ENGINEERING DIVISION
DEPARTMENT OF PUBLIC WORKS
THE COUNTY OF KAUA'I
DEREK S. K. KAWAKAMI, MAYOR
MICHAEL A. DAHILIG, MANAGING DIRECTOR

FILE COPY

SEP - 8 2020

TROY K. TANIGAWA
ACTING COUNTY ENGINEER

MICHAEL H. TRESLER
ACTING DEPUTY COUNTY ENGINEER

August 24, 2020

Director
Office of Environmental Quality Control
Department of Health, State of Hawai'i
235 S. Beretania Street, Room #702
Honolulu, HI 96813

Subject: Waimea River Ford Crossing, Draft Environmental Assessment

Dear Director,

With this letter, the County of Kaua'i, Department of Public Works hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the Waimea River Ford Crossing Project situated at Tax Map Key (TMK) (4) 1-6-001:027 (por.) and 888 (por.) of Waimea Town, in the Waimea District on the Island of Kaua'i for publication in the next available edition of *The Environmental Notice*.

The following are included as part of the online submittal:

- A completed OEQC Publication Form;
- A searchable Adobe Acrobat PDF file of the DEA-AFONSI;
- A .zip file that contains the KML file for the action location boundary.

Please address correspondence to Troy Tanigawa via email at publicworks@kauai.gov, or by U.S. Postal Service to Public Works Department, 4444 Rice Street, Suite 275, Lihue, HI, 96766, or contact Ms. Christie Bagley, Project Manager, at (808) 241-4885 or cbagley@kauai.gov.

Sincerely,

Michael Moule

Digitally signed by Michael Moule
Date: 2020.08.24 08:29:08 -10'00'

Michael Moule, P.E.
Chief, Engineering Division

Enclosures

21-038

From: webmaster@hawaii.gov
To: HI Office of Environmental Quality Control
Subject: New online submission for The Environmental Notice
Date: Wednesday, August 26, 2020 1:12:56 PM

Action Name

Waimea River Ford Crossing Project

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

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

Judicial district

Waimea, Kaua‘i

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

(4) 1-6-001:027 (por.); 888 (por.)

Action type

Agency

Other required permits and approvals

Numerous

Proposing/determining agency

County of Kaua'i, Department of Public Works

Agency contact name

Christie Bagley

Agency contact email (for info about the action)

cbagley@kauai.gov

Email address or URL for receiving comments

publicworks@kauai.gov

Agency contact phone

(808) 241-4885

Agency address

4444 Rice Street
Suite 275
Lihue, Hawaii 96766
United States
Map It

Was this submittal prepared by a consultant?

Yes

Consultant

Bow Engineering & Development, Inc.

Consultant contact name

Korey Johnson

Consultant contact email

kjohnson@bowengineering.com

Consultant contact phone

(808) 369-8214

Consultant address

1953 S. Beretania Street, PH-A
Honolulu, HI 96826
United States
Map It

Action summary

The County of Kaua‘i Department of Public Works proposes to replace the existing Waimea River earthen crossing with a concrete crossing to prevent erosion of the crossing and to reduce the amount of maintenance required. The existing river crossing includes an earthen and gravel ford crossing. During periods of extremely high storm flows, the roadway materials are transported downstream. As a result, vehicular access to the east bank is not available until storm flows recede and maintenance crews reconstruct a new earthen roadway. The County Department of Public Works has identified the following objectives of the Waimea River Ford Crossing Project:
• To protect the health and safety of the public.
• To provide reliable access for residents and farmers across the Waimea River.

Reasons supporting determination

Refer to Section 5. Findings and Determination

Attached documents (signed agency letter & EA/EIS)

- 2020-08-26_-Draft-EA-Waimea-FINAL.pdf
- Transmittal-to-OEQC-082420.pdf

Action location map

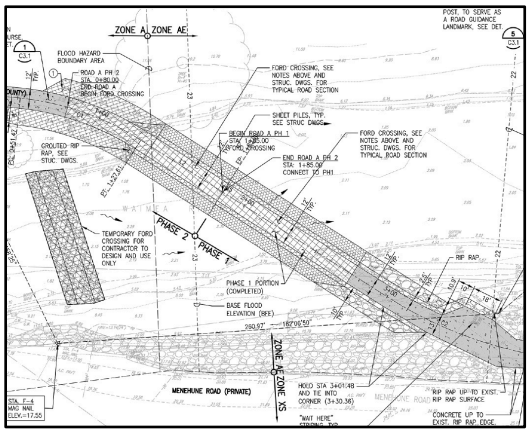
- Waimea-Project-Limits.zip

Authorized individual

Korey Johnson

Authorization

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



DRAFT
ENVIRONMENTAL ASSESSMENT

WAIMEA RIVER
FORD CROSSING PROJECT

Waimea and Makaweli Ahupua‘a, Waimea District, Island of Kaua‘i

County of Kaua‘i
Department of Public Works

August 2020

This page intentionally
left blank.

Waimea River Ford Crossing Project

Waimea and Makaweli Ahupuaʻa, Waimea District, Island of Kauaʻi

Draft Environmental Assessment

This environmental document has been prepared pursuant to
Chapter 343, Hawaii Revised Statutes
and Title 11, Chapter 200.1, Hawaii Administrative Rules

Prepared for:

County of Kauaʻi
Department of Public Works
4444 Rice Street
Lihue, Hawaiʻi 96766

Prepared by:

Bow Engineering & Development, Inc.

Civil Engineering *Planning*

1953 South Beretania Street, PH-A
Honolulu, Hawaiʻi 96826
Telephone: (808) 941-8853
Fax: (808) 945-9299
www.bowengineering.com

and
Environmental Planning Partners, Inc.

August 2020

This page intentionally
left blank.

PROJECT SUMMARY

Project:	Waimea River Ford Crossing Project
Type of Document:	Draft Environmental Assessment
Proposing/Approving Agency:	County of Kaua'i, Department of Public Works 4444 Rice Street Lihue, Hawai'i 96766 Contact: Ms. Christie Bagley, Project Manager (808) 241-4885
Location:	Waimea River 21°58'7.66"N, 159°39'22.00"W, TMK: (4) 1-6-001:027 (por.) and 888 (por.)
Proposed Project:	The proposed project includes the replacement of the existing Waimea River earthen crossing with a concrete crossing to prevent erosion of the crossing and reduce the amount of maintenance required.
Ch. 343, HRS Trigger:	Use of state lands and state funds
State Land Use Designation:	Agricultural District
Existing Zoning/Land Use:	Open District/Natural
Permits Anticipated:	Department of the Army Permit, Section 404 Clean Water Act, NWP 14 Section 401 Water Quality Certification Stream Channel Alteration Permit
Anticipated Determination:	Finding of No Significant Impact (FONSI)

SUMMARY OF MITIGATION MEASURES AND PROJECT COMMITMENTS TO MINIMIZE POTENTIAL IMPACTS OF THE PROJECT

The following measures have been incorporated into the project description:

Site-Specific Best Management Practices
Due to work within and adjacent to Waimea River waters, the project could present increased potential for water quality impacts during construction. The proposed project would include site-specific Best Management Practices (BMPs) to be implemented during project construction to minimize erosion and potential impacts to water quality. The BMPs would include but would not be limited to the USFWS recommended standard BMPs regarding sedimentation and erosion in aquatic environments:

1. Construct the new ford during the low flow time of year with lesser chance of rain and storm flow events.
2. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. Current plans call for sheet piles around the work area, in addition to turbidity curtains as a secondary measure. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
2. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non- native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP - see http://www.haccp-nrm.org/Wizard/default.asp) can help to prevent attraction and introduction of non-native species.
3. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf. A compost sock should be placed along the perimeter of all staging area used for storing construction materials to prevent migration and runoff of materials.
4. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
5. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non- invasive vegetation matting, hydro-seeding, etc.

Currently the BMPs that are likely to be used are a combination of sheet piles, sand bags, filter socks, and turbidity curtains to contain/divert the river flow enough to perform the work and contain the area. These BMPs will be refined in accordance with County of Kaua'i regulatory requirements as part of the permitting process.

MITIGATION MEASURES AND REGULATORY REQUIREMENTS
Geology, Topography, and Soils
During construction, all earthwork would be conducted in compliance with dust and erosion control requirements of Kauai County Code Section 22-7, *Grading, Grubbing and Stockpiling*. The proposed action includes a site-specific BMP plan developed as part of the project to minimize erosion and sedimentation during construction. The BMPs would include site-specific measures as outlined in Section 2.2 of this EA.
Hydrology and Water Quality
The proposed action includes site-specific BMPs to be implemented during construction in order to prevent any sediment, soil, and debris resulting from the proposed construction from adversely impacting the riverine ecosystem or adjacent properties. Further, all earthwork operations would be conducted in compliance with dust and erosion control requirements of Kauai County Code Section 22-7, *Grading, Grubbing and Stockpiling*.
Biological Resources
Should construction activities at the project site require the removal of shrubs or trees, then the following measures would be recommended: • Upon completion of construction, vegetation removed during construction should be replaced with ecologically suitable native plant species. If native plants do not meet landscaping objectives, non-native plants with a low risk of becoming invasive may be substituted. • Care should be taken to avoid the introduction and spread of invasive species during and after construction of the concrete ford. The staging areas and construction site should be closely monitored for the appearance of invasive species not known to occur on Kauai as well as for species that may be present on Kauai but, are being actively targeted for control by the Kauai Invasive Species Committee. • In addition, the following best management practices should be adopted to minimize the introduction and spread of new invasive species at the project site: 1) All construction equipment and vehicles should arrive at the project site clean and free of any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs. 2) All materials imported to the project site, including gravel, soil, rock, and sand, should be free of invasive species. Invasive species found on the stockpile should be removed either chemically or mechanically. 3) Only plants grown on Kauaʻi should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined, if necessary, to ensure that they are free from invasive species, such as the coconut rhinoceros beetle (Oryctes rhinoceros) and little fire ants (Wasmannia auropunctata) and invasive plants seeds and seedlings that could arrive inadvertently. 4) Only weed free seed mixtures should be used for hydroseeding and hydromulching on the project site. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Kauaʻi and those that are actively being controlled on the island should be removed.

Biological Resources, cont.
1. A preconstruction survey shall be conducted to determine the presence of nesting Hawaiian waterbirds within 100 feet of the project construction work. The initial preconstruction survey shall be performed by a qualified biologist or ornithologist to verify the presence or absence of nesting birds. Subsequent inspections may be performed by trained personnel who will be frequently on-site. 2. If Hawaiian waterbirds are observed in the area when construction activities are scheduled to occur, care shall be taken to avoid disturbance to individuals and their nests. In general, if an active nest of a federally listed waterbird is detected in the project vicinity, a 100-foot buffer shall be established and maintained around all active nests and broods until the chicks/ducklings/goslings have fledged. No potentially disruptive activities or habitat alteration shall occur within the buffer. A repeat survey by a qualified biologist or ornithologist to verify that Hawaiian waterbirds have left the construction site shall be completed 3 days prior to start of construction in the buffer areas. 3. The construction supervisor for this project must be fully aware of the possibility that Hawaiian waterbirds could be present in the work area. This individual should ensure that an inspection of the work site is performed before beginning work each day to verify that no Hawaiian waterbirds are present in the work area and at the immediate work site. 4. If Hawaiian waterbirds should move in to the construction site while work is being performed, work shall be stopped and not begin again until after the birds have departed on their own accord, or moved more than 100 feet from construction activity.
Implement a water quality monitoring program that includes pre-, during-, and post-construction monitoring of the stream. This may include either observational monitoring and/or collection of water samples for the analysis of a variety of parameters such as temperature, turbidity, total suspended solids, pH, and dissolved oxygen to identify potential impacts to physical and biological resources in the stream channel and nearby ocean waters.
Historical, Archaeological, and Cultural Resources
While there is low probability of encountering archaeological sites in this area, in the event that historic resources, including human skeletal remains, are identified during the construction activities, all work would cease in the immediate vicinity of the find, the find would be protected from additional disturbance, and the State Historic Preservation Division would be contacted immediately.
Air Quality and Climate
All construction work will be in conformance with the air pollution control standards contained in Title 11, Chapter 59, HAR, "Ambient Air Quality Standards," and Chapter 60, "Air Pollution Control," which would minimize air quality emissions.
Noise
Construction will be confined to 7 a.m. to 6 p.m., Monday through Friday, and 9 a.m. to 6 p.m. on Saturday. No construction activities exceeding maximum allowable noise levels will occur on Sundays and holidays without prior notice. Construction activities will comply with Chapter 11-46, HAR, "Community Noise Control."

Implementation of these measures and compliance with regulatory requirements would minimize environmental impacts resulting from the proposed project. Permits and approvals required for implementation of the proposed project are listed in Section 2.3 of this EA.

TABLE OF CONTENTS

1 Introduction 1
- 1.1 Project Overview and Project Need 1
- 1.2 Purpose of the Environmental Assessment 1
- 1.3 Federal and State Authority 1
- 1.4 Steps in the Environmental Review Process 2

2 Project Description 3
- 2.1 Environmental Setting 3
- 2.2 Description of the Proposed Action 4
- 2.3 Permits and Approvals Required or Potentially Required 10

3 Description of the Affected Environment, Anticipated Effects, and Proposed Mitigation Measures 12
- 3.1 Geology, Topography, and Soils 12
- 3.2 Hydrology and Water Quality 13
- 3.3 Natural Hazards 15
- 3.4 Biological Resources 21
- 3.5 Historic, Archaeological, and Cultural Resources 25
- 3.6 Air Quality and Climate 27
- 3.7 Noise 27
- 3.8 Visual Resources 28
- 3.9 Social and Economic Characteristics 29
- 3.10 Public Facilities and Services 29
- 3.11 Traffic and Parking 30
- 3.12 Conformance with State and Local Plans, Policies, and Land Use Controls 30

4 Alternatives to the Proposed Action 39
- 4.1 No Action Alternative 39
- 4.2 Preferred Alternative 1: Proposed Action 39
- 4.3 Alternatives Eliminated From Consideration 39

5 Findings and Determination 40

6 Individuals, Community Groups, and Agencies Consulted 43
- 6.1 Early Consultation 43
- 6.2 Environmental Assessment Preparation 44

7 References 45

FIGURES

Figure 1: Vicinity and Location Map 7
Figure 2: Project Area 8
Figure 3: Site Plan 9
Figure 4: National Wetlands Inventory Map 16
Figure 5: Flood Hazard Map 19
Figure 6: Tsunami Evacuation Area 20
Figure 7: State Land Use District Map 31
Figure 8: Special Management Area Map 35
Figure 9: County of Kaua'i General Plan Land Use 38

APPENDICES

Appendix A Early Consultation Comment Letters
Appendix B Demolition and Construction Phasing Plan Set
Appendix C FEMA No-rise Determination and Levee Impact Evaluation
Appendix D Biological Survey Report
Appendix E Archaeological Literature Review and Field Inspection

1 INTRODUCTION

1.1 PROJECT OVERVIEW AND PROJECT NEED

The County of Kaua'i Department of Public Works proposes to replace the existing Waimea River earthen crossing with a concrete crossing to prevent erosion of the crossing and to reduce the amount of maintenance required. The existing river crossing includes an earthen and gravel ford crossing. During periods of extremely high storm flows, the roadway materials are transported downstream. As a result, vehicular access to the east bank is not available until storm flows recede and maintenance crews reconstruct a new earthen roadway. The County Department of Public Works has identified the following objectives of the Waimea River Ford Crossing Project:

- To protect the health and safety of the public.
- To provide reliable access for residents and farmers across the Waimea River.

1.2 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

The evaluation of projects to determine their effects on the environment is required by the Chapter 343, Hawai'i Revised Statutes (HRS). An Environmental Assessment (EA) is a "written evaluation to determine whether an action may have a significant effect" (Section 343-2, HRS). The agency with primary responsibility over the project (the proposing agency) is required to prepare an EA and make a final environmental determination according to the presence of significant impacts or the lack thereof. As stated in Section 343-1, HRS:

> An environmental review process will integrate the review of environmental concerns with existing planning processes of the State and counties, and alert decision makers to significant environmental effects which may result from the implementation of certain actions. …The process of reviewing environmental effects is desirable because environmental consciousness is enhanced, cooperation and coordination are encouraged, and public participation during the review process benefits all parties involved and society as a whole.

As described above, the basic purpose of an EA is to provide information to the public and decision makers on proposed actions. The EA must also disclose: potential significant adverse environmental impacts, the expected primary and secondary consequences, and the cumulative as well as the short- and long-term effects of the action.

1.3 FEDERAL AND STATE AUTHORITY

The proposed action would use State and County of Kaua'i funding and would be subject to state environmental laws and regulations. Environmental review procedures required by the State of Hawai'i include compliance with Chapter 343, HRS "Environmental Impact Statements", and Department of Health Title 11, Chapter 200.1, Hawaii Administrative Rules (HAR), "Environmental Impact Statement Rules".

No federal funding is anticipated for Waimea River Ford Crossing project, and the project would not be subject to the environmental review requirements prescribed under the National Environmental Policy Act (NEPA).

1.4 STEPS IN THE ENVIRONMENTAL REVIEW PROCESS

Early Consultation and Data Gathering

Section 11-200.1-18, HAR requires that an agency must consult with agencies and individuals that might have jurisdiction or expertise with respect to the proposed action. Early consultation is considered an important part of the environmental review process – the ultimate goal is the gathering of information, data, and public concerns. A preliminary description of the project was circulated to agencies and individuals in December 2019, and phone consultations were conducted with permitting agencies as necessary. For a detailed description of the early consultation component of this project, see Chapter 6, *Individuals, Community Groups, and Agencies Consulted,* of this EA. Copies of the written comments are included in Appendix A.

Circulation of the Draft Environmental Assessment

Following completion of this Draft EA, the environmental document will be submitted to the State Office of Environmental Quality Control (OEQC). The OEQC will notify government agencies and the public when the Draft EA is available for review. The announcement will be made in a bimonthly bulletin called *The Environmental Notice*, which is available in print and online. Publication in *The Environmental Notice* marks the beginning of a 30-day comment period during which government agencies and the public can review and comment on the environmental document and its findings. For the proposed project, the County Department of Public Works has submitted a notice of determination with the Draft EA to the OEQC with an Anticipated Finding of No Significant Impact (AFONSI) (Section 11-200.1-11, HAR).

Final Environmental Assessment and Finding of No Significant Impact

After the 30-day review period, the Department of Public Works will consider all comments and incorporate necessary changes into a Final EA. The Final EA will support a Finding of No Significant Impact (FONSI), if appropriate. The publication of the notice of availability of the Final EA-FONSI in *The Environmental Notice* initiates a 30-day judicial challenge period under Section 343-7(b), HRS.

If the proposing agency reviews public comments on the Draft EA, and the public comments indicate that the proposed action could in fact have significant effects, the agency would prepare a Final EA supporting an Environmental Impact Statement Preparation Notice (EISPN) determination.

2 PROJECT DESCRIPTION

2.1 ENVIRONMENTAL SETTING

Project Location

The proposed project site is located approximately 1.3 miles north of Waimea Town, in the Waimea District, on the southwestern region of the Island Kaua'i (see Figure 1). The existing river crossing extends across the Waimea River, identified as Tax Map Key (TMK) (4) 1-6-001:027 (por.) and 888 (por.). The river ford crossing is approximately 350 feet south of the Waimea Swinging Bridge, a pedestrian bridge spanning the Waimea River.

Existing Site Conditions

The existing river crossing includes an earthen and gravel ford crossing. Based on current information, there are six permanent residents that use the existing earthen crossing as the sole vehicular access to their homes on the eastern bank of the river. When the crossing is not usable, the residents park on the stream bank on the western side of the river, along Menehune Road and the flood control levee, and use the pedestrian bridge to get across the river and access their homes. There are also other users of the ford crossing that have farmland on the east side of the river.

During periods of extremely high storm flows, the roadway materials are transported downstream (see Photo 1). As a result, vehicular access to the east bank is not available until maintenance crews reconstruct a new earthen roadway and storm flows recede.

Photo 1 – Waimea River crossing at high water flows.

Surrounding Land Use
The project site is within an area of diversified agricultural and pasture land uses. There are residential land uses on both the east and west side of the river, in addition to diversified agriculture on the west side of the river. There are flood levees and channel improvements along the Waimea River banks. The historic Menehune Ditch lies to the north of the project site while the confluence with the Makaweli River lies immediately to the south. The town of Waimea is located on the west side of the river and *makai* (toward the ocean) of the project site.

Maintenance History
Due to the frequency of storm flows, reconstruction and maintenance of the flood levee and river ford have been required almost yearly. However, within the last 7-10 years, County maintenance has occurred only on the river bank and levee, and not in the water. According to a resident of the east bank, there has not been a consistent river crossing for the past three years, and no work has been completed for the stream crossing since the 2008 flooding (Site Visit January 2020).

The destruction of the earthen crossing during storm flows has resulted in economic loss and personal inconvenience to the residents and farmers on the eastern bank of the river. Vehicle damage and destruction has occurred during attempted crossings following storm flows and delayed reconstruction activities. In the past, it has also resulted in recurring expenses to the County of Kaua‘i in the maintenance and reconstruction of the crossing.

2.2 DESCRIPTION OF THE PROPOSED ACTION

The County of Kaua‘i proposes to replace the existing Waimea River earthen crossing with a concrete crossing to reduce the amount of maintenance required. The proposed ford crossing would follow the alignment of the existing crossing of approximately 145 feet in length across the Waimea River. The proposed project would also improve/harden the river bank at the crossing to prevent erosion.

The maximum area of the project impact would include approximately 0.98 acres, including the stream crossing, the approaches on the banks, the construction staging area, and an upstream and downstream buffer area (see Figure 2 for the project area and Figure 3 for the site plan). The crossing would consist of a single 12-foot-wide travel lane at the same depth as the current mudline (or elevation of approximately 2.0 feet above mean sea level) with a 10-foot wide scour protection on either side. All improvements would occur in State and/or County land off of Menehune Road.

Two construction options are currently being considered for the river crossing: (1) Pre-Cast Concrete with grouted rip rap flanking the upstream and downstream portions, placed at the current mudline and (2) Gabions (wire mesh-encased aggregate) with gabions flanking the upstream and downstream portions, placed at the current mudline. The Pre-Cast Concrete option is preferred, although the logistics of transporting and placing the segments are still being resolved. Additional features of the project include:

- The in-water crossing would have no side slopes, and the road surface would be flush with the mudline (elevation 2 feet MSL);
- In order to minimize damage to the crossing, a 10-foot wide rip rap/mesh-encased aggregate would flank the upstream and downstream sides of the road;
- Slopes along the road would increase to the top of the bank, with a 17.6 percent slope on the west bank, and 10 percent slope on the east bank.

- Option 2 would provide traction with uneven aggregate surface encased in mesh to ensure adequate wheel traction under wet and slippery conditions. Even if a film of algae develops, the roadway finish would provide effective traction. This may also be provided under Option 1.

Construction would be completed in two phases. Phase 1 would include work along the west bank and in the river, and Phase 2 would include work along the east bank and the river. Phase 1 has two potential staging areas and one dewatering area; one staging site (approximately 950 square feet) is off Menehune Road on the western bank, one staging site (approximately 1,500 square feet) is in the rip rap area of the western bank, and the dewatering area (approximate volume of 240 cubic yards) is on the southern side of the crossing on the western bank. Phase 2 has one staging area (approximately 1,500 square feet) located on the upper flat portions of the eastern bank and one dewatering area (approximate volume of 280 cubic yards) adjacent to the staging area (see Appendix B for demolition and construction phasing plan set). During Phase 2 construction, a temporary crossing for contractor use would consist of an approximately 40-foot wide, 5-foot high trapezoidal in-water section, with up to seven 48-inch diameter pipes spanning the aggregate temporary crossing.

During construction, the pedestrian bridge would be available for crossing; there would be no temporary vehicular access across the river ford for area residents and farmers. A portion of the stream would always remain open throughout construction to avoid interference with the natural migration patterns essential for spawning of migratory fish.

The Final Plan Set for the proposed crossing will include measures related to levee safety and possible flooding. The Final Plan Set will include details for tying into the revetment, hydraulic stability of the crossing, and an emergency action plan for activities when the levee/revement are exposed. A plan for diverting flow during construction will include sheet piles driven into the river bed, and will be provided by the structural engineer.

The FEMA floodplain and floodway are based on the 100-year flood peak discharge of 53,300 cubic feet per second (cfs) through the project reach. A FEMA No-Rise Determination and Levee Impact Evaluation was prepared for the project to ensure there would be no adverse effects to the levee or increase in flooding (see Appendix C). The flood capacity of the flood levees would not be decreased with the construction of the proposed crossing.

After the new crossing is constructed, the County may maintain the crossing without any further permitting from the USACE.

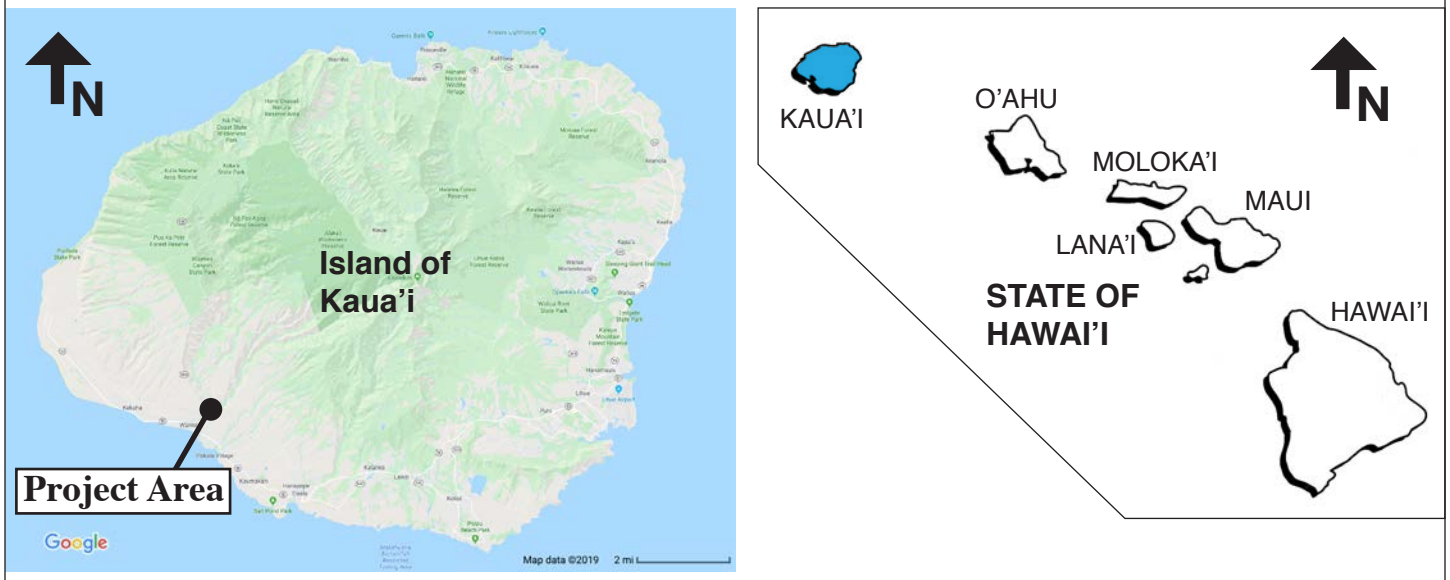
Site-Specific Best Management Practices

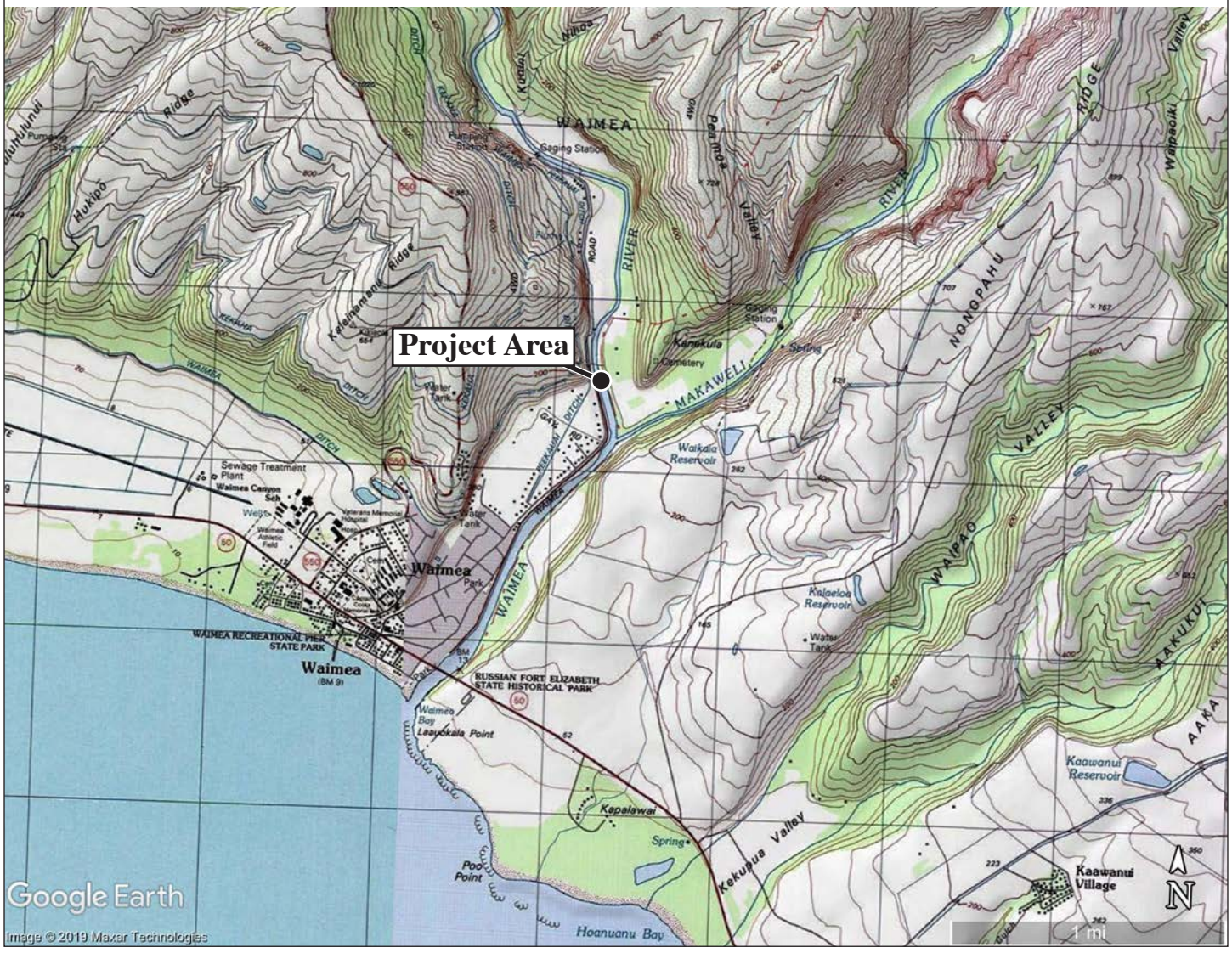
Due to work within and adjacent to Waimea River waters, the project could present increased potential for water quality impacts during construction. The proposed project would include site-specific Best Management Practices (BMPs) to be implemented during project construction to minimize erosion and potential impacts to water quality. The BMPs would include but would not be limited to the USFWS recommended standard BMPs[1] regarding sedimentation and erosion in aquatic environments:

[1] Since no activities are proposed in the nearby marine environment, several BMPs from the USFWS standard recommendations were not included.

1. Construct the new ford during the low flow time of year with lesser chance of rain and storm flow events.
2. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. Current plans call for sheet piles around the work area, in addition to turbidity curtains as a secondary measure. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
2. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP - see http://www.haccp-nrm.org/Wizard/default.asp) can help to prevent attraction and introduction of non-native species.
3. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf. A compost sock should be placed along the perimeter of all staging area used for storing construction materials to prevent migration and runoff of materials.
4. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
5. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non- invasive vegetation matting, hydro-seeding, etc.

Currently the BMPs that are likely to be used are a combination of sheet piles, sand bags, filter socks, and turbidity curtains to contain/divert the river flow enough to perform the work and contain the area. These BMPs will be refined in accordance with County of Kaua‘i regulatory requirements as part of the permitting process.



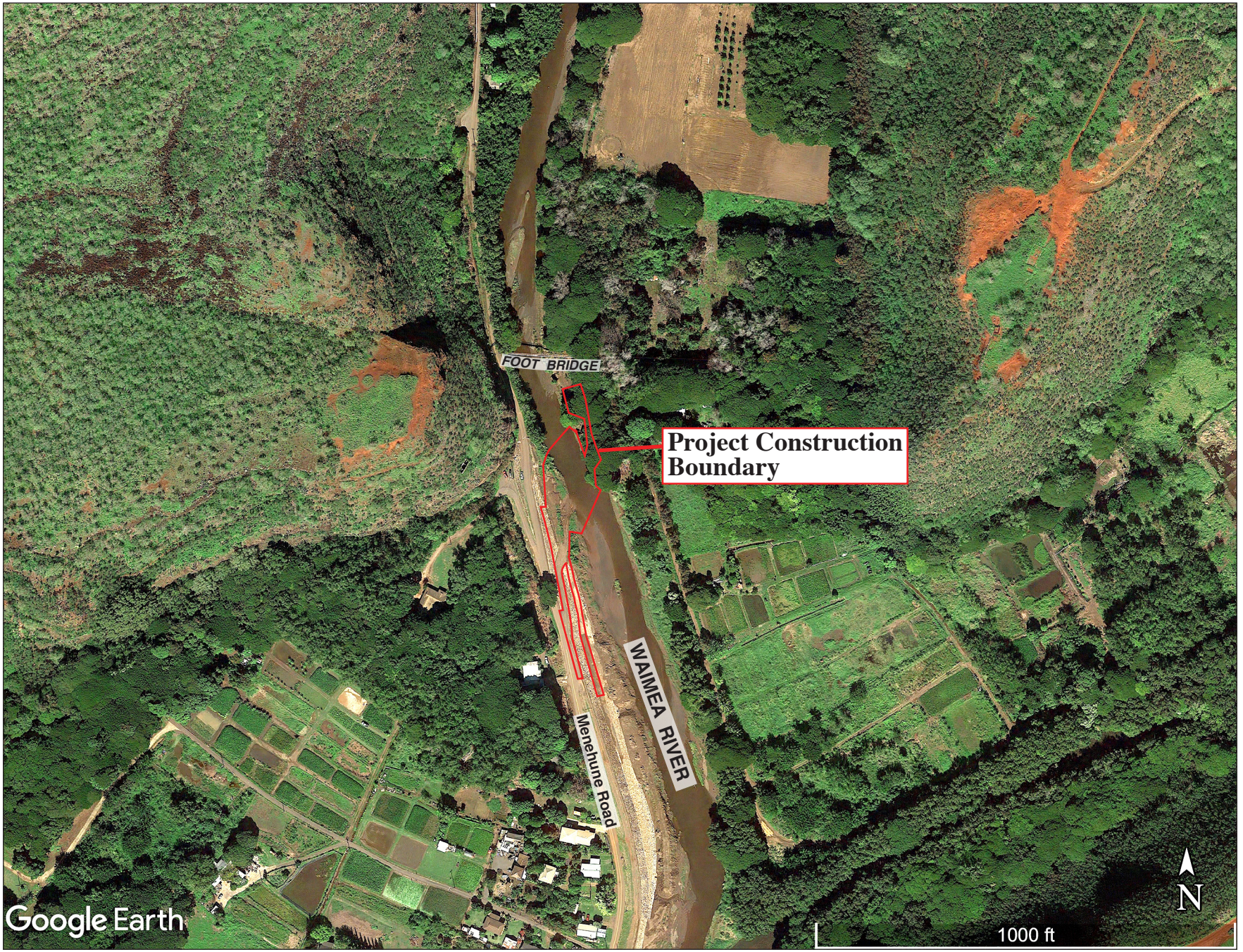


Waimea River Ford Crossing

SOURCE: Planning Partners, 2019; Google Maps, Google Earth, 2019

Figure 1

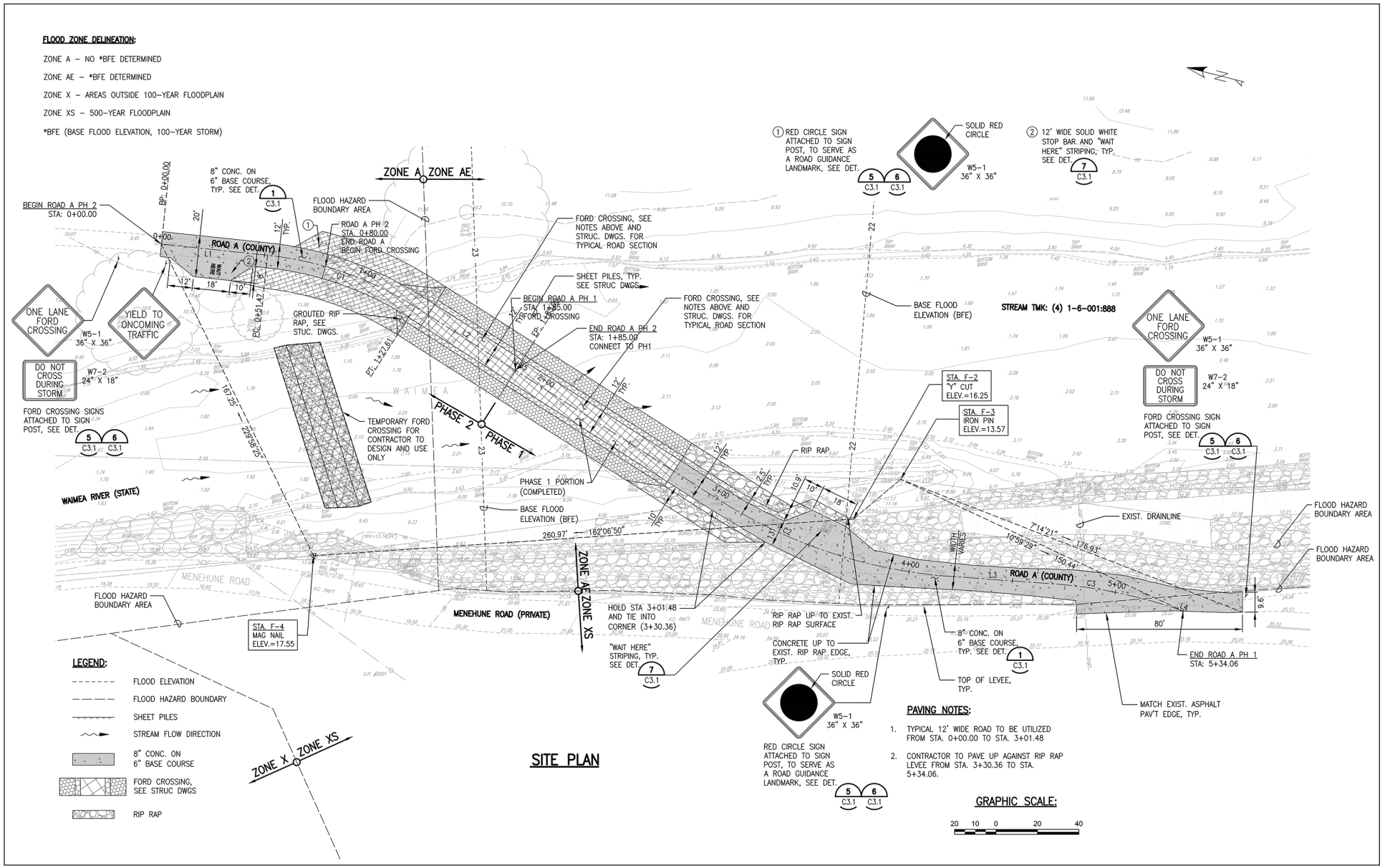
Vicinity and Location Map



Waimea River Ford Crossing

SOURCE: Planning Partners, 2020; Google Maps, Google Earth, 2019

Figure 2
Project Area



Waimea River Ford Crossing

SOURCE: Bow Engineering & Development, Inc. 2020

Figure 3
Site Plan

Project Phasing and Construction Cost

The project would be constructed based on funding availability in two phases. The estimated construction costs for completion of the proposed project is $1.777 million. Construction of the project would be financed by State and County of Kaua'i funds.

2.3 PERMITS AND APPROVALS REQUIRED OR POTENTIALLY REQUIRED

Government permits required or potentially required to implement the proposed action are listed below:

State and County

- Chapter 343, HRS, Preparation and approval of an Environmental Assessment – The County of Kaua'i, Department of Public Works is the accepting agency for the proposed action and has the authority to determine if the EA is adequate and whether a FONSI is appropriate
- National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Stormwater Activities (*not required*) - Because the project would disturb a maximum of 0.98 acres (less than one acre), a construction NPDES permit would not be required for discharges of storm water associated with construction activities. However, the proposed project may require NPDES permit coverage (Form G) from the State of Hawai'i Department of Health, Clean Water Branch if dewatering to a trench during construction is not feasible, and dewatering effluent is discharged back to the river.
- Noise Permit – required by State of Hawai'i, Department of Health for construction activities
- Construction Permits – Grading/Grubbing/Stockpiling permits from the County of Kaua'i, Department of Public Works
- Stream Channel Alteration Permit – before any alteration can be made to the bed and/or banks of a stream channel, a Stream Channel Alteration Permit is required by the State of Hawai'i, Department of Land and Natural Resources, Commission on Water Resource Management
- Clean Water Act, Section 401, Water Quality Certification – Section 404 permit cannot be issued without Section 401 water quality certification by the State of Hawai'i, Department of Health, Clean Water Branch

Federal

- Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) (*not required*) - prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from the U.S. Army Corps of Engineers (USACE). Navigable waters of the United States are those waters of the U.S. that are subject to the ebb and flow of the tide. Since the project's upstream location in the Waimea River does not experience tidal ebb and flow, Section 10 of the Rivers and Harbors Act would not apply.
- Section 404 of the Clean Water Act (CWA), Nationwide Permit (NWP) 14 - prohibits the discharge of dredged or fill material into waters of the U.S., including wetlands, without a USACE permit. Following on-site consultation with the USACE, it was determined that a NWP 14 for linear crossings would be appropriate, since the area of impact in the river is less than 0.5 acres.

- Section 408 Permit (*not required*) - Since the proposed project would not alter the existing flood structure constructed by the USACE, a Section 408 permit would not likely be necessary. As project plans are finalized, the project engineer would communicate with the USACE to ensure the approach from the exiting road or any other project feature would not require USACE permission.
- National Historic Preservation Act, Section 106 Consultation – State Historic Preservation Division
- Coastal Zone Management Act, Federal Consistency Determination – If the USACE determines a Department of the Army (DA) permit is required, then a Coastal Zone Management Act federal consistency review may be necessary, to be conducted by the State of Hawaii, Office of Planning

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT, ANTICIPATED EFFECTS, AND PROPOSED MITIGATION MEASURES

The intent of this chapter is to describe the existing physical and social environment that is affected by the proposed action. As defined in Section 11-200.1, HAR, Environmental Impact Statement Rules, potential project impacts or effects may include primary and secondary impacts, in addition to cumulative impacts:

- A "primary impact" or "direct impact" means impacts or effects that are caused by the action and occur at the same time and place.
- A "secondary impact" or "indirect impact" means an impact or effect that is caused by the action and occurs later in time, but is still reasonably foreseeable. An indirect effect may include a growth-inducing effect and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air, water, and other natural systems, including ecosystems.
- A "cumulative impact" means the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (Section 11-200.1-2, HAR).

Potential impacts that may result from implementation of the proposed action and mitigation measures to minimize the adverse impacts are described below.

3.1 GEOLOGY, TOPOGRAPHY, AND SOILS

The Natural Resources Conservation Service (NRCS) classifies the soils in the project area as Riverwash (rRH) and Water (W) (NRCS 2019). Soils east of the Waimea River are judged suitable for truck crops such as banana and *kalo* (taro), while the upland soils are suitable for pasture and wild life habitat. A soils technical investigation is currently being completed for the project. Additional soil details and construction conditions will be included in the Final Environmental Assessment to be prepared for the project.

Slopes within the project area range from 0 percent to over 60 percent. The area of the ford crossing is relatively flat within the riverbed with elevations between approximately 1 and 3 feet Mean Sea Level (MSL) at the crossing. Elevations on the project site range from approximately 3 feet at the bottom bank and 25 feet MSL at top of levee.

Based on soil suitability and extent, the State of Hawai'i, Department of Agriculture has established the Agricultural Lands of Importance to the State of Hawai'i (ALISH) system to identify areas of prime farmland. The ALISH system classifies three types of land suitable for agriculture: Prime Lands, Unique Lands, and Other Lands. The project alignment across the river is not located on designated agricultural lands of importance, but is surrounded by lands designated as Prime, Unique, and Other (Hawai'i OP 1977).

IMPACTS AND MITIGATION MEASURES

Implementation of the proposed action would result in disturbance of less than one acre (approximately 0.98 acres). The proposed concrete ford would be developed along the existing river ford alignment. There would be minor earthwork associated with construction of the concrete ford. No significant adverse impacts to the streambed topography would be anticipated.

Implementation of the project is not expected to involve substantial grading or earth-moving activities. During construction, all earthwork would be conducted in compliance with dust and erosion control requirements of Kauai County Code Section 22-7, *Grading, Grubbing and Stockpiling*. The proposed action includes a site-specific Best Management Practices (BMP) plan developed as part of the project to minimize erosion and sedimentation during construction. The BMPs would include site-specific measures as outlined in Section 2.2 of this EA. With implementation of these BMPs, the proposed project would not result in a significant impact due to soil erosion or off-site sediment transport. For a discussion of drainage on the project site, and stormwater erosion and sedimentation, see Section 3.2, *Hydrology and Water Quality*.

No long-term or cumulative adverse effects to topography or soils are anticipated with implementation of the proposed action.

3.2 HYDROLOGY AND WATER QUALITY

Surface Waters

The Waimea River and the Makaweli River, both perennial streams, run through the project area. The Waimea River is approximately 12.1 miles in length. Deep canyons and steep hills characterize the upper and central regions of the Waimea River basin. The Waimea Canyon is located in the upper western portion of the western portion of the basin. The Alakai Swamp, a montane wet forest, is located in the higher regions of the drainage area.

Groundwater

In Hawai‘i, groundwater recharge occurs when rainfall percolates through the root zone to the basal aquifer (State of Hawaii 2019). Groundwater recharge is also affected by evapotranspiration, agricultural irrigation water, and streamflow (County of Kaua‘i 2018). The project area is within Waimea Aquifer Sector Area, within the Waimea ground water hydrologic unit (State of Hawaii 2019). The 2019 predicted sustainable yield for the Waimea groundwater unit is approximately 37 million gallons per day (State of Hawaii 2019).

Wetlands and Waters

Waters of the United States include rivers, streams, creeks, intermittent tributaries, natural ponds, prairie potholes, impoundments, lakes, and wetlands. A review of the USFWS National Wetland Inventory Map was completed to identify the presence of wetlands within the vicinity of the project. The Waimea River is classified as Riverine habitat (R2UBH), and the western leg of the roadway approach is located in Freshwater Forested/Shrub Wetland habitat (PSS3C) (see Figure 4). The Riverine System includes all wetlands and deepwater habitats contained within a channel. The Subsystem is a “Lower Perennial (2)” characterized by a low gradient and no tidal influence. The Class is Unconsolidated Bottom (UB), which includes habitats with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent. Further, the Water Regime

classification is Permanently Flooded (H), where water covers the substrate throughout the year in all years. The Freshwater Forested/Shrub Wetland habitat includes all nontidal wetlands dominated by woody tree or shrub vegetation that is seasonally flooded. (USFWS 2019)

State Water Quality Standards

Coastal waters in the vicinity of the Waimea River outlet are classified by the State Department of Health (DOH) as "A" (DOH 2014). The objective of Class A waters is that their use for recreational purposes and aesthetic enjoyment be protected. According to Section 11-54-3(c)(2), HAR, Class A 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."

Water Quality

The federal Clean Water Act (CWA), Section 303(d), requires states to submit a list of waters that do not attain or maintain applicable water quality numeric criteria, in addition to a priority ranking of impaired waters for Total Maximum Daily Loads (TMDL) development based on the severity of pollution and the uses of the waters. After the identification of water quality-limited waters is completed, states develop TMDLs at a level necessary to achieve the applicable state water quality standards. The State's water quality report identifies exceedances of water quality standards in the Waimea River for total phosphorous and turbidity during the dry season and turbidity during the wet season. The State has categorized the Waimea River as a "low" priority for initiating TMDL development for the next cycle of monitoring and assessment (DOH CWB 2018).

IMPACTS AND MITIGATION MEASURES

The proposed project includes construction of a concrete river ford crossing within the Waimea River. The proposed project would have minimal effect on groundwater recharge because the area of the concrete ford alignment is minimal and would not affect overall groundwater recharge from the river upstream and downstream of the project. Existing drainage patterns with respect to adjacent properties would not be affected by the project.

Construction activities could result in adverse impacts to water quality, including erosion and increased sedimentation in storm water runoff. Construction activities disturbing one or more acres are regulated under the National Discharge Elimination System (NPDES) stormwater program and are required by the State to obtain a NPDES permit. Because the project would disturb a maximum of 0.98 acres (less than one acre), a construction NPDES permit would not be required for discharges of storm water associated with construction activities. However, the proposed project may require NPDES permit coverage (Form G) if dewatering effluent is discharged back to the river. If the contractor dewaters to a trench or ditch during construction, then NPDES permit coverage (Form G) would not be required. Determining factors as to whether discharges of construction activity dewater would occur back to the river include soil percolation and how much dewatering would be necessary within sheet pile work area. The proposed action also includes site-specific BMPs to be implemented during construction in order to prevent any sediment, soil, and debris resulting from the proposed construction from adversely impacting the riverine ecosystem or adjacent properties. Compliance with BMPs for construction and additional permit conditions would minimize impacts to water quality. Further, all earthwork operations would be conducted in compliance with dust and erosion control requirements of Kauai County Code Section 22-7, *Grading, Grubbing and Stockpiling*. Following construction of the project, the proposed concrete crossing would

reduce turbidity resulting from vehicle crossing compared to the earthen crossing, and could result in an improvement to water quality during the operational phase of the project.

Based on a January 21, 2019 site visit with the USACE, it was determined that the project would require an NWP 14 for linear crossings, where the area of impact in the river is less than 0.5 acres for projects in non-tidal areas. The work area in the river for the proposed project would include approximately 0.29 acres. The NWP 14 requires that any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. The NWP 14 includes BMPs, which are policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from the proposed development. Additionally, a State 401 Water Quality Certification approval and State Stream Channel Alteration Permit (SCAP) would be obtained prior to construction, as applicable.

No long-term or cumulative adverse effects to hydrology or water quality are anticipated with implementation of the proposed action. For a discussion of impacts due to soil erosion and off-site sediment transport, see Section 3.1, *Geology, Topography, and Soils*. For a discussion of potential impacts due to flooding, see Section 3.3, *Natural Hazards*.

3.3 NATURAL HAZARDS

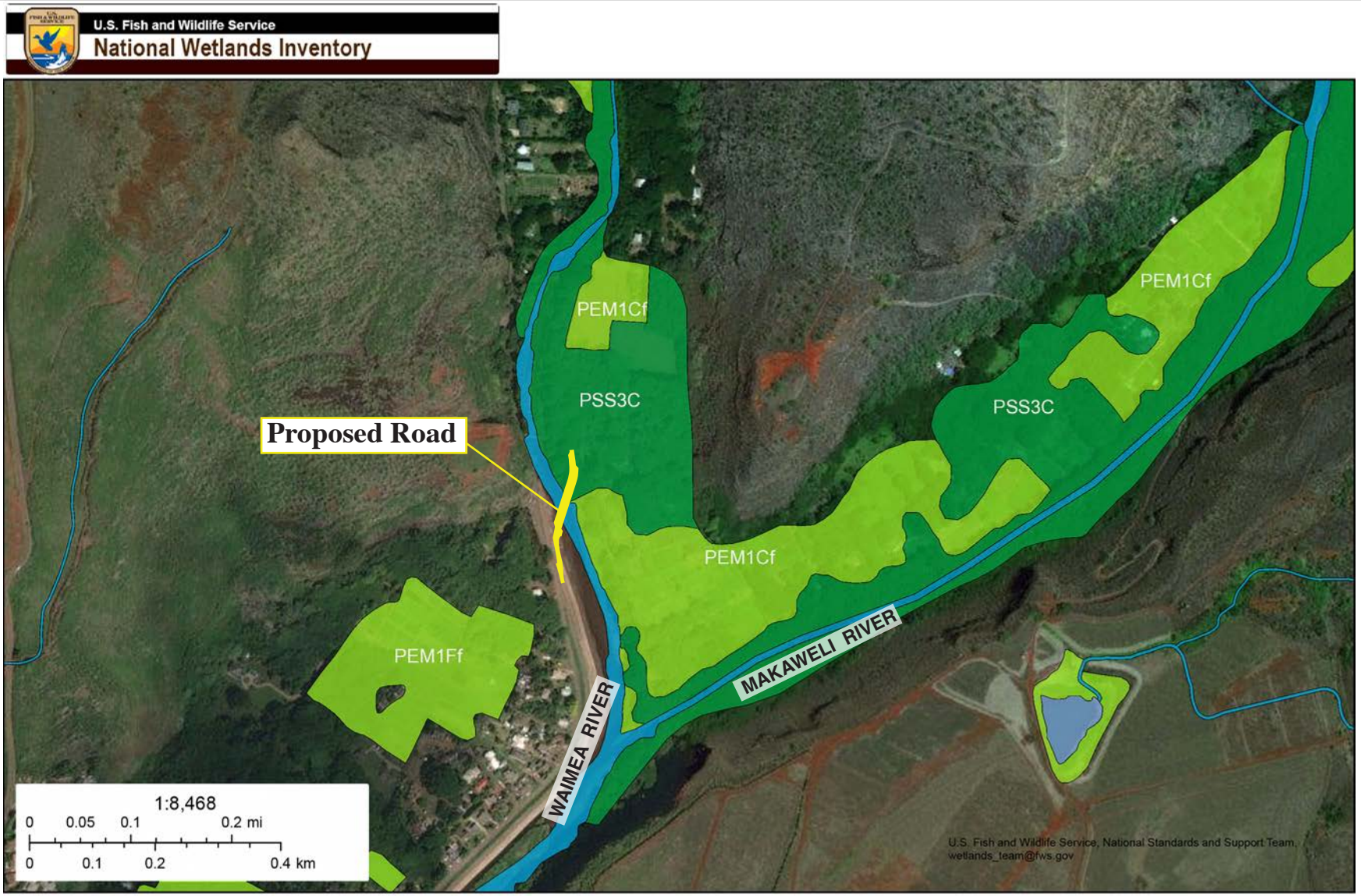
Natural hazards in the project region include earthquakes, volcanic activity, waves and storms, flooding from hurricanes and tropical storms, and tsunamis. Climate change and the related sea level rise will also impact the Hawaiian Islands. According to USGS hazard ratings, the Overall Hazard Assessment (OHA) of Waimea is moderate (4), except for a thin sliver of coast at the Waimea River mouth where it is moderate to high (5) because of the high stream flooding hazard there (USGS undated).

Earthquake and Volcanic Hazards

Most of the earthquakes in Hawai‘i are directly related to volcanic activity and are caused by magma moving beneath the earth’s surface. Numerous small earthquakes are reported each year, mostly on Hawai‘i Island. The project area is located on the Island of Kaua‘i, which is approximately 300 miles from Hawai‘i Island. According to FEMA earthquake hazard maps, the project area is located within Seismic Design Category B, which means it could experience shaking of moderate intensity with slight damage (FEMA 2019). Hawai‘i Island and Maui are the only islands with lava-flow hazard zones. Therefore, the volcanic/seismic hazards are moderately low in Waimea (USGS undated), and will not be discussed further.

Tsunami and Flood Hazards

The Federal Emergency Management Agency (FEMA) maps the project site as predominantly Zone AEF and Zone A (see Figure 5). Flood Zone AEF as defined for the project area is within the 100-year flood zone with a Base Flood Elevation of 22 and 23 feet and are within the stream channel and adjacent floodplain areas that must be kept free of encroachment, and Zone A is within the 100-year flood zone with no Base Flood Elevation (HNFIP 2020). The FEMA floodplain and floodway are based on the 100-year flood peak discharge of 53,300 cubic feet per second (cfs) through the project reach and 64,000 cfs makai (toward the ocean) of the confluence with Makaweli River (River Focus, Inc. 2020).



April 6, 2020

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Waimea River Ford Crossing

SOURCE: U.S. Fish and Wildlife Service, National Wetlands Inventory 2019; Planning Partners 2020

Figure 4
National Wetlands Inventory Map

The project alignment is located within the tsunami evacuation zone (see Figure 6) (HNFIP 2020). The project site is also located in the Dam Evacuation Zone for both the Waikaia Reservoir, located approximately 0.5 miles east-southeast of the site, and the Kepani Reservoir, located approximately 3.3 miles northeast of the site (HNFIP 2020).

During periods of unusual floods, the river ford is washed out and the river is impassible. Additional problems such as erosion and siltation on the levees and roadway have occurred. The County maintenance crew removes silt from the levees and roadway as necessary.

Climate Change and Sea Level Rise

Global Warming is a public health and environmental concern around the world. As global concentrations of atmospheric greenhouse gases increase, global temperatures increase, weather extremes increase, and air pollution concentrations increase. Global warming and climate change have been observed to contribute to poor air quality, rising sea levels, melting glaciers, stronger storms, more intense and longer droughts, more frequent heat waves, increases in the number of wildfires and their intensity, and other threats to human health (IPCC 2013). The five warmest years in the 1880–2019 record have all occurred since 2015, while nine of the 10 warmest years have occurred since 2005; the year 2019 was the second warmest year in the 140-year record (NOAA 2020).

The influences of climate change on global and local ecosystems are varied and often detrimental. Some of the changes likely to impact Hawai‘i’s ecosystems include accelerated sea-level rise, ocean and atmospheric warming, increased flooding, ocean acidification, changing distributions of terrestrial and marine biota, changing intensity and frequency of storms, among others. Projected sea-level rise will undoubtedly increase erosion and flooding statewide and expose coastal communities to greater hazards (University of Hawai‘i 2014). Sea-level rise hazards in Waimea are considered moderately low (USGS undated).

According to a recent report by the Hawai‘i Climate Change Mitigation and Adaptation Commission (2017), potential sea level rise could result in low-lying coastal areas around the island to become chronically flooded within the mid- to latter-half of this century. Over time, as the sea levels continue to rise, communities such as Waimea would experience increasing potential economic loss (Hawai‘i Climate Change 2017).

IMPACTS AND MITIGATION MEASURES

During construction, stream flood events or flash flooding could result in potential hazards to workers and construction equipment located in the flood hazards area. The project includes site-specific BMPs to minimize impacts to water quality during construction. These measures include curtailing work during flooding or adverse tidal and weather conditions. With implementation of these BMPs, potential hazards to construction workers and water quality would be minimized, and no mitigation would be required.

Implementation of the proposed river ford crossing project would not result in increased flooding or hazards from flooding in surrounding areas. Similar to existing conditions, the crossing would be inundated during periods of high flows and vehicular access may not be possible. While the river for crossing would be located in Flood Zone AEF and Zone A (see Figure 5), the proposed design

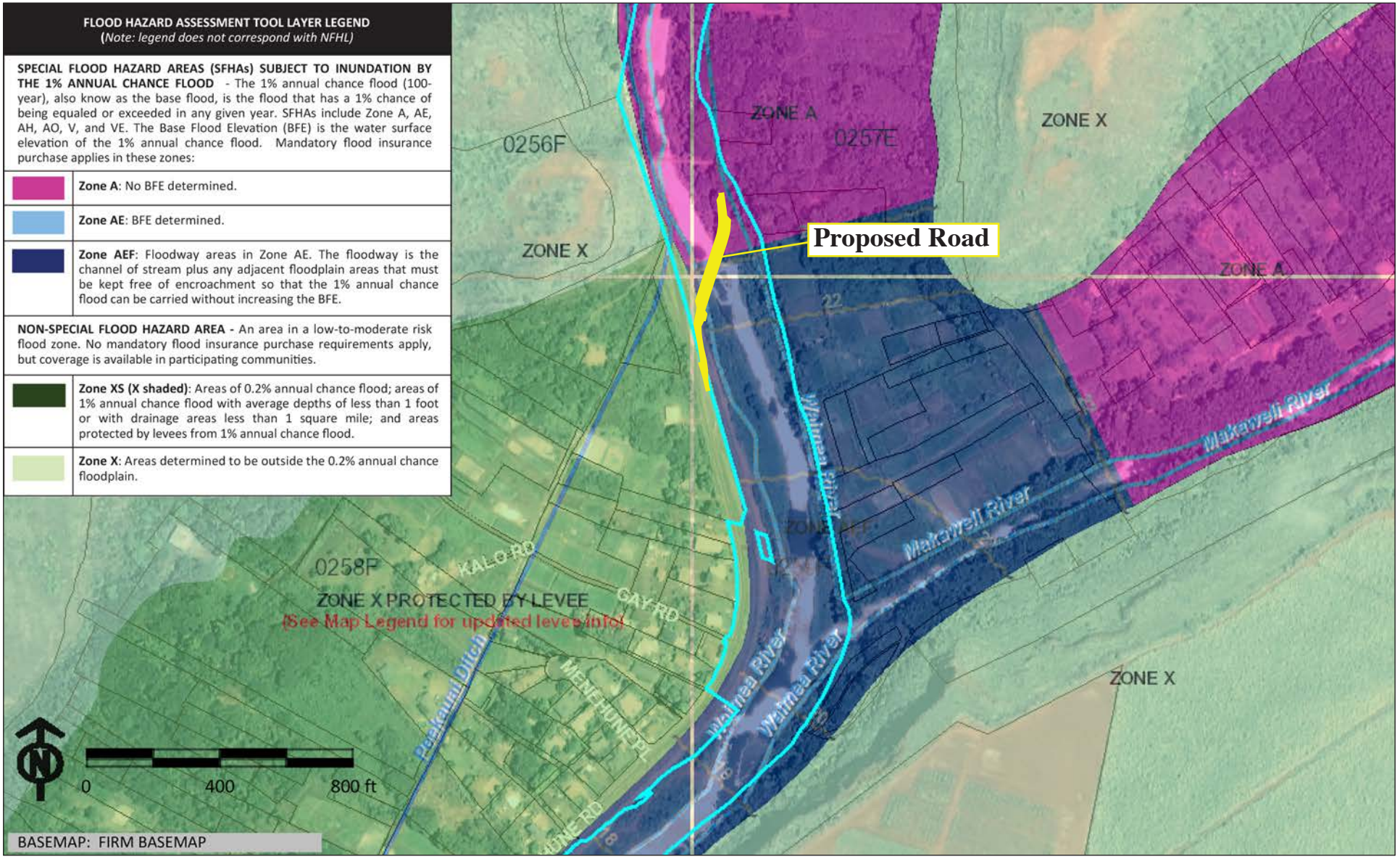
would slightly improve the conditions compared to the earthen embankment. A FEMA No-Rise Determination and Levee Impact Evaluation was prepared for the project (see Appendix C). The hydraulic modeling results demonstrate that the proposed Waimea River ford crossing improvements would not cause an increase in the base 100-year flood elevation within the regulatory floodway. In fact, the proposed crossing improvements would result in a 100-year flood elevation decrease of approximately 0.02 feet near the crossing, likely due to the lower roughness associated with the proposed concrete ford crossing (River Focus, Inc. 2020). Therefore, there are no anticipated adverse effects due to increased flooding as a result of the project.

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). The 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 proposed river ford would be designed and constructed in conformance with the standards and requirements of the Kaua'i County Code, Section 15-1.5, Floodplain Management. All development permits would be reviewed for consistency with the requirements of the Kaua'i County Code prior to approval.

