other aspects of water resource development. This is accomplished through consultation with NMFS, the U.S. Fish and Wildlife Service (USFWS), and appropriate state agencies whenever any body of water is proposed to be modified in any way and a Federal permit or license is required. These agencies determine the possible harm to

fish and wildlife resources, the measures needed to both prevent the damage to and loss of these resources, and the measures needed to develop and improve the resources, in connection with water resource development. NMFS, the USFWS, and state agencies submit comments to Federal licensing and permitting agencies on the potential harm to living marine resources caused by the proposed water development project, and recommendations to prevent harm (NMFS 2004). In all, the FWCA compliance process includes the following four steps: consultation (notice of initiation); reporting (e.g., field surveys and summary reports) and recommendations to protect, mitigate, and restore natural resources; Action agency consideration of recommendations, and Action agency implementation of recommendations.

Stressor Effects

Sedimentation and Turbidity: Enhanced sedimentation and turbidity may occur from dredging activity leading to sediment entering nearshore waters. To minimize effects of sedimentation, turbidity control measures should be taken including installing silt curtains as appropriate; water quality monitoring should take place before, during, and after construction; and halting project activities if increased sedimentation should occur.

Nutrients and Chemical Contamination: Adverse effects may occur during dredging due to release of sediment-bound nutrients and chemical contaminants. The latter may also occur from leaking construction equipment and introduction of treated materials into the marine environment. To monitor for these changes as well as unintended chemical contamination, water quality should occur before, during, and after project activities.

EFH Assessment Content

An EFHA should be included for the upcoming EFH consultation, and specific content should be considered for inclusion to inform an EFH determination and the EFH effects analysis. If a USACE permit is required, the USACE would be the lead federal action agency responsible for developing the EFHA. The EFHA should consider the full suite of potential stressors to habitat forming EFH. We also provide an Enclosure at the end of this letter with specific avoidance and minimization measures that would be applicable to the project.

Summary

We greatly appreciate early EFH coordination and the opportunity to provide comments on the proposed maintenance dredging in the Kahwainui Stream. The prospective EFH consultation led by the USACE would be better informed with an increased level of information and careful evaluation of potential stressor effects to EFH. We have described the stressor impacts to EFH from the proposed activities and have provided guidance on the EFH consultation process and mandatory content needed to include in an EFHA. In the Enclosure at the end of this email, we also provide specific avoidance and minimization recommendations by stressor-type relevant to the proposed activities.

For all additional questions related to consultations with us (e.g., ESA, EFH, and FWCA) in the future, please contact us through the email address: EFHESAconsult@noaa.gov. For ESA-related topics please also contact Ann Garrett (ann.garrett@noaa.gov) and Ron Dean (ron.dean@noaa.gov); for FWCA contact Steve Kolinski (steve.kolinski@noaa.gov).

Enclosure

Recommended Avoidance and Minimization Measures

Below is a list of avoidance and minimization measures that you could anticipate to include in your EFHA during EFH consultation relevant to the proposed maintenance dredging activities.

Physical Damage

1. Work platforms should be selected based on the following preferential hierarchy:
 - a. conduct all work from land;
 - b. use a barge with auto-positioning systems where thrusters will not cause increased turbidity;
 - c. anchor barges to (1) shoreline infrastructure; (2) nearby existing moorings; (3) anchors or spuds in/on sand only (as possible, have SCUBA divers lay anchors by hand in sand areas).
2. Prior to mobilizing, ensure all construction equipment, ballast, and vessel hulls do not pose a risk of introducing new invasive species and will not increase abundance of those invasive species present at the project location.
3. Prevent trash and debris from entering the marine environment through the use of nets or barriers.
4. Develop a Wave and Storm Contingency Plan for construction materials and equipment.

Sedimentation and Turbidity

1. Conduct intertidal work at low and or slack tide.
2. Conduct work during calm sea states; stop work during high surf, winds, and currents.
3. Perform work outside of the main coral spawning period in summer (May to August) to minimize sedimentation and turbidity effects to coral eggs and larvae in the area. Peak spawning periods vary by species and geography, and are based on best available science.
4. Install sediment, turbidity, and/or pneumatic curtains, and use real-time monitoring (automated or manual) for barges and dredge vessels to detect failure and implement stop-work processes if pre-determined project thresholds are reached (use standards from Clean Water Act 401 water quality certification). In areas of soft sediment, consider partial length turbidity curtains in order to reduce resuspension of sediment during high winds and currents.
5. Use soft and/or natural engineering solutions to maintain/restore natural flow volumes and velocity.
6. Minimize disturbances to stream banks, and place abutments outside of the floodplain whenever possible. Seek to maintain baseline water flow volume and velocity within the system.
7. Utilize environmental clamshell buckets for mechanical dredging.
8. Design the nourishment activities to maintain or replicate natural stream channel and flow conditions to the greatest extent practicable.
9. Revegetate shoreline areas with appropriate native species and fully stabilize disturbed upland areas prior to removing silt fences and erosion prevention measures.

Chemical Contamination

1. Conduct work during the dry season when possible; stop work during storms or heavy rains. Neutralize or treat contaminated sediments and/or waters prior to release from the project site.

2. Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (oil, fuel, etc.) leaks.
3. All equipment found to be leaking contaminants must be removed from service until repaired.
4. All fueling or repairs to equipment must be done in a location with the appropriate controls that prevents the introduction of contaminants to the marine environment.
5. Prevent discharges of chemicals and other fluids dissimilar from seawater into the water column.
6. Use materials that are nontoxic to aquatic organisms, such as untreated wood, concrete, or steel (avoid pressure treated lumber).

--

Anne Chung, Ph.D.

Marine Resource Specialist, Pacific Islands Regional Office
NOAA Fisheries | U.S. Department of Commerce

Office: 808-725-5096

Mobile: (732) 939-5253

www.fisheries.noaa.gov



January 19, 2022
2015.71.0300 / 22P-007

Dr. Anne Chung, Ph.D, Marine Resource Specialist
NOAA, Pacific Islands Regional Office
1245 Wasp Boulevard, Building 176
Honolulu, HI 96818

Dear Dr. Chung,

Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i

Thank you for your email dated July 16, 2021, providing technical assistance for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

1. Magnuson-Stevens Fishery Conservation and Management Act

We understand that consultation with National Marine Fisheries Sciences (NMFS) is required for federal actions affecting the essential fish habitat (EFH) per Section 305(b)(2) described by 50 CFR 600.920. We also understand that an EFH assessment is recommended for federal agencies to consider the impacts of federal actions on the EFH. The federal agency (United States Army Corps of Engineers [USACE]) will consult with NMFS to determine if any adverse effects on the EFH will result from the Proposed Action. The EFH assessment will be conducted by USACE to provide mitigation measures to avoid, minimize, or offset adverse effects on the EFH. It is understood that the EFH assessment can be incorporated into other federal documents in which USACE will provide to NMFS.

2. Fish and Wildlife Coordination Act

We understand that consultation with NMFS and the U.S. Fish and Wildlife Service (USFWS) is warranted for a federal action involving the modification of any body of water which may impact wildlife including fish. The USACE will consult with NMFS, USFWS and appropriate state agencies in determining impacts to fish and wildlife resources and the measures to develop and improve these resources in conjunction with the Proposed Action.

Dr. Anne Chung,
January 19, 2022 / 22P-007

3. Stressor Effects and Mitigation

We appreciate the list of potential stressor effects and the associated mitigations and best practices for the proposed dredging of Kahawainui Stream. The list of mitigation procedures to minimize and avoid any potential damage to the habitat will greatly be considered when implementing the Proposed Action.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc

From: Arindain, Ronnie E <Ronnie.Arindain@charter.com>

Sent: Thursday, July 22, 2021 1:00 PM

To: Honolulu <honolulu@bowersandkubota.com>

Subject: Kahawainui Dredging Project

CHARTERCOM_PMS_Logo_Color



July 22, 2021

BCH Design, A Bowers+ Kubota Company
2153 North King Street, Suite 200
Honolulu, HI 96819

Attention: William Kucharski

Subject: Kahawainui Dredging Project

Aloha William

Thank you for the opportunity to review and comment Kahawainui Dredging Project.

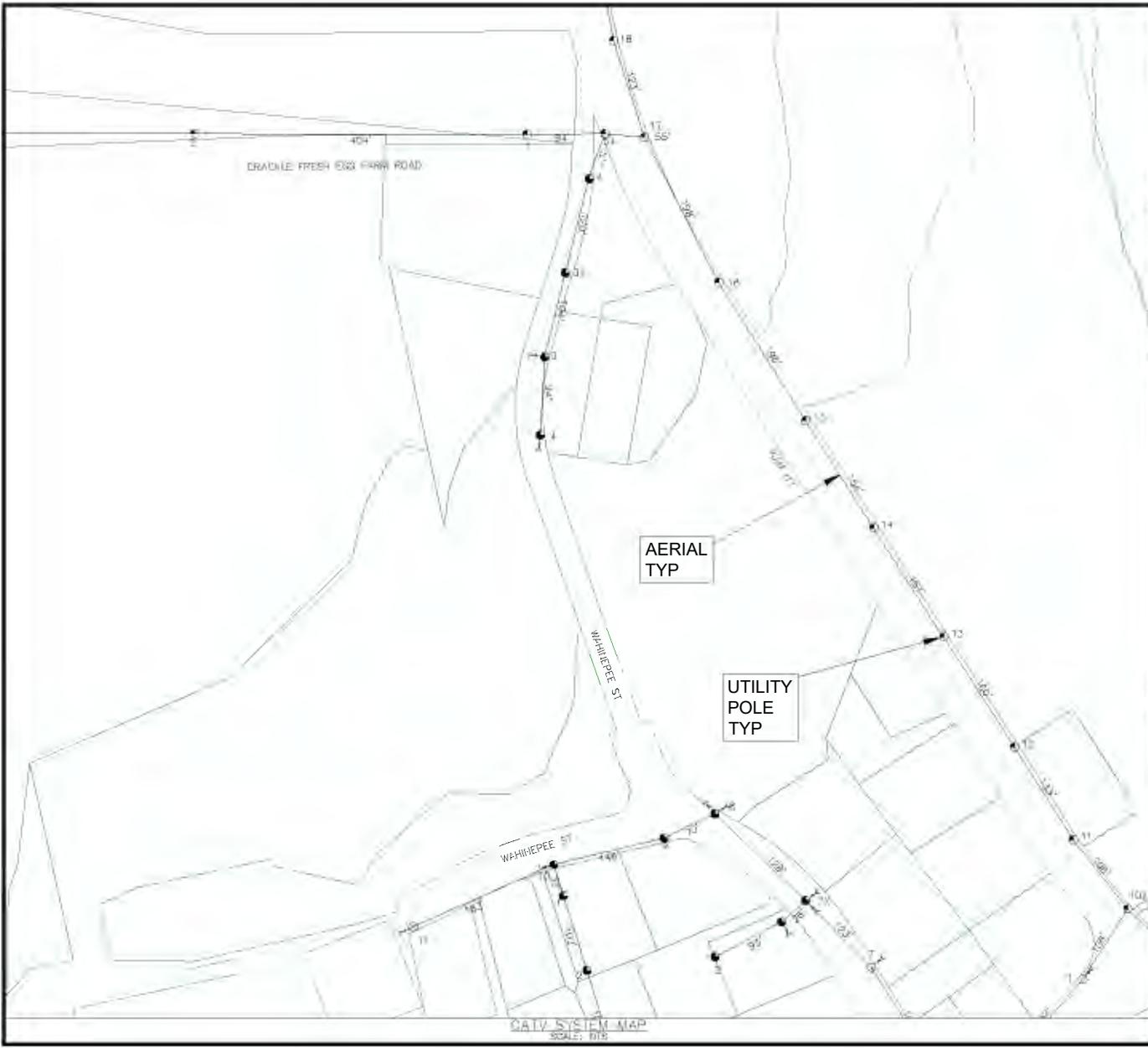
Spectrum is submitting information of the underground and aerial facilities near, and within your project area. Please note that these drawings are to be used as a reference only. The exact location, depth, and routing of all CATV facilities must be verified in the field due to construction variances. Contractors will be responsible to contact the One Call center to identify any underground facilities.

