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

STAFF SUBMITTAL

COMMISSION ON WATER RESOURCE MANAGEMENT

May 22, 2013
Honolulu, Hawaii

Application for Stream Channel Alteration Permit (SCAP.3528.2)
Streambank Stabilization, Moloa'a Stream
Moloa'a, Kaua'i (TMK: (4) 4-9-014:021)

APPLICANT:

David R. Houston
432 Court Street
Reno, NV 89501

LANDOWNER:

Same.

SUMMARY OF REQUEST:

Application for Stream Channel Alteration Permit (SCAP.3528.2), to reinforce and stabilize streambank, Moloa'a Stream, Moloa'a, Kaua'i (TMK: (4) 4-9-014:021).

LOCATION: See Exhibits 1, 2 and 3.

BACKGROUND:

On April 18, 2012, Ronald Wagner of Honua Engineering, Hanalei, requested emergency authorization from the Commission to stabilize a section of the bank on Moloa'a Stream on behalf of the applicant. The applicant stated that the work was required because the bank cut back during the high flows generated by the March 2012 rainstorms, placing one of the piers that elevate the dwelling on the property above the base flood elevation approximately 5 feet from the stream.

On May 9, 2012, the Commission approved Honua Engineering's request and issued emergency authorization for stream bank stabilization.

On June 25, 2012, Commission staff learned that the stabilization work had not started because the project was still under review by the U.S. Army Corps of Engineers (USACE). The USACE did not consider the project an "emergency" because Honua Engineering had previously contacted the Corps about the stabilization project and was asked to apply for a Department of the Army (DA) permit two years earlier in November, 2010. Consequently, Commission staff asked Honua Engineering to apply for a Stream Channel Alteration Permit (SCAP) in the normal manner.

D4

On July 3, 2012 the Commission received a SCAP application from Honua Engineering on behalf of the applicant.

On August 20, 2012, Commission staff conducted a site visit, with Jessie Paahana (USACE), Emilee Stevens (USACE) and Ronald Wagner (Honua Engineering) also present. It was observed that the section of affected bank extended over a distance of approximately 170 feet, around the outside of a bend, from just beyond the upstream boundary of the applicant's property, to well beyond the downstream boundary with the neighboring property (Exhibits 4 and 5). Existing controls on the stream channel in the vicinity of the applicant's residence include the footing to the two bridges that allow access to the applicant's and neighboring properties and unpermitted hardening of the right bank downstream from both bridges. Mr. Wagner also explained to Commission staff that additional structural beams had recently been bolted to the supporting sill beams to ensure that, if the pier in question was to be removed, the home would remain intact (although some sagging would be expected to occur).

On September 19, 2012, Commission staff presented the submittal for SCAP application SCAP.3528.2 to the Commission, recommending denial of the applicant's request for construction of stream bank stabilization measures because the applicant's proposal does not involved the use of bioengineered materials, and the proposed use of riprap to harden the bank of Moloa'a Stream will most likely create adverse impacts on neighboring properties. After some discussion, the Commission unanimously voted to defer the submittal, giving the applicant an opportunity to submit revised project plans for a bioengineered alternative and address concerns related to neighboring properties.

On February 22, 2013, Commission staff received an email from the applicant's representative, Jonathan Chun, containing revised plans for a bioengineered alternative, along with comments and responses to comments on the proposed project.

DESCRIPTION:

Moloa'a Stream is a 10.6 mile long perennial stream with tidal connection. The lower reaches of the stream, which are intermittently inundated and where the potential for flooding is high, flow through a drowned river valley (submerged by land subsidence and/or sea level rise) and terminate on the sandy barrier beach at the head of Moloa'a Bay. The stream supports endemic and indigenous species of crustaceans, fish and insects, and provide habitat for the endangered *'Alae 'ula* (Hawaiian common moorhen).

In the vicinity of the applicant's property, the vertical, 5 to 6 feet high bank is composed of unconsolidated, fine-grained alluvium and interfingering sand deposits and at the time of the site visit the water in the pool adjacent to the cutbank was approximately 5 feet deep (Exhibits 4 and 5). The unconsolidated sediments overlie limestone bedrock that, in the vicinity of the property, forms a gently sloping, approximately 6 feet wide, bench with a vertical drop-off into the pool (Exhibits 4 and 5). A photograph submitted by the applicant, taken prior to the March 2012 storm event shows a heavily vegetated bankline with a vertical face (Exhibit 6).

The applicant is proposing to stabilize the approximately 70 linear feet of streambank crossing his property with approximately 200 cubic yards of 18-inch diameter boulder riprap placed on top of a geotechnical fabric. He proposes to embed, to a depth of 1.5 times the riprap diameter, the lowest course of boulders in the stream bed and grade successive courses to create a 45° (1:1) slope (Exhibit 7). The riprap wall will be finished by returning the ends into the existing stream bank adjacent to the property line, over a minimum distance of 8 ft (Exhibit 8). Best management practices to be adopted include the installation of a silt fence and turbidity curtain.

Honua Engineering noted that a "bio-engineered slope treatment" (a combination of live plant material along with inert material such as logs, rocks and geosynthetics) may better conform to the environment but pointed out that it:

1. Would not provide the protection of a hard riprap from a major storm event;
2. Would be more extensive and expensive, and take longer to install than hard riprap;
3. Would intrude into the stream, require dredging to maintain flow capacity and impact other properties.

Following the Commission's decision to defer the applicant's initial project proposal, Honua Engineering submitted a revised bioengineered stream bank stabilization plan. The revised plan, similar to the original plan, proposes to install 18-inch minimum diameter boulder riprap on top of a geotechnical fabric with gravel bedding. The toe of the riprap slope would be embedded into the stream bottom. However, it would extended upward only to the mean water level (estimated at 3 feet above mean sea level). Mulch rolls with a coconut fiber blanket would be installed against the bank and atop the riprap footing (Exhibit 10).