The flood capacity of the flood levees would not be decreased with the construction of the proposed crossing. Based on the FEMA No-Rise Determination and Levee Impact Evaluation, the proposed Waimea River Ford Crossing improvements do not appear to negatively impact the existing Waimea River Levee, and could potentially result in a slight improvement to flood protection compared to existing conditions (River Focus, Inc. 2020). Further, based on a January 21, 2019 site visit with the USACE, it was determined that the project would not result in physical impacts to the existing levee. Since the proposed project would not alter the existing flood levee structure constructed by the USACE, a Section 408 permit would not likely be necessary. As project plans are finalized, the project engineer would communicate with the USACE to ensure the approach from the exiting road or any other project feature would not require USACE permission.

Greenhouse gas emissions would be generated from the proposed river ford improvement project during construction and operation. Temporary greenhouse gas emissions would occur during construction activities, predominantly from vehicle and equipment exhaust. No increase in operational greenhouse gas emissions are anticipated – limited emissions would continue from maintenance/work vehicles accessing the site. Greenhouse gas emissions would not be expected to be significant, and the project would not be expected to make a substantial contribution to the cumulatively significant impact of global warming and climate change.

The proposed facilities would be designed in accordance with County requirements and good engineering practice, which would minimize damage during tropical storm, hurricane, or strong wind events, and earthquake events. No significant environmental effects would result, and no mitigation would be necessary. No significant long-term or cumulative adverse environmental effects would result from natural hazards, and no mitigation would be necessary.

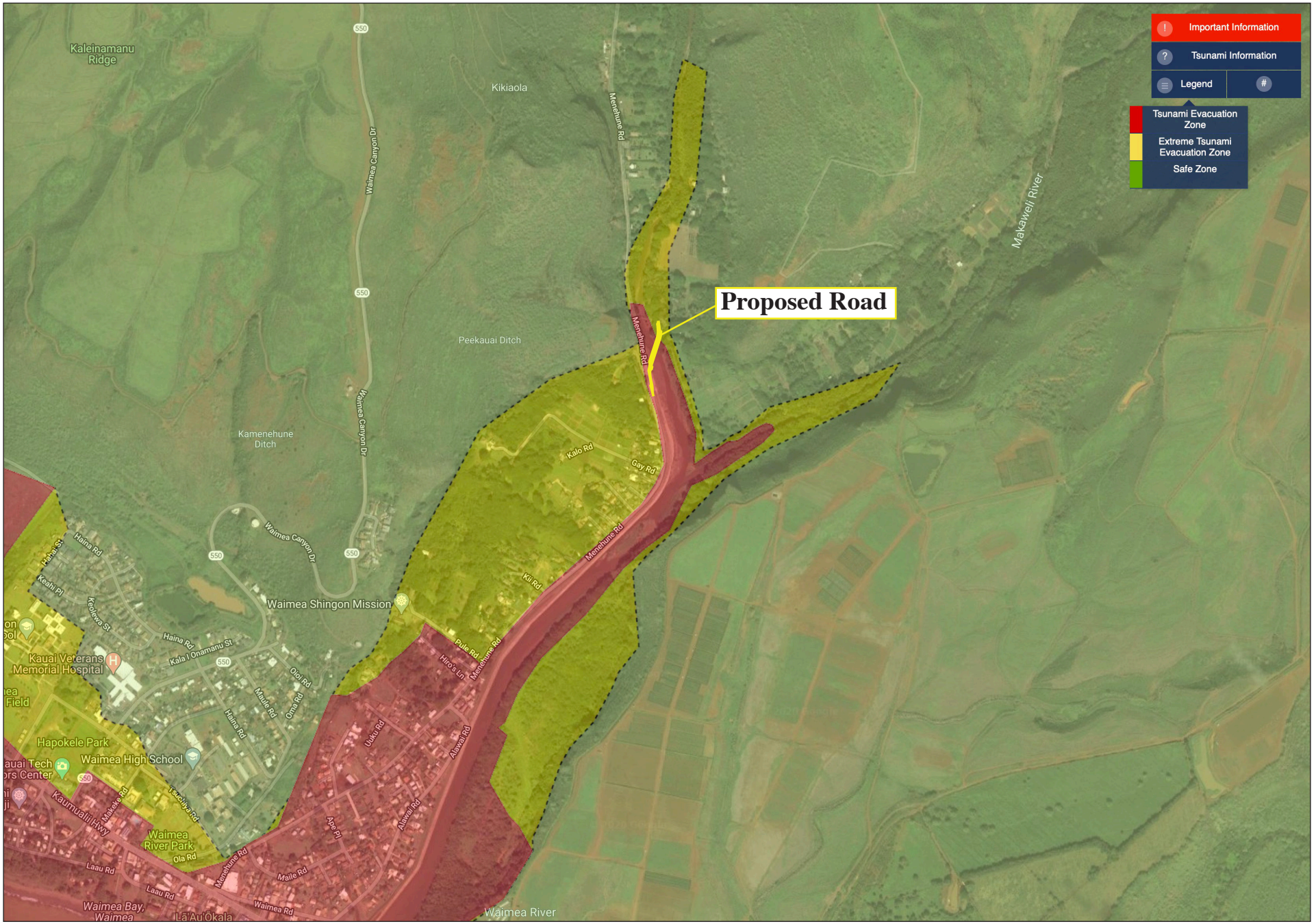


SOURCE: Hawai'i National Flood Insurance Program (HNFIP) 2020

Waimea River Ford Crossing

Figure 5

Flood Hazard Map



SOURCE: NOAA Office for Coastal Management 2015

Waimea River Ford Crossing

Figure 6

Tsunami Evacuation Zone

3.4 BIOLOGICAL RESOURCES

Reconnaissance level botanical[2], wildlife, and aquatic[3] surveys were conducted at the project site on December 6, 2019 (H.T. Harvey & Associates 2020). The study area surveyed for the biological study included 200 meters (approximately 660 feet) of the Waimea River, stretching 100 meters (approximately 330 feet) upstream and downstream from the location of the proposed concrete ford construction. The area surveyed ranged from very shallow to about a meter (approximately 3 feet) deep at the time of the survey. The biological study used the Hawaii Stream Bioassessment Protocol (HSBP) (Kido 2002a), which evaluates the stream habitat and its biological integrity at a given site on a scale from "Excellent" to "Very Poor". This method provides valuable information useful in assessing environmental impacts to a stream or change in its ecological condition over time. The following analysis summarizes the results of the biological study. (H.T. Harvey & Associates 2020)

Vegetation

No plant species state or federally listed as threatened, endangered, or candidates for listing, and no rare native Hawaiian plant species were observed in the study area of the biological survey. The study area of the biological survey did not contain proposed or designated critical habitat for threatened or endangered plant species (USFWS 2019).

A total of 41 plant species were observed in the study area (see Table 5 of Appendix D for a list of plant species observed at the project site). In general, vegetation in the study area can be described as mixed alien scrub, characteristic of a highly disturbed urban or rural lowland wet area on Kauai. Compared to the eastern bank, the western bank of the river in the study area was mostly lacking in vegetation. There were several Java plum trees toward the northern end of the western bank, above the river ford, but otherwise, the vast majority of the western bank was composed of bare, compacted soil (see Appendix D).

Wildlife Species

Nineteen bird species were observed at the project site during the biological survey (see Table 6 of Appendix D for a list of animal species observed at the project site). These include 16 non-native or alien species and three indigenous[4] or native species; the native species included the wandering tattler (*Tringa incana*), black-crowned night heron (*Nycticorax nycticorax hoactli*), and Hawaiian stilt (*Himantopus mexicanus knudseni*). Hawaiian stilt, as a state-listed and federally listed endangered species, is protected under the state and federal Endangered Species Acts (DLNR 2015a, USFWS 2019). No nesting behavior or bird nests were observed during the biological survey (see Appendix D).

Aquatic Species

No threatened or endangered aquatic species were observed in the study area during the one-day biological survey (see Table 7 of Appendix D for a list of the aquatic species observed in the study area). Three out of the five taxa observed are native. There were considerable numbers of juvenile

---

2 Relating to plants.

3 Relating to water.

4 A species is indigenous to a given region or ecosystem if its presence in that region is the result of only natural processes, with no human intervention.

ʻoʻopu hinana of undetermined species in the shallow, gravel/sand/silt covered runs. Given the lack of adult native fish, and the abundance of juvenile stage native gobies, the habitat in the study area can be characterized as a transient thoroughfare, where the young transform into their adult forms and move further upstream.

Hawaii Stream Bioassessment Protocol Rating

After scoring for the various HSBP criteria, the overall biological integrity metric in the study area was determined to be "Very Poor". The habitat scoring reflected the highly modified area around the study area. Very limited habitat was available for native species. The modified stream bank of the flood control berm resulted in lowering the score considerably. Compared to other stream systems in the State, the study area in the Waimea River has very poor (but not impaired) biotic integrity and has non-supportive habitat condition due to the direct and indirect effects of the modifications to the stream channel for flood control (see Figure 13 in Appendix D).

IMPACTS AND MITIGATION MEASURES

Vegetation Impacts

The proposed concrete ford crossing is not likely to have a significant adverse impact on any plant species state or federally listed as threatened or endangered, candidate species for listing as endangered, species of concern, or rare native Hawaiian plant species. The project site is a highly disturbed rural area, with 95 percent of the vegetation being nonnative and 5 percent being Polynesian introductions.

Should construction activities at the project site require the removal of shrubs or trees, then the following measures would be recommended:

- Upon completion of construction, vegetation removed during construction should be replaced with ecologically suitable native plant species. If native plants do not meet landscaping objectives, non-native plants with a low risk of becoming invasive may be substituted.
- Care should be taken to avoid the introduction and spread of invasive species during and after construction of the concrete ford. The staging areas and construction site should be closely monitored for the appearance of invasive species not known to occur on Kauai as well as for species that may be present on Kauai but, are being actively targeted for control by the Kauai Invasive Species Committee.
- In addition, the following best management practices should be adopted to minimize the introduction and spread of new invasive species at the project site:

    1) All construction equipment and vehicles should arrive at the project site clean and free of any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs.
    2) All materials imported to the project site, including gravel, soil, rock, and sand, should be free of invasive species. Invasive species found on the stockpile should be removed either chemically or mechanically.
    3) Only plants grown on Kauaʻi should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined, if necessary, to ensure that they are free from

invasive species, such as the coconut rhinoceros beetle (*Oryctes rhinoceros*) and little fire ants (*Wasmannia auropunctata*) and invasive plants seeds and seedlings that could arrive inadvertently.

4) Only weed free seed mixtures should be used for hydroseeding and hydromulching on the project site. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Kaua'i and those that are actively being controlled on the island should be removed.

Wildlife Impacts

Implementation of the proposed project would not likely have an adverse impact on waterbirds. While construction activities may displace waterbirds, or keep them from visiting the project areas, these impacts would be temporary. Further, alternative habitat for these waterbirds is widely available in neighboring areas in the Waimea watershed, as well as elsewhere on Kaua'i.

An individual Hawaiian stilt was observed just south of the project site, about 150 meters (approximately 490 feet) downstream of the ford crossing. No nesting behavior or nests were observed. The Hawaiian stilt, as a state-listed and federally listed endangered species, is protected under the state and federal Endangered Species Acts. Although other endangered Hawaiian waterbirds such as moorhen (*Gallinula chloropus sandvicensis*), coot (*Fulica alai*), Hawaiian duck, and nene (*Branta sandvicensis*) were not seen during this short reconnaissance level survey, they have been reported as known to occur in the general vicinity of the project site.

Based on the observations made during the project site survey, the following avoidance and minimization measures would be required:

1. A preconstruction survey shall be conducted to determine the presence of nesting Hawaiian waterbirds within 100 feet of the project construction work. The initial preconstruction survey shall be performed by a qualified biologist or ornithologist to verify the presence or absence of nesting birds. Subsequent inspections may be performed by trained personnel who will be frequently on-site.
2. If Hawaiian waterbirds are observed in the area when construction activities are scheduled to occur, care shall be taken to avoid disturbance to individuals and their nests. In general, if an active nest of a federally listed waterbird is detected in the project vicinity, a 100-foot buffer shall be established and maintained around all active nests and broods until the chicks/ducklings/goslings have fledged. No potentially disruptive activities or habitat alteration shall occur within the buffer. A repeat survey by a qualified biologist or ornithologist to verify that Hawaiian waterbirds have left the construction site shall be completed 3 days prior to start of construction in the buffer areas.
3. The construction supervisor for this project must be fully aware of the possibility that Hawaiian waterbirds could be present in the work area. This individual should ensure that an inspection of the work site is performed before beginning work each day to verify that no Hawaiian waterbirds are present in the work area and at the immediate work site.
4. If Hawaiian waterbirds should move in to the construction site while work is being

performed, work shall be stopped and not begin again until after the birds have departed on their own accord, or moved more than 100 feet from construction activity.

Preconstruction surveys and avoidance measures would minimize potential impacts to Hawaiian waterbirds, and no additional mitigation would be required.

AQUATIC IMPACTS

No threatened or endangered aquatic species were observed during the biological survey; therefore, construction of the proposed concrete ford crossing would not likely have an adverse impact to listed aquatic species.

However, the study area appears to serve as an important transitional area, where native juvenile fish change to adult form and subsequently move upstream. Due to the importance of the estuary and lower stream reaches for the transition of native populations, it is essential that native fish have unimpeded access upstream of the river ford. Construction and hardening of the stream crossing must be done in such a way as to allow adults of native species easy access to the downstream estuary. Additionally, the larvae and juveniles must be able to navigate upstream through the project site with minimal areas where predation could occur.

The proposed design of the crossing would construct the crossing at the existing mudline. Any low flow stream conditions where the depth of the constructed crossing may be too shallow for fish to swim upstream would have similarly been too shallow without the crossing. Therefore, there would be no increase in impacts to native fish movement with implementation of the concrete ford crossing.

The following measure is required to minimize potential impacts of the project to native aquatic species:

- Implement a water quality monitoring program that includes pre-, during-, and post-construction monitoring of the stream. This may include either observational monitoring and/or collection of water samples for the analysis of a variety of parameters such as temperature, turbidity, total suspended solids, pH, and dissolved oxygen to identify potential impacts to physical and biological resources in the stream channel and nearby ocean waters.

In addition to the measure above, implementing project-specific BMPs identified as part of the project, such as the installing silt curtains, dewatering portions of the stream at a time, inspecting equipment for pollutants, covering stockpiled materials, could also serve minimize impacts to aquatic species.

Summary

Temporary effects during construction would include increased traffic, noise, and overall activity, which could result in short-term disturbances to plants and wildlife in the project vicinity. Preconstruction surveys and avoidance measures would minimize potential impacts to Hawaiian waterbirds. During construction, site-specific BMPs developed as part of the permitting process and minimization measures set forth in this section would minimize erosion and sedimentation and

potential adverse effects to aquatic biota in the vicinity of the project site. No adverse long-term effects to biological resources would occur with implementation of minimization measures above.

3.5 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

An Archaeological Literature Review and Field Inspection (LRFI)[5] study was completed for the project site (Cultural Surveys Hawai‘i 2020) (see Appendix E). Chapter 6E, HRS consultation has been initiated with the State Historic Preservation Division (SHPD). Due to Army Corps of Engineering permitting, this project requires compliance with Section 106 of the National Historic Preservation and the National Environmental Policy Act.

In order to assess the potential for encountering archaeological or historic resources, the archaeological survey included the following:

- Historical research to include study of archival sources, historic maps, Land Commission Awards, and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or near this property.
- Limited field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites.

The following sections are summarized from the LRFI.

Historical Background

Waimea River separates the *ahupua‘a* (traditional land division) of Waimea and Makaweli. The lower portions of Kaua‘i’s southwest plains, which include Waimea and Makaweli, are dry and get little rainfall—less than 30 inches annually with an average of 20 inches per year near the coast. Water for crop irrigation and sustainability of large settlements would have been a problem. Based on Māhele records and archeological surveys, the population in Waimea and Makaweli was concentrated along the river valley; evidence of well-terraced and cultivated areas deep in the canyons of Waimea and Makaweli support the idea of a large inland population rather than a coastal one. Mountain trails that led to the sea allowed for trade with coastal dwellers. (Cultural Surveys Hawai‘i 2020)

Traditional legends claim Waimea Bay as the landing site for the first settlers of Kaua‘i, a home for the mythical little people, the *menehune*, and a land associated with the high chief Ola, who built a large-scale water project, the Pe‘ekaua‘i ‘Auwai, or Menehune Ditch. (Cultural Surveys Hawai‘i 2020)

In 1778, when Captain James Cook landed at Waimea, Hawaiians had already developed an extensive agricultural system that covered the entire floor of the lower valley. Much of the taro lands were converted to rice in the 1860s and rice production peaked in the 1890s. Most of the crop was grown by Chinese farmers who continued production on the valley floor well into the 1930s. (Cultural Surveys Hawai‘i 2020)

Based on Land Commission Award documents, lots surrounding the Waimea River and Pe‘ekaua‘i were prime locations for agricultural cultivation. A few claimants noted house lots on one side of the river and their agricultural lot on the other side. A few historic maps as well as a historic photograph

[5] The LRFI does not fulfill the requirements of an archaeological inventory survey investigation per Hawai‘i Administrative Rules Section 13-276.

presented in this report suggest river crossings were an everyday occurrence. Like any waterway crossings, those shown on the maps would suggest there were multiple ways to get across the river but also some of these crossings could be seasonal. (Cultural Surveys Hawai‘i 2020)

During the last decade of the nineteenth century, the population of Waimea increased, spurred by the establishment of commercial sugarcane planting at Waimea, and a few years later in Makaweli. Commercial sugar crops were first raised in the valley in the 1880s. Sugarcane cultivation continued to dominate land use in Waimea and Makaweli through the mid-1900s, especially on the flats of the upper valley. Smaller plots in the lower valley, such as the one formerly cultivated in the study area, were probably the work of independent growers who sold their corps to the mill. In 2009, Kaua‘i's sugar plantation-era came to an end with the closing of Gay & Robinson, the last operating mill. (Cultural Surveys Hawai‘i 2020)

During recent decades, growth in Waimea has focused on development of the former sugar plantation lands and structures into tourist-oriented facilities. Nearby in Makaweli, land use has remained much the same since the turn of the century. (Cultural Surveys Hawai‘i 2020)

Previous Archaeological Research

Several archaeological projects have been conducted near the proposed project area on the Waimea (west) side of the river. Previous archaeological projects have recorded subsurface deposits associated with taro cultivation near Pe‘ekaua‘i Ditch; a cultural deposit dated to AD 1000-1275 in Waimea Town, completely outside the proposed project, near to Kaumuali‘i Highway; and other historic features of importance not near the project site (i.e., First Bishop National Bank, Captain Cook's Landing Monument; and Russian Fort Elizabeth (Pā‘ula‘ula)).

No historic properties were identified within the proposed project area. Pe‘ekaua‘i Ditch (Menehune Ditch) is located to the west, outside of the proposed project area, and would not be affected by the construction of the Waimea River Ford Crossing project.

IMPACTS AND MITIGATION MEASURES

The field inspection of the proposed project area identified no surface historic resources. Based on lack of findings, no further archaeological work is proposed for the project. SHPD consultation for the project has been initiated in accordance with Chapter 6E, HRS and Section 106 of the National Historic Preservation Act (NHPA).

While there is low probability of encountering archaeological sites in this area, in the event that historic resources, including human skeletal remains, are identified during the construction activities, all work would cease in the immediate vicinity of the find, the find would be protected from additional disturbance, and the State Historic Preservation Division would be contacted immediately.

No adverse effect to cultural, historic, or archaeological resources would occur. Because the proposed project represents a continuation of existing uses and would not negatively impact access to the riverbanks, it is reasonable to conclude that, pursuant to Act 50, the exercise of Native Hawaiian rights, or any ethnic group, related to gathering, access, or other customary activities within the project area would not be affected, and there would be no direct adverse effect upon cultural practices or beliefs.

3.6 AIR QUALITY AND CLIMATE

Hawai'i receives most of its precipitation during the winter months (October to April). Flooding is more likely during this wet period, and stream flows decrease during drier conditions from May to September. The temperature in the general area averages from 62 to 87 degrees F (U.S. Climate Data 2020). Average annual rainfall in the project area is about 21 inches (U.S. Climate Data 2020).

The Department of Health, Clean Air Branch (CAB), monitors the ambient air in the State of Hawai'i for various gaseous and particulate air pollutants. The U. S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM_{10} and $PM_{2.5}$). Hawai'i has established state ambient air standards for all of these pollutants (except for $PM_{2.5}$) in addition to hydrogen sulfide, a product of volcanic emissions (CAB 2020). The primary purpose of the statewide monitoring network is to measure ambient air concentrations of these pollutants and ensure that these air quality standards are met.

In 2018, there was one air monitoring station on the island of Kaua'i. The monitoring station on Kaua'i is mainly to measure the air quality impacts from cruise ships. According to the State of Hawai'i Department of Health Annual Summary 2018 Air Quality Data, criteria and pollutant levels in the State remained below all federal and state ambient air quality standards (excluding exceedances due to volcanic activity) (CAB 2020).

IMPACTS AND MITIGATION MEASURES

Construction of the proposed project could result in temporary air quality effects, including exhaust emissions from construction vehicles and dust generated by short-term construction related activities. Components of construction emissions include employee trips, exhaust emissions from construction equipment, and fugitive dust emissions. Earthwork and grading within the project area could generate airborne dust particulates.

Dust control measures such as watering and sprinkling will be implemented as needed to minimize wind-blown dust. To minimize construction-related exhaust emissions, project contractors will ensure that all internal combustion engines are maintained in proper working order. All construction work will be in conformance with the air pollution control standards contained in Title 11, Chapter 59, HAR, "Ambient Air Quality Standards," and Chapter 60, "Air Pollution Control," which would minimize air quality emissions.

Once completed, the proposed concrete river ford crossing is not anticipated to result in increased trips by the existing residents and farmers. The proposed project would not result in any increased air emissions, and there would be no long-term adverse air quality impacts associated with the proposed action. Other than vehicles using the river ford, there are no air contaminant sources in the immediate project area.

3.7 NOISE

The project site is approximately 1.3 miles north of Waimea Town, in an area of residential and agricultural uses. Surrounding noise levels in the vicinity of the project site are considered generally quite low. Existing noise sources include the sound of the river, and occasional vehicular traffic on Menehune Road and the ford crossing.

IMPACTS AND MITIGATION MEASURES

Noise impacts from a project can be categorized as those resulting from construction and those from operational activities. Construction noise would have a short-term effect; operational noise would continue throughout the lifetime of the project. Implementation of the proposed concrete ford crossing could temporarily increase noise levels during construction. Noise from construction activities is regulated under Title 11, Chapter 46, Community Noise Control, of the State DOH's Administrative Rules. The zoning district classification and maximum permissible sound levels are outlined in Section 11-46-4, HAR. The project falls under the Class A zoning district category that applies to properties zoned for residential and open space types of land uses. The maximum permissible noise level for this site under Class A is 55 dBA at the property line during daytime and 45 dBA during nighttime. Typical ranges of construction equipment noise vary between 70 and 95 dBA. Therefore, earthmoving activities could temporarily increase noise levels during construction above maximum allowable limits that would impact nearby existing uses.

A Community Noise Permit for construction activities may be required by the Department of Health. Prior to construction, consultation with the state Department of Health will occur to determine permitting requirements. Should the permit be required, allowable construction conditions will be specified. Construction will be confined to 7 a.m. to 6 p.m., Monday through Friday, and 9 a.m. to 6 p.m. on Saturday. No construction activities exceeding maximum allowable noise levels will occur on Sundays and holidays without prior notice. Construction activities will comply with Chapter 11-46, HAR, Community Noise Control.

There would be no long-term increase in noise during project operations since the improved ford crossing project allow for continued stream crossing and access across the Waimea River and would not generate additional traffic and associated noise.

3.8 VISUAL RESOURCES

The project site consists of an undeveloped ford crossing across the Waimea River. Views on the project site are scenic and typical of rural streamside areas of Kaua'i. Visually prominent features in the project area include the developed levee on the western bank, a mix of trees and weedy ground vegetation on the eastern river bank, and the adjacent bluffs along the upper western banks of the river and Menehune Road.

IMPACTS AND MITIGATION MEASURES

During construction, workers, materials, and equipment would be visible from the surrounding residences and from motorists on Menehune Road. Visual impacts during construction would be temporary and intermittent.

The proposed replacement of the existing ford crossing to allow for continued stream crossing and access across the Waimea River would not significantly change the scenic and visual character of the surrounding area.

3.9 SOCIAL AND ECONOMIC CHARACTERISTICS

In both urban and rural areas, the County of Kaua'i has relatively low population density, and an overall population of 72,293 persons in 2019. The County of Kaua'i population accounts for approximately 5.1 percent of the state's total population. In 2018, the population in Waimea included an estimated 1,952 persons. From 2010 to 2018, there was a 5.2 percent increase in population for the area, while the state of Hawai'i only experienced a 4.5 percent increase in population. (Census 2019)

The major economic activity in the project area is agricultural. Kauai's crops include seed corn, coffee, guava, taro, papayas, bananas, tropical specialty fruits like rambutan, lychee and longan, and row crops like bok choi and lettuce. Beef cattle are also raised and exported to the U.S. mainland, while small hog and chicken operations remain for domestic consumption (Kaua'i Chamber of Commerce 2012).

IMPACTS AND MITIGATION MEASURES

The proposed project is not anticipated to have significant, adverse impacts on the social and economic characteristics of the area. The proposed concrete river ford crossing would replace existing earthen facilities with a more reliable crossing. The proposed project improvements would not generate any new permanent full-time jobs. Therefore, the primary economic effects would be associated with short-term construction jobs that would generate a small minor positive economic impact.

Implementation of the proposed action would not displace any residents or businesses since construction would occur within the existing footprint of the river ford crossing. Improvements planned under the proposed river ford crossing project would not impact the number of housing units in the surrounding area and surrounding community of Waimea because no housing units are included under this project.

The proposed ford crossing would not result in growth inducement in the project area, or more specifically on the eastern bank of the river where access is limited. There would still be access limitations with the proposed concrete ford crossing, though access would be more reliable for the existing residents and farmers.

3.10 PUBLIC FACILITIES AND SERVICES

There is no electrical, telephone, potable water, or wastewater infrastructure present at the river ford crossing project site.

IMPACTS AND MITIGATION MEASURES

The proposed project includes the replacement of the existing earthen river ford with a concrete ford crossing. No feature of the project would result in the need for new or altered services for fire or police protection, schools, libraries, parks, or health services. Because no new residences would be constructed on site, and no new employees would be drawn from the local labor pool, no increase in population would result from the proposed project. Therefore, no increases in the demands for public services such as schools, libraries, parks, health services, police, or fire

protection would be expected, and no additional public facilities would need to be constructed. Further, the proposed ford crossing would not affect the provision of utilities and public services to adjacent land uses. Replacement of the existing river ford crossing is expected to have no negative long-term impact on utilities and public services.

3.11 TRAFFIC AND PARKING

The existing river crossing extends across the Waimea River, providing access to residents and farmers on the east side of the river. When the crossing is not usable, the residents park on the stream bank on the western side of the river, along Menehune Road and the flood control levee, and use the pedestrian bridge to get across the river and access their homes. Vehicle access to the project area from Waimea village is via Menehune Road, a two lane, rural roadway off of Kaumualiʻi Highway (Route 50).

IMPACTS AND MITIGATION MEASURES

Construction of the proposed project could result in short-term increases in traffic. During construction of the proposed concrete ford crossing, there would be work vehicles using Menehune Road. There is limited traffic on Menehune Road, consisting of local traffic. During construction, residents and farmers would be required to use the pedestrian bridge for crossing.

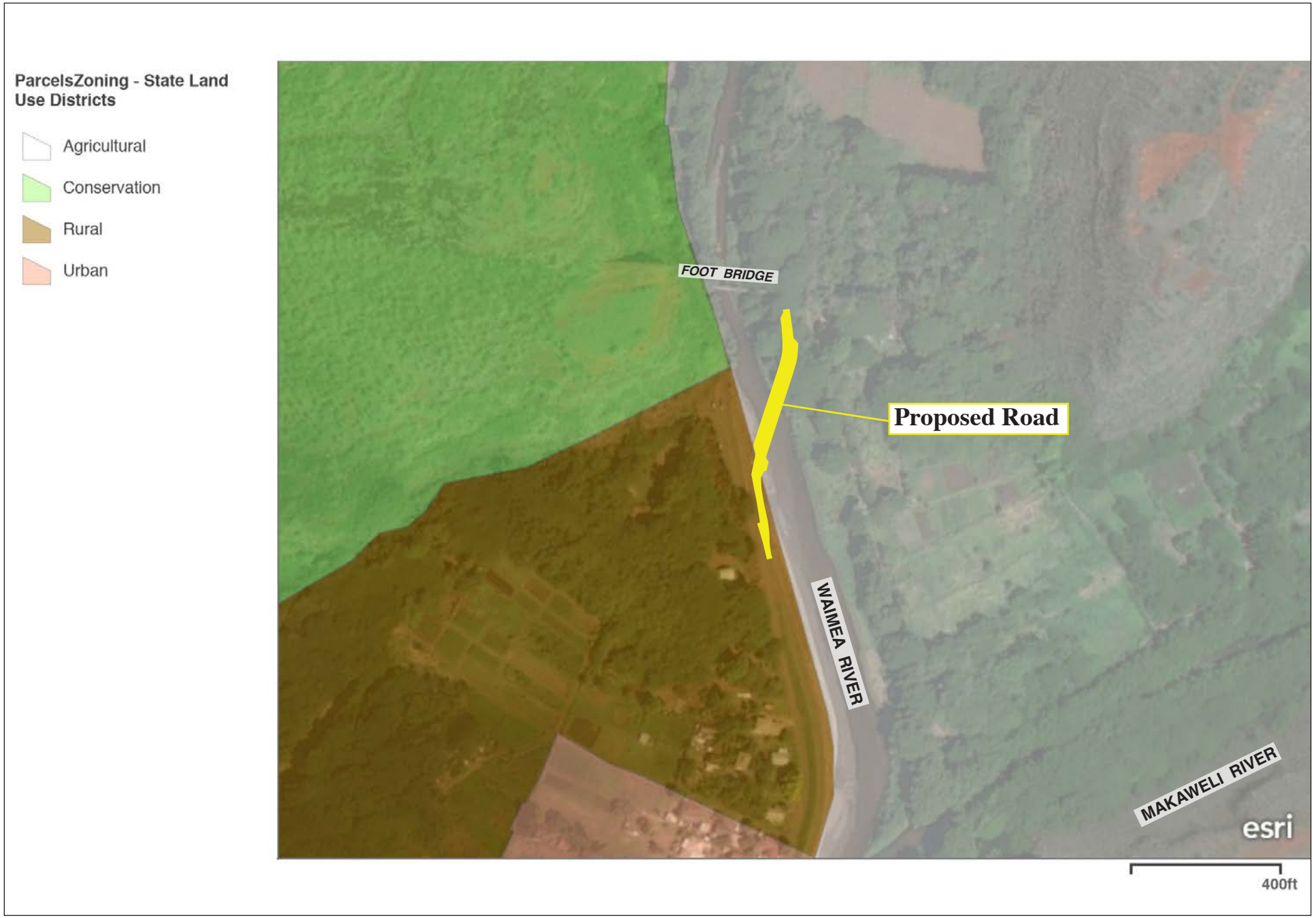
There would be no direct increase in operational traffic due to implementation of the proposed project, and no long-term adverse effects to circulation and parking would occur.

3.12 CONFORMANCE WITH STATE AND LOCAL PLANS, POLICIES, AND LAND USE CONTROLS

State and County policy, and land use and community plans and controls are established to address the long-term physical, social, economic, and environmental needs in Hawaiʻi. Pertinent land use controls for the Waimea River Ford Crossing project are described below.

State of Hawaiʻi

State of Hawaiʻi, Land Use Commission – State Land Use Districts
Chapter 205, HRS establishes four major land use districts in which all lands in the State are placed. These districts include: urban, rural, agricultural, and conservation. The project alignment is located within the agricultural and rural Districts (see Figure 7). Agricultural districts include activities such as farming and cultivation of crops, among other uses (Section 205-2(d), HRS). Rural districts include activities or uses of low-density residential lots of not more than one dwelling unit per one-half acre (Section 205-2(c), HRS). The proposed project would replace the existing river ford with a concrete river ford, which would not conflict with the agricultural or rural land use districts.



SOURCE: Hawaii State GIS Program 2020

Waimea River Ford Crossing

Figure 7

State Land Use District Map

Hawaii State Planning Act, Chapter 226, Hawai'i Revised Statutes

The Hawaii State Planning Act (Chapter 226, HRS) is a broad policy document that forms a basis for all activities, programs, and decisions made by local and state agencies. The Act sets forth the Hawaii State Plan, which is a long-range comprehensive plan that identifies the goals, objectives, policies, and priorities for the state, and provides a basis for determining priorities and allocating limited resources. The objectives and policies focus on general topic areas, including population, economy, physical environment, facility systems, and socio-cultural advancement. The proposed concrete river ford project is compatible with applicable objectives and policies, and priority guidelines listed in Chapter 226, HRS, as discussed in Table 1 below.

Table 1 Hawaii State Planning Act, Chapter 226, Hawai'i Revised Statutes

Objective or Policy	Consistency	Discussion
§226-7(a). Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives: (2) Growth and development of diversified agriculture throughout the State. §226-7(b). To achieve the agriculture objectives, it shall be the policy of this State to: (2) Encourage agriculture by making the best use of natural resources. (8) Support research and development activities that strengthen economic productivity in agriculture, stimulate greater efficiency, and enhance the development of new products and agricultural by-products.	Yes	The proposed concrete river ford would provide reliable access for residents and farmers across the Waimea River, which would help maintain more efficient transportation of agricultural goods and services.
§226-11(a). Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives: (1) Prudent use of Hawaii's land-based, shoreline, and marine resources. (2) Effective protection of Hawaii's unique and fragile environmental resources. §226-11(b). To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to: (1) Exercise an overall conservation ethic in the use of Hawaii's natural resources. (3) Take into account the physical attributes of areas when planning and designing activities and facilities. (4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage. (6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.	Yes	The proposed project includes the construction of a concrete river ford across the Waimea River the replace the existing earthen crossing. The proposed project BMPs and minimization measures would minimize impacts to water resources and rare or endangered plant and animal species.
§226-12(b). To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:	Yes	As set forth in Section 3.5, *Historic, Archaeological, and Cultural Resources*, an Archaeological Literature Review and Field Inspection study was completed for

Table 1 Hawaii State Planning Act, Chapter 226, Hawai'i Revised Statutes		
Objective or Policy	**Consistency**	**Discussion**
(1) Promote the preservation and restoration of significant natural and historic resources. (5) Encourage the design of developments and activities that complement the natural beauty of the islands.		the project site. The field inspection of the proposed project area identified no surface historic properties. Based on lack of findings, no further archaeological work is proposed for the project.
§226-13(a). Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives: (1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources. (2) Greater public awareness and appreciation of Hawaii's environmental resources.	Yes	As set forth in Section 5, *Findings and Determinations*, of this EA, no significant adverse effects to air quality or water quality would occur with implementation of the proposed accessibility improvements project.
(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to: (2) Promote the proper management of Hawaii's land and water resources. (3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters. (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.	Yes	As described in Section 3.3, *Natural Hazards*, of this EA, the concrete river ford would be within the flood zone of the Waimea River. Implementation of the proposed river ford crossing project would not result in increased flooding or hazards from flooding in surrounding areas. Further, the flood capacity of the flood levees would not be decreased with the construction of the proposed crossing. In addition, the project includes BMPs to be implemented during project construction to minimize erosion and potential impacts to water quality.
§226-17(a). Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives: (1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods. (2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State. §226-17(b). To achieve the transportation objectives, it shall be the policy of this State to: (2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;	Yes	The proposed concrete river ford would provide reliable and safe access for residents and farmers across the Waimea River.

Coastal Zone Management Program

In October 1972, Congress passed the Coastal Zone Management Act for the purpose of establishing a national program for the management, beneficial use, protection, and development of land and water resources of the coastal areas of the United States. The Hawai'i Coastal Zone Management (CZM) Program (Chapter 205A, HRS) was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. The objectives and policies of the CZM Program are to provide recreational resources; protect historic, scenic, and coastal ecosystem resources; provide economic uses; reduce coastal hazards; and manage development in the coastal zone. All lands in the state of Hawai'i are located within the coastal zone management area.

Special Management Area Designation

The CZM Program outlines controls and policies within an area along the shoreline called the Special Management Area (SMA). The objectives of the SMA are "the maintenance, restoration, and enhancement of the overall quality of the coastal zone environment, including, but not limited to, its amenities and aesthetic values, and to provide adequate public access to publicly owned or used beaches, recreation areas and national reserves." The purpose of the SMA Permit is to regulate any use, activity or operation that qualifies as a "development" and is administered at the County level – the permit is a management tool to ensure activities within the SMA are carried out in compliance with the CZM objectives and policies, and SMA guidelines.

The project site is not within the Special Management Area (SMA) designation, and a SMA permit would not be required (see Figure 8).

The following discussion evaluates the consistency of the proposed Waimea River Ford Crossing project with the applicable objectives and policies of Chapter 205A, HRS. The policies of Chapter 205A, HRS, the consistency of the proposed river ford with those policies, and the reasoning for the conclusion are set forth in Table 2 below.

Policy compliance is often a matter of interpretation. The County Council is the ultimate arbiter of public policy for the project, and their judgment regarding the project and a specific policy may be different from that set forth in this report. Therefore, the following policy evaluation should be viewed as preliminary, with the ultimate decision to be made by the appropriate appointed and elected officials.

SOURCE: Hawaii State GIS Program 2020

Waimea River Ford Crossing

Figure 8

Special Management Area Map

Table 2 Chapter 205A-2, Hawai'i Revised Statutes		
Objective or Policy	**Consistency**	**Discussion**
(2) Historic resources; (A) Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture. Policy: (A) Identify and analyze significant archaeological resources; (B) Maximize information retention through preservation of remains and artifacts or salvage operations; and (C) Support state goals for protection, restoration, interpretation, and display of historic resources.	Yes	As set forth in Section 3.5, *Historic, Archaeological, and Cultural Resources*, an Archaeological Literature Review and Field Inspection study was completed for the project site. The field inspection of the proposed project area identified no surface historic properties. Based on lack of findings, no further archaeological work is proposed for the project.
(3) Scenic and open space resources; (A) Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources. 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.	Yes	As set forth in Section 3.8, *Visual Resources*, the proposed project includes the reconstruction of existing facilities in addition to accessibility improvements. The proposed project would not significantly change the scenic and visual character of the surrounding area.
(6) Coastal hazards; (A) Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution. Policy: (B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards. (C) Ensure that developments comply with requirements of the Federal Flood Insurance Program.	Yes	As described in Section 3.3, *Natural Hazards*, of this EA, the entire shoreline is subject to inundation due to high seas and swells caused by hurricanes and distant storms and tsunami activity. The proposed improvements would be designed and constructed in conformance with the standards and requirements of the Hawai'i County Code, Chapter 27, *Floodplain Management*, as applicable. In addition, the project includes BMPs to be implemented during project construction to minimize erosion and potential impacts to water quality.
(7) Managing development; (A) Improve the development review process, communication, and public participation in the management of coastal resources and hazards.	Yes	Early consultation with agencies, organizations, and individuals was conducted during preparation of the Draft EA for the proposed project. Additional public review will occur during the public comment period for the EA.
(8) Public participation; (A) Stimulate public awareness, education, and participation in coastal management. Policy: (A) Promote public involvement in coastal zone management processes.	Yes	See above.

County Land Use Plans and Policies

Kaua'i County General Plan and Zoning Ordinance

The *Kaua'i Kākou - Kaua'i County General Plan* (2018) is a long-range, generalized planning policy document to guide the next 20 years of development of the County. It serves as a basis for an implementation program to effectuate desired changes and improvements in the social, economic, and environmental atmosphere of the County. The General Plan is based on the community's vision and goals for Kaua'i's future: that Kaua'i will be a sustainable island, a unique and beautiful place, a healthy and resilient people, and an equitable place with opportunity for all.

The general Plan covers six planning districts on the Island of Kaua'i: North Shore, east Kaua'i, Līhu'e, South Kaua'i, Hanapēpē-'Ele'ele, and Waimea-Kekaha. The Waimea-Kekaha Land Use Map shows the General Plan land use designation for the project site as Agricultural (see Figure 9). It is the County's policy to preserve and protect Agriculture lands. Agriculture lands are held in reserve for agricultural purposes with little residential development. The proposed project would not conflict with the General Plan designation, in that it would create reliable access for farmers in the area and it would not interfere with agricultural activities.

The County of Kaua'i land use ordinance, or zoning code (Kaua'i County Code Chapter 8), regulates land use and overall future development on Kaua'i Island within the framework of the Kaua'i County General Plan. The Waimea River site is zoned Open District. As set forth by the Zoning Code, "[the] Open District is established and regulated to create and maintain an adequate and functional amount of predominantly open land to provide for the recreational and aesthetic needs of the community or to provide for the effective functioning of land, air, water, plant and animal systems or communities" (Kaua'i County Code Section 8-9.1). The proposed river ford crossing would not conflict with this purpose.

West Kaua'i Community Plan

The County of Kaua'i is developing a West Kaua'i Community Plan to manage future growth and change, while also coordinating land use and transportation planning. The West Kaua'i Community Plan (2020)[6] builds upon the direction set forth in the 2018 General Plan. The West Kaua'i Community Plan includes the small towns of 'Ele'ele, Hanapēpē, Waimea, and Kekaha. The Waimea Town Plan portion of the document focuses on the town community. The Plan includes Goals and Objectives focusing on Resiliency, including the need to "address concerns pertaining to the Waimea River, levee maintenance, and nuisance flooding". (County of Kaua'i 2020). The proposed river ford crossing would not conflict with the Plan policies.

[6] The public process for the West Kaua'i Community Plan launched in August 2018. The community plan is still in Draft form and has not yet been adopted. The existing adopted plan for the area includes the Waimea-Kekaha Development Plan (1977). Since so much has changed since their adoption in the 1970s, the Draft West Kaua'i Community Plan is considered in this discussion.

SOURCE: Hawaii State GIS Program 2020

Waimea River Ford Crossing

Figure 9

County of Kaua'i General Plan Land Use

4 ALTERNATIVES TO THE PROPOSED ACTION

This chapter considers alternatives to the proposed action, including the No Action Alternative.

4.1 NO ACTION ALTERNATIVE

The No Action Alternative identifies the expected environmental impacts in the future if existing conditions were left as is with no action taken by the approving agency. Under the No Action Alternative, the existing earthen crossing would remain. Crossing of the Waimea River would continue to be difficult and inconsistent and would continue to create financial hardship to the residents and farmers on the eastern bank of the river. This alternative would not meet any of the identified project objectives.

4.2 PREFERRED ALTERNATIVE 1: PROPOSED ACTION

Under this alternative, the restoration improvements described in Section 2.2 would be implemented as the Proposed Project. This alternative was selected because the concrete design would provide a low-maintenance crossing along the existing earthen crossing alignment. This would limit the built structure in the stream to the current location.

4.3 ALTERNATIVES ELIMINATED FROM CONSIDERATION

Alternatives that were initially considered and eliminated from further consideration are presented in this section. These alternatives were eliminated based on their effectiveness in addressing project needs and meeting project objectives, conflicts with the physical environment, or feasibility and practicability of implementation. Alternatives for the project were considered by County staff and engineers during the initial planning and evaluation of site conditions.

ALTERNATIVE 2: A NEW CROSSING LOCATION

This alternative would construct a concrete ford crossing at an alternate location. However, this would create increased disruption at a new location in the stream bed, and would require new entry and exit locations on the western and eastern streambeds. There are very limited areas available for crossing Waimea River in this area, and if relocated, the project would involve considerably more extensive land disturbance and would have no known cost or environmental advantages. Therefore, this alternative was eliminated from consideration and not fully evaluated in this EA.

5 FINDINGS AND DETERMINATION

As set forth in Section 11-200.1-13, HAR, in considering the significance of potential environmental effects, an agency must "consider every phase of a proposed action, the expected impacts, and the proposed mitigation measures." The proposed action is not expected to have a significant effect on the environment. The recommended preliminary determination for the Waimea River Ford Crossing is a Finding of No Significant Impact (FONSI). The findings supporting this determination are discussed below.

(1) Does the project irrevocably commit a natural, cultural, or historic resource?

The field inspection of the proposed project area identified no surface historic resources. Based on lack of findings, no further archaeological work is proposed for the project. The proposed project also entails construction of a concrete crossing along the existing earthen river ford alignment, which would minimize new disturbance in the waterway. The proposed project is not anticipated to involve an irrevocable commitment, or loss and destruction of any natural or cultural resource.

(2) Does the project curtail the range of beneficial uses of the environment?

The proposed improvements would not curtail the range of beneficial uses at the project site. The project would increase the reliability of beneficial uses of the environment by providing reliable access for residents and farmers across the Waimea River.

(3) Does the project conflict with the State's environmental policies or long-term environmental goals established by the law?

The proposed project is consistent with the environmental policies and long-term environmental goals established in Chapter 344, HRS. The guiding policies as set forth in Chapter 344-3, HRS include:

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

(2) Enhance the quality of life by:

(A) Setting population limits so that the interaction between the natural and artificial environments and the population is mutually beneficial;

(B) Creating opportunities for the residents of Hawaii to improve their quality of life through diverse economic activities which are stable and in balance with the physical and social environments;

(C) Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian; and
(D) Establishing a commitment on the part of each person to protect and enhance Hawaii's environment and reduce the drain on nonrenewable resources.

The proposed project BMPs and avoidance and minimization measures would reduce impacts to natural resources, and the proposed concrete crossing would enhance the quality of life for residents and farmers on the eastern bank of the river by providing more reliable access.

(4) Does the project have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State?

The proposed action would have a short-term positive effect on the economic welfare of the island resulting from hiring construction workers. This project is not expected to significantly affect traditional native Hawaiian cultural practices or other traditional cultural practices occurring in the surrounding area. The proposed action would not have a substantial long-term effect on the economic and social welfare of the community or the state. The proposed project is in accordance with land use plans and regulations as set forth in Section 3.12, *Conformance with State and County plans, Policies, and Land Use Controls.*

(5) Does the project have a substantial adverse effect on public health?

The project would not substantially affect public health as discussed in various sections of this document. Construction activities may temporarily increase fugitive dust and noise levels in the project vicinity. Short-term construction-related effects would be minimized by complying with pertinent State or County regulations and conditions of permits required. Further, these impacts would cease upon completion of construction. The proposed improvements would construct a more permanent crossing where it has been previously destroyed by flooding, and therefore protect the health and safety of the public. No long-term negative impact on public health is anticipated with implementation of the proposed action.

(6) Does the project involve adverse secondary impacts, such as population changes or effects on public facilities?

The proposed action would not generate population or create secondary demands and impacts on public facilities and services. The project would not alter the present use of the crossing.

(7) Does the project involve a substantial degradation of environmental quality?

There would be no long-term, adverse environmental impacts associated with the proposed action. Construction activities may temporarily increase dust and noise in the project vicinity. However, these impacts would cease upon completion of construction. The proposed project will also include site-specific BMPs to minimize erosion and sedimentation effects to water quality. Additional avoidance and minimization measures included in Chapter 3 would reduce potential construction-related impacts.

(8) May the project be individually limited but cumulatively have substantial adverse effect upon the environment or involve a commitment for larger actions?

The proposed Waimea River Ford Crossing project is limited to the existing alignment. In a regional context, the project would not have cumulatively significant impacts.

(9) Does the project have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat?

With implementation of avoidance and minimization measures and BMPs described in Section 2.2 of this document, no substantial adverse effects would occur to rare, threatened, or endangered species, or their habitats.

(10) Does the project have a substantial adverse effect on air or water quality or ambient noise levels?

Construction activities would have a short-term effect on air quality, water quality, and ambient noise levels. Avoidance and minimization measures included in Chapter 3 would minimize these potential impacts. Construction activities would also be subject to applicable State and County regulations and permit conditions. No additional long-term impacts would occur.

(11) Does the project 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?

Construction of the proposed project would not result in increased flooding or hazards from flooding in surrounding areas. A FEMA No-Rise Determination and Levee Impact Evaluation was prepared for the project to ensure there would be no adverse effects to the levee or increase in flooding.

(12) Would the project have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies?

The proposed replacement of the existing ford crossing to allow for continued stream crossing and access across the Waimea River would not significantly change the scenic and visual character of the surrounding area. The proposed improvements would not obstruct views from any recognized view corridor or scenic roadway.

(13) Would the project require substantial energy consumption or emit substantial greenhouse gases?

There would be energy consumption associated with construction of the proposed project. The amount of energy that would be consumed with project implementation is not considered substantial.

6 INDIVIDUALS, COMMUNITY GROUPS, AND AGENCIES CONSULTED

6.1 EARLY CONSULTATION

Early consultation was conducted from July 2019 to March 2020, prior to preparation of the Draft EA for the proposed project. This is part of the scoping process for the Draft EA, and is intended to identify environmental issues and concerns to be addressed in the Draft EA. The following agencies, organizations, and individuals were sent a preliminary project description for comments or questions. Those that provided written comments (either by hard copy or electronically) are highlighted in italics. Copies of the written comments are included in Appendix A.

FEDERAL AGENCIES

U.S. Fish and Wildlife Service

Department of Army Corps of Engineers

Environmental Protection Agency, Region IX, Pacific Islands

U.S. National Oceanic Atmospheric Administration, National Marine Fisheries Service

STATE AGENCIES

Department of Health, Environmental Health Administration

Department of Agriculture

Department of Transportation

Office of Planning

University of Hawai'i Environmental Center

University of Hawai'i Water Resources Research Center

Office of Hawaiian Affairs

Department of Hawaiian Home Lands

Department of Land and Natural Resources

Department of Land and Natural Resources - Historic Preservation Division

COUNTY OF KAUA'I

Department of Planning

Fire Department

Police Department

Transportation Agency

Transportation Agency

ELECTED OFFICIALS

County Council Representative

COMMUNITY

Nearby residents

COMMUNITY INVOLVEMENT

In addition to early consultation materials sent to the residents and farmers on the eastern bank, the Department of Public Works and consultants have had informal conversations with several residents along the eastern bank. During one of these conversations, a resident described recurring flood events that have prevented vehicle crossing of the river. The resident described how the more recent December 2019 flood came to the sixth step of the pedestrian bridge and overtopped and covered the roadway. The flood created an area of deep waters on the eastern bank of the crossing, even after flood waters had receded. A truck attempted the crossing and got stuck, but the residents were able to get the vehicle out of the water. According to the resident, no in stream maintenance work has been completed since a flood event in 2008.

6.2 ENVIRONMENTAL ASSESSMENT PREPARATION

This Draft Environmental Assessment (EA) was prepared for the County of Kaua'i Department of Public Works by Environmental Planning Partners, Inc. and Bow Engineering & Development, Inc. The following consultants were involved in the preparation of this document:

William F. Bow, Executive Project Manager / Chemist, Bow Engineering & Development, Inc.

Daniel Tanigawa, P.E., Project Manager, Bow Engineering & Development, Inc.

Robert D. Klousner, President, Principal in Charge, Environmental Planning Partners, Inc.

Raadha M. B. Jacobstein, Professional Planner, Environmental Planning Partners, Inc.

Dale Nutley, Graphic Artist, Environmental Planning Partners, Inc.

7 REFERENCES

CAB. See Hawai‘i, State of, Department of Health, Clean Air Branch.

Cultural Surveys Hawai‘i, Inc. 2020. Draft Archaeological Literature Review and Field Inspection Report for the Waimea River Ford Crossing Project. Prepared by: William H. Folk, B.A., Nancine "Missy" Kamai, B.A., and Hallett H. Hammatt, Ph.D. Prepared for: Bow Engineering & Development, Inc. August 2020.

DAR. See Hawai‘i, State of, Division of Aquatic Resources.

DBEDT. See Hawai‘i, State of, Department of Business, Economic Development & Tourism.

DLNR. See Department of Land and Natural Resources.

DOH. See Hawai‘i, State of, Department of Health.

DOH CWB. See Hawai‘i, State of, Department of Health, Clean Water Branch.

Federal Emergency Management Agency (FEMA), 2019. Earthquake Hazard Maps. Last updated 12/23/2019. Accessed on March 17, 2020 at <https://www.fema.gov/earthquake/earthquake-hazard-maps>

FEMA. See Federal Emergency Management Agency.

Department of the Army, 1980. Detailed Project Report and Environmental Statement. Waimea River, Kauai, Hawaii. A Study to Determine the Feasibility of Providing Flood Control Improvements for the Town of Waimea, Island of Kauai, State of Hawaii. June 1980.

Hawai‘i, State of, 2020. Hawaii Statewide GIS Program. Kauai General Plan Boundaries, 2018. Water Quality Classification 10/7/2019. Tsunami Evacuation Zones 1/23/2019. Flood Hazard Areas (DFIRM) 3/28/2019. Fire Risk Areas 10/26/2017. Special Management Area. Data Accessed on March 13, 2020 at: <http://geoportal.hawaii.gov>.

Hawai‘i Climate Change Mitigation and Adaptation Commission. 2017. Hawai‘i Sea Level Rise Vulnerability and Adaptation Report. Prepared by Tetra Tech, Inc. and the State of Hawai‘i Department of Land and Natural Resources, Office of Conservation and Coastal Lands, under the State of Hawai‘i Department of Land and Natural Resources Contract No: 64064. Accessed on April 14, 2020 at < https://climateadaptation.hawaii.gov/wp-content/uploads/2017/12/SLR-Report_Dec2017.pdf>

Hawai‘i National Flood Insurance Program (HNFIP), 2020. Flood Hazard Assessment Tool. Accessed on March 31, 2020 at <http://gis.hawaiinfip.org/FHAT/>

Hawai‘i, State of, Department of Health, Clean Air Branch (CAB), 2020. State of Hawai‘i Annual Summary 2018 Air Quality Data. March 2020. Accessed on May 19, 2020 at < https://health.hawaii.gov/cab/hawaii-air-quality-data-books/ >

Hawai‘i, State of, Department of Health, 2014. Water Quality Standards Map of the Islands of Kaua‘i and Ni‘ihau. June 2014. Accessed on April 1, 2020 at <http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/water-quality-standards/>

Hawai‘i, State of, Department of Health (DOH), Clean Water Branch (CWB), 2018. 2018 State of Hawai‘i Water Quality Monitoring and Assessment Report. July 11, 2018. Accessed on March 11, 2020 at < http://health.hawaii.gov/cwb/clean-water-branch-home-page/integrated-report-and-total-maximum-daily-loads/ >

Hawai‘i, State of, Commission on Water Resource Management, 2019. Hawai‘i Water Plan. Water Resource Protection Plan. 2019 Update. Accessed on July 30, 2019 at: < http://files.hawaii.gov/Department of Public Works/cwrm/planning/wrpp2019update/WRPP_DRAFT_ALL_201907.pdf>

Hawai‘i, State of, Department of Land and Natural Resources (DLNR). 2015a. Hawaii Administrative Rules, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. Accessed Nov 3, 2016. <http://dlnr.hawaii.gov/dofaw/files/2013/09/Chap124a.pdf>

Hawai‘i, State of, Department of Planning, 2013. Stormwater Impact Assessments: Connecting primary, secondary and cumulative impacts to Hawaii's Environmental Review process. May 2013. Accessed on April 3, 2020 at: < http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf >

Hawai‘i, State of, Office of Planning (OP), 1977. Agricultural Lands of Importance to the State of Hawaii (ALISH). State Department of Agriculture, 1977. Map accessed on March 30, 2020 at: <http://planning.hawaii.gov/gis/various-maps/ >

HNFIP. See Hawai‘i National Flood Insurance Program.

H.T. Harvey & Associates, 2020. Waimea River Ford Crossing Project, Kauai. Biological Survey Report. August 24, 2020.

Intergovernmental Panel on Climate Change (IPCC), 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. Accessed on April 14, 2020 at < http://www.ipcc.ch/report/ar5/wg1/>

Kaua‘i, County of, 1974. Final Environmental Impact Statement for Waimea River Ford Crossing. October 24, 1974.

Kaua‘i, County of, 2018. Kaua‘i Kakou. Kaua‘i County General Plan. 2018 Final Version Approved by the County Council. Accessed on March 18, 2020 at: <http://plankauai.com>

Kaua‘i, County of, Chamber of Commerce, 2012. Kaua‘i Industries. Webpage dated 2012. Accessed on May 20, 2020 at: < http://www.kauaichamber.org/pages/KauaiIndustries1>

Kaua‘i, County of, Planning Department, 2020. West Kaua‘i Community Plan. Departmental Draft. January 2020. Accessed on September 4, 2019 at < http://www.hawaiicounty.gov/lb-countycode >

Kido, M. H. 2002a. The Hawaii Stream Bioassessment Protocol (Version 3.01): A Manual for Biological Monitoring and Assessment of Hawaiian Streams. Technical Report to the Hawaii Department of Health, Environmental Planning Division and the U.S. Environmental Protection Agency, Region 9, January 2002.

NOAA. See United States National Oceanic and Atmospheric Administration.

NRCS. See U.S. Department of Agriculture, Natural Resources Conservation Service.

River Focus, Inc. 2020. Technical Memo: Waimea River Ford Crossing Improvements FEMA No-Rise Determination and Levee Impact Evaluation. Dated March 23, 2020.

United States, Census Bureau, 2019. American Community Survey 2018 Data Release. Published online December 2019. Accessed on May 20, 2020 at: < https://www.census.gov/programs-surveys/acs>

United States, National Oceanic and Atmospheric Administration, National Centers for Environmental Information (NOAA), 2020. State of the Climate: Global Climate Report for Annual 2019. Published online January 2020. Accessed on February 18, 2020 at: < https://www.ncdc.noaa.gov/sotc/global/201913>

U.S. Department of Agriculture, Natural Resources Conservation Service, 2019. Custom Soil Resource Report for Island of Kauai, Hawaii. Version 14, September 17, 2019. Accessed on March 30, 2020 at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

U.S. Fish and Wildlife Service (USFWS), 2019. Critical Habitat Portal, Critical Habitat Mapper. Washington, D.C. Accessed March 15, 2019. <http://ecos.fws.gov/crithab/>.

USGS undated. Kauai Technical Hazard Maps. Accessed on April 3, 2020 at: < https://pubs.usgs.gov/imap/i2761/sections/2_Kauai.pdf >

USFWS 2019. National Wetlands Inventory, Surface Waters and Wetlands Mapper. Last modified October 8, 2019. Accessed on March 31, 2020 at: <https://www.fws.gov/wetlands/data/Mapper.html>

University of Hawai‘i at Manoa, Sea Grant College Program, 2014. Climate Change Impacts in Hawai‘i - A summary of climate change and its impacts to Hawai‘i’s ecosystems and communities. June 2014.

U.S. Climate Data, 2020. Accessed on May 19, 2020 at: <usclimatedata.com>

This page intentionally
left blank.

APPENDIX A

EARLY CONSULTATION COMMENT LETTERS

-----Original Message-----
From: Speerstra, Linda CIV USARMY CEPOA (USA) <Linda.Speerstra@usace.army.mil>
Sent: Thursday, January 9, 2020 4:33 PM
To: Christie Bagley <cbagley@kauai.gov>; Public Works - voicemail account <publicworks@kauai.gov>
Cc: Speerstra, Linda CIV USARMY CEPOA (USA) <Linda.Speerstra@usace.army.mil>
Subject: Waimea River crossing - Island of Kauai

CAUTION: This email originated from outside the County of Kauai. Do not click links or open attachments even if the sender is known to you unless it is something you were expecting.

Aloha Ms. Bagley, thank you for reaching out to the Corps. I'm providing scoping information in regards to the early consultation request provided to our office on December 31st. Based on the preliminary project description for the Waimea River Ford Crossing , you are seeking the basic information in regards to the Corps program.

The Corps' regulatory authorities are based on two laws: The first which may apply to your proposal is Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403), which prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from the Corps. The information provided doesn't indicate whether the Waimea River is subject to the ebb and flow of the tide. Further information would be required to determine if Section 10 would apply to your proposal.

The second law is in regards to Section 404 of the Clean Water Act (CWA), which prohibits the discharge of dredged or fill material into waters of the U.S., including wetlands, without a Corps' permit. Based on information provided you would be conducting work in waters of the United States that would be within the Corps' jurisdiction under Section 404 of the CWA.

I will be conducting outreach and site inspection on the island of Kauai during the week of the 21st. I will add this project to my itinerary. If you are available to meet on site please feel free to reach out. My contact information is below. Linda

Linda Speerstra
Chief, Regulatory Branch
U.S. Army Corps of Engineers
Honolulu District
808-835-4300

From: **Shimabuku, Lorayne P CIV USARMY CEPOH (USA)** Lorayne.P.Shimabuku@usace.army.mil
Subject: RE: Waimea River Ford Crossing Project - Inquiry About 408 Permit
Date: January 29, 2020 at 2:07 AM
To: Daniel Tanigawa DTanigawa@bowengineering.com, Gayagas, C Lincoln CIV USARMY CEPOH (USA) Lincoln.C.Gayagas@usace.army.mil
Cc: William Bow WBow@bowengineering.com, Korey Johnson kjohnson@bowengineering.com, Matthew Fujioka MFujioka@bowengineering.com, Speerstra, Linda CIV USARMY CEPOH (USA) Linda.Speerstra@usace.army.mil

---

Daniel

Based on our review, no 408 action is required. However, from an O&M perspective, please ensure the following are incorporated/considered into your design as related to levee safety and possible flooding:
- Ensure proper design analysis for the ford itself, including geotech, hydraulic stability, scour, etc.;
- Ensure protection for the upstream and downstream edges;
- Include details for tying into the revetment:
- A plan for diverting flow during construction;
- An emergency action plan for activities when the levee/revement are exposed;

In addition, please ensure that Lincoln/I are provided
- the construction schedule and 2 weeks notification prior to construction on the levee/revetment for Corps observation.
- provide one set of as-builts when construction is complete.

Recommend you check with our regulatory department if any permits are required.
https://www.poh.usace.army.mil/Missions/Regulatory/Permits/

Nani

-----Original Message-----
From: Daniel Tanigawa [mailto:DTanigawa@bowengineering.com]
Sent: Tuesday, January 28, 2020 11:31 AM
To: Shimabuku, Lorayne P CIV USARMY CEPOH (USA) <Lorayne.P.Shimabuku@usace.army.mil>; Gayagas, C Lincoln CIV USARMY CEPOH (USA) <Lincoln.C.Gayagas@usace.army.mil>
Cc: William Bow <WBow@bowengineering.com>; Korey Johnson <kjohnson@bowengineering.com>; Matthew Fujioka <MFujioka@bowengineering.com>
Subject: [Non-DoD Source] Waimea River Ford Crossing Project - Inquiry About 408 Permit

Aloha Nani, Lincoln,

We are working on the Waimea River Ford Crossing Improvement Project on the island of Kauai and I wanted to inquire about a potential 408 permit that may be triggered based on our improvements. Our project is to provide a hardened, driveable surface within the ford crossing and provide a new roadway on both sides of the river bank, see attached PDF. On one side of the project, there is an existing levee and an existing dirt road that leads to the un-stabilized ford crossing. Our improvements will provide a new concrete surface over the dirt road, maintaining existing grades as much as possible. In doing so, would this trigger a 408 permit? We would like to coordinate and discuss this before we get too far along.

Let me know if you have any questions or need any additional information.

Thanks,

Daniel Tanigawa, P.E.

Bow Engineering & Development, Inc.

1953 S. Beretania Street PH-A, Honolulu, Hawaii 96826

Direct: (808) 369-8212 E-mail: dtanigawa@bowengineering.com <mailto:dtanigawa@bowengineering.com>

Office: (808) 941-8853 (x112) Website: Blockedwww.bowengineering.com <Blockedhttp://www.bowengineering.com/>

FW 1.20.116

DAVID Y. IGE
GOVERNOR OF HAWAII

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

RECEIVED JAN 24 2020

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 24, 2020

(CY 2019) LD 2314

Lyle Tabata
County of Kauai
Department of Public Works
4444 Rice Street, Suite 275
Lihue, HI 96766-1340

via email: publicworks@kauai.gov

Dear Sirs:

SUBJECT: **Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing;** Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai; TMK (4) 1-6-001:888

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 comments.