According to our drawings, there are CATV Aerial facilities near, and possibly in your Project Area. Please refer to attached drawing for a reference.

Mahalo,

Ikaika Arindain

OSP Engineering | Construction Coordinator |
200 Akamainui Street | Mililani, HI 96789
(808) 476-3327 | Ronnie.Arindain@charter.com



330 KAHAWAINUI STREET
HAULULA, HI 96741-3300
PHONE: P (808) 923-3300

LOCATION MAP
BRYAN'S MAP, 25'

ENGINEERING: P. ALA ARIDAIN CELL #476-3327

PROJECT NO: 19-001-001

DATE: 7/22/21

SCALE: HTS

DES. BY	CHK. BY	ENG. BY

PROJECT NO:

DATE:

SCALE:

DREDGING KAHAWAINUI STREAM

KAMEHAMEHA HY
HAUULA

FIG: LOCATION MAP
NOTES
CATV RISER DIAGRAM
CATV SYSTEM MAP

DES. BY	CHK. BY	ENG. BY

PROJECT NO:

DATE:

SCALE:

CRADLE FRESH EGG FARM ROAD

January 19, 2022
2015.71.0300 / 22P-009

Mr. Ikaika Arindain, Construction Coordinator
Spectrum
200 Akamainui Street
Mililani, HI 96789

Dear Mr. Arindain:

**Response to Comments
Pre-Consultation for an Environmental Assessment
Proposed Department of Design and Construction
Maintenance Dredging at Kahawainui Stream
Tax Map Keys: (1) 5-5-5:22 (por.),
5-5-9:7 (por.), 5-5-9:9 (por.), 5-5-9:10 (por.),
5-5-9:11 (por.) and 5-5-9:47 por.)
Lā'ie, O'ahu, Hawai'i**

Thank you for your email dated July 22, 2021, commenting on the pre-consultation for the Draft Environmental Assessment (DEA) for the proposed City and County of Honolulu Department of Design and Construction Maintenance Dredging at Kahawainui Stream project in Lā'ie, O'ahu, Hawai'i. Please see our responses to your comments below:

- 1. Spectrum is submitting information of the underground and aerial facilities near, and within your project area. Please note that these drawings are to be used as a reference only. The exact location, depth, and routing of all CATV facilities must be verified in the field due to construction variances. Contractors will be responsible to contact the One Call center to identify any underground facilities.**

The possibility of underground and aerial facilities within the project area has been noted. Contractors will be responsible to contact the One Call center to identify the exact location of the underground facilities so that there is no interruption to your facilities and service in the area.

Thank you again for your comments and participating in the HRS Chapter 343 environmental review process. Your letters and responses will be included in the DEA. If you have any questions, please contact the undersigned at 808-521-5361 or by email at wkucharski@bowersandkubota.com

Sincerely yours,
BCH, a Bowers and Kubota Company



William Kucharski
Project Manager

WK:kc

APPENDIX F: DEA COMMENT LETTERS AND RESPONSES

From: May, Madison R <mday@usgs.gov>
Sent: Tuesday, March 28, 2023 11:23 AM
To: Jared Chang
Subject: [External] Kahawainui Stream Dredging Project
Attachments: [Kahawainui USGS equipment.jpg](#)

Follow Up Flag: Follow up
Flag Status: Flagged

[CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe]

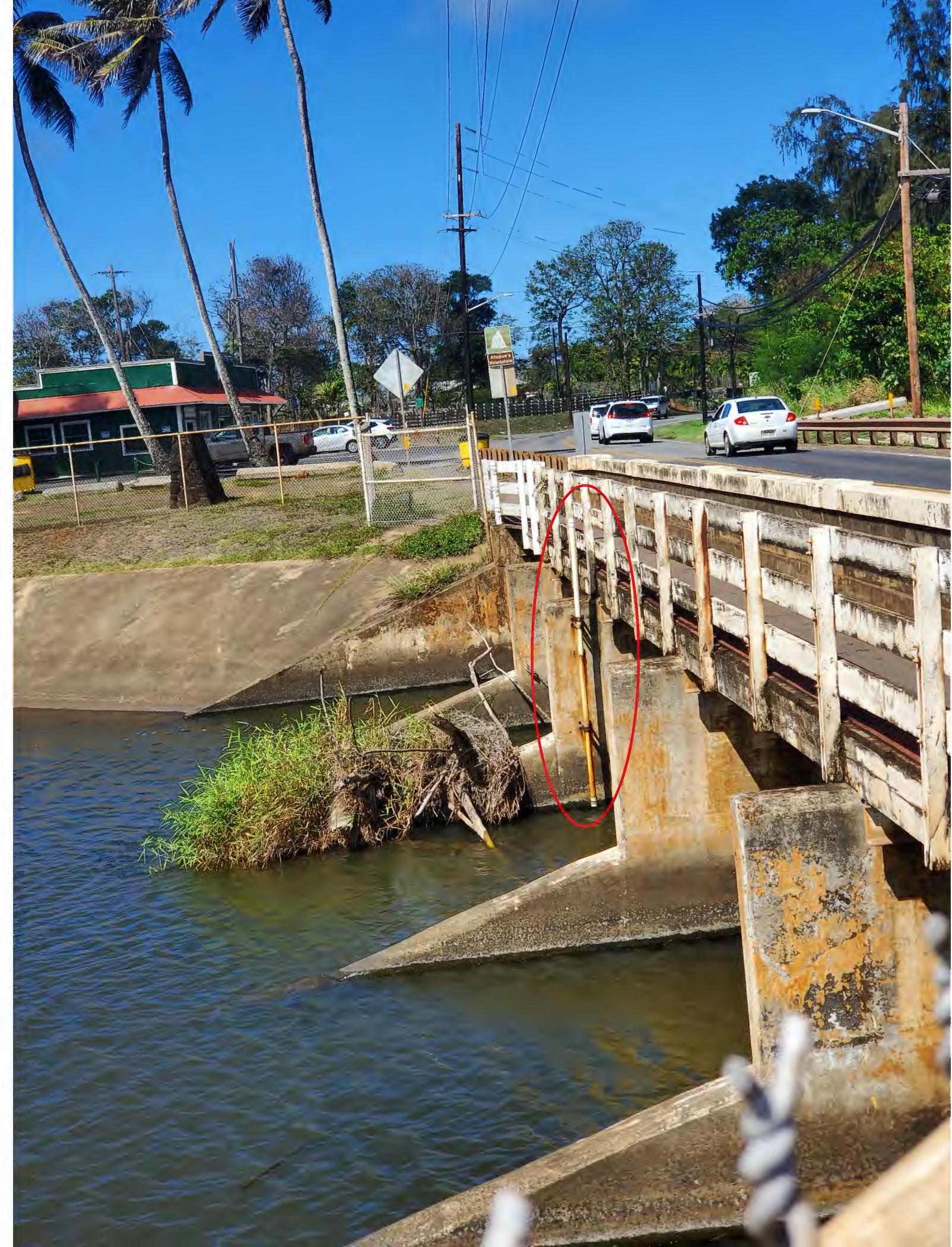
Aloha Jared,

Our office received a draft Environmental Assessment Public Notice for the dredging of Kahawainui Stream. While we do not have any environmental concerns to report related to this project, we do have some infrastructure on Kahawainui Stream Lā'iewai Bridge that I was hoping to bring to your attention in order to prevent any damage during the dredging project. The attached photo shows our equipment which includes a 2-inch diameter by 10-foot long PVC bracketed to the bring. This equipment can also be seen in Figure 31 in draft Environmental Assessment Report. We operate this equipment in cooperation with the US Army Corps of Engineers to provide [peak stage information on Kahawainui Stream](#).

If you could please inform your team to try to avoid any damage to the PVC pipe and brackets that would be greatly appreciated. Feel free to call or email back if you have any additional questions.

Thanks in advance,

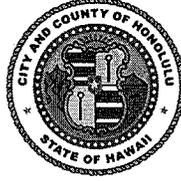
Madison May
PIWSC Field Operations Chief
1845 Wasp Blvd Bldg 176
Honolulu, HI 96818
Office: 808-690-9609
Cell (preferred) 808-292-3994



DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-1

September 10, 2025

Ms. Madison May, PIWSC Field Operations Chief
U.S. Department of the Interior, Geological Survey
Pacific Islands Water Science Center
1845 Wasp Boulevard, Building 176
Honolulu, Hawai'i 96818

Dear Ms. May:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your email dated March 28, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the U.S. Geological Survey, Pacific Islands Water Science Center (PIWSC) does not have any environmental concerns related to the subject project. We also acknowledge that the PIWSC has existing equipment on the Kamehameha Highway bridgeway, including a 2-inch diameter by 10-foot long polyvinyl chloride (PVC) pipe bracketed to the bridge. The existing equipment has been noted in the Final EA to avoid damage during all dredging activities.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your email and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Milles", is written over the typed name.