The applicant also provided a hydraulic analysis comparison showing a 10-year storm peak flow of 3,630 cubic feet per second (approximately the largest flow that the main channel can accommodate within its banks), based upon a 1994 R.M. Towill Corporation floodplain study for the U.S. Army Corps of Engineers. To compare the effect of the stream on neighboring properties, two hydraulic criteria were considered: the change in stream velocity and the change in normal water surface elevation.

According to the applicant, the results of the hydraulic analysis indicated only slight changes in velocity and water surface elevation at the Houston residence section for both the total riprap treatment and the bioengineered alternative. Similar changes were noted at upstream and downstream neighboring sections. Either of the stream bank stabilization options show a very small reduction in velocity and negligible increase in water surface elevations (less than 1-inch).

ANALYSIS:

Agency Review Comments:

Kaua'i County, Planning Department:

1. The proposed stream bank reinforcement measures shall be constructed as represented.

2. The Emergency Permit shall be subject to review by the Planning Department.

3. The Emergency Permit shall be valid for two years from the date of issuance.

4. The Applicant shall develop Best Management Practices (BMPs) during all phases of development to minimize erosion, dust, and sedimentation impacts of the project to abutting properties.

5. The applicant is advised that if any archaeological or historical resources are discovered during ground disturbing/construction work, all work in the area shall cease immediately and DLNR Historic Preservation Division shall be contacted.

6. The applicant, its successors and assigns, shall indemnify, defend and hold the County of Kaua'i harmless from and against any loss, liability, claim or demand for property damage, personal injury or death arising out of any act or omission of the applicant, its successors, assigns, officers,

employees, contractors and agents under this permit or relating to or connected with the granting of this Special Management Area Emergency permit. This indemnification agreement shall be submitted for approval by the Planning Department within 14 days from the date of-receipt of this amended SMA (E) approval letter, and shall be recorded at the Bureau of Conveyances or Land Court prior to the start of construction of this project. A recorded copy shall be provided to the Department prior to the start of construction of this project.

7. The applicant shall discuss and resolve the comments and recommendations of the Department of Public Works-Engineering and the Army Corps of Engineers prior to the start of construction activities.

Kaua'i County, Department of Public Works:

1. Since the Stream Channel Alteration Permit is not a County Permit; the County will defer review and approval of the hydrologic and hydraulic analysis to the State Floodplain Coordinator, which oversees the County's participation in the National Floodplain Insurance Program.

2. Recommend that other alternatives be investigated rather than hardening one side of the stream bank, and believe that erosion may become a problem on the opposite side and downstream side of the subject property.

Department of Hawaiian Home Lands: No objections.

Department of Health, Clean Water Branch (DOH):

1. DOH noted that the project is subject to Section 401 of the Clean Water Act, and the applicant must submit a 401 Water Quality Certification (WQC) application.

DLNR, Engineering Division (ED):

1. ED noted that the project zone is located in coastal high hazard Zone VE and that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP), presented in Title 44 of the Code of Federal Regulations.

DLNR, Division of Forestry and Wildlife: No objections.

DLNR, Land Division: No objections.

DLNR, Division of State Parks: No objections.

U.S. Fish and Wildlife Service (USFWS):

1. The USFWS noted that although the project appears relatively small and minimal as far as the footprint of fill is concerned, it may have precedent setting potential for neighboring property owners to follow suit with additional requests to install stream bank armor.

U.S. Army Corps of Engineers (USACE):

1. Moloa'a Stream is a perennial stream that is tidally influenced and is considered " waters of the U.S." subject to USACE regulatory jurisdiction.

2. The USACE discourages use of hardened structures to stabilize stream banks as they can exacerbate erosion upstream/downstream of the structure, and encourages evaluation of bioengineered alternatives.

3. The USACE recommended that Honua Engineering submit a Department of the Army (DA) permit application on behalf of the applicant for the USACE to review.

4. On May 23, 2012, USACE published a public notice to solicit comments from interested parties, adjacent landowners and cooperating resource agencies. The comment period closed on June 23, 2012. The USACE sent an advanced e-copy of a letter (dated August 16, 2012) to the applicant summarizing the public comments and requesting resolution or rebuttal of the concerns raised.

University of Hawaii Environmental Center (UH-EC):

1. UH-EC noted that the permit application does not include stream data that would normally be used to help characterize channel hydraulics and erosional processes and evaluate design alternatives. UH-EC suggested the applicant provide the Commission with additional detail about the trade-offs between protection, cost, construction timing, channel maintenance, and impact on other properties. The proposed riprap hardening of one bank raises concerns about potential impacts to the opposite bank and the downstream channel that would result from post-project changes in storm event hydraulics.

Hawaii Revised Statutes (HRS) Chapter 343, Environmental Review

Environmental Assessment (EA) Triggers. In accordance with HRS §343-5(a), the applicant's proposed action does not trigger an EA because the project is located on private land in the urban land use district, and will not use public funds.

Staff Review

Hawaii Revised Statutes, § 174C-71(3) gives responsibility to the Commission on Water Resource Management (Commission) for protecting stream channels from alteration whenever practicable to provide for fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses; and, except in the case of routine streambed and maintenance activities, §174C-71-3(A) requires persons to obtain a permit from the Commission prior to undertaking a stream channel alteration.

A comparison of the 1936 TMK map (Exhibit 2) with the applicant's June 2012 site plan (Exhibit 3), indicates that Moloa'a Stream has migrated approximately 120 ft across its floodplain in the intervening 76-year period. This progressive lateral change in channel location over time is the result of a natural process (bank erosion, caused by the interaction between the material characteristics of the stream bank, hydraulic and gravitational forces) that is integral to the maintenance of stream channel size, shape and pattern, and riparian habitat. Bank erosion is a common occurrence and is often focused on the outside of bends in streams where hydraulic processes, acting at or below the water surface, entrain unconsolidated sediment. Erosion often continues after the flood peak (highest period of flow), because gravitational mass failures often occur as the flood wanes and the saturated stream bank loses the support of water in the channel. Bank erosion is generally beneficial to stream ecology, because erosion and deposition create a range of habitats which contribute to ecological diversity.

