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GOVERNOR OF
HAWAII

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CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

Stable Road West FEA

MEMORANDUM

To: Scott Glenn, Director
Office of Environmental Quality Control

From: Suzanne D. Case, Chairperson
Department of Land and Natural Resources

Subject: Final Environmental Assessment (EA) for the Stable Road West Groin Repair and Replacement Located at Sprecklesville Beach Lots, Wailuku, Maui, Makai of TMKs: (2) 3-8-002: 025, 026 & 050 upon submerged land

The Department of Land and Natural Resources has reviewed the final EA for the subject project and has determined a Finding of No Significant Impact (FONSI). Please be advised, however, that this finding does not constitute approval of the proposal.

The draft EA was published in the March 8, 2019 edition of *The Environmental Notice*. Comments on the draft EA were sought from relevant agencies and the public, and were included in the final EA. The final EA has been prepared pursuant to Chapter 343, Hawai'i Revised Statutes and the former Chapter 11-200, Hawai'i Administrative Rules. Please publish this notice in OEQC's upcoming August 23, 2019 edition of *The Environmental Notice.*

We have enclosed one (1) hard copy of the FEA and OEQC publication form, as well as one (1) CD with a pdf file of the Final EA and the OEQC publication form in word document format for publication purposes.

Please contact Tiger Mills of our Office of Conservation and Coastal Lands at 587-0382 should you have any questions.

Attachments: *FEA, OEQC Pub Form, 1 CD*

20-040

APPLICANT
PUBLICATION FORM

Project Name:	Stable Road West Groin Repair and Replacement
Project Short Name:	Stable Road West Groin Rehabilitation
HRS §343-5 Trigger(s):	Use of Conservation District; Use of State lands; Use within the shoreline area
Island(s):	Maui
Judicial District(s):	Wailuku
TMK(s):	(2) 3-8-002:026, (2) 3-8-002:025, (2) 3-8-002:050
Permit(s)/Approval(s):	Conservation District Use Permit; County of Maui Special Management Area Permit and Shoreline Setback Variance; Department of the Army Nationwide Permit; Coastal Zone Management Federal Consistency Review; Department of Health Section 401 Blanket Water Quality Certification
Approving Agency:	Department of Land and Natural Resources
Contact Name, Email, Telephone, Address	Tiger Mills, DLNR-OCCL, Kimberly.Mills@hawaii.gov, 808.587.0377, DLNR-OCCL, 1151 Punchbowl Street, Room 131, Honolulu, Hawaii 96813
Applicant:	Community Beach Restoration Foundation
Contact Name, Email, Telephone, Address	Patricia Cadiz, pbc5@mac.com, 808.283.5070, 2406 Waipua Street, Paia, HI 96779
Consultant:	Sea Engineering, Inc.
Contact Name, Email, Telephone, Address	David Smith, dsmith@seaengineering.com, 808.259.7966 x.30, Sea Engineering Inc., Makai Research Pier, Waimanalo, Hawaii 96795

Status (select one)	**Submittal Requirements**
____ DEA-AFNSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
_X___ FEA-FONSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the approving agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
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____ FEIS Acceptance Determination	The approving agency simultaneously transmits to both the OEQC and the applicant a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
____ FEIS Statutory Acceptance	The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.
____ Supplemental EIS Determination	The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that

a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.

____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary
Provide a description of the proposed action and purpose and need in 200 words or less.

The project area is located on the north-central coast of Maui, just east of Wailuku/Kahului and seaward of the Kahului Airport. In the project area are seven rock groins that are believed to have been constructed pre-1944 and are presently in a deteriorated condition. The project area shoreline has historically been relatively stable over the long term, with shoreline recession typically being less than 1 foot per year. In recent years, however, there has been a dramatic increase in sand loss and shoreline recession. This is attributable to the continuing deterioration of the groins. The Japanese tsunami of 2011 damaged the groins and sustained large winter surf the past several years has further damaged the groins and eroded sand.

The proposed project is to repair Groins 1-2 and 4-7 to their original design and to replace Groin 3 with a new engineered groin. The objectives of the project are to maintain the groins so that they can continue to provide their intended stabilization of the beach resulting in recreational, environmental, and aesthetic benefits; to maintain existing lateral access along the shore; and to maintain the sandy shoreline as the first line of defense for the backshore area in the event of natural coastal hazards, such as storms, waves, or tsunamis.

APPLICANT
PUBLICATION FORM

Project Name:	Stable Road West Groin Repair and Replacement
Project Short Name:	Stable Road West Groin Rehabilitation
HRS §343-5 Trigger(s):	Use of Conservation District; Use of State lands; Use within the shoreline area
Island(s):	Maui
Judicial District(s):	Wailuku
TMK(s):	(2) 3-8-002:026, (2) 3-8-002:025, (2) 3-8-002:050
Permit(s)/Approval(s):	Conservation District Use Permit; County of Maui Special Management Area Permit and Shoreline Setback Variance; Department of the Army Nationwide Permit; Coastal Zone Management Federal Consistency Review; Department of Health Section 401 Blanket Water Quality Certification
Approving Agency:	Department of Land and Natural Resources
Contact Name, Email, Telephone, Address	Tiger Mills, DLNR-OCCL, Kimberly.Mills@hawaii.gov, 808.587.0377, DLNR-OCCL, 1151 Punchbowl Street, Room 131, Honolulu, Hawaii 96813
Applicant:	Community Beach Restoration Foundation
Contact Name, Email, Telephone, Address	Patricia Cadiz, pbc5@mac.com, 808.283.5070, 2406 Waipua Street, Paia, HI 96779
Consultant:	Sea Engineering, Inc.
Contact Name, Email, Telephone, Address	David Smith, dsmith@seaengineering.com, 808.259.7966 x.30, Sea Engineering Inc., Makai Research Pier, Waimanalo, Hawaii 96795

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Project Summary
Provide a description of the proposed action and purpose and need in 200 words or less.

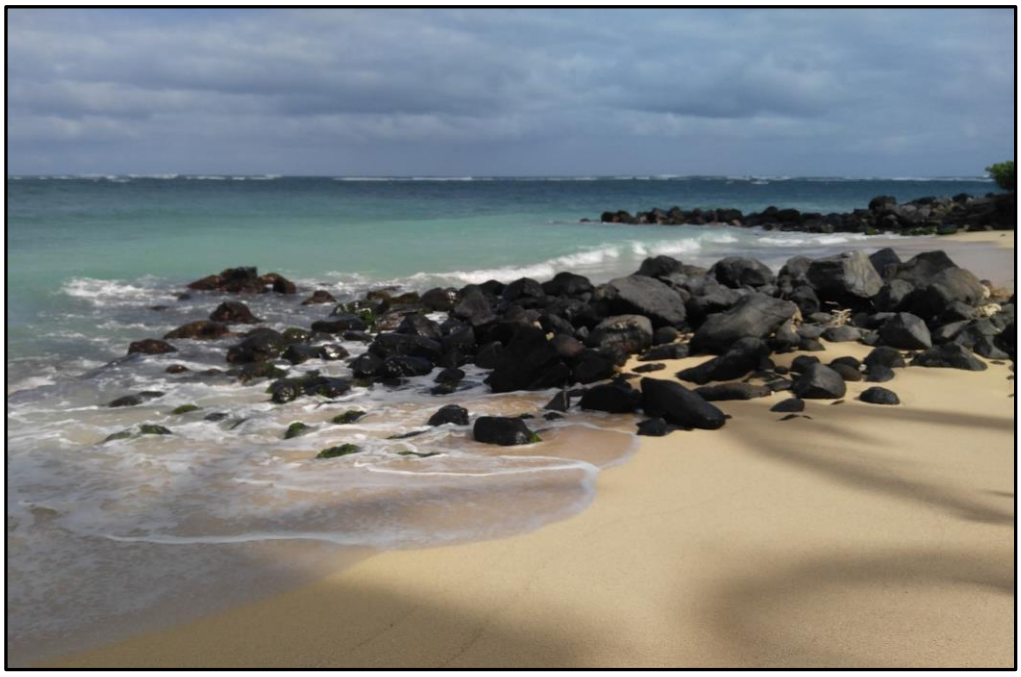
The project area is located on the north-central coast of Maui, just east of Wailuku/Kahului and seaward of the Kahului Airport. In the project area are seven rock groins that are believed to have been constructed pre-1944 and are presently in a deteriorated condition. The project area shoreline has historically been relatively stable over the long term, with shoreline recession typically being less than 1 foot per year. In recent years, however, there has been a dramatic increase in sand loss and shoreline recession. This is attributable to the continuing deterioration of the groins. The Japanese tsunami of 2011 damaged the groins and sustained large winter surf the past several years has further damaged the groins and eroded sand.

The proposed project is to repair Groins 1-2 and 4-7 to their original design and to replace Groin 3 with a new engineered groin. The objectives of the project are to maintain the groins so that they can continue to provide their intended stabilization of the beach resulting in recreational, environmental, and aesthetic benefits; to maintain existing lateral access along the shore; and to maintain the sandy shoreline as the first line of defense for the backshore area in the event of natural coastal hazards, such as storms, waves, or tsunamis.

FINAL ENVIRONMENTAL ASSESSMENT
STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT

Paia, Maui, Hawaii

July 2019



Prepared for:
Community Beach Restoration Foundation
2406 Waipua Street
Paia, Maui, Hawaii 96779-9748

Prepared by:
Sea Engineering, Inc.
Makai Research Pier
41-305 Kalanianaole Highway
Waimanalo, HI 96795-1806

Job No. 25553

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FINDING OF NO SIGNIFICANT IMPACT (FONSI)
STABLE ROAD WEST GROIN REPAIR, PAIA, MAUI, HAWAII

Accepting and Approving Agency:

Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 131
Honolulu, Hawaii 96813

Proposed Action:

The project area shoreline has historically been relatively stable over the long term, with shoreline recession typically being less than 1 foot per year. In recent years, however, there has been a dramatic increase in sand loss and shoreline recession. This is attributable to the continuing deterioration of the groins—three of the stems are now detached from the shoreline and no longer prevent the longshore transport of sand from east to west, and all 7 of the groin crests are too low to prevent overtopping. The Japanese tsunami of 2011 damaged the groins and sustained large winter surf the past several years has further damaged the groins and eroded sand.

Six of the seven groins are constructed of rock, while the other, Groin 3, is a combination of rock with a concrete core. Some of the rock is grouted into the core of Groin 3. The original construction of Groins 1-2 and 4-7 may have been piles of rocks placed by trucks and other equipment. It is likely that the stone was not carefully sorted or placed, resulting in what would resemble a profile groin constructed of riprap. A profile groin is one that has a sloping crest that follows the trend of the adjacent beach, sloping downward toward the ocean, though slightly flatter than the beach. The widths and elevations were inferred from the topographic surveys, where the bulk of the material was determined to be the existing groin outline and the top of the highest rocks represented the crest elevation—it is unlikely that the original crest elevations would have increased over time.

Recent erosion and shoreline recession have the potential to threaten the homes landward of the groins, and the homeowners wish to repair the groins in order to stabilize the sand beach shoreline. Repair of the groins is expected to also help retain the sand beach lateral access along the shore.

The purpose of the present project is:

- Repair Groins 1-2 and 4-7 to their original design
- Replace Groin 3 with a new engineered groin.

The objectives of the project are:

- Maintain the existing groins so they can continue to stabilize the beach, resulting in ecological, recreational, and aesthetic benefits
- Maintain existing lateral access along the shore

- Maintain the sandy coastline as the first line of defense for the backshore area in the event of coastal natural hazard, such as waves, storms, or tsunamis

The repaired groins are expected to improve beach stability, and a stable beach is expected to also help reduce potential adverse impacts to marine biota, which is caused when sand is moved offshore. With the exception of Groin 3, the intent of this plan is to repair the groins to what is believed to be their original designs. The present project does not improve the original design of the six groins. The repair design utilizes the existing stone from within the project area for the maintenance work. If there are shortfalls in stone volume due to natural removal from the area, then the groin repairs will use similar stone of the same size.

Groin 3 would be replaced with a new engineered groin designed based on current wave conditions and up-to-date sea level rise projections. Groin 3 is severely destabilized, having lost its lower, foundation support stone on the west (downdrift) side. Crest stones that were originally part of the western stone support structure had been cemented to the concrete stem, and now hang unsupported from the upper portions of the structure on the western side. Significant vertical cracks, with horizontal offsets, within the wall, are visible along the concrete stem's east side. The cemented basalt stones pull Groin 3's crest to the west, while beach sand pushes against it from the east. The cracked and leaning portion of the concrete structure extends roughly 26 feet in length and is within the swash zone abutting the active beach face. In this portion of the structure, which is currently still standing, the lower support stones on the west side have been washed away. Temporary sandbags have been placed alongside Groin 3 to provide stabilization until this proposed project is implemented. The groin, in its current condition, is a safety hazard to beach users due to potential failures of the structure.

In order to obtain the objectives listed above, the project involves three primary work tasks:

1. Obtain an approved Environmental Assessment (EA) and necessary Federal, State, and County permits for construction of a replacement groin
2. Design and prepare construction documents for the groin repairs
3. Complete construction of the replacement groin.

Basis for Determination:

The project would continue to stabilize the beach and shoreline in a manner consistent with the shoreline dynamics of the past nearly 80 years. The project would return Groins 1-2 and 4-7 to their original configuration, thereby restoring their capacity to stabilize the sand beach. Groin 3 would be replaced with a new engineered groin, to continue to perform the same function as the current Groin 3. The project is not expected to adversely alter or affect wave-driven currents, circulation patterns, overall water quality, or offshore wave breaking, as it is intended to maintain the status quo condition that has been present for nearly 80 years along this coastline. Construction activities would be designed to avoid and minimize impacts to nearshore water quality so far as practicable, and since the project would be replacing existing rocks or placing new stone on sand-covered substrate, no impacts to marine biota are anticipated. Stones would be placed in their original configuration; thus, no loss of marine habitat is anticipated for Groins 1-2 and 4-7; reconstruction of Groin 3 would result in loss of marine habitat. Construction Best Management Practices (BMPs) would be used to mitigate potential impacts to endangered and

protected species such as the Green and Hawksbill Sea Turtles and Hawaiian Monk Seals. Construction can be expected to result in some temporary disruption of beach use and recreational activities, as well as minor noise disturbance and short-term degradation of air quality from the operation of construction equipment.

Chapter 343 Hawaii Revised Statutes (HRS) and Hawaii Administrative Rules (HAR) §11-200 establish certain categories of action that require the agency processing an applicant's request for approval to prepare an Environmental Assessment (EA). HAR §11-200-11.2 established procedures for determining if an EA is sufficient, or if an Environmental Impact Statement (EIS) should be prepared for actions that may have a significant effect on the environment. HAR §11-200-12 lists the following criteria to be used in making such a determination.

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.*

The proposed project, groin repair and reconstruction, is expected to stabilize the shoreline and reduce erosion of the natural resource. The beach is experiencing both chronic and episodic erosion, and the backshore erosion is evident by the erosion scarps. Failure of the groin system, in particular Groin 3, is expected to destabilize the shoreline and cause significant erosion.

There are no significant flora or fauna expected to be lost due to the proposed groin repair and replacement project. No threatened or endangered species are expected to be impacted by the project.

There are two subsurface cultural deposits near the project site (Site 50-50-05-01799 and 50-50-05-01798). Site 50-50-04-01783, known as the Kanaha Pond is less than two miles south of the project area. The pond is said to have been built by Kiha-a-Pi‘ilani in the early 1500s. He, Kiha-a-Pi‘ilani, was the brother-in-law of ‘Umi-a-Līloa, a ruling ali‘i-ai-moku (district high chief of Hawai‘i).

The proposed project includes preparation of an Archaeological Monitoring Plan by an archaeological consultant prior to construction. During construction, an archaeological monitor would be present during any backshore excavation. An end-of-work Archaeological Monitoring Report would be prepared to document the findings or lack thereof during construction. If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the State Historic Preservation Division, the Maui Police Department, and the Division of Conservation and Resources Enforcement will be notified.

The proposed project is unlikely to have any significant adverse effect on known cultural or traditional Hawaiian practices, as the placement location is within an active beach face. The repaired and replaced groins are expected to provide protection to prevent loss or destruction of natural and cultural resources that may be located in the un-eroded backshore environment. In addition, archaeological monitoring will be conducted during the construction project.

2. *Curtails the range of beneficial uses of the environment.*

The groin repair and replacement project would provide stabilization of the beach and backshore. No adverse long-term impacts to the environment are anticipated to result from this project, as it is intended to maintain status quo coastal dynamics along the coastline. There may be temporary

short-term impacts during construction; however, these are not anticipated to be significant and will be mitigated to the maximum extent practicable by the use of Best Management Practices (BMPs) and monitoring procedures. The proposed project is expected to preserve the beneficial use of the shoreline area by preserving public coastal lateral access along this segment of the shoreline.

3. *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*

The groin repair and replacement project is consistent with Hawaii's State Environmental Policy as established in Chapter 343(4)(A), HRS, to establish, preserve, and maintain recreation areas, including the shoreline, for public recreational use. The preferred activity is needed to preserve public coastal lateral access along the shoreline.

The proposed groin repair and replacement project is located within Conservation land and in designated critical habitat for the Hawaiian Monk Seal as discussed in Section 6.2.2 *Impacts on Protected Species* in this EA. That section includes a discussion of mitigation measures should there be a siting of rare, threatened, or endangered species during the construction of the proposed groin project. If endangered or threatened species are encountered, all BMPs and mitigation measures will be implemented (Section 6.2.2 and Section 10).

4. *Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.*

The proposed project would have no adverse social or economic impact to the State. The groin repair and replacement project is expected to have some positive economic impact to the applicant as it is expected to stabilize the beach and shoreline. The proposed project may also have a positive economic impact on the State's ownership of the coastal area by promoting accretion and increasing public lateral access to the beach.

5. *Substantially affects public health.*

The proposed project, when implemented, is expected to have no adverse public health impacts. During construction, the contractor will be required to provide ample clearance for emergency vehicles at all times. The proposed project does not involve any activities that would permanently alter the need for, or ability to provide, emergency services. The construction site, by nature, could be a health and safety hazard to the public. The construction site will be clearly marked and shoreline users would be redirected around the construction site.

6. *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

The project is not expected to alter the existing land use pattern in and around the project site. The proposed project is not expected to affect public infrastructure and services. The proposed groin repair and replacement project has little potential to affect public infrastructure and services. Once in operation, it will not require water or electrical power. In and of themselves, the groins do not generate a need for additional sanitary wastewater collection and treatment facilities and it would not affect stormwater runoff that might impact the County's stormwater system. Most people visiting that section of the beach would arrive by foot rather than in

vehicles, and the improvements are not expected to increase the resident or visitor population of the island.

7. Involves a substantial degradation of environmental quality.

Other than temporary, short-term environmental impacts during construction, which are generally not considered significant, the proposed project is not expected to result in impacts which would degrade the environmental quality in the project area. The groin repair and replacement should improve existing environmental conditions by mitigating ongoing erosion and decreasing the amount of sediment released into nearshore waters from the erosion scarp, related to the aging of the structures. The project should not permanently degrade water quality, nor impact marine flora and fauna

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The proposed groin repair and replacement project would be a stand-alone project, with no cumulative impacts or commitment for larger actions. Its intended purpose is to stabilize the beach and shoreline.

9. Substantially affects a rare, threatened, or endangered species, or its habitat.

The affected environment should have a long-term positive effect on the coastal environment by stabilizing the shoreline and allowing sand to accumulate when there is available material in the littoral cell.

The following species may be in the project area and may be impacted by the proposed action: 1) Hawaiian hoary bat, ope'ape'a (Lasiurus cinereus semotus), 2) Wedge-Tailed Shearwater, 'ua'u kani (Puffinus pacificus), 3) Hawksbill Sea Turtle, honu'ea (Eretmochelys imbricata), 4) Green Sea Turtle, honu (Chelonia mydas), 5) Hawaiian Monk Seal, ‘ilio holo I ka uaua (Neomonachus schauinslandi). Please refer to Section 6.2.2 of this Environmental Assessment for a detailed discussion and analysis on the potential impacts and mitigation measures for the five (5) species listed above. Within one week prior to construction, a bird monitor would survey the project area for protected or endangered bird nests or active brood sites. At the start of each day, personnel would conduct visual monitoring within the project area for marine or endangered species. Furthermore, Section 6.2.2 and Section 10 list additional BMPs to mitigate impacts to rare, threatened, or endangered species and their habitats.

10. Detrimentally affects air or water quality or ambient noise levels.

There would be some temporary, short-term impacts to air and water quality, and noise levels during construction. However, these impacts would be limited to the construction period and are not expected to be significant. BMPs will be in effect to help minimize the construction impacts. Once construction is complete there will be no activity or mechanism for further air, water, or noise impacts. In addition, the proposed project stabilizes the shoreline and prevents the release of terrigenous fine material into the nearshore waters.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

The proposed groin repair and replacement will be subject to the same conditions as the existing groins. The conditions may include prevailing wave environment at the shoreline, particularly during winter season high surf, storm conditions, and large trade wind wave events. The proposed project is expected to maintain beach stability and littoral processes between the groins, including seasonal accretion. The proposed project is not expected to negatively alter erosion or coastal processes because it is an in-kind and in-place improvement to the existing groin field. If the groins are not repaired, erosion is expected to continue and has the potential to threaten the backshore properties. Repair of the groins, however, would not change the shoreline elevation, and would not change the existing tsunami or storm wave flood hazard.

12. Substantially affects scenic vista and view planes identified in county or state plans or studies.

The proposed project is relevant to the objectives of the Maui Island Plan, including protecting and improving the natural environment, restoring natural resources, retaining scenic resources, and enhancing scenic views. The repair project will reuse rock from the beach and place the rock on the groins, improving the appearance of the beach. The groins are not expected to impact view plane when viewed from the backshore.

13. Requires substantial energy consumption.

Other than energy expended during construction operations, the groin repair and replacement will require no additional energy consumption

Contacts:

Applicant: Community Beach Restoration Foundation
Attn: Patricia Cadiz
2406 Waipua Street
Paia, HI 96779-9748
Phone: (808) 283-5070
Email: pbc5@mac.com

Consultant: Sea Engineering, Inc.
Attn: David Smith
Makai Research Pier
41-305 Kalanianaole Highway
Waimanalo, HI 96795
Phone (808) 259-7966 x30
Email: dsmith@seaengineering.com

Determination: In accordance with the potential impacts outlined in Section 6 of this Final Environmental Assessment (FEA), the provisions of Chapter 343 Hawaii Revised Statutes (HRS), and Hawaii Administrative Rules (HAR) §11-200 significance criteria, the Approving Agency for applicant actions, the Department of Land and Natural Resources, State of Hawaii, is anticipated to make a Finding of No Significant Impact (FONSI).

_____ _____

Suzanne D. Case, Chairperson **Date**
Board of Land and Natural Resources
State of Hawaii

PROJECT SUMMARY

Project:	Stable Road West Groin Repair and Replacement
Approving Agency:	Department of Land and Natural Resources State of Hawaii 1151 Punchbowl Street, Room 131 Honolulu, HI 96813 Contact: Sam Lemmo Phone: (808) 587-0377 Fax: (808) 587-0322 Email: sam.j.lemmo@hawaii.gov
Applicant:	Community Beach Restoration Foundation 2406 Waipua Street Paia, Maui, Hawaii 96779-9748 Contact: Patricia Cadiz Phone: (808) 283-5070 Email: pbc5@mac.com
Consultant:	Sea Engineering, Inc. Makai Research Pier 41-305 Kalanianaole Highway Waimanalo, HI 96795 Contact: David Smith Phone: (808) 259-7966 x30 Email: dsmith@seaengineering.com
Location:	Paia, Maui, Hawaii
Tax Map Keys:	(2) 3-8-02:025 (2) 3-8-02:026 (2) 3-8-02:050
State Land Use District:	Conservation District, Resource Subzone
County Zoning:	R-5 (residential)
Proposed Action:	Reconstruction of shoreline groin structures
Required Permits & Approvals:	Environmental Assessment and Finding of No Significant Impact (Chapter 343, HRS and §11-200, HAR) Conservation District Use Permit (HAR 13-5) County of Maui Special Management Area Permit (Chapter 205A, HRS) Department of the Army Section 10 and Section 404

State of Hawaii Department of Health Section 401

Actions Requiring Environmental Assessment: Use within any land classified as Conservation District
Use of State or County Lands
Use within the shoreline area

Determination: Finding of No Significant Impact (FONSI)

Estimated Cost: $1,500,000 to $2,000,000

Time Frame: Construction would begin when the necessary permits and approvals are obtained, and a construction contract is awarded, currently estimated for Fall of 2019. The construction period is estimated to be 43 to 111 days.