For Haku Milles, P.E., LEED AP
Director

KC:bm

Handwritten initials in black ink, possibly "AK" or "AM", with a small arrow pointing to the right.

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

RICK BLANGIARDI
MAYOR



SHELDON K. HAO
FIRE CHIEF

JASON SAMALA
DEPUTY FIRE CHIEF

April 4, 2023

Mr. Jared Chang, AICP
Planning Manager
Bowers + Kubota Consulting
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Chang:

Subject: Draft Environmental Assessment
Kahawainui Stream Maintenance Dredging
Koolauloa District
Laie, Hawaii
Tax Map Keys: 5-5-005: 022 (Portion), 5-5-009: 007 (Portion) 008 (Portion),
009 (Portion), 010 (Portion), 011 (Portion), 047 (Portion),
and 061 (Portion), and 5-6-001: 004 (Portion)

In response to your letter received on March 28, 2023, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

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

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

Mr. Jared Chang, AICP
Page 2
April 4, 2023

2. The fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.
3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.
4. Submit civil drawings to the City and County of Honolulu's Department of Planning and Permitting and route them to the HFD for review and approval.

The abovementioned provisions are required by the HFD. This project may necessitate additional requirements be met as determined by other agencies.

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

Sincerely,



CRAIG UCHIMURA
Acting Assistant Chief

CU/MD:bh

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEJA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-2

September 10, 2025

MEMORANDUM

TO: Sheldon K. Hao, Fire Chief
Honolulu Fire Department

FROM: Haku Milles, P.E., LEED AP, Director
For Department of Design and Construction

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 4, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges the Honolulu Fire Department's (HFD) provisions required for projects. However, the project will not involve any buildings or structures that would be subject to the HFD's listed provisions, as the project will only consist of dredging activities at the Kahawainui Stream. Access to the staging areas will be provided off Kamehameha Highway through Wahinepee Street, Hukilau Beach, Cackle Fresh Egg Farm Road, and a private roadway. Fire department access along these roads will not be hindered by project activities. In addition, the project is not anticipated to pose any risks related to fire, nor will it increase the demand for HFD services.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response memo will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

JL:KC:bm
AK 9

From: Liu, Rouen <rouen.liu@hawaiianelectric.com>
Sent: Thursday, April 6, 2023 9:45 AM
To: Jared Chang
Cc: Kuwaye, Kristen
Subject: [External] Draft Environmental Assessment Kahawainui Stream Maintenance Dredging

[CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe]

Dear Mr. Chang,

Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has no objection to the project. Should Hawaiian Electric have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Kahawainui Stream Maintenance Dredging project comes to fruition, please continue to keep us informed.

Should there be any questions, please contact me at 808-543-7245.

Thank you,
Rouen Liu
Permit Engineer
Hawaiian Electric Company

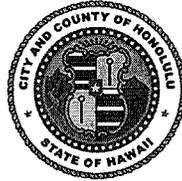
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DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

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PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-3

September 10, 2025

Mr. Rouen Liu, Permit Engineer
Hawaiian Electric Company
820 Ward Avenue
Honolulu, Hawaii 96814

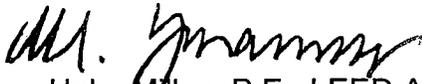
Dear Mr. Liu:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008
(por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your email dated April 12, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the Hawaiian Electric Company (HECO) has no objection to the project. Should there be any existing HECO easements and facilities in the project area, continued access for maintenance will be kept as is.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your email and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,


Haku Milles, P.E., LEED AP
For Director

KC:bm

Handwritten initials

BOARD OF WATER SUPPLY

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



April 12, 2023

RICK BLANGIARDI, MAYOR

BRYAN P. ANDAYA, Chair
KAPUA SPROAT, Vice Chair
MAX J. SWORD
NA'ALEHU ANTHONY
JONATHAN KANESHIRO

DAWN B. SZEWCZYK, P.E., Ex-Officio
EDWIN H. SNIFFEN, Ex-Officio

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

ERWIN M. KAWATA
Deputy Manager

Mr. Jared Chang
Bowers Kubota Consulting, Inc.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Chang:

Subject: Your Letter Dated March 22, 2023 Requesting Comments on the Draft Environmental Assessment Public Notice for the Kahawainui Stream Maintenance Dredging Project in Laie – Tax Map Key: 5-5-005: 022; 5-5-009: 007, 008, 009, 010, 011, 047, 061; 5-6-001: 004

Thank you for the opportunity to comment on the proposed stream dredging project.

The Honolulu Board of Water Supply does not have any water facilities within the project area. All water services should be provided by the private water system serving the area.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at (808) 748-5443.

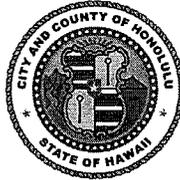
Very truly yours,

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

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-4

September 10, 2025

MEMORANDUM

TO: Ernest Y.W. Lau, P.E., Manager and Chief Engineer
Board of Water Supply

FROM: *H.M. Yonamine*
For Haku Milles, P.E., LEED AP, Director
Department of Design and Construction

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 12, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the Board of Water Supply does not have any water facilities within the project area.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response memo will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

JL:KC:bm
Hc 9



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

JOSH GREEN, M.D.
GOVERNOR

SCOTT J. GLENN
INTERIM DIRECTOR

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

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

Coastal Zone
Management
Program

Environmental Review
Program

Land Use Commission

Land Use Division

Special Plans Branch

State Transit-Oriented
Development

Statewide Geographic
Information System

Statewide
Sustainability Branch

DTS 202303281607NA

April 17, 2023

Mr. Jared Chang, AICP
Planning Manager
Bowers – Kubota Consulting, Inc.
2153 N. King Street, Suite 200
Honolulu, Hawai'i 96819

Dear Mr. Chang:

Subject: Kahawainui Stream Maintenance Dredging Project,
Kō'olauloa District, Lā'ie, O'ahu, Hawai'i
TMKs: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008
(por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061
(por.); and (1) 5-6-001:004 (por.)

Thank you for the opportunity to provide comments on the Draft Environmental Assessment (Draft EA) for the Kawainui Stream Maintenance Dredging project. The review material was sent to our office via memo dated March 22, 2023.

It is our understanding that this Project encompasses a segment of the Kahawainui Stream, which spans from the intersection of Lā'ie Wai Stream to the sand berm located at the Kahawainui Stream mouth. The proposed action will consist of the maintenance dredging of the stream, but the sand berm will be excluded from dredging action.

The purpose of the maintenance dredging project is to maintain sufficient flow capacity to prevent flooding of the adjacent areas. Approximately 2,955 cubic yards of sediment and debris will be dredged. The dredged material will be utilized for beneficial reuse or disposed at an approved disposal site.

The Office of Planning and Sustainable Development (OPSD) has the following comments to offer:

1. Previous Comments

We confirm that that the Draft EA has addressed some of our previous comments listed in our Early Consultation Response letter, DTS 202106251019HE, dated July 8, 2021. Our previous comments that were satisfactorily addressed in the Draft EA include:

- Confirming that the proposed action is exempt from Special Management Area Use permitting, and
- Details potential impacts and planned mitigation measures for polluted stormwater runoff, erosion and debris controls, and accounts for water quality concerns.

2. Coastal Zone Management Act (CZMA), Federal Consistency

We acknowledge that Table 8, page 75 of the Draft EA lists federal consistency as a needed approval by OPSD. We recommend that the applicant, the City and County of Honolulu, Department of Design and Construction (CCH-DDC), consult with our office on the policies and procedures applicable to CZMA federal consistency.

3. Hawai'i Coastal Zone Management (CZM) Program

We note that Section 5.2.4, pages 66-68 of the Draft EA include analysis on the project and the applicable provisions of the Hawai'i Revised Statute (HRS) § 205A-2, as amended. However, the analysis does not include an evaluation on HRS § 205A-2 (5),(7) and (9). Pursuant to HRS § 205A-4, in implementing the objectives of the CZM program, agencies shall consider ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, and economic development.

If CCH-DDC finds that the provisions listed above are not applicable to this dredging and maintenance project, the analysis in the Final Environmental Assessment should state this and detail the rationale behind this conclusion.

The objectives and supporting policies of the Hawai'i CZM Program serve as the foundation of the enforceable policies of the State of Hawai'i, as listed in HRS § 205A-2. Disclosure of impacts on CZM objectives and supporting policies, as it relates to HRS Chapter 343 requirements, will aid the State in determining impacts to the resources of the coastal zone, and mitigation measures on the subject lands involved for this proposed action.

If you have any questions, please contact Joshua Hekeka on Environmental Assessment concerns as they relate to this OPSD response letter at (808) 587-2845; or Debra Mendes on CZMA federal consistency issues at (808) 587-2840.

Sincerely,



for Scott J. Glenn,
Interim Director

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-5

September 10, 2025

Ms. Mary Alice Evans, Director
State of Hawai'i
Office of Planning & Sustainable Development
235 South Beretania Street, 6th Floor
Honolulu, Hawai'i 96813

Dear Ms. Evans:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olaupia District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.),
008 (por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and
061 (por.); (1) 5-6-001:004 (por.)

Thank you for your letter dated April 17, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction (DDC) acknowledges the State Office of Planning & Sustainable Development's (OPSD) comments and provides the following responses:

1. DDC acknowledges OPSD's comment stating that the office's previous comments in the Early Consultation Response Letter dated July 8, 2021 had been adequately addressed in the Draft EA.
2. Section 5.2.4 of the Final EA has been revised to note that Coastal Zone Management (CZM) Act federal consistency review will be required by OPSD, and that the DDC will consult with OPSD on the policies and procedures applicable to the review.

Ms. Mary Alice Evans, Director
September 10, 2025
Page 2

3. Section 5.2.4 of the Final EA has been revised to include an evaluation on the project against the policies of the CZM Program listed under Hawai'i Revised Statutes (HRS) §205A-2 (5), (7), and (9).