The management of bank erosion requires comprehensive and creative tools applied in a coordinated fashion, and long-term solutions often involve more than a bank stabilization project designed to locally limit land loss at an identified erosion site by installing riprap. As the stream adjusts to the hardened area, the locus of erosion shifts and additional bank stabilization measures are required. In extreme cases this

can produce a chain reaction that necessitates the haphazard installation of successive generations of bank erosion-control infrastructures within a short reach. By contrast, well-established vegetation, which not only dissipates flow energy and increases bank stability, but also provides habitat and is one of the most effective long-term protections against stream bank erosion and channel migration.

Staff noted the following inconsistencies in the completed application:

1. The size of the riprap is variously described as 18-inch diameter and 18-inch minimum.
2. Boulders that are proposed to be used to armor the bank on the applicant's property have already been delivered to the site (Exhibit 9). The quantity in evidence greatly exceeds the 200 cubic yards specified in the application for a Stream Channel Alteration Permit, approximately half of the boulders in evidence greatly exceed 18 inches in diameter.
3. Section A-A included in the permit application is a schematic representation that does not faithfully portray the present geometry of the stream cross-section (Exhibit 7).
4. The applicant proposes to embed, to a depth of 1.5 times the riprap diameter, the lowest course of boulders in the stream bed, but does not explain how this will be accomplished in the presence of the bedrock shelf or exactly where in the stream bed the trench will be excavated (Exhibit 7).
5. The applicant proposes to grade successive courses to create a 45° (1:1) slope (Exhibit 7), but does not explain how it will be possible to do this without backfilling behind the prosed riprap installation and specifies that no fill other than riprap will be used.
6. The applicant does not explain where the excavations necessary to return the riprap into the stream bank will be located or the amounts of materials involved (Exhibit 8).
7. The applicant's statement that the 'do nothing' option puts the existing residences (sic) at extreme risk is inconsistent with the knowledge that the home has already been strengthened to accommodate loss of the pier, and that the pier could be (if it has not already been) tied directly to the bedrock that underlies the floodplain alluvium at a depth of approximately 6 ft.

Staff raised the following concerns about the application:

1. The exclusive use of boulder riprap makes no concession to or provision for the maintenance of riparian habitat and vegetation will be removed from the site rather than replanted.
2. Minimal consideration was given to the use of practicable alternative, bioengineered stabilization methods.
3. There is a high probability that armoring the 70 ft section of stream bank crossing the applicant's property will cause the locus of erosion to shift and have a cumulative physical upstream and downstream impact on neighboring properties. This could expose ancient Hawaiian burials, human remains, *etc.*, first revealed after the floods that occurred in December, 1991, that are known to be present on the neighboring downstream property.

On September 18, 2012, the Commission was copied on a letter from the DLNR, Division of Aquatic Resources (DAR) in response to the U.S. Army Corps of Engineers' Public Notice of Application for Permit (File no. POH-2010-00318). The comments are summarized as follows:

1. Newly developed houses along often remove riparian vegetation to improve their aesthetic views and this is a problem inherent with riparian areas not being classified as Conservation district. DAR concurs with USACE that granting project authorization would likely result in adverse impact to Moloa'a Stream and nearshore waters. DAR recommends that USACE not authorize the proposed stream bank hardening and that the applicant work with the Natural Resources Conservation Service, USFWS, and DAR to: 1) develop and implement a riparian re-vegetation program including native and Polynesian-introduced non-native trees to stabilize the stream bank; 2) develop a comprehensive watershed restoration plan that establishes a "water budget" for the watershed,

amps diversions and groundwater withdrawals, and removes any unpermitted stream diversion weirs that were cited in studies in the aftermath of the Ka Loko dam breach.

On February 22, 2013, Commission staff received an email containing revised plans for the bioengineered alternative along with a summary of Public Notice comments compiled by the USACE as part of the DA permit application review. A summary of the comments are provided below:

1. On June 4, 2012, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service - Protected Resources Division (NOAA, NMFS-PRD), in accordance with the consultation requirements under Section 7 of the Endangered Species Act (ESA), transmitted recommendations for Best Management Practices to prevent adverse impacts to Federally protected species, should the proposed bank stabilization work be authorized.
2. On June 13, 2012 the NOAA, NMFS - Habitat Conservation Division (NOAA, NMFS-HCD), in accordance with the consultation requirements under the Magnuson Stevens Fishery Conservation and Management Act of 1966, identified concerns regarding the potential for adverse impacts to essential fish habitat (EFH) and recommends an assessment of alternative bank stabilization designs that minimize and/or eliminate hardening of the natural stream bank. Construction is recommended to be scheduled during the dry summer months, to avoid sediment runoff into the surrounding riparian and marine environment from heavy rains.
3. On June 20, 2012 the U.S. Fish and Wildlife Service (USFWS), in accordance with the consultation requirements under Section 7 of the ESA and the Fish and Wildlife Coordination Act of 1934, transmitted comments and recommendations to prevent adverse impacts to trust resources within the project area. USFWS provided general comments concerning potential adverse impacts to stream resources, stressing particular concern regarding the potential for your proposed bank armoring to transfer erosion problems from your property to upstream and downstream properties, setting the precedent for future requests for bank armoring should your proposed project exacerbate erosion along the adjacent and opposite banks. Accordingly, the USFWS requests an assessment of long term and cumulative impacts along the Moloaa stream and throughout the Moloaa Watershed as a result of your proposed bank stabilization. The USFWS recommends exploring the following alternatives to minimize the potential for adverse impacts to the adjacent Moloaa Stream: 1) Move the existing residential dwelling to safer, higher grounds on the property, 2) Strengthening of the upland foundation and/or 3) Construction of flood barriers in upland areas. The USFWS also recommends hiring a certified environmental consultant, or equivalent, to conduct a biological survey of the project area to address concerns regarding the potential adverse impacts to native stream fauna resulting from alteration of aquatic habitat, in particular, endangered waterfowl species.
4. On June 23, 2012, Mr. David M. Martin, Kaua'i Island resident, transmitted comments regarding impacts to adjacent properties resulting from the proposed bank stabilization. Mr. Martin recommends you address historic meandering of the Moloa'a Stream within the flood plain at this location. Mr. Martin also expressed concerns regarding project components encroaching on adjacent properties.
5. On June 23, 2012, Ms. Kuulei Thronas, on behalf of the Olaf E. Thronas Trust, adjacent property owner at TMK (4) 4-9-014:025 transmitted comments regarding impacts to adjacent properties resulting from the proposed bank stabilization. Ms. Thronas is concerned with the potential for your proposed bank hardening to change stream flow and energy downstream of your property thereby altering the current sediment accretion and stream meander patterns. Of particular concern is the potential for increased erosion through alteration of stream velocity for adjacent properties. Ms. Thronas also expressed concerns regarding property rights and encroachment of your project and/or project components on adjacent property(s).
6. On June 23, 2012, Ms. Hope Kallai, Moloaa Stream resident, Mālama Moloa'a member, transmitted comments regarding impacts to adjacent properties resulting from the proposed bank stabilization. Ms. Kallai recommends you take into consideration the upstream manipulation of the