Consulted Organizations/Individuals:

Federal

U.S. Army Corps of Engineers, Honolulu District, Regulatory Branch
U.S. Fish and Wildlife Service
National Oceanic and Atmospheric Administration, National Marine Fisheries Service

State of Hawaii

Department of Land and Natural Resources
- Division of Aquatic Resources
- Historic Preservation Division
- Division of Forestry and Wildlife
- Office of Conservation and Coastal Lands

Department of Health
- Office of Environmental Quality Control
- Clean Water Branch

Office of Hawaiian Affairs
Department of Business, Economic Development & Tourism
- Office of Planning / CZM Program

Maui County

Department of Planning

DEA Distribution:
Notice of availability of the DEA and the start of the 30-day public review and comment period was published in *The Environmental Notice* on March 8, 2019. The DEA was distributed (by email) to the organizations and individuals listed below, and their comments requested.

State Agencies

Department of Accounting and General Services
Department of Business, Economic Development and Tourism
Department of Health
Department of Land and Natural Resources
Division of Aquatic Resources
Historic Preservation Division
Office of Conservation and Coastal Lands
University of Hawaii, Environmental Center
Office of Hawaiian Affairs

County of Maui

Department of Planning

Federal Agencies

U.S. Fish and Wildlife Service
NOAA National Marine Fisheries Service
U.S. Army Corps of Engineers
Environmental Protection Agency, Region IX

Elected Officials

Rep. Lynn DeCoite
Sen. Kalani English
Councilmember Mike White

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1. INTRODUCTION

1.1 Project Location and General Description

The project area is located on the north-central coast of Maui, just east of Wailuku/Kahului and seaward of the Kahului Airport. The project is located at the west end of Spreckelsville Beach. The project area is part of the former Spreckelsville Plantation sugar growing operation founded in 1878 by Claus Spreckels, which later became H.C.&S. Co., the largest sugar plantation in the state. Stable Beach, named for the H.C.&S. stable located at the intersection of Hana Highway and Spreckelsville Beach Road (a.k.a, "Stable Road") is a popular local beach. Stable Road provides access to residential shoreline homes.

The project site includes six lots on three parcels at the west end of Stable Road. The existing shoreline is primarily composed of calcareous beach sand, with seven remnant rock groin structures helping to prevent longshore sand transport from east to west and stabilize the beach. The rock groins are believed to have been constructed in the early to mid-1900s, certainly pre-1944, and are presently in a deteriorated condition. Their condition is such that their effectiveness in stabilizing the shoreline is poor to marginal. The project location and vicinity are shown in Figure 1-1 through Figure 1-4. The groins are numbered 1 through 7, with Groin 1 being the western-most and Groin 7 being the eastern-most.

The proposed project is coordinated by the Community Beach Restoration Foundation (CBRF), a Hawaii corporation formed by five contiguous beachfront neighbors. These neighbors have signed a letter of concurrence indicating that they are all supportive of this project. The non-profit organization was created for the purpose of providing a formal management structure to promote and administer a beach conservation and restoration program. The CBRF recognizes that Maui's beaches are owned by the State of Hawaii as a public recreational and environmental resource. Recent erosion, however, has caused sand loss in the beach system and narrowing of the public beach areas, which has diminished this valuable resource. The CBRF is partnering with qualified professionals to envision and carry out an appropriate beach management plan for the region.

The CBRF officers are:

- Rawleigh Ralls, President/Director TMK (2) 3-8-002:026
- Ed Freedman, Director TMK (2) 3-8-002:026
- Tom Jenkins, Treasurer/Director TMK (2) 3-8-002:025
- Gregg Chisholm, Director TMK (2) 3-8-002:050
- Terry Porter, Director TMK (2) 3-8-002:050

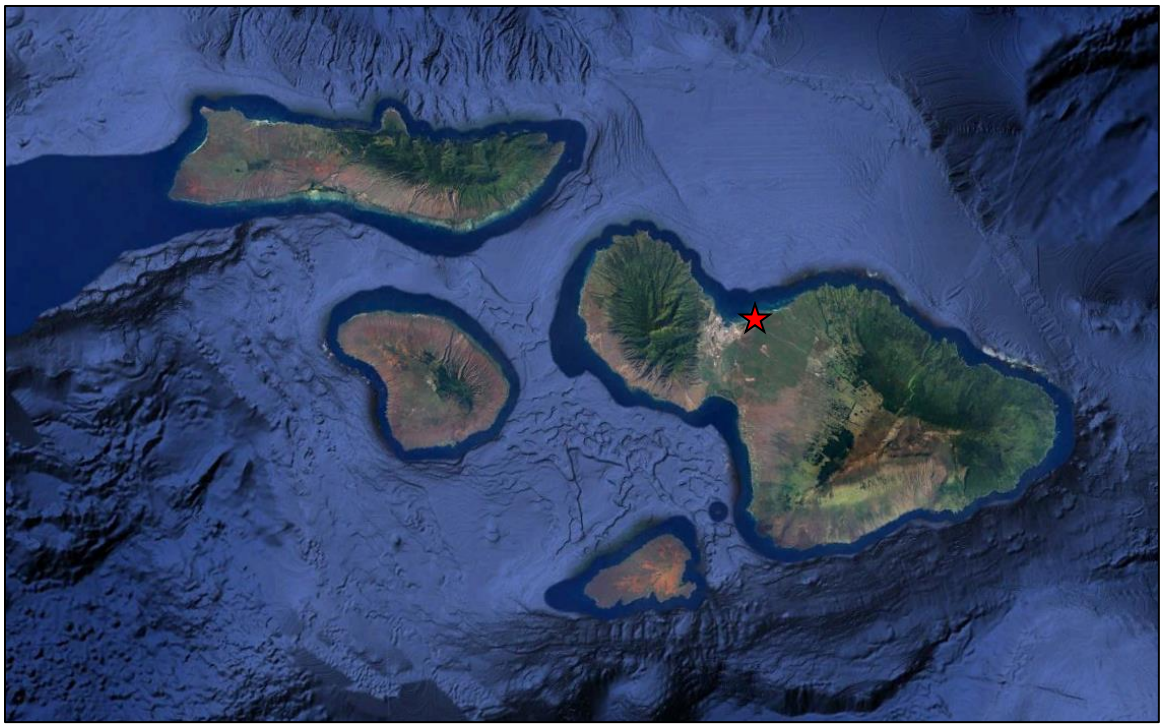

Figure 1-1. Maui Nui (Google Earth Image) with project area (red star)

Figure 1-2. Regional Setting (Google Earth Image) with Stable Road western coastline (red polygon)

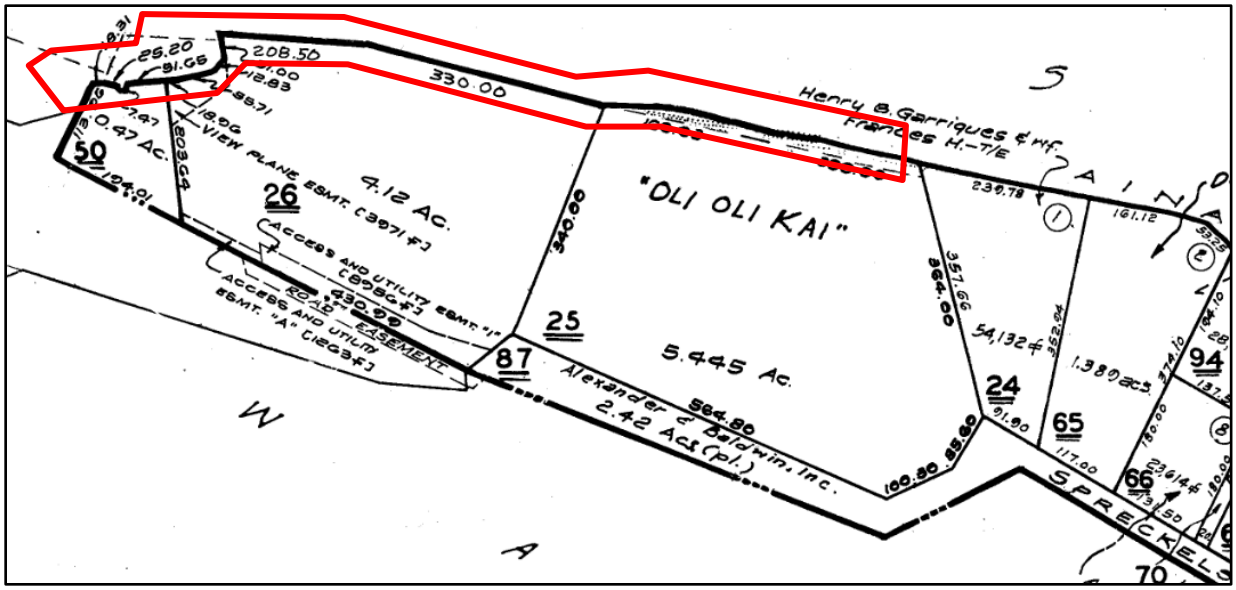

Figure 1-3. TMK map (red polygon indicates the project shoreline)

Figure 1-4. Beach and groin topography for the region

1.2 Project Purpose and Objectives

The project area shoreline has historically been relatively stable over the long term, with the shoreline being stable along most of this coastline, and the west end recession typically being less than 1 foot per year. In recent years, however, there has been a dramatic increase in sand loss and shoreline recession. This is attributable to the continuing deterioration of the groins—three of the stems are now detached from the shoreline and no longer prevent the longshore transport of sand from east to west, and the groin crests are too low to prevent overtopping. The Japanese tsunami of 2011 damaged the groins and sustained large winter surf the past several years has further damaged the groins and eroded sand.

Six of the seven groins are constructed of rock, while the other, Groin 3, is rock mound with a concrete core. Some of the rock is grouted onto the core of Groin 3. The original groin construction may have been piles of rocks placed by trucks and other equipment. It is likely that the stone was not carefully sorted or placed, resulting in what would resemble a profile groin constructed of riprap. A profile groin is one that has a sloping crest that follows the trend of the adjacent beach, sloping downward toward the ocean, though slightly flatter than the beach. The widths and elevations were inferred from the topographic surveys, where the bulk of the material was determined to be the existing groin outline and the top of the highest rocks represented the crest elevation.

Recent erosion and shoreline recession, due to deterioration of the existing groins, have the potential to threaten the homes landward of the groins, and the homeowners desire to repair the groins to stabilize the sand beach shoreline. Repair of the groins would also help retain the sand beach lateral access along the shore.

The goals of the proposed project are:

- Repair Groins 1-2 and 4-7 to their original design and
- Replace Groin 3 with a new engineered groin designed to perform the intended function of Groin 3.

The objectives of the project are:

- Maintain the groins so they can continue to provide their intended stabilization of the beach resulting in recreational, environmental, and aesthetic benefits
- Maintain existing lateral access along the shore
- Maintain the sandy shoreline as the first line of defense for the backshore area in the event of natural coastal hazards, such as storms, waves, or tsunamis.

The repaired groins would restore beach stability, and a stable beach will also help reduce the potential for adverse impacts to marine biota of sand being moved offshore. Except for Groin 3, the intent of this plan is to repair the groins to their original designs. The proposed project does not improve the design of those groins. The repair design would utilize existing stones, augmented by additional stones as needed.

In order to meet the objectives listed above, the project involves three primary work tasks:

1. Obtain an approved Environmental Assessment (EA) and necessary Federal, State, and County permits for construction of groin repair/replacement
2. Design and prepare construction documents for the groin repair/replacement
3. Complete construction of groin repair/replacement.

1.3 Summary Description of the Proposed Action

This document presents two general plans—a repair plan for Groins 1-2 and 4-7, and a replacement plan for Groin 3.

Groins 1-2 and 4-7 Repair

The groin repair design template for Groins 1-2 and 4-7 has been developed to return these groins to their approximate original condition. The property owners stated that their preferred methodology was in-kind repairs to the groins, with no engineering improvements desired.

Little quantitative data regarding the original construction of the groins is available. The rough dimensions of the groins are inferred from historical photographs, discussions with residents and other people knowledgeable about this site, and the topographic surveys.

The proposed plan is to repair the existing groins to a state that is believed to be consistent with their original construction. Stone for the groins would be obtained from the area immediately beside each groin. Additional stone would be delivered to the site from an upland source as needed.

Given the length of time that the groins have been in place, it is believed that the stones have settled far enough into the sand to produce stable foundations for the repairs. The repair plan would be to reshape the groins by placing similar-sized stone onto the existing groins.

A groin consists of a root (the end that attaches to shore), a head (the offshore end), and a stem in between the root and head. The proposed groin repair template includes a head elevation of +4 ft mean lower low water (mllw) and a stem that slopes upward to a root elevation of +8 ft mllw. The crest would be 8 feet wide with sideslopes of 1v:1.5h. The length of each groin would be based on the location of existing rock at each groin, which is believed to be consistent with the original design.

Proposed stone size is based on the existing stone on site. Measurements of individual stones showed that the "typical" armor stone weight was in the range of about 1,000 lbs to 1,600 lbs. Available stone from the near vicinity of each groin would be used for the repair, with additional stone distributed between 1,200 and 2,000 lbs delivered to the site as needed.

A schematic of the repair is shown in the following figures.

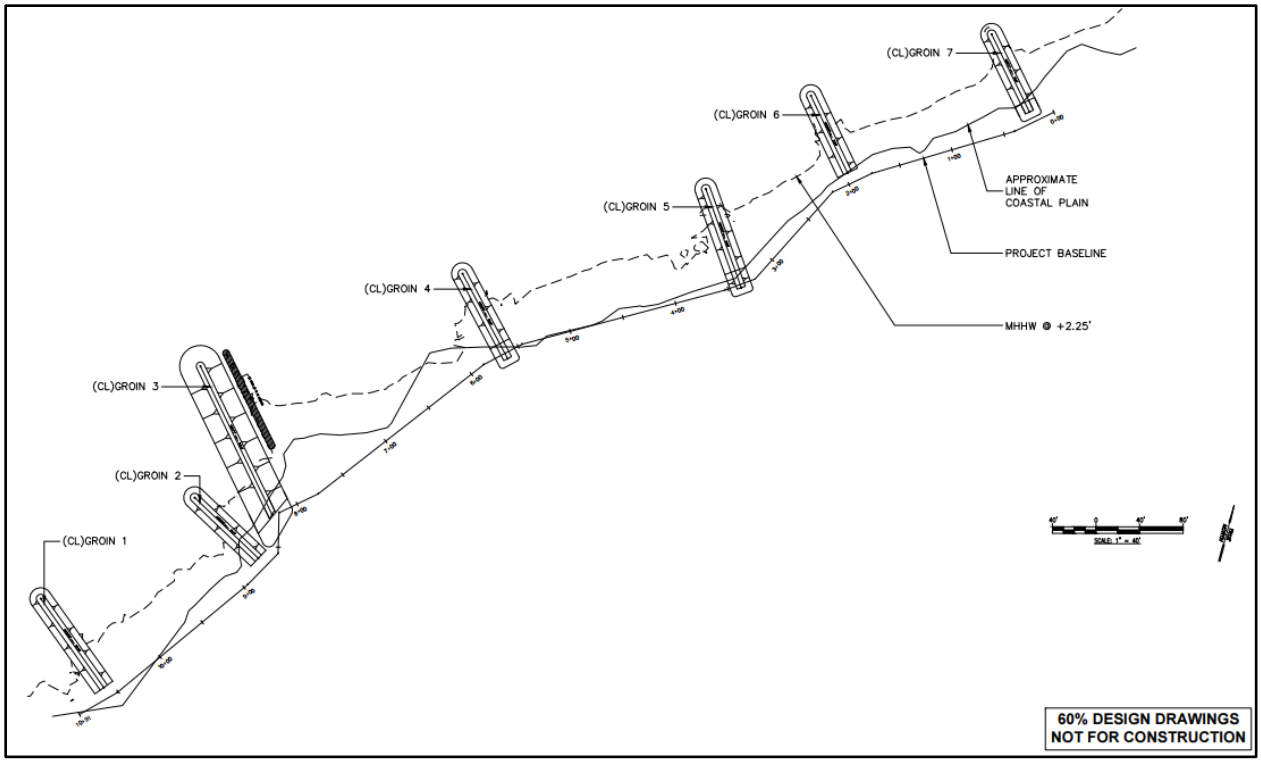

Figure 1-5 Plan view of proposed repairs

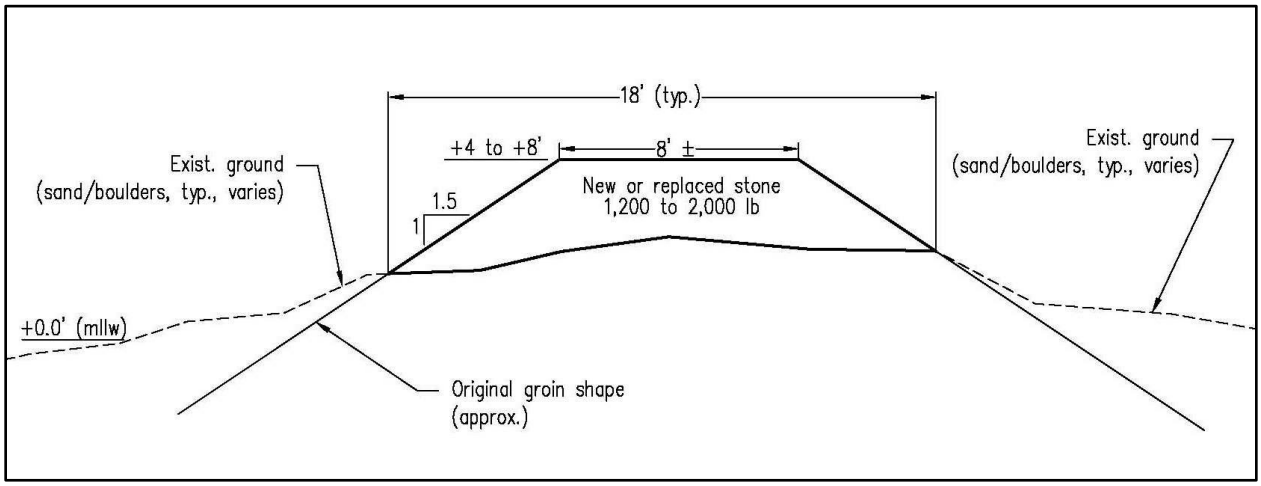

Figure 1-6 Cross section view of typical repair (Groins 1-2 and 4-7)

Groin 3 Replacement

Groin 3 is severely destabilized, having lost its lower foundation support stones on the west (downdrift) side. Crest stones that were originally part of the western stone support structure had been cemented to the concrete stem, and now hang supported by temporary sandbags from the upper portions of the structure on the western side. Significant vertical cracks, with horizontal offsets, within the wall are visible along the concrete stem's east side. The cemented basalt stones pull Groin 3's crest to the west, while beach sand pushes against it from the east. The cracked and leaning portion of the concrete structure extends roughly 26 feet in length and is within the swash zone abutting the active beach face. In this portion of the structure, which is currently still standing, the lower support stones on the west side have been washed away. The groin, in its current condition, is a safety hazard to beach users due to potential failures of the structure.

The preferred repair for Groin 3 is to rebuild the groin as a new rock rubblemound groin immediately to the west of the existing groin, after which the existing groin would be removed. The root of Groin 3 is presently flanked and the scarp inshore of the groin is eroding, resulting in a 15-foot gap between the groin and scarp. To mitigate this erosion, the groin would be extended inshore to intersect the erosion scarp and close the gap.

A schematic of the Groin 3 replacement is presented in the figures below.

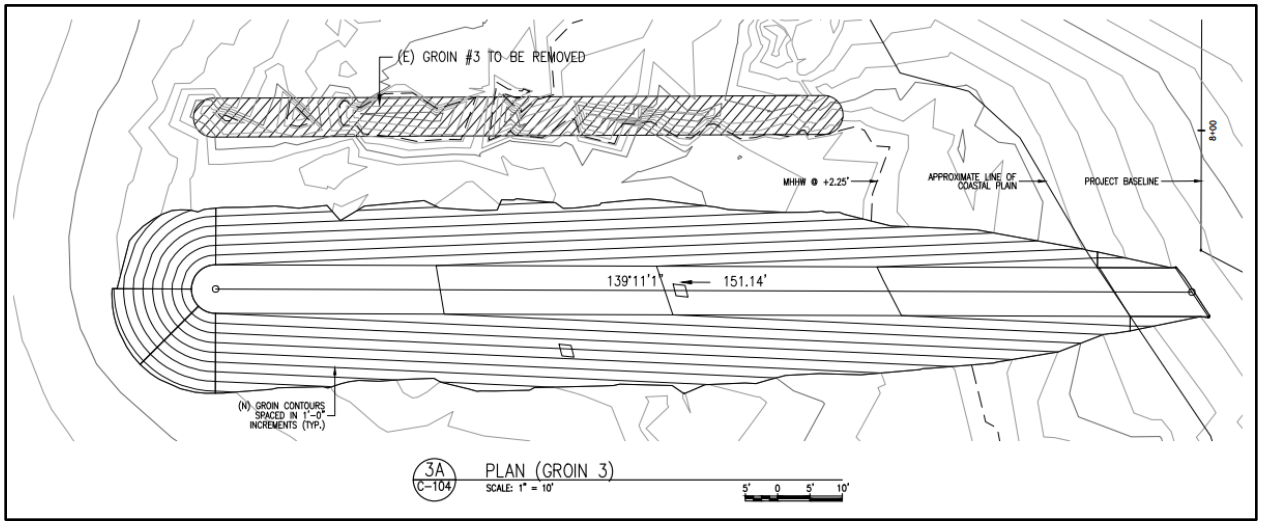

Figure 1-7 Plan view of Groin 3 replacement plan

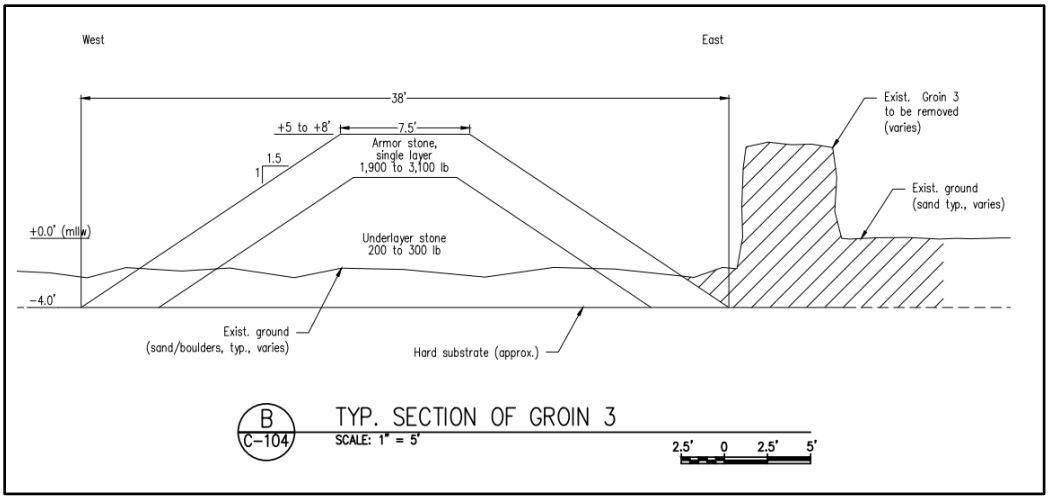

Figure 1-8 Cross section view of new Groin 3

1.4 Alternatives Considered

1.4.1 *Groin Repair with Sand Fill*

An alternative would be to repair the groins as per the proposed plan and place sand fill to nourish the beach and return it to a prior shoreline position. The groins have been effective shore protection structures for nearly 80 years and the shoreline has equilibrated to the groins. In their current state of disrepair, prior to repairs, the groins are unlikely to perform well in the future, even with additional sand added to the system. Thus, repair is necessary before a nourishment effort should be conducted. Finding a source for suitable quality beach sand is a challenge. The sand on this stretch of shoreline is excellent quality, medium grain size and well sorted. State regulations require that sand used for beach nourishment closely match the existing sand. Given the high quality of the existing sand, a close match is difficult to obtain. There are no commercial sources of similar high-quality beach sand. Until recently, a potential source of sand is the backshore dunes on Maui that were mined primarily for making concrete. This sand has been used for beach nourishment at other locations (e.g., Sugar Cove); however, the sand is fine and may not be suitable for this project area. Further, there is a county-imposed sand moratorium and it is unclear if the dune sand will be available again.