Thank you for participating in the HRS, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,



For Haku Miles, P.E., LEED AP
Director

KC:bm

HC

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honolulu.gov/dpp



RICK BLANGIARDI
MAYOR

DAWN TAKEUCHI APUNA
DIRECTOR

JIRO A. SUMADA
DEPUTY DIRECTOR

April 20, 2023

2023/ELOG-620 (MAK)

Mr. Jared Chang
Bowers & Kubota Consulting, Inc.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Chang:

SUBJECT: Draft Environmental Assessment (DEA)
Kahawainui Stream Maintenance Dredging
Kahawainui Stream - Laie
Tax Map Keys 5-5-005: 022; 5-5-009: 007 through 011, 047, and 067;
and 5-6-001: 004

This in response to your request, received March 24, 2023, for comments on the DEA published in the March 23, 2023 edition of the "*The Environmental Notice*" for the Kahawainui Stream Maintenance Dredging Project in Laie. We reviewed our previous comments, dated July 6, 2021, and find that they have been adequately addressed in the DEA. Therefore, we have no further comments at this time.

Thank you for the opportunity to comment on this DEA. Should you have any questions, please contact Michael Kat, of our Zoning Regulations and Permits Branch, at (808) 768-8013 or via email at michael.kat@honolulu.gov.

Very truly yours,

A handwritten signature in cursive script that reads "Jordan Oddy".

FOR Dawn Takeuchi Apuna
Director

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-6

September 10, 2025

MEMORANDUM

TO: Dawn Takeuchi Apuna, Director
Department of Planning and Permitting

A handwritten signature in black ink, appearing to read "M. Yonamine", is written over the text of the TO field.

FROM: For Haku Milles, P.E., LEED AP, Director
Department of Design and Construction

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 20, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the City and County of Honolulu, Department of Planning and Permitting's (DPP) previous comments from a letter dated July 6, 2021 has been adequately addressed in the Draft EA, and that the DPP has no further comments at this time.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response memo will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

JL:KC:bm

HL 9

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

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HONU KA'AI'AI



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

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

P.O. BOX 621
HONOLULU, HAWAII 96809

April 21, 2023

LD 00266

Jared K. Chang, AICP, Planning Manager
BOWERS + KUBOTA Consulting, Inc.
2153 N. King Street, Suite 200
Honolulu, HI 96819

Via email: jchang@bowersandkubota.com

Dear Sirs:

**SUBJECT: Draft Environmental Assessment (DEA) Publication Notice
Kahawainui Stream Maintenance Dredging**
Ko'olauloa District, La'ie, Island of O'ahu, Hawai'i
Portions of TMKs: (1) 5-5-005:022, 5-5-009:007, 008, 009, 010, 011, 047, 061; 5-6-001:004

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

Enclosed are responses/comments received from our (a) Division of Aquatic Resources, (b) Engineering Division, and (c) Office of Conservation and Coastal Lands. Should you have any questions, please feel free to contact Barbara Lee via email at barbara.j.lee@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments
cc: Central Files

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

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA



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

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

P.O. BOX 621
HONOLULU, HAWAII 96809

April 03, 2023

LD 0266

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources (via email: glemm.r.higashi@hawaii.gov)
- Div. of Boating & Ocean Recreation
- Engineering Division (via email: DLNR.Engr@hawaii.gov)
- Div. of Forestry & Wildlife (via email: rubyrosa.t.terrago@hawaii.gov)
- Div. of State Parks (via email: curt.a.cottrell@hawaii.gov)
- Commission on Water Resource Management (via email: DLNR.CWRM@hawaii.gov)
- Office of Conservation & Coastal Lands (via email: sharleen.k.kuba@hawaii.gov)
- Land Division – Oahu District (via email: harry.w.cheung@hawaii.gov)
- Ahā Moku (via email: leimana.k.damate@hawaii.gov)

Russell Tsuji

FROM:

Russell Y. Tsuji, Land Administrator

SUBJECT:

**Draft Environmental Assessment (DEA) Publication Notice
Kahawainui Stream Maintenance Dredging**

LOCATION:

Ko'olaupoko District, La'ie, Island of O'ahu, Hawaii

APPLICANT:

Portions of TMKs: (1) 5-5-005:022, 5-5-009:007, 008, 009, 010, 011, 047, 061; 5-6-001:004
BOWERS + KUBOTA on behalf of the City & County of Honolulu Department of Design
and Construction

Transmitted for your review and comment is information on the above-referenced subject. The [DEA](#) was published on March 23, 2023 by the State Environmental Review Program at the Office of Planning and Sustainable Development in the periodic bulletin, [The Environmental Notice](#), available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2023-03-23-TEN.pdf

Please submit any comments to barbara.j.lee@hawaii.gov at the Land Division by the internal deadline of **April 20, 2023**. If no response is received by this date, we will assume your agency has no comments. If you have any questions, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

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

Signed:

Print Name:

David Sakoda

Division:

Div. of Aquatic Resources

Date:

Apr 21, 2023

Attachments

Cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KAWAII

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KAWAII



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

LAURA H.E. KAARUA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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



STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII
DEPARTMENT OF LAND AND NATURAL
RESOURCES DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

Date: 4/20/2023

DAR # AR6372

MEMORANDUM

TO: Brian J. Neilson
DAR Administrator

FROM: Elizabeth Monaghan Aquatic Biologist

SUBJECT: Kahawainui Stream Maintenance Dredging

Request Submitted by: Bowers + Kubota Consulting, Inc.

Ko'olaupoko District, La'ie, island of O'ahu, Hawai'i

Location of Project: _____

Brief Description of Project:

The City and County of Honolulu, Department of Design and Construction is proposing to conduct routine maintenance dredging at the Kahawainui Stream, located in La'ie on the island of O'ahu. The purpose of the maintenance dredging is to maintain sufficient flow capacity to prevent flooding of the adjacent areas.

Comments:

No Comments Comments Attached

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

Comments Approved:

David Sakoda for Brian J. Neilson
DAR Administrator

Date: Apr 21, 2023

Comments

Riparian Impacts:

As per the Environmental Notice, previously recorded native goby species included 'o'opu nākea (*Awaous stamineus*), 'o'opu akupa (*Eleotris sandwicensis*), and 'o'opu naniha (*Stenogobius hawaiiensis*). 'ōpae kala'ole (*Atyoida bisulcata*) and 'ōpae'oeha'a (*Macrobrachium grandimanus*) have also been previously noted in the area. It is important to ensure that these, and other potential native species are protected from the effects of excessive sedimentation and altered water quality.

All these native stream fauna share an amphidromous life cycle which means they have a dependence on connectivity to the ocean. The adult animals lay their eggs in the stream and as the larvae hatch they are swept down stream into the ocean, where they grow into post-larvae/juveniles before migrating back upstream. Therefore, it is important that during the dredging operation and activities continuous stream flow is maintained and the avoidance of creating barriers that could block this downstream and upstream movement of these animals.

Best Management Practices (BMPs) for prevention of excessive sedimentation should be followed. These could include using sediment control measures such as silt fences, sediment basins, and sediment curtains to trap sediment and prevent it from being released downstream. Using proper dredging techniques to minimize the amount of sediment disturbed during the dredging operation. For example, a suction dredge can be used instead of a clamshell dredge, as it can be more precise and require less disturbance. Timing the dredging operation to avoid periods of high flow, such as during heavy rain events or spring runoff. High flow periods can increase sediment transport and erosion rates downstream. Minimizing disturbance of stream banks during the dredging operation, as bank erosion can contribute to sedimentation rates downstream. After the dredging operation is complete, restoring stream banks and vegetation to stabilize the soil and prevent erosion.

DAR would like to request prompt notification and photo-documentation of any occurrence where above-average amounts of sediment or pollution have entered the water in order to assess impact, if any.

DAR# AR6372

Comments

DAR would also like to request notification, photo documentation, and GPS coordinates in the event of an observed mortality event related to riparian biota (e.g. fish die-off).

Marine Impacts:

In addition to minimizing sedimentation and disturbance, interactions with marine species should be considered due to the close proximity of the activities to the ocean and shoreline. In the event that protected species such as the Hawaiian monk seal, other marine mammal or sea-turtle is observed in close proximity to the dredging site, contractors should take appropriate action to modify activities in order to avoid disturbance to the regular behavior and activities of the animal. Appropriate action would include but is not limited to ceasing construction activity until the animal leaves the area.

Any interaction between a protected species and the activity proposed should be reported to the NOAA Protected Species Division and State of Hawaii DOCARE:

NOAA Marine Mammal Response Coordinators (Oahu): 808-220-7802

NOAA National Marine Fisheries Service - PIFSC Marine Turtle Biology and Assessment Program: (808) 725-5730

State of Hawaii Department of Land and Natural Resources (DLNR) Division of Conservation and Resources Enforcement (DOCARE): 808-643-3567

DAR recommends that best management practices be utilized to eliminate any potential for incidental entanglement of any marine organism. Entanglement prevention practices will include but are not limited to: minimizing the amount of in-water structures or components that may potentially cause entanglement during research operations (loops, holes, slack lines). If incidental entanglement of protected species occurs DAR and the appropriate federal agency should be notified immediately.

Thank you for the opportunity to comment.

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-7

September 10, 2025

Mr. Brian J. Neilson, Administrator
State of Hawai'i
Department of Land and Natural Resources
Division of Aquatic Resources
P.O. Box 621
Honolulu, Hawai'i 96809

Dear Mr. Neilson:

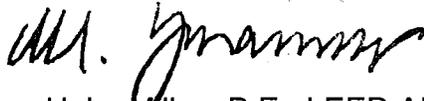
SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.),
008 (por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and
061 (por.); (1) 5-6-001:004 (por.)

Thank you for your letter dated April 21, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction (DDC) acknowledges the State Department of Land and Natural Resources, Division of Aquatic Resources' (DLNR-DAR) comments regarding riparian and marine impacts and mitigation measures. Section 3.9.4 of the Final EA includes Best Management Practices (BMPs) and mitigation measures for prevention of excessive sedimentation. This section has also been updated to include the requirement to notify DLNR-DAR if any above-average amounts of sediment or pollution enter the water, and if there is an observed mortality event related to riparian biota (e.g. fish die-off). In addition, the required actions and authorities to contact in the event that protected species such as the Hawaiian monk seal, other marine mammal, or sea-turtle is observed in close proximity to the project site has been added to Section 3.9.4. BMPs to eliminate potential incidental entanglement of marine organisms have also been included in Section 3.9.4.