Enclosed are responses from our (a) Division of Aquatic Resources, (b) Engineering Division, (c) Commission on Water Resource Management, and (d) Land Division—Kauai District. Should you have any questions about the attached comments, please feel free to contact Barbara Lee at (808) 587-0453 or barbara.j.lee@hawaii.gov. Thank you.

Sincerely,

for Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

LD 2314

ENGINEERING DIVISION
DEPARTMENT OF PUBLIC WORKS
THE COUNTY OF KAUA'I
DEREK S. K. KAWAKAMI, MAYOR
MICHAEL A. DAHILIG, MANAGING DIRECTOR

LYLE M. TABATA
DEPUTY COUNTY ENGINEER

RECEIVED
LAND DIVISION
2019 DEC 24 AM 10:50
DIV. OF LAND & NATURAL RESOURCES STATE OF HAWAII

RECEIVED
2019 DEC 23 AM 8:09
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

December 20, 2019

Director
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

SUBJECT: Waimea River Ford Crossing Project
Scoping and Early Consultation

To Whom It May Concern:

The County of Kaua'i, Department of Public Works proposes to replace the existing Waimea River earthen crossing with a concrete crossing to reduce the amount of maintenance required. The Waimea River is located in the Waimea District, on the southwestern region of the island of Kaua'i. A draft project description and figures are provided to further illustrate the proposed improvements.

To comply with state environmental laws and regulations, an Environmental Assessment (EA) will be prepared pursuant to Hawaii Revised Statutes §343. The ultimate goal of early consultation is the gathering of information or data in regards to the proposed project. The Department of Public Works is soliciting comments on specific issues to be included in the environmental analysis and permitting requirements to ensure that the Environmental Assessment is thorough and adequate, and that it meets the needs of the public and responsible/reviewing agencies.

Please submit written correspondence for the proposed project by January 24, 2020 to Mr. Lyle Tabata via email at publicworks@kauai.gov, or by U.S. Postal Service to: County of Kaua'i, Department of Public Works, 4444 Rice Street, Suite 275, Līhu'e, Hawaii 96766-1340. Should you have any questions, please contact Ms. Christie Bagley, Project Manager, by phone at (808) 241-4885 or via email at cbagley@kauai.gov.

Sincerely,

Michael Moule, P.E.
Chief, Engineering Division

Concur,

Lyle Tabata
Deputy County Engineer

Enclosure: Preliminary Project Description

PRELIMINARY PROJECT DESCRIPTION

Project Location

The proposed project site is located approximately 1.3 miles north of Waimea Town, in the Waimea District, on the southwestern region of the Island Kaua'i (see Figure 1). The existing river crossing extends across the Waimea River, identified as Tax Map Key (TMK) (4) 1-6-001:888. The river ford crossing is approximately 350 feet south of the Waimea Swinging Bridge, a pedestrian bridge spanning the Waimea River.

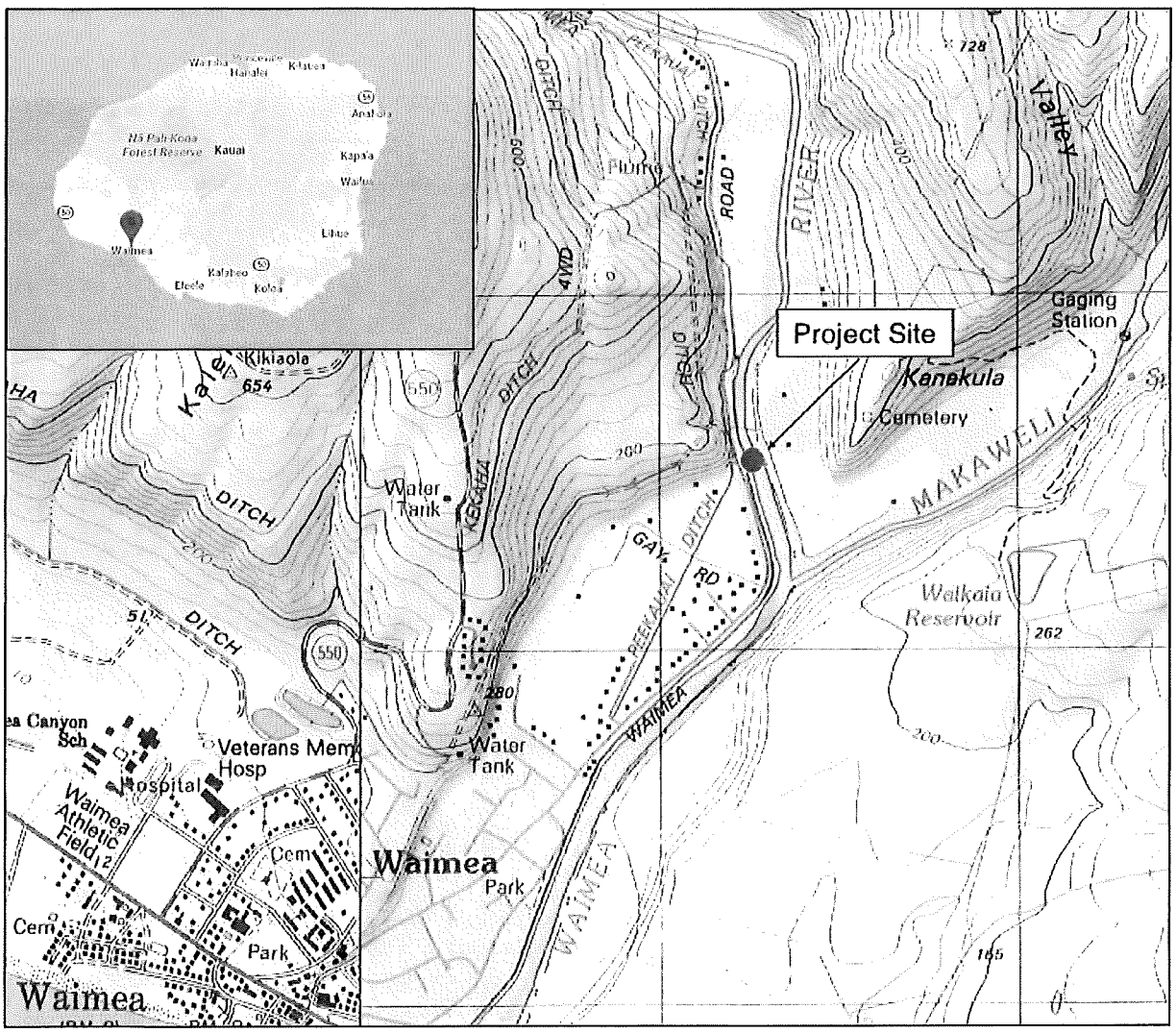


Figure 1: Project Location *Source: Google Maps 2019 and Topozone 2019*

Project Background

The existing river crossing includes an earthen and gravel ford crossing. Based on current information, there are six permanent residents that use the existing earthen crossing as the sole access to their homes via vehicles. When the crossing is not usable, the residents park on the stream bank on the Waimea side of the river along Menehune Road and the flood control levee and use the pedestrian bridge to get across the river and access their homes. There are also other users that have farmland on the east side of the river and use the ford crossing.

During periods of extremely high storm flows, the roadway materials are transported downstream (see Figure 2). As a result, vehicular access to the east bank is not available until maintenance crews reconstruct a new earthen roadway. Reconstruction and maintenance have been required almost yearly.

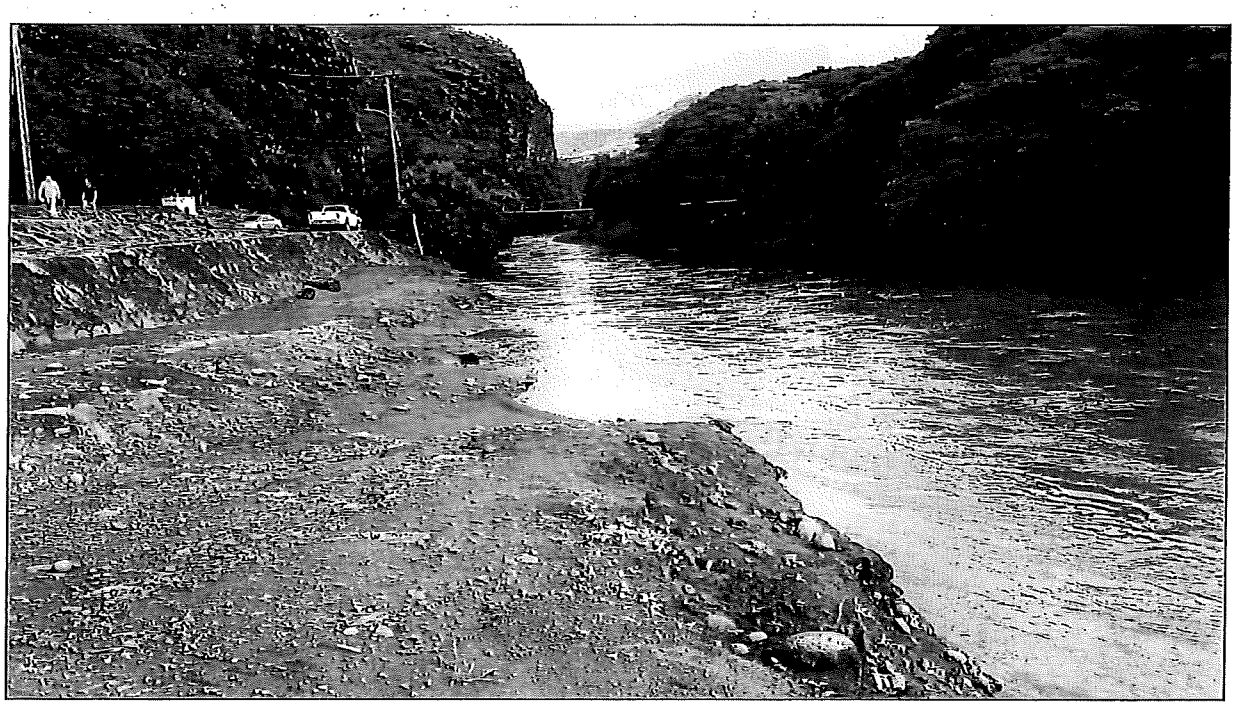


Figure 2: River Crossing at High Water Flows *Source: Site Photograph 2019*

Description of the Proposed Action

The County of Kaua'i proposes to replace the existing Waimea River earthen crossing with a concrete crossing to reduce the amount of maintenance required. The proposed ford crossing would follow the alignment of the existing crossing. The crossing would likely include culverts to allow water to flow. The proposed project would also improve/harden the river bank at the crossing to prevent erosion.

The area of the project would include approximately 0.75 acres, including the stream crossing, the approaches on the banks, and the construction staging area (see Figure 3 for the project area and Figure 4 for the conceptual plan). All improvements would occur in State and/or County land off of Menehune Road.

Three construction options are currently being considered, including: (1) Pre-Cast Concrete, (2) Pre-Cast Concrete Hybrid, and (3) Cast-in-Place Concrete. These construction options will be evaluated in the Environmental Assessment.

Project Phasing and Construction Cost

The project would be constructed based on funding availability in one phase. The estimated construction costs for completion of the proposed project is $1.7 - 2.2 million. Construction of the project would be financed by State and County of Kaua'i funds.

Figure 3: Project Area *Source: Google Earth Imagery 2019*

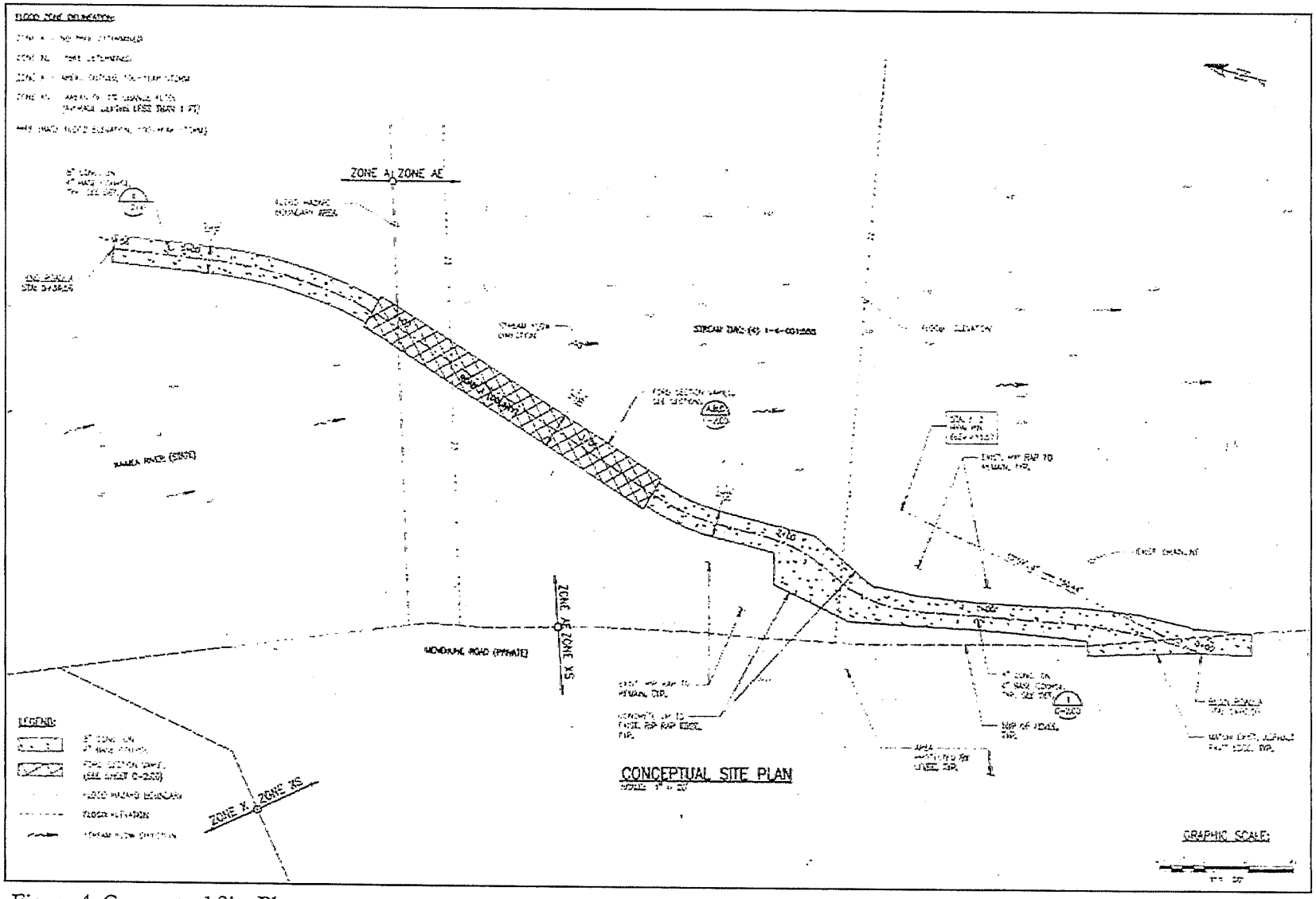


Figure 4: Conceptual Site Plan

Source: Bow Engineering & Development, Inc.

10 114

DAVID Y. IGE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2020 JAN 23 A11:23
DEPT. OF LAND & NATURAL RESOURCES
STATE 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

December 31, 2019

MEMORANDUM

LD 2314

RECEIVED
JAN 03 2020
Division of Aquatic Resources
0072

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

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: **Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing**
LOCATION: TMK (4) 1-6-001:888, Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai
APPLICANT: Engineering Division, Department of Public Works, County of Kauai

Transmitted for your review and comment is information on the above-referenced project contained in the attached received from the County of Kauai.

Please submit any comments to DLNR's Land Division by **January 22, 2020**, and we will forward them to the County per their request. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Barbara Lee by phone at 587-0453, or write to barbara.j.lee@hawaii.gov. Thank you.

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

Signed: _____

Print Name: Brian Neilson - DAR Administrator
Date: 1/22/2020

Attachments
Cc: Central Files

DAVID Y. IGE
GOVERNOR OF
HAWAII

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

Date: 1-15-2020
DAR #6072

MEMORANDUM

TO: Brian J. Neilson
DAR Administrator

FROM: Heather Ylitalo-Ward, Aquatic Biologist

SUBJECT: Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing

Request Submitted by: Russel Y. Tsuji, Land Administrator

Location of Project: TMK (4) 1-6-001:888, Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai

Brief Description of Project:
The County of Kaua'i, Department of Public Works proposes to replace the existing Waimea River earthen crossing with a concrete crossing to reduce the amount of maintenance required. The Department of Public Works is soliciting comments on specific issues to be included in the environmental analysis and permitting requirements to ensure that the Environmental Assessment is thorough and adequate, and that it meets the needs of the public and responsible/reviewing agencies.

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: _____ Date: 1/22/2020
Brian J. Neilson
DAR Administrator

DAR# 6072

Comments

The Division of Aquatic Resources (DAR) would like to request that the Environmental Assessment consider the possible incidences of sediment or land based sources of pollution (LBSP) released in order to avoid a continuous release or buildup of sediment or LBSP in near shore areas that may result in permanently killing or negatively impacting aquatic resources and habitat. It should take in to consideration what effect the structure will have on the water flow and how it will respond to high rains or hurricanes.

DAR recommends that the Environmental Assessment consider construction materials be composed of environmentally inert materials to the extent practicable.

Additionally, DAR requests that the Environmental Assessment determine what aquatic species can be found in the area and how the structure could impact their behavior and habitat.

Thank you for providing DAR the opportunity to review and comment on the preparation of the Environmental Assessment for Kalaunui Stream Bridge Replacement. When the Environmental Assessment has been prepared, DAR requests the opportunity to review and comment on the final document.

LD 058

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

December 31, 2019

MEMORANDUM

LD 2314

TO: FROM

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

FROM: TO Russell Y. Tsuji, Land Administrator
SUBJECT: **Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing**
LOCATION: TMK (4) 1-6-001:888, Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai
APPLICANT: Engineering Division, Department of Public Works, County of Kauai

Transmitted for your review and comment is information on the above-referenced project contained in the attached received from the County of Kauai.

Please submit any comments to DLNR's Land Division by **January 22, 2020**, and we will forward them to the County per their request. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Barbara Lee by phone at 587-0453, or write to barbara.j.lee@hawaii.gov. Thank you.

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

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 1/10/20

Attachments
Cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing
Location: Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai
TMK(s): (4) 1-6-001:888
Applicant: Engineering Division, Department of Public Works, County of Kauai

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.hawaiinfip.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: 1/10/20

LD 869

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

December 31, 2019

MEMORANDUM

LD 2314

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

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: **Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing**

LOCATION: TMK (4) 1-6-001:888, Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai

APPLICANT: Engineering Division, Department of Public Works, County of Kauai

Transmitted for your review and comment is information on the above-referenced project contained in the attached received from the County of Kauai.

Please submit any comments to DLNR's Land Division by **January 22, 2020**, and we will forward them to the County per their request. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Barbara Lee by phone at 587-0453, or write to barbara.j.lee@hawaii.gov. Thank you.

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

Signed: /s/ M. Kaleo Manuel

Print Name: Deputy Director

Date: January 13, 2020

Attachments
Cc: Central Files

FILE ID: RPD.6305.2
DOC ID: 22111

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON

BRUCE S. ANDERSON, PH.D.
KAMANA BEAMER, PH.D.
MICHAEL G. BUCK
NEIL J. HANNAHS
WAYNE K. KATAYAMA
PAUL J. MEYER

M. KALEO MANUEL
DEPUTY DIRECTOR

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

January 13, 2020

REF: RFD.5305.2

TO: Mr. Russell Tsuji, Administrator
Land Division

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

SUBJECT: Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing

FILE NO.: RFD.5305.2
TMK NO.: (4) 1-6-001:888

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

Our comments related to water resources are checked off below.

- [ ] 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
- [ ] 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
- [ ] 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
- [ ] 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.
- [X] 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 Lenore Ohye of the Planning Branch at 587-0216 or Dean Uyeno of the Stream Protection and Management Branch at 587-0234.

LD 689

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

December 31, 2019

MEMORANDUM

LD 2314

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

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: **Environmental Assessment, Early Consultation, for Proposed Replacement of Waimea River Earthen Crossing with Concrete Crossing**

LOCATION: TMK (4) 1-6-001:888, Waimea River Ford Crossing, 1.3 miles North of Waimea, Island of Kauai

APPLICANT: Engineering Division, Department of Public Works, County of Kauai

Transmitted for your review and comment is information on the above-referenced project contained in the attached received from the County of Kauai.

Please submit any comments to DLNR's Land Division by **January 22, 2020**, and we will forward them to the County per their request. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Barbara Lee by phone at 587-0453, or write to barbara.j.lee@hawaii.gov. Thank you.

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

Signed: [signature]

Print Name: Wesley T. Matsunaga

Date: 1/13/20

Attachments
Cc: Central Files

PW # 01.20.094

OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

DTS 202001091250HE

January 19, 2020

Mr. Lyle Tabata
Deputy County Engineer
Department of Public Works
Engineering Division
County of Kauai
4444 Rice Street, Suite 175
Lihue, Hawaii 96766

Dear Mr. Tabata:

Subject: Scoping and Early Consultation for Draft Environmental Assessment – Waimea River Ford Crossing Project, Waimea District, Island of Kauai TMK: (4) 1-6-001: 888

Thank you for the opportunity to provide comments on the early consultation request for the preparation of a Draft Environmental Assessment (Draft EA) on the Waimea River pedestrian crossing project.

It is our understanding that the County of Kauai proposes the replacement of the existing Waimea River earthen foot bridge with a concrete crossing to reduce the costs in maintaining this bridge. The ford crossing would follow the alignment of the existing crossing. The project also calls for making improvements to the river bank to prevent erosion.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. Hawaii State Planning Act
   The Hawaii Revised Statutes (HRS) Chapter 226, serves as a guide for long-term development for the State. It provides 1) goals, objectives, and policies; 2) the allocation of resources through planning coordination and implementation efforts; and 3) priority guidelines for the State. The Draft EA would benefit from the inclusion of a discussion on the provisions of HRS Chapter 226, as they pertain to this project.

2. Hawaii Coastal Zone Management Program
   The Hawaii Coastal Zone Management (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).

Pursuant to HRS § 205A-4, in implementing the objectives of the CZM program, approving agencies shall consider ecological, cultural, historic, esthetic, recreational, scenic, open space values, coastal hazards, and economic development. As the project is being proposed by the County of Kauai, the Draft EA should include an assessment on the project's consistency with the objectives and supporting policies of the Hawaii CZM Program, HRS § 205A-2.

3. Coastal Zone Management Act - Federal Consistency.
We note that the proposed action may involve construction activity within the bed and banks of Waimea River. Additionally, the proposed action calls for improvements to the bed and bank of the River. If the U.S. Army Corps of Engineers determines that the proposed replacement and construction work requires a Department of the Army (DA) permit, then a Coastal Zone Management Act (CZMA) federal consistency review may be necessary.

The national CZMA requires that federal actions be consistent with approved state coastal programs' enforceable policies. Federal actions include activities performed by a federal agency; activities that require federal permits or approvals; or state and local government projects that receive federal financial assistance.

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 federal consistency reviews if a DA permit is deemed necessary.

4. Drainage / Stormwater Runoff Mitigation / Erosion Controls
Pursuant to HAR § 11-200.1-18(d)(7) – identification and analysis of impacts and alternatives considered; to ensure that the surface water resources adjacent to the Waimea River and the downriver nearshore marine resources remain protected, the negative effects of stormwater inundation and sediment loading on water quality within the nearshore waters of Waimea Bay 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, the shoreline, and examining any increase of permeable surfaces in the project area. Developing mitigation measures for the protection for surface water resources and the coastal ecosystem should take this into account, pursuant to HAR § 11-200.1-18(d)(8).

To assist in the development of stormwater runoff strategies, OP has developed guidance documents on this subject. We recommend consulting these stormwater evaluative tools when developing mitigation approaches for polluted runoff. They offer useful techniques to keep land-based pollutants and sediment in place, while considering the management practices best suited for the topography of the area and the types of contaminants potentially affecting nearby water resources. The evaluative tools that you may find beneficial during

the design process include:

- Hawaii Watershed Guidance provides direction on mitigation strategies for urban development activities that will safeguard watersheds and implement watershed plans. http://files.hawaii.gov/dbedt/op/czm/initiative/nonpoint/HI_Watershed Guidance Final.pdf; and

- Stormwater Impact Assessments can be used to identify and analyze information on hydrology, sensitivity of coastal and riparian resources, and management measures to control runoff, as well as consider secondary and cumulative impacts to the area. http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf.

If you have any questions regarding this comment letter, please contact Joshua Hekekia of our office at (808) 587-2845.

Sincerely,

Mary Alice Evans

Mary Alice Evans
Director

PW # 01.20.026

Water Resources Research Center

UNIVERSITY of HAWAI'I®
MĀNOA

January 6, 2020

To Whom It May Concern,

This is to acknowledge receipt of your letter requesting a review of an environmental assessment (EA) or environmental impact statement (EIS). The Environmental Center at the University of Hawai'i at Mānoa, which for a time was linked to the Water Resources Research Center (WRRC), has been discontinued. As a result of the closure of the Environmental Center, we regret that WRRC no longer has the capacity to review environmental documents.

Sincerely,

Thomas Giambelluca
Director

Attachment

RECEIVED
JAN 09 2020
DEPARTMENT OF PUBLIC WORKS
ADMINISTRATION

2540 Dole Street, Holmes Hall 283
Honolulu, Hawai'i 96822
Telephone: (808) 956-7847
Fax: (808) 956-5044
An Equal Opportunity/Affirmative Action Institution

APPENDIX B

DEMOLITION AND CONSTRUCTION PHASING PLAN SET

COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
WAIMEA RIVER FORD CROSSING

KAUA'I, HAWAI'I
FEDERAL AID PROJECT NO. BR-0700(59)
TMK: (4) 1-6-001:888

DISTRICT OF WAIMEA
ISLAND OF KAUA'I

PLANS PREPARED BY:

KAI HAWAII INC.

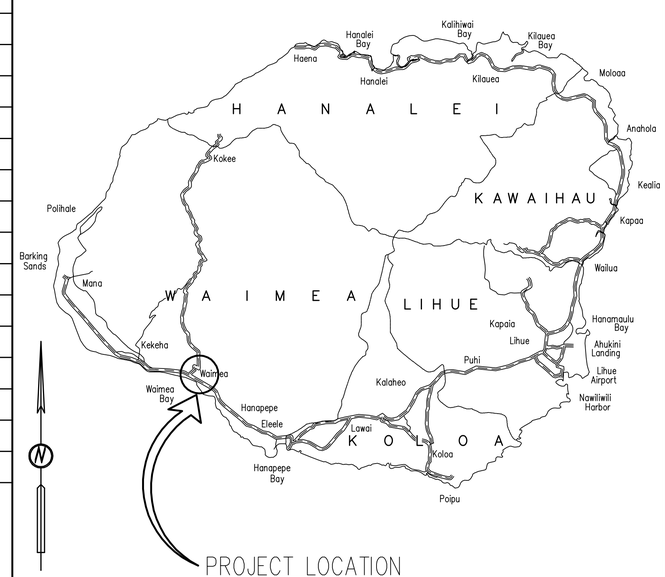
50 S. BERETANIA STREET, C-119C
HONOLULU, HAWAII, 96813

DATE: MAY 2020

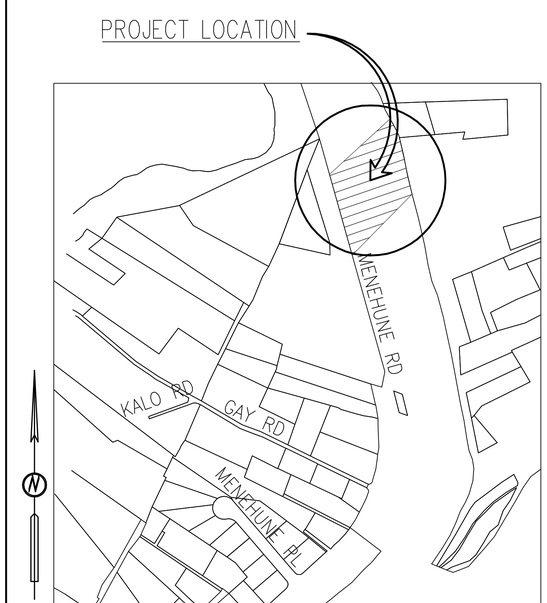
INDEX

SHT. NO.	DWG. NO.	DESCRIPTION
1	T0.1	TITLE SHEET
2	C-0.00	TITLE SHEET
3	C-0.01	CONSTRUCTION NOTES – 1
4	C-0.02	CONSTRUCTION NOTES – 2
5	C-1.00	DEMOLITION AND EROSION CONTROL PLAN
6	C-1.01	SITE PLAN
7	C-1.02	GRADING PLAN AND PROFILE
8	C-2.00	SECTIONS
9	C-3.00	MISCELLANEOUS DETAILS
10	C-4.00	TRAFFIC CONTROL PLAN
11		RESERVED SHEET
12		RESERVED SHEET
13		RESERVED SHEET
14		RESERVED SHEET
15		RESERVED SHEET
16	S0.1	STRUCTURAL NOTES AND ABBREVIATIONS
17	S0.2	TYPICAL STRUCTURAL DETAILS – 1
18	S0.3	TYPICAL STRUCTURAL DETAILS – 2
19	S0.4	TEMPORARY STREAM CROSSING AND SHEET PILE DETAILS
20	S0.5	TYPICAL SHEET PILE DETAILS
21	S1.1	FORD CROSSING LAYOUT PLAN
22	S1.2	TYPICAL FORD CROSSING LONGITUDINAL SECTION
23	S1.3	TYPICAL FORD CROSSING CROSS SECTION – OPTION 1
24	S1.4	TYPICAL FORD CROSSING CROSS SECTION – OPTION 2
25	S2.1	RESERVED SHEET
26	S2.2	RESERVED SHEET

VICINITY MAP (NOT TO SCALE)



LOCATION MAP (NOT TO SCALE)



APPROVED:

MAYOR
COUNTY OF KAUAI — DATE

DIRECTOR OF PLANNING
COUNTY OF KAUAI — DATE

COUNTY ENGINEER, DEPARTMENT OF PUBLIC WORKS
COUNTY OF KAUAI — DATE

MANAGER AND CHIEF ENGINEER, DEPARTMENT OF WATER
COUNTY OF KAUAI — DATE

FILE: _____ POCKET: _____ FOLDER: _____ NUMBER: _____

WAIMEA RIVER FORD CROSSING (PRELIMINARY DESIGN)

NOTES FOR GENERAL CONSTRUCTION:

1. ALL CONSTRUCTION WORK IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE PUBLICATION "HAWAI'I STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005" AND ITS AMENDMENTS AND "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION SEPTEMBER 1984" AS AMENDED OF THE DEPARTMENT OF PUBLIC WORKS, CITY AND COUNTY OF HONOLULU, AND THE COUNTIES OF KAUA'I, MAUI AND HAWAI'I. THE STANDARD DETAILS ARE AVAILABLE AT THE COUNTY OF KAUA'I CLERK'S OFFICE."
2. NO GRADING BETWEEN 7 P.M. TO 7 A.M. ON ANY GIVEN DAY OR ON SATURDAYS, SUNDAYS AND HOLIDAYS WITHOUT WRITTEN PERMISSION FROM THE COUNTY ENGINEER AND THE STATE DEPARTMENT OF HEALTH.
3. CONTRACTOR TO NOTIFY PUBLIC WORKS DEPARTMENT FIVE (5) BUSINESS DAYS PRIOR TO COMMENCING ANY GRADING WORK. WHEN COMPLETED AND READY FOR FINAL INSPECTION; NOTIFY PUBLIC WORKS DEPARTMENT INSPECTION SECTION.
4. CONSTRUCTION PLANS ARE VALID FOR A PERIOD OF ONE YEAR FROM THE DATE OF APPROVAL; IF CONSTRUCTION DOES NOT COMMENCE WITHIN THIS ONE YEAR TIME FROM THE DATE OF APPROVAL, THE CONSTRUCTION PLANS WILL NEED TO BE RESUBMITTED TO ALL REVIEWING AND APPROVING AGENCIES FOR REVIEW, APPROVAL AND RECERTIFICATION OF THE PLAN.
5. ALL GRADING, GRUBBING AND STOCKPILING WORK SHALL BE PERFORMED IN ACCORDANCE WITH COUNTY OF KAUA'I ORDINANCE NO. 808.
6. AFTER EACH RAINFALL EVENT, THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COST INCURRED FOR ANY NECESSARY REMEDIAL ACTION BY THE COUNTY ENGINEER SHALL BE PAYABLE BY THE CONTRACTOR.
7. DURING CLEANING OPERATIONS, THE CONTRACTOR SHALL SUPPLY A WATER TRUCK FOR DUST CONTROL PURPOSES UNTIL VEGETATION HAS RE-ESTABLISHED ITSELF. EXCESS WATER, INCLUDING SILT AND DIRT SHALL NOT BE ALLOWED TO RUN-OFF THE PROPERTY.
8. BENCHMARKS THAT ARE DISTURBED OR DESTROYED SHALL BE RESTORED UNDER A LICENSED LAND SURVEYOR'S DIRECTION. COPIES OF FIELD NOTES, DESCRIPTIONS AND NEW VALUES OF THE NEW BENCHMARK SHALL BE SENT TO THE DEPARTMENT OF PUBLIC WORKS SURVEY SECTION FOR REVIEW AND APPROVAL PRIOR TO FINAL ACCEPTANCE OF THE PROJECT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OVERTIME AND/OR NIGHT WORK PAYMENTS FOR COUNTY'S STAFF AND INSPECTION PERSONNEL INCLUDING CONSULTANTS, WHEN THE CONTRACT REQUIRES OVERTIME OR NIGHT WORK TO BE PERFORMED, OR DIRECTS THE CONTRACTOR TO WORK ADDITIONAL SHIFTS OR OVERTIME FOR COUNTY'S CONVENIENCE.
10. BEST MANAGEMENT PRACTICES (BMP'S) SHALL BE EMPLOYED AT ALL TIMES TO THE MAXIMUM EXTENT PRACTICABLE TO PREVENT DAMAGE BY SEDIMENTATION, EROSION OR DUST TO STREAMS, WATERCOURSES, NATURAL AREAS, AND THE PROPERTY OF OTHERS.
11. SURVEYS SHALL BE DONE UNDER THE SUPERVISION OF A LAND SURVEYOR LICENSED IN THE STATE OF HAWAI'I.
12. NO NIGHT TIME WORK SHALL BE PERMITTED UNLESS AUTHORIZED BY THE COUNTY CONTRACTING OFFICER. NIGHT TIME WORK SHALL BE FOR EMERGENCY PURPOSES ONLY, IN PREPARATION OF AN UPCOMING STORM.
13. PRIOR TO STARTING ANY EXCAVATION ACTIVITIES, THE CONTRACTOR SHALL CONTACT THE HAWAI'I ONE CALL CENTER AT 1-866-423-7287.
14. FOR BENCHMARK, SEE SHEET C1.1.
15. TOPOGRAPHIC SURVEY WAS PREPARED BY CONTROLPOINT SURVEYING INC., DATED JULY 23, 2018.

WATER POLLUTION AND EROSION CONTROL NOTES:

1. GENERAL:

   A. THE CONTRACTOR IS REMINDED OF THE REQUIREMENTS OF SECTION 209-WATER POLLUTION AND EROSION CONTROL AND SECTION 620 -DUST CONTROL IN THE "HAWAI'I STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005," AS AMENDED. SECTION 209 DESCRIBES BUT IS NO LIMITED TO: SUBMITTAL REQUIREMENTS; SCHEDULING OF A WATER POLLUTION AND EROSION CONTROL CONFERENCE WITH THE COUNTY ENGINEER; CONSTRUCTION REQUIREMENTS; METHOD OF MEASUREMENT; AND BASIS OF PAYMENT. NO WORK SHALL COMMENCE WITHOUT A BMP PLAN APPROVED BY THE DEPARTMENT OF HEALTH.

   B. THE CONTRACTOR SHALL FOLLOW THE GUIDELINES IN THE "INTERIM BEST MANAGEMENT PRACTICES MANUAL FOR CONSTRICTION SITE FOR COUNTY OF KAUA'I" APRIL 2004 IN DEVELOPING, INSTALLING AND MAINTAINING THE BEST MANAGEMENT PRACTICES (BMP'S) FOR THE PROJECT. THE CONTRACTOR MAY SUBMIT ALTERNATE METHODS TO THE COUNTY FOR ACCEPTANCE.

   C. THE CONTRACTOR SHALL KEEP A COPY OF THE APPROVED BMP PLAN, NOI, ETC. ON THE PROJECT SITE. THE BMP PLAN SHALL BE UPDATED TO REFLECT ANY CHANGES MADE DURING THE COURSE OF CONSTRUCTION FOR THE DURATION OF THE PROJECT.

   D. THE COUNTY ENGINEER MAY ASSESS LIQUIDATED DAMAGES OF UP TO $27,500 FOR NONCOMPLIANCE OF EACH BMP REQUIREMENT AND EACH REQUIREMENT STATED IN SECTION 209, FOR EVERYDAY OF NONCOMPLIANCE. THERE IS NO MAXIMUM LIMIT ON THE AMOUNT ASSESSED PER DAY.

   E. THE COUNTY ENGINEER MAY DEDUCT THE COST FROM THE PROGRESS PAYMENT FOR ALL CITATIONS RECEIVED BY THE DEPARTMENT FOR NON-COMPLIANCE, OR THE CONTRACTOR/OWNER SHALL REIMBURSE THE STATE AND/OR COUNTY FOR THE FULL AMOUNT OF THE OUTSTANDING COST INCURRED BY THE STATE AND/OR COUNTY.

2. WASTE DISPOSAL:

   A. WASTE MATERIALS: ALL WASTE MATERIALS SHALL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER THAT DOES NOT LEAK. THE DUMPSTER SHALL MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE SHALL BE DEPOSITED IN THE DUMPSTER. THE DUMPSTER SHALL BE EMPTIED A MINIMUM OF TWICE PER WEEK OR AS OFTEN AS IS DEEMED NECESSARY. NO CONSTRUCTION WASTE MATERIAL SHALL BE BURIED ONSITE. THE CONTRACTOR'S SUPERVISORY PERSONNEL SHALL BE INSTRUCTED REGARDING THE CORRECT PROCEDURE OR WASTE DISPOSAL. NOTICES STATING THESE PRACTICES SHALL BE POSTED IN THE OFFICE TRAILER AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR SEEING THAT THESE PROCEDURES ARE FOLLOWED.

   B. HAZARDOUS WASTE: ALL HAZARDOUS WASTE MATERIAL SHALL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATIONS OR BY THE MANUFACTURER. THE CONTRACTOR'S SITE PERSONNEL SHALL BE INSTRUCTED IN THESE PRACTICES AND SHALL BE RESPONSIBLE FOR SEEING THAT THESE PRACTICES FOR FOLLOWED.

   C. SANITARY WASTE: ALL SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS A MINIMUM OF ONCE PER WEEK, OR AS REQUIRED.

3. EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES:

   A. ALL CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE A EACH WEEK AND WITHIN 24 HOURS FOLLOWING ANY RAINFALL EVENT OF 0.5 INCHES OR GREATER.

   B. ALL MEASURES SHALL BE MAINTAINED IN GOOD WORKING ORDER. IF REPAIR IS NECESSARY, IT SHALL BE INITIATED WITHIN 24 HOURS AFTER THE INSPECTION.

   C. BUILT UP SEDIMENT SHALL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE.

   D. SILT SCREEN OF FENCE SHALL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, TO VERY THAT THE FABRIC FENCE IS SECURELY ATTACHED TO THE FENCE POST OR CONCRETE SLAB AND TO VERIFY THAT THE FENCE POST ARE FIRMLY IN THE GROUND.

   E. TEMPORARY AND PERMANENT SEEDING AND PLANTING SHALL BE INSPECTED FOR BARE SPOTS, WASH OUTS AND HEALTHY GROWTH.

   F. THE CONTRACTOR SHALL SUBMIT TO THE COUNTY ENGINEER A MAINTENANCE INSPECTION REPORT PROMPTLY AFTER EACH WEEKLY INSPECTION.

   G. THE CONTRACTOR SHALL SELECT A MINIMUM OF THREE PERSONNEL WHO SHALL BE RESPONSIBLE FOR INSPECTIONS, MAINTENANCE AND REPAIR ACTIVITIES AND FILLING OUT THE INSPECTION AND MAINTENANCE REPORT.

   H. PERSONNEL SELECTED FOR THE INSPECTION AND MAINTENANCE RESPONSIBILITIES SHALL RECEIVE TRAINING FROM THE CONTRACTOR. THEY SHALL BE TRAINED IN ALL THE INSPECTION AND MAINTENANCE PRACTICES NECESSARY FOR KEEPING THE EROSION AND SEDIMENT CONTROLS USED ONSITE IN GOOD WORKING ORDER.

   I. ALL SLOPES AND EXPOSED AREAS SHALL BE GRASSED AS FINAL GRADES HAVE BEEN ESTABLISHED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA IN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED OR EXPOSED FOR MORE THAN 15 DAYS SHALL BE GRASSED IN ORDER TO PREVENT DUST EMISSION, EROSION AND SILT RUNOFF. AREAS WITH IMPORTED SOILS SHALL BE GRASSED NOT MORE THAN 5 WORKING DAYS AFTER THE FINAL GRADES HAVE BEEN ESTABLISHED.

   J. TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.

WATER POLLUTION AND EROSION CONTROL NOTES (CONT.):

4. GOOD HOUSE KEEPING BEST MANAGEMENT PRACTICES:

   A. MATERIALS POLLUTION PREVENTION PLAN.

      a. APPLICABLE MATERIALS OR SUBSTANCES LISTED BELOW ARE EXPECTED TO BE PRESENT ONSITE DURING CONSTRUCTION. OTHER MATERIALS AND SUBSTANCES NOT LISTED BELOW SHALL BE ADDED TO THE INVENTORY OF THE CONSTRUCTION CONTRACTOR'S SITE-SPECIFIC BMP PLAN.

CONCRETE	FERTILIZERS
DETERGENTS	PETROLEUM BASED PRODUCTS
PAINTS (ENAMEL & LATEX)	CLEANING SOLVENTS
METAL STUDS	WOOD

      b. MATERIAL MANAGEMENT SHALL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORM WATER RUNOFF. AN EFFORT SHALL BE MADE TO STORE ONLY ENOUGH PRODUCT AS IS REQUIRED TO DO THE JOB.

      c. ALL MATERIALS STORED ONSITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS AND IF POSSIBLE UNDER A ROOF OR OTHER ENCLOSURE.

      d. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE ORIGINAL MANUFACTURE'S LABEL.

      e. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.

      f. A PRODUCT SHALL BE USED UP COMPLETELY BEFORE DISPOSING OF THE CONTAINER.

      g. MANUFACTURER'S RECOMMENDATION FOR PROPER USE AND DISPOSAL SHALL BE FOLLOWED.

      h. THE CONTRACTOR SHALL CONDUCT A DAILY INSPECTION TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS ONSITE.

   B. HAZARDOUS MATERIAL POLLUTION PREVENTION PLAN::

      a. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.

      b. ORIGINAL LABELS AND MATERIALS SAFETY DATA SHEETS (MSDS) SHALL BE RETAINED AND MADE AVAILABLE TO THE COUNTY ENGINEER UPON REQUEST.

      c. SURPLUS PRODUCTS SHALL BE DISPOSED OF ACCORDING TO MANUFACTURER'S INSTRUCTIONS OR LOCAL AND STATE RECOMMENDED REGULATIONS.

   C. ONSITE AND OFFSITE PRODUCTS SPECIFIC PLANS:

      THE FOLLOWING PRODUCT SPECIFIC PRACTICES SHALL BE FOLLOWED ONSITE:

      a. PETROLEUM BASED PRODUCTS: ALL ONSITE VEHICLES SHALL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE. PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT SUBSTANCES USED ONSITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION.

      b. FERTILIZERS: APPLY FERTILIZED USED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, WORK FERTILIZER INTO THE SOIL TO LIMIT EXPOSURE TO STORM WATER. STORAGE SHALL BE IN A COVERED SHED.

      c. PAINTS: SEAL AND STORE ALL CONTAINER WHEN NOT REQUIRED FOR USE. DO NOT DISCHARGE EXCESS PAINT TO THE ROADWAY DRAINAGE SYSTEM. DISPOSE PROPERLY ACCORDING TO MANUFACTURER'S INSTRUCTION OR STATE AND LOCAL REGULATIONS.

      d. CONCRETE TRUCKS: WASH OUT OR DISCHARGE CONCRETE TRUCK DRUM WASH WATER ONLY AT A DESIGNATED SITE. DO NOT DISCHARGE WATER IN ROADWAY DRAINAGE SYSTEM OR WATERS OF THE UNITED STATES. CONTACT DRINKING WATER BRANCH, DEPARTMENT OF HEALTH AT (808) 586-4258 TO RECEIVE PERMISSION TO DESIGNATE A DISPOSAL SITE. CLEAN DISPOSAL SITE AS REQUIRED OR AS REQUESTED BY THE OWNER'S REPRESENTATIVE.

   D. SPILL CONTROL PLAN:

      a. POST A SPILL PREVENTION PLAN TO INCLUDE MEASURES TO PREVENT AND CLEAN UP EACH SPILLWAY.

      b. THE CONTRACTOR SHALL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR. DESIGNATE AT LEAST THREE SITE PERSONNEL WHO SHALL RECEIVE SPILL PREVENTION AND CLEANUP TRAINING. THESE INDIVIDUALS SHALL EACH BECOME RESPONSIBLE FOR A PARTICULAR PHASE OF PREVENTION AND CLEANUP. POST THE NAMES OF RESPONSIBLE SPILL PERSONAL IN THE MATERIAL STORAGE AREA AND IN THE OFFICE TRAILER ONSITE.

      c. CLEARLY POST MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP. MAKE SITE PERSONNEL AWARE OF THE PROCEDURES AND THE LOCATION OF INFORMATION AND CLEANUP SUPPLIES.

      d. KEEP MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP IN THE MATERIAL STORAGE AREA ONSITE.

      e. CLEAN UP ALL SPILL IMMEDIATELY AFTER DISCOVERY.

      f. KEEP THE SPILL AREA WELL VENTILATED. PERSONNEL SHALL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH HAZARDOUS SUBSTANCE.

      g. REPORT SPILLS OF TOXIC HAZARDOUS MATERIAL TO THE APPROPRIATE STATE OR LOCAL GOVERNMENT AGENCY, REGARDLESS OF SIZE.

WATER POLLUTION AND EROSION CONTROL NOTES (CONT.):

5. NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEMS (NPDES) REQUIREMENTS:

   A. THE CONTRACTOR SHALL APPLY FOR, OBTAIN AND COMPLY WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPES) REQUIREMENTS FOR KAUA'I DISTRICT PERMIT PROJECTS. THIS IS AVAILABLE AT THE KAUA'I DISTRICT OFFICE AT 3040 UMI STREET, SUITE 205. DUE TO POTENTIAL COST IMPACTS, THE CONTRACTOR NEEDS TO BE AWARE OF THE REQUIREMENTS.

   B. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REQUIREMENTS FOR ALL PROJECTS WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND. THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL NOTICE OF GENERAL PERMIT COVERAGE (NGPC) IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAI'I AND HAS SATISFIED ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM.

   C. THE CONTRACTOR SHALL COMPLETE AND SUBMIT A CONTRACTOR'S CERTIFICATION OF NPDES COMPLIANCE, INCLUDING COMPLETION OF THE BEST MANAGEMENT PRACTICE (BMP) CHECKLIST AND SUBMITTAL OF A WRITTEN BMP PLAN AND DRAWINGS, PRIOR TO ISSUANCE OF THE PERMIT TO PERFORM WORK UPON COUNTY ROADWAYS.

GRADING NOTES:

TEMPORARY DUST CONTROL MEASURES FOR GRADING

1. THE GRADED OR PROJECT SITE THAT IS CLEARED OF VEGETATION SHALL BE KEPT DAMP WITH WATER CONTINUOUSLY FOR SEVEN (7) DAYS A WEEK. AT THE END OF EACH DAY, THE SITE SHALL BE SUFFICIENTLY DAMPENED WITH WATER ON A CONTINUAL BASIS SO THAT THE SITE WILL REMAIN MOISTENED DURING THE NIGHT.
2. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS SO THAT EXCAVATION, EMBANKMENT, AND IMPORTED MATERIAL SHALL BE DAMPENED WITH WATER ON A CONTINUAL BASIS TO PREVENT DUST PROBLEMS.
3. IN APPLYING FOR A GRADING PERMIT, THE CONTRACTOR SHALL SUBMIT PLANS, SCHEDULES AND/OR WRITTEN MEASURES WHICH PROVIDES FOR DUST CONTROL. THE DUST CONTROL MEASURES SHALL CONTAIN POSITIVE STATEMENTS WHICH REQUIRE ACTIONS OR WORK THAT PREVENT DUST PROBLEMS. NO PERMITS WILL BE ISSUED UNLESS THE COUNTY IS ASSURED THAT DUST PROBLEMS WILL BE MINIMIZED.

TEMPORARY DUST CONTROL MEASURES FOR GRADING

1. TEMPORARY VEGETATIVE COVER SHALL BE PLANTED WITHIN A PERIOD OF 30 CALENDAR DAYS AFTER THE SITE HAS BEEN GRADED OR BARED OF VEGETATION OR IF THE SITE WILL BE SUSPENDED FOR MORE THAN 30 CALENDAR DAYS.
2. TEMPORARY VEGETATIVE COVER SHALL CONSIST OF 40 LBS. COMMON RYE GRASS SEED PER ACRE, 400 LBS. PER ACRE 10-10-10 OR EQUIVALENT FERTILIZER WORKED INTO THE SEED BED BEFORE PLANTING. TEMPORARY SPRINKLER SYSTEM IS TO BE INSTALLED CONCURRENTLY WITH ALL PLANTINGS AND MAINTENANCE OF GRASS SHALL CONFORM TO THE "HAWAI'I STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005" AND ITS AMENDMENTS.

PERMANENT EROSION CONTROL MEASURES FOR GRADING

1. THE CONTRACTOR SHALL GRASS THE ENTIRE PROJECT SITE, EXCEPT PAVED AREAS WITH BERMUDA GRASS SPRIGS. THE GRASS SHALL BE PLANTED, FERTILIZED, AND MAINTAINED IN ACCORDANCE WITH THE "HAWAI'I STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2005" AND ITS AMENDMENTS.
2. THE CONTRACTOR SHALL GRASS ALL EXPOSED AREAS THAT HAVE BEEN CONSTRUCTED TO FINAL GRADES WITHIN A PERIOD OF 30 CALENDAR DAYS.
3. IN LIEU OF GRASS SPRIGS (NOTE 1), THE CONTRACTOR MAY USE HYDROMULCH WITH SEEDINGS AND IRRIGATION SPRINKLER SYSTEM.

GRADING PHASES

1. WHEN GRADING WORK IS DONE IN PHASES, THE ENGINEER MUST ACCEPT THE COMPLETED PHASE PRIOR TO START OF WORK ON THE NEXT PHASE. EVEN AFTER A COMPLETED PHASE HAS BEEN ACCEPTED, THE GRASSING OR OTHER MEANS OF STABILIZATION MUST BE MAINTAINED UNTIL PROJECT COMPLETION.

GRADING RECOMMENDATION

1. ALL GRADING IMPROVEMENTS AND PAVEMENT RECOMMENDATIONS SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS PROVIDED BY GEOLABS, INC.

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

CONSTRUCTION NOTES - 1

SCALE: AS SHOWN | DATE: MAY 2020
DRAWN BY: DT | F.B. | C.B.
TRACED BY:
CHECKED BY: MF
APPROVED _____ COUNTY ENGINEER
SHEET CO.1 OF 2 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted Wed, 12 Aug 2020 - 1:19pm By: DTANIGAWA
File Name: H:\FY2018\8016 Waimea River Ford Crossing\06 CADD\C-01 to C-02 Waimea River - General Notes.dwg

TMK (4) 1-8-001:888

ENVIRONMENTAL CONTROL NOTES:

1. IN ACCORDANCE WITH CHAPTER 11-60.1, AIR POLLUTION CONTROL, TITLE 11, HAWAI'I ADMINISTRATIVE RULES, THE PROPERTY OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR ENSURING THAT EFFECTIVE CONTROL MEASURES ARE PROVIDED TO MINIMIZE OR PREVENT ANY VISIBLE DUST EMISSION CAUSED BY THE CONSTRUCTION WORK FROM IMPACTING THE SURROUNDING AREAS INCLUDING THE OFF-SITE ROADWAYS USED TO ENTER/EXIT THE PROJECT. THESE MEASURES INCLUDE BUT ARE NOT LIMITED TO THE USE OF WATER WAGONS, SPRINKLER SYSTEM, DUST FENCES, ETC.

2. IN ACCORDANCE WITH CHAPTER 11-55, WATER POLLUTION CONTROL AND CHAPTER 11-54, WATER QUALITY STANDARDS, TITLE 11, HAWAI'I ADMINISTRATIVE RULES, THE PROPERTY OWNER/DEVELOPER SHALL RESPONSIBLE FOR ENSURING THAT THE BEST MANAGEMENT PRACTICES (BMP) TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENTS, DEBRIS AND OTHER WATER POLLUTANT INTO STATE WATERS IS PROVIDED AT ALL TIMES.

3. IN ACCORDANCE WITH CHAPTER 11-58, SOLID WASTE MANAGEMENT CONTROL, TITLE 11, HAWAI'I ADMINISTRATIVE RULES, THE PROPERTY OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR ENSURING THAT GRUB MATERIAL, DEMOLITION WASTE AND CONSTRUCTION WASTE GENERATED BY THE PROJECT ARE DISPOSED OF IN A MANNER OR AT A SITE APPROVED BY THE STATE DEPARTMENT OF HEALTH. DISPOSAL OF ANY OF THESE WASTES BY BURNING IS PROHIBITED.

4. THE PROPERTY OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL APPLICABLE PERMITS FROM THE DEPARTMENT OF HEALTH INCLUDING BUT NOT LIMITED TO NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES), NOTICE OF INTENT AND GENERAL PERMIT FOR STORM WATER, HYDROSTATIC TEST AND DEWATERING DISCHARGES PRIOR TO COMMENCING CONSTRUCTION. NPDES PERMIT SHALL BE REQUIRED PRIOR TO GRADING OR GRUBBING WORK OVER AN AREA OF ONE ACRE OR MORE.

5. AFTER EACH RAINFALL EVENT, THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM THIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COST INCURRED FOR ANY NECESSARY REMEDIAL ACTION BY THE COUNTY ENGINEER SHALL BE PAYABLE BY THE CONTRACTOR.

6. BEST MANAGEMENT PRACTICES (BMP'S) SHALL BE EMPLOYED AT ALL TIMES TO THE MAXIMUM EXTENT PRACTICABLE TO PREVENT DAMAGE BY SEDIMENTATION, EROSION OR DUST TO STREAMS, WATER COURSES, NATURAL AREAS AND THE PROPERTY OF OTHERS.

7. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT REQUIREMENTS FOR ALL PROJECTS WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND. THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL NOTICE OF GENERAL PERMIT COVERAGE (NGPC) IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAI'I AND HAS SATISFIED ANY OTHER PERMITTING REQUIREMENTS OF THE NPDES PERMIT PROGRAM.

8. IN ACCORDANCE WITH CHAPTER 11-46, COMMUNITY NOISE, HAWAI'I ADMINISTRATIVE RULES, THE CONTRACTOR AND THE PROPERTY OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR PROVIDING EFFECTIVE CONTROL MEASURES TO MINIMIZE OR PREVENT CONSTRUCTION RELATED NOISE FROM IMPACTING THE RESIDENTS IN THE IMMEDIATE AREA. IF REQUIRED, NOISE REDUCTION MEASURES SHALL BE IMPLEMENTED BY THE CONTRACTOR DURING THE CONSTRUCTION WORK.

9. THE PROPERTY MAY HARBOR RODENTS WHICH WILL BE DISPERSED TO THE SURROUNDING AREAS WHEN THE SITE IS CLEARED. IN ACCORDANCE WITH CHAPTER 11-26, ENTITLED VECTOR CONTROL OF TITLE 11, HAR, THE APPLICANT SHALL ASCERTAIN THE PRESENCE OR ABSENCE OF RODENTS ON THE PROPERTY. SHOULD THE PRESENCE OF RODENTS BE DETERMINED, THE APPLICANT SHALL ERADICATE THE RODENTS PRIOR TO CLEARING THE SITE.

10. A COPY OF THE PLANS, CONSTRUCTION SCHEDULE AND/OR WRITTEN MEASURES THAT IS REQUIRED TO BE SUBMITTED BY THE CONTRACTOR (DUST CONTROL MEASURES/PLANS) SHOULD ALSO BE SENT TO THE DEPARTMENT OF HEALTH FOR MONITORING PURPOSES.

PUBLIC HEALTH, SAFETY AND CONVENIENCE NOTES:

1. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH AND SAFETY AND ENVIRONMENTAL QUALITY.

2. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AND ITS SURROUNDING AREAS FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.

3. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC.

4. THE CONTRACTOR SHALL SUBMIT A NOISE POLLUTION CONTROL PLAN WHEN APPLYING FOR A CONSTRUCTION PERMIT.

NOTES FOR CONSTRUCTION WITHIN COUNTY RIGHT-OF-WAY

1. ALL DAMAGED PAVEMENT SHALL BE RESTORED TO ITS ORIGINAL CONDITION IN ACCORDANCE WITH COUNTY OF KAUA'I, "HAWAI'I STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (2005)" AND ITS AMENDMENTS AND THE "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1984", AS AMENDED BY THE DEPARTMENT OF PUBLIC WORKS, CITY AND COUNTY OF HONOLULU, AND THE COUNTIES OF KAUA'I, MAUI, AND HAWAI'I, WITH 2" MINIMUM HOT MIXED ASPHALT CONCRETE PAVEMENT (STATE DESIGN MIX V) AND 8" MINIMUM BASE COURSE.

2. THE CONTRACTOR SHALL PROVIDE, INSTALL MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION AND FOR THE CONVENIENCE AND SAFETY OF THE PUBLIC TRAFFIC. ALL SUCH PROTECTIVE FACILITIES AND PRECAUTIONS TO BE TAKEN SHALL CONFORM WITH THE RULES AND REGULATIONS GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORK SITES ON OR ADJACENT TO PUBLIC STREET AND HIGHWAYS ADOPTED BY THE HIGHWAY SAFETY COORDINATOR AND U.S. FEDERAL HIGHWAY ADMINISTRATION MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS DATED 2009 AND ITS AMENDMENTS.

3. THE CONTRACTOR SHALL, WHENEVER NECESSARY, PROPERLY SHEET AND BRACE ALL EXCAVATIONS TO RENDER IT SECURE AND SHALL REMOVE ALL SUCH SHEETING AND BRACING BEFORE COMPLETION OF THE BACKFILL FOR WATER MAINS. THE MINIMUM COVER REQUIREMENTS (FROM TOP OF PIPE TO FINISHED GRADE OVER PIPE) IS THREE (3) FEET.

4. A. A PERMIT SHALL BE OBTAINED BY THE CONTRACTOR FROM THE DEPARTMENT OF PUBLIC WORKS, COUNTY OF KAUA'I BEFORE WORK ON A PUBLIC STREET OR HIGHWAY MAY BEGIN. PERMIT FEES SHALL BE AT THE CONTRACTOR'S EXPENSE.

   B. DRIVEWAYS SHALL BE KEPT OPEN UNLESS OWNERS OF THE ABUTTING LOTS USING THESE RIGHT-OF-WAY ARE OTHERWISE PROVIDED FOR SATISFACTORILY.

   C. ALL WORK INCLUDING REPAIR OF DAMAGED PAVEMENT AND SHOULDERS SHALL BE INSPECTED AND APPROVED BY THE DEPARTMENT OF PUBLIC WORKS. ALL UNAPPROVED WORK SHALL BE CONSIDERED UNACCEPTABLE AND SHALL BE REWORKED AND CORRECTED AS DIRECTED BY THE DEPARTMENT OF PUBLIC WORKS, AT THE CONTRACTOR'S EXPENSE.

   D. DAMAGED SHOULDERS SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN EXISTING CONDITION.

   E. WORK ON A PUBLIC STREET AREA MAY BE PERFORMED ONLY BETWEEN THE HOURS OF 8:00 A.M. TO 3:30 P.M. MONDAY THROUGH FRIDAY, EXCEPT ON HOLIDAYS RECOGNIZED BY THE COUNTY OF KAUA'I, UNLESS OTHERWISE PERMITTED IN WRITING BY THE COUNTY ENGINEER.

   F. DURING NON-WORKING HOURS, ALL TRENCHES SHALL BE COVERED WITH A SAFE NON-SKID BRIDGING MATERIAL AND ALL LANES SHALL BE OPENED TO PUBLIC VEHICULAR AND PEDESTRIAN TRAFFIC.

   G. NO MATERIAL AND/OR EQUIPMENT SHALL BE STOCKPILED OR OTHERWISE STORED WITHIN COUNTY RIGHT-OF-WAY EXCEPT AT LOCATIONS DESIGNATED IN WRITING AND APPROVED BY THE COUNTY ENGINEER.

   H. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS SO AS TO OFFER THE LEAST POSSIBLE OBSTRUCTION AND INCONVENIENCE TO THE PUBLIC, AND HE SHALL HAVE UNDER CONSTRUCTION NO GREATER LENGTH OR AMOUNT OF WORK THAT HE CAN EXECUTE PROPERLY WITH DUE REGARD TO THE RIGHTS OF THE PUBLIC.

   I. ALL EXISTING DRAINAGE FLOW CONDITIONS SHALL BE MAINTAINED.

5. THE CONTRACTOR SHALL RETAIN THE SERVICES OF A GEOTECHNICAL ENGINEER FOR QUALITY CONTROL. CERTIFICATION FROM THE GEOTECHNICAL ENGINEER SHALL BE SUBMITTED TO THE DEPARTMENT OF PUBLIC WORKS AT THE COMPLETION OF THE CONSTRUCTION WORK. THE GEOTECHNICAL ENGINEER SHALL CERTIFY THAT THE CONSTRUCTION WORK MEETS "STANDARD SPECIFICATIONS". THE GEOTECHNICAL ENGINEER SHALL ALSO SUBMIT TEST RESULTS AS REQUESTED BY THE DEPARTMENT OF PUBLIC WORKS

6. THE CONTRACTOR SHALL HOLD A PRECONSTRUCTION MEETING WITH THE CONSTRUCTION – DESIGN SECTIONS OF THE DEPARTMENT OF PUBLIC WORKS BEFORE COMMENCING ANY WORK.

7. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION TO PRESERVE BENCHMARKS (SURVEY MONUMENTS) WHENEVER THE CENTER OF A SURVEY MONUMENT IS LESS THAN THREE (3) FEET FROM THE EDGE OF CONSTRUCTION. THE CONTRACTOR SHALL RETAIN A LICENSED SURVEYOR TO REFERENCE THE LOCATION OF SAID SURVEY MONUMENT.

8. BENCHMARKS THAT ARE DISTURBED OR DESTROYED SHALL BE RESTORED UNDER A LICENSED LAND SURVEYOR'S DIRECTION. COPIES OF FIELD NOTES, DESCRIPTIONS AND NEW VALUES OF THE NEW BENCHMARK SHALL BE SENT TO THE DEPARTMENT OF PUBLIC WORKS SURVEY SECTION FOR REVIEW AND APPROVAL PRIOR TO FINAL ACCEPTANCE OF THE PROJECT.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OVERTIME OR NIGHT WORK PAYMENTS FOR COUNTY'S STAFF AND INSPECTION PERSONNEL INCLUDING CONSULTANTS WHEN THE CONTRACT REQUIRES OVERTIME OR NIGHT WORK TO BE PERFORMED, OR DIRECTS THE CONTRACTOR TO WORK ADDITIONAL SHIFTS OR OVERTIME FOR COUNTY'S CONVENIENCE.