Offshore sand deposits are a possible source of sand. Two recent projects on Oahu have used offshore sand deposits as a beach nourishment sand source but were fortunate in both instances to have suitable nearby sand deposits. In general, offshore sand is finer than preferred for most nourishment applications and may be stained dark in color due to anaerobic decay processes as it sits on the bottom. A significant offshore investigation would be required to find suitable offshore deposits for the project area, should they exist. In 2010, Sea Engineering conducted a survey of an extensive offshore sand field extending from west of Kahului Harbor east to Kanaha/Spreckelsville. Much of the sand was too fine for beach nourishment, but samples from several areas indicated possible suitable grain size and color.

An additional difficulty associated with offshore sand is the feasibility of how to mine it and transport it to the project site. There are two commonly utilized methodologies to bring sand from offshore to shore. The first is to mine the sand using a submerged pump and transport it to

shore as a sand/water slurry through a pipeline, e.g., Waikiki Beach maintenance in 2012. The other option is to recover the sand using a barge-mounted clamshell dredge and transport it to shore by barge for offloading and trucking to the project site. Both methodologies have significant potential difficulties and impacts associated with them, and typical costs are $100 to $200 per cubic yard of sand. Given the complexities and impacts associated with sand fill, it is considered beyond the scope of what is needed for this project.

1.4.2 *Re-Engineering the Groins and Shoreline Configuration*

Coastal engineering design practice has improved significantly since the existing groins were constructed well over 50 years ago. Should this be a new shoreline stabilization project, it is likely that a very different groin layout and configuration would be considered. Modern T-head groin design is a very successful means of stabilizing sand fill, as has been demonstrated by the recent Iroquois Point beach nourishment and stabilization project on the island of Oahu in Hawaii. Given the difficulty and expense of obtaining suitable sand fill, using the most effective way of preventing its loss is obviously advantageous. This, however, would entail completely new and larger groins at different locations, plus the complexities of sand fill, and is again considered beyond the scope of this project.

1.5 No Action

Maui's sandy shoreline and beaches are known to be eroding and sandy shoreline area is diminishing. The University of Hawaii Coastal Geology Group (CGG) has been studying coastal erosion for decades and have collected a large dataset of shoreline change. The CGG (Romine et al, 2013) published a report stating that 78% of Maui's beaches were eroding at an island-wide average of about 5 inches per year over the previous 50 years. They report that 12% of Maui's beaches were completely lost to erosion.

Sea level rise was also considered a significant cause of the beach erosion, though sediment supply, coastal armoring, and coastal geomorphology were also driving factors. More recently, the Hawaii Climate Change Mitigation and Adaptation Commission (2017) released the *Hawaii Sea Level Rise Vulnerability and Adaptation Report*, predicting 3.2 feet of sea level rise over the next 70 years. The report estimated that this amount of sea level rise would flood almost 300 structures in the area and showed that the shoreline from Kanaha Beach Park past Paia would be exposed to chronic flooding from even 1.1 feet of sea level rise.

The project site beach has exhibited significant erosion and loss of sand, and this sand is not expected to return or be replaced with the groins in their deteriorated condition. There is no reason to believe that this trend will not continue into the foreseeable future, and thus there is the very real likelihood that without repair of the groins to help stabilize the beach, the functional sandy shoreline will disappear over time. As undesirable as it may be, however, *No Action* is an alternative and is therefore carried through the EA evaluation in order to discuss the potential impacts of simply doing nothing. The *No Action* alternative provides decision-makers with a benchmark against which to compare the magnitude of environmental effects of the action alternatives. *No Action* represents a "future-without-project" scenario: a continuation of existing activities and natural processes that leads to a picture of the future conditions most likely to occur if the proposed action (issuance of a permit and the subsequent implementation of the

applicant's proposed project) does not occur. Its purpose is to provide a "reasonable" baseline for assessing the impacts of the action alternative.

1.6 Required Federal and State Approvals and Applicable Regulatory Requirements

1.6.1 *Required State of Hawaii Approvals*

The proposed project will require preparation of a Draft and Final Environmental Assessment (DEA and FEA) pursuant to the State of Hawaii's environmental impact assessment process, Chapter 343, Hawaii Revised Statutes, and its' implementing regulations. Hawaii Administrative Rules (HAR) Title 11, Chapter 200, addresses the determination of significance and contents of an environmental assessment. If the FEA and Finding of No Significant Impact (FONSI) are approved by the Department of Land and Natural Resources, the project can then proceed to implementation, once all other required permits and approvals are obtained.

The project will require a Conservation District Use Permit (CDUP) pursuant to Title 13 Chapter 5, Hawaii Administrative Rules (HAR). The project area is within the State Conservation District.

The Hawai'i Coastal Zone Management (CZM) Program (HRS Chapter 205A) regulates all types of land uses and activities ("development") in the Special Management Area (SMA). The SMA on Maui is regulated by the County of Maui, Department of Planning. Portions of the proposed project staging areas and ingress/egress routes that are located within the SMA will be subject to the SMA rules and regulations for the County of Maui. The proposed action will require an SMA permit from the County of Maui, Department of Planning.

The requirement for a DA permit pursuant to Section 404 of the Clean Water Act will also require a Section 401 Water Quality Certification to be issued by the State Department of Health. The project will also require a Hawaii Coastal Zone Management (CZM) Program review for consistency with the CZM objectives and policies (HRS Chapter 205A).

1.6.2 *Applicable Federal Laws, Regulations and Executive Orders*

The approvals and consultations that will be needed from Federal agencies other than the Corps of Engineers include the:

Archaeological and Historic Preservation Act (16 U.S.C. § 469a-1);

National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470(f));

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC §3001);

Clean Air Act (42 U.S.C. § 7506(C));

Coastal Zone Management Act (16 U.S.C. § 1456(C) (1));

Endangered Species Act (16 U.S.C. 1536(A) (2) and (4));

Fish and Wildlife Coordination Act (FWCA) of 1934, as amended (16 USC §§661-666[C] et seq.);

Magnuson-Stevens Fishery Conservation and Management Act (16 USC §1801 ET SEQ.);

Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC §§1361-1421(H) et seq.);

1.7 Decision to be Made

The Army Corps of Engineers, Honolulu District, the State of Hawaii Department of Land and Natural Resources, the County of Maui Planning Department, the Hawaii Coastal Zone Management (CZM) Program, and the State Department of Health will review the analyses and conclusions drawn in this EA and decide whether to issue the necessary permits and approvals that the applicant has requested, to issue the permits and approvals with special conditions, or to deny the permits and approvals.

2. DETAILED DESCRIPTION OF THE PROPOSED ACTION, PHASE 1 (GROINS 1-2 AND 4-7)

The following discussion pertains to Groins 1-2 and 4-7, which are similar in construction and therefore have been designed similarly for repair. Proposed drawings of the repaired groins are given in Figure 2-2 thorugh Figure 2-1. These are 60% drawings, not to be used for construction.

A detailed description of the proposed replacement of Groin 3 can be found in Section 3.

2.1 General Description of the Repair Plan

The proposed plan is to repair the existing groins, retaining their seaward extension from the shoreline (length) and resetting the stones in a more stable configuration. The project would involve salvaging existing stone that is surrounding the groins and importing additional stone as needed to restore the effectiveness of the groins. Additional stones would be sized to match the existing stone.

Dimensions of six representative stones at each groin were measured during the January 2017 site visit. Volume and weight of each stone were calculated and averages are presented in Table 2-1. The average of all the stones measured is 1,400 lbs.

Table 2-1. Groin Stone Summary

Groin	Mean Stone Diameter (ft)	Mean Stone Weight (lbs)
1	2.0	1,340
2	1.9	1,080
3	2.2	1,630
4	2.0	1,230
5	2.0	1,300
6	2.2	1,670
7	2.1	1,540

The original groin elevations are assumed based on the topographic survey, and these elevations are high enough to prevent overtopping during typically prevailing wave conditions and the resultant overwash of sand. For the groins currently being flanked, their stems would be lengthened and tied back into the land (Groins 4, 5 and 7).

The proposed Phase 1 action is repair of the existing groins, without betterment. Certain assumptions about the original designs have been made in the absence of design documents or other historical information. All efforts herein are made to match what is believed to be the original condition of the groins. Since this is a repair project, no design is necessary; however, it is important to note that the stone will be stable up to a certain design wave height. Beyond that wave height, maintenance might be necessary.

The following sections are presented as if the repair were to include stable stone size based on a pre-determined design wave event to address the effectiveness of the repair and potential stability when compared to engineered structures.

2.2 Groin Repair Design Considerations

As presented in Section 2.1, measured armor stone size was found to vary between 1,100 lbs and 1,700 lbs with an average of 1,400 lbs. This section determines the oceanographic conditions under which the existing stone would be stable.

The required stone weight for stability under the design wave height is given by the Hudson Formula (Coastal Engineering Manual, 2006):

$$W = \frac{w_r H^3}{K_D (S_r - 1)^3 \cot\theta}$$

where,

W = median weight in pounds of an individual stone
w_r = unit weight of the stone (160 lb/ft^3)
H = wave height
K_D = stability coefficient (2 for depth limited waves and random placed stone
S_r = specific gravity of the stone relative to seawater
cot θ = cotangent of the revetment face slope (1.5)

The median armor stone weight of 1,400 lbs would have a nominal median diameter of 2.1 ft, where the nominal diameter is calculated by

$$D_{nom} = \left(\frac{W}{w_r}\right)^{1/3}$$

Based on the above, the maximum wave height for the stability of a 1,400 lb stone would be 4.5 ft. To achieve a better understanding of the stability of the armor stone versus return period events, an iterative wave modeling process was undertaken to find the combination of sea level rise and return period wave height that produced a 4.5 ft wave. The modeling showed that the combination of a 15-year projected sea level rise and a 15-year return period wave produced a 4.5 ft design wave.

Stone size calculations for specific wave events using the Hudson equation produce a stable median stone weight. Armor stone size is typically specified as being in the range of the median diameter +/- 25%. In this case, the measured stone size is about 1,400 lbs, and therefore the range of stone specified for the repair would be 1,100 to 1,800 lbs. It is anticipated that the repaired groins would resemble a two-stone thick armor layer groin, randomly-placed stone, in which case the Shore Protection Manual recommends a value of K_D = 2 for use in the Hudson equation.

2.3 Construction Methodology

Within one week prior to construction, a bird monitor would survey the project area for protected or endangered bird nests or active brood sites. Construction would proceed from shore seaward, recovering existing stone and building the groin foundation to +2 ft msl, which would provide a platform on which an excavator could operate and maneuver. Construction to +2 ft msl would continue until the excavator could reach the groin head. Upon completion of the groin head, to final lines and grades, construction would reverse and head to shore. The groin stem and root would be completed to final lines and grades as the excavator proceeds back toward shore.

Equipment and materials would access the beach at designated ramps for each work area, to minimize impacts to the area (Figure 2-14). Additional stone would be transported to the site as necessary for completion of each groin. Work would be conducted on one groin at a time. A silt curtain would surround the in-water portion of the groin and silt fences would surround the remaining portion of the groin on the landward ends (Figure 2-15). During the proposed project, signs would be posted around the work site to warn and educate the public of project activities.

The repair project would also include trimming vegetation between Groin 3 and Groin 4 along the shoreline to promote lateral access.

An archaeological monitoring program will include hiring an archaeological consultant who will be onsite during any backshore excavation to monitor for any cultural or archaeological remains.