Mr. Brian J. Neilson, Administrator
September 10, 2025
Page 2

Thank you for participating in the HRS, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,



For Haku Milles, P.E., LEED AP
Director

KC:bm
HK

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

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA



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

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

P.O. BOX 621
HONOLULU, HAWAII 96809

April 03, 2023

LD 0266

MEMORANDUM

FROM: ~~TO:~~

DLNR Agencies:

- Div. of Aquatic Resources (via email: glemm.r.higashi@hawaii.gov)
- Div. of Boating & Ocean Recreation
- Engineering Division** (via email: DLNR.Engr@hawaii.gov)
- Div. of Forestry & Wildlife (via email: rubyrosa.t.terrago@hawaii.gov)
- Div. of State Parks (via email: curt.a.cottrell@hawaii.gov)
- Commission on Water Resource Management (via email: DLNR.CWRM@hawaii.gov)
- Office of Conservation & Coastal Lands (via email: sharleen.k.kuba@hawaii.gov)
- Land Division – Oahu District (via email: barry.w.cheung@hawaii.gov)
- Aha Moku (via email: leimana.k.damate@hawaii.gov)

Russell Tsuji

TO: ~~FROM:~~

Russell Y. Tsuji, Land Administrator

~~SUBJECT:~~

**Draft Environmental Assessment (DEA) Publication Notice
Kahawaiui Stream Maintenance Dredging**

~~LOCATION:~~

Ko'olauloa District, La'ie, Island of O'ahu, Hawai'i

~~APPLICANT:~~

Portions of TMKs: (1) 5-5-005:022, 5-5-009:007, 008, 009, 010, 011, 047, 061; 5-6-001:004
BOWERS + KUBOTA on behalf of the City & County of Honolulu Department of Design
and Construction

Transmitted for your review and comment is information on the above-referenced subject. The DEA was published on March 23, 2023 by the State Environmental Review Program at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2023-03-23-TEN.pdf

Please submit any comments to barbara.j.lee@hawaii.gov at the Land Division by the internal deadline of **April 20, 2023**. If no response is received by this date, we will assume your agency has no comments. If you have any questions, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

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

Signed:

Print Name:

Cary S. Chang, Chief Engineer

Division:

Engineering Division

Date:

Apr 10, 2023

Attachments

Cc: Central Files

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-8

September 10, 2025

Ms. Dina Lau, Acting Chief Engineer
State of Hawai'i
Department of Land and Natural Resources
Engineering Division
P.O. Box 621
Honolulu, Hawai'i 96809

Dear Ms. Lau:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 10, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the State Department of Land and Natural Resources, Engineering Division has no additional comments.

Thank you for participating in the HRS, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Milles", is written over the typed name.

For Haku Milles, P.E., LEED AP
Director

KC:bm
AK 9

AW Cor: GA 23 - 159

RECEIVED LAND DIVISION

JOSH GREEN, M.D. GOVERNOR | KE KIA AINA

SYLVIA LUKE LIEUTENANT GOVERNOR | KA HOPE | KIA AINA

2023 APR 14 PM 2:22



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

2023 APR 14 PM 12:56

2023 APR -3 P 12:56

DEPARTMENT OF LAND & NATURAL RESOURCES OF HAWAII

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

P.O. BOX 621 HONOLULU, HAWAII 96809

April 03, 2023

LD 0266

MEMORANDUM

TO: DLNR Agencies:
 Div. of Aquatic Resources (via email: glenn.r.higashi@hawaii.gov)
 Div. of Boating & Ocean Recreation
 Engineering Division (via email: DLNR.Engr@hawaii.gov)
 Div. of Forestry & Wildlife (via email: rubyrosa.t.terrago@hawaii.gov)
 Div. of State Parks (via email: curt.a.cottrell@hawaii.gov)
 Commission on Water Resource Management (via email: DLNR.CWRM@hawaii.gov)
 Office of Conservation & Coastal Lands (via email: sharleen.k.kuba@hawaii.gov)
 Land Division – Oahu District (via email: barry.w.cheung@hawaii.gov)
 Aha Moku (via email: leimana.k.damate@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator
 SUBJECT: Draft Environmental Assessment (DEA) Publication Notice
 Kahawainui Stream Maintenance Dredging
 LOCATION: Ko'olauloa District, La'ie, Island of O'ahu, Hawai'i
 APPLICANT: Portions of TMKs: (1) 5-5-005:022, 5-5-009:007, 008, 009, 010, 011, 047, 061; 5-6-001:004 BOWERS + KUBOTA on behalf of the City & County of Honolulu Department of Design and Construction

Russell Tsuji

Transmitted for your review and comment is information on the above-referenced subject. The DEA was published on March 23, 2023 by the State Environmental Review Program at the Office of Planning and Sustainable Development in the periodic bulletin, The Environmental Notice, available at the following link:

https://files.hawaii.gov/dbedt/erp/The_Environmental_Notice/2023-03-23-TEN.pdf

Please submit any comments to barbara.j.lee@hawaii.gov at the Land Division by the internal deadline of April 20, 2023. If no response is received by this date, we will assume your agency has no comments. If you have any questions, please contact Barbara Lee at the above email address. Thank you.

BRIEF COMMENTS:

() We have no objections.
 () We have no comments.
 () We have no additional comments.
 (x) Comments are included/attached.

Signed: Michael Cain
 Print Name: Michael Cain
 Division: occc
 Date: 04-13-23

Attachments
Cc: Central Files

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

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA



STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands
P.O. BOX 621
HONOLULU, HAWAII 96809

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT
LAURA H.E. KAAKUA
FIRST DEPUTY
M. KALEO MANUEL
DEPUTY DIRECTOR - WATER
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE
MANAGEMENT
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CONSERVATION AND RESOURCES
ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

REF: OCCL: AW

COR: OA-23-159

APR 13 2023

MEMORANDUM

TO: Russell Y. Tsuji, Administrator
Land Division Administrator

FROM: Michael Cain, Administrator
Office of Conservation and Coastal Lands (OCCL) 

SUBJECT: Draft Environmental Assessment (DEA) Publication Notice Kahawainui Stream Maintenance Dredging, portions of Tax Map Keys (TMKs) (1) 5-5-005:022, (1) 5-5-009:007, 008, 009, 010, 011, 047, 061; (1) 5-6-001:004.

According to the information provided in the Draft Environmental Assessment for the subject property, the maintenance dredging will take place outside of the Conservation District and will not include clearing of the sand berm at the stream mouth.

In the event that the City and County of Honolulu Department of Design and Construction (DDC) determines that it is necessary to include the sand berm in the dredging project, then the activity will be regulated under Hawaii Administrative Rules §13-5-22 *P-13 LAND AND RESOURCE MANAGEMENT (A-3) Clearing of sand or silt from stream mouths, canals, drainage pipes or other features for state or county maintenance, provided that the sand removed shall be placed on adjacent shoreline areas unless the placement would result in significant turbidity, as determined by the department.*

If sand is cleared from the mouth of Kahawainui Stream, it must be placed on the adjacent shoreline.

Any dredged and dried materials from the currently identified dredging limit which are designated for beach replenishment per section 1.4 of the DEA must be submitted to OCCL for assessment prior to placement on the beach.

Should you have any questions, please feel free to contact Amy Wirts, Sea Grant Extension Agent and Coastal Lands Program Coordinator at DLNR OCCL at Amy.E.Wirts@hawaii.gov.

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-9

September 10, 2025

Mr. Michael Cain, Administrator
State of Hawai'i
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
P.O. Box 621
Honolulu, Hawai'i 96809

Dear Mr. Cain:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 13, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the State Department of Land and Natural Resources, Office of Conservation and Coastal Lands' (OCCL) comment regarding required provisions under Hawai'i Administrative Rules §13-5-22 should the sand berm be included in the dredging activities. In addition, Section 1.4 of the Final EA has been revised to note that any dredged and dried materials designated for beach replenishment must be submitted to OCCL for assessment prior to placement on the beach.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Milles", is written over a faint, larger version of the same signature.

For Haku Milles, P.E., LEED AP
Director

KC:bm

Handwritten initials "AK" and a small mark resembling a stylized "9" or a checkmark.

JOSH GREEN, M.D.
GOVERNOR



KEITH T. HAYASHI
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
KA 'OIHANA HO'ONA'AUAO
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF FACILITIES AND OPERATIONS

April 24, 2023

Jared Chang
Bowers + Kubota Consulting, Inc.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Re: Draft Environmental Assessment Publication Notice Kahawainui Stream Maintenance Dredging, Koolauloa District, Laie, Island of Oahu, Hawaii, Tax Map Keys: (1)5-5-005:022 (por); (1)5-5-009:007 (por), 008 (por), 009 (por), 010 (por), 011 (por), 047 (por), and 061 (por), (1)5-6-001:004 (por)

Dear Mr. Chang:

Thank you for your letter dated March 22, 2023. The Hawaii State Department of Education previously provided the enclosed comments, dated June 28, 2021, and has no additional comments.

Should you have any questions, please contact Cori China of the Facilities Development Branch, Planning Section, at (808) 784-5080 or via email at cori.china@k12.hi.us.

We appreciate the opportunity to comment.

Sincerely,

A handwritten signature in black ink, appearing to read "Roy Ikeda".

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:ctc
Enclosure

c: Facilities Development Branch

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEJA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-10

September 10, 2025

Mr. Roy Ikeda, Interim Public Works Manager
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Ikeda:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawaii
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 24, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction (DDC) acknowledges that the State Department of Education (DOE) has previously provided a comment letter dated June 28, 2021, which stated that the project will not impact DOE schools. DDC also acknowledges that the DOE has no additional comments at this time.

Thank you for participating in the Hawaii Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Haku Milles", is written over the typed name.

For Haku Milles, P.E., LEED AP
Director

KC:bm

Handwritten initials and a circled number 9

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

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



JOYOUNG J. LOEWEN
CHIEF

K. CITY & HONOLULU
MADE A VARIOUS
DEPUTY CHIEF

KOOLAHUKU
MAYOR

OUR REFERENCE: EO-GK

April 28, 2023

SENT VIA EMAIL

Mr. Jared Chang
jchang@bowersandkubota.com

Dear Mr. Chang:

This is in response to your letter of March 22, 2023, requesting input on the Draft Environmental Assessment for the proposed Kahawainui Stream Maintenance Dredging Project in Laie.

The Honolulu Police Department recommends that all necessary signs, lights, barricades, and other safety equipment be installed and maintained by the contractor during the project. The impact of the ingress and egress of construction vehicles, equipment, and deliveries should be evaluated to ensure the traffic flow is not adversely affected.

If there are any questions, please call Major Herbert Soria of District 4 (Kaneohe, Kailua, Kahuku) at 808-723-8640.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn Hayashi".