reservoir, ditch and stream hydrology that may have accounted for the increase in stream flow in March 2012, in conjunction with the historic flooding of the estuarine reaches of Moloaa Stream. Ms. Kallai is particularly concerned with the potential loss in foraging, resting and nesting wetland habitat for the endangered 'alae 'ula (*Gallinula chloropus sandwichensis*) and 'alae ke'oke'o (*Fulica alae*) with the proposed rock riprap placement over natural streambank. Additionally, Ms. Kallai attests that the Moloaa Beach, downstream of the project site, is nesting habitat for the threatened Hawaiian green sea turtle (*Chelonia mydas*) and the endangered Hawaiian monk seal (*Monachus schauinslandz*) and should be included in the scope of analysis for potential project impacts to Federally protected species.

7. On June 29, 2012 the Environmental Protection Agency (EPA), Region 9 transmitted comments in accordance with the Clean Water Act, iterating the requirement for an analysis of practicable alternative stabilization methods as well as the potential for direct, secondary and cumulative impacts to the Moloaa Stream fronting your property. In addition, EPA reiterates the conditions of the Section 404(b)1 of the CWA requiring compensatory mitigation for unavoidable losses to aquatic functions resulting from the discharges of fill material associated with the proposed bank stabilization. The EPA also requests a best management practices plan to prevent construction-related sediment erosion during larger flow events in addition to normal flow conditions.
8. On August 3, 2012, the State of Hawaii, Department of Land and Natural Resources – Historic Preservation Division (SHPD), in accordance with the consultation requirements of Section 106 of the National Historic Preservation Act, transmitted comments regarding potential adverse impacts to historic properties within the area of potential effect (APE). The SHPD stated that as a result of the regional floods of December 1991, human remains were revealed and confirmed via a site visit from SHPD on February 12, 1992 at an adjacent property, TMK (4) 4-9-014:020 (reference SIHP 50-30-04-1879, SHPD). As such, SHPD expressed concerns regarding implications of historic remains at your property and properties adjacent to the project location. Accordingly, SHPD recommends you hire a certified archeologist, or equivalent, to conduct an archeological inventory survey of your property and all other properties related to the proposed bank stabilization to determine the presence of historic properties i.e., burials, human remains, etc. that may be impacted by your project, prior to construction.

Additional comments received from the applicant, included with in the email dated February 22, 2013, include correspondence between Honua Engineering and neighboring landowners, summarized as follows:

1. On August 23, 2012, Julie Valentine informed Honua Engineering that she and her husband, Robert Davidson have no objection to the repair of the streambank on David Houston's property and do not wish to be part of any project as it concerns stabilization of their streambank.
2. On September 20, 2012, Jay Weatherford, TMK (4) 4-9-014:020 informed Honua Engineering that he presently has no capability to perform streambank repairs, and has no objections to repair of the streambank on David Houston's property.

RECOMMENDATION

Staff recommends that the Commission:

1. Approve a Stream Channel Alteration Permit (SCAP.3528.2) for construction of 70 linear feet of a bioengineered revetment to provide for stream bank stabilization, consisting of an embedded riprap toe to the mean water level and topped with mulch rolls covered with a coconut fiber blanket, on the bank of Moloa'a Stream, TMK (4) 4-9-014:021, subject to the following conditions:

    a) The applicant shall obtain a Department of the Army permit from the U.S. Army Corps of Engineers before proceeding with any work in the stream channel. Upon issuance of the

Department of the Army permit, the applicant shall notify the Commission and submit a set of plans approved by the U.S. Army Corps of Engineers.

b) The applicant shall obtain a Clean Water Act Section 401, Water Quality Certification from the Department of Health, Clean Water Branch before proceeding with any work in the stream channel.

c) Standard conditions in Exhibit 11.

2. Find and determine that the proposed work is exempt from the requirement to prepare an EA.

Respectfully submitted,

WILLIAM M. TAM
Deputy Director

Exhibits:

1. Location of project site.
2. TMK map dated October, 1936 (applicant's property is outlined in red and double-headed arrow shows distance stream has migrated in the intervening 76-yr period).
3. Site plan (residence on applicant's property is outlined in red).
4. Left bank of Moloa'a Stream, Kaua'i, looking upstream (9AM August 20, 2012 staff site visit), showing pier adjacent to streambank.
5. Left bank of Moloa'a Stream, Kaua'i, looking downstream (9AM August 20, 2012 staff site visit).
6. Moloa'a Stream crossing applicant's property prior to March 2012 storm event.
7. Cross-section of Moloa'a stream (see Exhibit 3 for location) showing proposed placement of boulder riprap.
8. Schematic plan of riprap end return.
9. Boulder riprap on site (5 ft 6 inch high person for scale, 9AM August 20, 2012 staff site visit).
10. Revised Bioengineered Cross Section Plan
11. Standard Stream Channel Alteration Permit Conditions

APPROVED FOR SUBMITTAL:

WILLIAM J. AILA, JR.
Chairperson
CWRM

EXHIBIT 1
Location of project site.