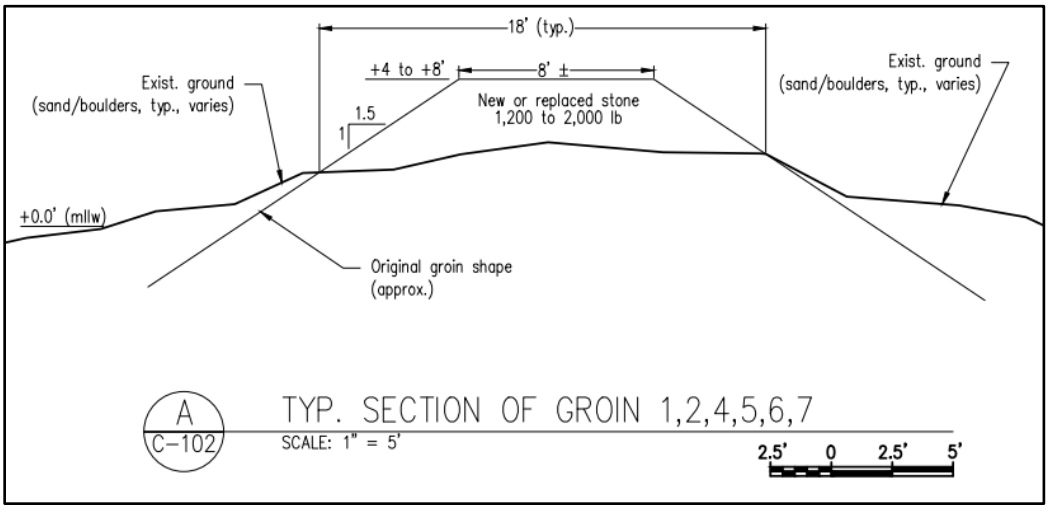

Figure 2-1. Typical section of groins 1-2, 4-7

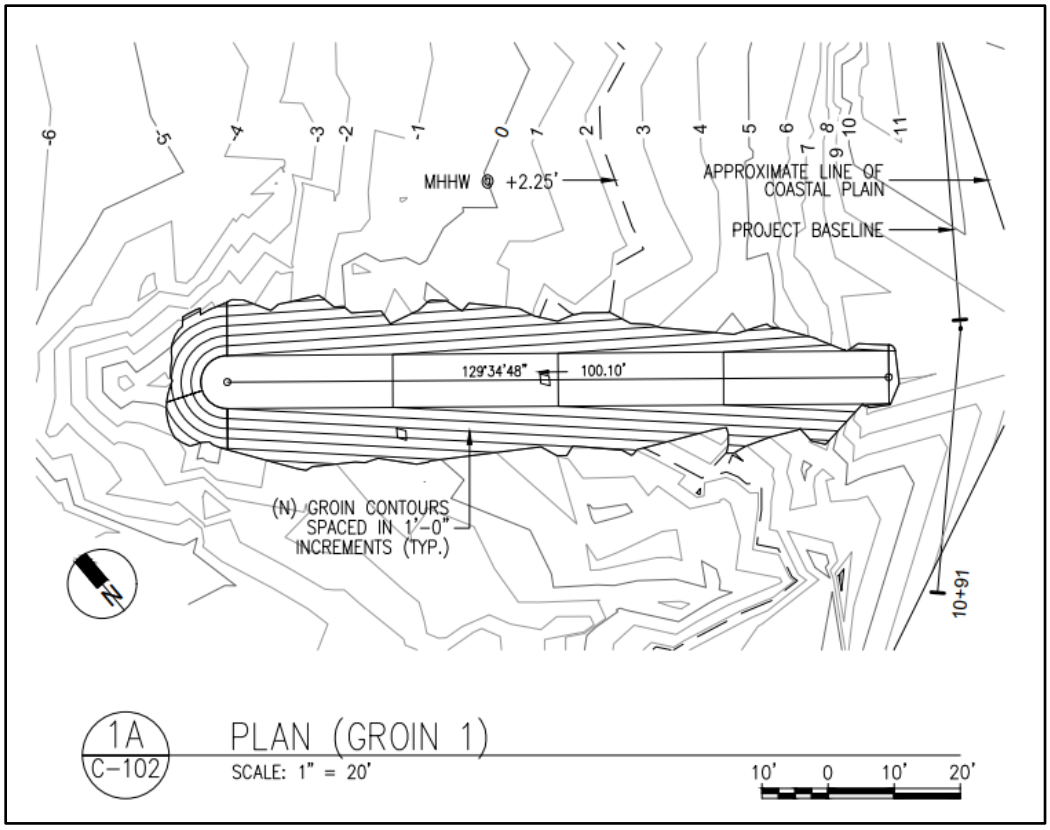

Figure 2-2. Repair plan, Groin 1

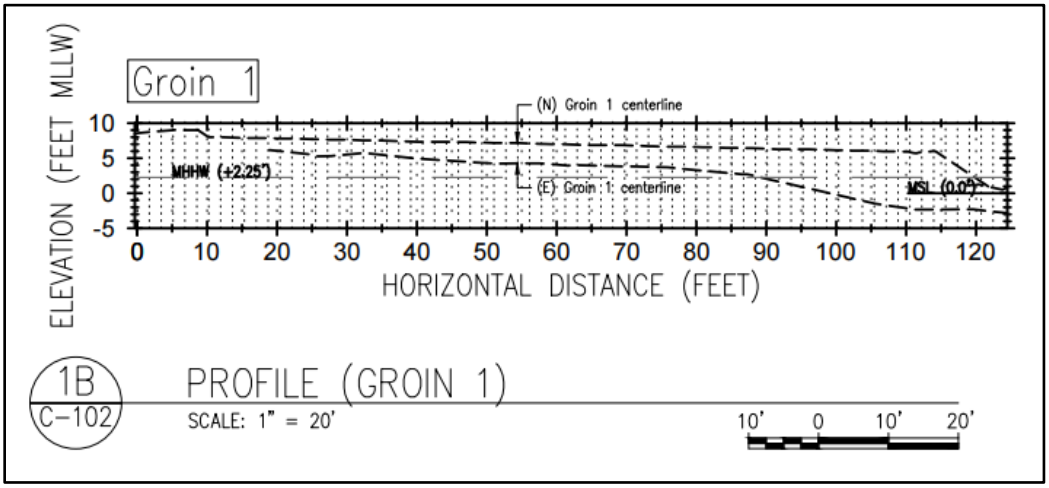

Figure 2-3. Repair profile, Groin 1

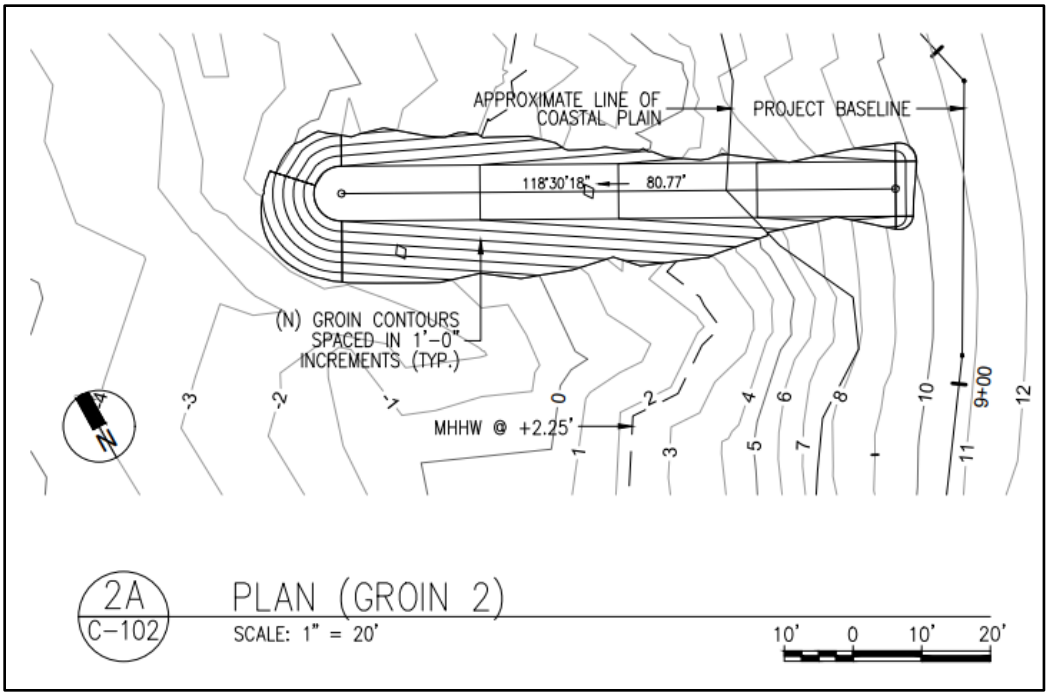

Figure 2-4. Repair plan, Groin 2

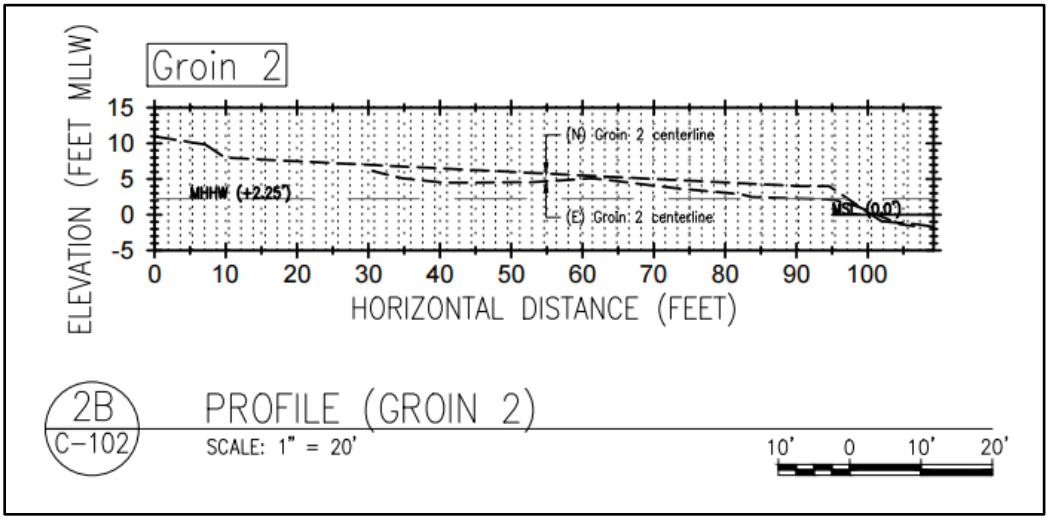

Figure 2-5. Repair profile, Groin 2

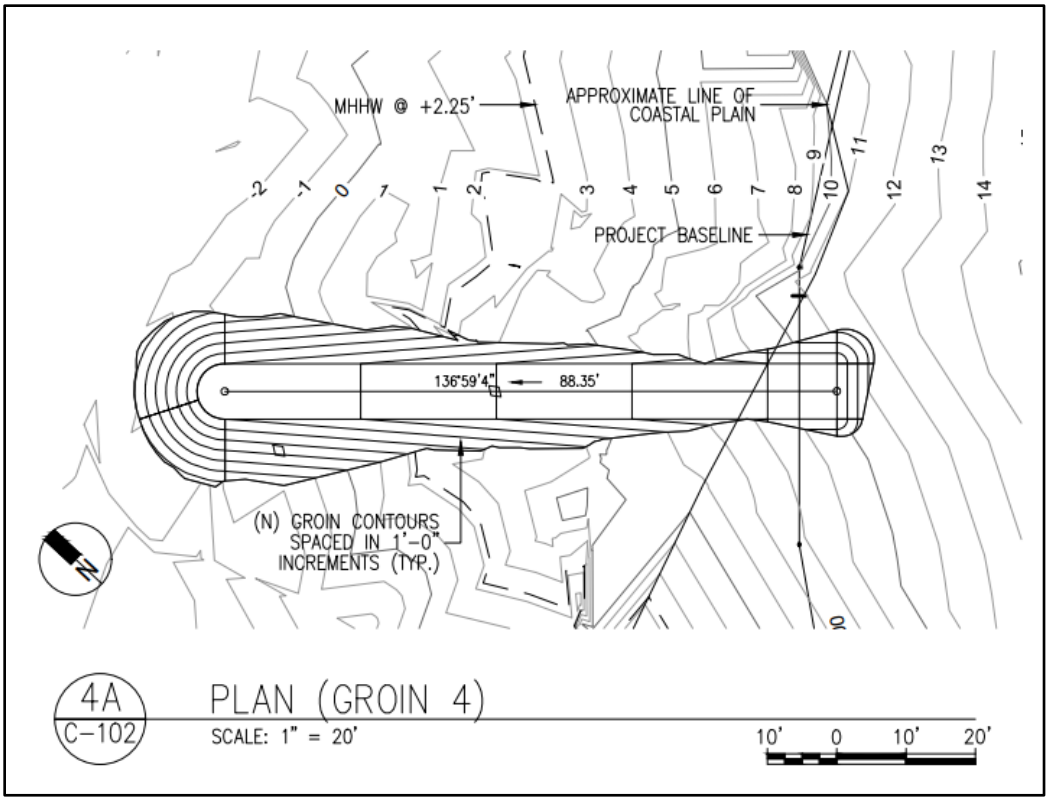

Figure 2-6. Repair plan Groin 4

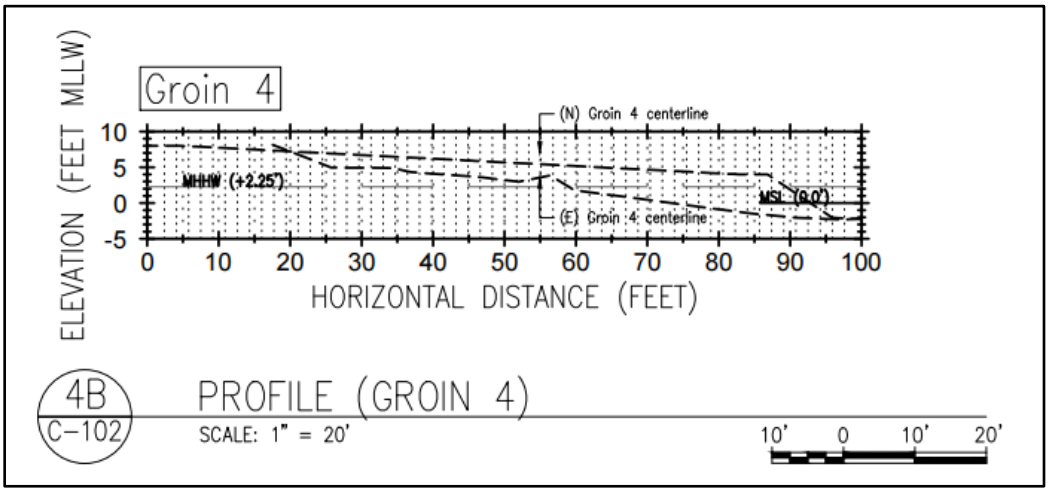

Figure 2-7. Repair profile, Groin 4

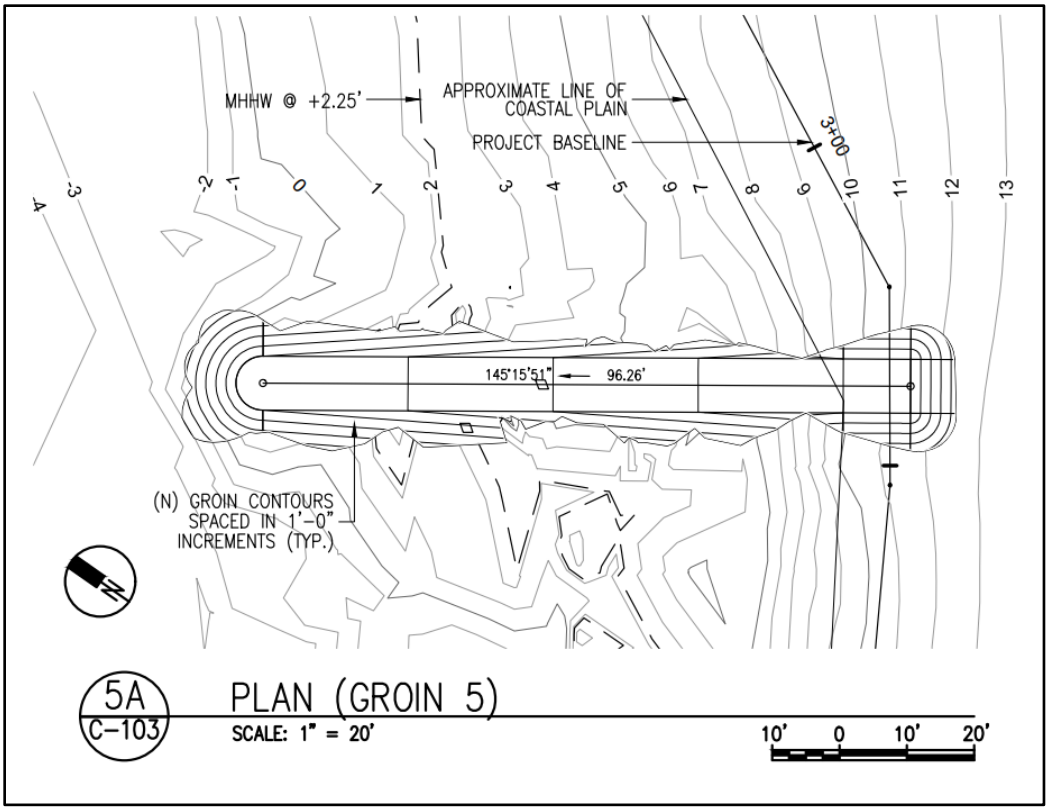

Figure 2-8. Repair plan Groin 5

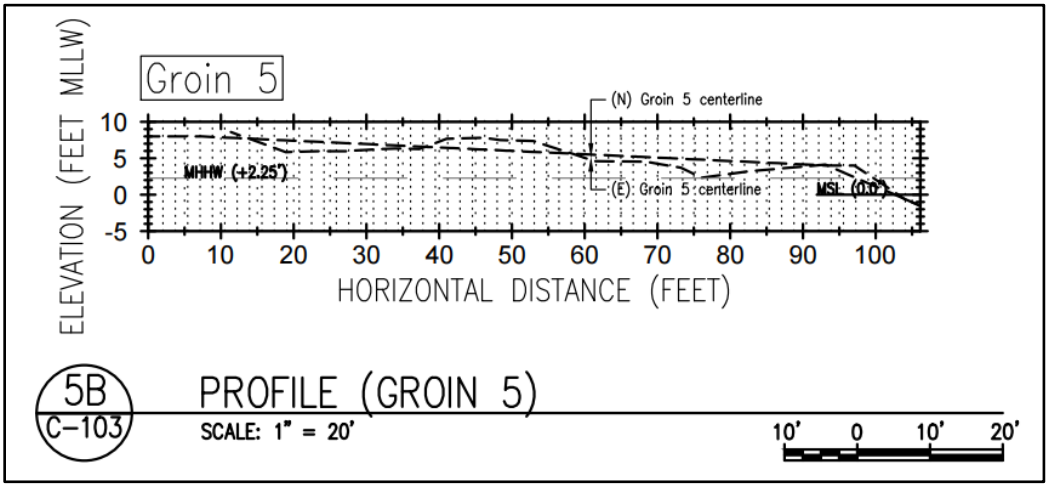

Figure 2-9. Repair profile, Groin 5

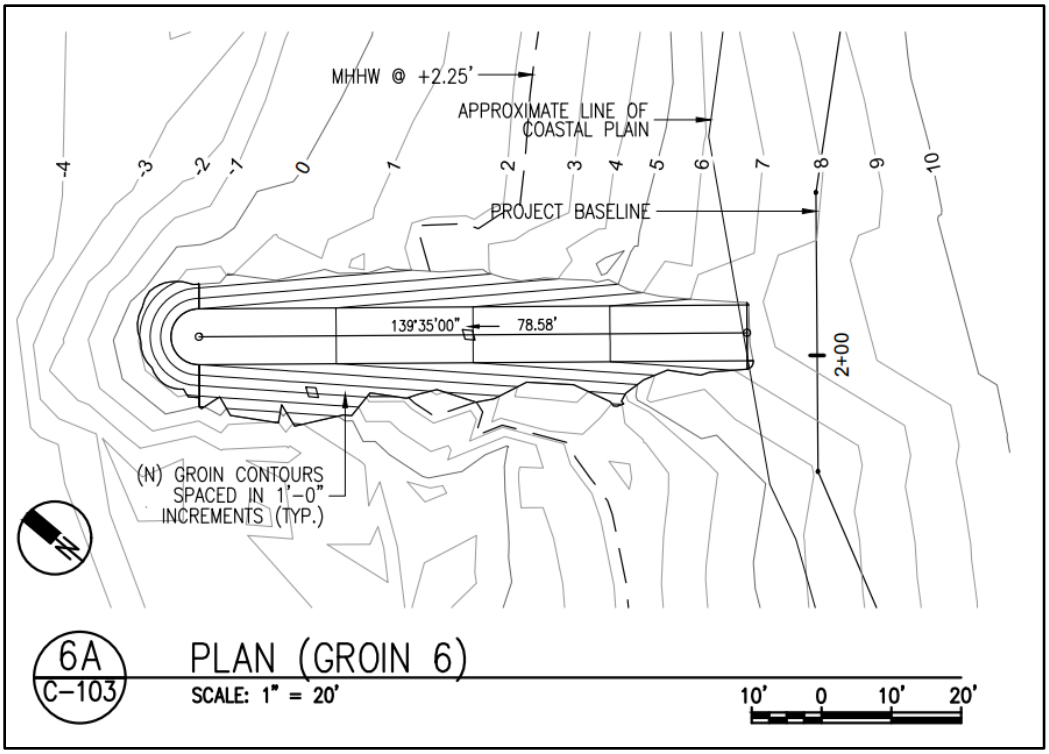

Figure 2-10. Repair plan Groin 6

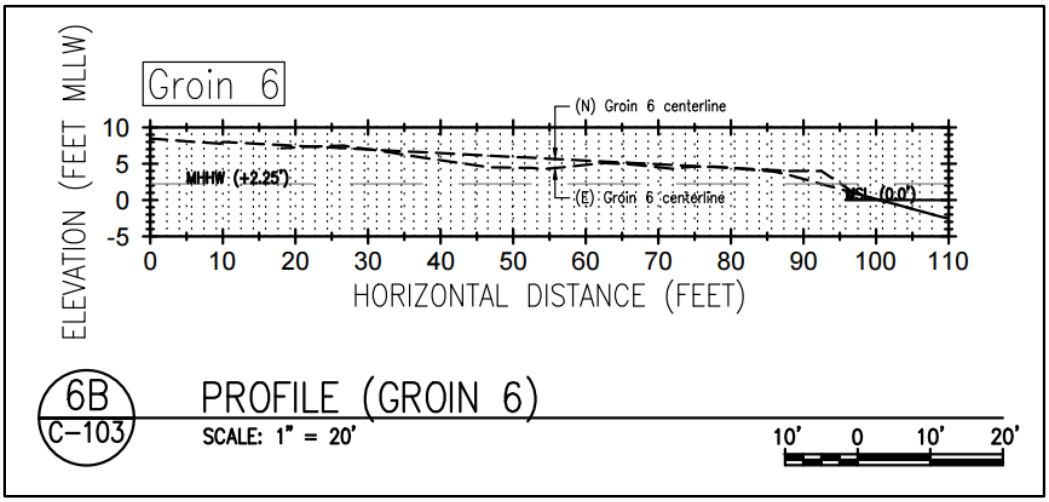

Figure 2-11. Repair profile Groin 6

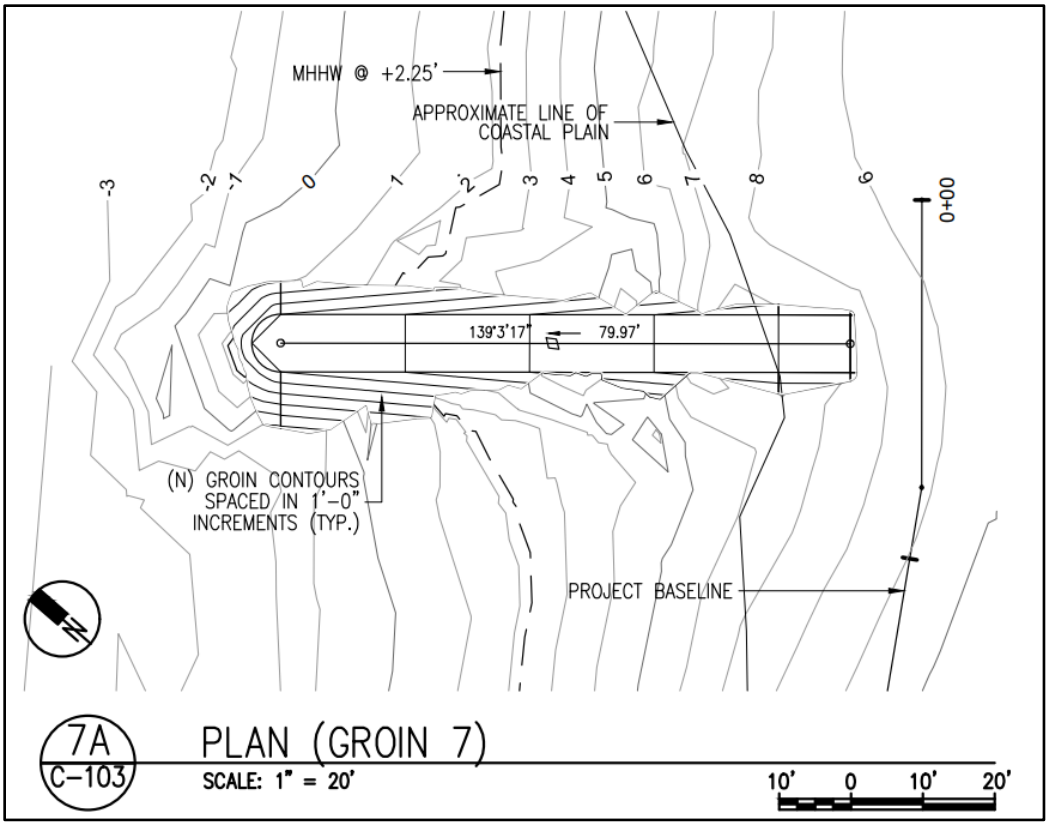

Figure 2-12. Repair plan Groin 7

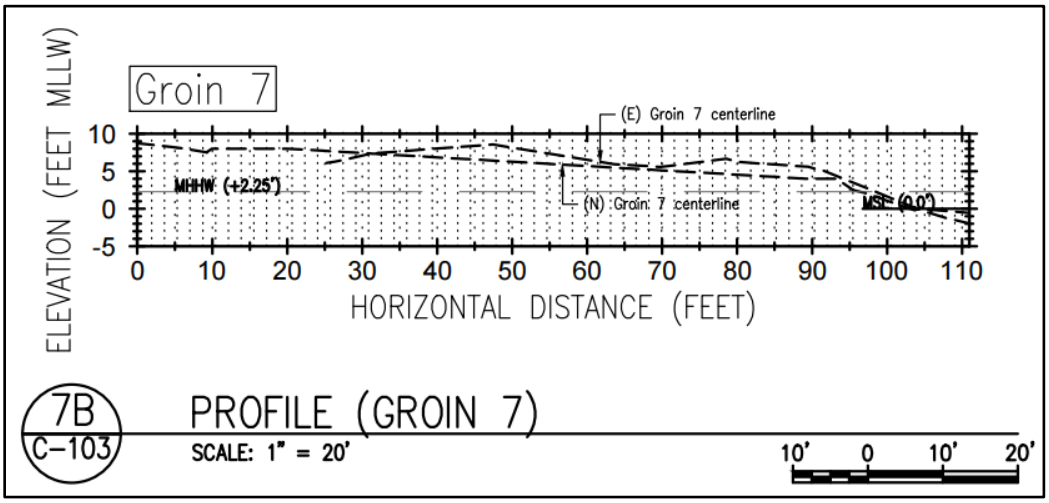

Figure 2-13. Repair profile Groin 7

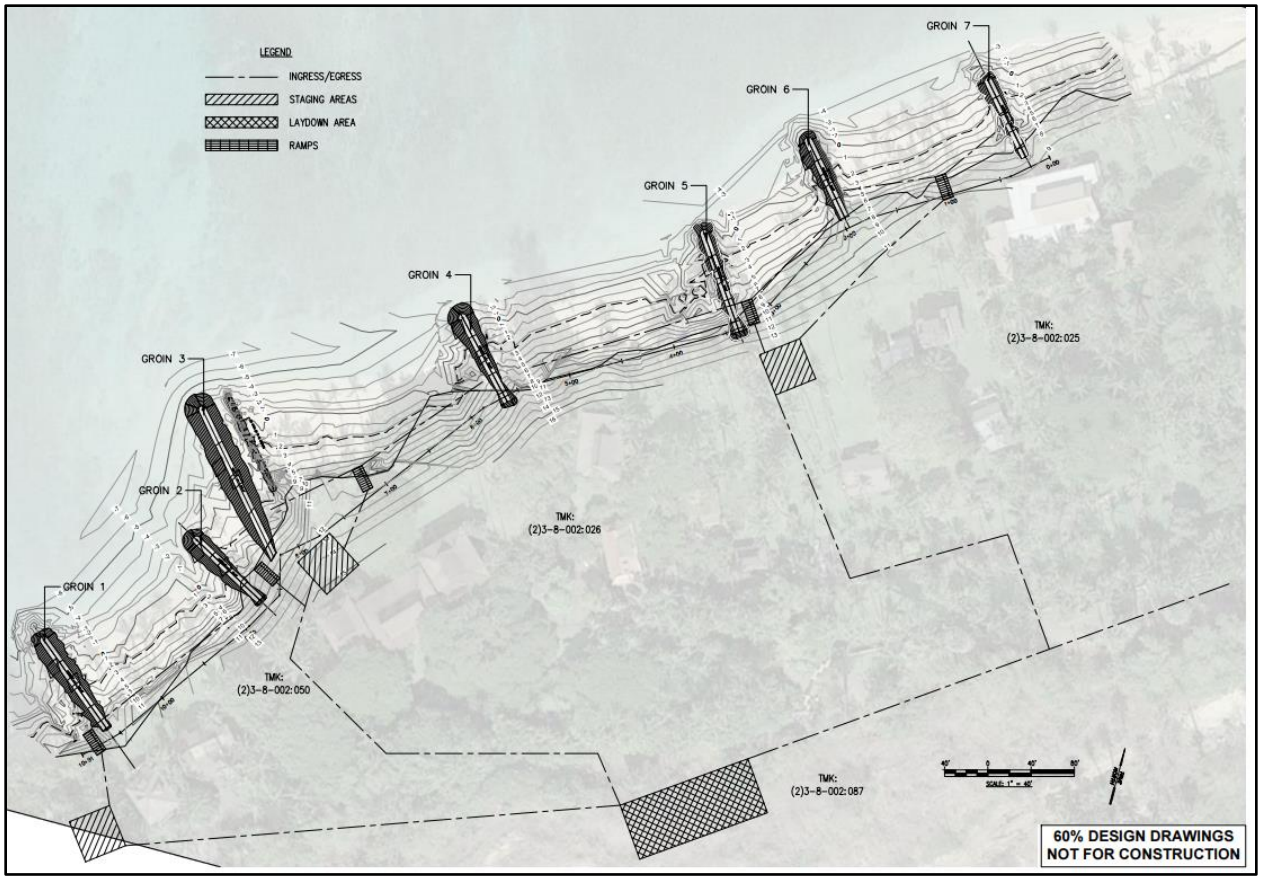

Figure 2-14. Proposed locations of staging areas, ingress and egress paths, and ramps.

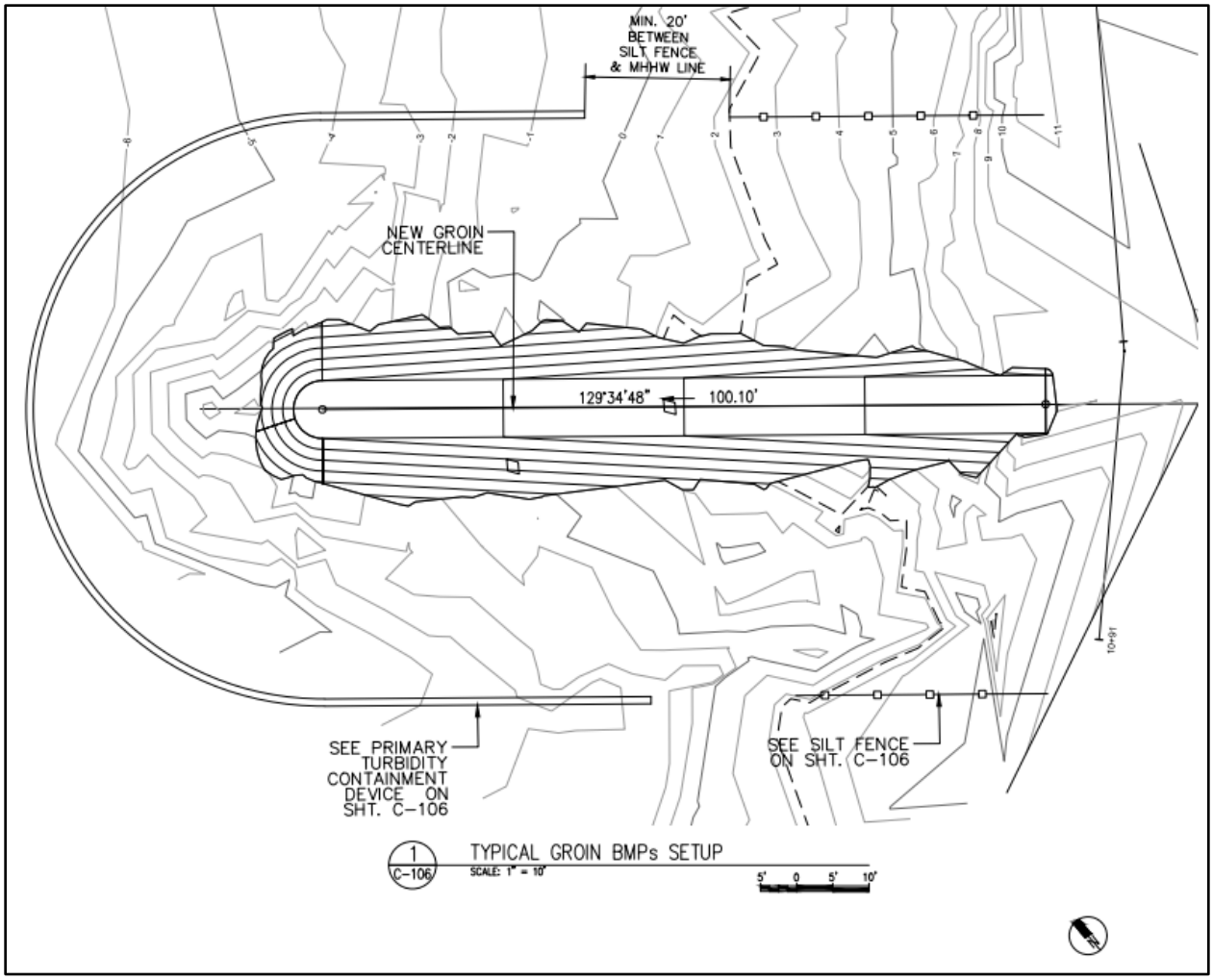

Figure 2-15. Example of proposed silt curtain and silt fence placement around the groin being worked on.

3. DETAILED DESCRIPTION OF THE PROPOSED ACTION, PHASE 2 (GROIN 3)

3.1 General Description of the Groin Replacement Plan

Groin 3 is located at a change in the shoreline orientation and is a key groin for maintaining the updrift shoreline in place. The existing groin is also of different construction than the other six groins. Groin 3 is composed of a concrete and cemented rock core, surrounded by a rock rubblemound. It is also deteriorated and unstable, the foundation is undermined, support stone is missing, and there are significant vertical cracks and horizontal shifting. The existing groin is not considered repairable. It is proposed to replace the existing groin with an engineered structure, located immediately west of and abutting the existing groin. After completion of the replacement structure, the existing groin remnants would be removed.

3.2 Groin Design Considerations

A conventional rock rubblemound groin structure is recommended. Stone, sized according to the design wave conditions, is typically used for groin construction when the required size and quantities are available. Stone design and construction is tried and proven, with a long history of testing and actual structure performance monitoring. In addition, a sloping rock rubblemound structure provides good wave energy dissipation and minimal wave reflection and turbulence around the structure, which helps to stabilize the adjacent beach. The groin design is based on methodology contained in the Shore Protection Manual (1984), the Coastal Engineering Manual (2006), and the Coastal Engineering Design & Analysis System (CEDAS), all based on research by the U.S. Army Corps of Engineers, Coastal Engineering Research Center. Primary groin design parameters are as follows.

Nearshore Water Level Rise and Breaker Height: The project site is an open coast, directly exposed to waves from the northeast (tradewind seas) counter-clockwise to the northwest (north swell). The site is also exposed to extreme storm events, such as hurricanes. The seafloor seaward of the groin location is a relatively shallow, flat sloped, and broad fossil reef flat, which significantly limits wave energy reaching the shoreline. Large deepwater waves approaching shore break seaward of the reef, then reform and continue shoreward as smaller waves, sometimes breaking several times before reaching shore.

Wave heights at the shore are partially a function of the water depth. The total design water depth is composed of the depth below the sea level datum, plus factors such as the astronomical tide, wave setup, and potential sea level rise. The sea level datum for this project is mean lower low water (mllw). A tide elevation of +1.9 feet, equivalent to mean high water (mhw), the average of the daily high tides, is used due to the relative frequency of occurrence of this elevation. Hawaii is also subject to periodic extreme tide levels due to large-scale oceanic eddies that propagate through the islands. These eddies produce tide levels up to 0.5 to 1 ft higher than normal for periods of up to several weeks. Wave setup nearshore during a 50-year north swell wave event is estimated to be 1.3 feet based on numerical modeling of deepwater wave transformation to the shore. Potential sea level rise by the year 2050 is estimated to be 1.5 feet based on recent NOAA (2017) guidance. These factors result in a total design water level of 5.2 feet above mllw.