Glenn Hayashi
Assistant Chief of Police
Support Services Bureau

**DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU**

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DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-11

September 10, 2025

MEMORANDUM

TO: Rade Vanic, Interim Chief of Police
Honolulu Police Department

FROM: Haku Milles, P.E., LEED AP, Director
Department of Design and Construction

For

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated April 28, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction (DDC) acknowledges the Honolulu Police Department's (HPD) recommendation to install necessary signs, lights, barricades, and other safety equipment during the project. HPD's recommendation has been noted in Section 4.6.2 of the Final EA.

The project will not impact traffic and nearby facilities. Loading trucks carrying dredging equipment and hauling off sediment off-site will be operated in time intervals determined by the Contractor. This will help alleviate congestion on the two-lane Kamehameha Highway and other surrounding areas. No road closures are expected to take place during dredging activities; however, the HPD will be notified if such actions take place. This may require the use of flagmen or off-duty police officers to direct traffic and emergency vehicles to minimize the potential disturbance of the project to traffic flow.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response memo will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

JL:KC:bm

AK 9



200 Akamainui St. Mililani, HI 96789
(808) 625-2100

Transmittal

Date: 05/03/2023

RE: PROJECT LOCATION/WORK ORDER

To: Jared Chang,
Bowers + Kubota
3049 Ualena St. Suite 1001
Honolulu, HI 96819

Kahawainui Stream Maintenance
Dredging
La'ie, O'ahu, Hawai'i

Attention: _____

We are sending you the following:

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

Copies	Sht / Appl. #	Description
1		CHARTER RESPONSE LETTER
1		CATV MAPS
1		CONTRACTOR NOTES

The Above is transmitted:

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

Comments / Remarks: REVIEW AND COMMENT FOR KAHAWAINUI STREAM MT.
IF YOU HAVE ANY COMMENTS OR QUESTIONS, PLEASE CONTACT ME AT:

Chinnough.Colburn@Charter.com or 808-695-3165 808-348-8359 (cell)

cc: _____ Signed: Chinnough Colburn
Printed Engr/Title: CONSTRUCTON COORDINATOR



May 1, 2023,

BOWERS + KUBOTA
2153 N. King Street Suite 200
Honolulu, HI 96819

Attn: Mr. Jared Chang

Subject: KAHAWAINUI STREAM MAINTENANCE DREDGING
Tax Map Key: (1) 5-5-5:022; (1)5-5-009:007; (1)5-5-009:008; (1) 5-5-009:009

Dear Mr. Chang,

The locations of existing routes and crossings were shown on the provided plans. The exact locations, and routing of all CATV facilities must be verified in the field due to construction variances. The location of the proposed project may influence Spectrum's existing CATV plant in your work area.

However, if the work or repairs being performed requires special machinery, with a specific height requirement, the contractor performing the work, will be required to notify our office prior to performing any work. Spectrum may need to reattach or move or plant system, if we must relocate our existing plant system, charges may apply.

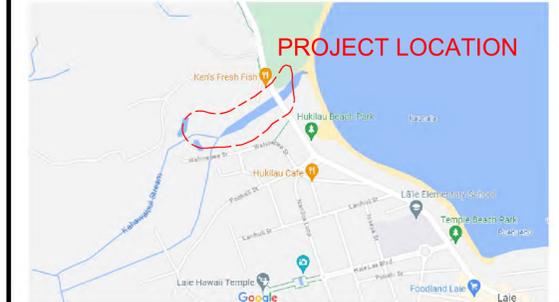
Currently, Spectrum utilizes HECO's aerial infrastructure to provide our CATV services in the area that passes through your project location. Before any digging toning may be required. Call "One Call Center" at 866 423-7287 to set up toning.

This information has been provided to help minimize delays and prevent damage to existing CATV structures within the project area. Should you have any questions or concerns, please feel free to contact me at 808-348-8359, 808-695-3165, or email me via Chinnough.Colburn@charter.com

Sincerely,

Chinnough Colburn

Chinnough Colburn
Construction Coordinator



LOCATION MAP
BRYAN'S MAP 52, D1

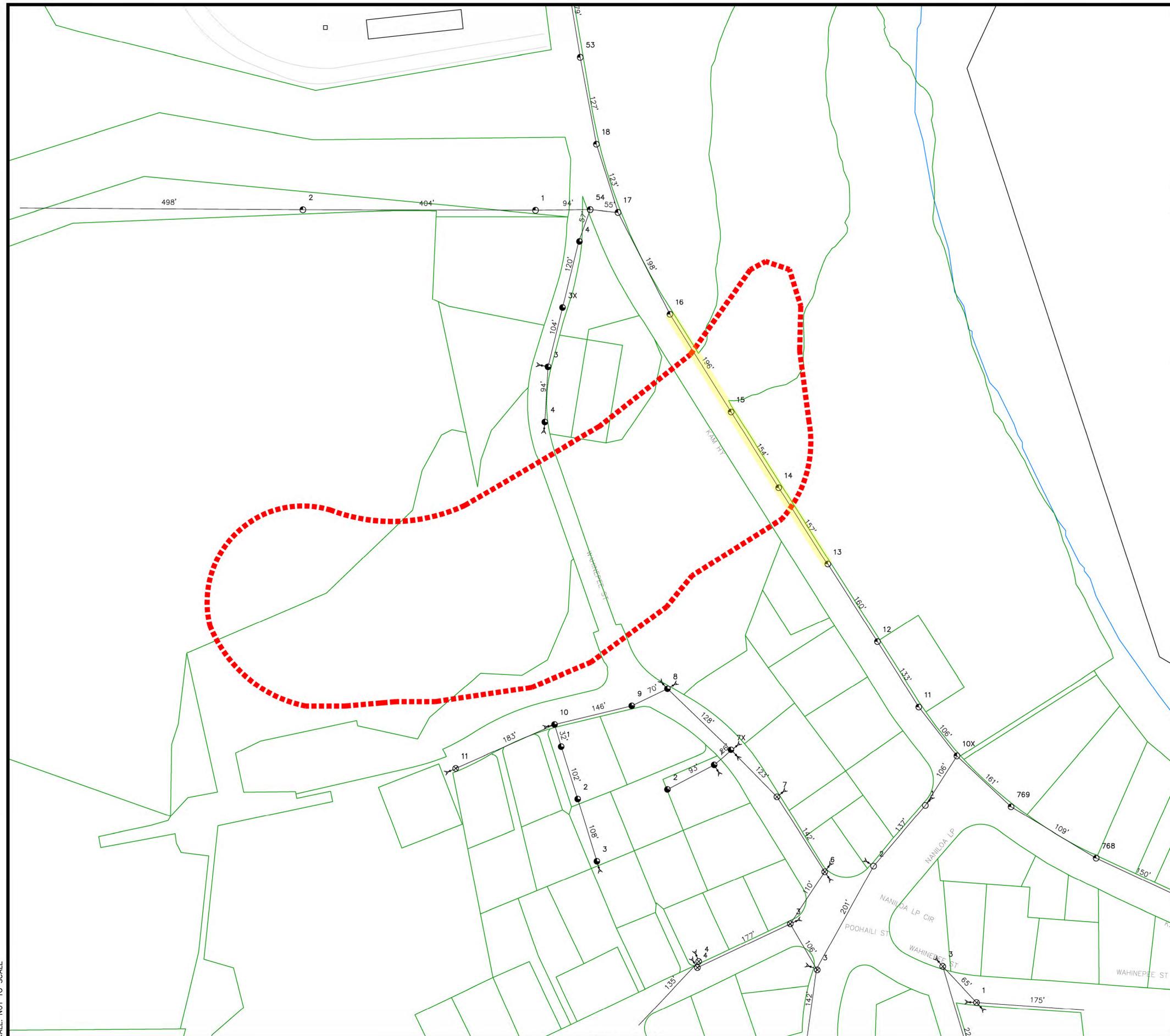
ENGINEERING: C. COLBURN TEL #695-3165, CELL #348-8359

PROJECT NUMBER:	DATE OF CONSTRUCTION:	ESTIMATED HOURS:	DATE:	DATE:	DATE:
N/A	XX-XX-XX				
TOTAL COAX FOOTAGE: XXXX					
TOTAL FIBER FOOTAGE: XXXX					

CONSTRUCTION NOTES:
SPECTRUM UTILIZES HECO'S AERIAL INFRASTRUCTURE CROSSING THROUGH YOUR PROJECT TO PROVIDE SERVICES TO OUR CUSTOMERS (AREA HIGHLIGHTED IN YELLOW)

PROJECT LOCATION (HIGHLIGHTED IN RED)

IF THE WORK OR REPAIRS BEING PERFORMED REQUIRES SPECIAL MACHINERY, WITH A SPECIFIC HEIGHT REQUIREMENTS, THE CONTRACTOR PERFORMING THE WORK WILL BE REQUIRED TO NOTIFY OUR OFFICE PRIOR TO PERFORMING ANY WORK.



CATV SYSTEM MAP
SCALE: NOT TO SCALE

KAHAWAINUI STREAM MT. DRDG.
 KO'OLAULOA DISTRICT
 LA'IE, ISLAND OF OAHU

TITLE:
LOCATION MAP
NOTES
CATV SYSTEM MAP

DATE:
05-03-23

SCALE:
NOT TO SCALE

DES. BY	DR. BY	CHK. BY
CC	CC	

PROJECT NO:
N/A

SHEET NO:
1
1 OF 1 SHEETS

GENERAL CONTRACTOR'S NOTES:

1. **THE CONTRACTOR SHALL PROCURE AND PAY FOR ALL LICENSES AND PERMITS AND SHALL GIVE ALL NOTICES NECESSARY AND INCIDENT TO THE DUE AND LAWFULL PROSECUTION OF THE WORK.**
2. **THE LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THEIR LOCATIONS AND SHALL BE RESPONSIBLE FOR ANY DAMAGES TO THESE UTILITIES AS A RESULT OF THEIR OPERATIONS. ADJUSTMENTS TO THE NEW DUCTLINE ALIGNMENT, IF REQUIRED, SHALL BE MADE TO PROVIDE THE REQUIRED CLEARANCES.**
3. **THE CONTRACTOR SHALL BRACE ALL POLES OR LIGHT STANDARDS NEAR THE NEW DUCTLINE, MANHOLE OR HANDHOLE DURING ITS OPERATIONS.**
4. **THE CONTRACTOR SHALL SAW-CUT A.C. PAVEMENT, CONCRETE GUTTER, AND CONCRETE SIDEWALK WHEREVER NEW MANHOLES, HANDHOLES, PULLBOXES OR DUCTLINES ARE TO BE PLACED AND SHALL RESTORE TO EXISTING CONDITION OR BETTER.**
5. **THE UNDERGROUND PIPES, CABLES, OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM THEIR SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREAS. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.**
6. **THE CONTRACTOR, AT THEIR OWN EXPENSE, SHALL KEEP THE PROJECT AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE COST FOR SUPPLEMENTARY MEASURES, WHICH WILL BE REQUIRED BY THE CITY AND COUNTY, SHALL BE BORNE BY THE CONTRACTOR.**
7. **THE CONTRACTOR, AT THEIR OWN EXPENSE, SHALL KEEP THE PROJECT AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE OF HAWAII, DEPARTMENT OF HEALTH.**
8. **PRIOR TO THE EXCAVATION OF THE DUCTLINE, THE CONTRACTOR SHALL REQUEST THAT SPECTRUM OCEANIC CABLE COMPANY TO LOCATE EXISTING DUCTLINE WHEREVER REQUIRED.**
9. **THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTION NOT TO DAMAGE EXISTING CABLES OR DUCTS. ANY WORK INVOLVING EXISTING CABLES OR DUCTS SHALL BE DONE IN THE PRESENCE OF THE SPECTRUM OCEANIC INSPECTOR OR THEIR REPRESENTATIVE. TEMPORARY CABLE AND DUCT SUPPORT SHALL BE PROVIDED WHEREVER NECESSARY.**