NOTES FOR CONSTRUCTION WITHIN COUNTY RIGHT-OF-WAY (CONT.)

10. SYSTEM CONDITIONS REQUIRE NON-EMERGENCY NIGHTTIME WORK DURING THE AUTUMN SEABIRD FALL SEASON (SEPTEMBER 15 THROUGH DECEMBER 15), USE OF LIGHTING SHALL BE RESTRICTED BETWEEN 9:00 P.M. TO 4:30 A.M. IF LIGHTING OF THE WORK AREA IS REQUIRED IN SUCH SITUATION, ALL LIGHTS SHALL BE SHIELDED (MINIMUM LIGHT SPILL TOWARDS THE SKY) AND DIRECTED DOWNWARDS TO THE MAXIMUM EXTENT PRACTICABLE. MINIMUM REQUIREMENTS FOR LIGHTING BY HIOSH AND OSHA SHALL BE PROVIDED AND ASSURED BY THE CONTRACTOR. THE CONTRACTOR SHALL TRAIN ALL EMPLOYEES WORKING AT NIGHT (RECORDS RETAINED BY THE CONTRACTOR) IN HOW TO HANDLE ANY RETRIEVED DOWNED BIRDS AND SHALL HAVE APPROPRIATE EQUIPMENT AS APPROVED BY SAVE OUR SHEARWATERS (SOS) ON SITE TO HOLD AND TRANSPORT ANY RETRIEVED BIRDS TO AN SOS FACILITY. THIS REQUIREMENT DOES NOT ALLOW LIGHTING AS MAY BE RESTRICTED BY OTHER GOVERNMENT AGENCIES.

BEST MANAGEMENT PRACTICE NOTES:

1. THE CONTRACTOR SHALL PREPARE AND SUBMIT TO THE ENGINEER FOR APPROVAL A BEST MANAGEMENT PRACTICES (BMP) PLAN PRIOR TO THE START OF THE MAINTENANCE DREDGING AND REVETMENT REPAIRS.

2. NO CONSTRUCTION MATERIALS OR HARBOR SEDIMENTS SHALL BE STOCKPILED IN THE MARINE ENVIRONMENT.

3. ALL CONSTRUCTION-RELATED MATERIALS AND EQUIPMENT (E.G., BARGES, EXCAVATOR ARM, PILINGS, ETC.) TO BE PLACED IN THE WATER SHALL BE CLEANED OF POLLUTANTS PRIOR TO USE. CONTRACTOR WILL PERFORM DAILY PRE-WORK EQUIPMENT INSPECTIONS FOR CLEANLINESS AND LEAKS. ALL HEAVY EQUIPMENT OPERATIONS WILL BE POSTPONED OR HALTED SHOULD A LEAK BE DETECTED, AND WILL NOT PROCEED UNTIL THE LEAK IS REPAIRED AND EQUIPMENT CLEANED.

4. CONTRACTOR TO DEVELOP CONTINGENCY PLAN TO CONTROL THE ACCIDENTAL SPILLS OF PETROLEUM PRODUCTS. ABSORBENT PADS AND CONTAINMENT BOOMS WILL BE STORED ON-SITE TO FACILITATE THE CLEAN-UP OF PETROLEUM SPILLS.

5. PLACE TURBIDITY CURTAIN ANCHORS IN SOFT-SEDIMENT ONLY.

6. DUST GENERATION WILL BE MINIMIZED BY USING WATER TO DAMPEN THE SURFACES TO BE DEMOLISHED WHEN FEASIBLE. REQUIREMENTS OF HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1 (HAR 11-60.1) MUST BE FOLLOWED FOR PREVENTING THE RELEASE OF DUST DURING CONSTRUCTION ACTIVITIES. MEASURES MUST BE TAKEN TO REDUCE AND ELIMINATE SEDIMENT FROM LEAVING THE JOBSITE WHETHER IT IS AIRBORNE OR IN THE FORM OF SILTY WATER. THESE ADDITIONAL MEASURES WILL INCLUDE (BUT NOT BE LIMITED TO) SPRAYING WATER TO ELIMINATE DUST, REDUCING TRAFFIC ON THE SITE, DUST SCREEN ON PERIMETER FENCING, SILT CURTAINS, SAND BAGS, DRAIN INLET/SCUPPER PROTECTION, SILT FENCE, GUTTER BUDDIES, BIOSOCKS, GREEN SNAKE BAGS (IF APPROPRIATE) OR ANY ALTERNATIVE OR EQUIVALENT MEANS TO PREVENT SILTS/SEDIMENTS OR POLLUTANTS FROM LEAVING THE JOBSITE.

7. HAULING TRUCKS EXITING THE SITE MUST BE INSPECTED TO ENSURE THEY ARE CLEAN AND DO NOT TRACK MATERIALS WHEN ENTERING OR EXITING THE PROJECT SITE. TRUCKS MUST BE CLEANED TO PREVENT THE TRACKING OF MUD OR DEBRIS OVER ROADS OR PARKING LOTS. THE JOBSITE MUST BE KEPT FREE OF RUBBISH AND CONSTRUCTION DEBRIS. THE PROJECT SITE MUST BE CLEANED REGULARLY AND THE MATERIALS MUST BE COLLECTED IN ROLL-OFF CONTAINERS. THESE MATERIALS MUST BE DISPOSED OF ON A ROUTINE BASIS IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.

8. MISCELLANEOUS CONSTRUCTION DEBRIS AND TRASH ARE TO BE DISPOSED OF AT KEKAHA LANDFILL.

9. MATERIALS MUST BE PROPERLY STORED IN A CONTAINER, ON DUNNAGE, OR AS REQUIRED BY THE MANUFACTURER TO AVOID CONTACT WITH STORM WATER IN ORDER TO CONTROL SPILLS.

10. ON-SITE STORAGE OF CONSTRUCTION MATERIALS MUST BE STORED WITHIN THE LIMITS INDICATED ON THE CONTRACT DRAWINGS.

11. THE CONTRACTOR MUST CONDUCT DAILY VISUAL OBSERVATIONS TO ENSURE THAT ALL BMPS AND EROSION CONTROL MEASURES ARE IN PLACE AND FUNCTIONING PROPERLY. IF A BMP IS NOT FUNCTIONING PROPERLY THE CONTRACTOR MUST STOP THAT ACTIVITY AND TAKE IMMEDIATE CORRECTIVE ACTION BY REPAIRING THE BMP. THE ACTIVITY CAN RESUME ONLY AFTER THE PROBLEM IS CORRECTED. THE CONDITION OF THE BMPS MUST BE DOCUMENTED IN THE INSPECTION AND MAINTENANCE REPORT FORM.

12. AT THE COMPLETION OF WORK, THE EXPOSED AREA ADJACENT TO THE NEW REVETMENT MUST BE GRASSED AND MAINTAINED UNTIL VEGETATION IS ESTABLISHED.

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

CONSTRUCTION NOTES - 2

SCALE: AS SHOWN | DATE: MAY 2020

DRAWN BY: DT | F.B. | C.B.
TRACED BY:
CHECKED BY: MF

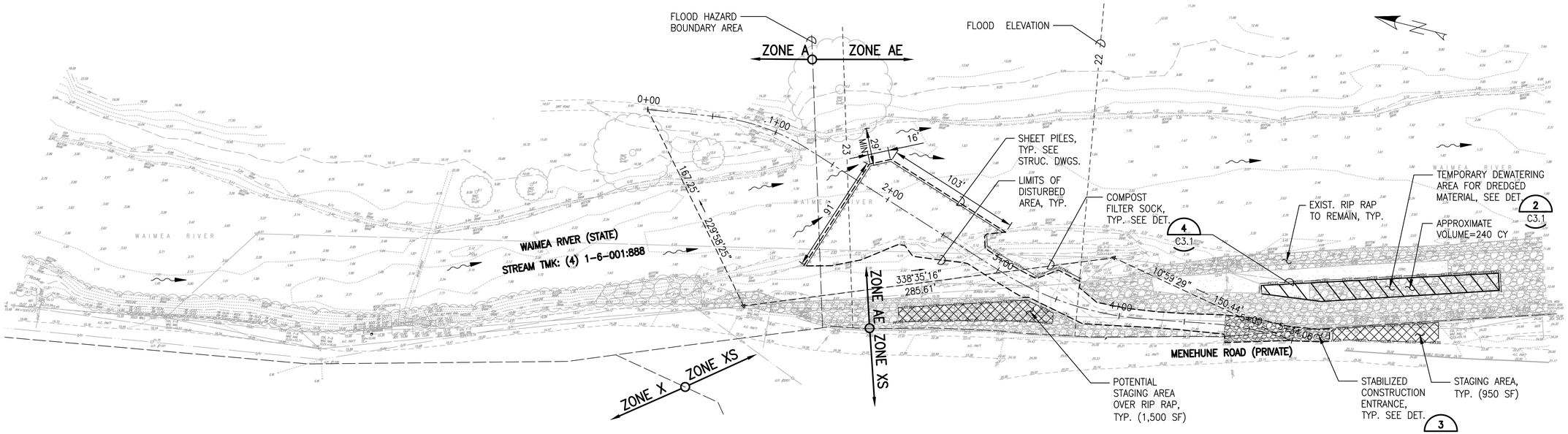
SHEET C0.2 OF 3 of 21 SHEETS

APPROVED _____ COUNTY ENGINEER

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

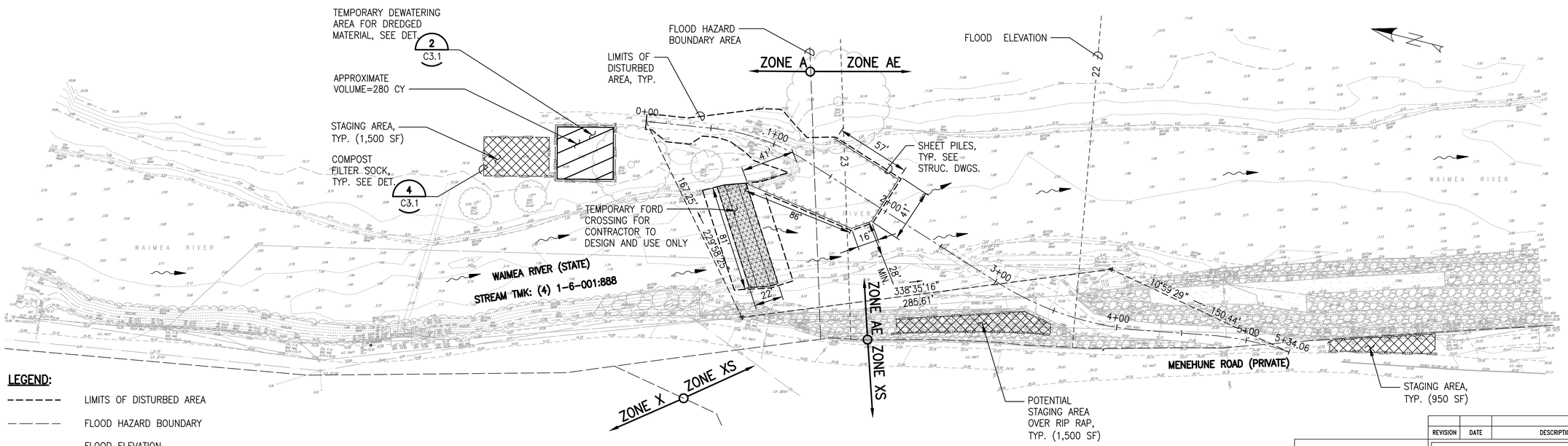
Plotted: Wed, 12 Aug 2020 - 1:20pm By: DTANIGAWA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CADD\C-01 to C-02 Waimea River - General Notes.dwg

TMK (4) 1-8-001:088



DEMOLITION AND EROSION CONTROL PLAN: PHASE 1

SCALE: 1" = 40'



DEMOLITION AND EROSION CONTROL PLAN: PHASE 2

SCALE: 1" = 40'

LEGEND:

- LIMITS OF DISTURBED AREA
- FLOOD HAZARD BOUNDARY
- FLOOD ELEVATION
- FILTER SOCK
- STAGING AREA
- DEWATERING AREA
- STREAM FLOW DIRECTION

GRAPHIC SCALE:

40 20 0 40 80

1" = 40'

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

DEMOLITION AND EROSION CONTROL PLAN

SCALE: AS SHOWN — DATE: MAY 2020

DRAWN BY: DT
TRACED BY:
CHECKED BY: MF
F.B. C.B.

APPROVED _____ COUNTY ENGINEER

SHEET C1.1 OF 4 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Wed, 12 Aug 2020 - 3:08pm By: DTANIGAWA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CADD\C-1.1 Waimea River Demolition and Erosion Control Plan.dwg

TMK (4) 1-6-001:888

FLOOD ZONE DELINEATION:

ZONE A – NO *BFE DETERMINED

ZONE AE – *BFE DETERMINED

ZONE X – AREAS OUTSIDE 100–YEAR FLOODPLAIN

ZONE XS – 500–YEAR FLOODPLAIN

*BFE (BASE FLOOD ELEVATION, 100–YEAR STORM)

IN–WATER ROAD SECTION NOTES:

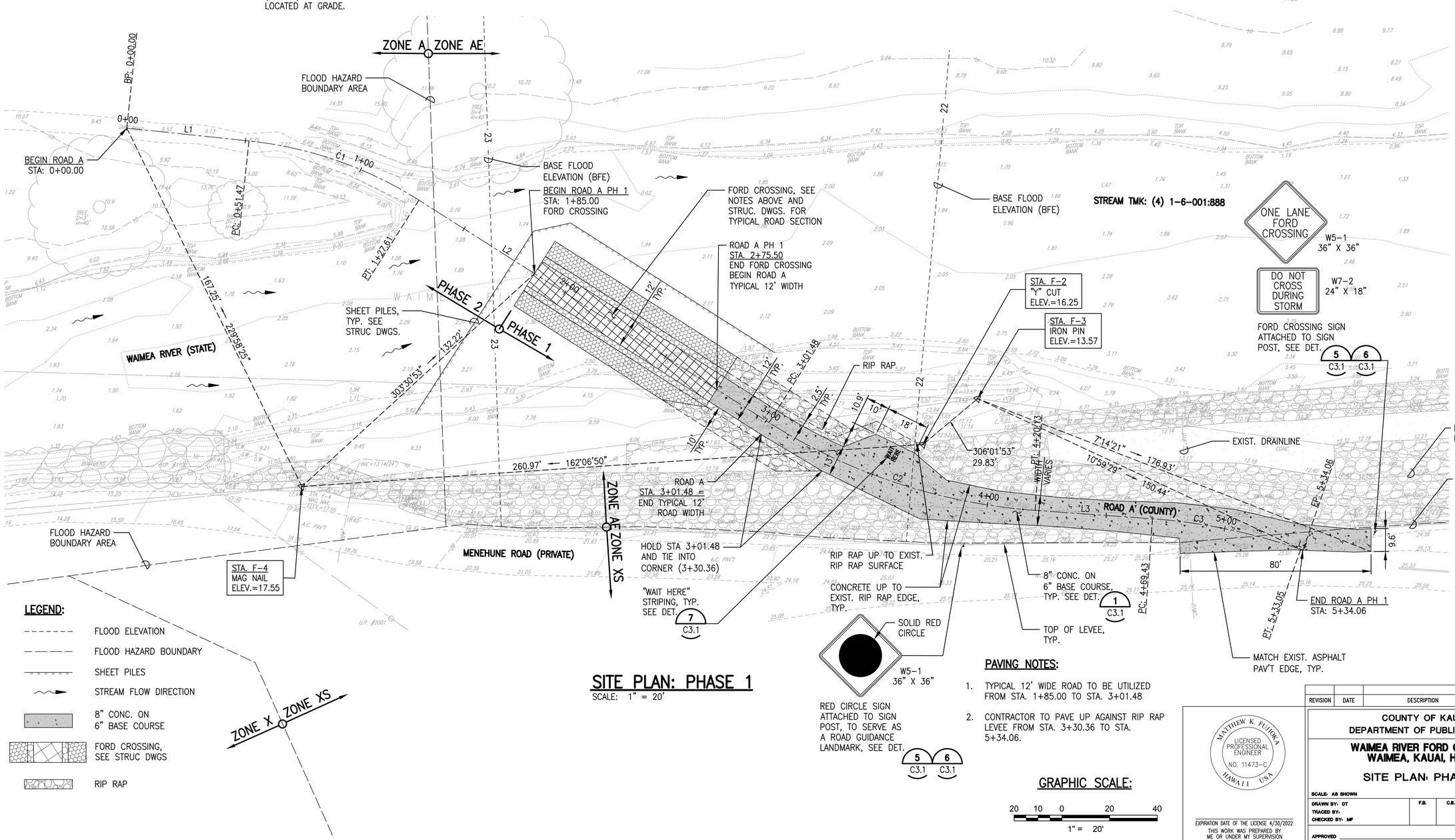
1. THE STRUCTURAL ENGINEER IS PROPOSING TWO OPTIONS FOR THE IN–WATER ROAD SECTION.
2. OPTION 1 CONSISTS OF A 12–FOOT WIDE CONCRETE ROAD WITH A 10–FOOT WIDE SCOUR PROTECTION ON THE UPSTREAM AND DOWNSTREAM PORTIONS OF THE PAVEMENT, LOCATED AT GRADE.
3. OPTION 2 CONSISTS OF A 12–FOOT WIDE MESH–ENCASED AGGREGATE, WITH A 10–FOOT WIDE, SCOUR PROTECTION (GABION) ON THE UPSTREAM AND DOWNSTREAM PORTIONS, LOCATED AT GRADE.

LINE TABLE

LINE NO.	BEGIN STA.	END STA.	L	AZI.
L1	0+00.00	0+51.47	51.47	351° 59' 37"
L2	1+27.61	3+01.48	173.87	18° 25' 56"
L3	4+20.13	4+69.43	49.30	350° 06' 25"
L4	5+33.05	5+34.06	1.01	5° 17' 42"

CURVE TABLE

CURVE NO.	BEGIN STA.	END STA.	Δ	R	Lc	T	C
C1	0+51.47	1+27.61	026°26'19"	165.00	76.14	38.76	75.46
C2	3+01.48	4+20.13	028°19'31"	240.00	118.65	60.56	117.44
C3	4+69.43	5+33.05	015°11'17"	240.00	63.62	32.00	63.43



LEGEND:

- FLOOD ELEVATION
- FLOOD HAZARD BOUNDARY
- SHEET PILES
- STREAM FLOW DIRECTION
- 8" CONC. ON 6" BASE COURSE
- FORD CROSSING, SEE STRUC DWGS
- RIP RAP

SITE PLAN: PHASE 1

SCALE: 1" = 20'

PAVING NOTES:

1. TYPICAL 12' WIDE ROAD TO BE UTILIZED FROM STA. 1+85.00 TO STA. 3+01.48
2. CONTRACTOR TO PAVE UP AGAINST RIP RAP LEVEE FROM STA. 3+30.36 TO STA. 5+34.06.

GRAPHIC SCALE:

20 10 0 20 40

1" = 20'

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473–C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

SITE PLAN: PHASE 1

SCALE: AS SHOWN | DATE: MAY 2020

DRAWN BY: DT
TRACED BY:
CHECKED BY: MF
F.B. | C.B.

APPROVED _____ COUNTY ENGINEER

SHEET C1.2 OF 5 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Fri, 14 Aug 2020 – 10:58am By: DTANIGAWA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CADD\C-1.2 Waimea River Site Plan PH1.dwg

TMK (4) 1-6-001:888

FLOOD ZONE DELINEATION:

ZONE A – NO *BFE DETERMINED

ZONE AE – *BFE DETERMINED

ZONE X – AREAS OUTSIDE 100–YEAR FLOODPLAIN

ZONE XS – 500–YEAR FLOODPLAIN

*BFE (BASE FLOOD ELEVATION, 100–YEAR STORM)

IN–WATER ROAD SECTION NOTES:

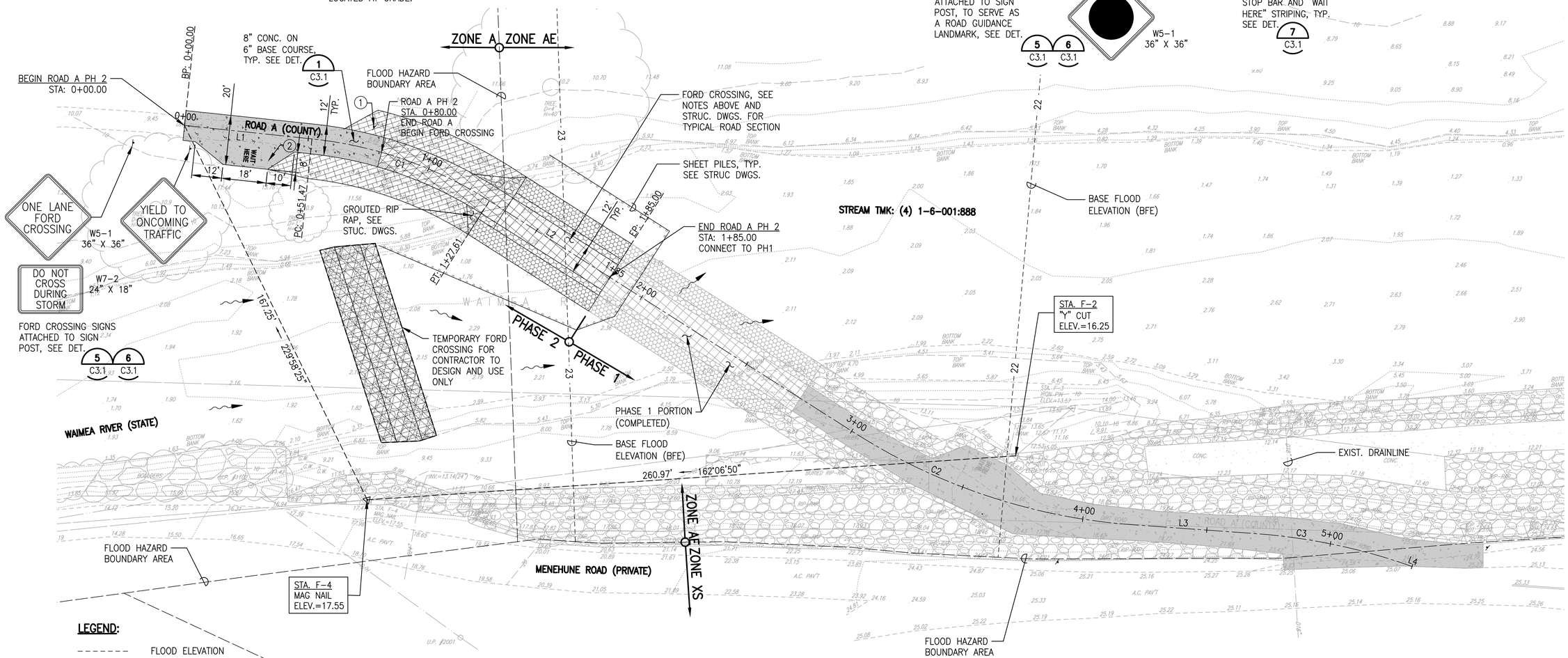
1. THE STRUCTURAL ENGINEER IS PROPOSING TWO OPTIONS FOR THE IN–WATER ROAD SECTION.
2. OPTION 1 CONSISTS OF A 12–FOOT WIDE CONCRETE ROAD WITH A 10–FOOT WIDE SCOUR PROTECTION ON THE UPSTREAM AND DOWNSTREAM PORTIONS OF THE PAVEMENT, LOCATED AT GRADE.
3. OPTION 2 CONSISTS OF A 12–FOOT WIDE MESH–ENCASED AGGREGATE, WITH A 10–FOOT WIDE, SCOUR PROTECTION (GABION) ON THE UPSTREAM AND DOWNSTREAM PORTIONS, LOCATED AT GRADE.

LINE TABLE

LINE NO.	BEGIN STA.	END STA.	L	AZI.
L1	0+00.00	0+51.47	51.47	351° 59' 37"
L2	1+27.61	3+01.48	173.87	18° 25' 56"
L3	4+20.13	4+69.43	49.30	350° 06' 25"
L4	5+33.05	5+34.06	1.01	5° 17' 42"

CURVE TABLE

CURVE NO.	BEGIN STA.	END STA.	Δ	R	Lc	T	C
C1	0+51.47	1+27.61	026°26'19"	165.00	76.14	38.76	75.46
C2	3+01.48	4+20.13	028°19'31"	240.00	118.65	60.56	117.44
C3	4+69.43	5+33.05	015°11'17"	240.00	63.62	32.00	63.43



LEGEND:

- FLOOD ELEVATION
- FLOOD HAZARD BOUNDARY
- SHEET PILES
- STREAM FLOW DIRECTION
- 8" CONC. ON 6" BASE COURSE
- FORD CROSSING, SEE STRUC DWGS
- RIP RAP
- TURF REINFORCEMENT MAT

SITE PLAN: PHASE 2

SCALE: 1" = 20'

PAVING NOTES:

1. TYPICAL 12' WIDE ROAD TO BE UTILIZED FROM STA. 0+00.00 TO STA. 1+85.00

GRAPHIC SCALE:

20 10 0 20 40

1" = 20'

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473–C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

SITE PLAN: PHASE 2

SCALE: AS SHOWN — DATE: MAY 2020

DRAWN BY: DT
TRACED BY:
CHECKED BY: MF
F.B. C.B.

APPROVED _____ COUNTY ENGINEER

SHEET C1.3 OF 6 of 21 SHEETS

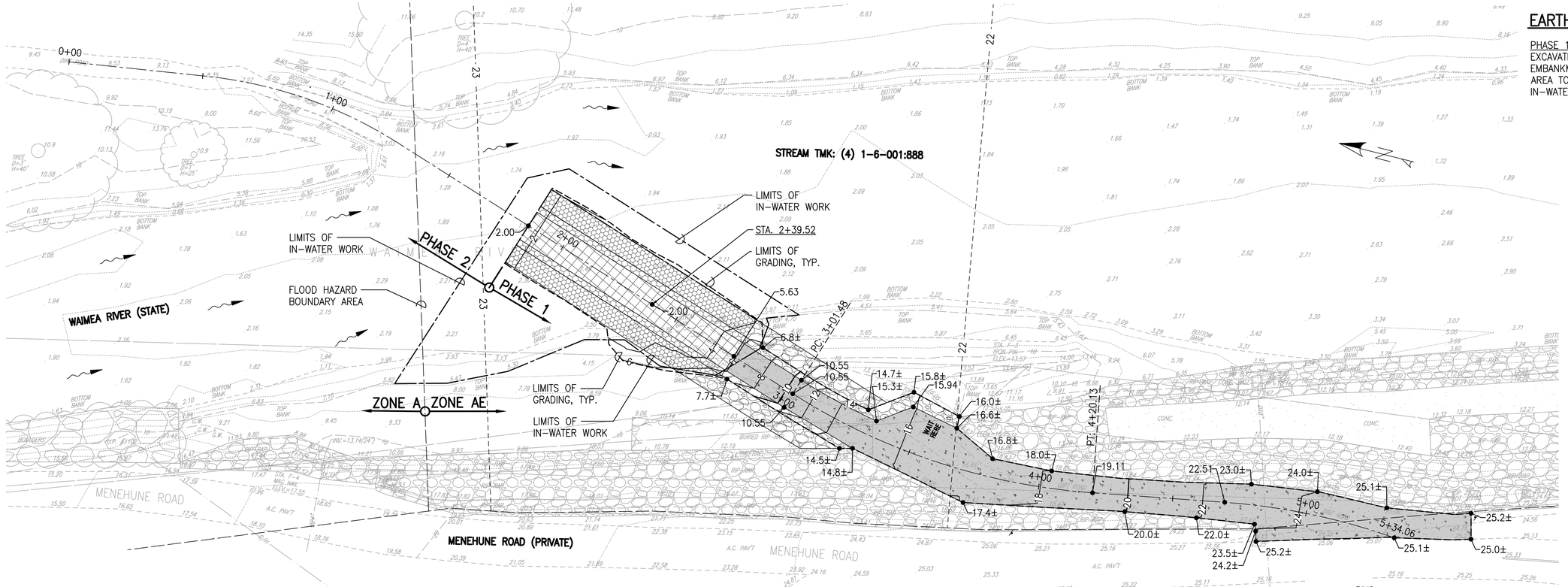
WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Fri, 14 Aug 2020 – 11:30am By: DJTANIGAWA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CADD\Archive\C-1.3 Waimea River Site Plan PH2.dwg

TMK (4) 1-6-001:888

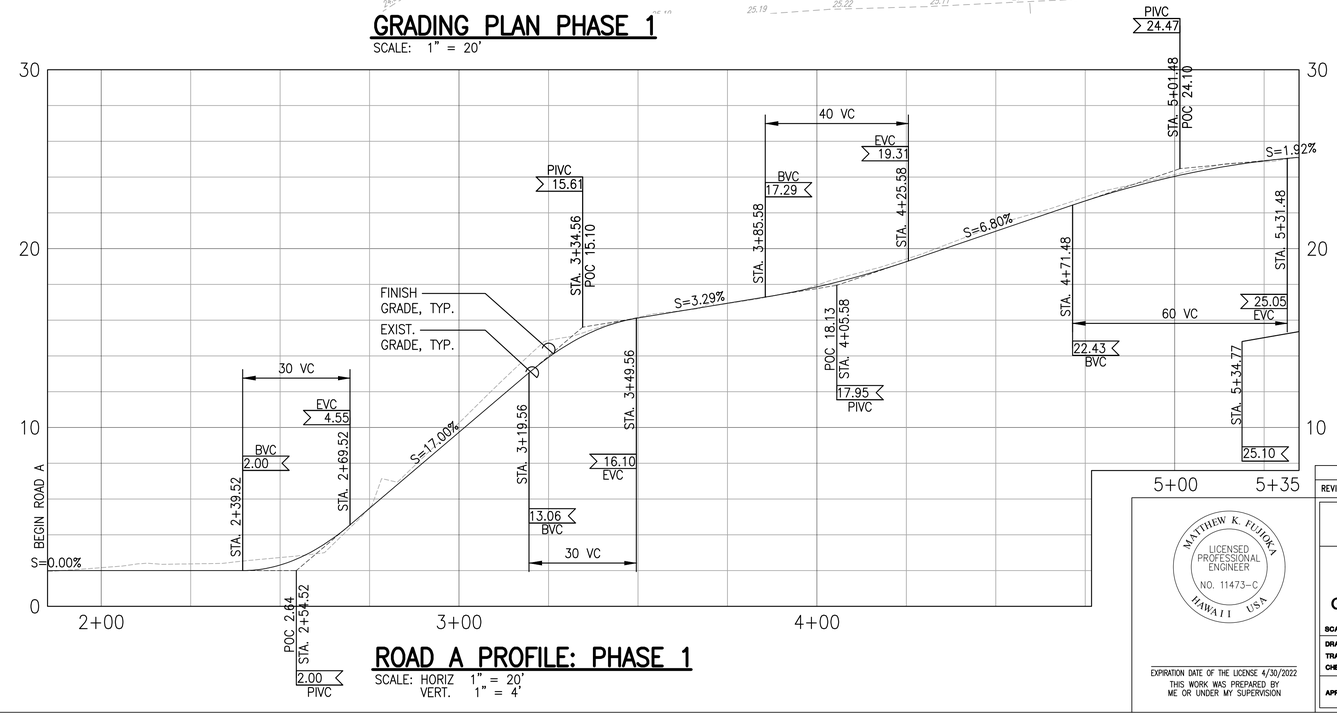
EARTHWORK SUMMARY:

PHASE 1:
EXCAVATION = 562 CY
EMBANKMENT = 0 CY
AREA TO BE GRADED = 0.20 AC
IN-WATER AREA = 0.14 AC



GRADING PLAN PHASE 1

SCALE: 1" = 20'



ROAD A PROFILE: PHASE 1

SCALE: HORIZ 1" = 20'
VERT. 1" = 4'

GRAPHIC SCALE:

4 2 0 4 8
1" = 4'

20 10 0 20 40
1" = 20'

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

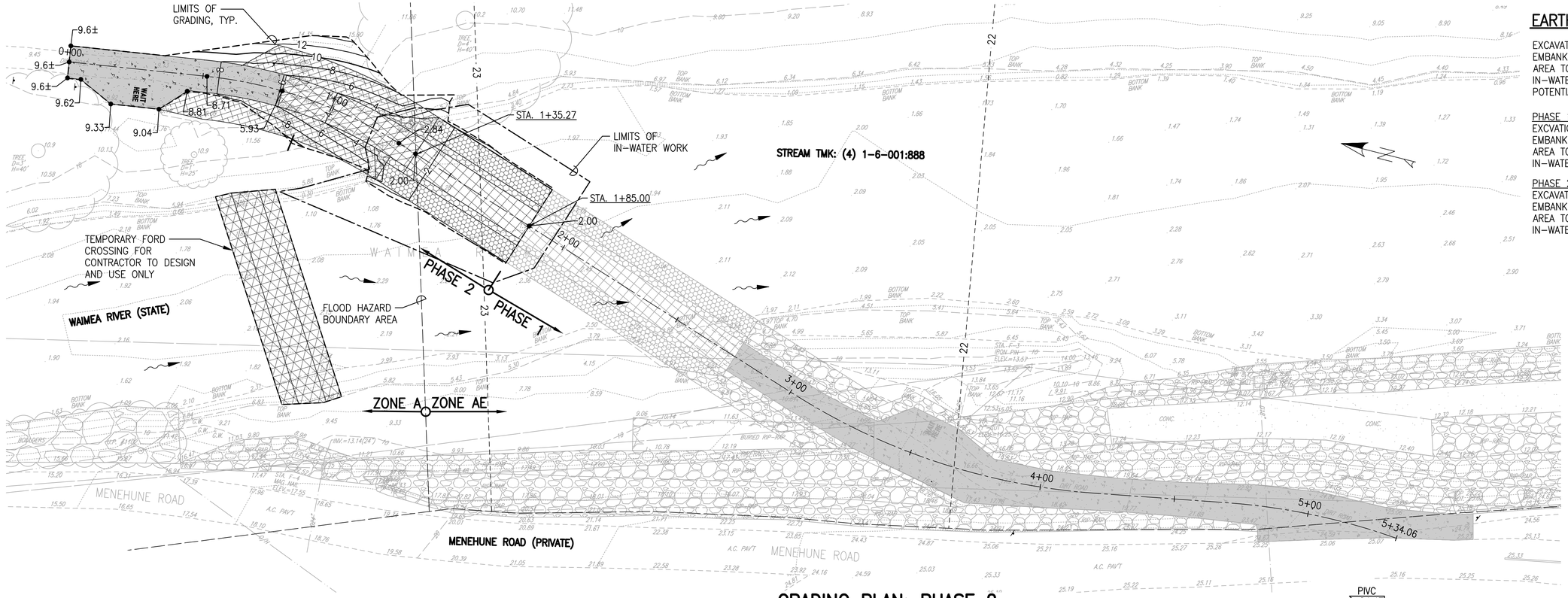
GRADING PLAN & PROFILE: PHASE 1

SCALE: AS SHOWN
DATE: MAY 2020
DRAWN BY: DT
TRACED BY:
CHECKED BY: MF
F.B.
C.B.
APPROVED _____ COUNTY ENGINEER
SHEET C1.4 OF 7 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Fri, 14 Aug 2020 - 11:26am By: DTANIGAVA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CADD\Archive\C-1.4 Waimea River Grading Plan and Profile PH 1.dwg

TMK (4) 1-6-001:888



GRADING PLAN: PHASE 2

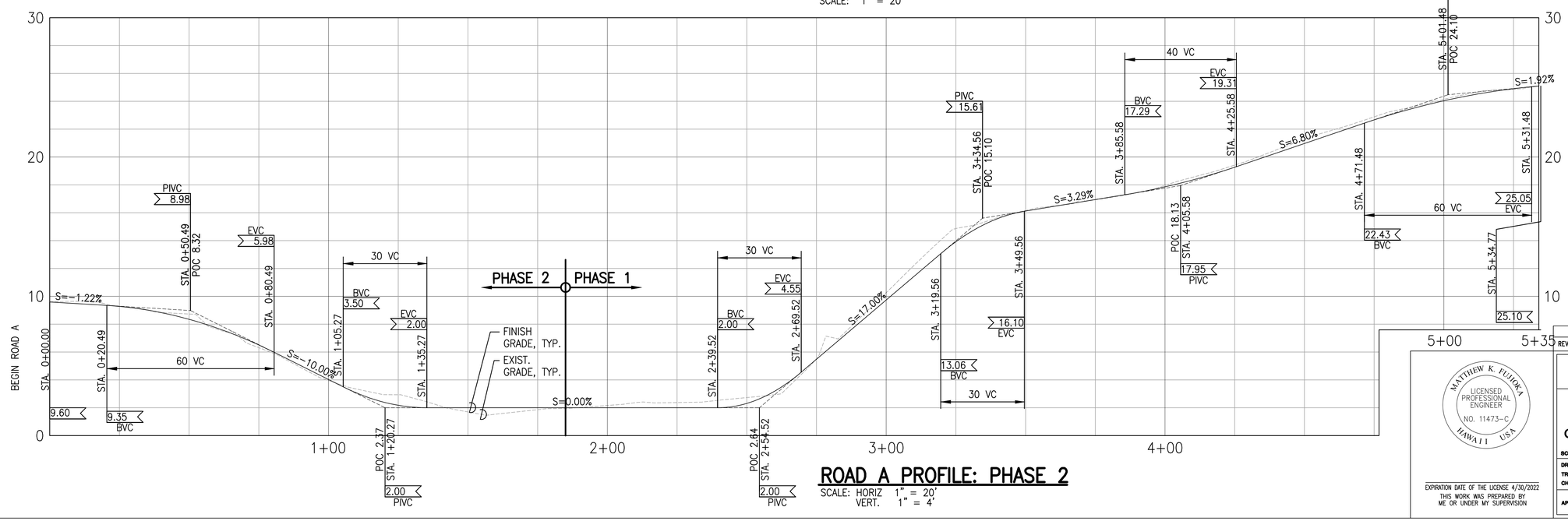
SCALE: 1" = 20'

EARTHWORK SUMMARY:

EXCAVATION = 1,045 CY
EMBANKMENT = 1 CY
AREA TO BE GRADED = 0.33 AC
IN-WATER AREA = 0.28 AC
POTENTIAL STAGING AREA = 0.16 AC

PHASE 1:
EXCVATION = 562 CY
EMBANKMENT = 0 CY
AREA TO BE GRADED = 0.20 AC
IN-WATER AREA = 0.14 AC

PHASE 2:
EXCAVATION = 483 CY
EMBANKMENT = 1 CY
AREA TO BE GRADED = 0.13 AC
IN-WATER AREA = 0.14 AC



ROAD A PROFILE: PHASE 2

SCALE: HORIZ 1" = 20'
VERT. 1" = 4'

GRAPHIC SCALE:

1" = 4'

1" = 20'

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

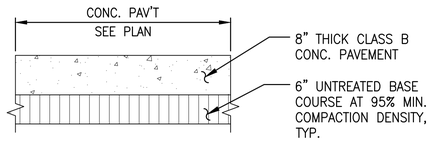
GRADING PLAN & PROFILE: PHASE 2

SCALE: AS SHOWN — DATE: MAY 2020
DRAWN BY: DT — F.B. — C.B.
TRACED BY:
CHECKED BY: MF
APPROVED _____ COUNTY ENGINEER
SHEET C1.5 OF 8 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

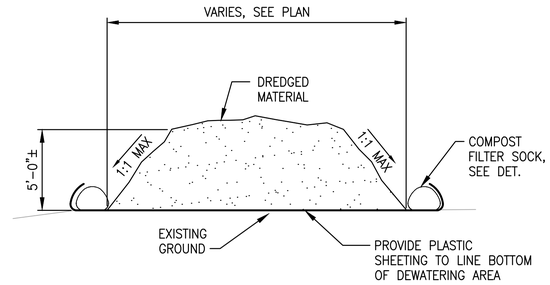
Plotted: Fri, 14 Aug 2020 - 11:29am By: DTANIGAWA
File Name: H:\FY2018\18016 Waimea River Ford Crossing\06 CAD\C-1.5 Waimea River Grading Plan and Profile PH2.dwg

TMK (4) 1-6-001:888



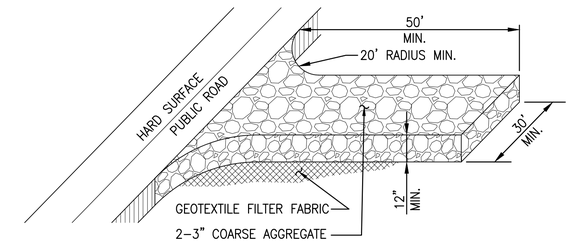
1 CONCRETE PAVEMENT DETAIL

SCALE: NOT TO SCALE



2 DEWATERING DETAIL

NOT TO SCALE

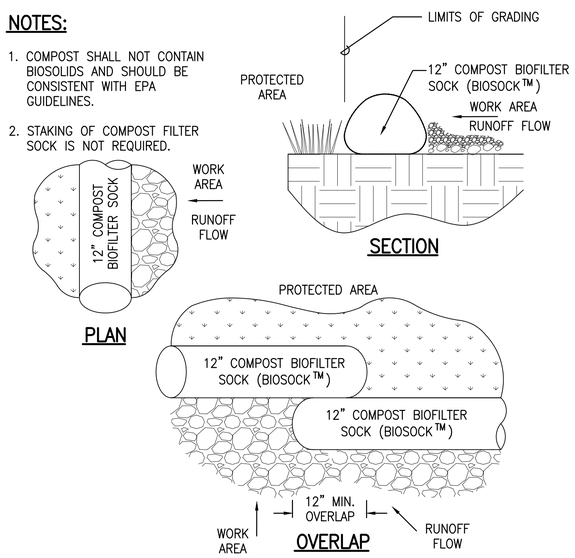


3 STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

NOTES:

1. COMPOST SHALL NOT CONTAIN BIOSOLIDS AND SHOULD BE CONSISTENT WITH EPA GUIDELINES.
2. STAKING OF COMPOST FILTER SOCK IS NOT REQUIRED.

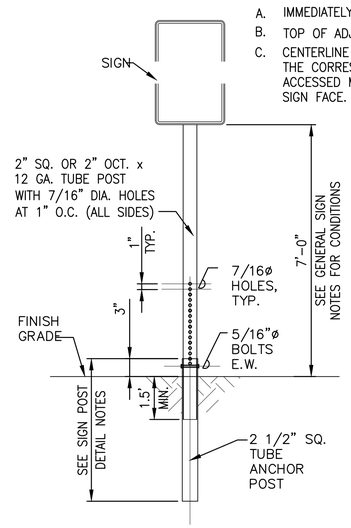


4 COMPOST FILTER SOCK DETAIL

NOT TO SCALE

GENERAL SIGN NOTES:

1. LOCATE SIGNS AS INDICATED ON THE PLANS AND AS SHOWN IN DETAILS.
2. MOUNTING HEIGHT FOR ALL SIGNS SHALL BE 7'-0" MINIMUM FROM THE BOTTOM EDGE OF THE SIGN TO (WHICHEVER IS GREATER):
   - A. IMMEDIATELY ADJACENT FINISH GRADE (OR)
   - B. TOP OF ADJACENT FINISH GRADE (OR)
   - C. CENTERLINE OF TRAVELED WAY FROM WHICH THE CORRESPONDING PARKING STALL IS ACCESSED MEASURED PERPENDICULAR TO THE SIGN FACE.

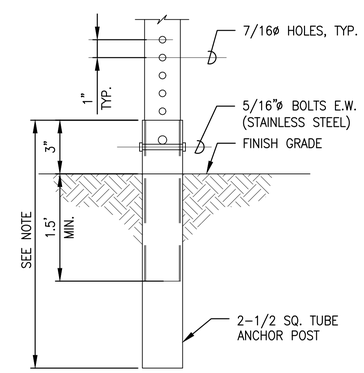


5 SIGN POST DETAIL

SCALE: 1/2" = 1'-0"

TUBE ANCHOR POST DETAIL NOTES:

1. THE INSIDE OF THE 2 1/4" ANCHOR POSTMUST BE KEPT FREE OF IMPEDIMENTS TO ASSURE EASY INSERTION OF THE 2" SIGN POST.
2. SQUARE TUBE POSTS SHALL BE TELESCOPING PERFORATED.
3. THE 2 1/2" ANCHOR POST SHALL BE 4'-0" LONG FOR NORMAL OR POOR CONDITIONS AND 2'-6" FOR ROCKY CONDITIONS.
4. SIGN POST MUST BE FIRM AND NOT SHAKY, OTHERWISE CONCRETE MUST BE USED TO STABILIZE THE ANCHOR POST.



6 SIGN POST DETAIL

SCALE: 3" = 1'-0"

7 TYPICAL STRIPING DETAIL

NOT TO SCALE

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

MISCELLANEOUS DETAILS

SCALE: AS SHOWN — DATE: MAY 2020

DRAWN BY: DT — F.B. — C.B.
TRACED BY:
CHECKED BY: MF

APPROVED _____ COUNTY ENGINEER

SHEET C3.1 OF 9 of 21 SHEETS

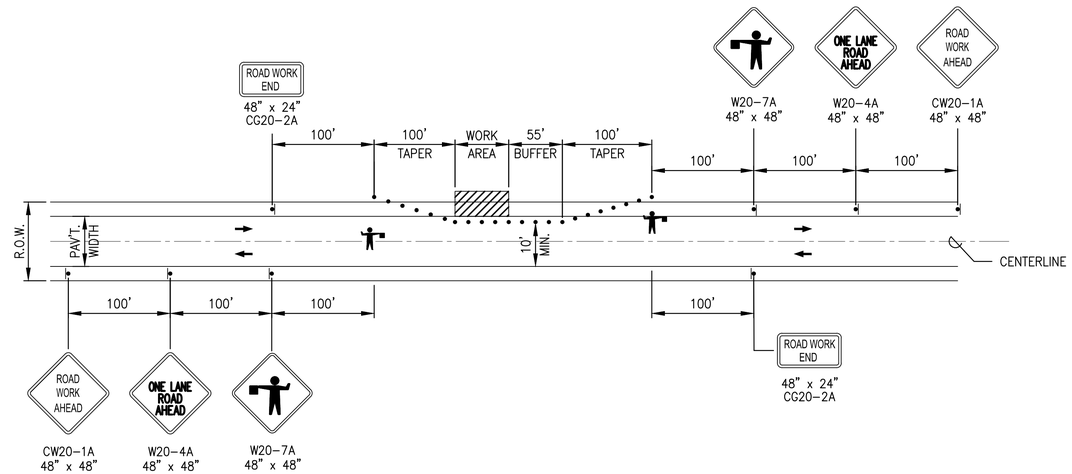
WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Wed, 12 Aug 2020 - 1:26pm By: DIANIGAVA
File Name: H:\FY2018\8016 Waimea River Ford Crossing\06 CADD\C-3.1 Waimea River - Miscellaneous Details.dwg

TMK (4) 1-8-001:888

CONSTRUCTION NOTES FOR TRAFFIC CONTROL PLAN

1. THE PERMITTEE SHALL MAKE ADJUSTMENTS AT INTERSECTIONS, DRIVEWAYS, BRIDGES, STRUCTURES, ETC., TO FIT FIELD CONDITIONS.
2. CONES OR DELINEATORS SHALL BE EXTENDED TO A POINT WHERE THEY ARE VISIBLE TO APPROACHING TRAFFIC.
3. TRAFFIC CONTROL DEVICES SHALL BE INSTALLED SUCH THAT THE SIGN OR DEVICE FARTHEST FROM THE WORK AREA SHALL BE PLACED FIRST. THE OTHERS SHALL THEN BE PLACED PROGRESSIVELY TOWARD THE WORK AREA.
4. REGULATORY AND WARNING SIGNS WITHIN THE CONSTRUCTION ZONE THAT ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLANS SHALL BE REMOVED OR COVERED. ALL SIGNS SHALL BE RESTORED UPON COMPLETION OF THE WORK.
5. FLAGGERS AND/OR POLICE OFFICERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES.
6. WHEN REQUIRED BY THE ISSUING OFFICE, THE PERMITTEE SHALL INSTALL A FLASHING ARROW SIGNAL AS SHOWN ON THE TRAFFIC CONTROL PLANS.
7. SIGN SPACING (D), TAPER LENGTHS (T) AND SPACING OF CONES OR DELINEATORS SHALL BE AS SHOWN IN TABLE 1, UNLESS OTHERWISE NOTED ON THE TRAFFIC CONTROL PLANS.
8. ALL TRAFFIC LANES SHALL BE A MINIMUM OF 10 FEET WIDE.
9. ALL CONSTRUCTION WARNING SIGNS SHALL BE PROMPTLY REMOVED OR COVERED WHENEVER THE MESSAGE IS NOT APPLICABLE OR NOT IN USE.
10. THE BACKS OF ALL SIGNS SHALL BE PROMPTLY REMOVED OR COVERED TO PRECLUDE THE DISPLAY OF INAPPLICABLE SIGN MESSAGES (I.E., WHEN SIGNS HAVE MESSAGES ON BOTH FACES), WHENEVER THE MESSAGES ARE NOT APPLICABLE OR NOT IN USE.
11. AT THE END OF EACH DAY'S WORK OR AS SOON AS THE WORK IS COMPLETED, THE PERMITTEE SHALL REMOVE ALL TRAFFIC CONTROL DEVICES NO LONGER NEEDED TO PERMIT FREE AND SAFE PASSAGE OF PUBLIC TRAFFIC. REMOVAL SHALL BE IN THE REVERSE ORDER OF INSTALLATION.
12. REPLACE PERMANENT PAVEMENT MARKINGS AND TRAFFIC SIGNS UPON COMPLETION OF EACH PHASE OF WORK.
13. POLICE OFFICERS/FLAGGERS SHALL BE PRESENT AT ALL TIMES.
14. WHEN REQUIRED BY THE COUNTY OF KAUA'I, AN ADVERTISEMENT SHALL BE PLACED IN THE NEWSPAPER BY THE CONTRACTOR FOR ANY LANE CLOSURE. THE ADVERTISEMENT SHALL BE MADE ONE (1) WEEK BEFORE ANY LANE CLOSURE AND SHALL CONTAIN THE FOLLOWING INFORMATION:
    - A. MAP OF THE TRAFFIC CHANGE LIMITS;
    - B. NOTICE OF STARTING AND ENDING DATES, TIMES AND DURATIONS;
    - C. MAP TO SHOW LANE CLOSURE;
    - D. EXPLANATION OF THE LANE CLOSURE, "NOTICE TO MOTORIST & PEDESTRIANS" THE CONTRACTOR SHALL BE REQUIRED TO HAVE ANY LANE CLOSURE ANNOUNCED DAILY OVER THE RADIO TWO (2) DAYS BEFORE STARTING DATE UNTIL THE WORK IS COMPLETED. BOTH ADVERTISEMENTS IN THE NEWSPAPER AND OVER THE RADIO SHALL BE PAID FOR BY THE CONTRACTOR. THE CONTRACTOR SHALL ALSO NOTIFY THE HOSPITALS, POLICE, FIRE, AND AMBULATORY SERVICES OF THE LANE CLOSURES.
15. WORKERS WITHIN THE COUNTY R/W WHO ARE EXPOSED TO EITHER VEHICLES USING THE ROADWAY OR TO CONSTRUCTION EQUIPMENT SHALL WEAR HIGH VISIBILITY SAFETY APPAREL THAT MEETS THE PERFORMANCE CLASS 2 OR 3 REQUIREMENTS OF ANSI/ISEA 107-2004. "WORKERS" ARE DEFINED AS PEOPLE ON FOOT WHOSE DUTIES PLACE THEM WITHIN THE ROAD RIGHT OF WAY, SUCH AS, BUT NOT LIMITED TO CONSTRUCTION AND MAINTENANCE FORCES, EQUIPMENT OPERATORS, SURVEY CREW, UTILITY CREW, RESPONDERS TO INCIDENTS (EG. EMT AND FIREMEN), AND LAW ENFORCEMENT PERSONNEL DIRECTING TRAFFIC, INVESTIGATING ACCIDENTS, HANDLING LANE CLOSURES AND ROADWAY CONSTRUCTION.
16. ALL TRAFFIC CONTROL DEVICE SHALL BE REFLECTORIZED WHEN USED AT NIGHT. CONES SHALL BE EQUIPPED WITH REFLECTORIZED COLLAR WHEN USED AT NIGHT. FLASHING LIGHTS SHALL BE USED WITH BARRICADES AND STEADY BURN LIGHTS WHEN USED IN A SERIES FOR CHANNELIZATION. FLAGGER STATIONS SHALL BE ADEQUATELY ILLUMINATED AT NIGHT.
17. CONTRACTOR TO PROVIDE ACCESS AND/OR DIRECTION SIGNS TO REROUTE PEDESTRIAN TRAFFIC.
18. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MINIMIZE THE USE AND DURATION OF STEEL PLATES. ALL STEEL PLATES SHALL HAVE A NON-SKID SURFACING. THE COUNTY MAY REQUIRE THE BACKFILLING AND PATCHING OF THE TRENCH DUE TO THE EXCESSIVE USE OF STEEL PLATES.
19. THE CONTRACTOR SHALL PROVIDE AN ADEQUATE NON-SLIP BRIDGING MATERIAL, INCLUDING SHORING OVER TRENCHES IN PAVEMENT AREAS. THE BRIDGING SHALL BE ABLE TO SUPPORT ALL TYPES OF VEHICULAR AND PEDESTRIAN TRAFFIC.
20. WHERE PEDESTRIAN WALKWAYS EXIST, THEY SHALL BE MAINTAINED IN A SAFE AND PASSABLE CONDITION OR OTHER FACILITIES FOR PEDESTRIANS SHALL BE PROVIDED. PASSAGES BETWEEN WALKWAYS AT INTERSECTIONS SHALL LIKEWISE BE PROVIDED.



TYPICAL PARTIAL ONE-LANE CLOSURE WORK

NOT TO SCALE

LEGEND

- WORK AREA
- SIGN
- CONE OR DELINEATOR
- DIRECTION OF TRAFFIC
- FLAGGER

APPROVAL:

COUNTY ENGINEER DATE
DEPARTMENT OF PUBLIC WORKS
COUNTY OF KAUA'I (FOR WORK WITHIN COUNTY RIGHT-OF-WAY)

MATTHEW K. FUJIOKA
LICENSED PROFESSIONAL ENGINEER
NO. 11473-C
HAWAII USA

EXPIRATION DATE OF THE LICENSE 4/30/2022
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

REVISION	DATE	DESCRIPTION	SHT. NO.	APPROVED

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS

WAIMEA RIVER FORD CROSSING
WAIMEA, KAUAI, HAWAII

TRAFFIC CONTROL PLAN

SCALE: AS SHOWN DATE: MAY 2020
DRAWN BY: DT
TRACED BY:
CHECKED BY: MF
F.B. C.B.
APPROVED _____ COUNTY ENGINEER
SHEET C4.1 OF 11 of 21 SHEETS

WAIMEA RIVER FORD CROSSING (65% PRELIMINARY DESIGN)

Plotted: Wed, 12 Aug 2020 - 3:14pm By: DTANIGAWA
File Name: H:\FY2018\8016 Waimea River Ford Crossing\06 CADD\C-41 Waimea River - Traffic Control Plan.dwg

TMK (4) 1-8-005:088

APPENDIX C

FEMA NO-RISE DETERMINATION AND LEVEE IMPACT EVALUATION

Technical Memo

Date: March 23, 2020

To: Daniel Tanigawa, P.E., Bow Engineering and Development, Inc.

From: Jake Gusman, P.E., and Darren Bertrand, CFM, River Focus, Inc.

Subject: **Waimea River Ford Crossing Improvements**
FEMA No-rise Determination and Levee Impact Evaluation

Introduction

The purpose of this technical memo is to provide the results of the no-rise analysis and levee impact evaluation for the Waimea River Ford Crossing Improvement project located on the Island of Kaua'i.

No-Rise Determination

Modeling Approach. The floodplain modeling for the no-rise analysis was performed using a two-dimensional (2-D) HEC-RAS (River Analysis System) hydraulic model created by River Focus. The ford crossing is highly skewed to the flow in Waimea River (i.e., it crosses the river at a significant angle) and the proposed crossing elevations are very close to existing conditions. As a result, a 1-D model would have difficulty picking up any increases in water surface elevation or localized changes in velocity or shear stress—a 2-D model is much better suited for this effort.

The effective FEMA floodplain and floodway are based on the Flood Insurance Study (FIS) 1% annual chance exceedance (100-year) peak discharge of 53,300 cfs through the project reach and 64,000 cfs makai of the confluence with Makaweli River. **Figure 1** shows the effective FEMA floodplain and floodway.

2-D Hydraulic Model. **Figure 2** provides an aerial view of the 2-D model mesh in the vicinity of the existing Waimea River ford crossing. The model was run using the HEC-RAS version 5.0.7.

Within 2-D models, rather than making edits to individual cross-sections to model the difference between existing and proposed conditions, changes to the underlying terrain and Manning's *n* roughness values drive the differences in results. **Figures 3 & 4** show the differences in the underlying terrain and Manning's *n* regions between the existing and proposed conditions.

Downstream Boundary Condition. To remain consistent with the FEMA 1-D modeling, the downstream boundary condition of the 2-D model was set to match 100-year water surface elevation from the 1-D cross-section at that location.

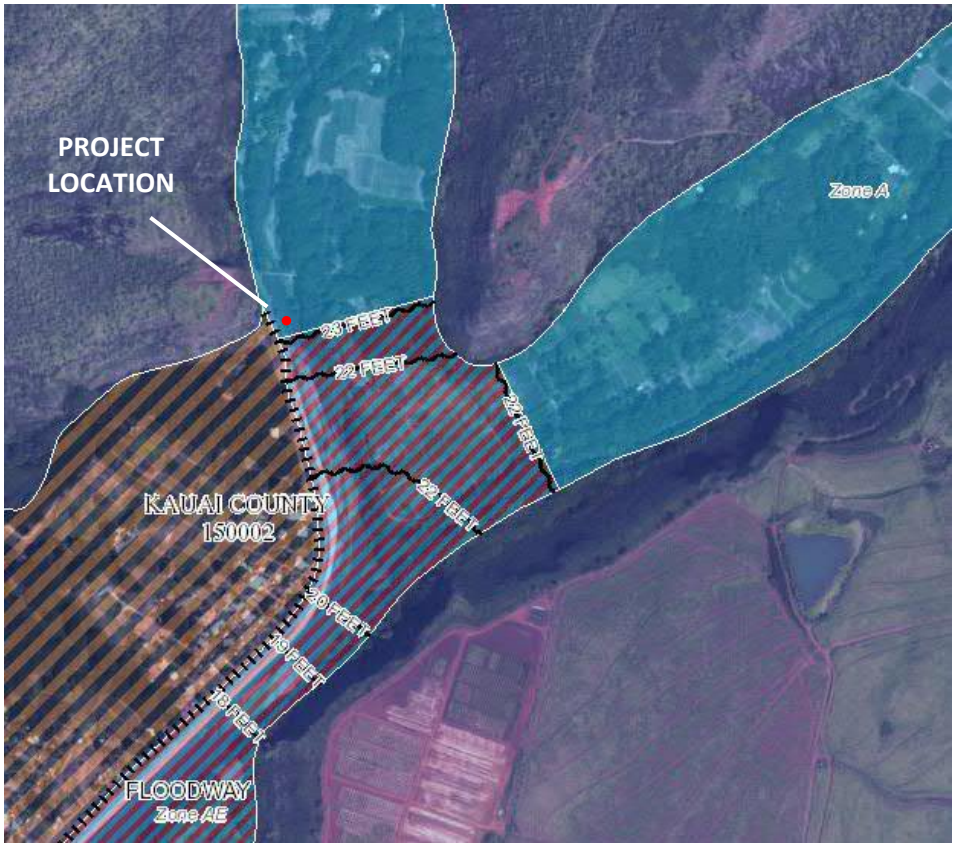


Figure 1. Effective FEMA Floodplain and Floodway Limits

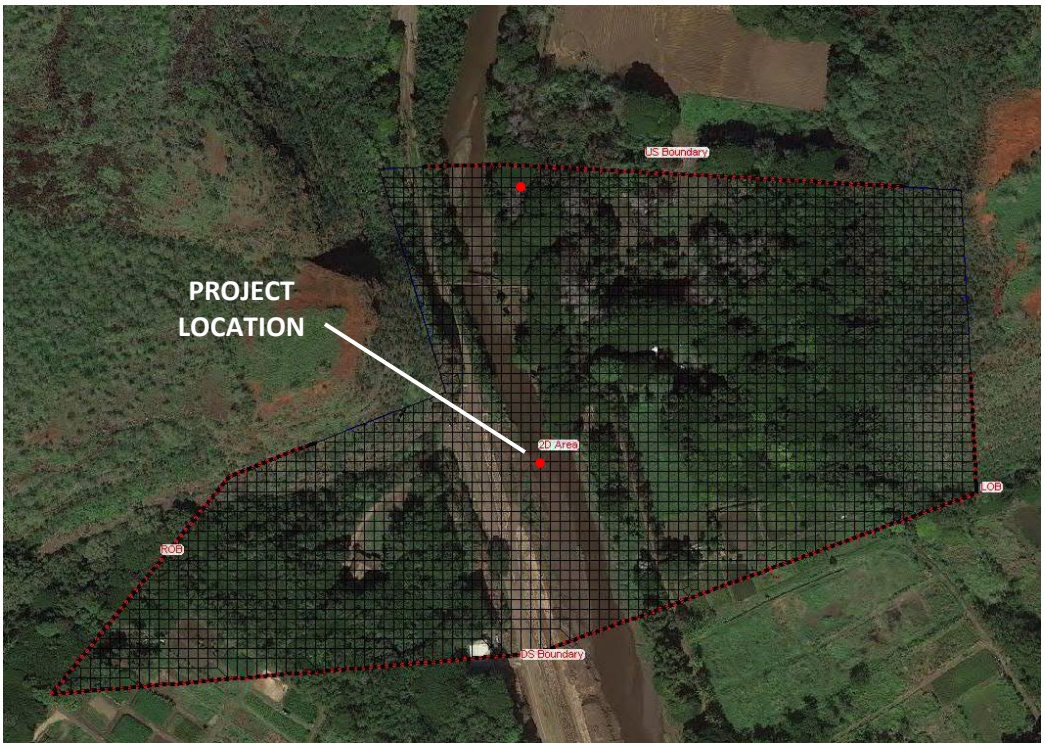


Figure 2. HEC-RAS 2-D Model Mesh – Existing Conditions

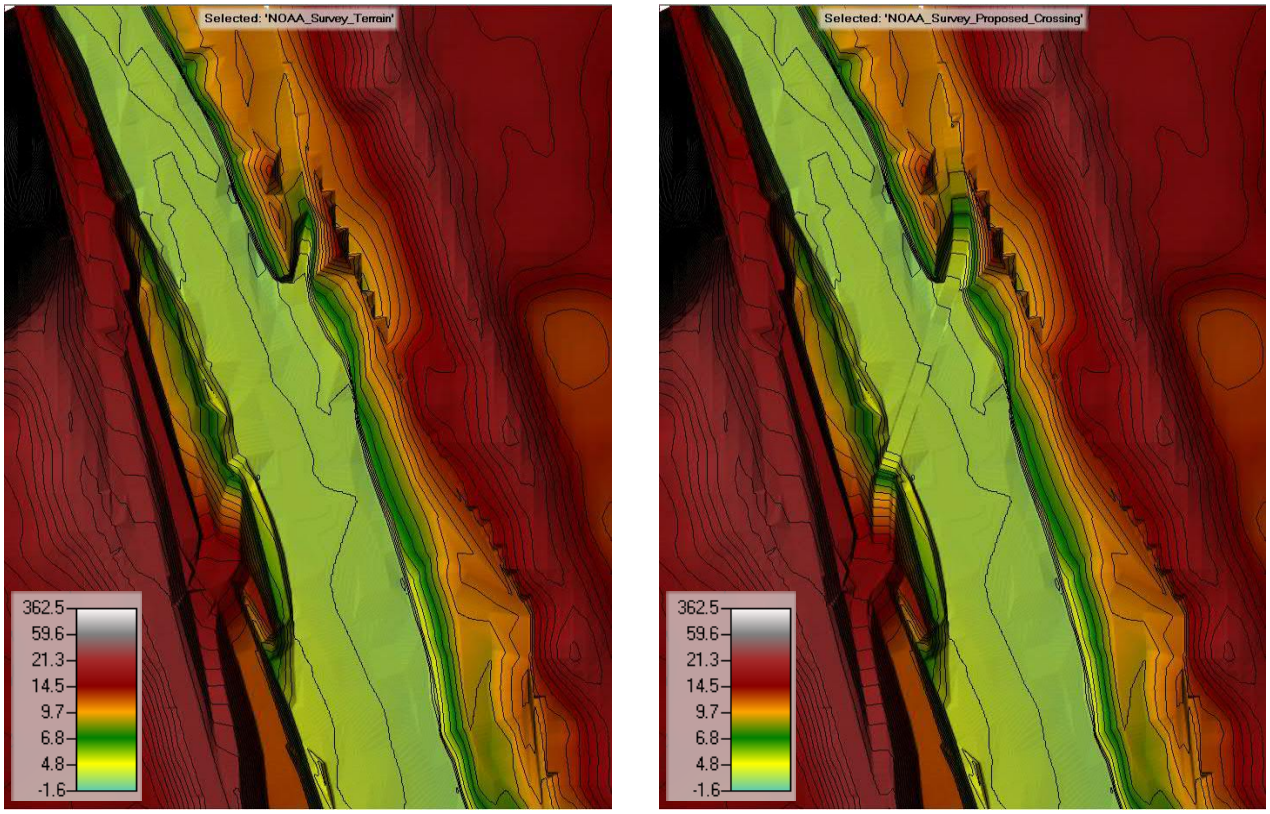
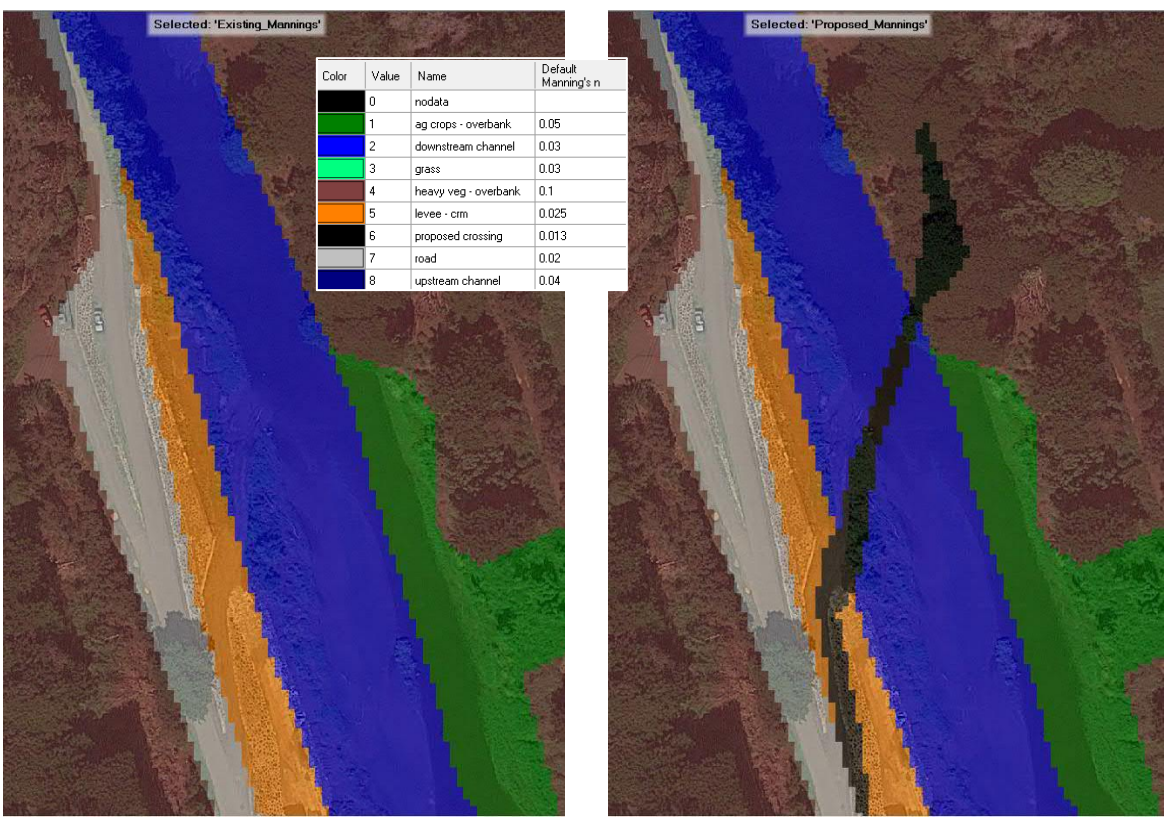


Figure 3. 2-D Hydraulic Model Underlying Terrain – Existing (left) and Proposed (right) Conditions



Color	Value	Name	Default Manning's n
	0	nodata	
	1	ag crops - overbank	0.05
	2	downstream channel	0.03
	3	grass	0.03
	4	heavy veg - overbank	0.1
	5	levee - crm	0.025
	6	proposed crossing	0.013
	7	road	0.02
	8	upstream channel	0.04

Figure 4. 2-D Hydraulic Model Manning's *n* Roughness – Existing (left) and Proposed (right) Conditions

HEC-RAS Model Results

In 1-D models, no-rise certification is based on water surface elevations from cross-sections, which contain only one unique water surface elevation per cross-section, while each cell in the 2-D mesh contains its own water surface elevation. To perform a no-rise analysis with the 2-D model, profile lines were drawn within the model to extract data at intervals to approximate 1-D model cross-sections. These profile lines contain more than one unique water surface elevation (from each cell the profile line crosses), so the averaged water surface elevation along the profile line is compared from existing and proposed conditions. The profile lines that were drawn to extract data from the model are shown in **Figure 5**.