As deepwater waves approach the shoreline, they begin to transform due to the effects of shoaling, bottom friction, and refraction. As waves shoal, heights increase and the wave crests steepen, to the point that the waves become unstable, leading to breaking and dissipation of wave energy. Wave energy is also attenuated due to bottom friction. The approach direction can change as the wave front refracts and becomes oriented parallel to the bottom contours. Wave transformation from deep water to the nearshore has been modeled using the numerical computer model SWAN (Simulating Waves Nearshore). The SWAN model is a non-stationary (non-steady state) third generation wave model, based on the discrete spectral action balance equation and is fully spectral (over the total range of wave frequencies). Wave propagation is based on linear wave theory, including the effect of wave generated currents. The processes of wind generation, dissipation, and nonlinear wave-wave interactions are represented explicitly with state-of-the-science third-generation formulations. The SWAN model can also be applied as a stationary (steady-state) model. This is considered acceptable for most coastal applications because the travel time of the waves from the seaward boundary to the coast is relatively small compared to the time scale of variations in the incoming wave field, the wind, or the tide. SWAN provides many output quantities including two-dimensional spectra, significant wave height and mean wave period, and average wave direction and directional spreading. The SWAN model has been successfully validated and verified in several laboratory and complex field cases. The SWAN model transformation of the 31-foot, 50-year return period, northwest swell deepwater waves to the nearshore results in a design wave height of 4.9 feet in the vicinity of Groin 3 as shown in Table 3-1.

Table 3-1. Deepwater wave parameters and design wave heights

Deepwater wave parameters	**10-year NW Swell**	**25-year NW Swell**	**50-year NW Swell**
H_s (feet)	26	29	31
T_p (sec)	17	17	17
Dir (°TN)	315	315	315
Still Water Level Rise			
Astronomical tide (ft)	1.9	1.9	1.9
Mesoscale eddy (ft)	0.5	0.5	0.5
Sea level rise (ft)	1.5	1.5	1.5
Wave setup (ft)	1.3	1.3	1.3
Design Wave Height (SWAN)	**4.6**	**4.8**	**4.9**
Design Armor Stone:			
W (median weight in pounds)	1,640	1,860	1,980
D_n (nominal diameter in feet)	2.2	2.3	2.3

Design Analysis: Key structure design parameters include height, slope, composition, stone size, and crest width. The groin is designed as a rock rubblemound structure with side slopes of 1V:1.5H, a single stone thick, keyed-and-fit armor layer over an underlayer, or core, of smaller stone.

Armor Stone Size: Armor stone size is based on the design wave height of 4.9 feet. The required groin armor stone weight for stability under this design wave height is given by the Hudson Formula (USACE, 2006):

$$W = \frac{w_r H^3}{K_D (S_r - 1)^3 \cot\theta}$$

where,

W = median weight in pounds of an individual stone
w_r = unit weight of the stone (160 lb/ft^3)
H = wave height
K_D = stability coefficient (1.5)
S_r = specific gravity of the stone relative to seawater
cot θ = cotangent of the revetment face slope (1.5)

The resultant armor stone weight would be approximately 2,500 lbs with a corresponding nominal diameter of about 2.5 ft, where the nominal diameter is calculated by

$$D_{nom} = \left(\frac{W}{w_r}\right)^{1/3}$$

A range of ±25% of the median weight is typically utilized, which yields a stone weight range of 1,900 to 3,100 lbs. The armorstone would be carefully placed (keyed-and-fit) for an added level of stability.

Underlayer Stone: Underlayer stone is sized at approximately 1/10 the armor weight, resulting in underlayer stone size between about 200 to 300 lbs. The sizing is important for providing porosity for energy dissipation rather than reflection, to achieve interlocking between the armor and underlayer, and to ensure that the underlayer material cannot be removed through voids in the armor layer.

Crest Elevation and Width: The crest elevation of the landward end of the groin would be +8 feet, the same as the adjacent ground elevation. This would extend for 20 feet, and then the crest elevation would gradually slope down to +5 feet, following the slope of the beach (1V:10H), and would remain at +5 feet to the head. The remaining intact portions of the existing groin have an elevation of +5 feet. The crest width would be 7.5 feet, or 3 stones, for stability during wave overtopping.

The groin would extend the same distance offshore as the existing groin. Given the erosion of the shoreline and the offset of the groin to the west, the total length of the groin is expected to be about 150 feet.

3.3 Construction Methodology

The existing temporary sandbags would first be removed from the project site and disposed of at an approved upland facility. An archaeological monitoring plan will include hiring an

archaeological consultant who will be onsite during excavation of the backshore to monitor for any cultural or archaeological remains. Construction would proceed from shore seaward, recovering existing stone and clearing loose sand and rocks to the extent practicable. The groin would initially be constructed to +2 ft msl, which would provide a platform for an excavator to work from. Construction to +2 ft msl would continue until the excavator could reach the groin head. Upon completion of the groin head, to final lines and grades, construction would reverse and head to shore. The groin stem and root would be completed to final lines and grades as the excavator proceeds back toward shore. Stone would be placed using a medium-sized excavator working from the groin stem platform, with stone being supplied by dump trucks backing out onto the stone platform.

Equipment and materials would access the beach at designated ramps for each work area, to minimize impacts to the area. Additional stone would be transported to the site as necessary for completion of each groin. No heavy equipment would work directly in the water. Groin construction is estimated to take 10 to 20 working days. During the proposed project, signs would be posted in the project area to warn and educate the public of project activities.

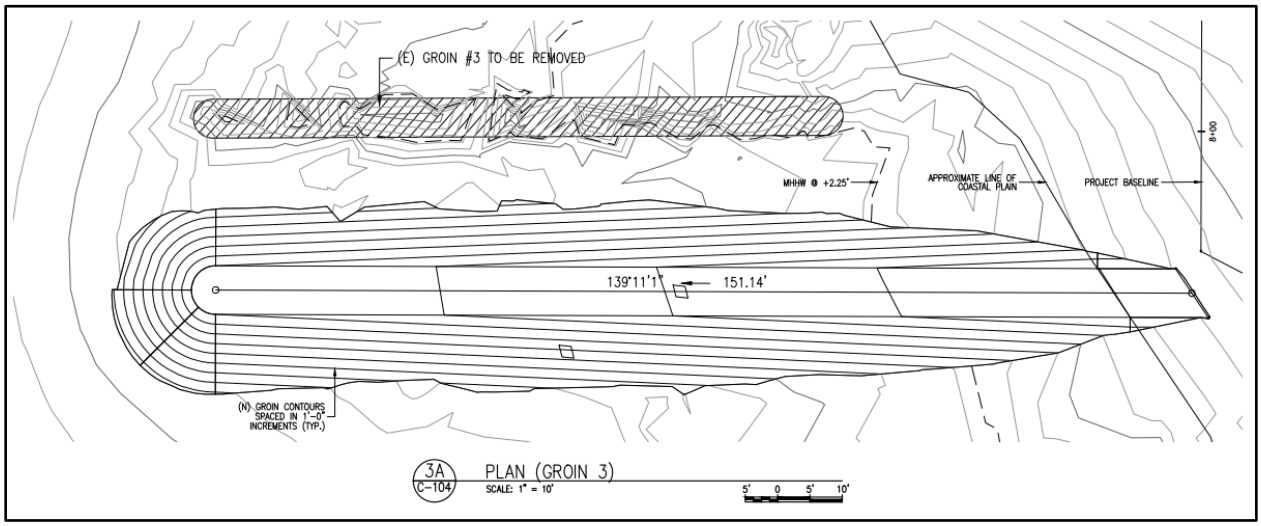

Figure 3-1. Replacement plan, Groin 3

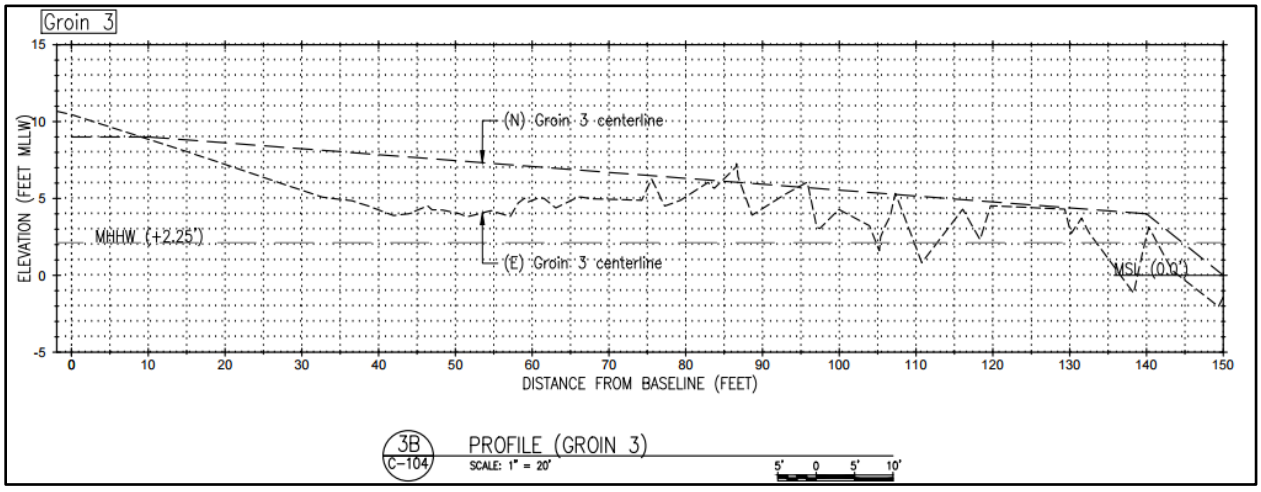

Figure 3-2. Replacement profile, Groin 3

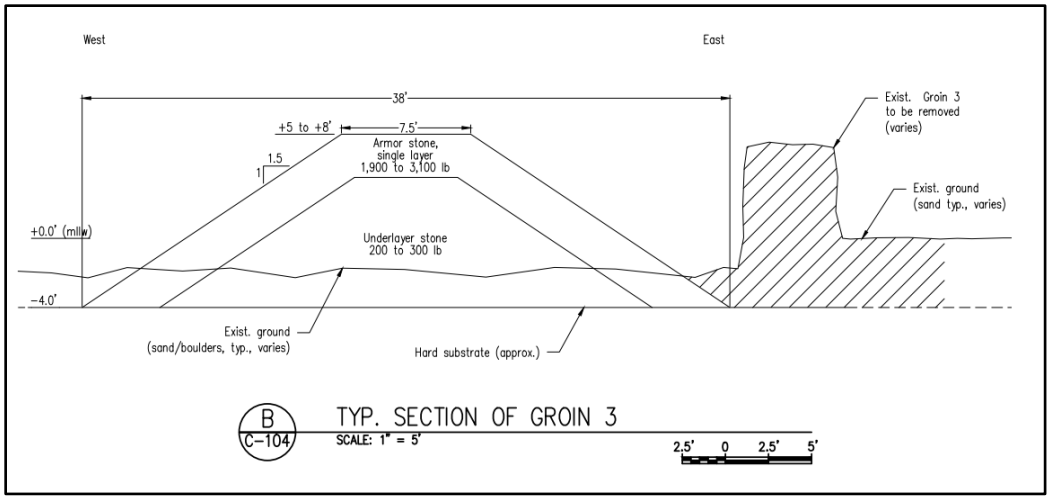

Figure 3-3. Replacement section, Groin 3

4. EXISTING PROJECT AREA CONDITION

4.1 Existing Groin and Shoreline Condition

Coastal engineers from SEI performed a coastal assessment of the Stable Road west shoreline on January 19, 2017. The field work included site photographs and observations, a topographic beach survey using a Leica GS14/CS20, and existing groin stone size measurements.

The seven groins divide the beach into six cells. The vegetation line to beach toe distance in these cells ranged from between 0 feet (west of Groin 4) and 75 feet, though the distance was generally greater than 50 feet for most of the coastline in this region. At the time of the survey, there was no dry beach berm along the project shoreline. The beach sloped up from the water into the vegetation, oftentimes with a distinct erosion scarp at the transition from beach to fastland.

Though all the structures have an armor stone component, every groin is unique in length, stone size, shape, construction, and condition. During the January 19, 2017, survey, each groin was visually inspected for voids, structural deficiencies, and effectiveness at trapping sand. Each of the groins is located within sandy substrate, in the beach face, and within the nearshore sand field. The nearshore sand field sits atop the fossil reef and pinches out close to shore, just outside of the reach of the groins. The foundations for the groins were not directly observed, due to the sand cover of the lower stones in each structure. The dimensions of six typical stones were measured at each groin and the shapes of the stones were recorded. The shapes and dimensions were used to estimate a median stone size (D_{50}) of each groin's armor stones.

The groins were originally built nearly 80 years ago and have been effective shore protection structures until recently. They have proven to be suitable structures for the environmental and oceanographic conditions at the project site. For many years they have trapped sand moving from east to west along north Maui stabilizing the shoreline. The coastline in the project area has equilibrated to the presence of the groins. This equilibrium has resulted in sediment storage between the groins and only a limited amount of transport past the groins. Shown in Figure 4-1 through Figure 4-7 are historical photos of the groins documenting their long history in the project area.

Historical aerial photographs and t-sheets dating back to 1912 were used by the Coastal Geology Group at the University of Hawaii to estimate the annual erosion rate at transects along the shoreline (Figure 4-8). Within the project area, long-term average annual erosion rates vary from 0 feet per year to -1.1 feet per year with an average of approximately -0.2 feet per year since 1912. The groins were built some time prior to 1944. Historical shorelines since the construction of the groins have been approximately in the same location indicating that the shoreline has equilibrated. The erosion rate that includes pre-groin shoreline positions may result in an overprediction of actual erosion on the equilibrated shoreline.

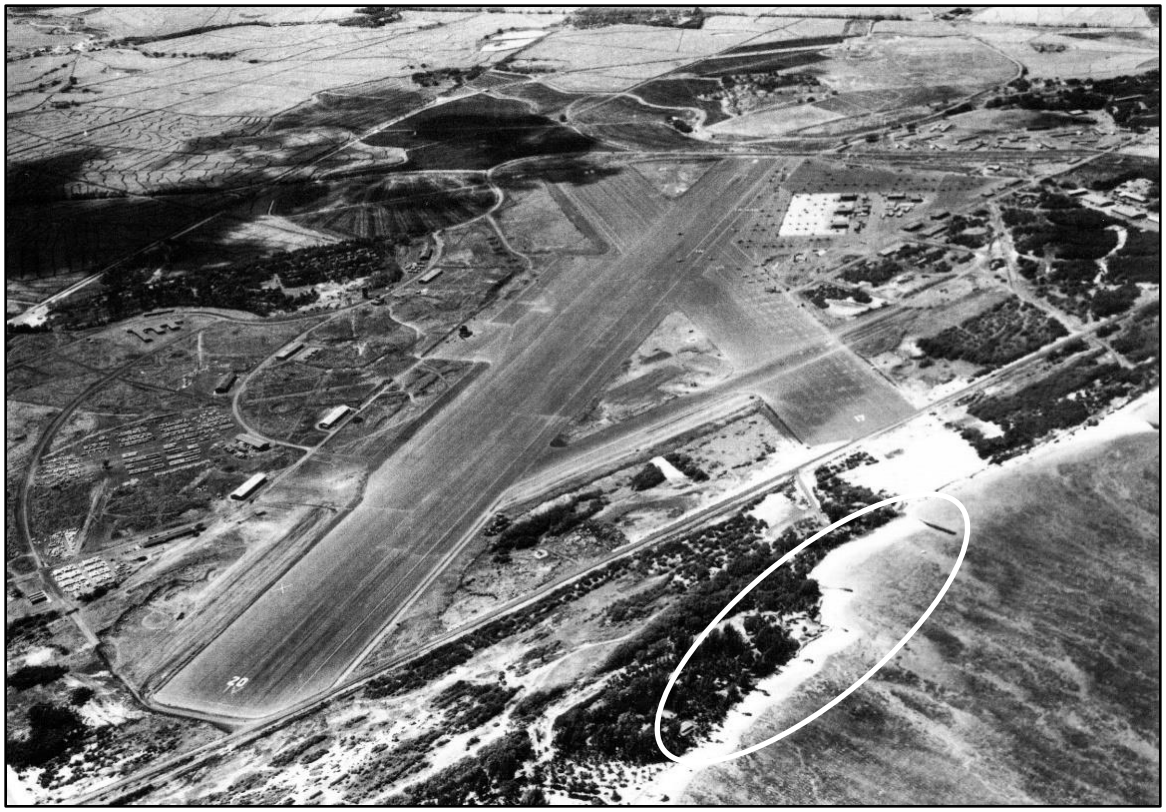

Figure 4-1. Stable Road project area in September 1944

Figure 4-2. Stable Road project area on February 28, 1950

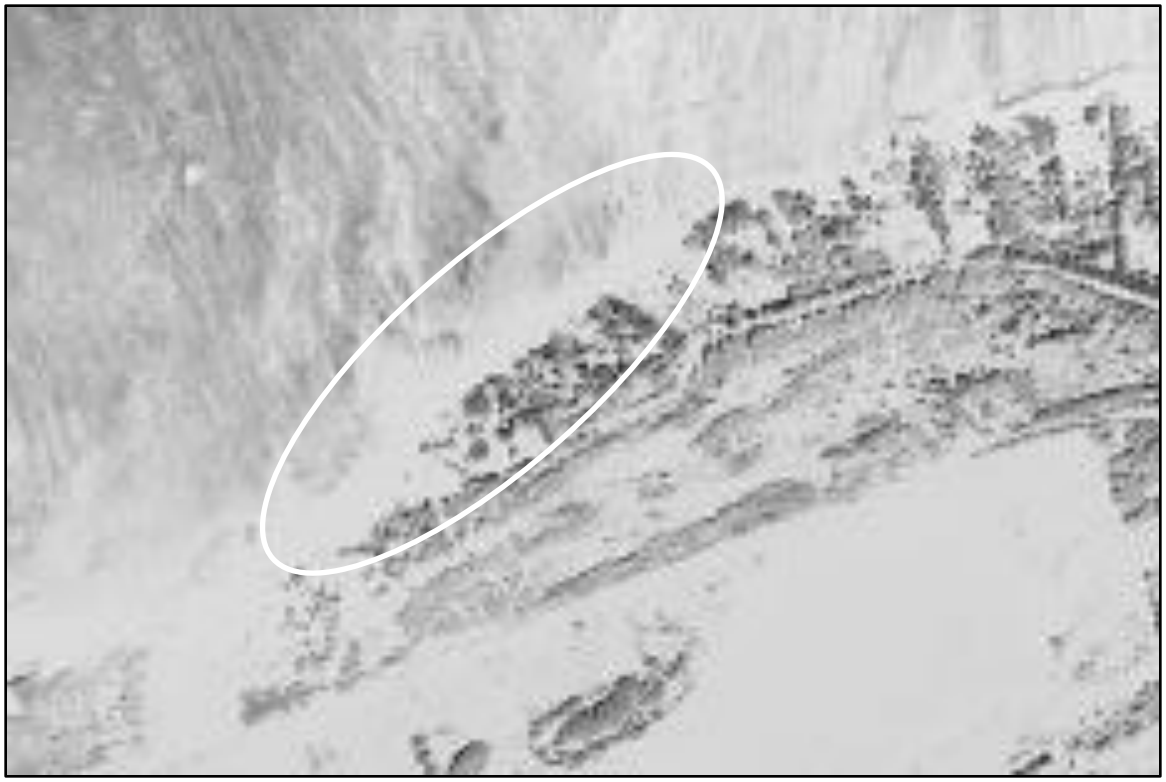

Figure 4-3. Stable Road project area in 1951

Figure 4-4. Stable Road groins in 1960

Figure 4-5. Stable Road groins on April 1, 1962

Figure 4-6. Stable Road groins in 1987

Figure 4-7. Stable Road groins in 1997

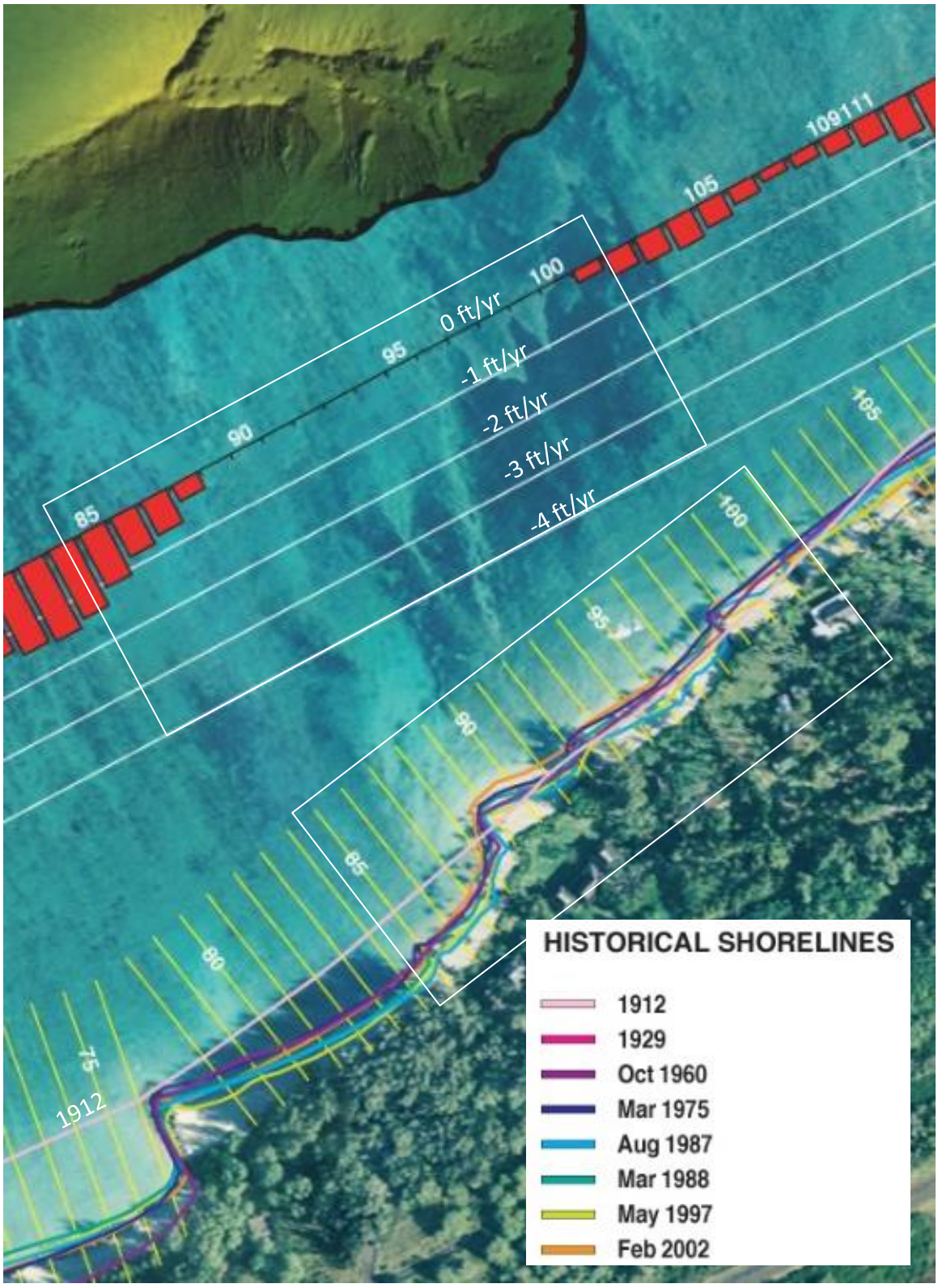

Figure 4-8. Historical shoreline change rates for the project area

4.1.1 *Groin 1*

Groin 1 is furthest to the west and is located on the west side of the TMK (2) 3-8-002:050 property line and is shown in Figure 4-9. The groin is approximately 100 feet long and 35 feet wide. Large voids and a low crest height allow sand to be washed through and over the groin (Figure 4-10), reducing its effectiveness as a sand retention structure. Smaller stones, which may have come from multiple failures along the structure stem, are spread on the west side of the structure. The root of the structure (landward end) is no longer connected to the coastal plain and waves and sand can pass between the groin and the vegetation line.

Along both sides of the groin, there is a one to two-foot tall erosion scarp inside the edge of vegetation. This scarp extends the full distance between Groin 1 and Groin 2. Elevations of the groin and adjacent beach area are shown in Figure 4-11.