- 10. THE CONTRACTOR SHALL NOTIFY THE SPECTRUM OCEANIC INSPECTOR 72 HOURS PRIOR TO THE START OF WORK ON CATV INFRASTRUCTURE, POURING CONCRETE, OR BACKFILLING. SPECTRUM OCEANIC'S INSPECTOR(S): PERRY SAMUELU AT 387-2496 OR PAUL CASPILLO AT 479-1637.**
- 11. WHEREVER CONNECTIONS TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES PRIOR TO EXCAVATION OF THE MAIN TRENCHES TO VERIFY THEIR LOCATIONS AND DEPTHS.**
- 12. CONTRACTOR SHALL PROVIDE ALL MATERIALS AND FURNISH ALL LABOR AND EQUIPMENT NECESSARY TO INSTALL THE DUCTLINE IN PLACE COMPLETE.**
- 13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT ALL REQUIRED LINES AND GRADES AND SHALL PRESERVE ALL BENCH MARKS AND WORKING POINTS NECESSARY TO LAY OUT THE WORK CORRECTLY. THE NEW DUCTLINE SHALL BE ADJUSTED BY THE CONTRACTOR TO SUIT THE EXISTING CONDITIONS AND THE DETAILS AS DESCRIBED IN THE PLANS.**
- 14. THE LOCATION OF CATV FACILITIES SHOWN ON PLANS ARE FROM EXISTING RECORDS WITH VARYING DEGREES OF ACCURACY AS TO ITS ACTUAL FIXED LOCATION. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING IN CLOSE PROXIMITY OF CATV FACILITIES.**
- 15. THE CONTRACTOR SHALL OBTAIN EXCAVATION PERMIT CLEARANCE FROM SPECTRUM OCEANIC'S ENGINEERING SECTION LOCATED AT 200 AKAMAINUI ST., MILILANI TECH PARK.**
- 16. FOR ANY FIELD ASSISTANCE OR VERIFICATION OF CATV FACILITIES, THE CONTRACTOR SHALL CALL SPECTRUM OCEANIC AT 625-2100 AND ASK FOR THE OSP ENGINEERING DEPARTMENT.**
- 17. ANY WORK REQUIRED TO RELOCATE CATV FACILITIES SHALL BE DONE BY SPECTRUM OCEANIC CABLE AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION REQUIREMENTS AND ASSOCIATED COSTS.**
- 18. ANY DAMAGE TO SPECTRUM OCEANIC'S FACILITIES SHALL BE REPORTED TO SPECTRUM OCEANIC'S TOC DEPARTMENT AT 625-8169.**
- 19. THE CONTRACTOR SHALL TUNNEL UNDER EXISTING CONCRETE CURB AND GUTTER AS NECESSARY TO EXTEND CONDUIT INTO EXISTING CATV PULLBOX AND INTO THE PROPOSED POWER SUPPLY PULLBOX.**
- 20. ALL EXISTING IMPROVEMENTS THAT ARE DISTURBED DURING THE CONSTRUCTION PHASE SHALL BE RESTORED TO ITS ORIGINAL OR BETTER CONDITION AT NO COST TO THE CITY IN ACCORDANCE WITH CITY'S STANDARDS.**

- 21. AT LOCATIONS WHERE EXISTING CATV PULLBOX REPLACEMENT IS PROPOSED, THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTION NOT TO DAMAGE THE EXISTING CABLES IN THE PULLBOX. ALL DAMAGES TO EXISTING CABLES SHALL BE REPAIRED BY SPECTRUM OCEANIC CABLE AND PAID FOR BY THE CONTRACTOR.**
- 22. COORDINATE ALL PENETRATION OF TELEPHONE PULLBOXES WITH HAWAIIAN TEL INSPECTOR.**
- 23. SMOOTH FINISH INSIDE WALL OF EXISTING PULLBOXES AND HAND-HOLES TO ITS ORIGINAL CONDITION OR BETTER.**
- 24. ALL NEW CONCRETE ENCASED CONDUIT SHALL BE PVC PIPE-SCHEDULE 40. ALL NEW DIRECT-BUIRED CONDUIT SHALL BE PVC PIPE-SCHEDULE 80. USE OF ANY OTHER MATERIAL TYPE (GTS, ETC.) SHALL BE LIMITED TO MATCHING EXISTING FACILITES. CONNECTION OF DISSIMILAR MATERIALS TO REQUIRE APPROVAL FROM SPECTRUM OCEANIC INSPECTOR AND ENGINEERING DEPT.**
- 25. THE CONTRACTOR SHALL PLACE POLY CORD THROUGH OUT PROJECT, AND SECURE IN MANHOLES, HANDHOLES, AND PULLBOXES.**
- 26. FOR 3" CONDUITS OR LARGER, THE CONTRACTOR SHALL INSTALL NEPTCO WP1800 MULETAPE OR APPROVED EQUAL IN ALL DUCTLINES, LEAVE MULETAPE IN PLACE FOR FUTURE USE AS A PULL OR FISH LINE, UNLESS OTHERWISE NOTED. REFERENCE GTE MATERIAL CODE NO. 571154. ALL DUCTS SHALL BE CAPPED TO PREVENT ENTRY OF FOREIGN MATERIAL DURING CONSTRUCTION AND AT COMPLETION OF INSTALLATION. ENDBELLS ARE REQUIRED FOR CONDUITS 2" AND LARGER.**
- 27. PENETRATION INTO PULLBOXES IF NECESSARY TO BE FROM FACTORY INSTALLED OPENING OR FROM BRICKS POSITION. PENETRATION FROM PULLBOX WALLS IS NOT ACCEPTABLE.**
- 28. BENDS IN THE DUCT ALIGNMENT, DUE TO CHANGES IN GRADE SHALL HAVE A MINIMUM RADIUS OF 20-FEET. ALL 90-DEGREE C-BENDS AT A POLE OR AT THE BUILDING FLOOR SLAB PENETRATION, SHALL HAVE A BEND RADIUS OF 10 TIMES THE DIAMETER OF THE DUCT OR GREATER.**
- 29. MINIMUM LENGTH OF CONDUIT USED SHALL NOT BE LESS THAN 5-FEET IN LENGTH. USE OF PARTIAL CONDUIT SECTIONS ALLOWABLE IS AT SPECTRUM OCEANIC INSPECTOR(S) DISCRETION.**
- 30. ALL CONDUITS SHALL ENTER THROUGHT THE END "SHORT WALL" OF THE PULL-BOX. ENTRY SHALL BE AT 90 DEGRESS (PERPENDICULAR) TO WALL FACE WITH BENDS NO LESS THAN 12" FROM EXTERIOR WALL.**
- 31. A MINIMUM OF (2) PRECAST SECTIONS MUST BE USED ON ALL 2X4 OR 2X6 PULLBOXES.**

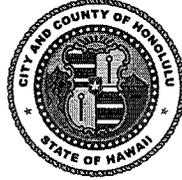
32. **ALL NEW CONSTRUCTION SHALL UTILIZE CONCRETE PRECAST BASE UNLESS OTHERWISE APPROVED OR SPECIFIED BY SPECTRUM OCEANIC INSPECTOR(S).**
33. **FOR PULL-BOX LOCATIONS WHERE VEHICULAR INTRUSION POSSIBLE, CONCRETE COLLAR REQUIRED PER SPECTRUM OCEANIC STANDARDS AND SPECIFICATIONS MANUAL. EXAMPLES INCLUDE, BUT NOT LIMITED TO, ROLLED/RIBBON CURBS, CURB / HEADERS LESS THAN 5" IN HEIGHT, VEHICLE TRAVELWAYS WITH NO DEFINED CURB / HEADER, ETC.**
 - A. **NON SIDEWALK AREAS, SEE FIGURE 18.1c, 19.1c AND 20.1b IN THE SPECTRUM SPECIFICATIONS MANUAL.**
34. **WHEN THREE (3) OR MORE 4" CONDUITS ENTER ONE END WALL OF ANY PULLBOX, ONLY BRICK BASES WILL BE ALLOWED UNLESS OTHERWISE INSTRUCTED/APPROVED BY SPECTRUM OCEANIC INSPECTOR(S).**
35. **TWO MINIMUM LAYERS OF BRICKS TO BE USED LOWER THAN THE LOWEST DUCT ENTERING THE PULLBOX. TOP LAYER OF BRICK TO BE FLUSH WITH TOP OF CONDUIT OR HIGHER.**
36. **FOR UPGRADE/REPAIRS TO EXISTING PULL-BOXES, BRICKS MAY BE USED AND SHALL ALWAYS BE AT LEAST TWO LAYERS LOWER THAN THE LOWEST DUCT ENTERING THE PULLBOX.**
37. **AT NO TIME SHALL CEMENT MORTAR, WOOD, OR ANY OTHER MATERIAL BE USED BETWEEN PRECAST SECTIONS.**
38. **LEVELING OR RAISING OF BOXES TO GRADE MUST BE DONE:**
 - A. **PRE-CAST BASE(S) – USING GRAVEL LAYER UNDER BASE (TYPE 3B OR EQUIVALENT APPROVED BY SPECTRUM OCEANIC INSPECTOR)**
 - B. **BRICK BASE(S) – ADJUSTMENTS TO BRICKWORK SECTION. THE PERMANENT INSTALLATION OF WOODEN WEDGES TO ACCOMPLISH THIS PURPOSE WILL NOT BE ACCEPTED.**
39. **5/8" x 8' COPPER GROUND RODS SHALL BE PLACED IN ALL PULLBOXES UNLESS OTHERWISE DIRECTED BY SPECTRUM OCEANIC CABLE. GROUND RODS WILL BE PLACED IN THE CORNER 3" TO 4" FROM THE WALL AND AWAY FROM ANY CONDUIT WITH NO MORE THAN 8" STICKING UP ABOVE GROUND.**
40. **TRENCHING TO BE CONDUCTED BY HAND DIGGING NEAR AND ACROSS EXISTING UTILITY LINES.**
41. **MINIMUM CLEARANCE BETWEEN STREET LIGHT STAND AND FIRE HYDRANTS SHALL BE THREE FEET.**
42. **UNDERGROUND UTILITIES SHOWN HEREON IS FOR INFORMATION ONLY. NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF SAID INSTALLATION.**