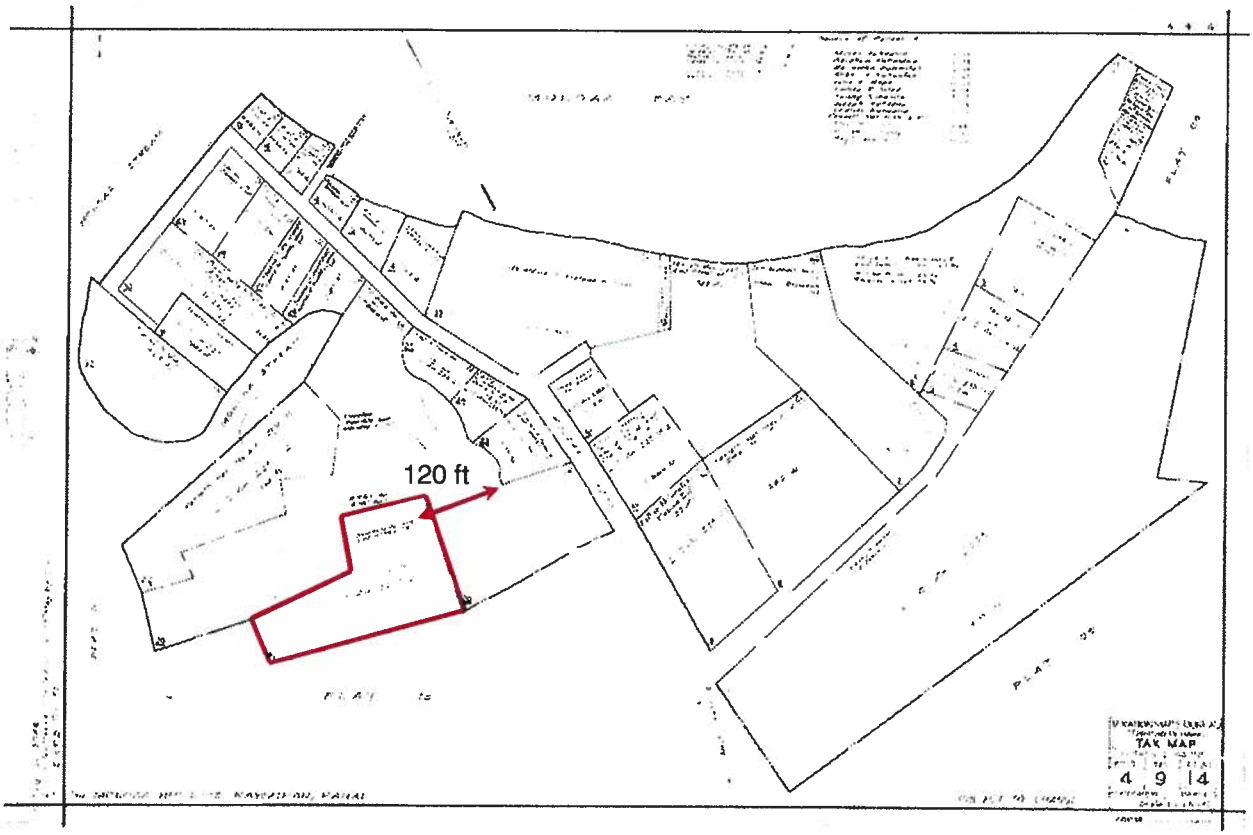


EXHIBIT 2

TMK map dated October, 1936 (applicant's property is outlined in red and double-headed arrow shows distance stream has migrated in the intervening 76-yr period).