Figure 4-9. Groin 1, looking to the east

Figure 4-10. Groin 1, sand overtopping groin crest and vertical beach offset

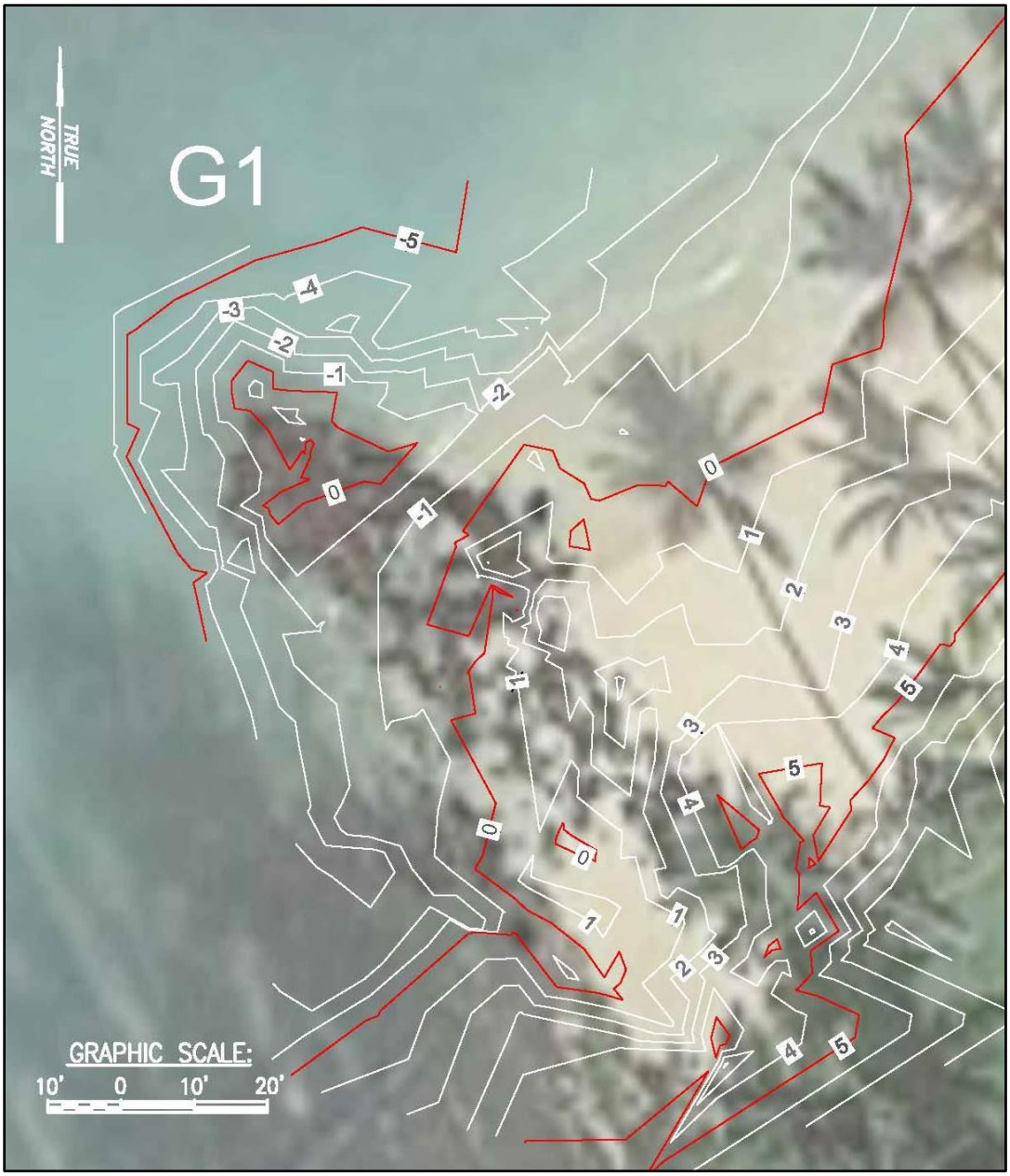

Figure 4-11. Elevation data in the Groin 1 area

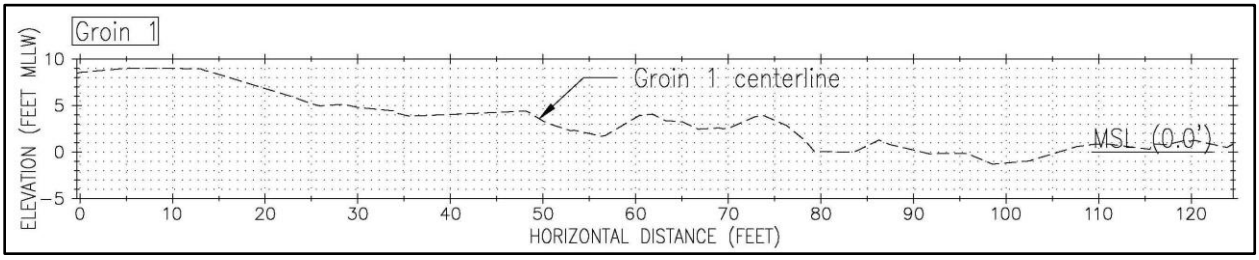

Figure 4-12. Elevation data in the Groin 1 area

4.1.2 *Groin 2*

Groin 2 is located 170 feet to the east of Groin 1, fronting TMK (2) 3-8-002:050, and is shown in Figure 4-13. The groin is approximately 70 feet long and 15 feet wide with a crest height of 2.5 to 5 feet. Groin 2 is the smallest of the seven groins along the project coastline. Similar to Groin 1, voids between the armor stones allow sand to be transported through the crest of the structure. The groin's stem is still connected to the coastal plain and is within a line of rocks present along the erosion scarp that extends to the east and west of the groin. The surveyed crest along with the updrift (east) side of Groin 2 is shown in Figure 4-14 and Figure 4-15.

Figure 4-13. Groin 2, looking to the east

Figure 4-14. Elevation data in the Groin 2 area

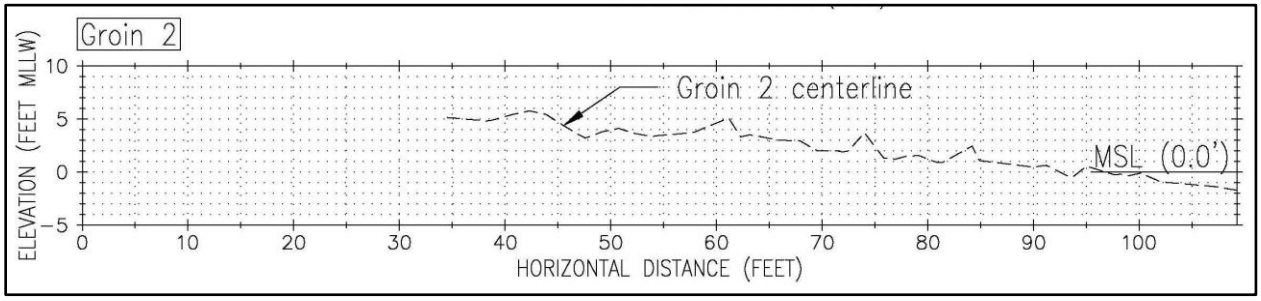

Figure 4-15. Groin 2 elevation

4.1.3 *Groin 3*

Groin 3 is located 90 feet to the east of Groin 2. Groin 3 is a hybrid unreinforced concrete wall with cemented rock armor on the west side of the wall. The groin is approximately 115 feet in length and 15 feet in width. Topography for this groin and the beach area around it indicates higher beach elevations on the east (updrift) side of the groin (Figure 4-16); however, the eastern beach elevation is significantly lower than previous winters.

Groin 3 is severely destabilized, having lost its lower, foundation support stone on the west (downdrift) side (Figure 4-17). Crest stones that were originally part of the western stone support structure were cemented to the concrete stem (Figure 4-18) and now hang unsupported from the upper portions of the structure on the western side. Significant vertical cracks, with horizontal offsets, within the wall are visible along the concrete stem's east side (Figure 4-19). The cemented basalt stones pull Groin 3's crest to the west, while beach sand pushes against it from the east. The cracked and leaning portion of the concrete structure extends roughly 26 ft in length and is within the swash zone abutting the active beach face. In this portion of the structure, which is currently still standing, the lower support stones on the west side have been washed away. The groin, in its current condition, is a safety hazard to beach users due to potential failures of the structure.

At the inshore end of this failing section of the groin, a roughly 24-foot-long length of the concrete stem failed in 2016 (Figure 4-20). The upper portion of the concrete stem in this section was also cracked and in poor condition, just prior to failure. Currently, the lower crest elevation of the groin stem in this failed section allows the swash of the waves to wash sand from the eastern beach, across the groin, to the western beach (Figure 4-21). This is an active mechanism for one-way transport of sand from the east to west, across this groin.

Immediately after Groin 3 was damaged, the shoreline to the east of Groin 3 became heavily eroded. A two to three-foot-high erosion scarp and saltwater-damaged vegetation were present between Groin 3 and Groin 4. The erosion was encroaching on backshore hardscape, which by then was being undermined by wave attack (Figure 4-22). Beach deflation and erosion scarp migration were prevalent during the winters of 2016 and 2017, which were normally inflation periods for this section of shoreline. During those times, boulders and the lower portion of the concrete stem still protected the root of the groin; however, as the erosion scarp migrated inshore, the risk of flanking for Groin 3 significantly increased.

In September 2018, temporary sandbags were added to Groin 3. The sandbags are intended to stabilize the structure and prevent the erosion scarp from continuing to move landward. The sandbags are filled with beach-quality sand that was recovered from Lahaina Harbor. The sandbags will be removed when the permanent repair project is implemented. The sandbag placement design is shown in Figure 4-23 and the bags in their final configuration are shown in Figure 4-24.

The surveyed crest along with the updrift (east) side of Groin 3 is shown in Figure 4-25.

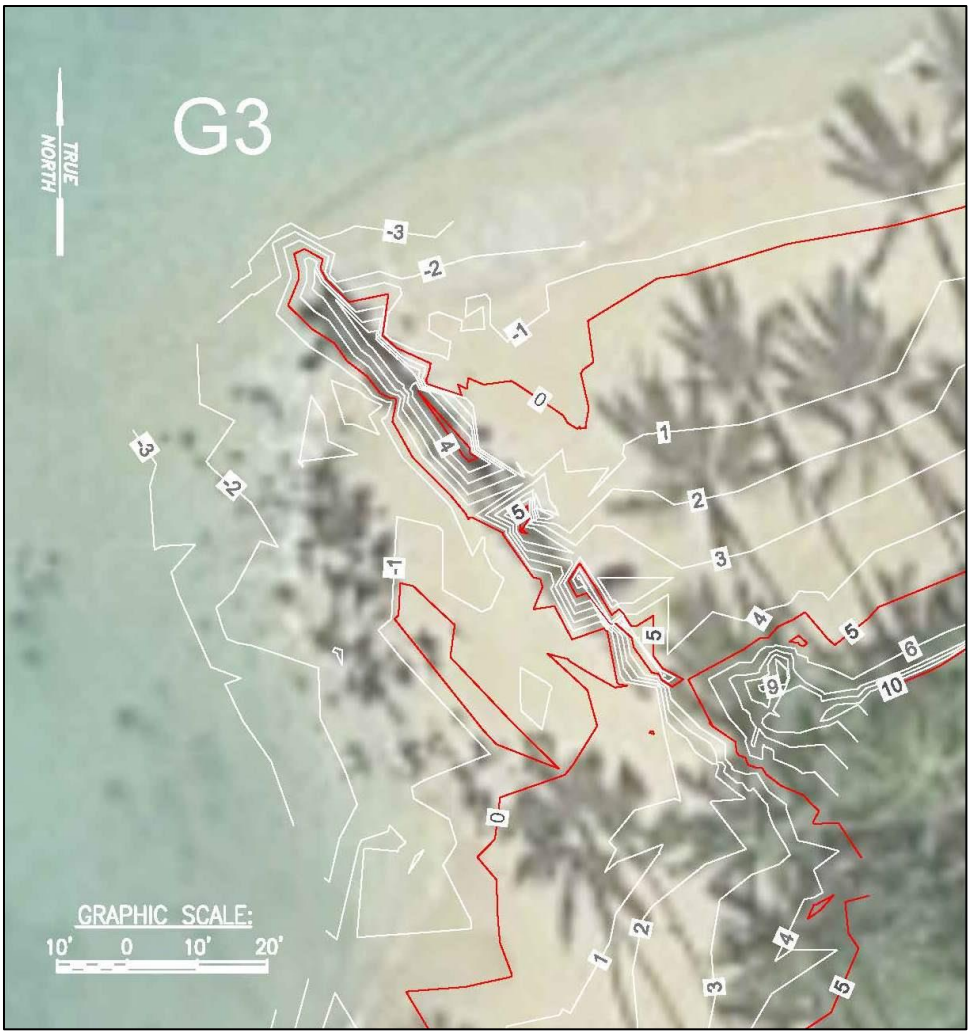

Figure 4-16. Elevation data in the Groin 3 area

Figure 4-17. Groin 3 at low tide, cemented basalt boulders hanging on the upper portion of the concrete groin stem, lower stones missing

Figure 4-18. Groin 3 at low tide, looking makai along the crest with basalt stones cemented to the upper part of the concrete structure

Figure 4-19. Groin 3 at low tide, east side of the groin, major vertical cracks with horizontal offsets (red ovals)

Figure 4-20. Groin 3 at low tide, failed 24 ft section of concrete groin stem in the foreground

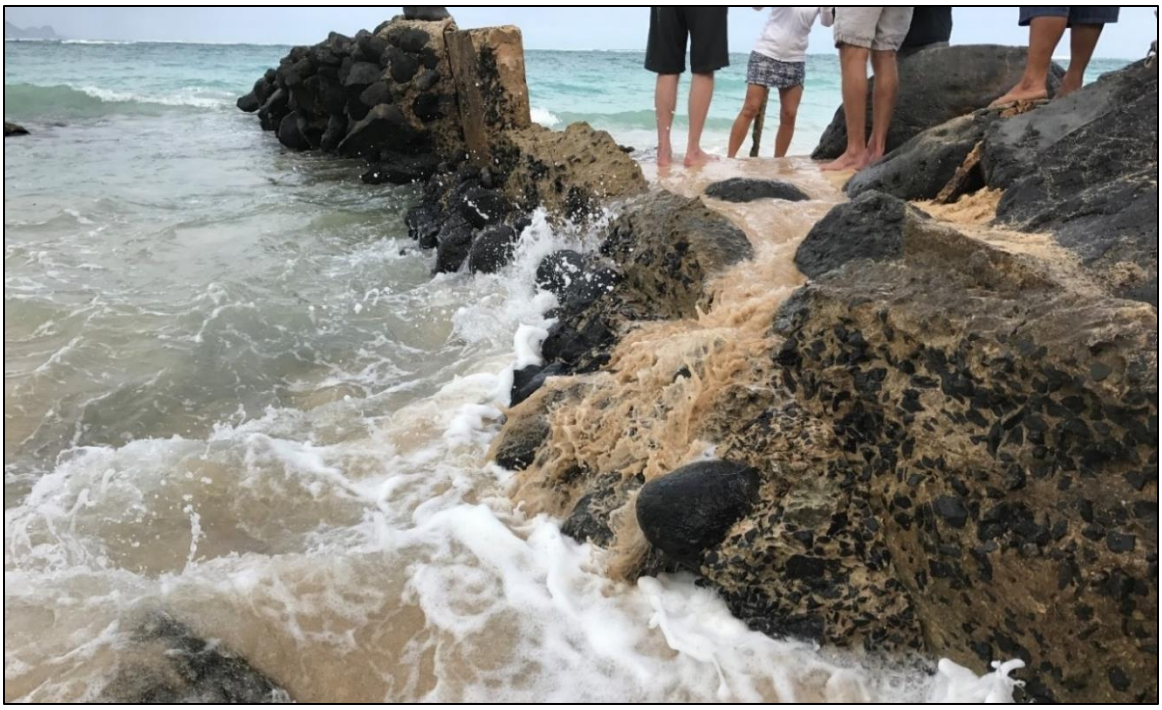

Figure 4-21. Groin 3, wave wash running across the eastern beach and broken stem of the groin, draining back beach sand to the west side

Figure 4-22. Erosion scarp to the east of Groin 3

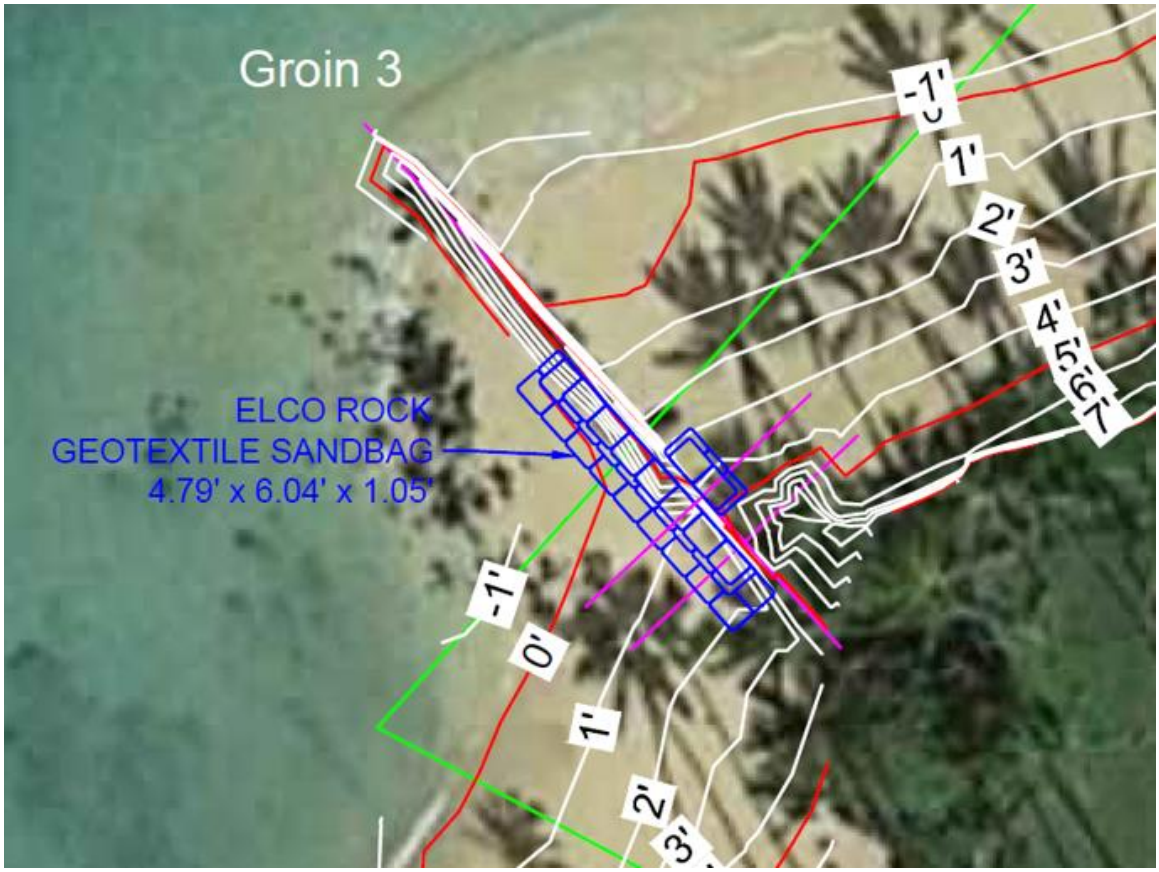

Figure 4-23. Groin 3 sandbag design placement

Figure 4-24. Groin 3 sandbags installed (photo date: September 7, 2018)

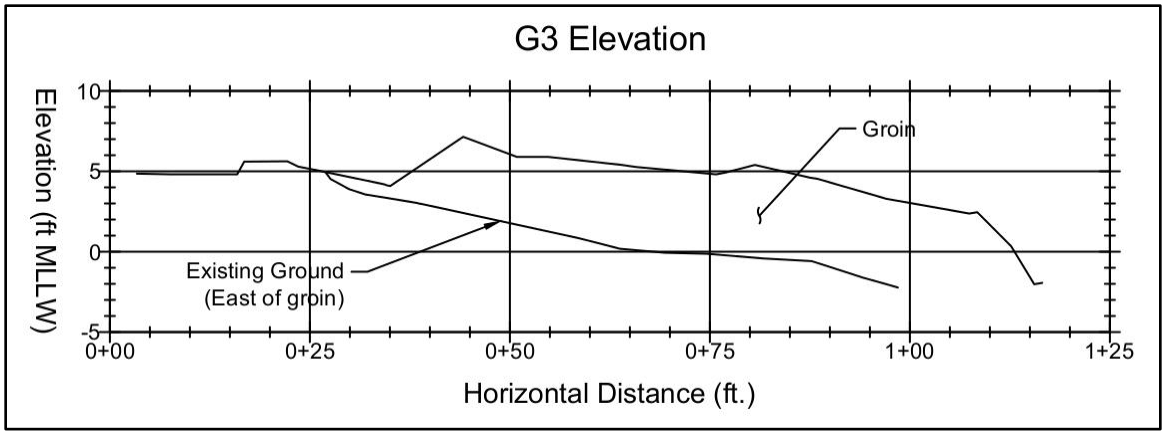

Figure 4-25. Groin 3 elevation

4.1.4 *Groin 4*

Groin 4 is located 225 feet to the east of Groin 3 and extends 70 feet seaward from a concrete rubble masonry (CRM) wall, which runs along the shoreline (Figure 4-26). Groin 4, which is 55 feet from east to west, is unconventionally wide, more like a rock pile than a linear groin structure. Additionally, there is no clear crest, although the highest point in the broad emplacement of rocks is +4.5 feet (Figure 4-27). Whether this shape was by design or from progressive damage and flattening of the cross-section is unknown. D_{50} armor stone weight is estimated to be 1,400 lbs (2.2 ft median stone diameter), which is small relative to other groins along the beach. These armor stones (larger protective stones originally on the outside of the structure) had much smaller stones interspersed. These smaller stones may have originally been underlayer stone or core stones that armor stone is placed atop.

At the time of the survey, there was no sandy beach to the west of the groin. The CRM wall starts in the middle of the groin's root and continues west along the waterline into an area of heavily eroded rubble and vegetation. The wall ties into a set of historic concrete stairs (Figure 4-28). Local residents reported that erosion recently uncovered the stairs, which had been buried under sand for decades. The seawall and stairs are remains of a cottage that was built along the beach and was demolished by a tidal wave in 1946. An affidavit from Mr. Doug Cameron who lived by the encroachments from 1961 to 1994 recalls the stairs and wall existing when he was a child.

A sandy beach is present to the east, although the beach shows signs of significant erosion (Figure 4-29). An erosion scarp exists between Groin 4 and Groin 5, and the roots of several large trees have been exposed by wave attack. The groin is being flanked on the east side of the CRM wall, where the root no longer connects to the coastal plain.

Figure 4-26. Groin 4, looking to the east

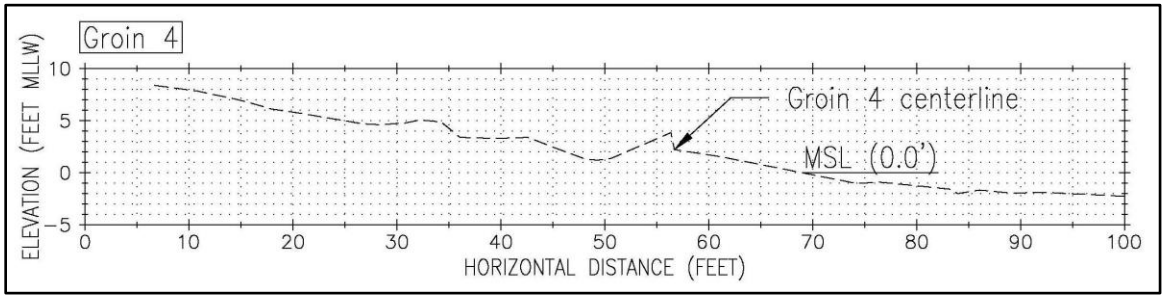

Figure 4-27. Groin 4 elevation

Figure 4-28. Heavily eroded vegetation and concrete/rock wall to the west of Groin 4

Figure 4-29. Elevation data in the Groin 4 area

4.1.5 *Groin 5*

Groin 5 is located 235 feet east of Groin 4. Groin 5 is 80 feet in length and 40 feet in width (Figure 4-30). The groin crest height is typically less than 5 feet; however, at the landward end of the stem it is nearly +8 feet high (Figure 4-31). Similar to Groin 4, Groin 5 is a widespread rock pile of armor and underlayer stone with no clear crest. A failure along the stem of the groin dispersed rocks on the beach to the west. An approximately 16-foot gap exists between the root of the groin and the erosion scarp within the vegetation line. The erosion scarp continues west to Groin 6, situated beneath the edge of vegetation.