43. **FOR UNDERGROUND CABLE LOCATING AND MARKING, FIVE WORKING DAYS ADVANCE NOTICE IS REQUIRED. THREE WORKING DAYS ADVANCE NOTICE IS REQUIRED FOR ANY INSPECTION BY A DESIGNATED REPRESENTATIVE. CONTRACTOR SHALL TAKE NECESSARY PRECAUTION NOT TO DAMAGE ANY EXISTING CABLES OR DUCTS. SPECTRUM OCEANIC'S INSPECTOR OR DESIGNATED REPRESENTATIVE IS REQUIRED TO BE AT ANY JOB SITE WHENEVER THERE WILL BE A BREAKAGE INTO OR ENTRY INTO ANY STRUCTURE THAT CONTAIN SPECTRUM OCEANIC'S FACILITIES.**
44. **CONCRETE STRENGTH SHALL BE 3000 PSI IN 28 DAYS.**
45. **CURING AND BACKFILLING. MAINTAIN CONCRETE IN A MOIST CONDITION FOR 24 HOURS MINIMUM FOR 3,000 PSI AND 48 HOURS MINIMUM FOR 2,500 PSI BEFORE COMPACTED. BACKFILLING: 72 HOURS MINIMUM BEFORE PERMITTING MOTOR TRAFFIC LOAD ON DUCTLINE. CURING METHOD SHALL MEET SPECTRUM OCEANIC INSPECTOR'S APPROVAL.**
46. **INSTALL 8-MIL. THICK ORANGE COLOR WARNING TAPE 4-INCH WIDE ENTIRE LENGTH OF TRENCH WHEN PLACING CATV CONDUITS. TAPE SHOULD READ "CAUTION BURIED CABLE LINE BELOW". MANUFACTURED BY HARRIS INDUSTRIES, INC. CATALOG NUMBER UT-43 OR EQUIVALENT TAPE. TAPE TO BE INSTALLED 12-INCHES BELOW GRADE.**
47. **AFTER DUCTLINE HAS BEEN COMPLETED, A MANDREL WITH A SQUARE FRONT NOT LESS THAN 12-INCH LONG AND HAVING A DIAMETER OF ¼-INCH LESS THAN THE INSIDE DIAMETER OF DUCT, SHALL BE PULLED THROUGH EACH DUCT AFTER WHICH A BRUSH WITH STIFF BRISTLES SHALL BE PULLED THROUGH TO MAKE CERTAIN THAT NO PARTICLES OF EARTH, SAND, OR GRAVEL HAVE BEEN LEFT INSIDE. DUCTS SHALL BE COMPLETELY DRY AND CLEAN.**
48. **METALLIC ENTRANCE CONDUITS SHALL BE GROUNDED.**
49. **ALL CONDUITS WITHIN A BUILDING SHALL:**
- A) **BE INSTALLED IN THE SHORTEST AND STRAIGHTEST POSSIBLE RUN.**
 - B) **HAVE NO SECTION LONGER THAN 100-FEET NOR CONTAIN MORE THAN TWO 90-DEGREE BENDS. AN APPROVED SIZED JUNCTION BOX OR GUTTER BOX SHALL BE PLACED IF THIS IS EXCEEDED.**
 - C) **ALL BENDS SHALL BE LONG SWEEP-RADIUS BENDS BUT THE INSIDE RADIUS OF THE BEND MUST NEVER BE LESS THAN TEN TIMES THE DIAMETER OF THE CONDUIT.**
50. **ALL CONSTRUCTION MUST BE INSPECTED AND APPROVED BY SPECTRUM OCEANIC PRIOR TO THE INSTALLATION OF ANY OF ITS FACILITIES AND THE ENERGIZING OF ITS SYSTEM.**
51. **CONTRACTOR AND/OR CUSTOMER SHALL PROVIDE SPECTRUM OCEANIC WITH SUFFICIENT INSTALLATION TIME IN THEIR OCCUPANCY TIME TABLE.**

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-12

September 10, 2025

Mr. Chinnough Colburn, Construction Coordinator
Charter Communications
200 Akamainui Street
Mililani, Hawaii'i 96789

Dear Mr. Colburn:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawaii'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.),
008 (por.), 009 (por.), 010 (por.), 011 (por.),
047 (por.), and 061 (por.); (1) 5-6-001:004 (por.)

Thank you for your letter dated May 1, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges Charter Communication's comments regarding Spectrum's existing aerial CATV facilities within the project area. Charter Communication's office will be notified should the project require equipment that may interfere with aerial facilities. In addition, should any digging toning be required, the "One Call Center" will be contacted to set up toning.

Thank you for participating in the Hawaii'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Milles".

For Haku Milles, P.E., LEED AP
Director

KC:bm

AK 9

DEPARTMENT OF FACILITY MAINTENANCE
CITY AND COUNTY OF HONOLULU

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

RICK BLANGIARDI
MAYOR

WARREN K. MAMIZUKA
ACTING DIRECTOR

TYLER K. SUGIHARA, P.E.
ACTING DEPUTY DIRECTOR



IN REPLY REFER TO:
DRM 23-231

May 1, 2023

Bowers + Kubota Consulting, Inc.
Attention: Jared K. Chang, AICP, Planning Manager
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Chang:

Subject: Draft Environmental Assessment Publication Notice
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, La'ie, Oahu, Hawaii
TMKs: 5-5-005:002 (POR), 5-5-009:007 (POR), 008 (POR),
009 (POR), 010 (POR), 011 (POR), 047 (POR), and 061 (POR)
5-6-001:004 (POR)

Thank you for the opportunity to review and give input on the subject project.

We have no comment at this time and we support the Department of Design and Construction (DDC) maintenance dredging project of Kahawainui Stream.

If you have any questions, please call Mr. Thomas Takeuchi of the Division of Road Maintenance at (808) 768-3608.

Sincerely,

A handwritten signature in black ink, appearing to read "Warren K. Mamizuka".

Warren K. Mamizuka
Acting Director

DEPARTMENT OF DESIGN AND CONSTRUCTION
KA 'OIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: honolulu.gov

RICK BLANGIARDI
MAYOR
MEIA



HAKU MILLES, P.E.
DIRECTOR
PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-13

September 10, 2025

MEMORANDUM

TO: Warren K. Mamizuka, Deputy Director
Department of Facility Maintenance

FROM: *Haku Milles*
For Haku Milles, P.E., LEED AP, Director
Department of Design and Construction

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olaupia District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.), 008 (por.),
009 (por.), 010 (por.), 011 (por.), 047 (por.), and 061 (por.);
(1) 5-6-001:004 (por.)

Thank you for your letter dated May 1, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the Department of Facility Maintenance has no comments at this time and appreciates the department's support of the project.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response memo will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

JL:KC:bm

Hk 9

JOSH GREEN, M.D.
GOVERNOR



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

EDWIN H. SNIFFEN
DIRECTOR

Deputy Directors
DREANALEE K. KALILI
TAMMY L. LEE
ROBIN K. SHISHIDO
JAMES KUNANE TOKIOKA

IN REPLY REFER TO:

DIR 0250
HWY-OM 2.23-0269

May 5, 2023

Bowers + Kubota Consulting, Inc.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Attention: Mr. Jared Chang

Dear Colleagues:

Subject: Draft Environmental Assessment Publication Notice
Kahawainui Stream Maintenance Dredging
Koolauloa District, Laie, Island of Oahu, Hawaii
Tax Map Keys: (1) 5-5-005:022(por.); (1)5-5-009:007 (por.),
008 (por.), 009 (por.), 010(por.), 011 (por.), 047 (por.)
and 061 (por.); 5-6-001:004 (por.)

Thank you for your letter dated March 22, 2023, regarding the Draft Environmental Assessment Publication Notice. We have no further comments at this time.

Should you have further questions, please contact Ryan Nakata, our Highways Oahu Maintenance Engineer at (808) 831-6700 ext. 134 or via email at ryan.a.nakata@hawaii.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Ed Sniffen".

EDWIN H. SNIFFEN
Director of Transportation

DEPARTMENT OF DESIGN AND CONSTRUCTION
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PO'O

MARK YONAMINE, P.E.
DEPUTY DIRECTOR
HOPE PO'O

CDD-A 25-944980-14

September 10, 2025

Mr. Edwin H. Sniffen, Director
State of Hawai'i
Department of Transportation
869 Punchbowl Street, 5th Floor
Honolulu, Hawai'i 96813

Dear Mr. Sniffen:

SUBJECT: Draft Environmental Assessment Response Letter
Kahawainui Stream Maintenance Dredging
Ko'olauloa District, Lā'ie, Island of O'ahu, Hawai'i
Tax Map Keys: (1) 5-5-005:022 (por.); (1) 5-5-009:007 (por.),
008 (por.), 009 (por.), 010 (por.), 011 (por.), 047 (por.), and
061 (por.); (1) 5-6-001:004 (por.)

Thank you for your letter dated May 5, 2023, commenting on the Draft Environmental Assessment (Draft EA) for the Kahawainui Stream Maintenance Dredging Project. The City and County of Honolulu, Department of Design and Construction acknowledges that the State Department of Transportation has no further comments at this time.

Thank you for participating in the Hawai'i Revised Statutes, Chapter 343 environmental review process. A copy of your letter and this response letter will be included in the Final EA. If you have any questions or concerns regarding the project, please feel free to contact Kristie Ching at (808) 768-8800 or by email at kching1@honolulu.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Milles", is written over a faint, larger signature.

For Haku Milles, P.E., LEED AP
Director

KC:bm
AK 9