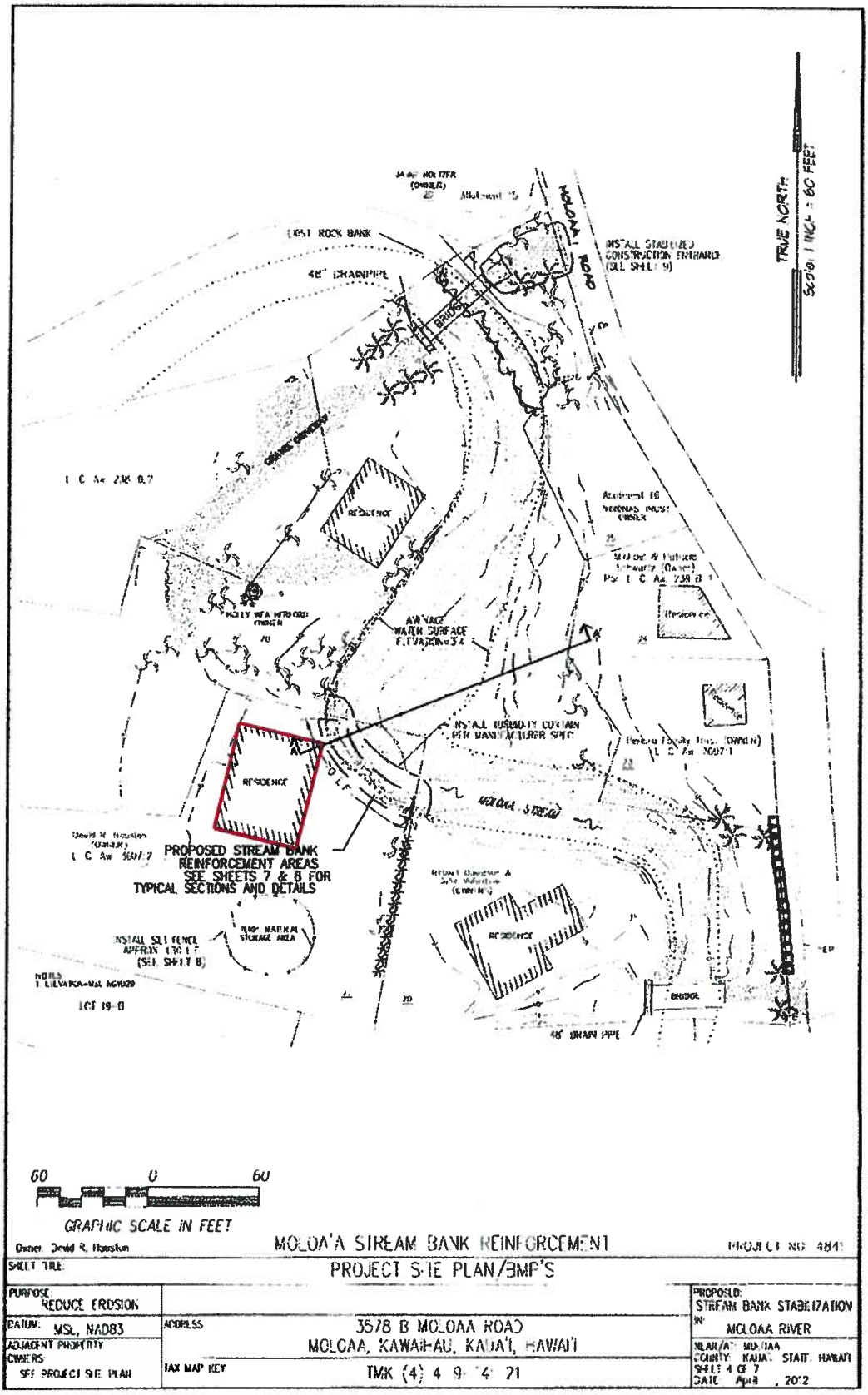


EXHIBIT 3

Site plan (residence on applicant's property is outlined in red).

EXHIBIT 4

Left bank of Moloa'a Stream, Kaua'i, looking upstream (9AM August 20, 2012 staff site visit), showing pier adjacent to streambank.

EXHIBIT 5
Left bank of Moloa'a Stream, Kaua'i, looking downstream (9AM August 20, 2012 staff site visit).

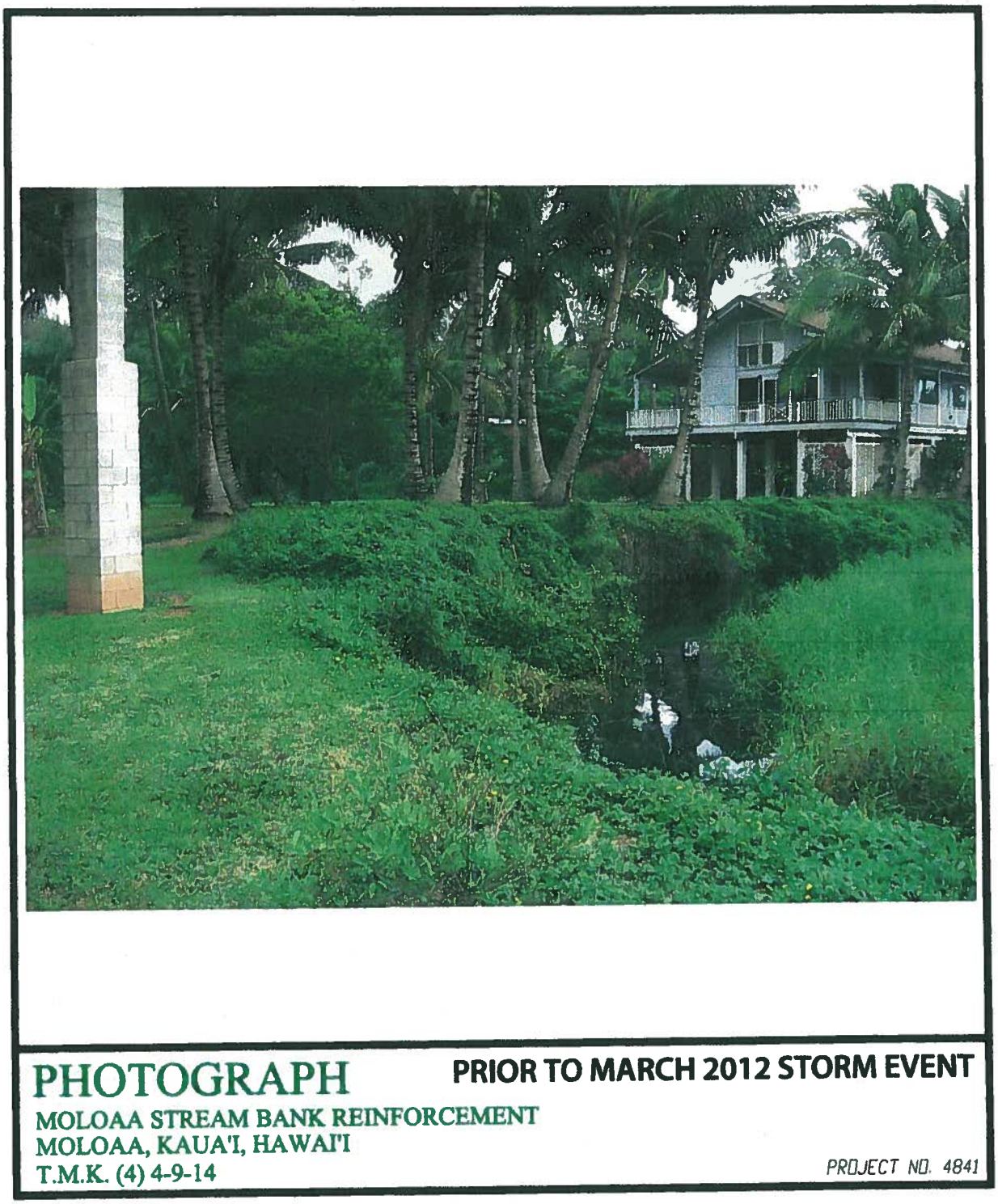
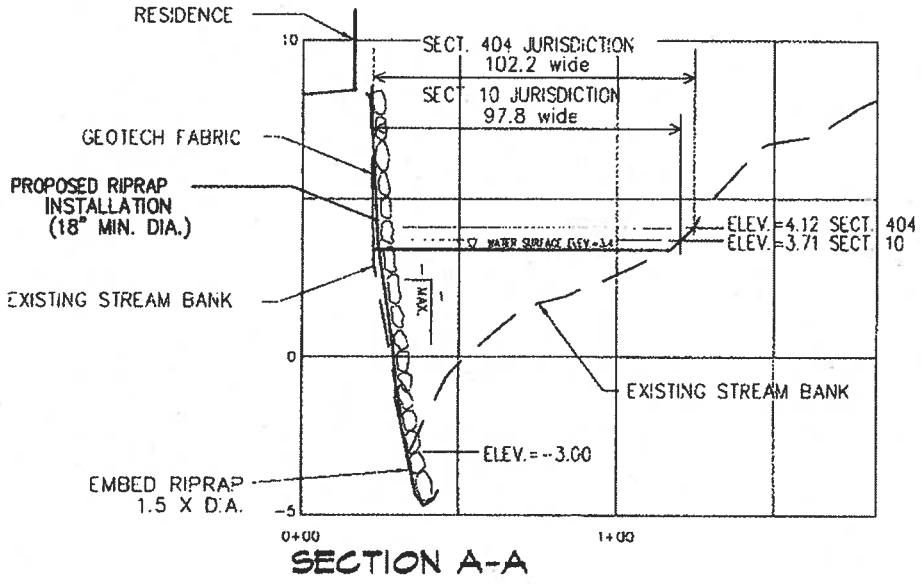