Unlike the other groins, there is very little elevation change to the beach on either side of this Groin 5 (Figure 4-32 and Figure 4-33). In addition, the beach toe location on the east side (updrift) is nearly even with the beach toe on the west side (downdrift), providing further evidence that Groin 5 is currently ineffective at trapping sand.

Figure 4-30. Groin 5, looking to the east

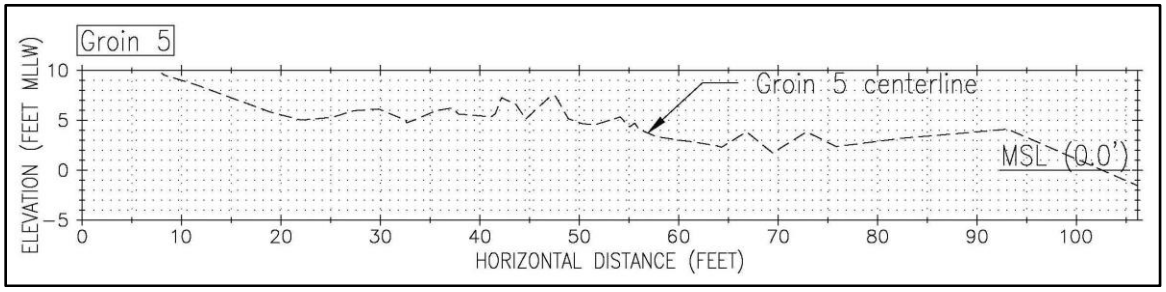

Figure 4-31. Groin 5 elevation

Figure 4-32. Groin 5, gap between vegetation and groin root

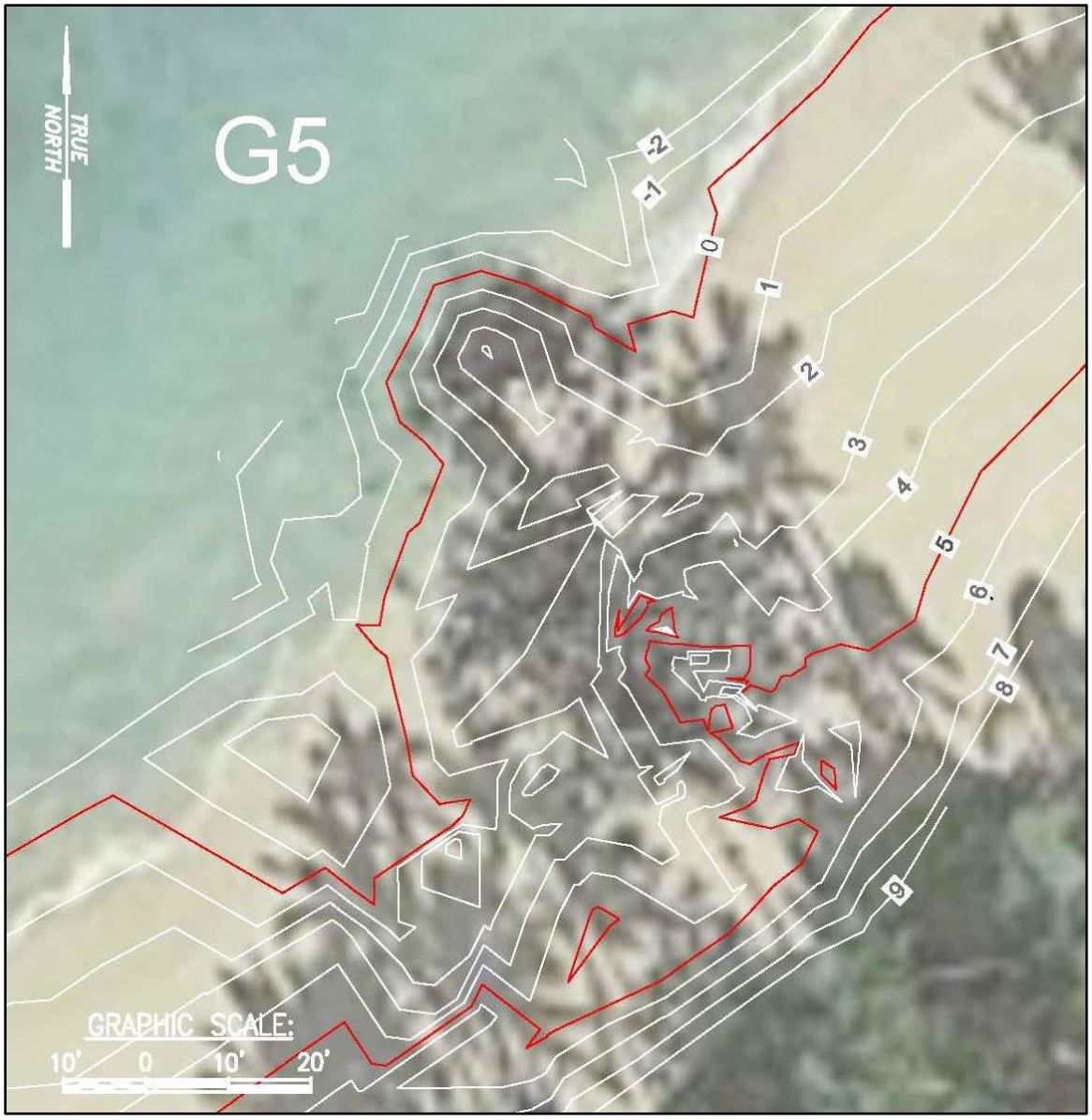

Figure 4-33. Elevation data in the Groin 5 area

4.1.6 *Groin 6*

Groin 6 is located 130 feet to the east of Groin 5 and is 90 feet long and 35 feet wide (Figure 4-34). The groin is constructed of stone and broken sections of CRM wall. The CRM blocks occur closer to the root of the structure. Crest elevations typically ranged from +4 to +5 feet, with elevations rising closer to the root (Figure 4-35). The root of the structure is connected to the erosion scarp and coastal plain with a stack of boulders and CRM blocks. The erosion scarp continues east to Groin 7 and beyond. There is a significant beach elevation change between the east and west sides of the groin (Figure 4-36), although suspended sediment was observed to wash through and over the structure.

Figure 4-34. Groin 6, looking to the east

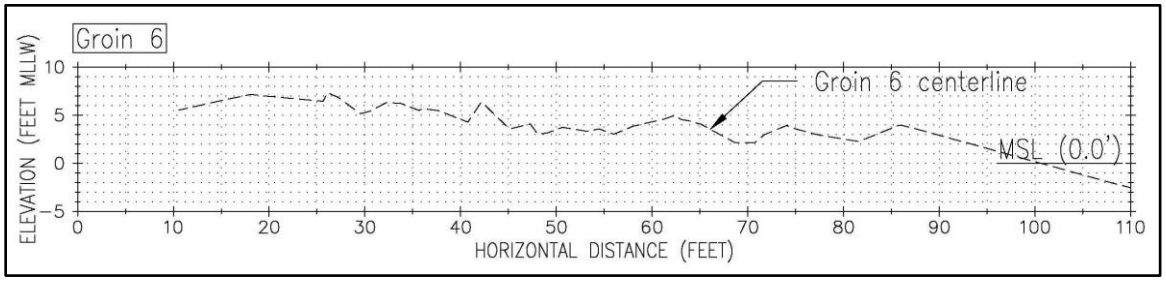

Figure 4-35. Groin 6 elevation

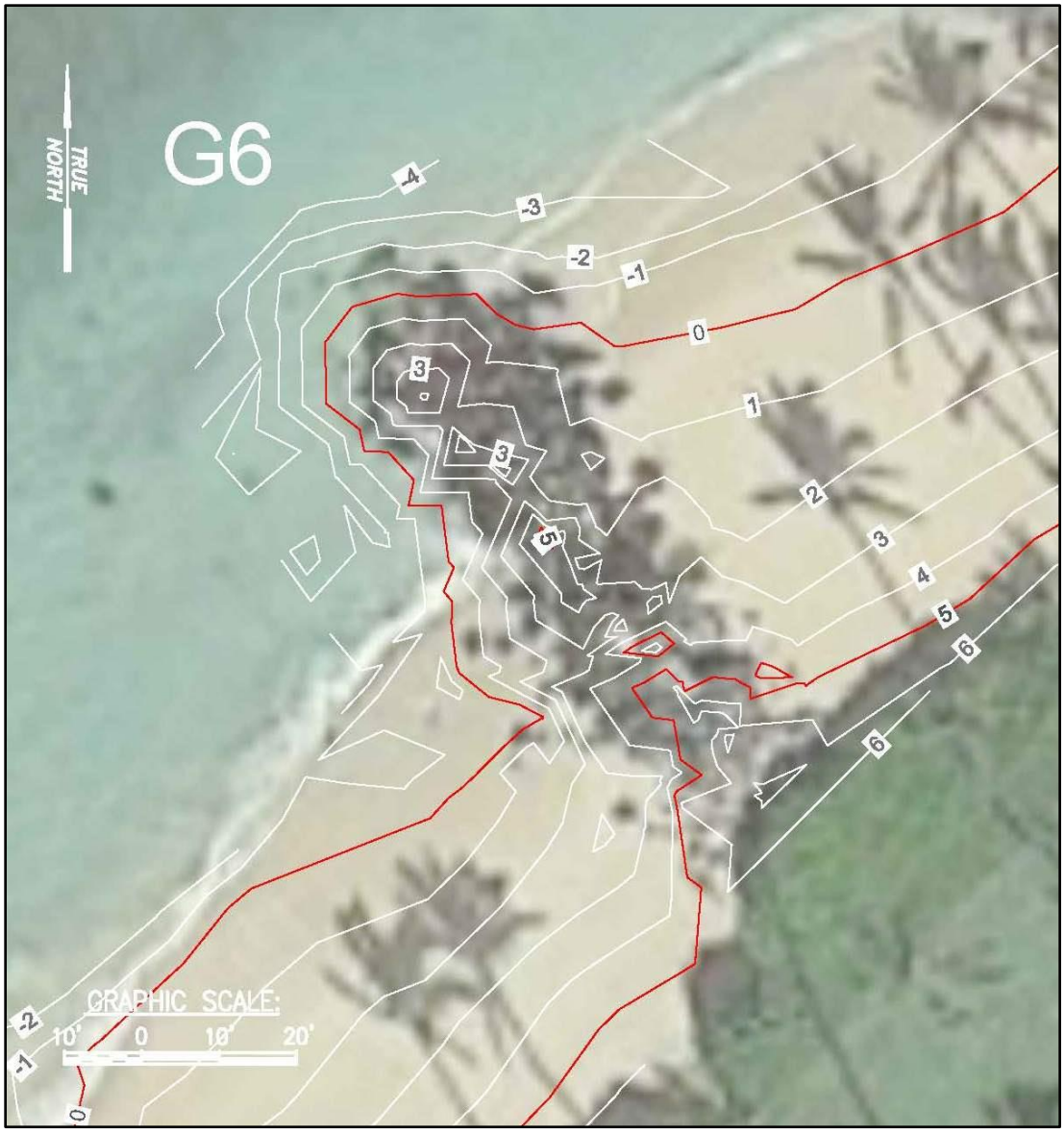

Figure 4-36. Elevation data in the Groin 6 area

4.1.7 *Groin 7*

Groin 7, shown in Figure 4-37, is located 175 feet to the east of Groin 6. Similar to Groin 5, a 17-foot gap exists between the root armor stones and the erosion scarp within the vegetation line (Figure 4-38). Just inshore of the groin, a two-story house is located approximately 22.5 feet landward of the erosion scarp within the vegetation line. The erosion scarp continues to the east, through an area of heavily eroded vegetation with exposed roots (Figure 4-39). Suspended sand was observed to wash through voids in the groin crest and behind the groin, between the root and the erosion scarp. Though the stem of the groin still has large, angular armor stone along its length and crest elevations between +6 feet and +8 feet (Figure 4-40), the entire structure is being flanked and allows sand to wash past. As a result, there was no significant difference between beach elevations on the east (updrift) and west (downdrift) sides of Groin 7 (Figure 4-41), at the time of the survey.

Figure 4-37. Groin 7, looking to the east

Figure 4-38. 17-foot gap between Groin 7 root and vegetation line

Figure 4-39. Eroded vegetation and exposed roots directly east of Groin 7

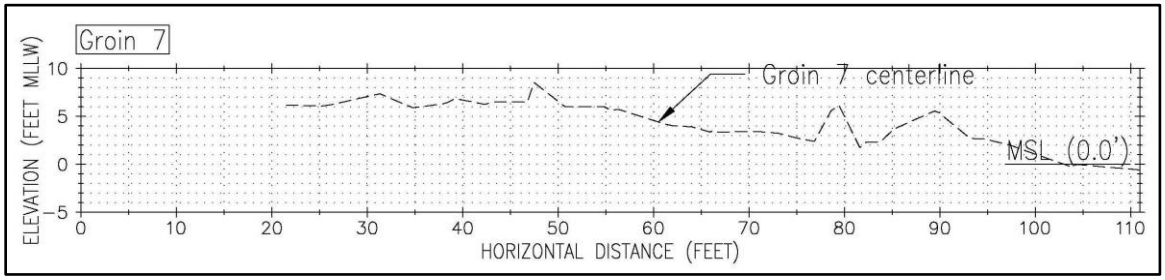

Figure 4-40. Groin 7 elevation

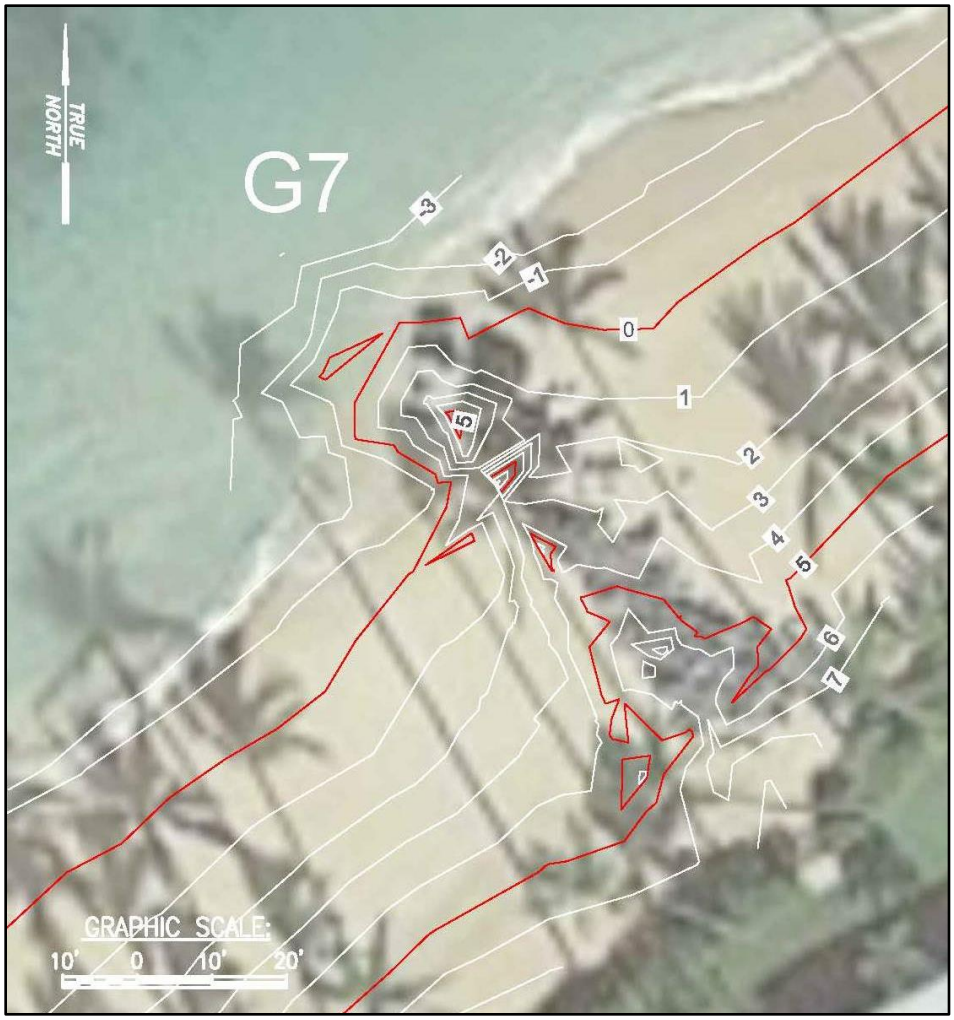

Figure 4-41. Elevation data in the Groin 7 area

4.1.8 *Summary*

Groin specifications including median armor stone size and weight, the estimated excavation volumes for the proposed repairs, groin length, width, and crest height are shown in Table 4-1. The total project area for all seven groins and the staging areas is 0.92 acres.

Table 4-1. Groin Summary

Groin	Mean Stone Diameter (ft)	Mean Stone Weight (lbs)	Groin Length (ft)	Groin Width (ft)	Max. Crest Height (ft)	Excavation Volume (cy)
1	2.0	1,340	100	35	5.5	0.00
2	1.9	1,080	80	15	5	0.00
3	2.2	1,630	151	10	7.5	17.78
4	2.0	1,230	88	55	4.5	26.67
5	2.0	1,300	96	40	8	26.67
6	2.2	1,670	79	35	7.5	0.00
7	2.1	1,540	80	25	8	19.26

5. OVERVIEW OF THE EXISTING ENVIRONMENT

5.1 Physical Environment

5.1.1 *Elevation and Nearshore Bottom Conditions*

A shallow fringing reef extends 2,500 feet offshore of the project shoreline. Elevations on the reef flat are generally less than -10 feet. Within the wave breaker zone, 0.5 miles offshore, elevations rise to approximately -5 feet. Multiple channels transect the reef edge, which is irregular and does not necessarily follow the shape of the shoreline. Seaward of the breaker zone, the bottom slope steepens.

National Oceanographic and Atmospheric Administration (NOAA) benthic maps show the geomorphology of the seafloor offshore of the project site. The reef offshore of the project site is characterized as "pavement", which refers to low-relief, solid carbonate rock, with a veneer of sand or silt in several locations. Outside of the breaker zone, the bottom is characterized as "aggregate reef", which refers to continuous, high-relief coral formation of variable shapes lacking sand channels. Figure 5-1 shows bathymetry overlaid on the NOAA benthic habitat classification map for the area. The United States Geological Survey (USGS) topographic map for the project region is given in Figure 5-2 [HAR § 11-200-10(5)].

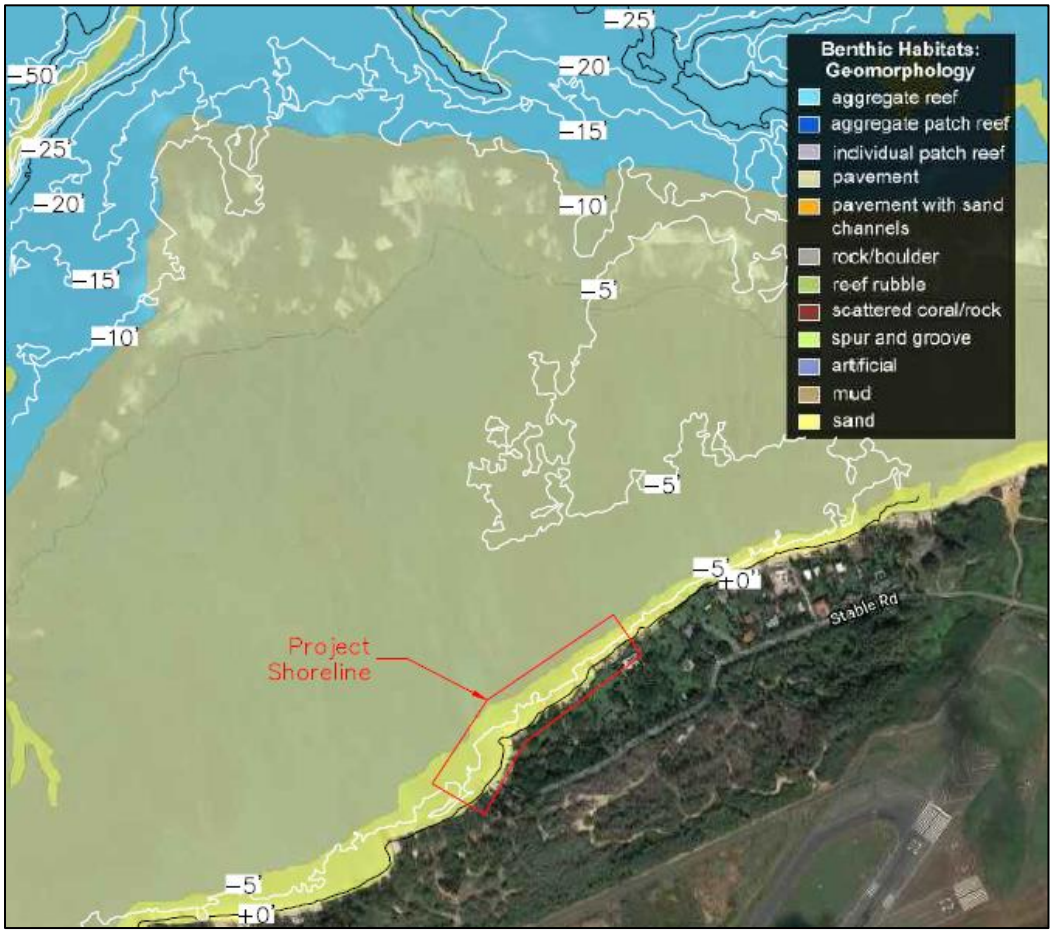

Figure 5-1. Offshore bathymetry and geomorphology at Stable Road

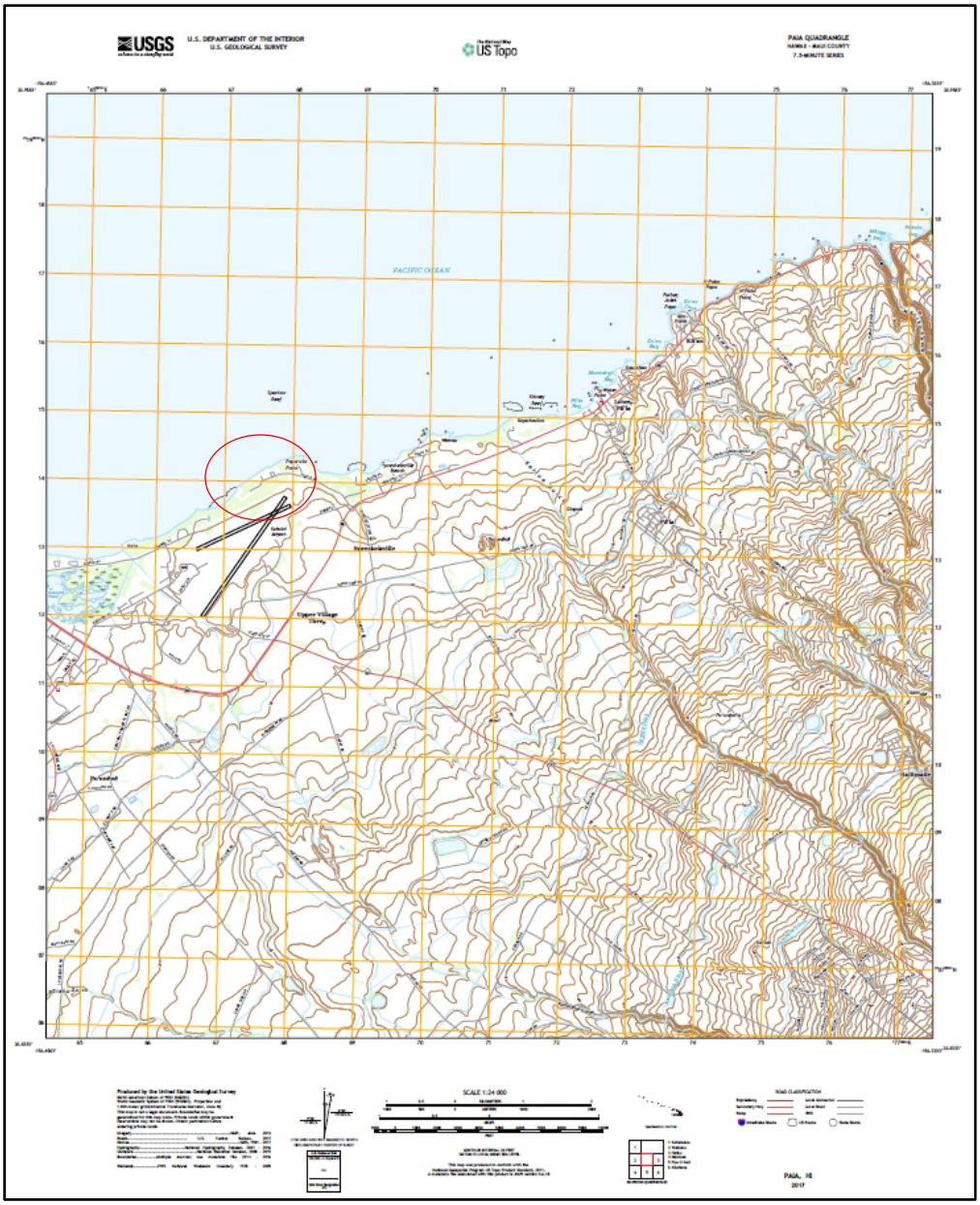

Figure 5-2. USGS Topography Quad Map for the project region

5.1.2 *Climate*

The Hawaiian Island chain is situated south of the large Eastern Pacific semi-permanent high-pressure cell, the dominant feature affecting air circulation in the region. Over the Hawaiian Islands, this high-pressure cell produces very persistent northeasterly winds called the trade winds. During the winter months, cold fronts sweep across the north-central Pacific Ocean, bringing rain to the Hawaiian Islands and intermittently modifying the trade wind regime. Thunderstorms, which are rare but most frequent in the mountains, also contribute to annual precipitation.