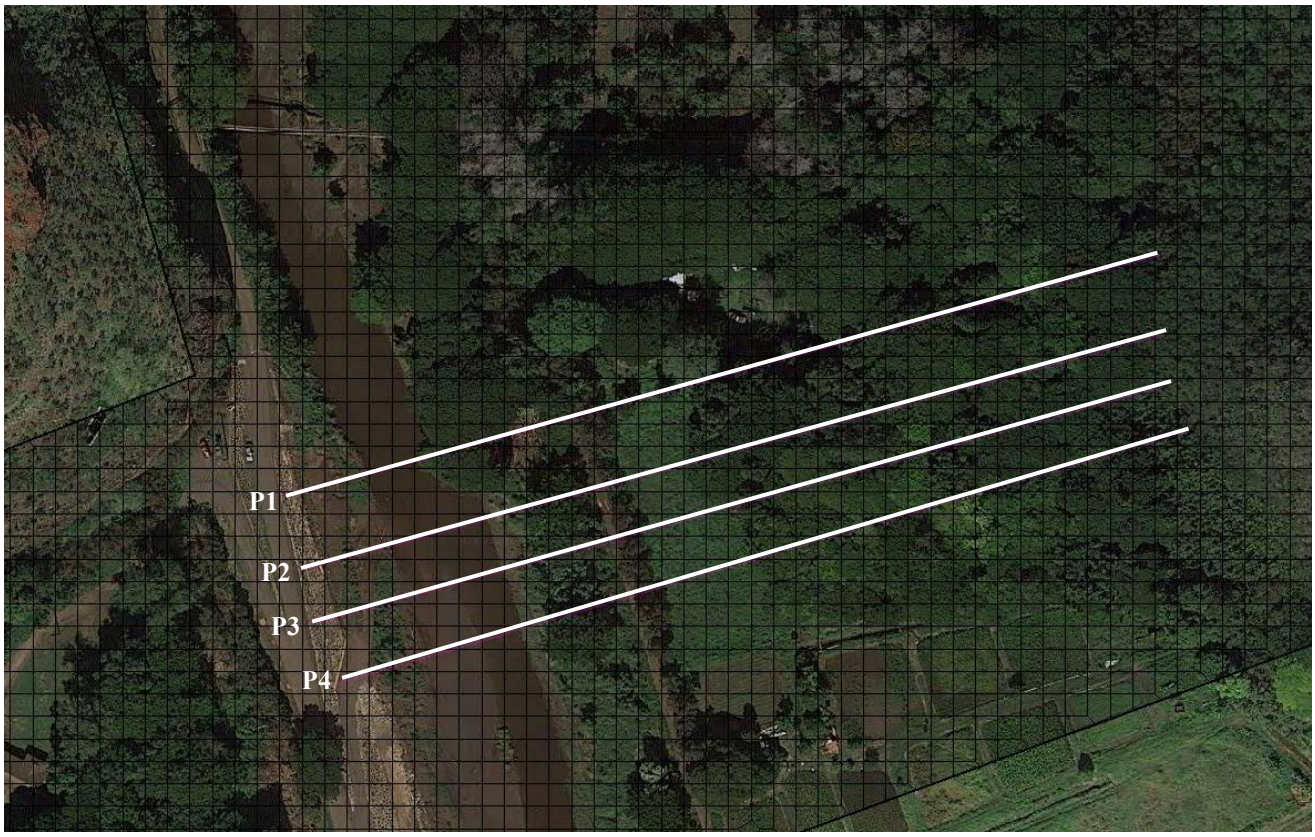


Figure 5. 2-D Hydraulic Model Profile Lines

The HEC-RAS 100-year water surface elevation (WSEL) results are shown in **Figure 6**. The extracted water surface elevation data from profile lines P1 through P4 are summarized in **Table 1** and profile plots are shown in **Figures 7-10**.

These model results demonstrate that the proposed Waimea River ford crossing improvements will not cause an increase in the base (100-year) flood elevation within the regulatory floodway. In fact, the proposed crossing improvements yield a 100-year flood elevation *decrease* of approximately 0.02 feet near the crossing, likely due to the lower roughness associated with the concrete ford crossing.

Figure 6. Water Surface Elevation (1-ft Contours) – Existing Conditions (black) & Proposed Conditions (pink)

Table 1. Hydraulic Model Results (100-year Discharge) – Proposed vs. Existing Conditions

Profile Line	Existing 100-yr WSEL (ft)	Proposed 100-yr WSEL (ft)	Difference (ft) *(Proposed - Existing)*
P1	26.40	26.38	-0.02
P2	26.77	26.75	-0.02
P3	26.52	26.50	-0.02
P4	26.28	26.26	-0.02

**Note*: *Negative values show a water surface elevation decrease.*

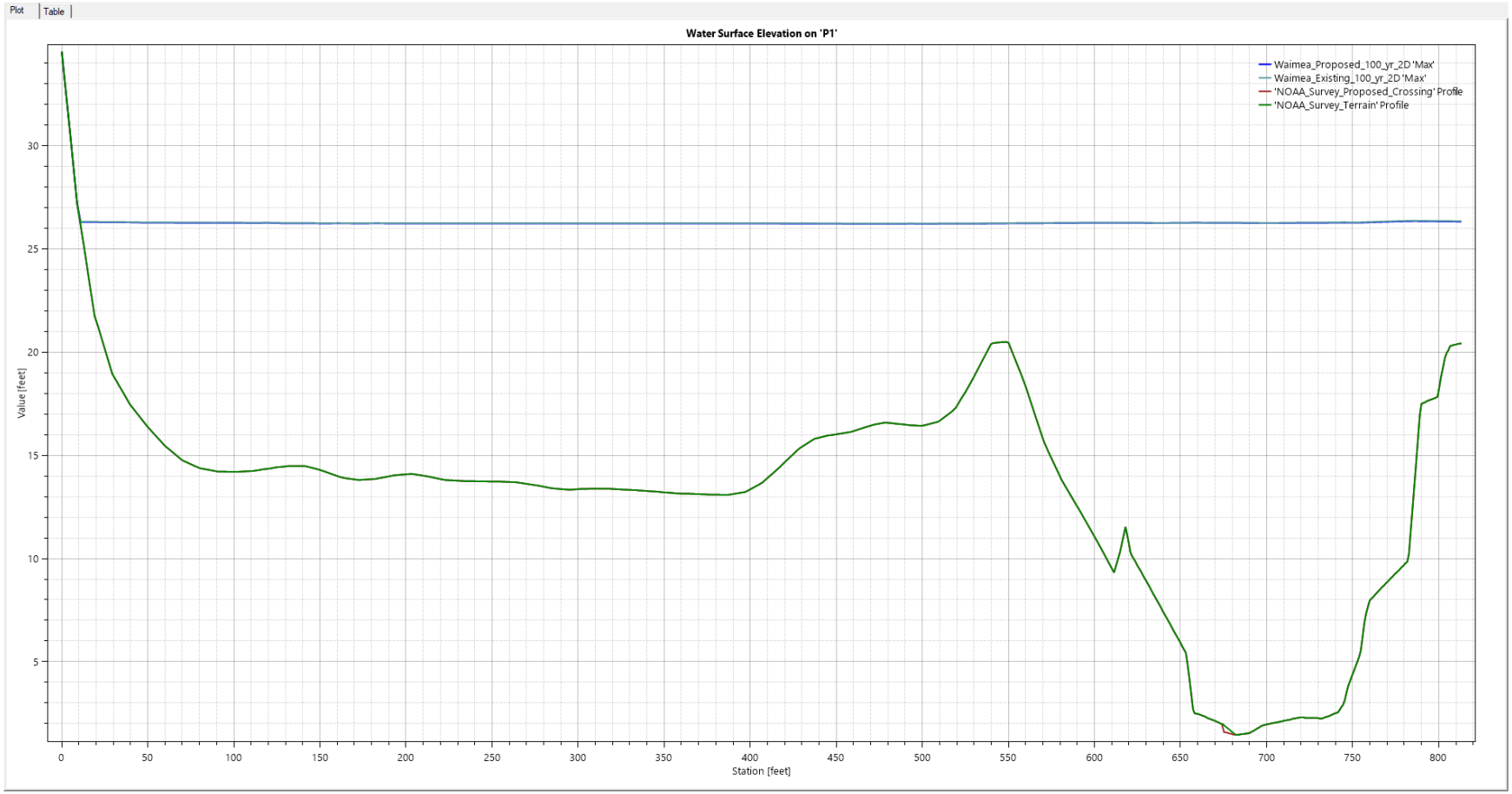


Figure 7. Water Surface Elevation Profile Plot – Profile Line 'P1'

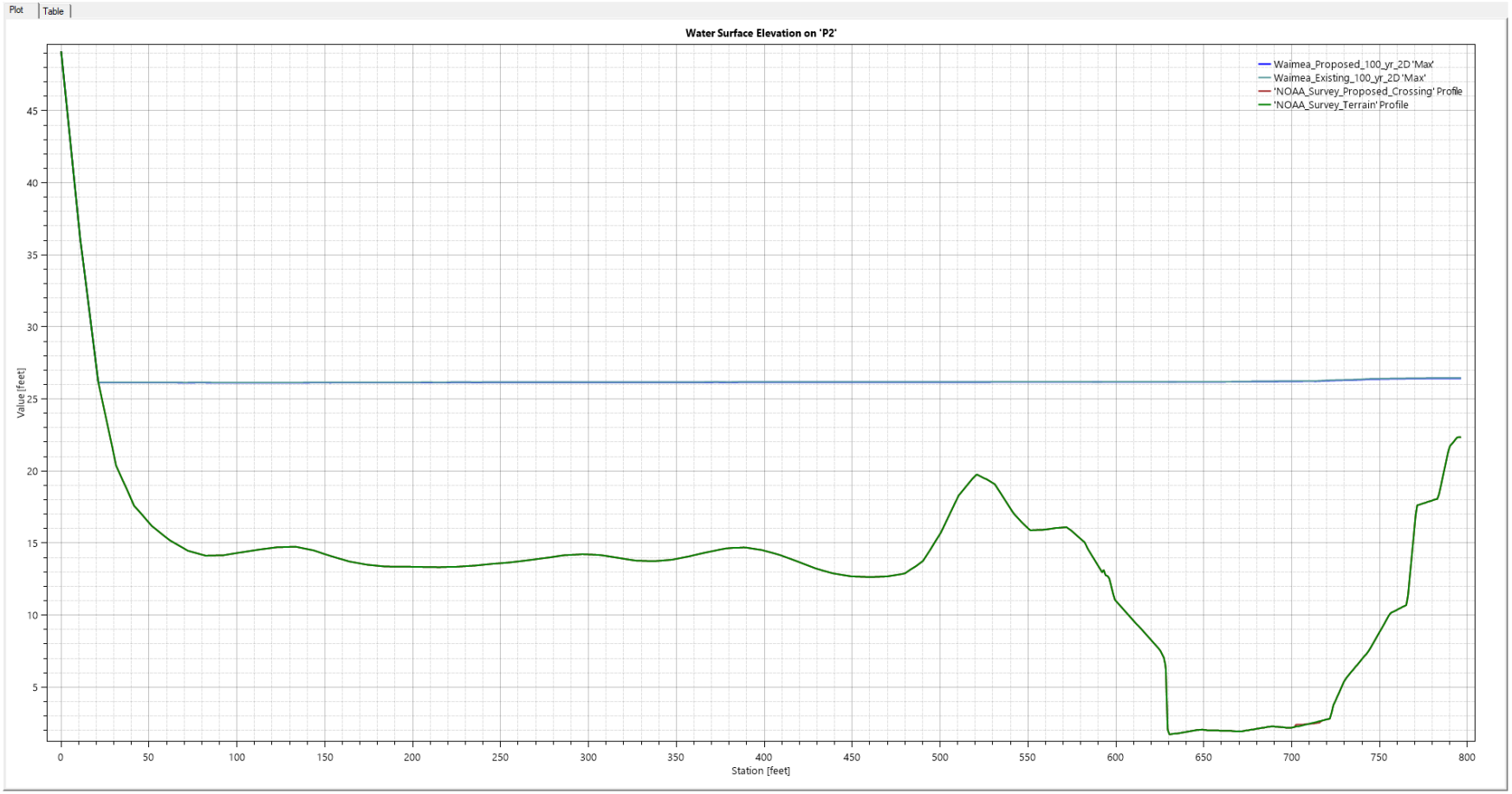


Figure 8. Water Surface Elevation Profile Plot – Profile Line 'P2'

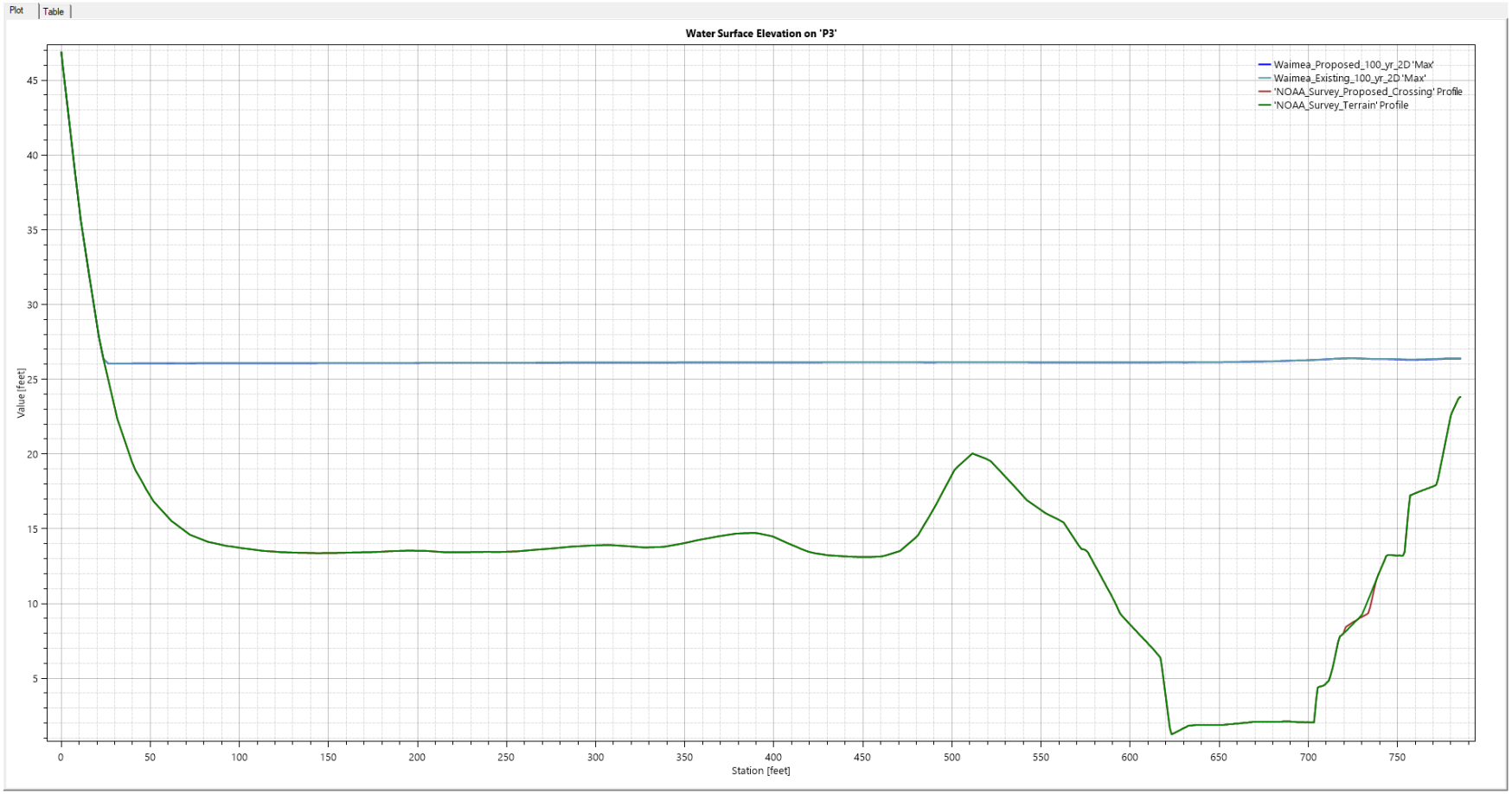


Figure 9. Water Surface Elevation Profile Plot – Profile Line 'P3'

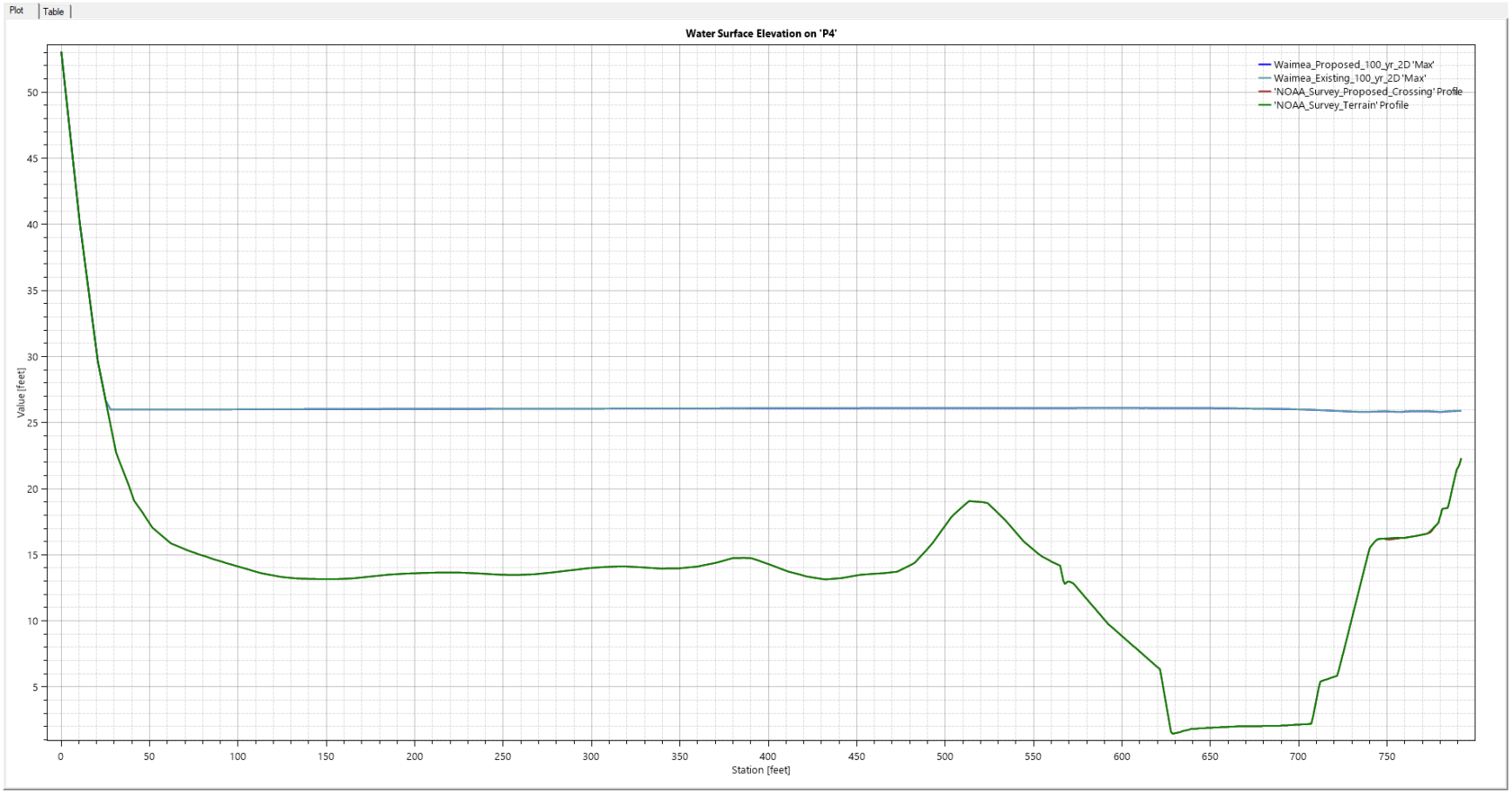


Figure 10. Water Surface Elevation Profile Plot – Profile Line 'P4'

Levee Impact Evaluation

The 2-D model created to perform the no-rise analysis was also used to determine if the ford crossing improvements would negatively impact the Waimea River levee. Flow velocities and shear stresses for existing and proposed conditions were compared along the levee. **Figures 11 & 12** show the computed velocities and shear stresses, respectively, for the existing and proposed conditions in the vicinity of the crossing. The computed 100-year velocities range from 5 to 10 feet per second (ft/s) for both existing and proposed conditions, with similar contours.

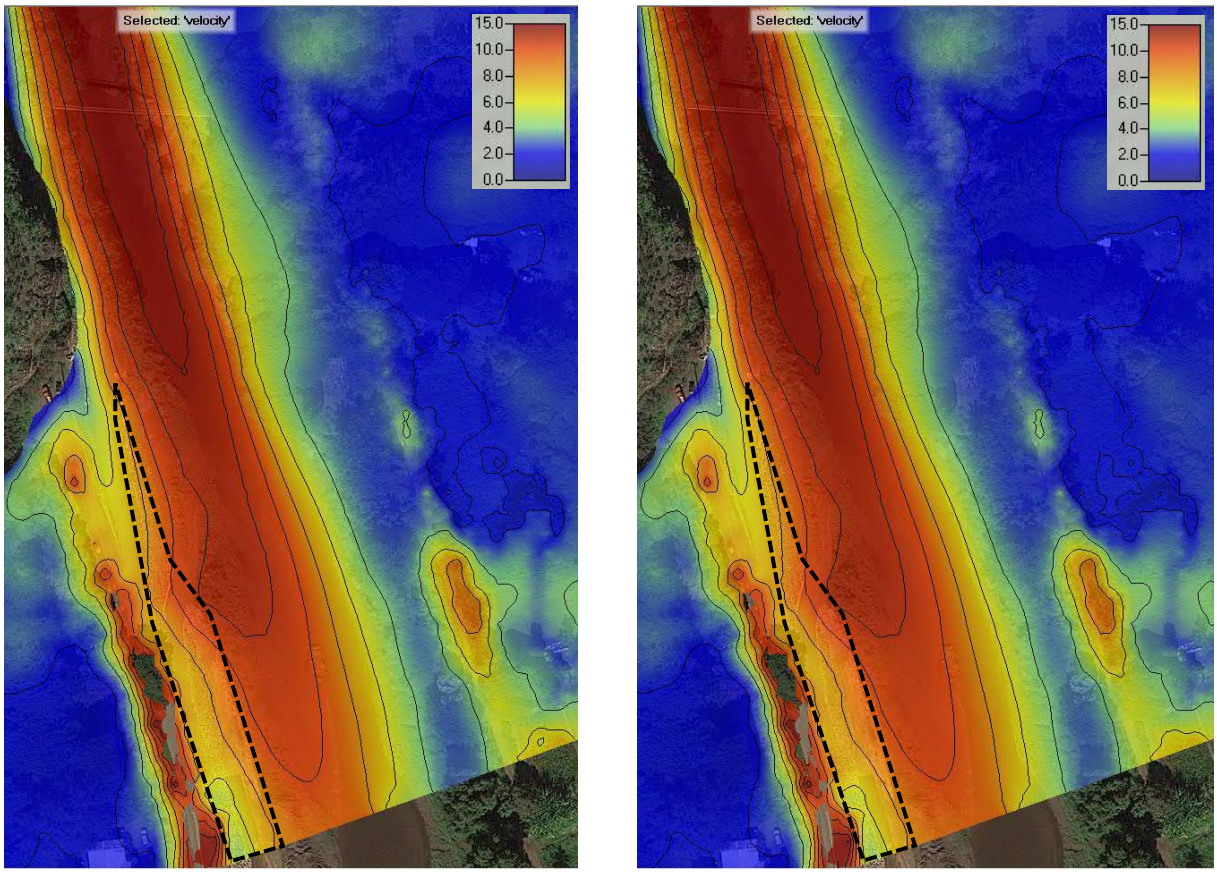


Figure 11. Velocity of Flow (2-ft/s Contours) – Existing (left) and Proposed (right) conditions [Levee outlined]

The shear stress plot (**Figure 12**) favors the proposed conditions, with values ranging from 0.1 to 1.0 lb/ft^2 along the levee (with a small pocket of 2 to 4 lb/ft^2 near what is left of the existing crossing entrance) for existing conditions. The proposed conditions results vary from 0.1-1.0 lb/ft^2 along the levee.

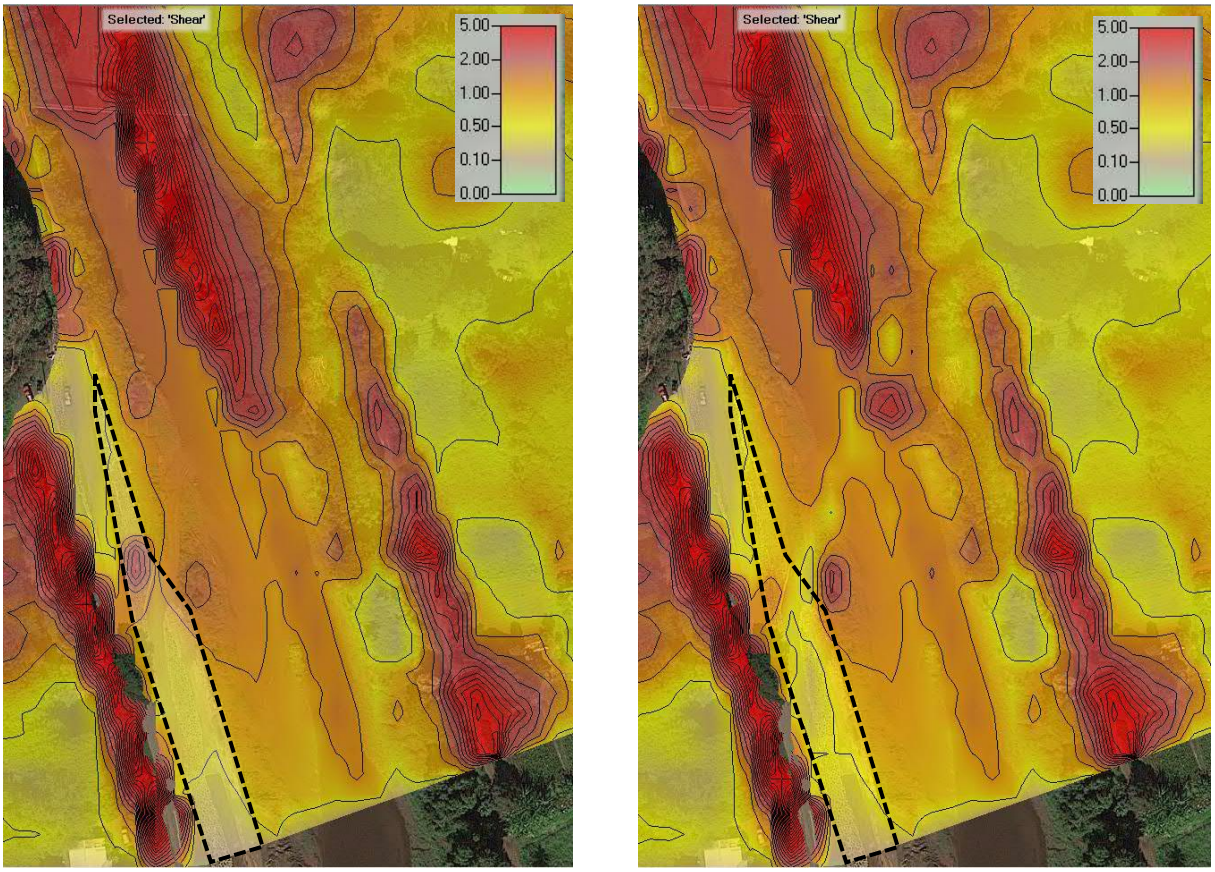


Figure 12. Shear Stress (0.5-lb/ft^2 Contours) – Existing (left) and Proposed (right) Conditions [Levee outlined]

To better compare the results, a profile line was drawn to extract data along the levee. The profile line is shown in **Figure 13.** Profile plots of velocity and shear stress along the levee profile line are shown in **Figures 14 & 15**. Velocities are similar for both plans, with slight increases (approximately 0.5 ft/sec) at the proposed improvements due to a reduction in roughness values. However, this increase does not lead to an increase in shear stress at the levee. In fact, the shear stress is reduced for most of the levee.

These model results demonstrate that the proposed Waimea River ford crossing improvements do not appear to negatively impact the existing Waimea River Levee and could potentially improve slightly compared to existing conditions.

Figure 13. Profile Line along Waimea River Levee

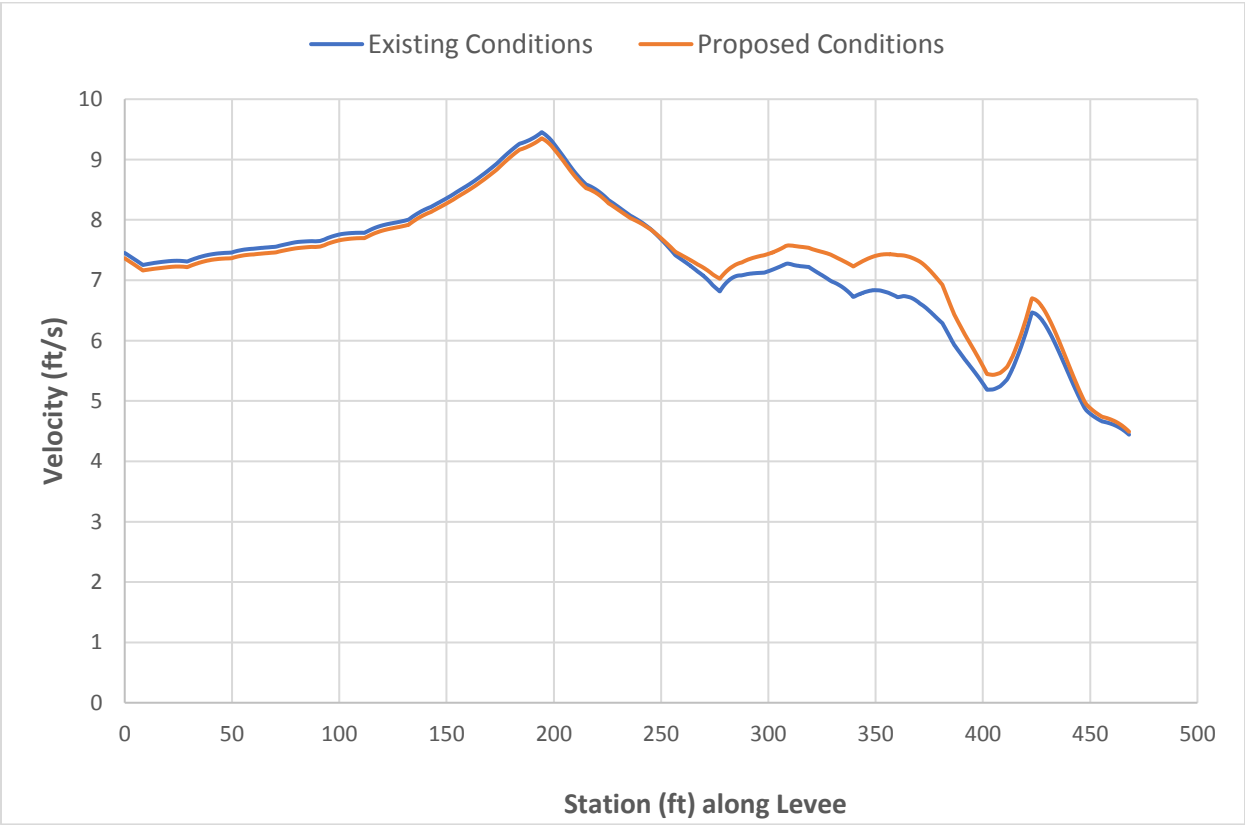


Figure 14. Computed Velocities along Levee Profile Line

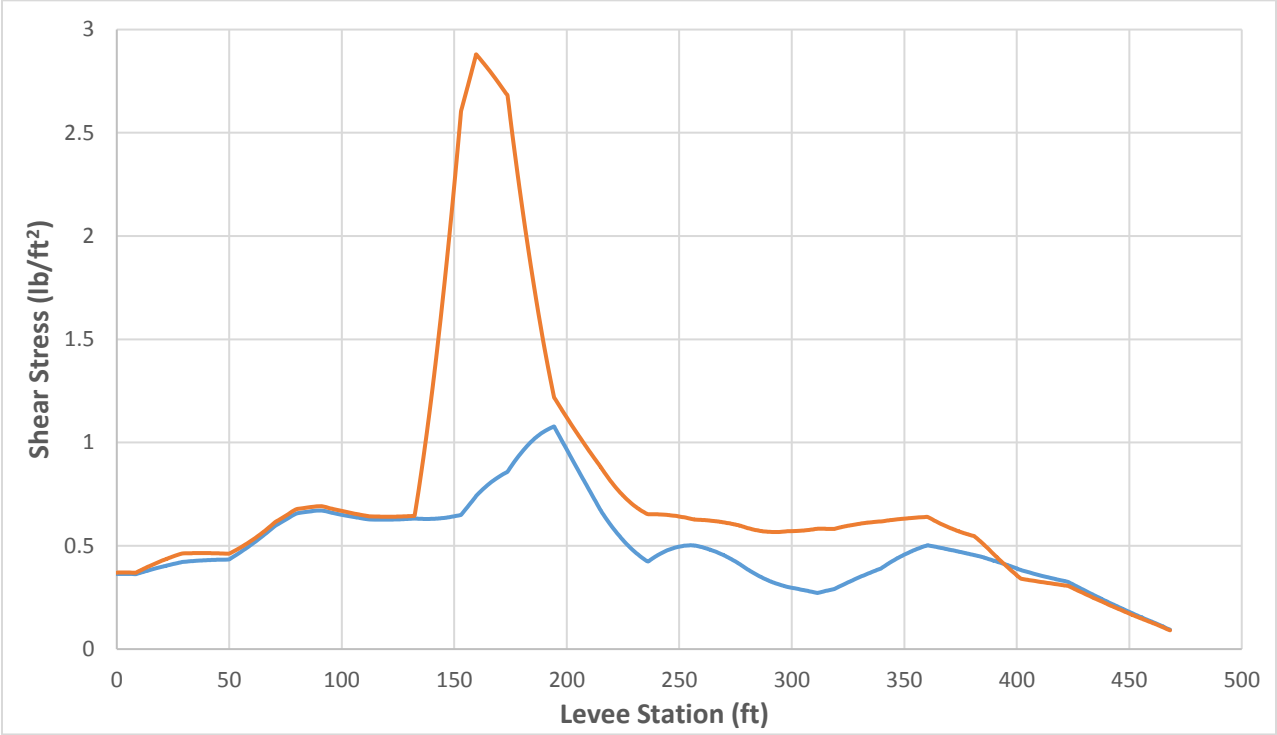


Figure 15. Computed Shear Stress along Levee Profile Line

No-Rise Certification

I hereby state that this analysis was performed by me or under my supervision and all work accomplished in the conduct of this study was done in accordance with accepted engineering practice. I further state that, based on the hydraulic model results, the proposed Waimea River Ford Crossing Improvements will not increase the base (100-year) flood elevation within the FEMA regulatory floodway. The signed FEMA no-rise determination form is provided as an attachment.

Please contact me at (808) 377-4437 or *jgusman@riverfocus.com* if you have any questions or comments.

A. Jake Gusman, P.E., D.WRE
River Focus, Inc.
March 23, 2020

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFICATION OF A "NO-RISE" DETERMINATION

FOR A PROPOSED FLOODWAY DEVELOPMENT

County of Kauai

Community Name

Waimea River Ford Crossing Improvements

Development Name

Lot/Property Designation

Property Owner

I hereby certify that the proposed remedial measures, in combination with the property development designated above, will result in no loss of flow conveyance during the occurrence of the 1 percent annual chance of exceedence (100-year flood) discharge.

I further certify that the data submitted herewith in support of this request are accurate to the best of my knowledge, that the analyses have been performed correctly and in accordance with sound engineering practice, and that the proposed structural works are designed in accordance with sound engineering practice.

March 23, 2020

Date

Andreas Jake Gusman

Registered Professional Engineer

Seal

ANDREAS JAKE GUSMAN
LICENSED PROFESSIONAL ENGINEER
No. 10801-C
HAWAII U.S.A.

This work was prepared by me or under my supervision.

APPENDIX D

BIOLOGICAL SURVEY REPORT

H. T. HARVEY & ASSOCIATES
Ecological Consultants
50 years of field notes, exploration, and excellence

Waimea River Ford Crossing Project, Kauai
Biological Survey Report

Project #4370-01

Prepared for:

Matthew K. Fujioka
Bow Engineering & Development, Inc.
1953 S. Beretania Street PH-A
Honolulu, HI 96826

Prepared by:

H. T. Harvey & Associates

August 24, 2020

Table of Contents

Section 1.0 Introduction 1
Section 2.0 Methods 4
2.1 Botanical Survey 4
2.2 Wildlife Survey 4
2.3 Aquatic Survey 4
Section 3.0 Results and Discussion 10
3.1 Botanical Survey 10
3.2 Wildlife Survey 15
3.3 Aquatic Survey 18
Section 4.0 Conclusions and Recommendations 25
4.1 Botanical Survey 25
4.2 Wildlife Survey 26
4.3 Aquatic Survey 27
Section 5.0 References 29

Tables

Table 1. Biotic Metrics and Scoring Used in the Hawaiian Stream Bioassessment Protocol 3.1 (Kido 2002a) 6
Table 2. Native Hawaiian Stream Macrofaunal Assemblage (Kido 2002a) 7
Table 3. HS-IBI Ratings, Integrity Classes, and Class Attributes (Kido 2002a) 7
Table 4. Habitat Metrics for the HSBP (Kido 2002a) 8
Table 5. Plant Species Observed at the Waimea River Ford Crossing Project Site, December 2019 10
Table 6. Bird Species Observed at the Waimea River Ford Crossing Project Site, December 2019 15
Table 7. Aquatic Species Observed in the Waimea River Crossing Study Area 18
Table 8. Scores for HS-IBI Metrics Obtained from HSBP application in the Waimea River Crossing Study Area 20
Table 9. Scores for Habitat Metrics Obtained from HSBP Application in Waimea River Site 22
Table 10. Native Taxa Reported to Be Found in the Estuary and Lower Reaches of the Waimea River (Modified from Parham et al 2008) 23

Figures

Figure 1. Vicinity Map 2
Figure 2. Project Site and Study Area 3
Figure 3. Southern Part of the Aquatic Study Area Looking Upstream; Red Arrow Indicates Location of Proposed Concrete Ford Crossing 5
Figure 4. Eastern River Bank at the Ford Entrance with Monkey Pod (*Samanea saman*) Trees and Mix of Weedy Ground Vegetation 12
Figure 5. Weedy Castor Bean (*Ricinus communis*) Shrubs and Guinea Grass (*Urochloa maxima*) Were Common Along the Eastern Bank of the River, North of the Ford 12
Figure 6. Thicket (right of the tree) of Guinea Grass (*Urochloa maxima)* and California Grass (*Urochloa mutica*) Along the Eastern Bank, South of the Ford. 13
Figure 7. Western Bank of the Study Area Was Largely Devoid of Vegetation. 14

Figure 8. Java Plum Trees (light green in center) Along the Northern End of the of the Western Bank of the River. 14
Figure 9. The Indigenous Black-Crowned Night Heron (*Nycticorax nycticorax hoactli*) (back) and the State and Federally Endangered Hawaiian Stilt (*Himantopus mexicanus knudseni*) (Front) Were Seen Foraging in the Shallow Waters About 150 m Downstream (South) of the Project Site. 17
Figure 10. Juvenile 'O'opu Hinana (of Undetermined Species) Were Abundant in the Shallow Gravel/ Sand/Silt Bottom Typical of the River Substrate in the Study Area 19
Figure 11. A Mortally Wounded and Dying Adult 'O'opu-nopili Observed in the Study Area 19
Figure 12. Juvenile O'opu Were Seen in the Shallow Waters Along the Western Bank (circled in red) in the Middle Reach of the Study Area 21
Figure 13. Statewide Comparisons of Stream Biotic Integrity (HS-IBI) and Condition of Supporting Habitat in Waimea River (Kauai) Sites Sampled in Dec 2019 23

List of Preparers

Sharon Kramer, Principal

Shahin Ansari, Senior Plant Ecologist

Linda Koch, Senior Aquatic Biologist

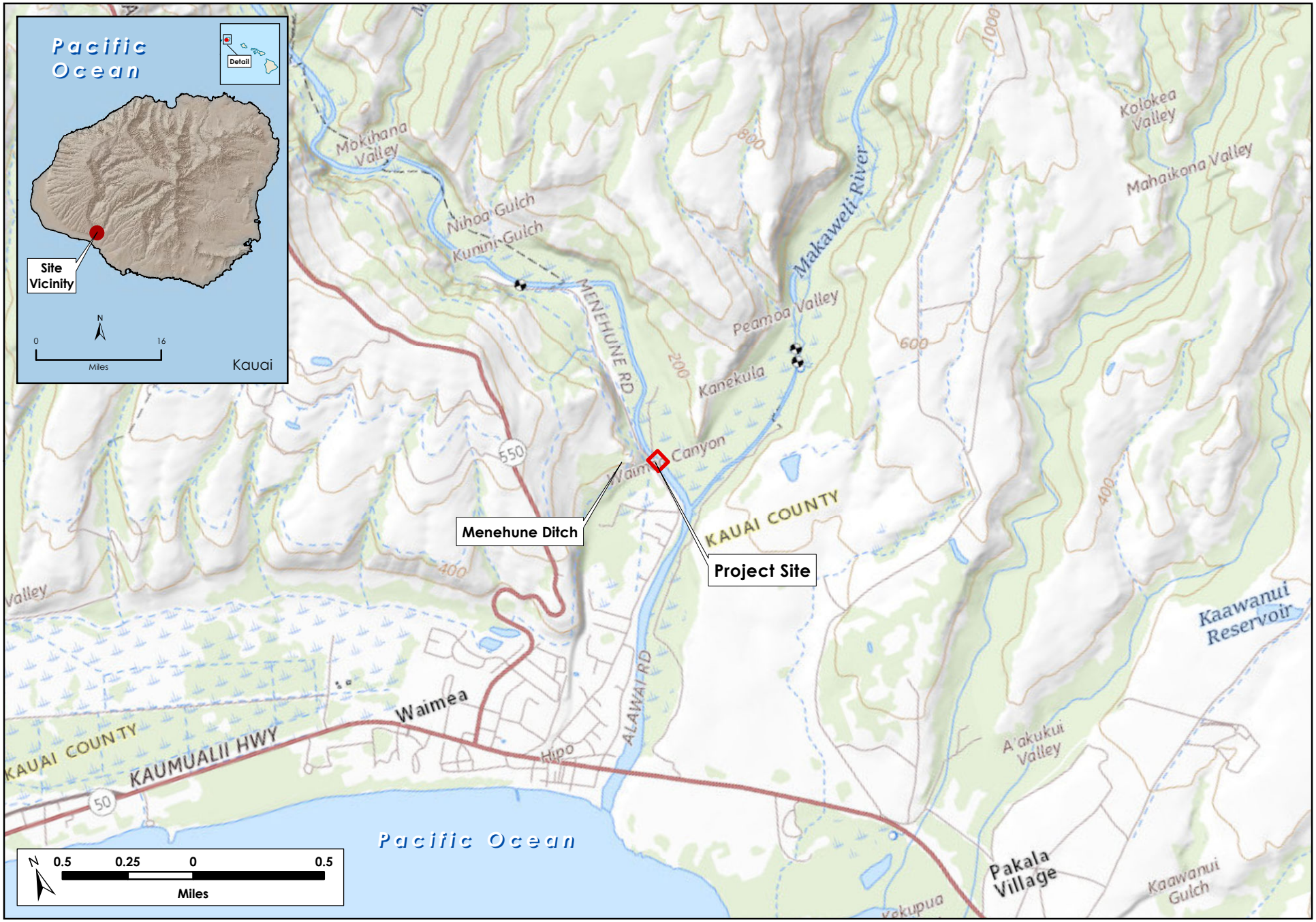
Ilana Nimz, Wildlife Biologist

Section 1.0 Introduction

The Waimea River Ford Crossing Project (the Project) is located on the Kauai Island in the lower reaches of the Waimea River, approximately 1 mile upstream from where the river enters the Pacific Ocean (Figure 1). Situated along Menehune Road, the Project Site is bound by the town of Waimea to the southwest and agricultural lands to the east (Figure 1). The historic Menehune Ditch lies to the north of the Project Site while the confluence with the Makaweli River lies immediately to the south (Figure 1). There is a residential farming community situated between the Waimea and the Makaweli Rivers. The Project Site comprises an undeveloped ford across the Waimea River (Figure 2), which is the only vehicular access that the farming community has to reach Waimea town on the western side of the river. Also, this ford crossing and the Waimea Swinging Bridge immediately to the north of the Project Site are the only pedestrian crossing areas for the farm residents to access Waimea town. During heavy rains, it becomes unsafe or impossible to drive across this undeveloped river ford, thereby shutting down the only access that the farming community has to the town of Waimea. To remedy this situation, the County of Kauai is planning to construct a new concrete ford crossing in place of the undeveloped crossing to provide the community with safer access across the river. Bow Engineering & Development, Inc. (Bow Engineering) have been contracted to plan and design this Project and conduct the environmental assessment in accordance with Hawaii Revised Statute Chapter 343.

This report represents the results of the biological studies done by H. T. Harvey & Associates in support of the environmental planning and permitting for this Project. The biological studies at the Project Site comprised botanical, wildlife, and aquatic field surveys. The objectives of the biological surveys were to:

1. Conduct a reconnaissance level botanical survey to identify and document the observed vegetation communities and the plant species.
2. Conduct a reconnaissance level wildlife survey to identify and document the presence of wildlife (birds and mammals) species.
3. Conduct an aquatic survey to identify and document the presence of observed fish and other aquatic macrofauna.
4. Identify and document the presence of biological issues of concern including the presence of any taxa state or federally listed as threatened or endangered and candidate species for listing.
5. Identify potential impacts and a range of potential conservation measures that may be considered for inclusion into the planning stage of the Project if any taxa state or federally listed as threatened or endangered and candidate species for listing are found in the Project Site.



N:\Projects4300\4370-01\Reports\Bio Survey\Fig 1 Vicinity Map.mxd

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 1. Vicinity Map

Waimea River Ford Crossing Project, Kauai. Biological Survey Report (4370-01)

February 2020

N:\Projects4300\4370-01\Reports\Bio Survey\Fig 2 Project Site.mxd

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 2. Project Site and Survey Area

Waimea River Ford Crossing Project, Kauai. Biological Survey Report (4370-01)

February 2020

Section 2.0 Methods

Reconnaissance level botanical, wildlife, and aquatic surveys were conducted at the Project Site on December 6, 2019. Weather was overcast (~60 percent cloud cover) until 10 AM, and sunny (<25 percent cloud cover) after 10 AM. Winds were calm; 0-5 miles per hour. The Study Area and the methods for the botanical, wildlife and the aquatic surveys are described below.

2.1 Botanical Survey

The Study Area for the botanical survey overlapped the boundary of the Project Site (Figure 2). A botanist conducted the survey by walking around the Project Site and documenting the observed plant species. A handheld Global Positioning System (GPS) device l was used to navigate during the survey and to record site-specific field observations. The biologists walked the accessible parts (see discussion below) of the Study Area documenting the plants and vegetation types. In general, rocky outcrops, shaded areas, and depressions, which are more likely to support native plant species, were intensively searched for native species.

2.2 Wildlife Survey

Weather conditions were found to be ideal for conducting bird surveys, with no rain, unlimited visibility, and light winds. Visual and auditory detection together with observations of scats, tracks, nests, and other animal signs were used to record observations of birds and mammals around and within the Project Site. In addition to general observations, five, 10-minute point counts were also conducted tallying all birds seen or heard by a single observer from a fixed point over a period of 10 minutes. Observations were made by using an Eagle Optics 10x50 binoculars and by listening for vocalizations.

Hawaii does not have native reptiles and amphibians. Surveys for insects were limited to visual and auditory detection during general field observations. The only native terrestrial mammal, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), is known to occur on Kauai (Tomich 1986). But, based on the project description (Section 1), this species was not considered as a species of concern and therefore, no surveys were conducted to detect its presence in the Project Site.

2.3 Aquatic Survey

The Hawaii Stream Bioassessment Protocol (HSBP) (Kido 2002a) evaluates the stream habitat and its biological integrity at a given site on a scale from "Excellent" to "Very Poor". This method provides valuable information useful in assessing environmental impacts to a stream or change in its ecological condition over time. Therefore, the HSBP method, with some modifications (as explained below) was used in this Waimea River crossing study.

The Study Area comprised 200 m (~660 ft) of the Waimea River; stretching 100 m upstream and 100 m downstream from the location of the proposed concrete ford construction (which overlaps the existing undeveloped ford crossing) (Figures 2 and 3).As per HSBP protocol, the length of the study stream reach is set to be 20 times the mean width of the stream with a minimum length of 100 m. At the time of this aquatic survey, the estimated width of the stream at the Project Site was about 30 m (~100 ft). However, given the relatively small size of the Project Site, we determined that a modified study stream reach length of 200 m (~660 ft) would be adequate to address the purpose of the study which is to establish a baseline condition to assess potential biological impacts of the Project.

Figure 3. Southern Part of the Aquatic Study Area Looking Upstream; Red Arrow Indicates Location of Proposed Concrete Ford Crossing

The HSBP utilizes sampling protocols and metrics for two integrated indices which evaluate: 1) the biotic integrity of the stream location using the Hawaii Stream Index of Biotic Integrity (HS-IBI) and, 2) the condition of the supporting habitat for aquatic organisms. Protocols used in the study utilize visual observations to score eleven metrics (Table 1) that provide ecological insight from the individual, population, and community levels of ecological organization of the native Hawaiian macrofauna. The biotic integrity metrics mainly rely on the presence of the native Hawaiian macrofaunal stream assemblage which consists of five gobiid fish, two neritid mollusks, and two decapod crustaceans (Table 2). The Study Area ranged from very shallow to about a meter deep at the time of the survey. Because the majority of the stream in the Study Area was less than a foot deep, the HSBP protocol was again modified to use a visual above water census to sample the fish population. The

raw data were then used to calculate the HS-IBI which rates biological quality in comparison to reference Hawaiian stream conditions on a scale from 0 % (< 40 % is impaired) to 100 % (Excellent) (Table 3).

The HSBP also evaluates stream habitat quality for various characteristics which support native aquatic organisms as well as riparian habitat for their ability to buffer the stream environment from land-based anthropogenic degradation. Ten physical habitat metrics (Table 4) are scored in the protocol and rated according to a percentage scale (i.e. 0-100%) which rates habitat quality as compared to a reference stream habitat from "Optimal" to "Poor" (Table 4). Stream flow (99 cubic feet/ second) was determined by utilizing the U. S. Geological Services gage station upstream from the Study Area.

After the biological integrity metric (HS-IBI) and the habitat metrics are calculated, they are compared against reference conditions to gain a sense of overall quality in relation to ecological stream function.

Table 1. Biotic Metrics and Scoring Used in the Hawaiian Stream Bioassessment Protocol 3.1 (Kido 2002a)

	Scoring Criteria		
Metric	**pts 5**	**3**	**1**
1a. Number of native amphidromous macrofauna (SNAM) - High/Moderate Slope Mid Reach	4 - 3	2 - 1	0
1b. Number of native amphidromous macrofauna (SNAM) - Low Slope Terminal Reach	6 - 5	4 - 2	1 - 0
2. Percent Contribution Native Taxa (PNT)	100% - 75%	74% - 50 %	> 49 %
3. Percent Sensitive Native Fish (SNF)[1]	< 50%	49% - 20 %	> 19 %
4. Sensitive Native Fish Density (fish sq m-1)[2]	< 0.46	0.45 - 0.20	> 0.19
5. Sensitive Native Fish Size (% > 6.0 cm)[3]	< 50%	49% - 25 %	> 24 %
6. Awaous guamensis Size (% > 8.0 cm)[3]	< 50%	49% - 25 %	> 24 %
7. Total Native Fish Density (fish sq m-1)	< 0.75	0.74 - 0.36	> 0.35
8. Community Weighted Average (CWA)	1.0 - 4.0	4.1 - 9.0	9.1 - 10
9. Number of Alien Taxa (NAT)	0 - 1	2 - 3	>3
10. Percent Tolerant Alien Fish	0%	1 - 4%	> 5%
11. Percent Diseased/Parasitized Fish	> 1 %	2 % - 10 %	< 11 %
Maximum Possible Points = 55			

[1] Sensitive species are *'o'opu-alamo'o* and *'o'opu- nōpili*; total no. individuals/total no. fish only

[2] Either *'o'opu-alamo'o* or *'o'opu-nōpili* (whichever is in highest density) but not both.

[3] Excluding post-larval size-classes (≤ 3.0 cm TL).

Table 2. Native Hawaiian Stream Macrofaunal Assemblage (Kido 2002a)

Taxa	Hawaiian Name	Status
Teleostei; Perciformes; Gobioidei		
Eleotridae - *Eleotris sandwicensis*	*'o'opu-'akupa*	endemic
Gobiidae - *Awaous guamensis (stamineus)*	*'o'opu-nākea*	indigenous
Lentipes concolor	*'o'opu-alamo'o*	endemic
Sicyopterous stimpsoni	*'o'opu-nōpili*	endemic
Stenogobius hawaiiensis	*'o'opu-naniha*	endemic
Kuhliidae – *Kuhlia sandvicensis (xenura)*	*aholehole*	endemic
Arthropoda; Crustacea; Decapoda;		
Atyidae - *Atyoida bisulcata*	*'ōpae-kala'ole*	endemic
Palaemonidae - *Macrobrachium grandimanus*	*'ōpae-'oeha'a*	endemic
Mollusca; Gastropoda; Neritidae		
Neritina granosa	*hīhīwai*	endemic
Theodoxus vespertinus	*hapawai*	endemic
Theodoxus cariosus	*hapawai*	endemic

Table 3. HS-IBI Ratings, Integrity Classes, and Class Attributes (Kido 2002a)

HS-IBI Score as % of Reference	Integrity Class	Attributes
90 - 100 %	Excellent	Comparable to reference conditions with minimal human disturbance; all expected native macrofauna present with alien *M.lar* either absent or in very low numbers; robust *'o'opu* population meeting density and size-class expectations including those for sensitive *'o'opu* species (i.e. *'o'opu-nōpili* and/or *'o'opu-alamo'o*).
79 - 89 %	Good	All expected native macrofauna present; Alien *M. lar* present but in low proportionate abundance (< 10 %); total *'o'opu* populaion densites generally attained but sensitive *'o'opu* densities and/or size classes may be somewhat below expectations.
69 - 78 %	Fair	Most expected native macrofaunal species present; Alien *M. lar* present in greater proportionate abundance (> 10 %); total *'o'opu* population and sensitive species densities/size classes below expectations.
59 - 68 %	Poor	Few expected native macrofaunal species present; Alien *M. lar* as or more abundant than native species but other alien species absent or rare; total *'o'opu* population and sensitive species densities/size classes well below expectations.
40 - 58 %	Very Poor	Only one or two expected native macrofaunal species present and if present in very low abundance; Alien aquatic species dominate the community and may include tolerant fish species (e.g. Poeciliidae).
< 39 %	Impaired	Native aquatic macrofaunal species absent; Only alien species present including *M. lar* and tolerant fish species.

Table 4. Habitat Metrics for the HSBP (Kido 2002a)

Metric	Optimal	Suboptimal	Marginal	Poor
1.Habitat Availability	> 80% of eleven possible habitat types present for slope gradient type (low, med, high)	51% - 79% of eleven possible habitat types present	26% - 30% of eleven possible habitat types present	< 25% of eleven possible habitat types present
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Substrate Embeddedness	Gravel, cobble, and boulder particles 0% - 10 % surrounded by fine sediment	Gravel, cobble, and boulder particles 11% - 25 % surrounded by fine sediment	Gravel, cobble, and boulder particles 26% - 74 % surrounded by fine sediment	Gravel, cobble, and boulder particles > 75 % surrounded by fine sediment
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. FPOM*/CPOM Characterization	FPOM/CPOM localized covering <10% of sq m quadrant	FPOM/CPOM obvious covering 11%-25% of sq m quadrant	FPOM/CPOM widespread covering 26%-50% of sq m quadrant	FPOM/CPOM dominant covering >51% of sq m quadrant
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Velocity-Depth Combinations	> 80% of seven possible flow regimes present for slope gradient type (low, med, high)	51% - 79% of seven possible flow regimes present	26% - 30% of seven possible flow regimes present	< 25% of seven possible flow regimes present
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Status	Ratio of stream width to bank-full width > 80 %	Ratio of stream width to bank-full width 79% - 65%	Ratio of stream width to bank-full width 64% - 50%	Ration of stream width to bank-full width < 49%
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	< 8 % of channel altered	10% – 23% of channel altered	24% - 44% of channel altered	> 45% of channel altered
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Bank Stability	< 8 % of stream bank unstable	10% – 23% of bank unstable	24% - 44% of bank unstable	> 45% of bank unstable
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Riparian Vegetation Zone Width	> 80% of riparian zone covered by trees/shrubs	51% - 79% of riparian zone covered by trees/shrubs	26% - 30% of riparian zone covered by trees/shrubs	< 25% of riparian zone covered by trees/shrubs
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
9. Percent Riparian Understory Coverage	> 80% of riparian zone covered by understory plants	51% - 79% of riparian zone covered by understory plants	26% - 30% of riparian zone covered by understory plants	< 25% of riparian zone covered by understory plants
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Metric	Optimal	Suboptimal	Marginal	Poor
10. Cobble/Boulder vs. Soil Presence	Boulder/Cobble substrate dominant feature; 0% - 10% of bottom affected by soil.	Boulder/Cobble substrate common feature;11% - 25 % of bottom affected by soil	Boulder /Cobble substrate margi-nal feature; 27%-50% of bottom af fected by soil.	Boulder/Cobble substrate rare feature; > 51 % of bottom affected by soil deposition.
Points	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Notes: FPOM=fine particulate organic matter; CPOM=coarse particulate organic matter

Section 3.0 Results and Discussion

3.1 Botanical Survey

No plant species state or federally listed as threatened, endangered, or candidates for listing, and no rare native Hawaiian plant species were observed in the Study Area. The Study Area did not contain proposed or designated critical habitat for threatened or endangered plant species (USFWS 2019).