EXHIBIT 6

Moloa'a Stream crossing applicant's property prior to March 2012 storm event.



HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=5'

Owner: David R. Houston

MOLOA'A STREAM BANK REINFORCEMENT

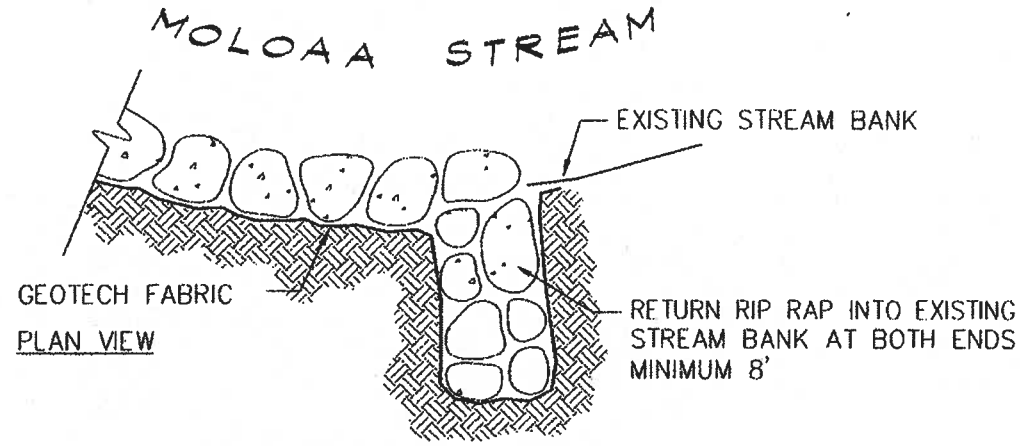
PROJECT NO. 4841

SHEET TITLE: CROSS SECTIONS

PURPOSE: REDUCE EROSION		PROPOSED: STREAM BANK STABILIZATION
DATUM: MSL, NAD83	ADDRESS: 3578 B MOLOAA ROAD MOLOAA, KAWAIHAU, KAUA'I, HAWAI'I	IN: MOLOAA RIVER
ADJACENT PROPERTY OWNERS: SEE PROJECT SITE PLAN	TAX MAP KEY: TMK (4) 4-9-14: 21	NEAR/AT: MOLOAA COUNTY: KAUA'I STATE: HAWAI'I SHEET 5 OF 7 DATE: APRIL , 2012

EXHIBIT 7

Cross-section of Moloa'a stream (see Exhibit 3 for location) showing proposed placement of boulder riprap.



TYPICAL END RETURN DETAIL

N.T.S.

Owner: David R. Houston — MOLOA'A STREAM BANK REINFORCEMENT — PROJECT NO. 4841

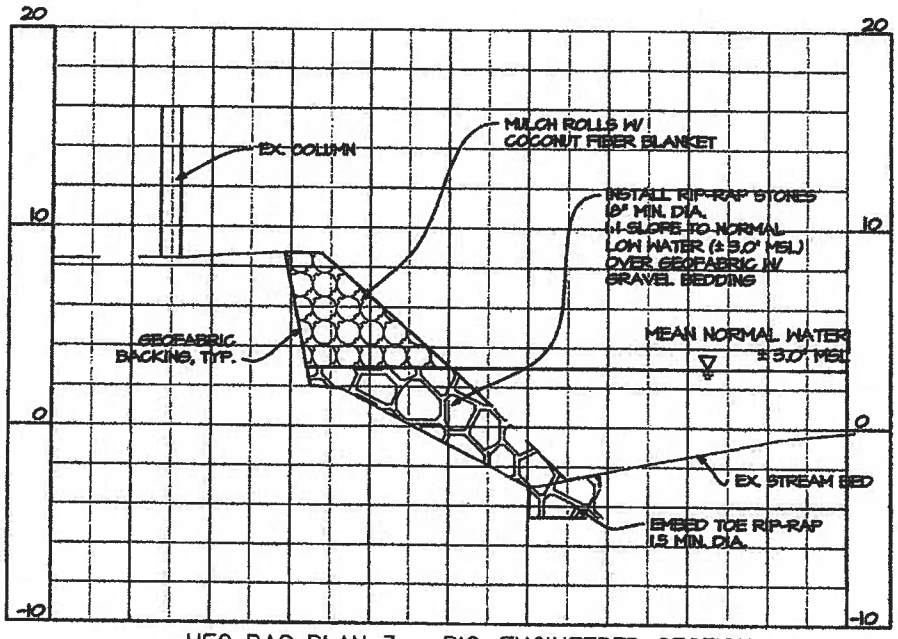
SHEET TITLE: DETAILS

PURPOSE: REDUCE EROSION		PROPOSED: STREAM BANK STABILIZATION
DATUM: MSL, NAD83	ADDRESS: 3578 B MOLOAA ROAD, MOLOAA, KAWAIHAU, KAUA'I, HAWAI'I	IN: MOLOAA RIVER
ADJACENT PROPERTY OWNERS: SEE PROJECT SITE PLAN	TAX MAP KEY: TMK (4) 4-9-14:21	NEAR/AT: MOLOAA COUNTY: KAUA'I STATE: HAWAI'I SHEET 6 OF 7 DATE: APRIL , 2012