A total of 41 plant species were observed in the Study Area and except for the two Polynesian introduced species of kukui (*Aleurites moluccana*) and coconut (*Cocos nucifera*); the remaining species seen are naturalized to the Hawaiian Islands (Wagner et al. 1999). Table 5 below provides a list of the plant species observed in the Study Area.

Table 5. Plant Species Observed at the Waimea River Ford Crossing Project Site, December 2019

Family	Scientific Name	Common name	Status[1]	Relative Abundance[2]
Ferns and Fern Allies				
Pteridaceae	*Adiantum raddianum* C.Presl	Maidenhair fern	nat	Uncommon
Angiosperms – Monocots				
Araceae	*Epipremnum pinnatum* (L.) Engl.	Money plant	nat	Uncommon
Arecaceae	*Cocos nucifera* L.	Coconut	pol	Rare
Cyperaceae	*Cyperus involucratus* Rottb.	Umbrella sedge	nat	Uncommon
	Cyperus sp.	Cyperus	nat	Uncommon
Poaceae	*Axonopus compressus* (Sw.) P.Beauv.	Wide leaved carpet grass	nat	Common
	Cynodon dactylon (L.) Pers.	Bermuda grass	nat	Common
	Urochloa maxima (Jacq.) R. Webster	Guinea grass	nat	Abundant
	Paspalum conjugatum P.J.Bergius	Hilo grass	nat	Common
	Urochloa mutica (Forssk.) T.Q.Nguyen	California grass	nat	Abundant
Angiosperms – Dicots				
Amaranthaceae	*Amaranthus sp.*	Amaranthus	nat	Common
Asclepediaceae	*Asclepias curassavica* L.	Butterfly weed	nat	Rare
Asteraceae	*Parthenium hysterophorus* L.	False ragweed	nat	Rare
	Synedrella nodiflora (L.) Gaertn.	Node weed	nat	Common
	Sphagneticola trilobata (L.) Pruski	Wedelia	nat	Uncommon
	Tridax procumbens L.	Coat buttons	nat	Common
Commelinaceae	*Commelina diffusa* Burm.f.	Honohono	nat	Common

Family	Scientific Name	Common name	Status[1]	Relative Abundance[2]
Convolvulaceae	*Ipomoea triloba* L.	Little bell	nat	Rare
Cucurbitaceae	*Momordica charantia* L.	Bitter melon	nat	Rare
Euphorbiaceae	*Aleurites moluccana* (L.) Willd.	Kukui	pol	Rare
	Euphorbia hirta L.	Hairy spurge	nat	Uncommon
	Ricinus communis L.	Castor	nat	Common
Fabaceae	*Chamaecrista nictitans* (L.) Moench ssp. *patellaria* (DC. ex Collad.) H.S.Irwin & Barneby var. glabrata (Vogel) *H.S.Irwin & Barneby*	Partridge pea	nat	Uncommon
	Crotalaria incana L.	Fuzzy rattlepod	nat	Uncommon
	Desmodium incanum DC.	Spanish clover	nat	Uncommon
	Indigofera suffruticosa Mill.	Creeping indigo	nat	Common
	Leucaena leucocephala (Lam.) de Wit	Koa haole	nat	Common
	Macroptilium atropurpureum (DC.) Urb.	Vining cow pea	nat	Common
	Pithecellobium dulce (Roxb.) Benth.	Opiuma	nat	Uncommon
	Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	Kiawe	nat	Uncommon
	Samanea saman (Jacq.) Merr.	Monkey pod	nat	Common
	Senna occidentalis (L.) Link	Coffee senna	nat	Rare
Lamiaceae	*Hyptis pectinata* (L.) Poit.	Comb hyptis	nat	Uncommon
	Leonotis nepetifolia (L.) R.Br.	Lion's ear	nat	Rare
Malvaceae	*Abutilon grandifolium* (Willd.) Sweet			Rare
	Sida acuta Burm.f. ssp. carpinifolia (L.f.) Borss.Waalk.	Sida	nat	Uncommon
Myrtaceae	*Syzygium cumini* (L.) Skeels	Java plum	nat	Uncommon
Passifloraceae	*Passiflora edulis Sims*	Passion fruit	nat	Rare
Phytolaccaceae	*Rivina humilis* L.	Coral berry	nat	Uncommon
Tiliaceae	*Triumfetta semitriloba* Jacq.	Sacramento bur	nat	Common
Verbenaceae	*Lantana camara* L.	Lantana	nat	Rare
	Stachytarpheta cayennensis (Rich.) Vahl	Vervain	nat	Rare

1 Status Notes: nat = naturalized = introduced or alien (all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact [i.e., Cook's arrival in the islands in 1778]).

2 Relative Abundance Notes: abundant = forming a major part of the vegetation in the survey of the project areas; common = widely scattered throughout the area or locally abundant in a portion of it; uncommon = scattered sparsely throughout the surveyed areas or occurring in a few small patches; rare = only a few isolated individuals in the project area

Additional Notes: This checklist is an inventory of all the plant species observed on December 6, 2019 at the Waimea River Ford Crossing Study Area. The plant names are arranged alphabetically by family, then by species, into each of three groups: ferns and fern allies; and monocots and dicots within the subdivision of angiosperm (flowering plants). The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999); recent name changes are those recorded in Wagner and Herbst (1999) and Wagner et al. (2012).

Figure 4. Eastern River Bank at the Ford Entrance with Monkey Pod (*Samanea saman*) Trees and Mix of Weedy Ground Vegetation.

Figure 5. Weedy Castor Bean (*Ricinus communis*) Shrubs and Guinea Grass (*Urochloa maxima*) Were Common Along the Eastern Bank of the River, North of the Ford.

Figure 6. Thicket (right of the tree) of Guinea Grass (*Urochloa maxima)* and California Grass (*Urochloa mutica*) Along the Eastern Bank, South of the Ford.

In general, vegetation in the Study Area can be described as mixed alien scrub, characteristic of a highly disturbed urban or rural lowland wet area on Kauai. There were large monkey pod (*Samanea saman*) trees on the eastern bank of the river near the entrance of the ford. In addition, there were scattered shrubs of castor bean (*Ricinus communis*) and haole koa (*Leucaena leucocephala*), and most of the ground vegetation in this area comprised a mix of herbaceous weedy species such as guinea grass (*Urochloa maxima*), amaranthus (*Amaranthus sp.*), Sacramento burr (*Triumfetta semitriloba*), sida (*Sida acuta*), and vining cow pea (*Macroptilium atropurpureum*) (Figure 4). There was one kukui (*Aleurites moluccana*) tree and a few coconut palms (*Cocos nucifera*) inland from the eastern bank behind the monkey pod trees. Castor bean shrubs, amaranthus, and guinea grass were also common on the eastern river bank north of the ford (Figure 5). While guinea grass and California grass (*Urochloa mutica*) formed a dense impenetrable thicket along the eastern bank south of the river ford (Figure 6). Guinea grass was the most abundant species all along the eastern bank of the river in the Study Area.

Compared to the eastern bank, the western bank of the river in the Study Area was mostly devoid of vegetation (Figure 7). There were several Java plum trees toward the northern end of the western bank, above the ford, but otherwise, the vast majority of the western bank had bare compacted soil (Figures 7 and 8). Umberella sedge (*Cyperus involucratus*) and the maiden hair fern (*Adiantum raddianum*) were growing under the shade of the Java plum trees, along the water's edge. While in the southern part, only few sedges were seen at the edge of the river bank, close to the water.

Figure 7. Western Bank of the Study Area Was Largely Devoid of Vegetation.

Figure 8. Java Plum Trees (light green in center) Along the Northern End of the of the Western Bank of the River.

The Study Area also comprised a narrow strip of the roadside vegetation with low growing weedy species such as Hilo grass (*Paspalum conjugatum*), node weed (*Synedrella nodiflora*), coat buttons (*Tridax procumbens*), and hairy spurge (*Euphorbia hirta*).

3.2 Wildlife Survey

Nineteen bird species—16 non-native or alien species and three indigenous species—wandering tattler (*Tringa incana),* black-crowned night heron (*Nycticorax nycticorax hoactli*), and Hawaiian stilt (*Himantopus mexicanus knudseni*), were observed at the Project Site (Table 6). Hawaiian stilt, as a state-listed and federally listed endangered species, is protected under the state and federal Endangered Species Acts (DLNR 2015a, USFWS 2019).

Table 6. Bird Species Observed at the Waimea River Ford Crossing Project Site, December 2019

Common Name	Scientific Name	Status	Abundance
Galliformes			
Phasianidae(pheasants&partridges)			
Black francolin	*Francolinus francolinus*	X	Uncommon
Red junglefowl	*Gallus gallus*	X	Abundant
Columbiformes			
Columbidae (pigeons & doves)			
Spotted dove	*Streptopelia chinensis*	X, IW	Common
Zebra dove	*Geopelia striata*	X, IW	Abundant
Passeriformes			
Sylviidae (Old World warblers & gnatcatchers)			
Japanese bush-warbler	*Cettia diphone*	X	Uncommon
Zosteropidae (white-eyes)			
Japanese white-eye (also known as Warbling white-eye)	*Zosterops japonicus*	X, IW	Very Abundant
Mimidae (mockingbirds & thrashers)			
Northern mockingbird	*Mimus polyglottos*	X, M	Rare
Sturnidae (starlings)			
Common myna	*Acridotheres tristis*	X, IW	Very Abundant
Emberizidae (emberizids)			
Red-crested cardinal	*Paroaria coronata*	X	Common
Fringillidae (fringilline and carduline finches & allies)			
House finch	*Carpodacus mexicanus*	X, M	Uncommon
Passeridae (Old World sparrows)			

Common Name	Scientific Name	Status	Abundance
House sparrow	*Passer domesticus*	X	Uncommon
Estrildidae (estrildid finches)			
Scaly-breasted munia	*Lonchura punctulata*	X	Uncommon
Java Sparrow	*Lonchura oryzivora*	X, IW	Rare
Charadriiformes			
Scolopacidae (waders, shorebirds)			
Wandering Tattler	*Tringa incana*	I, M	Rare
Recurvirostridae (Stilts, avocets)			
Black-necked Stilt (Hawaiian)	*Himantopus mexicanus knudseni*	I, ES, M	Rare
Pelecaniformes			
Ardeidae (Herons)			
Cattle Egret	*Bubulcus ibis*	X, IW, M	Uncommon
Black-crowned night heron	*Nycticorax nycticorax*	I, M	Rare
Psittaciformes			
Psittaculidae (parrots)			
Rose-ringed Parakeet	*Psittacula krameri*	X, IW	Uncommon
Anseriformes			
Anatidae (ducks)			
Mallard duck (male)	*Anas platyrhynchos*	X, M	Uncommon
Mallard-like duck (female mallard, koloa, or Koloa/hybrid)	Anas platyrhynchos/Anas wyvilliana/or hybrid	X/ES, M	Rare

Abundance based on the average number of individuals observed per count station, averaged across all point count stations, as follows:

Very Abundant – average > 7 calls/minute or > 7 individuals observed per station

Abundant – average 5 - 7 calls/minute or 5- 7 individuals observed per station

Common – average 3 - 5 calls/minute or 3 - 5 individuals observed per station

Uncommon – average 1 - 3 calls/minute or 1 - 3 individuals observed per station

Rare – average < 1 call/minute or < 1 individual observed per station

ES = state or federally listed as endangered

I = indigenous (native to the Hawaiian Islands and elsewhere)

IW = State (HAR 12-124, Exhibit 5) or Federal (18 U.S.C. 42) injurious wildlife species

X = introduced or alien (non-native species)

M= Listed as a Migratory Bird Treaty Act Protected Species (10.13 List)

One wandering tattler, a migratory shorebird, was observed flying through the project area at 10:53 and landed about 150 m downstream (south) of the Project Site. The two waterbirds—black crowned night heron and Hawaiian stilt were seen flying over the Project Site at 10:36 and 10:53 respectively. One black-crowned night

heron and one Hawaiian stilt were also seen foraging at the same time about 150 m south of the ford crossing (Figure 9). The birds spent about five minutes foraging in the shallow water in the middle and toward the western bank of the river.

Figure 9. The Indigenous Black-Crowned Night Heron (*Nycticorax nycticorax hoactli*) (back) and the State and Federally Endangered Hawaiian Stilt (*Himantopus mexicanus knudseni*) (Front) Were Seen Foraging in the Shallow Waters About 150 m Downstream (South) of the Project Site.

The remaining 16 bird species observed at the Project Site are all non-native introduced species typically seen in rural areas on Kauai (Table 6). Avian activity was highest in vegetated habitats, with birds regularly transiting over the Waimea River. Birds were observed in monkeypod, opiuma, haole koa, kiawe and Java Plum trees The Japanese white-eye (*Zosterops japonicus*) and Common Myna (*Acridotheres tristis*) were the most abundant species, and observed at all point-count stations. Seven of these species—spotted dove (*Streptopelia chinensis*), zebra dove (*Geopelia striata*), japanese white-eye (*Zosterops japonicus*), common myna, java sparrow (*Lonchura oryzivora*), cattle egret (*Bubulcus ibis*), and rose-ringed parakeet (*Psittacula kramerí*)—are designated as injurious species on the state list of injurious wildlife (DLNR 2015b) and are known to be harmful to agriculture, aquaculture, or indigenous wildlife or plants or to constitute a nuisance or health hazard. One male mallard was seen flying over the Project Site. In addition to this male mallard duck, two ducks passed quickly overhead and did not land in the Project Site. It could not be confirmed if they were Hawaiian ducks (koloa) (*Anas wyvilliana*), female mallards (*Anas platyrhynchos*) or koloa-mallard hybrids. No nesting behavior or bird nests were observed.

One feral dog (*Canis lupus familiaris*) was seen in the Study Area and many dog tracks were present on the non-vegetated river bank. Cat (*Felis catus*) scat and tracks were observed at numerous locations along both sides of the river. Signs of pig (*Sus scrofa)* rooting and wallowing were visible on the vegetated eastern side of the river.

Lizards observed in the Study Area were the brown anole (*Anolis sagrei*) and the mourning gecko (*Lepidodactylus lugubris*). Several individuals of the roseate skimmer (*Orthemis ferruginea*), a non-native dragonfly species, were seen hovering over the water surface and the river banks.

3.3 Aquatic Survey

No threatened or endangered aquatic taxa were observed in the Study Area during this one-day survey. Table 7 lists the aquatic species observed in the Study Area. Three out of the five taxa observed are native. The presence of these native aquatic species in this reach of the river was determined to be relatively robust with two out of the 2-4 expected native amphidromous fish present. There were considerable numbers of juvenile 'o'opu hinana of undetermined species in the shallow, gravel/sand/silt covered runs less than 20 cm deep (Figure 10). Water depths greater than 20 cm, including the scoured channels with similar bottom type were devoid of hinana, but small schools of mullet were present just under the surface. No adult gobies were observed. The Index of Biotic Integrity was lowered significantly by the metric that provides an indication of population structure in the Study Area. Given the lack of adult native fish, and the abundance of juvenile stage native gobies, the habitat in the Study Area can be characterized as a transient thoroughfare where the juveniles metamorphosize into their adult forms and move further upstream.

Table 7. Aquatic Species Observed in the Waimea River Crossing Study Area

Scientific Name	Common Name	Status	Relative Abundance
Fish			
Gobiid post larvae	Hinana	Endemic	Common
Sicyopterous stimpsoni	'O'opu Nopili	Endemic	Rare
Mugil cephalus	Striped Mullet	Indigenous	Common
Xiphophorus helleri	Swordtail	Alien	Common
Peocilia reticulata	Guppies	Alien	Common

Status: Endemic = found only in the Hawaiian Islands, Indigenous = native to the Hawaiian Islands and elsewhere, Alien = introduced, non-native species

Note: Abundant = species that are so numerous and conspicuous that they are difficult for an observer to miss; Common = found regularly but may not be exceptionally abundant; Uncommon = present in low numbers but seen regularly; Rare = species that may have low populations, require special efforts to observe, or appear only during brief circadian cycles

Figure 10. Juvenile 'O'opu Hinana (of Undetermined Species) Were Abundant in the Shallow Gravel/Sand/Silt Bottom Typical of the River Substrate in the Study Area

Figure 11. A Mortally Wounded and Dying Adult 'O'opu-nopili Observed in the Study Area

While numbers of native ‘o’opu and ‘opae populations observed were not comparable to numbers found in high quality streams, some of these species were at least present, which is not the case with severely degraded streams on Oahu island (Kido 2000, 2004, 2005). Particularly notable was the presence of ‘o’opu-nopili (*Sicyopterus stimpsoni*) (Metric 3 – Table 8) which are highly “sensitive” to human-induced degradation (Kido 2002a). Two adult ‘o’opu-nopili were observed that were either freshly dead or mortally wounded and dying (Figure 11). During our survey, there was a fieldtrip from the local high school with students evaluating the river upstream from the Study Area. There were over 20 students in the stream and moving about the riffle habitat which is where this taxon is expected to be found. It is very likely that the ‘o’opu-nopili we encountered were accidentally stepped on by the students upstream and were carried by the current into our sampling transects.

Table 8. Scores for HS-IBI Metrics Obtained from HSBP application in the Waimea River Crossing Study Area

HSBP Metric	Criteria	Score
1. Number of native amphidromous macrofauna (SNAM)	2	3
2. Percent Contribution Native Taxa (PNT)	50%	3
3. Percent Sensitive Native Fish (SNF)1	0.01%	1
4. Sensitive Native Fish Density (fish sq m-1)2	> 19 %	1
5. Sensitive Native Fish Size (% > 6.0 cm)3	> 0.19	1
6. *Awaous guamensis* Size (% > 8.0 cm)3	0.0 %	1
7. Total Native Fish Density (fish sq m-1)	34%	1
8. Community Weighted Average (CWA)	> 0.35	1
9. Number of Alien Taxa (NAT)	3	3
10. Percent Tolerant Alien Fish	4%	3
11. Percent Diseased/Parasitized Fish	0 %	5
Maximum Possible Points = 55 Total Points		
HS-IBI Score (% of Reference)		23
		41.8 %

The river channel in the middle part of the Study Area, immediately to the south of the crossing, comprised a wide shallow water bench where the native juvenile fish were found (Figure 12), and a narrow deeper channel along the eastern bank where the water moved more quickly. The water along the eastern bank in the lower (southern) section of the river, below the crossing, had a maximum depth of about two feet (0.6 m), and the section above (north) the crossing had a maximum depth of 1.3 m (4.3 ft). A few juvenile mullet (*Mugil cephalus*) (4-10 cm) and subadults (>35cm) were observed in these deep scoured channels along the eastern banks of both (upper and lower) sections of the Study Area. The behavior of these fish, exhibited by darting away suggests a substantial fishing pressure on this species.

Figure 12. Juvenile O'opu Were Seen in the Shallow Waters Along the Western Bank (circled in red) in the Middle Reach of the Study Area

Of significant note was the lack of adult gobies and other native species such as shrimp or snails in the Study Area. This can be explained based on the lack of appropriate habitat such as larger rocks and quiet areas of water within the Study Area. The invertebrate species would have difficulty occupying gravel and sand substrate with high water velocity and no shelter from predators. Crustaceans may have been present in the vegetation on the river banks, but it was difficult to see due to the turbid water and fine sediment in the area.

The dominant nonnative species we observed in the Study Area were swordtails (*Xiphophorus helleri*) and guppies (*Peocilia reticulata*), seen among the vegetation of California grass along the banks of the river. Blackchin tilapia (*Sarotherodon melanotheron*), a nonnative cichlid that are usually common in degraded estuaries, was not observed. This African cichlid is omnivorous, tolerant to degraded stream conditions and thus a significant threat to native aquatic species populations. Previous studies have noted tilapia in Waimea River but did not identify the species (Parham et al. 2008). No tilapia species were observed in the Study Area during this one-day survey.

After scoring for the various HSBP criteria, the overall biological integrity metric (HS-IBI) in the Study Area was determined to be 41.8 percent or "Very Poor" (40% to 60 % of Reference) (Tables 3 and 8). The habitat metrics reflected the highly modified area around the Study Area (Tables 4 and 9). Very limited habitat was available for native species. Of note, the modified stream bank of the flood control berm resulted in lowering the score considerably for several of the metrics including those that evaluate riparian vegetation. The shallow water over the homogenous substrate allowed for an elevated metric score for Channel Status. The river also

scored high in the metric for Fine Particulate Organic Matter/Coarse Particulate Organic Matter. The water was not as turbid as expected with a small amount silt or vegetative debris present along the bottom. The low percentage of reference conditions for the stream habitat ratings determined by the HSBP in the Study Area resulted in an overall habitat score of 44.5 percent (89/200 points) or "Poor" (less than 45.5% of Reference). Compared to other stream systems in the State, the Study Area in the Waimea River has very poor (but not impaired) biotic integrity and has non-supportive habitat condition (Figure 13).

Table 9. Scores for Habitat Metrics Obtained from HSBP Application in Waimea River Site

HSBP METRIC % of Reference	Dec 2019
1. Habitat Availability	10.0
2. Embeddedness	20.0
3. FPOM/CPOM Characterization	85.0
4. Velocity-Depth Combinations	65.0
5. Channel Status	80.0
6. Channel Alteration	75.0
7. Bank Stability	35.0
8. Riparian Zone Width	20.0
9. Riparian Understory	20.0
10. Boulder Cobble vs. Soil Presence	20.0
Total Points (Max = 200 pts)	89.0
Habitat Score (% of Reference)	44.5

Many previous studies have documented numerous biologic surveys in the Waimea River system since 1895 (Parham et al 2008). The Hawaii State Division of Aquatic Resources have documented 219 Larval Trapping Surveys and 153 Point Quadrat Surveys in the lower section of Waimea River. Table 10 lists the native taxa reported in the Watershed Atlas of Hawaii to be found in the estuary and lower reaches of the Waimea River (Parham et al. 2008).

The Hawaii Watershed Atlas also reports the current Hawaii State Division of Aquatic Resources - Decision Rule Status, which uses the following criteria to determine the biotic importance of the Waimea River system (Parham et al 2008).

Native Insect Diversity (>19 spp.) – Yes
Absence of Priority 1 Introduced – No
Presence of Candidate Endangered Species – No
Native Macrofauna Diversity (>5 spp.) – Yes
Abundance of Any Native Species – No
Endangered Newcomb's Snail Habitat - No

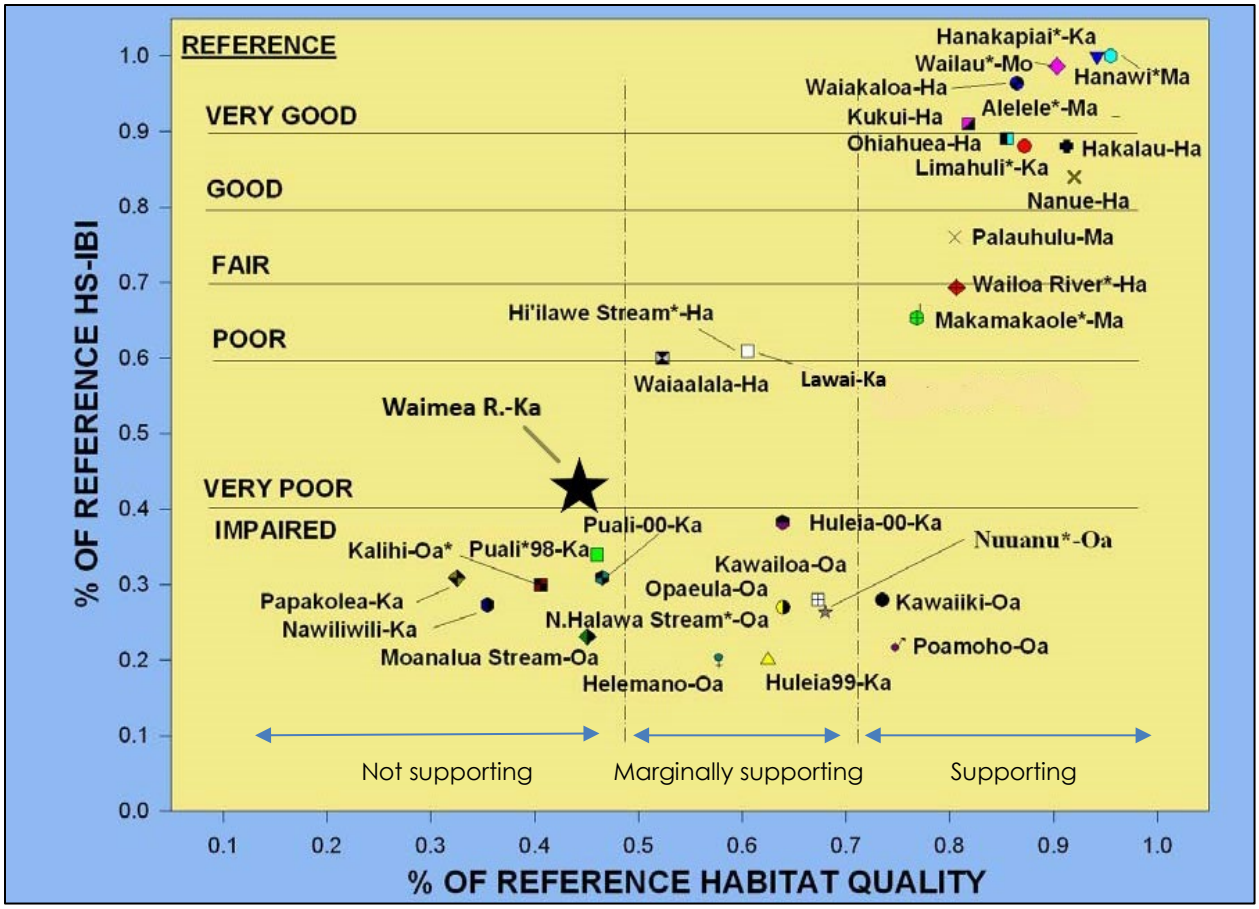


Figure 13. Statewide Comparisons of Stream Biotic Integrity (HS-IBI) and Condition of Supporting Habitat in Waimea River (Kauai) Sites Sampled in Dec 2019

*averaged values in streams that have been sampled at multiple elevations and/or times, Ka= Kauai, Oa= Oahu, Ma= Maui, Mo= Molokai, Ha= Hawaii). (Figure modified from Kido 2007)

Table 10. Native Taxa Reported to Be Found in the Estuary and Lower Reaches of the Waimea River (Modified from Parham et al 2008)

Scientific Name	Status	Estuary	Low
Atyoida bisulcate	Endemic	P	P
Macrobrachium granidimanus	Endemic		P
Eleotris sandwicensis	Endemic		P
Kuhlia xenura	Endemic		P
Lentipes concolor	Endemic		P
Sicyopterus stimpsoni	Endemic		P
Stenogobius hawaiiensis	Endemic		P
Neritina granosa	Endemic		P
Neritina vespertina	Endemic		P
Awaous guamensis	Indigenous		P
Gobiid sp.	Indigenous	P	P

Scientific Name	Status	Estuary	Low
Mugil cephalus	Indigenous		P
Mugilid sp.	Indigenous		P
Polydactylus sexfilis	Indigenous		P
Campsicnemus sp.	Indigenous		P
Bufo marinus	Introduced		P
Rana rugosa	Introduced		P
Macrobrachium lar	Introduced		P
Peocilia reticulata	Introduced	P	P
Peocilia sphenops	Introduced		P
Peociliid sp.	Introduced		P
Tilapia sp.	Introduced	P	P
Xiphophorus helleri	Introduced	P	P
Chironomid larvae	Introduced	P	
Enallagma civile	Introduced		P
Melania sp.	Introduced	P	P

P = Present

Thus, the Study Area is representative of the Waimea River system with respect to the absence of endangered taxa and lack of abundance of native species. Compared to other stream systems across the state, the Waimea River site is scored on the lower side in HSBP habitat and biotic integrity (Figure 13) due to the direct and indirect effects of the modifications to the stream channel for flood control. The HSBP and its metrics were developed for smaller Hawaiian streams with a variety of substrate and habitat types and are difficult to apply to this section of a large modified river with limited habitat types. The natural bottom was devoid of larger boulders that would be typical of other streams, and the high flow of the large Waimea watershed belies the compromise that was made to build flood prevention levees and create a system for quick exit of storm flows that scour the bottom and create the homogenous habitat as observed in the Study Area. Suitable habitat types of boulders, pools, riffles and cascades have been replaced by a very wide shallow run with a scoured deeper channel to one side, which likely changes continually in high flow events. In spite of this habitat limitation, there were large numbers of native post larvae and juveniles in the stream and the Study Area would be considered of good quality for recruitment of native taxa. There was a lack of larger adults but, prior studies show a much more robust population exists further up the river in more appropriate habitat away from the flood control channel (Parham et al 2008).

Section 4.0 Conclusions and Recommendations

4.1 Botanical Survey

The proposed Project to build a concrete ford in not likely to have a significant adverse impact on any plant species state or federally listed as threatened or endangered, candidate species for listing as endangered, species of concern, or rare native Hawaiian plant species. The Project Site is highly disturbed rural area with 95% of the flora being nonnative and 5% being Polynesian introductions.

If ford construction activities at the Project Site warrant the removal of shrubs or trees, then H. T. Harvey & Associates recommends that upon completion of the Project, they be replaced with ecologically suitable native plant species. If native plants do not meet landscaping objectives, non-native plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the Plant Pono website (http://www.plantpono.org/).

Care should be taken to avoid the introduction and spread of invasive species during and after construction of the concrete ford. The staging areas and construction site should be closely monitored for the appearance of invasive species not known to occur on Kauai as well as for species that may be present on Kauai but, are being actively targeted for control by the Kauai Invasive Species Committee. In addition, the following best management practices could be adopted to minimize the introduction and spread of new invasive species at the Project Site:

1) All construction equipment and vehicles should arrive at the Project Site clean and free of any soil; plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs.
2) All materials imported to the Project Site, including gravel, soil, rock, and sand, should be free of invasive species. Invasive species found on the stockpile should be removed either chemically or mechanically.
3) Only plants grown on Kauai should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined, if necessary, to ensure that they are free from invasive species, such as the coconut rhinoceros beetle (*Oryctes rhinoceros*) and little fire ants (*Wasmannia auropunctata*) and invasive plants seeds and seedlings that could arrive inadvertently.
4) Only weed-free seed mixtures should be used for hydroseeding and hydromulching on the Project Site. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Kauai and those that are actively being controlled on the island should be removed.

4.2 Wildlife Survey

Project actions are not likely to have an adverse impact on waterbirds. Project activities may displace waterbirds, or keep them from visiting the project areas. However, these impacts are temporary and alternative habitat for these taxa is widely available in neighboring areas in the Waimea watershed as well as elsewhere on Kauai.

An individual Hawaiian stilt was observed just south of the Project Site about 150 m downstream of the ford crossing. No nesting behavior or nests were observed. The Hawaiian stilt, as a state-listed and federally listed endangered species, is protected under the state and federal Endangered Species Acts (DLNR 2015a, USFWS 2019). Although other endangered Hawaiian waterbirds such as moorhen (*Gallinula chloropus sandvicensis*), coot (*Fulica alai*), Hawaiian duck, and nene (*Branta sandvicensis*) were not seen during this short reconnaissance level survey, they have been reported as known to occur in the general vicinity of the Project Site (USFWS 2011). In fact a taro farmer, whom the biologist happened to meet during the survey commented that Hawaiian moorhens, are common in the taro patches close to the Project Site. Additionally, a teacher from Waimea High School, conducting a field study with his students during this survey mentioned seeing a Hawaiian moorhen earlier in the morning.

Listed below are measures recommended by the U. S. Fish and Wildlife Service (USFWS) to avoid and minimize impacts to the state and federally endangered Hawaiian waterbirds and nene (USFWS 2020). As and when applicable, H. T. Harvey & Associates recommends that this Project incorporate these avoidance and minimization measures.

Avoidance and Minimization Measures for Nene:

- *Do not approach, feed, or disturb nene.*
- *If nene are observed loafing or foraging within the project area during the breeding season (September through April), halt work and have a biologist familiar with the nesting behavior of nene survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).*
- *Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.*
- *In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.*

Avoidance and Minimization Measures for Hawaiian Waterbirds:

- *In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site or nearby.*
- *If water resources are located within or adjacent to the project site, incorporate the applicable best management practices (BMPs) regarding work in aquatic environments into the project design.*

- *Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).*
- *If a nest or active brood is found:*
    - *Contact the Service within 24 hours for further guidance.*
    - *Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.*
    - *Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.*

4.3 Aquatic Survey

No threatened or endangered aquatic taxa were observed during the survey and therefore, construction of a concrete ford crossing at the Project Site is not likely to have an adverse impact of listed aquatic species. However, the Study Area, as discussed above, appears to serve as an important transitional area, where native juvenile taxa change to adult form and subsequently move upstream. Due to the importance of the estuary and lower stream reaches for the transition of native populations, it is imperative that native taxa have clear and unimpeded access upstream of the Study Area. Construction and hardening of the stream crossing must be done in such a way as to allow adults of native species easy access to the downstream estuary. Additionally, the larvae and juveniles must be able to navigate upstream through the Project Site with minimal areas where predation could occur.

At this time it is not clear to us if the planned ford will have low flow channels to prevent damming of the river in low water conditions. Also, it is not clear if the construction plans take into consideration normal depth of water over the ford substrate. As plans for construction of the ford are finalized, they should be thoroughly reviewed to minimize effects on fish and fish habitat. A consultation with the U.S. Fish and Wildlife Service would be advised through a program called the Hawaii Fish Habitat Partnership (http://www.fishhabitat.org/the-partnerships/hawaii-fish-habitat-partnership) that facilitates planning and implementation of appropriate habitat modifications. Young hinana and 'opae are colored to blend in with gravel and sand substrate. Construction material for the ford should mimic natural conditions and allow for water to flow gently across the ford with no impediments to native fish movement.

Longer term hydrologic effects should also be considered. Redirecting flow to concentrate and constrain the river through culverts would have unintended consequences where bottom substrate is modified and potentially creates habitat that would be conducive to invasive aquatic species. Examples of this would be deep pools where bass and tilapia would proliferate and create adverse conditions for juvenile native taxa by allowing predation to occur. Similarly, construction of the ford that would be exposed under low flow conditions and act as a dam would also be disruptive to native fish by not allowing easy access upstream.

Following are some recommendations to minimize potential impacts of the Project to native aquatic species:

1. Construct the new ford during the low flow time of year with lesser chance of rain and storm flow events.
2. Implement best management practices (BMPs) such as the installing silt curtains and dewatering portions at a time which could also serve to keep the native fish from entering the construction site.
3. Inspect all equipment before entering the construction area for oil leaks or potential polluting substances and store equipment outside of the stream channel.
4. Cover all stockpile material and install a compost sock along the perimeter of all staging areas used for storing construction material to prevent migration and runoff of this material into the storm drains or channels that lead back to the stream.
5. Implement a water quality monitoring program which will include pre-, during-, and post-construction monitoring of the stream. This may include either observational monitoring and/or collection of water samples for the analysis of a variety of parameters such as temperature, turbidity, total suspended solids, pH, and dissolved oxygen to identify potential impacts to physical and biological resources in the stream channel and nearby ocean waters.

Section 5.0 References

[DLNR] Hawai'i Department of Land and Natural Resources. 2015a. Hawaii Administrative Rules, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. <http://dlnr.hawaii.gov/dofaw/files/2013/09/Chap124a.pdf>. Accessed Nov 3, 2016.

[DLNR] Hawai'i Department of Land and Natural Resources. 2015b. Hawaii Administrative Rules, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. <http://dlnr.hawaii.gov/dofaw/files/2013/09/Chap124a.pdf>. Accessed Nov 3, 2016.

Kido, M. H. 2000. A Biological and Habitat Assessment of Halawa Stream, Oahu. Technical Report, City and County of Honolulu, July 2001.

Kido, M. H. 2002a. The Hawaii Stream Bioassessment Protocol (Version 3.01): A Manual for Biological Monitoring and Assessment of Hawaiian Streams. Technical Report to the Hawaii Department of Health, Environmental Planning Division and the U.S. Environmental Protection Agency, Region 9, January 2002.

Kido, M. H. 2002c. Biological and Habitat Assessment of Moanalua Stream, Oahu. Technical Report, City and County of Honolulu, September 2002.

Kido, M. H. 2004. A Biological and Habitat Assessment of Nuuanu Stream, Phase I. Technical Report to the City and County of Honolulu Department of Environmental Services (Storm Water Branch), October 2004.

Kido, M. H. 2005. A Biological and Habitat Assessment of Nuuanu Stream, Phase II. Technical Report to the City and County of Honolulu Department of Environmental Services (Storm Water Branch), August 2005.

Kido, M. H. 2007. A Biological and Habitat Assessment of Lower Lawai Stream., Kauai. Final Technical Report to the National Tropical Botanical Garden. The Hawaii Stream Research Center. University of Hawaii.

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. A Joint Project between the Hawaii Division of Aquatic Resources and Bishop Museum. <http://www.hawaii watershedatlas.com/authors.html>. Accessed January 15, 2020.

Tomich, P. Q. 1986. Mammals in Hawaii. Second edition. Bishop Museum Special Publication 76. Bishop Museum Press, Honolulu, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 2011. Recovery Plan for Hawaiian Waterbirds. Second revision. U.S. Fish and Wildlife Service, Portland, Oregon.

[USFWS] U.S. Fish and Wildlife Service. 2019. Critical Habitat Portal, Critical Habitat Mapper. Washington, D.C. <http://ecos.fws.gov/crithab/>. Accessed March 15, 2019.

[USFWS] U.S. Fish and Wildlife Service. 2020. Animal Avoidance and Minimization Measures. Pacific Islands Fish and Wildlife Service. <https://www.fws.gov/pacificislands//articles.cfm?id=149489720>. Accessed February 5.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawaii. Two volumes. Revised edition. University of Hawaii Press and Bishop Museum Press, Honolulu.

Wagner, W. L., and D. R. Herbst. 1999. Supplement to the manual of the flowering plants of Hawaii. Pages 1855–1918 *in* W. L. Wagner, D. R. Herbst, and S. H. Sohmer, editors, Manual of the Flowering Plants of Hawaii. University of Hawaii Press and Bishop Museum Press, Honolulu.

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 Hawaii and Hawaii's Ferns and Fern Allies. Version 1.3.

APPENDIX E

ARCHAEOLOGICAL LITERATURE REVIEW AND FIELD INSPECTION

Draft

Archaeological Literature Review and Field Inspection Report for the Waimea River Ford Crossing Project, Waimea Ahupuaʻa, Waimea District, Kauaʻi TMKs: [4] 1-6-001:027 (por.) and 888

Prepared for
Bow Engineering & Development, Inc.
on behalf of
County of Kauaʻi

Prepared by
William H. Folk, B.A.,
Nancine "Missy" Kamai, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi

(Job Code: WAIMEA 31)

August 2020

Oʻahu Office
P.O. Box 1114
Kailua, Hawaiʻi 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

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

Management Summary

Reference	Archaeological Literature Review and Field Inspection Report for the Waimea River Ford Crossing Project, Waimea Ahupua‘a, Waimea District, Kaua‘i, TMK: [4] 1-6-001:027 (por.) and 888 (Folk et al. 2020)
Date	August 2020
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: WAIMEA 31
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 19-07, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	State of Hawai‘i Department of Land and Natural Resources/State Historic Preservation Division (SHPD)
Land Jurisdiction	State of Hawai‘i, County of Kaua‘i, and Private
Project Proponent	County of Kaua‘i
Project Funding	State of Hawai‘i and County of Kaua‘i
Project Location	The proposed project area crosses into Waimea River from Menehune Road on the Waimea side of the river to a dirt road on the Makaweli side of the river, extending 60 m to the north. The proposed project is located approximately 125 m (410 feet [ft]) south of the Waimea Swinging Bridge. The project area is depicted on a portion of the 1991 Kekaha and 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles.
Project Description	The proposed project would replace the existing earthen crossing with either a concrete or aggregate-based crossing within Waimea River to reduce the amount of maintenance required. The approaches to the ford crossing would be hardened to prevent erosion.
Project Acreage and Area of Potential Effect (APE)	The Waimea River ford crossing’s project area is 0.98 acre (0.40 hectare). The APE is the same as the project area.
Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the study area—to determine the likelihood that cultural resources/historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276. This document may be used to support Section 106 of the National Historic Preservation Act consultation.

Fieldwork Effort	CSH archaeologist Missy Kamai, B.A., accomplished fieldwork on 12 September 2019 under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 1 person-day to complete.
Summary of Findings	No historic properties were identified within the proposed project area.
Recommendations	Recommendation is for a letter of determination from agency to agency to facilitate the Section 106 process due to Army Core of Engineer’s permit as well as to facilitate consultation with SHPD. Based on the lack of findings and the proposed project—construction of a concrete ford crossing and the hardening of the riverbanks—no further archaeological work is needed.

Table of Contents

Management Summary i

Section 1 Introduction 1

1.1 Project Background 1
1.2 Historic Preservation Regulatory Context 1
1.3 Scope of Work 1
1.4 Document Purpose 7
1.5 Environmental Setting 7
1.5.1 Natural Environment 7
1.5.1 Built Environment 9
1.6 Methods 9
1.6.1 Document Review 9
1.6.2 Field Methods 9

Section 2 Background Research 10

2.1 Mythological and Traditional Accounts 10
2.1.1 *Nā Wahi Pana* (Place Names, Sacred Places, and Landscapes) 10
2.2 *Nā mo‘olelo o ka wā kahiko* (Mythological and Traditional Stories) 14
2.2.1 Waimea Ahupua‘a 14
2.2.2 Makaweli Ahupua‘a 18
2.3 Early Historic Period 18
2.3.1 Land Ownership of Waimea and Makaweli: 1778–1848 19
2.3.2 The Māhele and the Kuleana Act 20
2.3.1 Mid- to Late 1800s 25
2.3.2 Sugar Industry 28
2.3.3 1900s to the Present 31
2.4 Previous Archaeological Research in and Around the Proposed Project 36
2.4.1 *Heiau* on Kaua‘i (Thrum 1906) 36
2.4.2 Archaeology on Kaua‘i (Bennett 1931) 36
2.4.3 Archaeological Studies along Menehune Road (Kikuchi 1983; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017) 36
2.4.4 Proposed State Agricultural Park (Hammatt and Ida 1993) 41
2.4.5 West Bank of Waimea River (Joerger and Streck 1979) 41
2.4.6 A Parcel along Gay Road (Ida and Hammatt 1993) 41
2.4.7 Kōke‘e and Waimea Canyon State Parks (Chiogioji et al. 2004) 41
2.5 Background Summary 42

Section 3 Results of Fieldwork 43

3.1 Pedestrian Inspection Results 43

Section 4 Summary and Recommendations 47

Section 5 References Cited 48

List of Figures

Figure 1. Portion of the 1991 Kekaha and 1996 Hanapepe USGS 7.5-minute topographic quadrangles showing the location of the proposed project area 2
Figure 2. Hawai‘i State Tax Map Key (TMK) [4] 1-6-01, showing proposed project location, (Hawai‘i TMK Service 2014) 3
Figure 3. Aerial photograph of the proposed Project area (Google Earth 2013) 4
Figure 4. Demolition and erosion control plan showing the proposed project (courtesy of client) 5
Figure 5. Photo of the ford crossing area, view to north (courtesy of client) 6
Figure 6. Overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001) 8
Figure 7. 1891 Imlay map (RM 2246) showing Gay and Robinson lands in Waimea and place names (mainly *‘ili* names) surrounding the proposed project area 11
Figure 8. A portion of the 1918 Thrum and Evans map of Waimea Valley lots, showing the relationship of the Pe‘ekaua‘i (Menehune) Ditch to the APE 16
Figure 9. A portion of the 1918 Thrum and Evans map of Waimea Valley lots, showing the various river crossings in relation to the APE 21
Figure 10. Portion of the 1996 Hanapepe USGS 7.5-minute topographic quadrangle showing the location of LCAs and the proposed project area.....26
Figure 11. The proposed project area/APE overlaid on a 2013 aerial photo showing the location of LCAs in the immediate vicinity (Google Earth) 27
Figure 12. A portion of a 1906 Donn map of Kaua‘i, showing the boundaries of land use for taro/rice cultivation, sugarcane cultivation, and pasture in relation to the proposed project area 29
Figure 13. Photo (n.d.) showing a Waimea river crossing (Hawai‘i State Archives).....30
Figure 14. A portion of a 1910 Mana and Hanapepe USGS topographic quadrangles, showing the proposed project area 33
Figure 15. A portion of a 1963 Kekaha and Hanapepe USGS 7.5-minute series topographic quadrangles, showing proposed project area location just southeast to the 1963 river ford crossing 34
Figure 16. 1966 Waimea coast aerial photograph (UH SOEST), showing proposed project location just southeast to the 1966 river ford crossing 35
Figure 17. Portion of 1991 Kekaha and 1996 Hanapepe USGS topographic quadrangles, showing locations of previous archaeological projects in and around the vicinity of the proposed project area/APE 37
Figure 18. Portions of 1991 Kekaha and 1996 Hanapepe USGS topographic quadrangles, showing locations of previously identified historic properties nearest to the proposed project area/APE 39
Figure 19 and Figure 20. Photos of Waimea side of the river, north view (left), south view (right) 43
Figure 21. Photo of proposed project area from the Waimea side of the river, view to northeast 44
Figure 22. Photo of proposed project area from the Makaweli side of the river, view to southwest 44
Figure 23. Photo of Waimea side of the river, taken from the Makaweli side showing parking area for vehicles belonging to Makaweli residents, view to southwest.....45

Figure 24. Photo of Waimea side of the river, taken from the Makaweli side showing parking area for vehicles belonging to Makaweli residents who walk across the river via the Waimea Swinging Bridge, view to southwest 45
Figure 25. Makaweli resident or *lo‘i* farmer driving through the Waimea River via the “ford crossing,” view to southeast.....46
Figure 26. Makaweli resident or *lo‘i* farmer driving through the Waimea River via the “ford crossing,” view to east 46

List of Tables

Table 1. Land Commission Awards near the vicinity of the proposed project area.....23
Table 2. Waimea Port exports between 1850 and 1851.....25
Table 3. Previous archaeological studies in the vicinity of the project area.....38
Table 4. Previously identified archaeological sites from Figure 18 40

Section 1 Introduction

1.1 Project Background

At the request of Mr. William F. Bow of Bow Engineering & Development, Inc., on behalf of the County of Kaua‘i (CoK), Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological literature review and field inspection study (LRFI) for the Waimea River Ford Crossing Project, Waimea Ahupua‘a, Waimea District, Kaua‘i, TMK: [4] 1-6-001:027 (por.) and 888. The proposed project extends across Waimea River, approximately 125 m south of the Waimea Swinging Bridge. The project area is depicted on a portion of the 1991 Kekaha and 1996 Hanapepe U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1), a tax map plat (Figure 2), a 2013 aerial photograph (Figure 3), a client-provided demolition and control plan showing the proposed project (Figure 4), and a client-provided photo (Figure 5).

The 0.40-hectare (0.98-acre) proposed project area traverses State of Hawai‘i, CoK, and private lands. The proposed project consists of the CoK replacing the existing earthen crossing with either a concrete or aggregate-based crossing within Waimea River to reduce the amount of maintenance required. The approaches to the ford crossing would be hardened to prevent erosion.

Six permanent residents use the crossing as their sole vehicular access to their homes. When the crossing is not usable, the residents park on the long shoulder of Menehune Road on the Waimea side of the river and use the Waimea Swinging Bridge to get to their homes. There are also other users who have farmlands, including *lo‘i* (taro terraces), across the river who use the ford crossing.

1.2 Historic Preservation Regulatory Context

Due to Army Corps of Engineering permitting, this project requires compliance with Section 106 of the National Historic Preservation and the National Environmental Policy Act.

1.3 Scope of Work

The scope of work for this archaeological LRFI is as follows:

1. Historical research to include study of archival sources, historic maps, Land Commission Awards, and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or near this property.
2. Limited field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This assessment will identify any sensitive areas that may require further investigation or mitigation before the project proceeds.
3. Preparation of a report to include the results of the historical research and the limited fieldwork with an assessment of archaeological potential based on that research, with recommendations for further archaeological work, if appropriate. It will also provide mitigation recommendations if there are archaeologically sensitive areas that need to be taken into consideration.

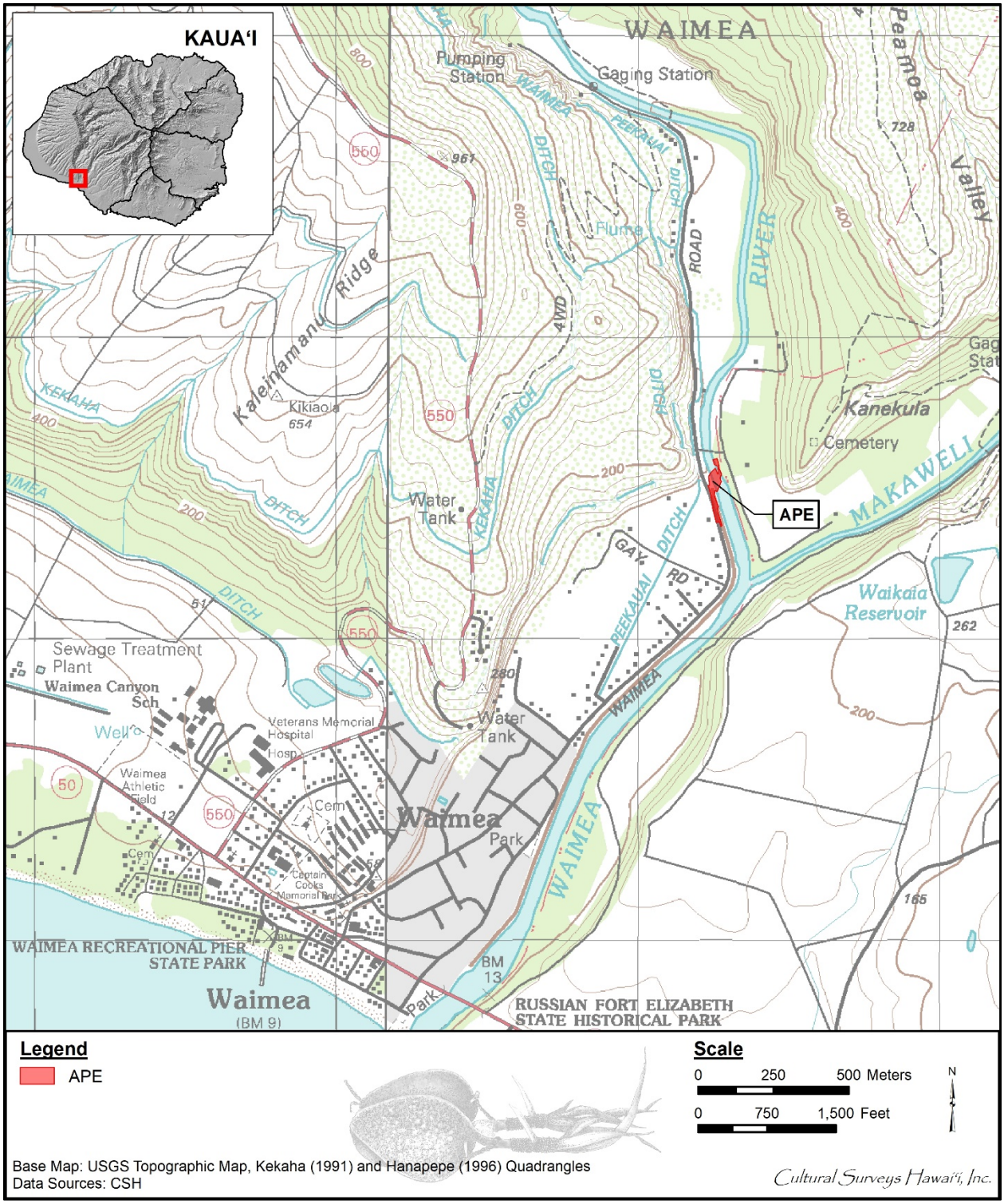


Figure 1. Portion of the 1991 Kekaha and 1996 Hanapepe USGS 7.5-minute topographic quadrangles showing the location of the proposed project area

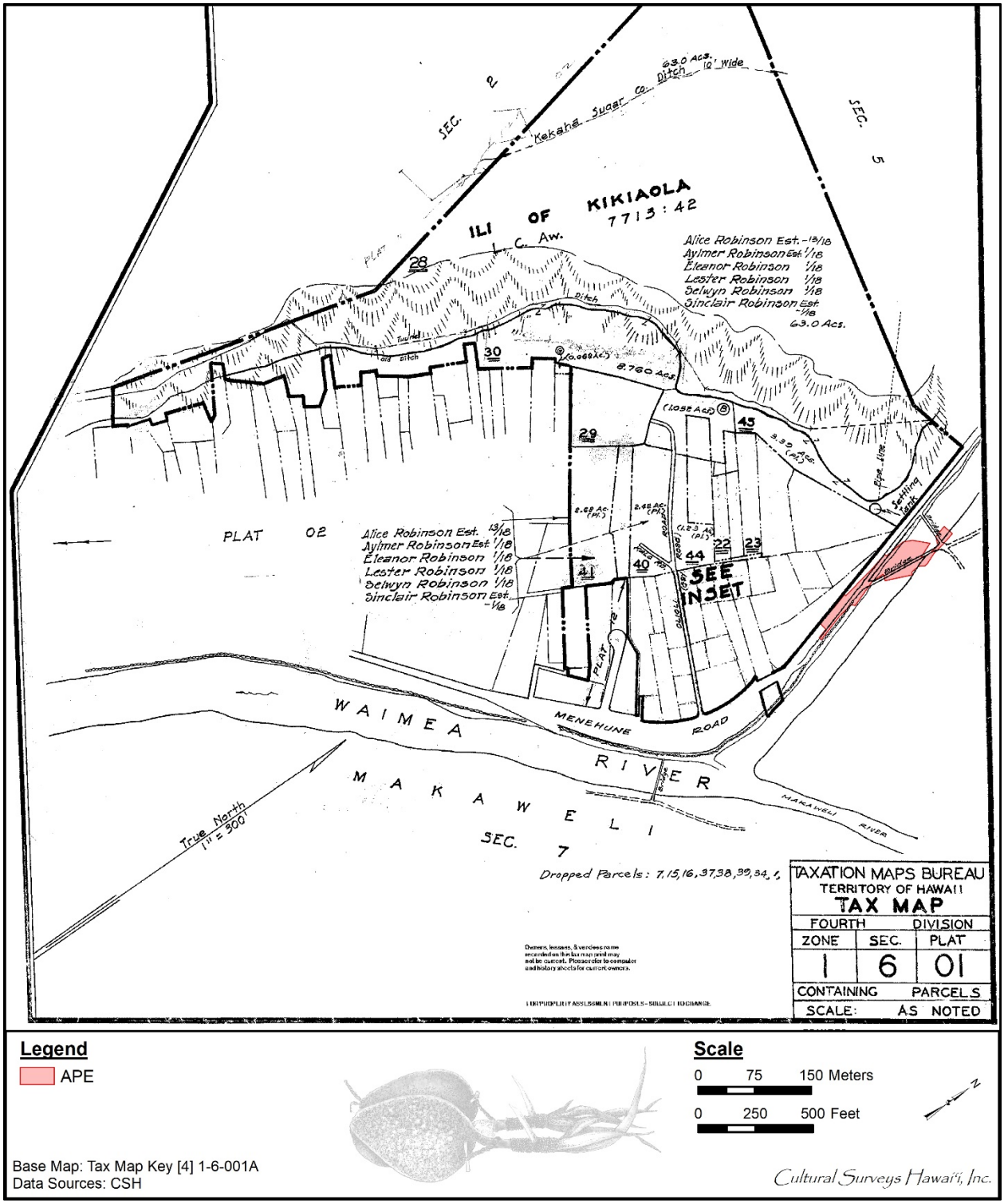


Figure 2. Hawai‘i State Tax Map Key (TMK) [4] 1-6-01, showing proposed project location, (Hawai‘i TMK Service 2014)

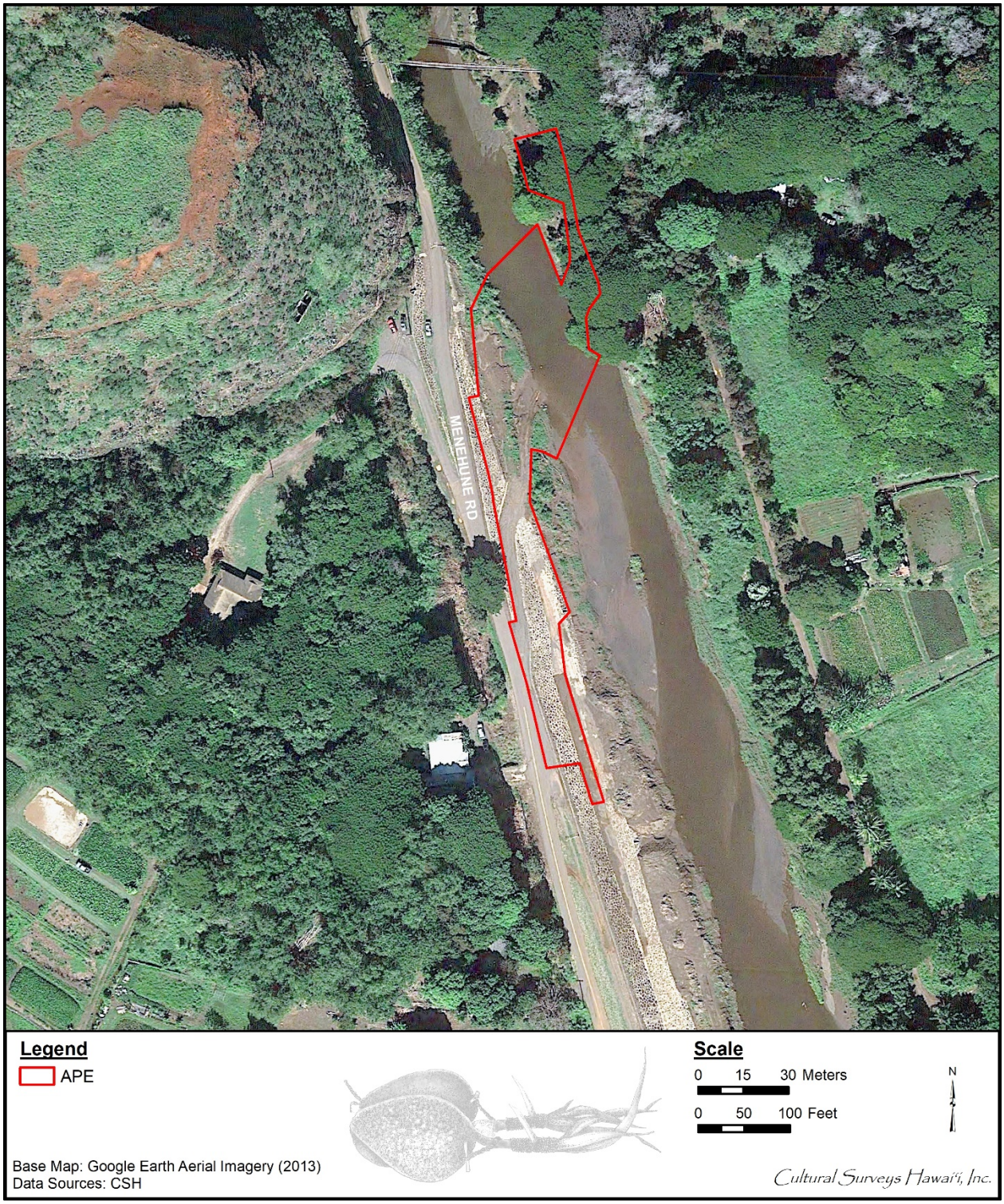


Figure 3. Aerial photograph of the proposed Project area (Google Earth 2013)

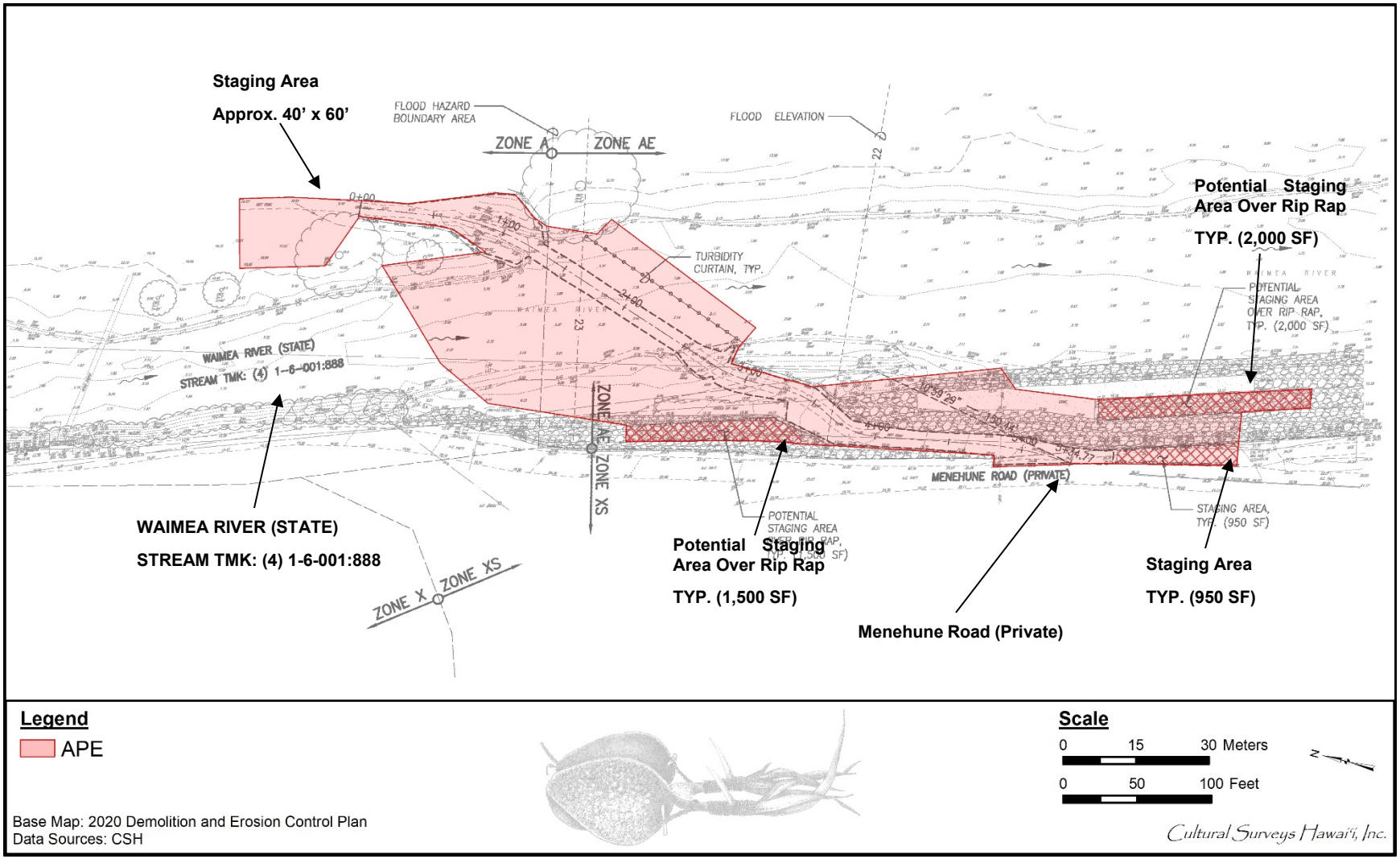


Figure 4. Demolition and erosion control plan showing the proposed project (courtesy of client)

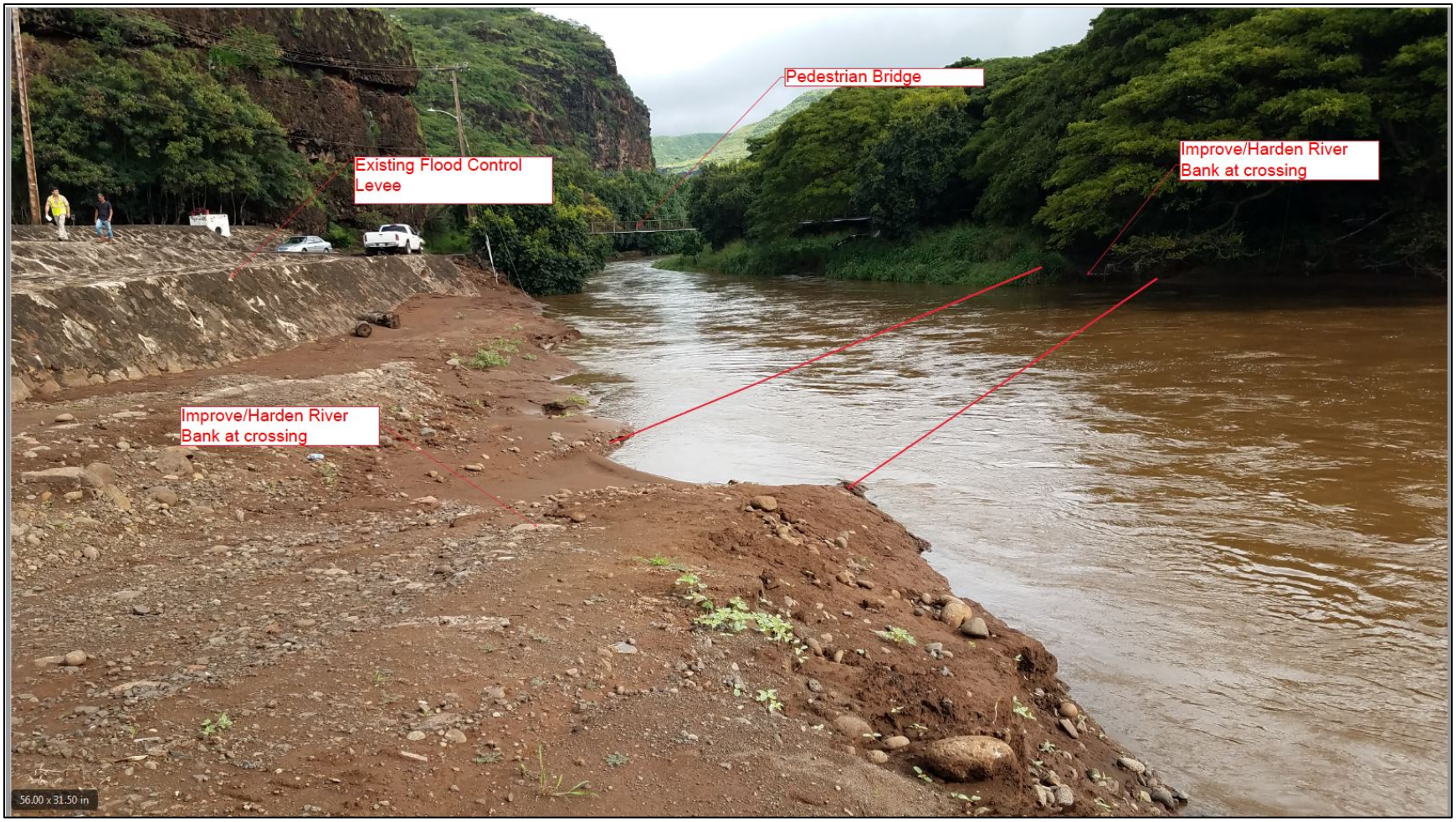


Figure 5. Photo of the ford crossing area, view to north (courtesy of client)

1.4 **Document Purpose**

This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the study area—to determine the likelihood that cultural resources/historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per Hawai‘i Administrative Rules (HAR) §13-276. This document may be used to support Section 106 of the National Historic Preservation Act consultation.

1.5 **Environmental Setting**

1.5.1 Natural Environment

Waimea River separates the *ahupua‘a* (traditional land division) of Waimea and Makaweli. Waimea Ahupua‘a is the largest *ahupua‘a* on the island. It comprises 92,646 acres, accounting for more than a quarter of the total land area of Kaua‘i. It encompasses all of the Waimea River Canyon area, the uplands of Kōke‘e, the high swampy plateau of Alaka‘i, and the northwestern coastal valleys of Nu‘alolo and Miloli‘i.

Information about the *ahupua‘a* of Makaweli is sketchy, though it can be compared to the adjacent land area of Waimea, which is similar in many ways. The lower portions of Kaua‘i's southwest plains, which include Waimea and Makaweli, are dry and get little rainfall—less than 30 inches annually with an average of 20 inches per year near the coast (Juvik and Juvik. 1998:56). Water for crop irrigation and sustainability of large settlements would have been a problem.

However, on this drier southwestern side of Kaua‘i, evidence of well-terraced and cultivated areas deep in the canyons of Waimea and Makaweli support the idea of a large inland population rather than a coastal one. Mountain trails that led to the sea allowed for trade with coastal dwellers. A particular taro variety, the *ha‘o kea*, was said to be fast growing and well adapted to the cold stream water and shallow soil at higher elevations. Another variety, *nā kalo a ‘Ola*, was reputed to have grown in high inaccessible places deep in the canyon recesses (Handy and Handy 1972:397). Freshets from mountain streams provided freshwater fish and shell fish such as *‘o‘opu* (*Eleotridae, Gobiidae* and *Blennidae*), *‘ōpae* (*Palaemon*), and *hihiwai* (*Neritina granosa*). On the hillsides above the flood plains the *mōhihi* varieties of sweet potato were planted. As in other places, *kō* (sugarcane), *mai‘a* (banana), and *pia* (arrow root) would have been grown on the outer edges of cultivated patches. Other plants such as *uhi* (yam), *‘awa* (Piper methysticum), *wauke* (paper mulberry), and *olonā* (*Touchardia latifolia*) probably grew wild in the wet gulches. There would also have been *kukui* (*Aleurites moluccana*) as well as *‘ulu* (breadfruit; *Artocarpus altilis*) and *kī* (*Cordyline terminalis*). Native woods would have been utilized for floats, weapons, canoes and paddles. Bird catchers would have had access to feathers for lei, royal *kahili* (standard), capes and helmets. All of these items would have provided the necessary food and supplies to sustain a large inland population (Handy and Handy 1972:397–400).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the proposed project area consists of Waimea river (Water [W]) and Riverwash (rRH) on either side of the river (Figure 6).

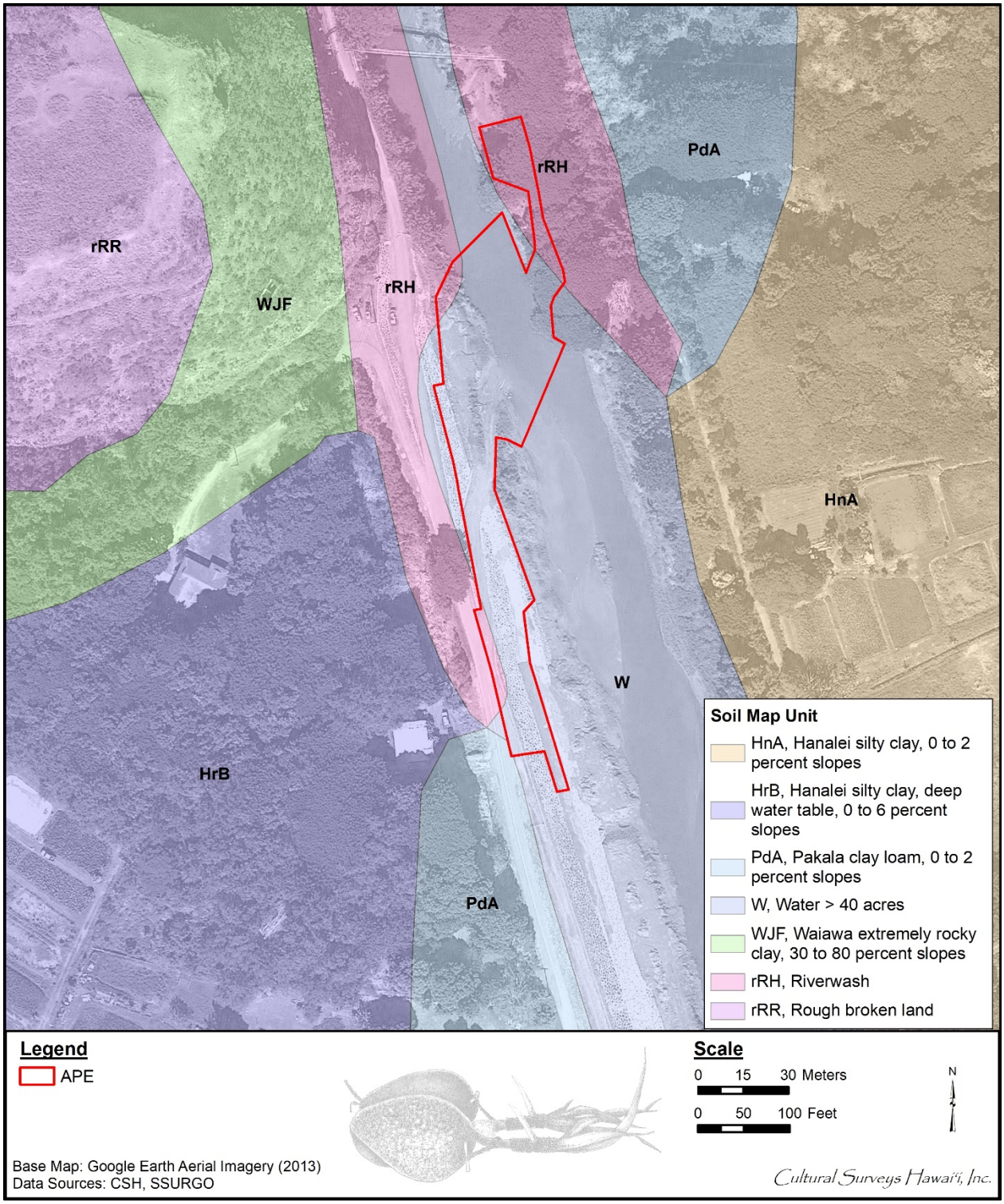


Figure 6. Overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001)

Riverwash is described with the following:

> […] nearly level bars of sand, gravel, and stones along perennial and intermittent streams on the island of Kauai. In places it consists mainly of large stones and boulders. It is nearly bare of vegetation and is subject to overflow and shifting during normally high water.
>
> Accessible areas of Riverwash are sources of material for roadbuilding and other kinds of construction. [Foote et al. 118]

1.5.1 Built Environment

The proposed project area extends across Waimea River into two *ahupua‘a*, Waimea and Makaweli, approximately 125 m south of the Waimea Swinging bridge. From the Waimea side, the crossing is at the base of the Waimea River levee at the bank of the river. It extends through the river to a dirt road on the Makaweli side of the river (see Figure 5). The Waimea River levee parallels Menehune Road, a major coast-to-inland thoroughfare through Waimea Town, and residential development is present near the proposed project on both sides of the river (see Figure 3).

1.6 **Methods**

1.6.1 Document Review

Historic and archival research included information obtained from the University of Hawai‘i at Mānoa’s Hamilton Library, the State Historic Preservation Division Library, the Hawai‘i State Archives, the State Land Survey Division, the Bishop Museum Archives, and the Kauai Historical Society. Previous archaeological reports for the area were reviewed, as were historic maps, historic photos, and primary and secondary historical sources. Information on Land Commission Awards was accessed through Waihona ‘Āina Corporation’s Māhele database (Waihona ‘Aina 2020) and Ulukau: The Hawaiian Electronic Library’s Māhele Data Base (Ulukau 2014).

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

1.6.2 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 19-07, issued by the State Historic Preservation Division (SHPD) pursuant to Hawai‘i Administrative Rules (HAR) §13-13-282. CSH archaeologist Missy Kamai, B.A., conducted fieldwork on 12 September 2019 under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately a 1 person-day to complete.

In general, the purpose of the field inspection was to develop data on the nature, density, and distribution of archaeological sites within the project area, and to develop information on the degree of difficulty that vegetation and terrain create for future archaeological studies. The field inspection consisted of a walk-through reconnaissance of the project area.

Section 2 Background Research

2.1 Mythological and Traditional Accounts

On the southwest side of Kaua‘i, Waimea is the name of a canyon, river, and *ahupua‘a.* Waimea is literally translated as “reddish water” (*wai* – water, *mea* – reddish), and it is at Waimea where Captain Cook first landed in Hawai‘i in 1778 (Pukui et al. 1974:225). The proposed project area, located south of the *‘ili* (small land division) of Kapalawai and east of the *‘ili* of Kīkīaola, extends across Waimea River into two *ahupua‘a*: Waimea and Makaweli.

2.1.1 *Nā Wahi Pana* (Place Names, Sacred Places, and Landscapes)

A Hawaiian *wahi pana* is also referred to as a place name. “In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has meaning for the people of that time” (McGuire and Hammatt 2000:17). *Nā wahi pana* were passed on through the oral tradition, preserving the unique significance of each place. *Nā wahi pana* can refer to natural geographic locations, such as streams, peaks, rock formations, ridges, and offshore islands and reefs, or they can refer to Hawaiian divisions, such as *ahupua‘a, ‘ili*, *mo‘o* (narrow strip of land), and man-made structures, such as fishponds, reservoirs, *kula* (farm pasture), and *kauhale* (group of houses). Hawaiians named all sorts of objects, places, and points of interest (Figure 7)

2.1.1.1 Waimea Ahupua‘a

Waimea, of southwest Kaua‘i, is the name of the canyon, land division and *ahupua‘a*. **Kekaha**, an *‘ili* within the *ahupua‘a* of Waimea, is literally translated as “the place” (Pukui et al. 1974:106). **Mānā**, also in *‘ili* in the *ahupua‘a* of Waimea, literally translates as “arid” (Pukui et al. 1974:144). Wichman describes Mānā, with its rich history, many stories, and legends with the following:

> [A] land of sand, marsh, and heat, intermingled fresh and salt water, a land of decorated gourds and of fishermen, the home of supernatural white and black dogs, a land where confused spirits of the newly dead wandered, was not at first a desirable place to live. [Wichman 1998:158–159]

Polihale, “house bosom” is referred to as a beach, *heiau* (pre-Christian place of worship), cliff, and spring (Soehren 2013:165; Wichman 1998:162). Wichman explains that the spirits of the dead from all over Kaua‘i came to Polihale and gathered in **Kā‘ana**, then followed **Hikimoe**, a stream to the *heiau* to rest. The spirits would then climb to the top of the cliff and leap into the ocean and into Pō (Wichman 1998:163).

Pōki‘i, the name of the ridge and *‘ili* within Waimea Ahupua‘a, literally translates as “youngest brother or sister” (Pukui et al. 1974:188). **Kaunalewa** is the land section and ridge in the Waimea District and literally translates as “swaying place” (Pukui et al. 1974:95), perhaps referring to a coconut grove that was once there.

The sacred *heiau* of **Makahoa** is located *mauka* of the current study area and literally translates as “friendly point” (Pukui et al. 1974:140). According to a community member, this *wahi pana* was used for astronomy purposes such as ceremonies during the solstices. The Makahoa Heiau was described as destroyed. Bennett describes the *heiau* as Makahoe, marking its location on Niu Ridge in Kaunalewa (Bennett 1931:102).

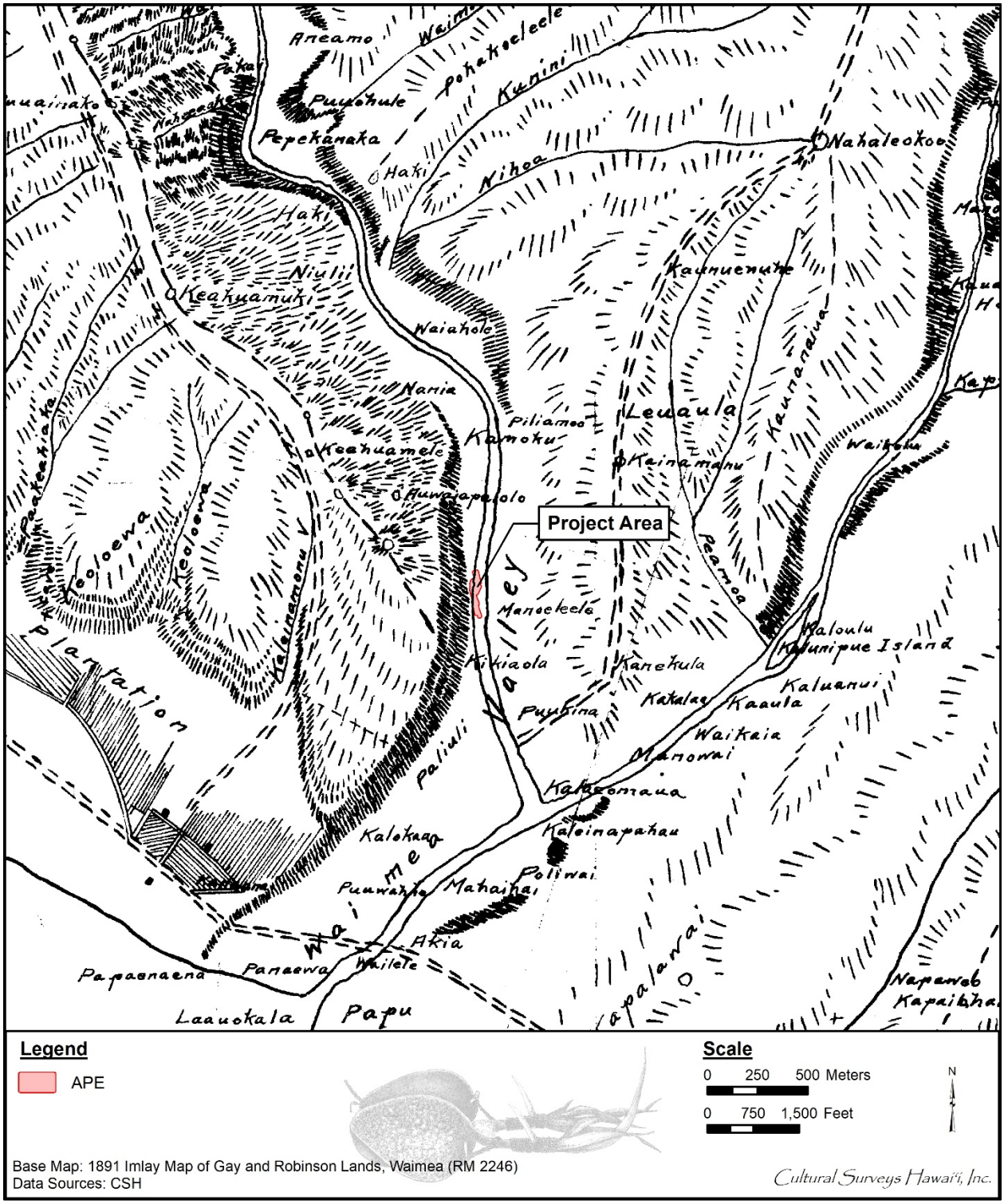


Figure 7. 1891 Imlay map (RM 2246) showing Gay and Robinson lands in Waimea and place names (mainly *‘ili* names) surrounding the proposed project area

Kahelu Heiau was once located in the Mānā area and is literally translated as “the number” or “the scratch” (Pukui et al. 1974:64). Thrum describes the *heiau* as “A heiau of platform character at the base of the hill, about 6 feet high in front, not of large size” (Bennett 1931:102).

Ho‘one‘enu‘u Heiau is located *mauka* of the current study area on Kaunalewa Ridge. According to Pukui and Elbert (1986), “*ho‘one‘e*” literally translates as “to move along” (Pukui and Elbert 1986:82) and “*nu‘u*” translates as “high place” (Pukui and Elbert 1986:273). The literal translation for Ho‘one‘enu‘u may therefore be “to move along to the high place.”

Kapua‘i refers to a point; it literally means “the bubbling & flowing out of fresh water” (Flores et al. 1993:II-11; Motteler 1974:29). Wichman (1998:160) cites this as “where the beach makes its turn on the way to Waimea.”

Nohili is the name for a swamp, ditch, point, beach area, and sand dune (Flores et al. 1993:II-14, Motteler 1974:29). Wichman (1998:160) writes, “Behind Kapu‘ai is a series of large sand dunes called Ke-one-kani-o-Nohili.” Pukui also refers to Nohili: “Nohili is the old name, famed in song and chant, for Barking Sands, Mānā, Kaua‘i” (Pukui 1983:190 #1774). She even refers to the beach at Nohili and the strange noises it makes (Pukui 1983:269 #2468). Motteler mentions Nohili pond (Motteler 1974:30).

Keanapuka refers to the “Beach area, Canoe Landing, Fishing Village. Lit, the passage [through the beach rock and reef to the ocean]” (Flores et al. 1993:II-12). Pukui cites the canoe landing in a *‘ōlelo no‘eau* (Hawaiian proverb) mentioned in a later paragraph (Pukui 1983:318–319 #2910).

Moelola refers to a locality and means striped tapa (Flores et al. 1993:II-14). There is no other mention of this place.

Kuaki‘i refers to a stone *ki‘i* (image) and a beach, meaning “image [of the] back, referring to the image of a person’s side-view on a stone that is submerged in the ocean just off the reef area at this site” (Flores et al. 1993:II-13). An oral tale concerning this name was given in an interview done by Flores et al.:

> There were a few individuals that were going from Mānā to the island of Ni‘ihau in an outrigger canoe. Therefore,—in order to protect themselves from the spirits on that island—the men put a stone image carved in the shape of a person in the front of their canoe. If the spirits should attack them when they landed on Ni‘ihau, the spirits would bite into this stone image and break their teeth. However, after launching their canoe from the shores of Kaua‘i—their canoe overturned a short distance from the beach near the off-shore surf. After being able to only retrieve one half of this stone image, they continued on their journey to Ni‘ihau. It is said that the other half is still submerged off-shore and can be seen even until this day. The shape of this stone is said to resemble the side-profile of a person’s back and leg. [Flores et al. 1993:IV-66–67]

Palaiholani is a beach area, a boat landing, and a point (Flores et al. 1993:II-14). Flores et al. 1993 quote some of the elders of the area about this place. Some of the elders recall boats being launched from here (Flores et al. 1993:V-71).

> Travelling from Mānā to the Nā Pali area was usually done on the ocean where the canoes and boats could be launched from beaches with unobstructed reefs and passageways such as at Palaiholani, Keanapuka, Po‘oahonu, Keawanai‘a, and Polihale. [Fores et al. 1993:VI–I]

Kohomahana is as a beach area (Flores et al. 1993:II-12). An interview with an elder recalls Kohomahana:

> The corral used to be over here [*mauka* side of road across from the Japanese cemetery at Pacific Missle Range Facility (PMRF)]. And used to get a fence running straight. That's Kohomahana [toward the beach] right over there where that stuff stay. That's Kohomahana fence. When we used to come to go that side [toward Polihale], this was the best way to go—no more mud. This place when rain, you never can make it to go Polihale. Never. You got to come inside here and then you stay on that sand to go Polihale. This place [was] all swamp. But plenty fish those days [in the swamp]! [Flores et al. 1993:V-59]

Kawai‘ele is a pond (Motteler 1974:30). It is also referred to as a beach area point, fishing grounds, ditch, and pumping station (Flores et al. 1993:II-12). **Waiokapua**, also known as Major's Bay or Waiokapua‘a, is a beach and bay area as well as a point meaning water of the pig (Flores et al. 1993:II-17; Motteler 1974:29). **Waiolono** is a beach area and point, meaning water of Lono (Flores et al. 1993:II-17). **Kokole** refers to a point and lighthouse, meaning any food crop stunted by weeds or drought (Flores et al. 1993:II-12).

2.1.1.2 Makaweli Ahupua‘a

Makaweli, which means "fearful features," refers to a landing, *ahupua‘a*, and a river in what is presently called the Waimea district on the south coast of Kaua‘i (Pukui et al. 1974:142), or perhaps it was named in reference to the glaring, threatening eyes of religious images or the fearful eyes of the victims (Wichman 1998:22). A more ancient name for Makaweli is **Ho‘ānuanu** which means "to cause cold" (Pukui 1983:47). This older name is no longer used to refer to Makaweli Ahupua‘a as a whole; however, it is a name still used to refer to Ho‘anuanu Bay along the ocean. Another interpretation of Makaweli was given by a Robinson family member. To him, Makaweli means "red eyes." This is because of the dry, dusty climate and especially the fine red dirt Makaweli is famous for, which makes the eyes red. A similar meaning of "burning eyes" was given. The last two interpretations are likely recent interpretations of the name. "As with all place names, meanings may change over time according to usage or to mark events of a particular period in time" (McGuire et al. 1999:13). **Kekupua Valley**, which means "Valley near Makaweli [...] Three heiau for human sacrifice were here: Kii-ana-lili, A‘a-kukui, and Ka-unu-loa" (Pukui et al. 1974:107). **Kaunuloa**, meaning "the long pebble," is alternately identified as the landing place for canoes and traced to the etymology "long end piece of a canoe" (Wichman 1998:24). **Keolo‘ewa**, name of a ridge west of Waimea River, was named after the god of sorcerers and black magic (Wichman 1998:12). Maha‘iha‘i meaning "brittle" is a small plain upriver of La‘au-‘ōkala edged on one side by 20-ft-high cliffs where there was a large sport field. It was the site of the first home of missionaries Whitney and Ruggles in 1820 (Wichman 1998:9).

The place names in the vicinity of the **Kapalawai** (meaning "the water moss") refer to many of the most important cultigens introduced by Polynesians which most likely formed dietary staples or were frequently used as raw materials by the people of the area. These include the well-known

breadfruit (**Kumu-‘ulu**), coconuts (**Kumu-niu**), mountain-apples (**Kumu-‘ōhia**), candle-nuts (Aa-kukui and **Kumu-kukui**) and *hau* (**Kumuhau**). Certain native plants are referred to including *hapu‘u* tree fern (**Kiinehapu‘u**); *koai‘e,* a form of *koa* (**Koai‘e Valley**); *manienie‘ula*—a golden beardgrass (**Manienie‘ula Ridge**); *mokihana* whose fragrant fruits are symbolic of Kaua‘i (**Mokihana Valley** and **Mokihana Ridge**); and the *‘iliahi* or sandalwood indirectly referred to in the place name **Pu‘u wahie.** Kapalawai is also relatively rich in references to birds in place names including **‘Ahuimanu**, **Kaholuamanu,** and **Wai‘alae** with only the last place name specific to a type of bird (the mudhen or Hawaiian gallinule; *Gallinula chloropus sandwichensis*). It seems probable that a variety of birds including the *‘alae* were harvested by Hawaiians (McGuire et al. 1999:18, 19).

2.2 *Nā mo‘olelo o ka wā kahiko* (Mythological and Traditional Stories)

2.2.1 Waimea Ahupua‘a

2.2.1.1 The Legend of Kūapāka‘a

Each *ahupua‘a* had an associated wind. In the Legend of Kūapāka‘a, the hero who controls the wind gourd of La‘amaomao chants the winds of Kaua‘i. The winds in the *ahupua‘a* of Waimea and Makaweli are as follows:

The aikoo is of Nualolo	*He aikoo ko Nualolo,*
The kuehukai is of Milolii,	*He kuehu kai ko Milolii,*
The puukapele is of Mana,	*He puukapele ko Mana,*
The moeahua is of Kekaha,	*He moeahua ko Kekaha,*
The waipaoa is of Waimea,	*He waipaoa ko Waimea,*
[The kapaahoa is of Kahana],	*He kapaahoa ko Kahana,*
The makaupili is of Peapea,	*He makaupili ko Peapea,*
[Fornander 1918:5:94–96]	

2.2.1.2 Pele and Her Sisters: the Winds and Waters

There are many legends of the Hawaiian volcano goddess Pele on the island of Hawai‘i. Pele and her sisters left their ancestral home of Hawaiki (the Marquesan Islands) and journeyed to Hawai‘i. On Kaua‘i, Pele’s siblings, her sisters Kapo‘ulakina‘u (Kapo), a brother Kahuilaokalani (Kahuila), and the youngest sister, Kapokūlanimoeha‘unaiki (Moeha‘una) landed on the shores of Mānā, an *‘ili* of the western section of Waimea. A handsome chief, Limaloa, with a feather cape greeted the travelers. Limaloa fell in love with Moeha‘una and begged her to stay with him in Mānā as the other siblings traveled onward east toward Waimea village. The group stopped on a ridge, missing their sister, and looked back toward Mānā. To commemorate the spot, Kahuila suggested they name the ridge Pōki‘ikauna, meaning “the yearning for the little sister.” This may be a reference to the ridge near the project area called Pōki‘i (Wichman 1991:32–38).

When the Hawaiian goddess, Pele, traveled to Kaua‘i, she recited the winds of Kaua‘i to her lover Lohi‘au and his people. Several place names, generally names of *‘ili* and other place names within the *ahupua‘a* of Waimea and Makaweli are found.

The winds of Kaua‘i blow, urged on…	*A pa a noua ka makani o Kaua‘i…*
Kaua‘i is what I see and know	*‘O Kaua‘i ka‘u i ‘ike*
A land where the winds assemble…	*He ‘āina na ka makani i ho‘olulu ai…*

Pōki‘i has a Lamalamapū‘ilikai wind…	*He Lamalamapū‘ilikai ko Pōki‘i…*
‘Āina‘ike has a Mau‘umae wind…	*He Mau‘umae ko ‘Āina‘ike…*
Kapa‘eli has a Holonaku wind	*He Holonaku ko Kapa‘eli*
Kekaha has a Moeahua wind	*He Moeahua ko Kekaha*
Pu‘upu‘upa‘akai has a Moehau wind	*He Moehau ko Pu‘upu‘upa‘akai*
Pāwehe has an Ulumano wind	*He Ulumano ko Pāwehe*
Pa‘ena‘ena has a Lapawai wind	*He Lapawai ko Pa‘ena‘ena*
Waimea has a Ho‘okomowaipao wind	*He Ho‘okomowaipao ko Waimea*
Kīkīlaola has a Kiuwai‘ula wind	*He Kiuwai‘ula ko Kīkīlaola*
Koai‘e has a Wai‘alae wind	*He Wai‘alae ko Koai‘e*
Mokihana has a Kumulipoho‘ouluali‘i wind	*He Kumulipoho‘ouluali‘i ko Mokihana…*
Waiahulu has a Waikea wind	*He Waikea ko Waiahulu*
Makaweli has a Pūnohu‘ula wind…	*He Pūnohu‘ula ko Makaweli…*
Kahana has a Kapāhoa wind	*He Kapāhoa ko Kahana*
Pe‘ape‘a has a Pilialoha wind	*He Pilialoha ko Pe‘ape‘a*
Kekupua has a Punohu‘ula wind	*He Pūnohu‘ula ko Kekupua*
Mahinauli has a Mo‘oholoawāwa wind	*He Mo‘oholoawāwa ko Mahinauli*
Pu‘uopāpa‘i has a Kula‘imano wind	*He Kula‘imano ko Pu‘uopāpa‘i*
Ka‘awanui has an Uhao‘ōwili wind	*He Uhao‘ōwili ko Ka‘awanui*

[Ho‘oulumāhiehie 2008a:16–17; Ho‘oulumāhiehie 2008b:16–17]

This chant also refers to Waimea and the land of “two beloved waters.” An *‘ōlelo no‘eau*, a Hawaiian proverb, explains this reference.

Ka wai‘ula‘ilahi of Waimea	The red sandalwood water of Waimea.

This expression is sometimes used in old chants of Waimea, Kaua‘i. After a storm Waimea Stream is said to run red. Where it meets Makaweli Stream to form Waimea River, the water is sometimes red on one side and clear on the other. The red side is called *wai‘ula‘iliahi*. [Pukui 1983:179, No. 1662]

2.2.1.3 The Menehune and Kīkīaola Ditch

Hawaiian legends concerning Waimea focus on the engineering feats that made the agricultural abundance of the *ahupua‘a* possible. Especially noteworthy are the legends narrating the origins of the cut stone-lined *‘auwai* (irrigation ditch) called Kīkīaola, popularly known as the “Menehune Ditch.” As seen in Figure 8, the *‘auwai* located just outside the proposed project area is also labeled Pe‘ekaua‘i, meaning “hidden Kauai.” Wichman (1998:9) says the original settlers named the farmland in this area Pe‘e Kaua‘i after the name of their ancient homeland. In the Māhele land records, Pe‘ekaua‘i is listed as the name of an *‘ili* near the Waimea coast and along the west bank of the Waimea River. The Pe‘ekaua‘i *‘auwai* watered the plain west of the Waimea River, and its most notable section (several hundred feet [ft] north of the proposed project) transported the water along the face of a cliff, some 20 ft above the river, by means of an aqueduct constructed of intricately fitted, cut, and dressed stones (Bennett 1931:23, 105–107).

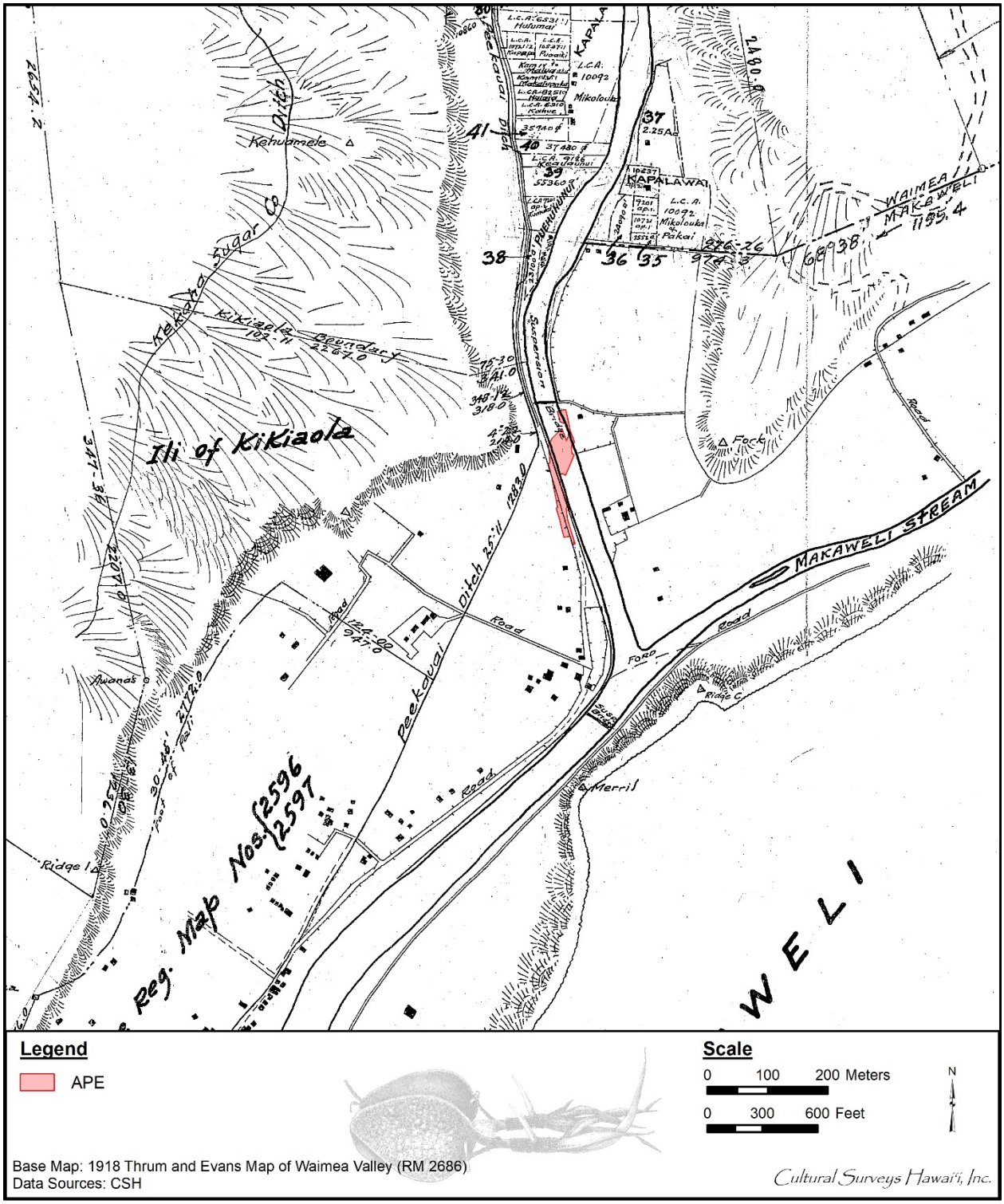


Figure 8. A portion of the 1918 Thrum and Evans map of Waimea Valley lots, showing the relationship of the Pe‘ekaua‘i (Menehune) Ditch to the APE

Martha Beckwith (1970:329–330) associates the name Kīkīaola (meaning, “container acquired by ‘Ola”; Pukui et al. 1974:110) with three versions of the legend of Ola, an *ali‘i* (chief) of Waimea. In one version (Rice 1923:45), Ola, “desiring to bring water to the taro patches of the Waimea flats […] summon[s] the Menehune people [who] each bring a stone and the watercourse (Kiki-a-Ola) is laid in a single night.” In another version (Thrum 1908:110–111), Kīkīaola is not the name of the watercourse itself: “Pi is the chief of Waimea who gets the Menehune to construct for him a dam across the Waimea river and a watercourse leading from it to a place above Kiki-a-ola.”

Thrum says of the *menehune*,

> Their dwelling place was in the mountains, above Waimea, near, perhaps, to a place known as Waineki. […] The watercourse of Kikiaola, above the Waimea river, was built by this race of Menehunes […] The chief that encouraged this race of Menehunes to the task rejoiced greatly at hearing of and seeing the completion of the watercourse of Kikiaola, to benefit the laboring people residing at *Paliuli*, and the water flowing down its course to enable the taro to grow thriftily for their sustenance. [Thrum 1923:214, 216]

Thus, Thrum identifies the land east and adjacent to the Kīkīaola Ditch as the land (*‘ili*) of Pali‘uli, a Hawaiian word for “green cliff.” In the third version (Luomala 1951:23), “Kiki-a-ola is the chief of Waimea” who “seems to be the sacrifice to be offered” at the completion of the dam and watercourse of Waimea by the *menehune*.

Menehune, a Tahitian term meaning “commoner,” came to refer to a mythical race of small industrious people who were alleged to have built many of the fishponds, irrigation systems, and *heiau* on Kaua‘i (Mills 1996:63). The *menehune* overseer of the Pe‘ekaua‘i *‘auwai* project was named Papa‘ena‘ena, which is the place name of the Waimea shore near the old wharf. Papa‘ena‘ena means “red, hot, lowland,” according to information on place names collected by Francis Gay in 1873 (Gay 1873:33). In Rice’s version, Papa‘ena‘ena is the name of a stone on the Waimea shore. “At one time the Menehune hollowed out a huge stone, and carried it to Waimea, where the head Menehune fisherman used it as a house. It was called Papa‘ena‘ena, from his name. He sat in this house, and watched his men fish” (Rice 1923:36).

Wichman (1998:8) also states this is the stone Papa‘ena‘ena sat on to direct his *menehune* workers when they built the irrigation ditch, Kīkīaola, which means “container acquired by Ola.”

The chief Ola is also associated with several other sites in Waimea Ahupua‘a, including Hau‘ola Heiau (built by his father near Kekaha), Ahululu Heiau at the foot of Pu‘ukapele Crater, and Kīpapa-a-Ola, a trail paved with sticks that crossed the Alaka‘i Swamp and connected Kōke‘e with Wainiha Valley on the island’s north shore (Beckwith 1970:328–229). Any attempt to even roughly date these sites or the Menehune Ditch through genealogical means would probably be fruitless. Although Ola is a very popular *ali‘i* in legends, his name cannot be found in any surviving Kaua‘i genealogy (Luomala 1955:132).

2.2.2 Makaweli Ahupua‘a

An *‘ōlelo no‘eau* (proverb or wise saying) which sheds possible light on the meaning of Makaweli and which has been passed down over time is *“Ho‘olele ka uila o Makaweli.”* Mary Kawena Pukui translates this as, “sending the lightning of Makaweli flying.” She explains that this is a play on the word “maka-weli” or terrifying eyes and says this refers to sending a god on an errand of destruction (Pukui 1983:117). At one time, Makaweli must have been known for this particular kind of sorcery or perhaps *akua lele* (flying gods) were commonly seen in this region. Specific information regarding this seems to have been lost over time.

2.3 **Early Historic Period**

By the time the British vessels *Discovery* and *Resolution*, under the command of Captain James Cook, anchored at Waimea Bay on 20 January 1778, the *ahupua‘a* of Waimea had long been a focus of settlement, agriculture, and *ali‘i* residence on Kaua‘i. The well-watered valley and delta of the Waimea River were ingeniously developed and engineered for wetland agriculture, and represent the epitome of the typical Hawaiian and Kaua‘i-type valley settlement (Handy and Handy 1972:393–397).

Cook’s observations during an excursion on shore in 1778 reveal the profusion of population, agriculture, and cultural/religious expression that had evolved at Waimea by the latter eighteenth century:

> Our road […] lay through the plantations. The greatest part of the ground was quite flat, with ditches full of water intersecting different parts, and roads that seemed artificially raised to some height. The interspaces were, in general, planted with *taro*, which grows here with great strength, as the fields are sunk below the common level, so as to contain the water necessary to nourish the roots. This water probably comes from the same source, which supplies the large pool from which we filled our casks. On the drier spaces were several spots where the cloth-mulberry was planted in regular rows; also growing vigorously, and kept very clean. The cocoa-trees were not in so thriving a state, and were all low; but the plantain-trees made a better appearance, though they were not large. In general the trees round this village, and which were seen at many of those which we passed before we anchored are the *cordia sebestina* [*kou*; *Cordia subcordata*]; but of a more diminutive size than the product of the southern isles. The greatest part of the village stands near the beach, and consists of above sixty houses there; but, perhaps, about forty more stand scattered about, farther up the country, toward the burying-place [*heiau*]. […]
>
> I found a great crowd assembled at the beach, and a brisk trade for pigs, fowls, and roots going on there, with the greatest good order, though I did not observe any particular person who took the lead amongst the rest of his countrymen. [Cook 1821:189]

While provisioning on this particular excursion, Cook’s party acquired nine tons of water, 60 to 80 pigs, some fowl, potatoes, a small quantity of plantains and taro—all this in exchange for nails and iron pieces. Captain Cook’s first visit to Waimea was brief, but it left a major impact on the small village. Cook’s own lieutenants (Portlock, Dixon, Vancouver) returned to Waimea repeatedly and established it as a major port and entry point. While Waimea may have always been

a royal center for the *ali‘i* of Kaua‘i, this position was greatly reinforced after Western Contact (Zulick et al. 2000:14).

The Russians recognized the importance of Hawai‘i for provisioning their ships along the fur trade route between the Northwest and China. In 1815, a Russian-owned ship full of furs hit a reef and sank off Waimea Bay, Kaua‘i. The crew abandoned ship and was left stranded on Kaua‘i for 2½ months. Meanwhile, Kaumuali‘i, paramount chief of Kaua‘i, retrieved the ship's goods (furs included) and kept them, in spite of the Russians' objections. Georg Schäffer was sent to Hawai‘i under Russian orders to retrieve the goods as diplomatically as possible. It has been debated whether Schäffer was following orders or whether he acted on his own behalf when he raised the Russian flag on Kaua‘i. An agreement was reached when Kaumuali‘i asked for protection in exchange for a Russian monopoly of the sandalwood trade. Kaumuali‘i agreed to provide 500 men as an army to conquer the other islands and Schäffer was to provide the ships, ammunition, and weapons. An important part of the agreement was that Schäffer would oversee all construction of future forts and trading posts. The Russian fort at Waimea was built by the Russian-American Company in 1816 under the direction of Schäffer. Kamehameha I, hearing of Schäffer's plans and feeling intimidated by the threat of Russian invasion, sent a message to Kaumuali‘i asking that Schäffer be deported. By June 1817, Schäffer and his men were forced to leave Kaua‘i (Mills 1996:30–37).

2.3.1 Land Ownership of Waimea and Makaweli: 1778–1848

When Captain Cook first landed at Waimea in 1778, Ka‘eokūlani was the ruling chief of Kaua‘i (Kamakau 1992:92). Upon his death in 1794, he was succeeded by his son Kaumuali‘i. Because Kaumuali‘i was too young to rule at the time, the kingdom was administered by his *kahu* (guardian), Nākaikua‘ana (Kamakau 1992:162, 169). In 1810, rather than go to war, Kaumuali‘i offered to cede his government to Kamehameha I. Kaumuali‘i and Kamehameha must have reached a mutual understanding because Kaumuali‘i was allowed to rule independently over his kingdom of Kaua‘i until his death in 1824 on O‘ahu, where he had resided following his marriage to Ka‘ahumanu two years earlier (Kamakau 1992:253). Following Kaumuali‘i's death, there was a great rebellion and a battle for political power between the Hawai‘i and Maui island chiefs and the Kaua‘i chiefs. It was at this time that the Kamehameha family won control of Kaua‘i. The Kaua‘i chiefs were punished for their rebellion and were excluded from the *kālai ‘āina* (distribution of lands) when the lands were redistributed. At the end of the 1824 rebellion, as Hawaiian historian, Samuel Kamakau, notes, "The lands held by chiefs of Hawai‘i were tabu; Waimea and Makaweli were held by Ka-‘ilinaoa and Ka‘u‘uku-ali‘i" (Kamakau 1992:268).

Soon afterward, Kaikio‘ewa was appointed governor of Kaua‘i (Kamakau 1992:269). He held this position until his death in 1839.

Following the death of Kamehameha I, Ka‘ahumanu, his favorite wife, inherited his lands. When Ka‘ahumanu died in 1832, her heir was Elizabeth Kaho‘anokū Kīna‘u, daughter of Kamehameha I and Kaheiheimālie (Ka‘ahumanu's sister). Kīna‘u inherited Ka‘ahumanu's *‘āina* (lands) as well as the position of *Kuhina Nui* (Premier). In 1827, Kīna‘u married Mataio Kekūanaō‘a and bore five children. The first two sons died young. But the other three children would continue the Kamehameha legacy. Alexander Liholiho would reign as Kamehameha IV and Lota Kapuāiwa would reign as Kamehameha V. Kīna‘u died in 1839 only four months after her daughter, Victoria Kamāmalu Ka‘ahumanu, was born. Since Kīna‘u's death was sudden and she

did not leave a *kauoha* (command), it was decided by the *Ali‘i Nui* (high chief) that Victoria Kamāmalu would inherit her lands and her position of *Kuhina Nui.* Kamāmalu's guardians were John ‘Ī‘ī and her father, Mataio Kekūanaō‘a (Kame‘eleihiwa 1992:120–24).

At the time of the Māhele in 1848, Kamamalu held seven *‘āina* on the island of Kaua‘i. Five of these *‘āina* were relinquished to the *Mo‘i* (King) and she retained two *‘āina* for herself. The *ahupua‘a* of Makaweli was kept for Kamamalu (Land Commission Award [LCA] 7713).

2.3.2 The Māhele and the Kuleana Act

In 1845, the Board of Commissioners to Quiet Land Titles, also called the Land Commission, was established "for the investigation and final ascertainment or rejection of all claims of private individuals, whether natives or foreigners, to any landed property" (Chinen 1958:8). This led to the Māhele, the division of lands among the king of Hawai‘i, the *ali‘i,* and the common people, which introduced the concept of private property into Hawaiian society. In 1848, Kamehameha III divided the land into four divisions: Crown Lands to be reserved for himself and the royal house; Government Lands set aside to generate revenue for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana,* habitation and agricultural plots claimed by the common people (Chinen 1958:8–15).

Upon the confirmation of a land claim, the *ali‘i* were required to pay a commutation to the government. This commutation (substitution of one form of payment or charge for another) could be satisfied with a cash payment or the return of land of equal value. This payment was usually one-third of the value of the unimproved land at the date of the award (Chinen 1958:9–12).

The pattern of settlement for Makaweli Ahupua‘a is far from clear. Māhele land claims of the mid-1800s often offer a good approximation of traditional patterns of land use but this is not the case at Makaweli owing to the nature of Māhele records for this area and changes in land tenure patterns which occurred in the early 1800s.

The enumeration of Māhele land claims for Makaweli is unusually complicated. In this portion of Kaua‘i, many people claimed lands in more than one *ahupua‘a*. There are 117 claims made by 85 claimants which either describe or award claims in Makaweli Ahupua‘a. Of these 117 claims, 83 are awarded but some of the awarded parts are in Waimea or even Hanapēpē.

It should also be noted that there is more than one Kapalawai on the island of Kaua‘i. There is a Kapalawai in Waimea and one in Hanapēpē, which are clearly different lands than the Kapalawai of Makaweli. Of the 117 claims made for Makaweli, nine claims were for Kapalawai in Waimea (southwest of the proposed project area) and four claims were for Kapalawai in Hanapēpē.

The Māhele land documents suggest a pattern of the extensive exploitation of the Waimea Makaweli-Mokuone river basin. The *ahupua‘a* of Makaweli is bounded by the Waimea River on the western side at the shore. The Waimea River is fed by the Makaweli River tributary a short distance up the river, and the Makaweli River, in turn, is fed by other streams such as the Mokuone Stream. These are the stream valleys where, at the time of the Māhele, people were settled. Waimea, at this same time, had the greatest population on the island of Kaua‘i and Makweli's land use is closely linked to Waimea, with some claimants living in one place and farming in the other or vice versa, which leads to the idea that traversing through the Waimea River was an everyday occurrence as presented in the various river crossings in Figure 9.

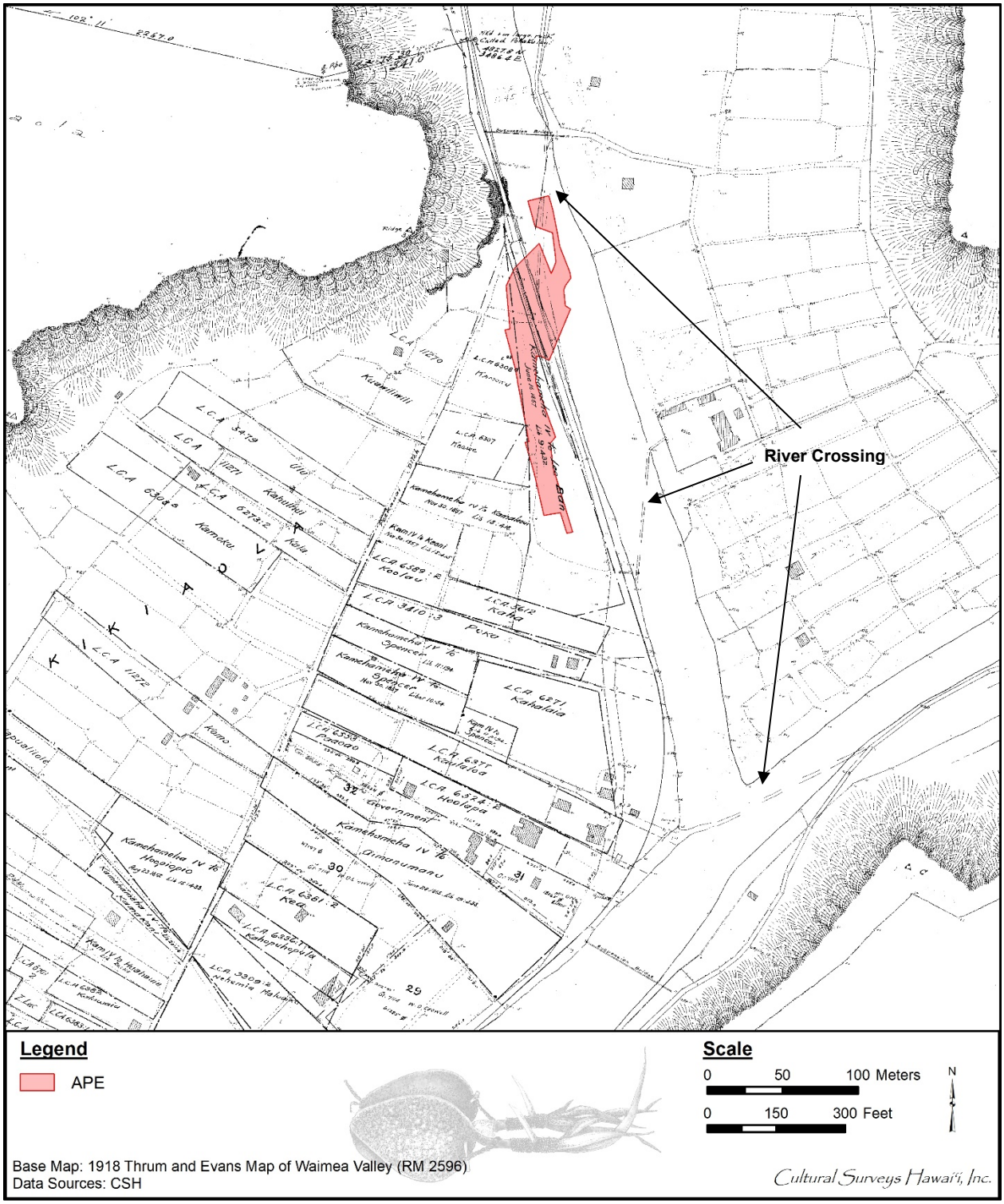


Figure 9. A portion of the 1918 Thrum and Evans map of Waimea Valley lots, showing the various river crossings in relation to the APE

The fort, at the mouth of the Waimea River on the Makaweli side, had seen action in the rebellion of 1824 when O‘ahu forces put down the uprising against the Kamehameha dynasty. *Nā koa* or soldiers at the fort were given *lo‘i* lands nearby the fort so they could help raise their own food. Twenty-two of the Makaweli claims are for fort soldiers, who generally claim a single *lo‘i* or *mo‘o* (LCAs 6587, 6578, and 6588). Most fort soldiers were given land in the *‘ili* of Kaho‘omano, with some others in Hakioa, both located quite close to the fort.

There are 119 (*‘āpana* or pieces) in Makaweli awarded claims. The awarded *‘āpana* are located in the *‘ili* of Hakioa, Kaho‘omano, Kakalae, Kaloulu, Kapalawai, Koleakalo Manawai, Pu‘ulima, Wai‘awa‘awa, and Waikaia all located along the Waimea River, the Makaweli River or a major western tributary of the Makaweli River.

A major problem in reconstructing Māhele-era settlement patterns within the Makaweli Ahupua‘a is that tax maps and other readily available historic maps do not show *‘ili* areas for claims or awards in Huakaule, Kahalai, Kahana, Kahola, Kaikolu, Kalā‘au‘ōkala, Kamaka‘eli‘eli, Kamo‘ouli (Kamo‘oali‘i), Kaneli, Kaohuilihau, Kapuemanu, Kaunuloa, Kiele, Kohiana, Kukuihoehoe, Kula‘amokualuli, Kumuiki, Mahaihai (Mahaemae), Manini, Mokuone, Nonopahu, Ololokalau, Olokele, Palaloa, Piliamo‘o, Poleiwale, Uhilau, Waikui or Wailele. It is difficult to understand the entire *ahupua‘a* settlement pattern when so many of the geographic areas of settlement are unknown. Perhaps these *‘ili* were all along the westernmost margin of Makaweli as is the case with the geographically identifiable *‘ili*, but for all we know they may have been widely spread over Makaweli Ahupua‘a.

Waimea is the largest *ahupua‘a* on Kaua‘i, containing many *‘ili* (land divisions) that may once have been separate *ahupua‘a*, such as Kīkīaola, Mānā, Miloli‘i, Mokihana, Pōki‘i, Pu‘ukapele, and Wai‘awa‘awa. Each of these *‘ili* were awarded to an *ali‘i* as a Konohiki Award, although in each case the *ali‘i* returned them as part of their commutation fee and they became either Crown Lands or Government Lands. All land within Waimea not covered by these aforementioned *‘ili* were awarded to Victoria Kamāmalu who also returned this award, which then became Crown Lands.

It is through records for these Land Commission Awards that the first direct documentation of life in Waimea Ahupua‘a, and thus the Makaweli Ahupua‘a—specifically those along the Waimea River—as it had evolved up to the mid-nineteenth century comes to light. The *kuleana* awardees in the *ahupua‘a* do not reflect the total population of Waimea and Makaweli. As Russell Apple notes with the following:

> They probably represent the local elite, those who could afford the survey and commutation [that were part of the award procedure], had proper authority for permanent occupancy, had reputable witnesses to sustain both the authority [to occupy] and continuous use [of the parcel], and who chose to apply. [Apple 1978:62]

However, the records associated with these awards illuminate the character of the Hawaiian settlement and livelihood within Waimea by 1850. The upper and lower valleys were extensively cultivated. The Pe‘ekaua‘i Ditch, along with a system of lateral *‘auwai*, watered *lo‘i kalo* (taro terraces) on the western flats of the river all the way to the shore. Interspersed among the *lo‘i* were house sites, small plots of *kula* on which were cultivated traditional native dryland crops as well as introduced ones, and also pasture land. The farthest *mauka* (inland) extent of settlement was Kalakahi’s LCA 11286 which was approximately 2,000 ft into Koai‘e Valley.

Over 150 *kuleana* awards were granted in Waimea. Fifteen claims were awarded in Kīkīaola ‘Ili, on the west side of Kana‘ana Ridge. Over 50 claims were awarded in the *‘ili* of Pe‘ekaua‘i, on the east and west sides of Kana‘ana and Poki‘i Ridge. The land east and west of the Kana‘ana Ridge was mainly Crown and Government Land, some of which had already been given or sold to individuals and associations. Table 1 lists the LCAs within an approximate 200-m radius of the proposed project area in Waimea and Makaweli Ahupua‘a in numerical order. The LCA locations are illustrated in Figure 10. One of the potential staging areas within the proposed project area lies within the eastern edge of LCA 6308 B (Figure 11).

Table 1. Land Commission Awards near the vicinity of the proposed project area

LCA #	Awardee	*‘Ili/Ahupua‘a*	Land Use	Description
5479	Ulu	Kīkīaola/Waimea	*Kula* (pasture), two *lo‘i*	One *‘āpana*; 3 roods 17 rods
5612	Kaha	Halepua/Waimea	Two *lo‘i*, *kula*	One *‘āpana*; 2 roods 2 rods
6273; RP 8498	Kala	Kīkīaola/Waimea	Three *lo‘i*, *kula*, house lot	One *‘āpana*; 1 rood 20 rods
6307; RP: 6861	Kahalehookahi	Halepua	Two *lo‘i*	One *‘āpana*; 1 acre
6308 B	Kukanaloa (*wahine*) and Kamoku	Kīkīaola, Waimea	Kīkīaola: one *lo‘i*, *kula*, and house lot	LCA 6308, Kukanaloa only LCA 6308B, Kumoku and Kukanaloa Confusion with numbers 6308, 6308B and 6681—all for Waimea, but 6308B awarded in Makaweli with no supporting documents
6327	Keawe, Lota	Kaho‘omano/Makaweli	Two *lo‘i*, house lot, *kula*	Three *‘āpana*; 1 rood 31 rods
6330	Kaniaupio	Kaho‘omano/Makaweli	One *lo‘i*, house lot, *pakanu* (garden)	One *‘āpana*; 1 rood 12 rods
6338	Kiipono	Kaho‘omano, Huahaule, both in Makaweli	Kaho‘omano: one *lo‘i* Huahaule: house lot	Kaho‘omano: one *‘āpana;* 21 rods Huahaule: one *‘āpana;* 31 rods

LCA #	Awardee	*‘Ili/Ahupua‘a*	Land Use	Description
6339; RP: 7901	Kawelo	Kaho‘omano/Makaweli	One *lo‘i*	One *‘āpana*; 1 rood 9 rods
6340	Kuala	Kaho‘omano/Makaweli	One *lo‘i*	One *‘āpana;* 31 rods
6342	Kikoi	Kaho‘omano/Makaweli	One *lo‘i, ‘auwai*	One *‘āpana;* 38 rods
6514	W. B. Aka	Pu‘ulima/Makaweli	Three *lo‘i, kula*, house lot	Two *‘āpana*; 1 acre 14 rods
6518; RP: 7921	Wahaolelo	Pu‘ulima, Mahaihai, both in Makaweli	Pu‘ulima: two *lo‘i*, *kula* Mahaihai: house lot	Awardee’s alternate manes: Nauahaolelo, Nawahaolelo Pu‘ulima: one *‘āpana*; 2 roods 32 rods Mahaihai: one *‘āpana*; 3 roods 8 rods
6566; RP 8321	Isiaka Pehu	Pu‘ulima, Hakioa, Kaho‘omano, all in Makaweli	Pu‘ulima: one *lo‘i, kula* Hakioa: house lot Kaho‘omano: five *lo‘i, kula*	Pu‘ulima: one *‘āpana*; 1 acre 14 rods Kaho‘omano: one *‘āpana*; 1 acre
6578	Paele	Kaho‘omano, Hakioa, both in Makaweli	Kaho‘omano: one *lo‘i* Hakioa: two *lo‘i*	Fort claim, Paele is the Commander of the Fort; Kaho‘omano: one *‘āpana*; 1 acre 5 rods Hakioa: two *‘āpana*; 1 rood 32 rods
6587	Pahia	Kaho‘omano/Makaweli	One *lo‘i*	A fort claim; one *‘āpana*; 38 rods
6588	Papapa	Kaho‘omano/Makaweli	One *lo‘i*	Awardee’s alternate name: Pakula; secondary claimant: Pukala, Papapa’s wife; Fort claim; one *‘āpana*; 33 rods

LCA #	Awardee	*‘Ili/Ahupua‘a*	Land Use	Description
6589	Paele	Nania/Waimea, Kaho‘omano/Makaweli	Nania: one *lo‘i* Kaho‘omano: house lot, garden	No. 6589 not awarded
10009	Tamara Lapuwale	Pu‘ulima/Makaweli	One *lo‘i*	One *‘āpana*; 1 rood 15 rods
11270; RP: 6684	Kuawiliwili	Kīkīaola/Waimea	Unknown land use	One *‘āpana*; 1 acre 2 roods
11271; RP: 8077	Kahuihui	Kīkīaola/Waimea	Unknown land use	One *‘āpana*; 1 acre
11301	Pahupu	Kaho‘omano/Makaweli	Two *lo‘i*	Three *‘āpana*; 2 roods 35 rods

2.3.1 Mid- to Late 1800s

In 1850, Waimea was designated a government port, opening it to foreign commerce. At the time, Waimea was exporting a respectable variety of agricultural goods and livestock (Table 2). A report of the Royal Hawaiian Agricultural Society noted the listed exports from the port of Waimea between 1 July 1850 and 30 June 1851 (Damon 1931:291). Most of these goods were brought to the port of Waimea for shipment off the island; they were not necessarily products of the *ahupua‘a* itself. Within a few years, the government port facility was moved to Kōloa, and Waimea declined in importance as a shipping destination.