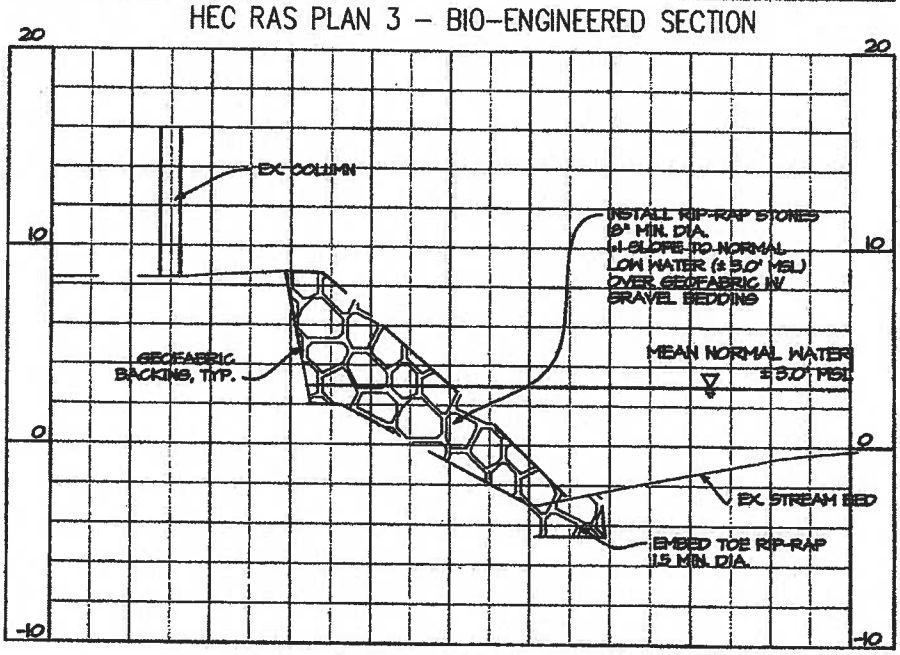
EXHIBIT 8

Schematic plan of riprap end return.

EXHIBIT 9
Boulder riprap on site (5'6" high person for scale, 9AM August 20, 2012 staff site visit).



HEC RAS PLAN 3 – BIO-ENGINEERED SECTION



HEC RAS PLAN 4 – RIP-RAP CROSS SECTION

Owner: David R. Houston

MOLOA'A STREAM BANK REINFORCEMENT

PROJECT NO. 4841

SHEET TITLE: TYPICAL CROSS SECTIONS

PURPOSE: REDUCE EROSION		PROPOSED: STREAM BANK STABILIZATION
DATUM: MSL, NAD83	ADDRESS: 3570 A & 3578 B MOLOAA ROAD MOLOAA, KAWAIHAU, KAUA'I, HAWAI'I	IN: MOLOAA RIVER
ADJACENT PROPERTY OWNERS: SEE PROJECT SITE PLAN	TAX MAP KEY: TMK (4) 4-9-14:20, 21	NEAR/AT: MOLOAA COUNTY: KAUA'I STATE: HAWAI'I
		DATE: January 4, 2013

EXHIBIT 10

STANDARD STREAM CHANNEL ALTERATION PERMIT CONDITIONS
(Revised 9/19/07)

1. The permit application and staff submittal approved by the Commission at its meeting on May 22, 2013, shall be incorporated herein by reference.

2. The applicant shall comply with all other applicable statutes, ordinances, and regulations of the Federal, State and county governments.

3. The applicant, his successors, assigns, officers, employees, contractors, agents, and representatives, shall indemnify, defend, and hold the State of Hawaii harmless from and against any claim or demand for loss, liability, or damage including claims for property damage, personal injury, or death arising out of any act or omission of the applicant or his successors, assigns, officers, employees, contractors, and agents under this permit or related to the granting of this permit.

4 The applicant shall notify the Commission, by letter, of the actual dates of project initiation and completion. The applicant shall submit a set of as-built plans and photos of the completed work to the Commission upon completion of this project. This permit may be revoked if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The proposed work under this stream channel alteration permit shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Commission upon showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Commission no later than three (3) months prior to the date the permit expires. If the commencement or completion date is not met, the Commission may revoke the permit after giving the permittee notice of the proposed action and an opportunity to be heard.

5. Before proceeding with any work authorized by the Commission, the applicant shall submit one set of construction plans and specifications to determine consistency with the conditions of the permit and the declarations set forth in the permit application.

6. The applicant shall develop site-specific, construction best management practices (BMPs) that are designed, implemented, operated, and maintained by the applicant and its contractor to properly isolate and confine construction activities and to contain and prevent any potential pollutant(s) discharges from adversely impacting state waters. BMPs shall control erosion and dust during construction and schedule construction activities during periods of low stream flow.

7. The applicant shall protect and preserve the natural character of the stream bank and stream bed to the greatest extent possible. The applicant shall plant or cover lands denuded of vegetation as quickly as possible to prevent erosion and use native plant species common to riparian environments to improve the habitat quality of the stream environment.

8. In the event that subsurface cultural remains such as artifacts, burials or deposits of shells or charcoal are encountered during excavation work, the applicant shall stop work in the area of the find and contact the Department's Historic Preservation Division immediately. Work may commence only after written concurrence by the State Historic Preservation Division.

EXHIBIT 11