Table 2. Waimea Port exports between 1850 and 1851

Item	Quantity	Item	Number
Sweet potatoes	3,009 bbls.	Oranges	4,000
Yams	9 bbls.	Squashes	100
Onions	568½ bbls.	Cattle	4
Sugar	5,000 lbs.	Sheep	108
Salt	50 lbs.	Swine	110
Pineapples	2,000	Turkeys	110
Cocoanuts	1,400	Fowls	1,202
Bananas	20 bunches	Ducks	12
Dried pork	1,200 lbs.	**Total Value**	**$9,030.62**

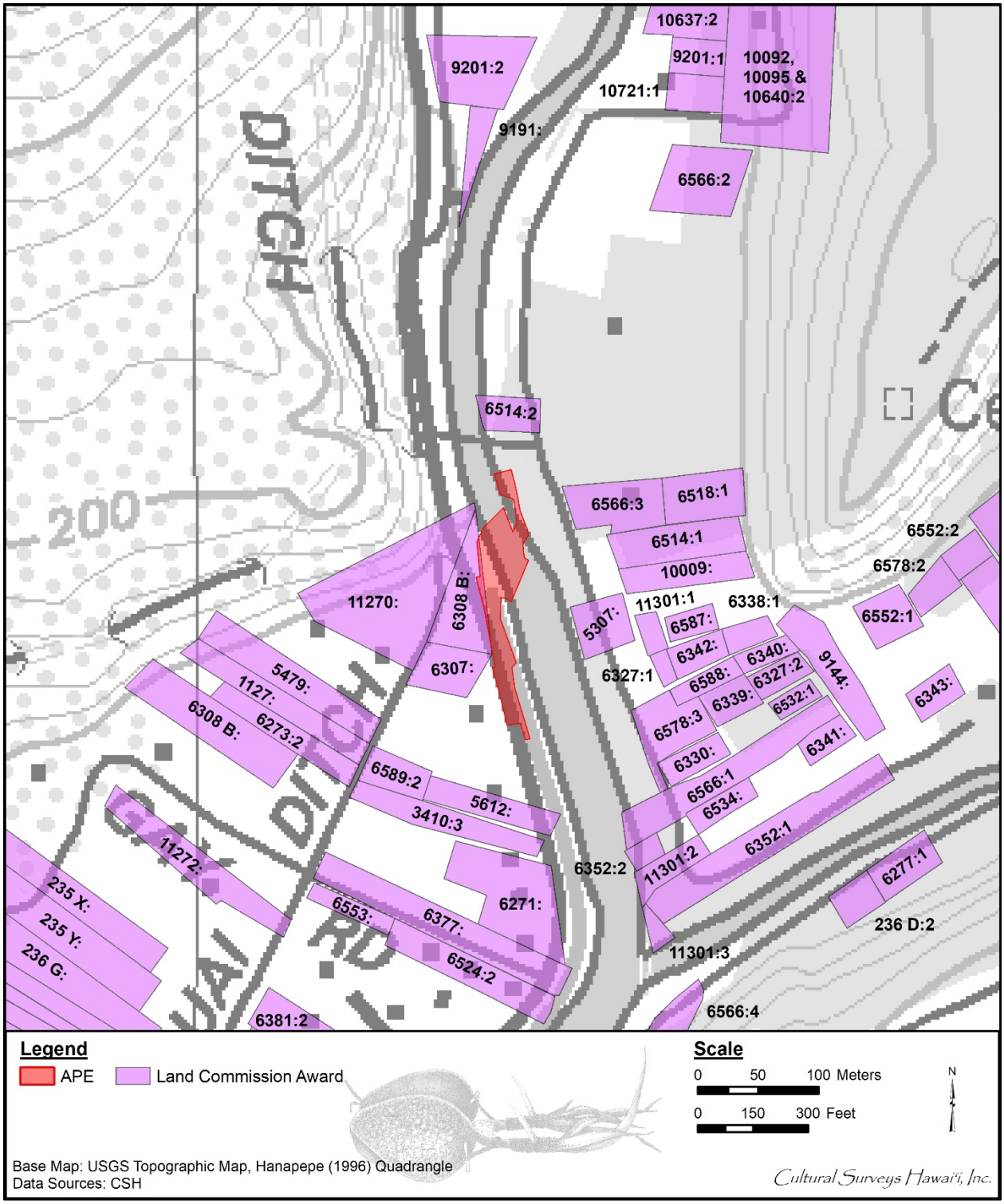


Figure 10. Portion of the 1996 Hanapepe USGS 7.5-minute topographic quadrangle showing the location of LCAs and the proposed project area

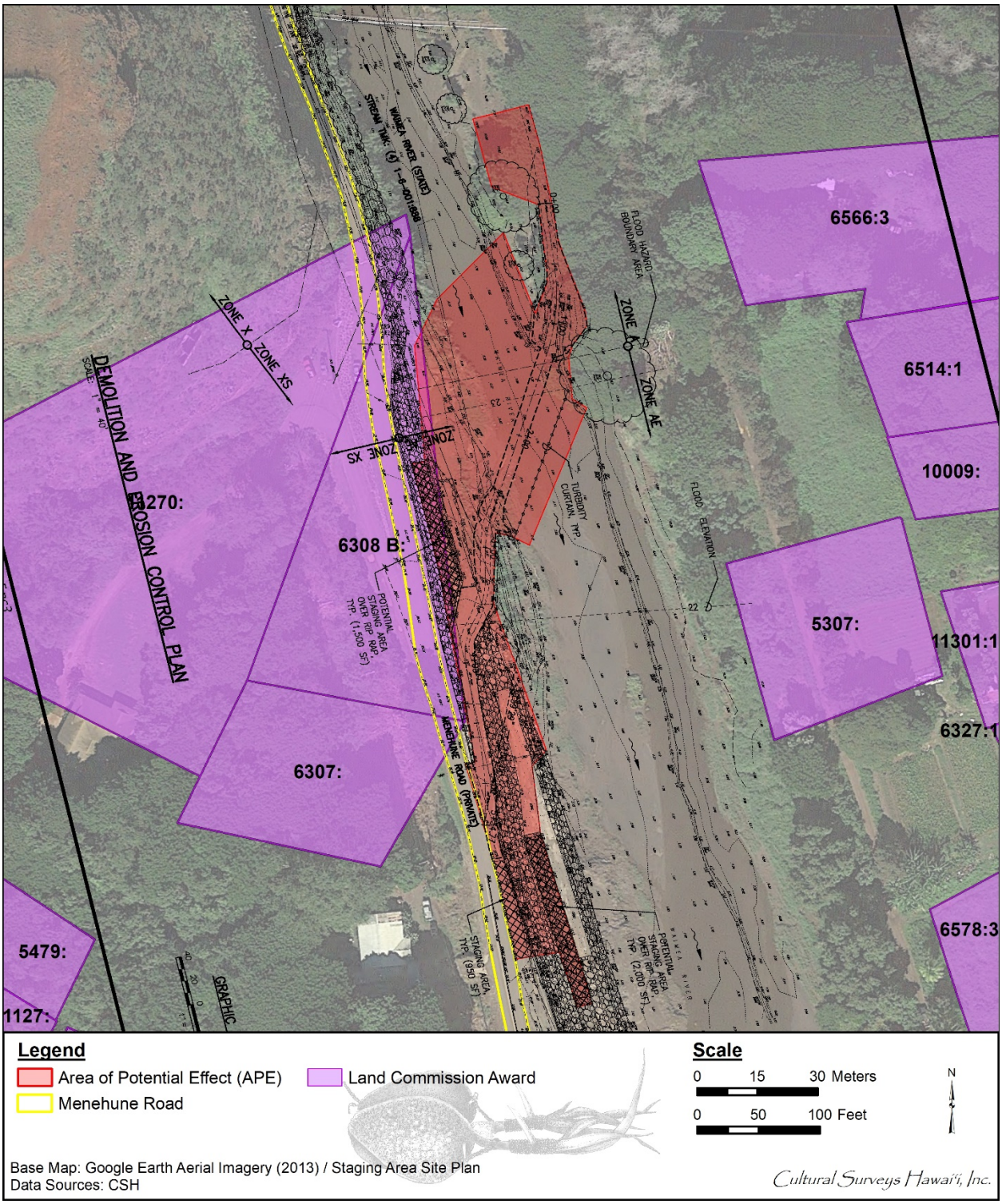


Figure 11. The proposed project area/APE overlaid on a 2013 aerial photo showing the location of LCAs in the immediate vicinity (Google Earth)

Rice cultivation by Chinese farmers began in Waimea Valley in the 1860s. The Chinese had come to the Islands to work on the sugar plantations. As the commercial sugar industry expanded throughout the Hawaiian Kingdom, the need for increased numbers of field laborers prompted passage of contract labor laws. In 1852, the first Chinese contract laborers arrived in the Islands. Contracts were for five years, and pay was $3 a month plus room and board. Upon completion of their contracts, a number of the immigrants remained in the Hawaiian kingdom, many becoming merchants or rice farmers. The Hawaiian Islands were well positioned for rice cultivation. A market for rice in California had developed as increasing numbers of Chinese laborers immigrated there since the mid-nineteenth century. Similarly, as Chinese immigration to the Islands also accelerated, a domestic market opened. A 1906 map of Waimea shows a large rice field inland of Waimea Town (Figure 12). Figure 13 shows a river crossing where individuals were able to cross from Waimea into Makaweli or vice versa.

At Waimea, as in other locales, groups of Chinese began leasing former taro lands for conversion to rice farming. Overall, by 1892, 2,055 acres of Kaua‘i lands were planted in rice (Coulter and Chun 1937:20). Sadly, the taro lands' availability throughout the Islands in the later 1800s reflected the declining demand for taro, as the Native Hawaiian population diminished. Censuses taken during the second half of the nineteenth century record the dwindling population of the Waimea District. In 1838 there were 3,272 persons living in the district, by 1853 a total of 2,872 persons were recorded in Waimea. Twenty-five years later, in 1878, the total population had diminished further to 1,374 (Schmitt 1977:12–13).

Rice farming declined sharply throughout the Hawaiian Islands after the first decade of the twentieth century. Total acreage dropped from a high of 9,425 acres in 1909 to 1,130 acres in 1935. By the 1930s the rice industry had ceased entirely on the islands of Hawai‘i, Maui, and Moloka‘i (Coulter and Chun 1937:62). Though rice continued to be grown at Waimea and Makaweli into the 1930s, many of the rice fields were being reclaimed for sugar planting.

During the last decade of the nineteenth century, the population of Waimea rebounded, growing from a total of 2,739 in 1890 to 4,595 in 1896, and 5,886 in 1900 (Schmitt 1977:13). That growth was spurred by the establishment of commercial sugarcane planting at Waimea. Population figures up to World War II reflect the continued growth of the Waimea District as the sugar industry prospered; in 1910 the population total was 8,195 and by 1940 it had grown to 10,852 (Schmitt 1977:13–14).

In the 1880s, two planters named Conrad and Borchgrevink attempted to grow cane at Waimea. They had little success, but in 1884 H. Schmidt organized the mill enterprise and other entrepreneurs on O‘ahu were organizing the Waimea Sugar Mill Company to begin operations on land leased from the Rowell family. Soon, a ditch was constructed to bring Waimea River water to the fields, which covered about 200 acres. The extent of Waimea Plantation in 1906 is shown in Figure 12. This map of Kaua‘i also shows the location of the wetlands, at first used for rice and then taro, and the location of pasture land.

2.3.2 Sugar Industry

2.3.2.1 Waimea Plantation and its endeavors

Hans Peter Fayé came to Kaua‘i from Norway in 1880 at the age of 21. Four years later, with a loan from Isenberg and a lease from his uncle, sugar pioneer Valdemar Knudsen, Fayé founded

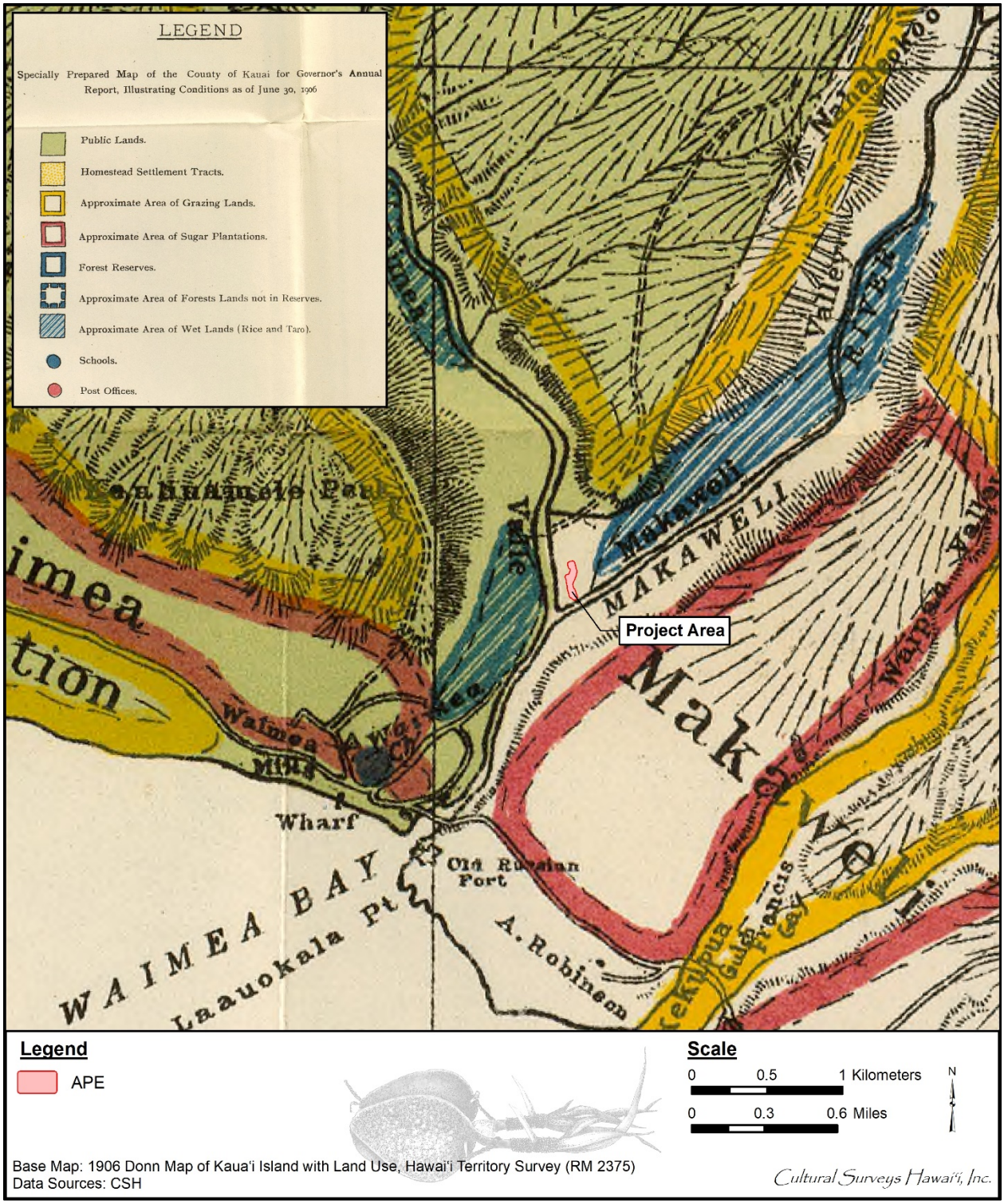


Figure 12. A portion of a 1906 Donn map of Kaua‘i, showing the boundaries of land use for taro/rice cultivation, sugarcane cultivation, and pasture in relation to the proposed project area

Figure 13. Photo (n.d.) showing a Waimea river crossing (Hawai‘i State Archives)

H.P. Fayé & Company, a sugar plantation in Mānā, the westernmost town in Kaua‘i. In 1906 Fayé acquired the Waimea Sugar Mill, which had been founded in 1884.

At the time of statehood in 1959, H.P. Fayé & Company was incorporated as Kikiaola Land Company, and it is still owned by about 100 of the founder's descendants. Linda Collins, a granddaughter of H.P. Fayé is now the president of Kikiaola Land Company.

The Waimea Sugar Mill Company may have been the smallest (in land) of the sugar companies in the Hawaiian Islands. A 1910 newspaper article in the San Francisco *Chronicle* describes the sugar lands and the railroad line (probably owned by the Kekaha Sugar Company) built to haul the cane to the mill:

> Waimea has a bit of flat land hemmed in by two neighbors, Kekaha and Hawaiian Sugar Company, just over a half mile long and a little wider. It lies only a few feet above sea level. Cane is transported from the fields over a railway system which consists of two miles of permanent track and one mile of portable track, thirty-eight cars and a locomotive. [Condé and Best 1973:203]

The railroad line mentioned was actually built by the Kekaha Sugar Company about 1884, which used it to transport sugar from its own mill to the pier at Waimea Landing. Initially it stopped at the Waimea Sugar Mill to also transport their sugar to the landing. Part of this railroad line runs

through the center of the project area (parallel to the shore). It was probably dismantled around 1947, when transportation switched to truck hauling (Condé and Best 1973:141, 146). By the early 1930s, about 670 acres of land was cultivated by the Waimea Sugar Mill Company. Most of Waimea Town’s commercial buildings were constructed during this period of the sugar industry’s growth.

During World War II the U.S. Army Corps of Engineers used the plantation shop yard as their headquarters; the sugarcane from the fields was taken to Kekaha to be milled. Following World War II, the fortunes of the Waimea Company changed. The Waimea mill stopped operating in 1945, though the Waimea Sugar Company continued to cultivate cane on its lands until 1969. The milling equipment was sold, and the mill building was used for grain storage (Fayé 1997:26). After the company closed, its fields were leased to the Kekaha Sugar Company.

In 1950, the sugar company was reorganized into the Waimea Sugar Mill, Inc., which continued to process cane, and the Kikiaola Land Company, which was created to manage the property. In 1982, one of the former plantation cottages opened as a vacation rental and was so successful that the Fayés decided to construct a plantation-type resort. The renovated plantation houses, built between 1900 and 1920, became part of the Waimea Plantation Cottages (Chang 1988:49–52), with 48 rental units and a conference center.

2.3.2.2 Gay and Robinson (G&R)

In 1865, Eliza Sinclair purchased the *ahupua‘a* of Makaweli (21,844 acres) from Victoria Kamamalu Ka‘ahumanu for $15,000. A new home was built in the cool uplands of Makaweli and sometime in the early 1870s the Sinclair family moved from Ni‘ihau to settle in Makaweli. This home, situated at about 1,800 ft elevation became known as the “Makaweli house.”

The Sinclairs began ranching in Hawai‘i when they bought the island of Ni‘ihau in 1865. There they raised Merino sheep and Shorthorn cattle from the continental United States, Australia, and New Zealand. Aubrey Robinson was the first to bring purebred Arabian horses to Hawai‘i in 1884. He imported game birds (pheasant and quail) as well as trout and bass which were placed in Waimea and Makaweli streams.

In 1889, Francis Gay and Aubrey Robinson formed the family partnership known today as Gay and Robinson (G&R). Through this partnership, the various family businesses (i.e., Makaweli Ranch and Makaweli Plantation) were managed. By the early 1880s the Robinsons got involved in the sugar business not only by planting their own crops, but also by leasing large tracts of land to Hawaiian Sugar Company. The Robinsons were always looking for new and creative ways to utilize their land. For many years, they raised bees for honey and experimented with other agricultural crops.

The Robinson Family Partners is a separate business entity that represents the land owners of the family lands. This partnership was set up to protect the lands and ensure that all lands stay within the family, as well as to preserve these lands for future generations of Robinsons.

2.3.3 1900s to the Present

Sugarcane cultivation continued to dominate land use in Waimea and Makaweli through the mid-1900s. At the end of the twentieth century, two of the remaining three sugar plantations on Kaua‘i shut down, Kekaha and Lihue Plantation, ending the sugar plantation era on the southeast

and east side of Kaua‘i. Less than ten years later, 2009 brought the last of Kaua‘i’s sugar plantation-era to an end with the closing of Gay & Robinson.

A 1910 USGS map (Figure 14) of Kaua‘i shows no development in the immediate vicinity of the proposed project area and its surroundings in the early twentieth century. In 1963 (Figure 15), the Pe‘ekaua‘i Ditch is present but also a network of ditches and a couple of tunnels in the ridge are shown just west of the proposed project. A 1966 aerial photograph (Figure 16) shows residences aligned along Menehune Road, cane lands, and other agricultural fields.

With the closing of sugar plantations and the opening of the cane lands, agribusiness companies (also known as seed companies) have migrated to the Hawaiian Islands to utilize the plantation fields and some of their infrastructure, especially on lands between Makaweli and Waimea Ahupua‘a. By 2015, four major agribusiness companies were on Kaua‘i: BASF Plant Science (in Kekaha, north of Kekaha Road and Elementary School), Dow AgroSciences (in Makaweli, northwest of Kaumakani, north of the Highway), DuPont Pioneer (in Makaweli, north of the highway and north of Russian Fort Elizabeth (Pā‘ula‘ula, State Inventory of Historic Places [SIHP] # 50-30-05-01000), and Syngenta (which was bought out in 2017 and was located in Kekaha, *makai* [seaward] of the highway and west of the Mana Plains area). With the controversies such as GMO products and health issues associated with pesticides, agribusinesses companies left the island or were bought out by other agribusinesses.

During recent decades, growth in Waimea has focused on development of the former sugar plantation lands and structures into tourist-oriented facilities. Nearby in Makaweli land use has remained much the same since the turn of the century. Cattle ranching continues.

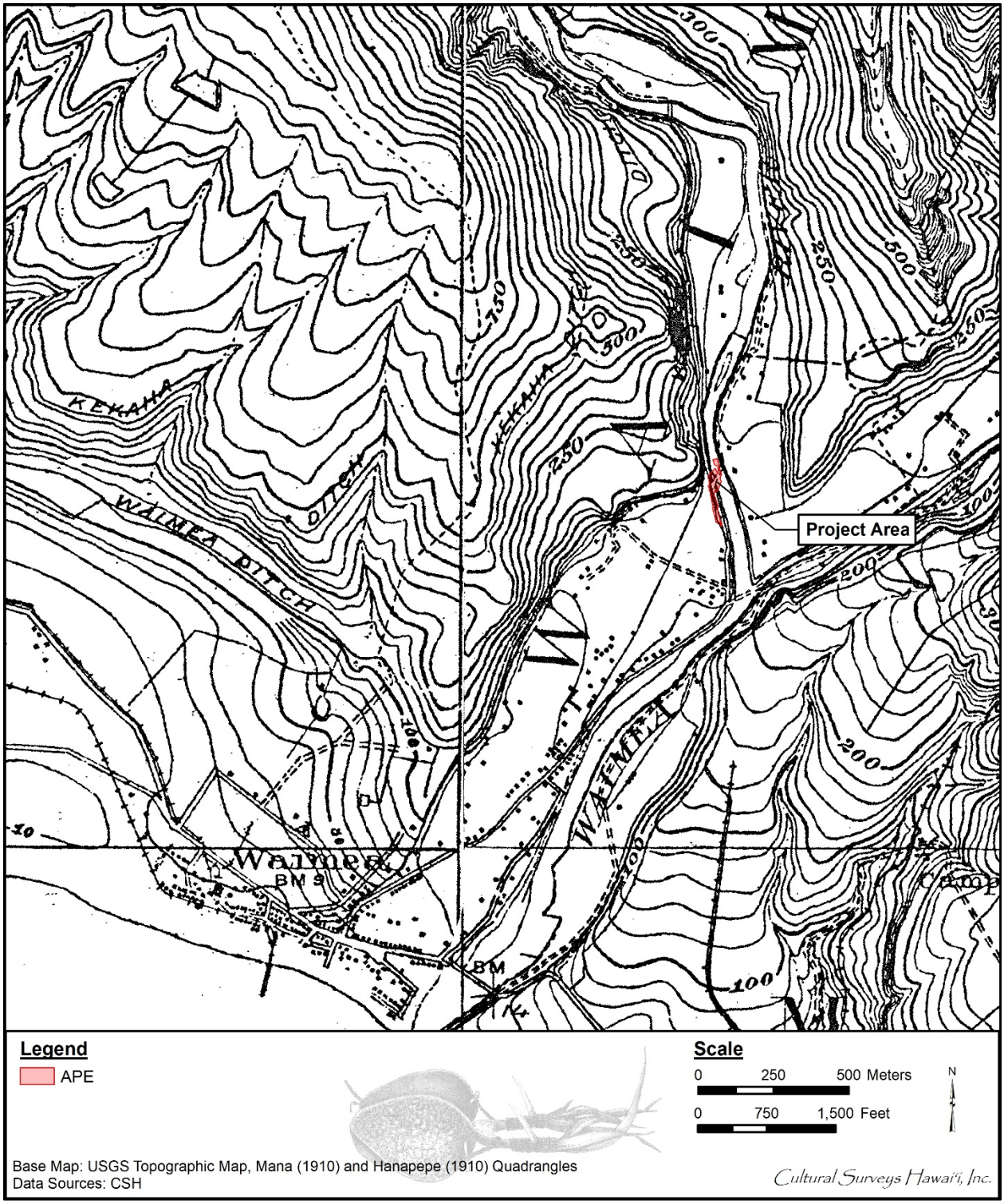


Figure 14. A portion of a 1910 Mana and Hanapepe USGS topographic quadrangles, showing the proposed project area

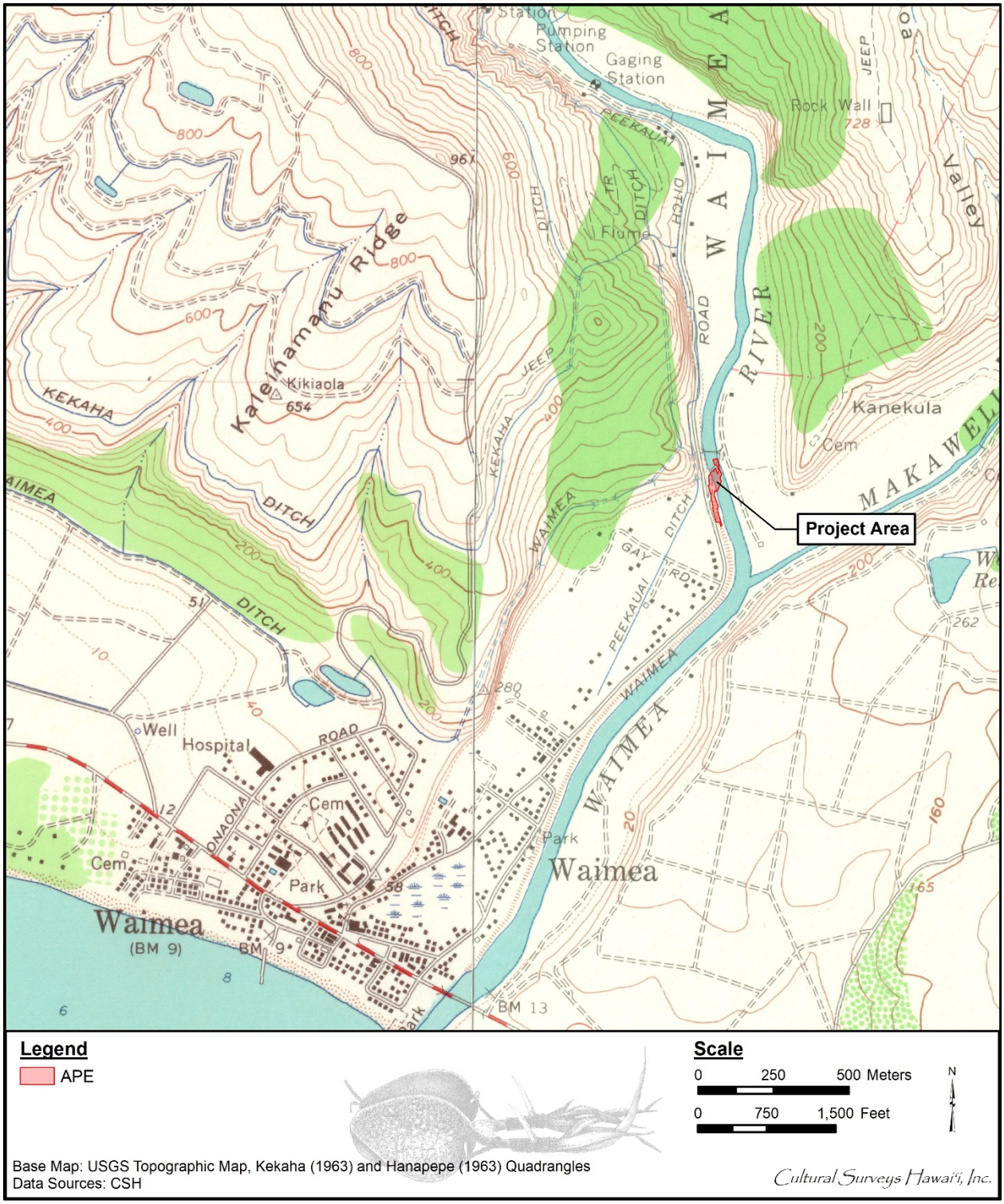


Figure 15. A portion of a 1963 Kekaha and Hanapepe USGS 7.5-minute series topographic quadrangles, showing proposed project area location just southeast to the 1963 river ford crossing

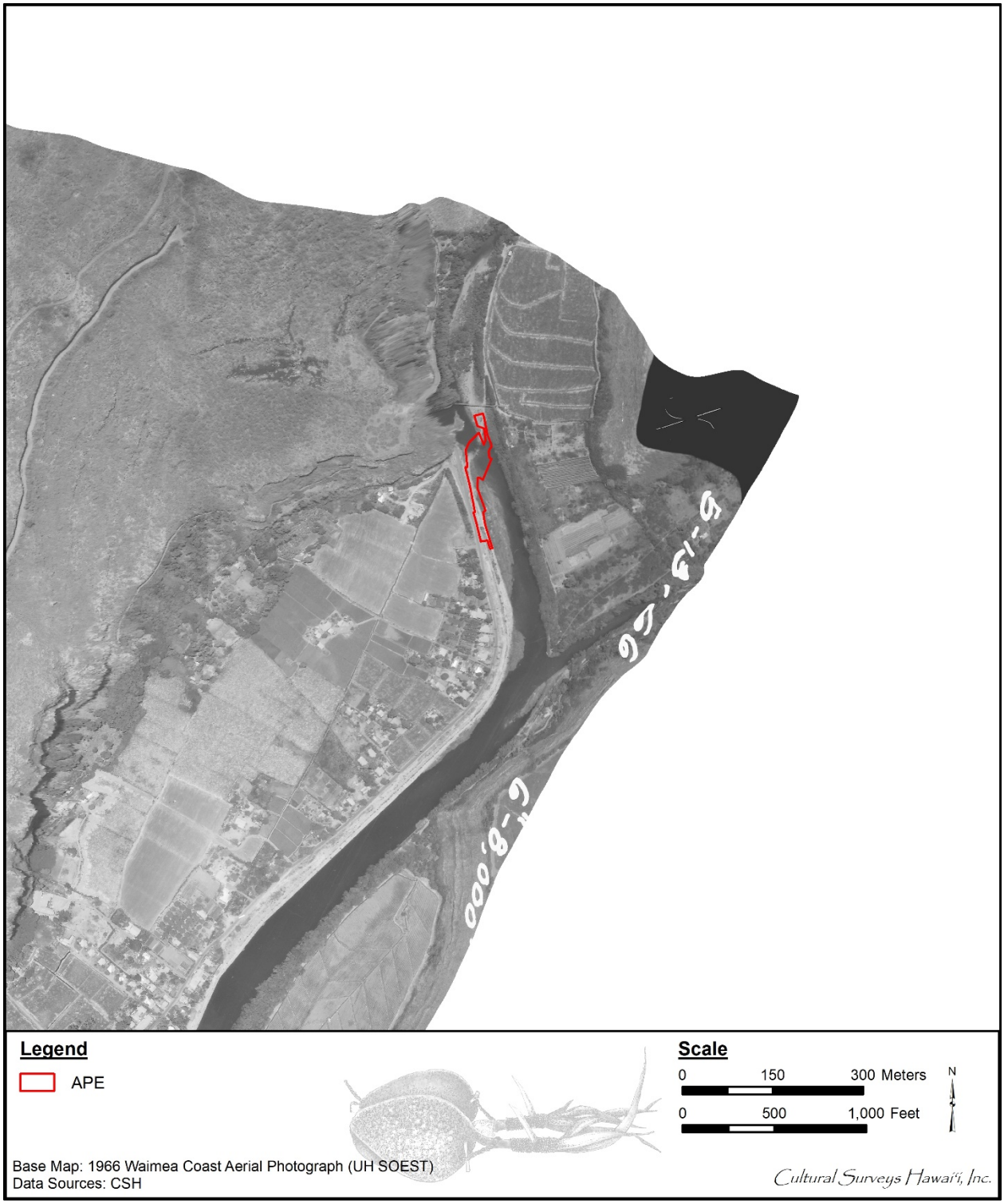


Figure 16. 1966 Waimea coast aerial photograph (UH SOEST), showing proposed project location just southeast to the 1966 river ford crossing

2.4 Previous Archaeological Research in and Around the Proposed Project

Several archaeological projects have been conducted near the proposed project area on the Waimea side of the river. The location of these projects is illustrated in Figure 17. The previous archaeological studies are summarized in Table 3. The locations of historic properties identified during previous archaeological studies are seen in Figure 18 and listed in Table 4.

2.4.1 *Heiau* on Kaua‘i (Thrum 1906)

Thomas Thrum, the publisher of the *Hawaiian Almanac*, gathered lists of *heiau* on all islands. Three *heiau* he listed are nearest to the proposed project area (see Figure 18): Keakuamele (as of 1906, “an unenclosed small pile of rocks”); Wailaau (as of 1906, “open platform […] in good preservation”); and Lewaula (as of 1906, “made into a cattle pen”) (Thrum 1906:38).

2.4.2 Archaeology on Kaua‘i (Bennett 1931)

The first comprehensive archaeological survey on the island of Kaua‘i was undertaken by Wendell Bennett in 1929; his work was published in 1931. Bennett attempted to confirm sites (*heiau*) previously described by Thrum, as well as identify additional significant sites. It is important to understand that Bennett’s work was conducted after commercial sugarcane cultivation and other historic activities had destroyed or damaged many historic properties. It is also important to keep in mind that most of the historic properties documented by Bennett were relatively easy to access and relatively conspicuous (i.e., large and obvious). Bennett documented seven historic properties in the general area of the proposed project: Site 25 (Taro terraces); Site 26 (Pe‘ekaua‘i Ditch, a.k.a. Menehune Ditch); Site 27 (House sites); Site 28 (Keakuamele Heiau); Site 29 (Makaakiaki Heiau); Site 30 (Wailaau Heiau); and Site 40 (Lewaula Heiau). Site 26, Pe‘ekaua‘i Ditch is the nearest historic property, approximately 100 m west/northwest to the proposed project.

2.4.3 Archaeological Studies along Menehune Road (Kikuchi 1983; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017)

Kikuchi (1983) conducted an archaeological reconnaissance for the installation of the 12-inch water main along Menehune Road in Waimea Valley from the existing Waimea intake toward Waimea Town. One historic property, SIHP # 50-30-09-00187, burial was identified adjacent to a cliff. Kikuchi noted two concrete pads on the dirt road, the remnants of a hospital according to a long-time resident (Kikuchi 1983:3).

Kamai and Hammatt (2015) conducted an archaeological inventory survey (AIS) for the rockfall mitigation north of the Waimea Swinging Bridge, the bridge which is approximately 200 m north of the proposed project area. Two historic properties were identified, SIHP #s 50-30-09-02271, ditch and tunnel segments, and -00026, Kikia‘ola Ditch (also known as Menehune Ditch or Pe‘ekaua‘i Ditch) (Kamai and Hammatt 2015:62–63).

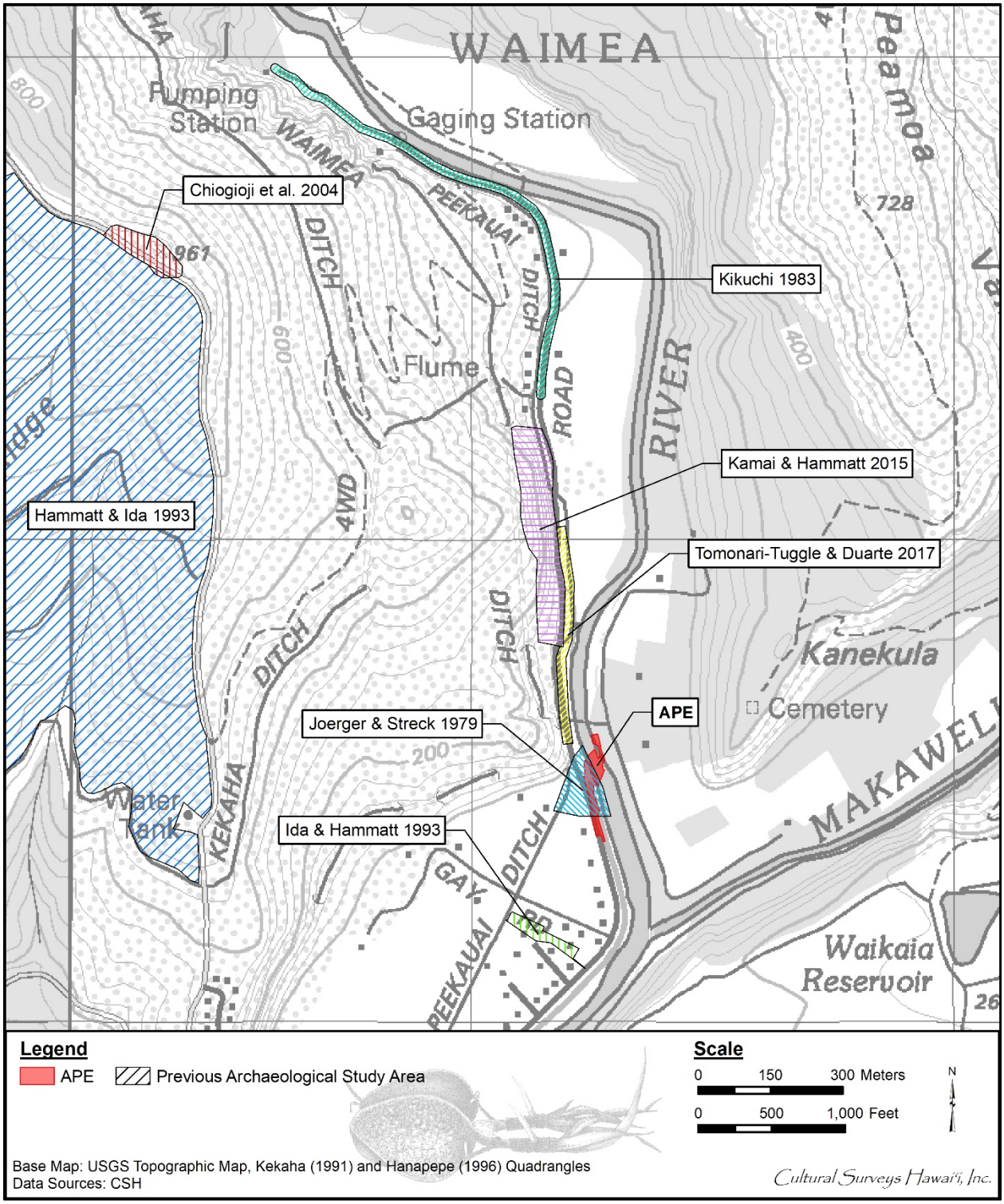


Figure 17. Portion of 1991 Kekaha and 1996 Hanapepe USGS topographic quadrangles, showing locations of previous archaeological projects in and around the vicinity of the proposed project area/APE

Table 3. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results
Joerger and Streck 1979	Cultural resource reconnaissance	Waimea River flood control study	Exposed soil stratigraphy on west bank of Waimea River near mouth, showed recent fill
Kikuchi 1983	Archaeological reconnaissance	Menehune Rd, Waimea	One historic property, SIHP # 50-30-09-01870, burial, identified
Hammatt and Ida 1993	Archaeological inventory survey	1-acre Waimea Town lot	Recorded cultural layer, dated to AD 1000-1275, and a burial designated SIHP # 50-30-05-04012
Ida and Hammatt 1993	Archaeological subsurface survey	Waimea, Kaua‘i, TMK: [4] 1-6-001:004	One historic property identified, SIHP # 50-30-09-00559, a trash deposit
Chiogioji et al. 2004	Archaeological field inspection	Ten localities within Kōke‘e and Waimea Canyon State Parks, TMK: [4] 4-8-001	No significant findings
Kamai and Hammatt 2015	Archaeological inventory survey	Menehune Rd, TMK: [4] 1-5-001:002	Two historic properties identified: SIHP #s 50-30-09-02271, ditch and tunnel segments and -00026, Kikia‘ola Ditch
Tomonari-Tuggle and Duarte 2017	Archaeological inventory survey	Pe‘ekaua‘i Ditch in Waimea Valley	Extensive discussion and documentation for a portion of SIHP # 50-30-09-00026, Pe‘ekaua‘i Ditch

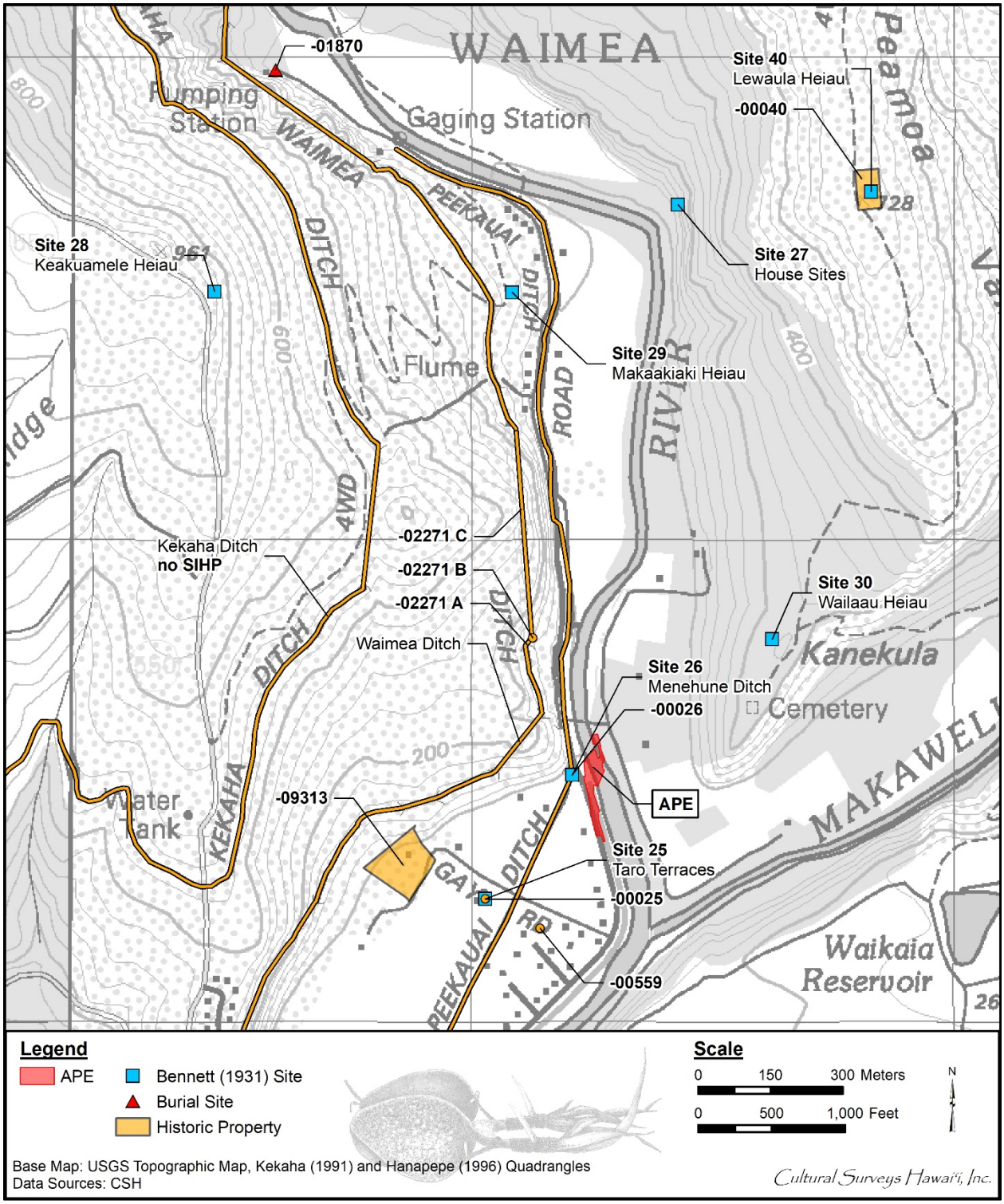


Figure 18. Portions of 1991 Kekaha and 1996 Hanapepe USGS topographic quadrangles, showing locations of previously identified historic properties nearest to the proposed project area/APE

Table 4. Previously identified archaeological sites from Figure 18

SIHP #	Site Type	Reference
Site 25	Taro terraces	Bennett 1931
Site 26 (50-30-09-00026)	Pe‘ekaua‘i (Menehune) Ditch	Bennett 1931; Joerger and Streck 1979; Ida and Hammatt 1993; O’Hare et al. 2015; Kamai and Hammatt 2015; Tomonari-Tuggle and Duarte 2017
Site 27	House sites	Bennett 1931
Site 28	Keakuamele Heiau	Thrum 1907; Bennett 1931
Site 29	Makaakiaki Heiau	Bennett 1931
Site 30	Wailaau Heiau	Thrum 1907; Bennett 1931
Site 40	Lewaula Heiau	Thrum 1907; Bennett 1931
50-30-05-09313	Charles Gay House	Hawai‘i Register 1984; National Register 1984; Kamai and Hammatt 2015
50-30-09-00559	Trash deposit	Ida and Hammatt 1993
50-30-09-01870	Burial	Kikuchi 1983
50-30-09-02271	Ditch and tunnel segments	Kamai and Hammatt 2015
Kekaha Ditch (No SHIP #)	Plantation-era ditch	1963 USGS topo map; Kamai and Hammatt 2015

2.4.4 Proposed State Agricultural Park (Hammatt and Ida 1993)

CSH conducted an AIS (lack of finds recorded as an archaeological assessment) of two locations for a proposed state agricultural park in Kekaha (Hammatt and Ida 1993). The parcel *makai* of Kaumuali‘i Highway showed evidence of extensive grading and sand removal. The *mauka* parcel was located on Kaleinamanu Ridge. With the exception of the southeastern portion of the *mauka* parcel, the rest of the parcel was active in cane cultivation during the time of the survey. No significant findings were identified during the survey.

2.4.5 West Bank of Waimea River (Joerger and Streck 1979)

In 1979, Hawaii Marine Research, Inc. (Joerger and Streck 1979) conducted a cultural resource reconnaissance of two areas adjacent to the west bank of the Waimea River. The study assessed the potential adverse effects of the flood control project on Cook’s Landing Monument (SIHP # 50-30-05-09303) and the Pe‘ekaua‘i Ditch (SIHP # 50-30-09-00026). Area 1 was adjacent to the mouth of the stream (partly within Lucy Wright Park), and Area 2, at the junction of the Waimea River and the Pe‘ekaua‘i Ditch. The proposed project is partially in the Joerger and Streck 1979 study area (see Figure 17). No subsurface testing was conducted but exposed soil stratigraphic sections were observed. Joerger and Streck note of Area 2:

> The portion of the Peekauai Ditch included within the survey area however has been extensively modified through realignment of the watercourse and destruction of the original construction […] The ditch was apparently realigned during the 1920s […] [and] portions of the Menehune Ditch were exposed by the building of the ‘new’ ditch and road. [Joerger and Streck 1979:27]

2.4.6 A Parcel along Gay Road (Ida and Hammatt 1993)

Ida and Hammatt (1993) conducted an AIS with subsurface testing for a residential lot southwest of Gay Road in Waimea Valley. One historic property was identified, SIHP # 50-30-09-00559, a trash deposit. Based on the analysis of domestic refuse collected during subsurface testing, the trash deposit may have started as early as 1907 and “could have continued until well after World War II” (Ida and Hammatt 1993:38).

2.4.7 Kōke‘e and Waimea Canyon State Parks (Chiogioji et al. 2004)

In 2004, CSH (Chiogioji et al. 2004) conducted a field inspection in ten discrete localities within Kōke‘e and Waimea Canyon State Parks proposed for a future improvement project. The ten localities were potential lookouts at mile markers 2.0 and 2.3 on Route 550, a potential lookout at mile marker 3.3 on Route 550, potential lookouts at mile markers 3.5 and 3.6 on Route 550, a potential future entry gate location on Route 550, Kukui Trail Head and adjacent potential parking areas on Route 550, Waimea Canyon Lookout, Pu‘u Hinahina Lookout, Halemanu Intersection on Route 550, Kalalau Lookout, and Pu‘u O Kila Lookout (Chiogioji et al. 2004:1). No historic properties were identified in the ten localities; these areas had already been extensively developed for park infrastructure including roads, paved parking areas, lookout structures, landscaped lawns, bathhouse facilities, and cleared bulldozed areas (Chiogioji et al. 2004:27).

2.5 **Background Summary**

By the time Captain James Cook stepped ashore at Waimea in 1778, Hawaiians had already developed an extensive agricultural system which covered the entire floor of the lower valley and displayed a high degree of ingenuity and engineering skill. The background research presented emphasizes the traditional importance of the coast along Waimea Bay in pre-Contact times. Traditional legends claim Waimea Bay as the landing site for the first settlers of Kaua‘i, a home for the mythical little people, the *menehune*, and a land associated with the high chief Ola, who built a large-scale water project, the Pe‘ekaua‘i ‘Auwai, or Menehune Ditch. Along with Wailua, Waimea was one of the two capitols of the islands for Hawaiian royalty and *ali‘i* into the early post-Contact period. There were possibly as many as four *heiau* located adjacent to the Waimea River mouth on the east and west banks, which emphasizes the importance of this area to the Hawaiian *kama‘āina* (commoners) and *ali‘i*.

Although no early historical descriptions exist of the upper valley and canyon areas, evidence sourced in legendary material and surviving archaeological remains indicate these areas were also well settled in the pre-Contact period.

Waimea Bay is also noted as the first landing spot for westerners, as Captain Cook anchored off the bay in 1778, instructed his men to load water casks from the Waimea River, and landed on the shore to tour a *heiau*, probably Kea‘ali‘i Heiau on the west side of the river. Captain Cook and later explorers also noted the intensive taro agriculture along the banks of the river and the *‘auwai.* Māhele records indicate this intensive agriculture continued into the mid-nineteenth century, with awardees also claiming house lots along the shore, four of which are just *mauka* of the current project area. The taro fields gradually gave way to rice fields in the late nineteenth century and to sugar cultivation in the twentieth century.

Based on LCAs documents, lots surrounding the Waimea River and Pe‘ekaua‘i were prime locations for agricultural cultivation. A few claimants noted house lots on one side of the river and their “ag lot” on the other side. A few historic maps as well as a historic photograph presented in this report suggest river crossings were an everyday occurrence. Like any waterway crossings, those shown on the maps would suggest there were multiple ways to get across the river but also some of these crossings could be seasonal.

Previous archaeological projects have recorded subsurface deposits associated with taro cultivation near Pe‘ekaua‘i Ditch, a cultural deposit dated to AD 1000-1275 in Waimea Town (Hammatt and Ida 1993) completely outside the proposed project, near to Kaumuali‘i Highway, and other historic features of importance not present in this report (i.e., First Bishop National Bank, Captain Cook’s Landing Monument; Russian Fort Elizabeth [(Pā‘ula‘ula]).

Section 3 Results of Fieldwork

The fieldwork component of this study was accomplished under archaeological fieldwork permit number 19-07, issued by the SHPD per HAR §13-282. CSH archaeologist Missy Kamai, B.A., completed the field inspection on 12 September 2019 under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 1 person-day to complete.

3.1 Pedestrian Inspection Results

No historic properties were identified within the proposed project area which consists of Waimea River and the bank on the Waimea and Makaweli sides of the river (Figure 19 through Figure 26).

Figure 19 and Figure 20. Photos of Waimea side of the river, north view (left), south view (right)

Figure 21. Photo of proposed project area from the Waimea side of the river, view to northeast

Figure 22. Photo of proposed project area from the Makaweli side of the river, view to southwest

Figure 23. Photo of Waimea side of the river, taken from the Makaweli side showing parking area for vehicles belonging to Makaweli residents, view to southwest

Figure 24. Photo of Waimea side of the river, taken from the Makaweli side showing parking area for vehicles belonging to Makaweli residents who walk across the river via the Waimea Swinging Bridge, view to southwest

Figure 25. Makaweli resident or *lo‘i* farmer driving through the Waimea River via the “ford crossing,” view to southeast

Figure 26. Makaweli resident or *lo‘i* farmer driving through the Waimea River via the “ford crossing,” view to east

Section 4 Summary and Recommendations

At the request of Mr. William F. Bow of Bow Engineering & Development, Inc., on behalf of CoK, CSH has prepared this archaeological LRFI for the Waimea River Ford Crossing project, Waimea Ahupua‘a, Waimea District, Kaua‘i, TMKs: [4] 1-6-001:027 (por.) and 888.

The proposed project consists of replacing the existing earthen crossing with either a concrete or aggregate-based crossing within Waimea River to reduce the amount of maintenance required. The approaches to the ford crossing would be hardened to prevent erosion. The Waimea River ford crossing’s APE is the same as the project area. The field inspection included the entire 0.40-hectare (0.98-acre) APE/project area.

Fieldwork was accomplished on 12 September 2019 by CSH archaeologist Missy Kamai, B.A., under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. Fieldwork was conducted under archaeological fieldwork permit number 19-07, issued by the SHPD pursuant to HAR §13-282. This work required approximately 1 person-day to complete.

The field inspection of the proposed project area identified no surface historic properties.

Based on the current proposed project—construction of a concrete river ford crossing and hardening of the riverbanks—suggested recommendations include a letter of determination from agency to agency to facilitate the Section 106 process due to United States Army Corps of Engineers’ permitting as well as to facilitate consultation with SHPD.

Based on lack of findings, no further archaeological working is proposed for the project.

Section 5 References Cited

Apple, Russell A.
1978 *Pahukanilua: Homestead of John Young, Kawaihae, Kohala, Island of Hawai‘i.* National Park Service, Hawai‘i State Office, Honolulu.

Beckwith, Martha
1970 *Hawaiian Mythology.* University of Hawaii Press, Honolulu.

Bennett, Wendell C.
1931 *The Archaeology of Kaua‘i.* Bishop Museum Bulletin 80. Bernice Pauahi Bishop Museum, Honolulu.

Chang, Melissa
1988 Kikiaola: Waimea’s Sugar Shacks. *Hawaii Business*, July 1899:49–52.

Chinen, Jon J.
1958 *The Great Mahele. Hawaii’s Land Division of 1848*. University of Hawaii Press, Honolulu.

Chiogioji, Rodney, David Shideler, Todd Tulchin, and Hallett H. Hammatt
2004 *Archaeological Field Inspection of Ten Localities within Kōke‘e and Waimea Canyon State Parks, Waimea Ahupua‘a, Kona (Waimea) District, Island of Kaua‘i, TMK 4-8-01.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Cook, James P.
1821 *The Three Voyages of Captain James Cook Round the World*. Vol. VI. Longman, Hurst, Rees, Orme, and Brown, London.

Condé, Jesse C. and Gerald M. Best
1973 *Sugar Trains.* Glenwood Publishers, Felton, California.

Coulter, John Wesley and Chee Kwon Chun
1937 *Chinese Rice Farmers in Hawaii.* UH Research Publications Number 16. University of Hawai‘i, Honolulu.

Damon, Ethel M.
1931 *Koamalu. A Story of Pioneers on Kauai and of What They Built in That Island Garden.* Two volumes. Privately printed by the Honolulu Star-Bulletin Press, Honolulu.

Donn, John M.
1906 Hawaii Territory Survey map of Kauai. Registered Map 2375. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Fayé, Christine
1997 *Touring Waimea*. Kaua‘i Historical Society, Līhu‘e, Kaua‘i.

Flores, E. Kalani, Aletha G. Kaohi, and Tirzo Gonzalez
1993 *Hawaiian Cultural & Historic Survey of Nohili, Mana, Kona District, Island of Kauai, State of Hawaii.* Advanced Sciences, Inc., ‘Ele‘ele, Hawai‘i and San Diego, California.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawai‘i Agricultural Experiment Station. U.S. Government Printing Office, Washington, D.C.

Fornander, Abraham
1918 *Fornander Collection of Hawaiian Antiquites and Folk-lore.* Volume V. Memoirs of the Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu.

Gay, Francis
1873 *Kauai Place Names in Laauokala, Mahinauli, and Ukula*. Hms. Misc. 4. Bishop Museum Library, Honolulu.

Google Earth Imagery
2013 Aerial photographs of Hawai‘i. Google Inc., Mountain View, California. Available online at www.google.com/earth.html.

Hammatt, Hallett H. and Gerald K. Ida
1993 *Archaeological Assessment of Two Locations for a Proposed State Agricultural Park Waimea, Kaua‘i.* Cultural Surveys Hawai‘i, Kailua, Hawai‘i.

Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment.* Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Hawai‘i State Archives
n.d. Photograph of Waimea River crossing. Digital Collection, Hawai‘i State Archives, Honolulu.

Hawai‘i TMK Service
2013 Tax Map Key [4] 1-6-01. Hawai‘i TMK Service, Honolulu.

Ho‘oulumāhiehie
2008a *Ka Mo‘olelo o Hi‘iakaikapoliopele*. Original Hawaiian text taken from series of articles in *Ka Na‘i Aupuni* 1905-1906. Awaiaulu Press, Honolulu.

2008b *The Epic Tale of Hi‘iakaikapoliopele. As Told by Ho‘oulumāhiehie*. M. Puakea Nogelmeier, translator. Awaiaulu Press, Honolulu.

Ida, Gerald and Hallett H. Hammatt
1993 *Archaeological Subsurface Survey of the Campos Property Waimea, Kaua‘i (TMK 1·6·01:4).* Cultural Surveys Hawai‘i, Kailua, Hawai‘i.

Imlay, L.E.
1891 Map of Kauai. Compiled from Government Surveys and Private Surveys of Lands Belonging to Gay and Robinson 1891. Map by L.E. Imlay. Tracing by H.E. Newton April 1903. Registered Map 2246. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Joerger, Pauline King and Charles F. Streck, Jr.
1979 *A Cultural Resource Reconnaissance of the Waimea River Flood Control Study Area, Kauai, Hawaii.* Hawai‘i Marine Research, Inc., Honolulu.

Juvik, Sonia P. and James O. Juvik (editors)
1998 *Atlas of Hawai‘i.* Third edition. University of Hawai‘i Press, Honolulu.

Kamai, Nancine “Missy and Hallet H. Hammatt
2015 *Archaeological Inventory Survey Report for the Menehune Road Rockfall Mitigation near Swinging Bridge, Phases 1-2-3 with Additional 1 Acre Waimea Ahupua‘a, Kona District, Kaua‘i TMK: [4] 1-5-001:002.* Cultural Surveys Hawai‘i Inc., Kailua, Hawai‘i.

Kamakau, Samuel M.
1992 *Ruling Chiefs of Hawaii*. Kamehameha Schools Press, Honolulu.

Kame‘eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai? How Shall We Live in Harmony?* Bishop Museum Press, Honolulu.

Kikuchi, William K.
1983 *Waimea 12 Inch Transmission Main, Waimea Intake Towards Waimea Town, Job # 81-5, Waimea, Island of Kaua‘i.* Crafts-Hawaii, ‘Ōma‘o, Kaua‘i.

Luomala, Katharine
1951 *The Menehune of Polynesia and other Mythical Little People of Oceania*. Bishop Museum Bulletin 203. Bernice Pauahi Bishop Museum, Honolulu.

McGuire, Ka‘ohulani and Hallet H. Hammatt
2000 *A Traditional Practices Assessment for the Proposed Faulkes Telescope on 1.5 Acres of the University of Hawai‘i Facility at Haleakalā, Papa‘anui Ahupua‘a, Makawao District, Island of Maui (TMK 2-2-07:8).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

McGuire, Ka‘ohulani, Leilani Pyle, David W. Shideler, and Hallet H. Hammatt
1999 *Hawaiian Traditional Customs and Practices Study for Kapalawai, Ahupua‘a of Makaweli, District of Kona, Kaua‘i (TMK 1-7-05:por.1).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Mills, Peter R.
1996 Transformations of a Structure: The Archaeology and Ethnohistory of a Russian Fort in a Hawaiian Chiefdom, Waimea, Kaua‘i. Dissertation. University of California at Berkley, California.

Motteler, Lee S.
1974 *Guide to place names in the Hawaiian Islands. Pt. 1, Kauai County and the northwestern Hawaiian Islands.* Pacific Scientific Information Center, Bernice Pauahi Bishop Museum. Honolulu.

O’Hare, Constance R., Nicole Ishihara, Missy Kamai, David W. Shideler, William H. Folk, and Hallett H. Hammatt
2015 *Archaeological Inventory Survey for the Menehune Road Rockfall Mitigation Project, Waimea Ahupuaa, Waimea District, Kauai TMKs: [4] 1-6-003:056; 1-6-005:017; 1-6-010:001–003.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Pukui, Mary Kawena
1983 *‘Ōlelo No‘eau: Hawaiian Proverbs and Poetical Sayings.* Bishop Museum Special Publication No.71. Bishop Museum Press, Honolulu.

Pukui, Mary K. and Samuel H. Elbert
1986 *Hawaiian Dictionary.* Second edition. University of Hawaii Press, Honolulu.

Pukui, Mary K., Samuel H. Elbert, and Esther Mookini
1974 *Place Names of Hawaii*. University of Hawaii Press, Honolulu.

Rice, William Hyde
1923 *Hawaiian Legends*. Bishop Museum Bulletin 3. Bernice Pauahi Bishop Museum, Honolulu.

Schmitt, Robert C.
1977 *Historical Statistics of Hawaii.* University of Hawaii Press, Honolulu.

Soehren, Lloyd
2013 *Hawaiian Place Names.* Electronic database, ulukau.org/cgi-bin/hpn?l=haw.

Thrum, Thomas G.
1906 Heiaus and Heiau Sites throughout the Hawaiian Islands. *The Hawaiian Almanac and Annual for 1907*. Thos. G. Thrum, Honolulu.

1908 Kekaha–Waimea Ditch. *The Hawaiian Almanac and Annual for 1908*. Thomas G. Thrum, Honolulu.

1923 *More Hawaiian Folk Tales. A Collection of Native Legends and Traditions.* Compiled by Thos. G. Thrum. A.C. McClurg & Company, Chicago.

Thrum, F.W. and Thos. J.K. Evans
1918 Waimea Village, Kona, Kauai. Survey and map by F.W. Thrum and Thos. J.K. Evans 1918. Registered Map 2596. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Tomonari-Tuggle, M.J. and Trevor Duarte
2017 *Archaeological Inventory Survey of Pe‘ekaua‘i Ditch, Ahupua‘a of Waimea, Kona District, Island of Kaua‘i, Portions of TMK 4-1-5-001:002 AND 4-1-5-002:008.* International Archaeology, LLC, Honolulu.

UH SOEST (University of Hawai‘i at Mānoa, School of Ocean and Earth Science and Technology)
1966 Aerial photograph of Waimea Coast. UH SOEST, Honolulu.

Ulukau
2014 *Māhele Database.* Hawaiian Electronic Library, http://ulukau.org/cgi-bin/vicki?l=en..

USDA (U.S. Department of Agriculture)
2001 Soil Survey Geographic (SSURGO) database. U.S. Department of Agriculture, Natural Resources Conservation Service. Fort Worth, Texas. http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/ (accessed March 2005).

USGS (U.S. Geological Survey)

1910 Mana USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

1910 Hanapepe USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

1963 Kekaha USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

1963 Hanapepe USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

1991 Kekaha USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

1996 Hanapepe USGS 7.5-minute series topographic quadrangle. USGS Information Services, Denver, Colorado.

Waihona ‘Aina

2020 *The Māhele Database*. Electronic document, http://waihona.com (accessed 23 September 2019).

Wichman, Frederick B.

1991 *Polihale and other Kaua‘i Legends.* Bamboo Ridge Press, Honolulu.

1998 *Kaua‘i. Ancient Place-Names and Their Stories.* University of Hawai‘i Press, Honolulu.

Zulick, Loren A., Ka`ohulani McGuire, Leilani Pyle, Victoria S. Creed, David W. Shideler, Gerald K. Ida, and Hallett H. Hammatt

2000 *Archaeological Inventory Survey Report for 170 Acres including a 6-Acre Inland Fish Pond for the Proposed Kapalawai Resort, Kapalawai, Kaua‘i, Hawai‘i, (TMK 1-7-05:Por. 1).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.