5.1.3 *Temperature and Rainfall*

Due to the tempering influence of the Pacific Ocean and their low-latitude location, the Hawaiian Islands experience extremely small diurnal and seasonal variations in ambient temperature. Average temperatures in the coolest and warmest months at Honolulu International Airport are 72.9˚ Fahrenheit (F) (January) and 81.4˚F (July). These temperature variations are quite modest compared to those that occur at inland continental locations. Additional temperature data from Honolulu International Airport are summarized in Table 5-1.

Topography and the dominant northeast trade winds are the two primary factors that influence the amount of rainfall that falls on any given location on Maui. The project area is on the north coast of the island, fully exposed to the prevailing tradewinds.

Table 5-1 Average Monthly Temperature, Rainfall, and Humidity

Month	Normal Ambient Temperature, ºFahrenheit		Average Monthly Rainfall (inches)		Average Relative Humidity (%)
	Daily Minimum	Daily Maximum	Monthly Minimum	Monthly Maximum	
January	65.7	80.4	0.18	14.74	71.0
February	65.4	80.7	0.06	13.68	69.0
March	66.9	81.7	0.01	20.79	65.0
April	68.2	83.1	0.01	8.92	62.5
May	69.6	84.9	0.03	7.23	60.5
June	72.1	86.9	T	2.46	59.0
July	73.8	87.8	0.03	2.33	60.0
August	74.7	88.9	T	3.08	60.0
September	74.2	88.9	0.05	2.74	61.5
October	73.2	87.2	0.07	11.15	63.5
November	71.1	84.3	0.03	18.79	67.0
December	67.8	81.7	0.04	17.29	74.75
Note: "T" signifies a trace amount of rainfall (i.e., less than 0.01 inch).					
Source: State of Hawaii Data Book 2003 (Data from Honolulu International Airport).					

5.1.4 *Wind*

The prevailing wind throughout the year is the northeasterly trade wind. Its average frequency varies from more than 90% during the summer season to only 50% in January, with an overall annual frequency of 70%. Westerly, or Kona, winds occur primarily during the winter months, generated by low pressure or cold fronts that typically move from west to east past the islands. Figure 5-3 shows a wind rose diagram applicable to the site based on wind data recorded at Honolulu International Airport between 1949 and 1995.

Tradewinds are produced by the outflow of air from the Pacific Anticyclone high-pressure system, also known as the Pacific High. The center of this system is located well north and east of the Hawaiian chain and moves to the north and south seasonally. In the summer months, the center moves to the north, causing the tradewinds to be at their strongest from May through September. In the winter, the center moves to the south, resulting in decreasing tradewind

frequency from October through April. During these months, the tradewinds continue to blow; however, their average monthly frequency decreases to 50%.

Wind patterns of a more transient nature increase in prevalence during the winter months. Winds from extra-tropical storms can be very strong from almost any direction, depending on the strength and position of the storm. The low-pressure systems associated with these storms typically track west to east across the North Pacific north of the Hawaiian Islands. At Honolulu Airport, wind speeds resulting from these storms have on several occasions exceeded 60 mph. Kona winds are generally from a southerly to a southwesterly direction, usually associated with slow-moving low-pressure systems known as Kona lows situated to the west of the island chain. These storms are often accompanied by heavy rains.

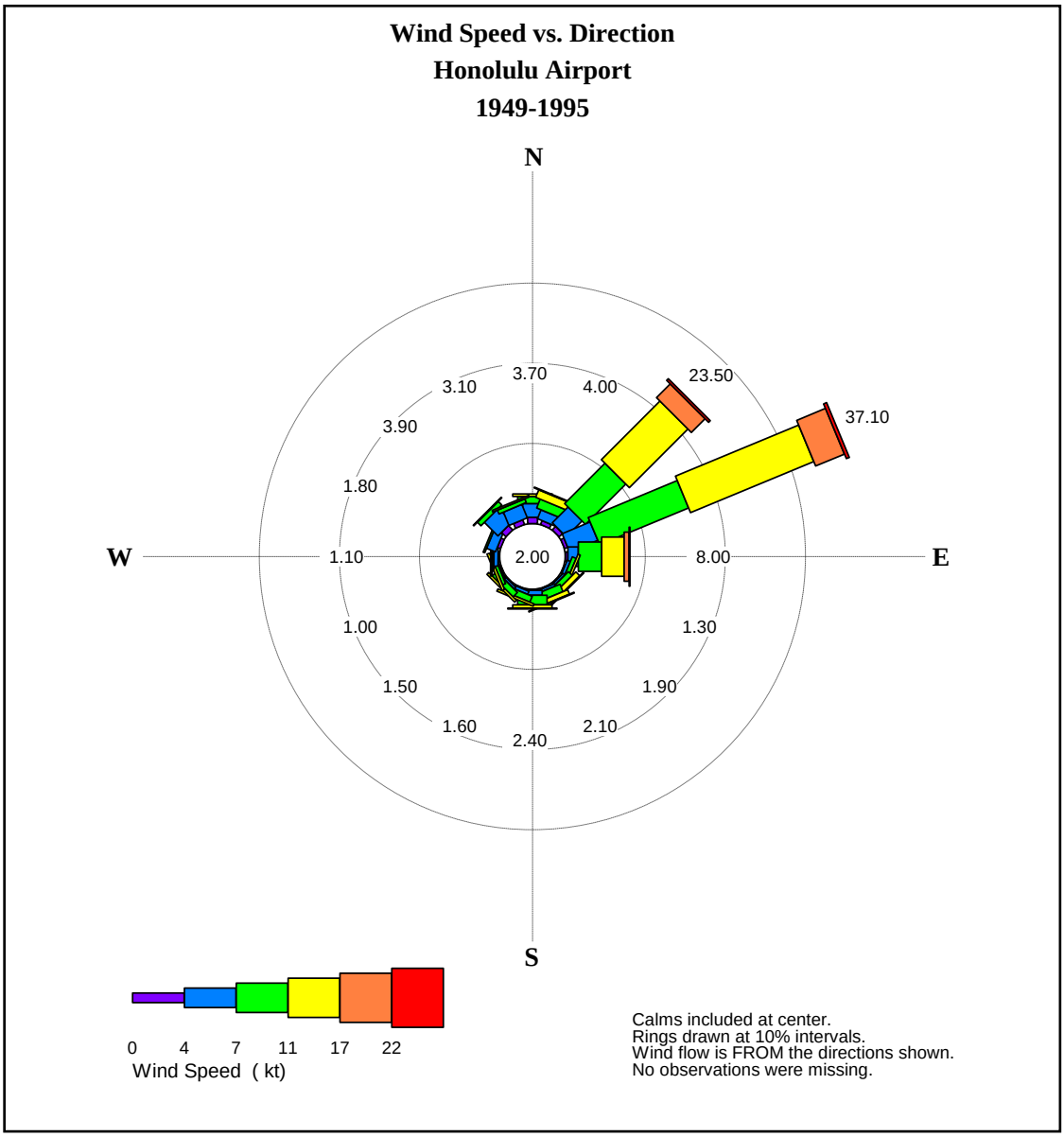

Figure 5-3. Wind rose for Honolulu Airport (1949 to 1995)

5.1.5 *Air Quality*

The U.S. Environmental Protection Agency has set national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, 2.5-micron and 10-micron particulate matter ($PM_{2.5}$ and PM_{10}), and airborne lead. These ambient air quality standards establish the maximum concentrations of pollution considered acceptable, with an adequate margin of safety, to protect the public health and welfare. The State of Hawaii has also adopted ambient air quality standards for some pollutants. In some cases, these are more stringent than the Federal standards. At present, the State has set standards for five of the six criteria pollutants (excluding $PM_{2.5}$) in addition to hydrogen sulfide (DOH, 2003).

Generally, air quality in the vicinity of the project site is excellent. The State of Hawaii Department of Health (DOH) monitors ambient air quality on Maui using a system of two monitoring sites. The closest monitoring site to the project is in Kahului. DOH monitoring data for August 2017 – August 2018 shows that air quality in the area during this year never exceeded the $PM_{2.5}$ short-term or long-term State or National standards.

5.1.6 *Still Water Level*

The total water depth at any given location is composed of the seafloor depth below the sea level datum, plus factors that add to the still water level (SWL) such as the astronomical tide, wave setup, storm surge (pressure setup and wind setup), mesoscale eddies and other oceanographic phenomena, and potential sea level change over the life of the project. The sea level datum for this project is the mean lower low water (MLLW) level, which represents the average of the lowest daily tides.

5.1.7 *Astronomical Tides*

Hawaii tides are semi-diurnal with pronounced diurnal inequalities (i.e., two tidal cycles each day with the range of high and low water levels being unequal). Tidal predictions and historical extreme water levels are given by the Center for Operational Oceanographic Products and Services (COOPS), National Ocean Service (NOS), NOAA. The nearest tide station to the Stable Road shoreline is at Kahului Harbor, approximately 3 miles to the west. The water level data from this station is shown in Table 5-2 and is based on the 1983-2001 tidal epoch.

Table 5-2. Water level data for Kahului Harbor (NOAA)

Datum	Elevation (feet MLLW)	Elevation (feet MSL)
Mean Higher High Water (MHHW)	+2.3	+1.1
Mean High Water (MHW)	+1.9	+0.8
Mean Sea Level (MSL)	+1.1	0.0
Mean Low Water (MLW)	+0.3	-0.8
Mean Lower Low Water (MLLW)	0.0	-1.1

5.1.8 *Other Water Level Rise Phenomena*

During high wave events, the water level shoreward of the breaker zone may be elevated above the tide level as a result of the wave breaking process. This water level rise, termed *wave setup*,

may be as much as 10 to 12% of the breaker height. Numerical wave modeling shows that wave setup nearshore in the project area is 0.8 feet for a 50-year return period wave event.

During tropical storm and hurricane conditions, with high winds and very low pressures, an additional water level rise termed *storm surge* can occur. There is no storm surge component to waves generated by distant storms. Storm surge on continental coasts can be amplified by the wide and shallow continental shelf. This type of surge is only minimally present in Hawaii due to the narrow insular shelf that surrounds the islands.

Hawaii is subject to periodic extreme tide levels due to large oceanic eddies and other oceanographic phenomena that have recently been recognized and that sometimes propagate through the islands. *Mesoscale eddies* produce tide levels that can be up to 0.5 feet higher than normal for periods up to several weeks (Firing and Merrifield, 2004). Temporary sea level rise has also been associated with phenomena related to the El-Nino/Southern Oscillation (ENSO).

It is now widely accepted among Hawaii coastal scientists and engineers that a 2003 erosion event that damaged a number of Hawaii's shorelines was caused by the vigorous and sustained occurrence of southern swell in combination with pronounced short-term increases in sea level due to the presence of mesoscale eddies (SEI 2003, Vitousek 2007). The highest sustained sea level measurements recorded at the Honolulu Harbor tide gauge occurred during September of 2003. Comparison and analysis of tide level, satellite altimetry, and hydrographic measurements around the Hawaiian Islands suggest that the 2003 extreme water levels were largely due to an anti-cyclonic eddy with an offshore water level rise of approximately 0.5 feet and a diameter of roughly 186 miles.

Together, these water level phenomena have led to the development of a Flood Insurance rate Map for the project area (Figure 5-4, [HAR § 11-200-10(5)]). The project area is within Zone VE that describes coastal areas with a 1% or greater chance of annual flooding with increased risk due to storm waves; base flood elevations determined.

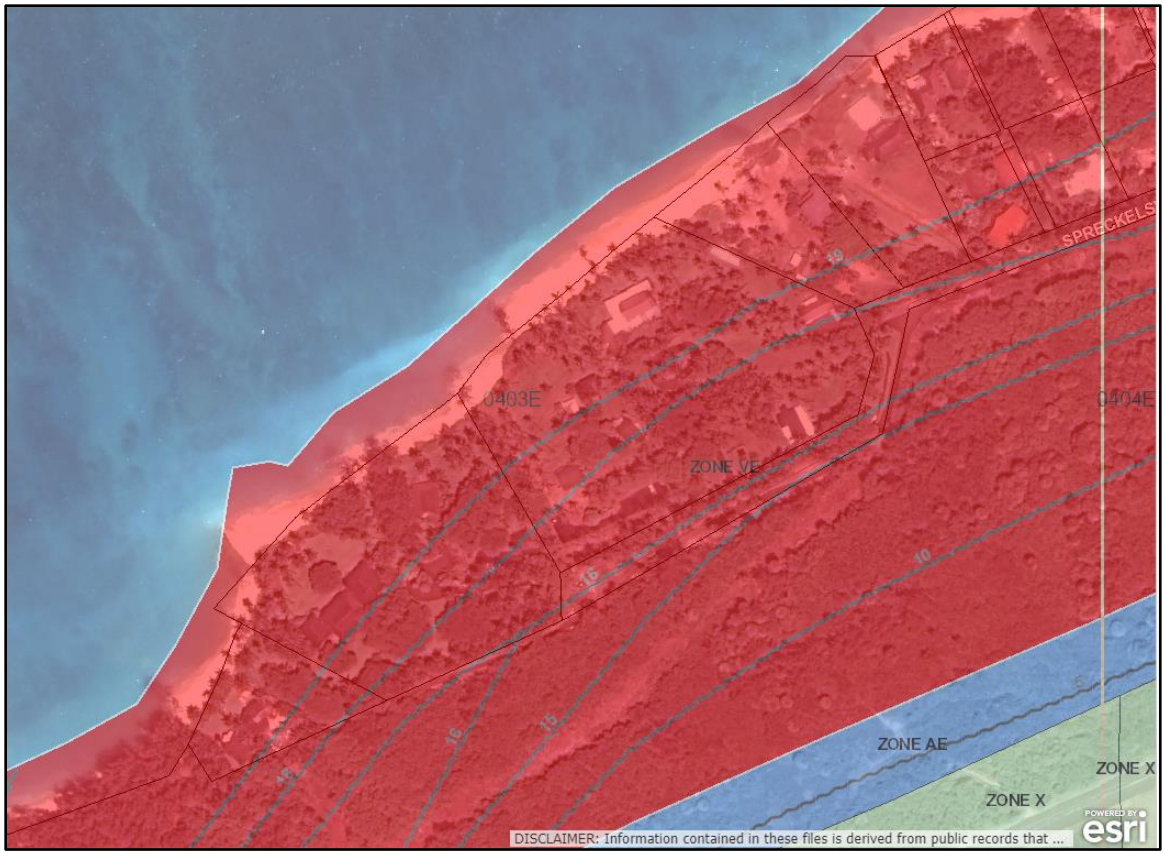

Figure 5-4. Flood Insurance Rate Map for the project area (Zone VE, Flood Hazard Assessment Tool)

5.1.9 *Sea Level Change*

The present rate of global mean sea-level change (SLC) is +3.4 ± 0.4 mm/year (Sweet et al., 2017), where a positive number represents a rising sea level. SLC appears to be accelerating compared to the mean of the 20th Century. Factors contributing to the measured rise in sea level include decreasing global ice volume and warming of the ocean. Sea level, however, is highly variable. The historical sea level trend for Kahului Harbor, Station 1615680, is shown in Figure 5-5 (NOAA, 2017). The mean historical rate of sea level change (RSLC) is +2.21 ± 0.42 mm/yr based on monthly data for the period 1947 to 2017. The tide gauge data also shows interannual anomalies exceeding 0.5 feet (15 cm) in Kahului Harbor.

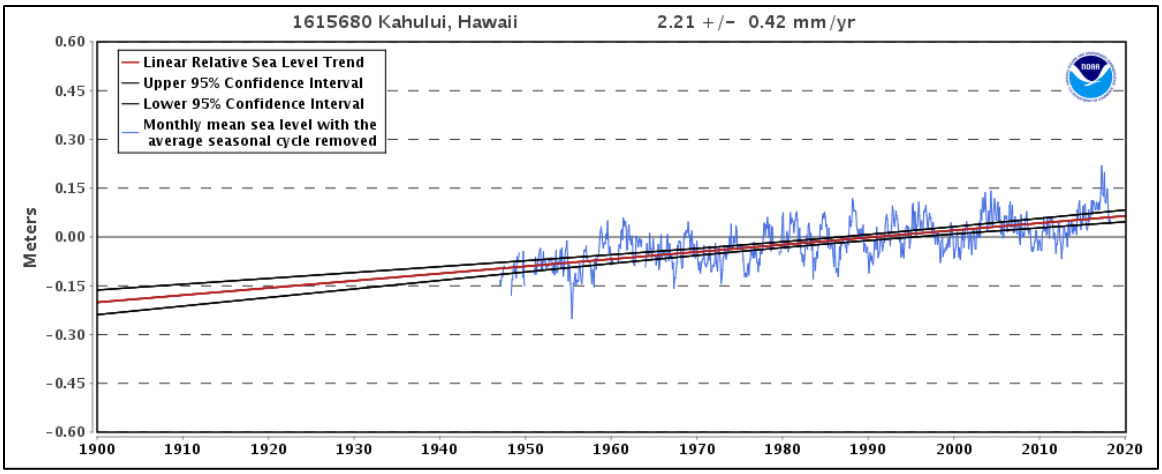

Figure 5-5 Mean sea level trend, Honolulu Harbor, Station 1612340, 1905 to present (NOAA, 2017)

The National Oceanic and Atmospheric Administration (NOAA) recently revised their sea level change projections through 2100 taking into account up-to-date scientific research and measurements. NOAA is projecting that global sea level rise as shown by their *Extreme* scenario could be as high as about 8 feet by 2100. NOAA's recent report also identifies specific regions that are susceptible to a higher than average rise in sea level. Hawaii has thus far experienced a rate of sea level rise that is less than the global average; however, this is expected to change. Hawaii is in the "far field" of the effects of melting land ice. This means that those effects have been significantly less in Hawaii compared to areas closer to the ice melt. Over the next few decades, this effect is predicted to spread to Hawaii, which will then experience sea level rise greater than the global average.

Figure 5-6 presents mean sea level rise scenarios for Kahului Harbor based on the revised NOAA projections, taking into account the far-field effects. While the projections are based on the most current scientific models and measurements, discretion is necessary in selecting the appropriate scenario. Selecting the appropriate sea level change projection is a function of many parameters, including topography, coastal setting, criticality of infrastructure, potential for resilience, budget, and function.

An important conclusion of the regional climate assessment is that NOAA's revised *Intermediate* rate is recommended for planning and design purposes in Hawaii. Given the recent upwardly revised projections and the potential for future revisions, consideration may also be given to the *Intermediate-High* rate for planning and design purposes, which projects that sea level in Hawaii will rise 3.4 feet by 2070.

Estimates for sea-level rise by 2050, an approximate 30-year projection, are determined for the Stable Road shoreline using scenarios provided by NOAA (2017) as shown in Figure 5-6. The NOAA Intermediate rate shows an increase in sea level of 1.5 feet by 2050. This value is used in the design of the Groin 3 replacement.

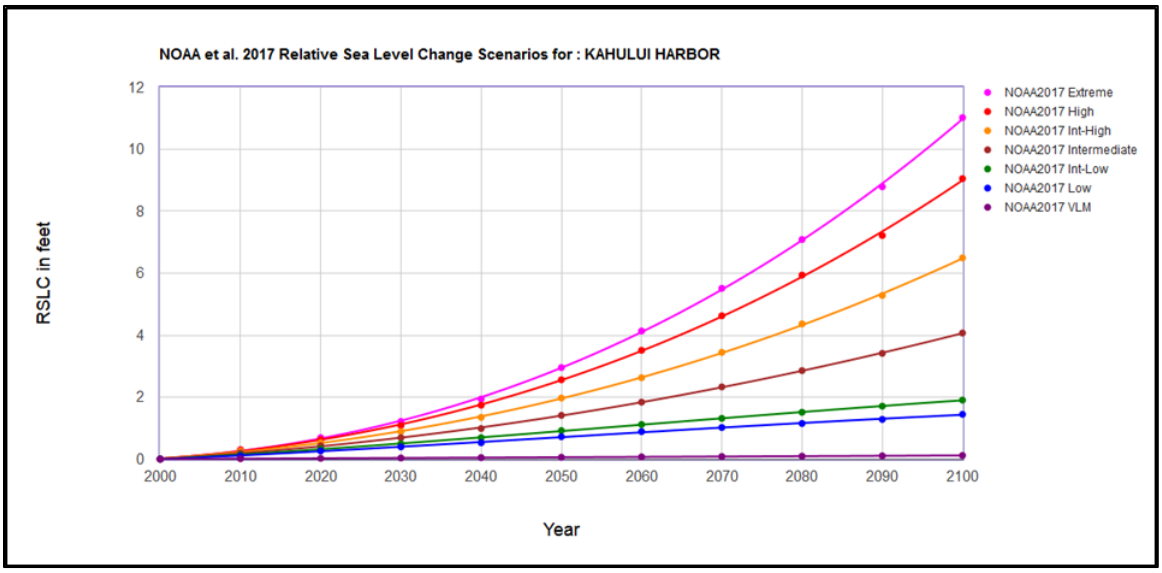

Figure 5-6 Hawaii sea level rise projections (adapted from NOAA, 2017)

Sea level rise has the potential to impact beaches and shorelines in Hawaii. Impacts may include beach narrowing and beach loss, loss of land due to erosion, and infrastructure damage due to inundation and flooding. The impacts from anomalous sea level events (e.g., king tides, mesoscale eddies, storm surge) are also likely to increase. A 2015 study found that, due to increasing sea level rise, average shoreline recession (erosion) in Hawaii is expected to be nearly twice the historical extrapolation by 2050, and nearly 2.5 times the historical extrapolation by 2100 (Anderson et al., 2015).

The State of Hawaii recently published the *Sea Level Rise Vulnerability and Adaptation Report for Hawaii*, which discusses the anticipated impacts of projected future sea level rise on coastal hazards, and the potential physical, economic, social, environmental, and cultural impacts of sea level rise in Hawaii (Hawaii Climate Change Mitigation and Adaptation Commission, 2017). The University of Hawaii conducted numerical modeling to estimate the potential impacts that a 2-foot rise in sea level would have on coastal hazards including passive flooding (Figure 5-7), annual high wave flooding (Figure 5-8), and coastal erosion.

Figure 5-7 Sea Level Rise Passive Flooding and Coastal Erosion Exposure Area, Kahului Airport region (PacIOOS, 2018)

Figure 5-8 Sea Level Rise Annual High Wave Flooding and Coastal Erosion Exposure Area, Kahului Airport region (PacIOOS, 2018)

5.1.10 *General Wave Climate*

The wave climate in Hawaii is typically characterized by five general wave types. These include northeast trade wind waves, southern swell, southeast trade wind swell, North Pacific swell, and Kona wind waves (Figure 5-9**)**. Tropical storms and hurricanes also generate waves that can approach the islands from virtually any direction. Any and all of these wave conditions may occur at the same time.

Trade wind waves occur throughout the year and are the most persistent in April through September when they usually dominate the local wave climate. They result from the strong and steady trade winds blowing from the northeast quadrant over long fetches of open ocean. Trade wind deepwater waves are typically between 3 to 8 feet in height with periods of 5 to 10 seconds, depending upon the strength of the trade winds and how far the fetch extends east of the Hawaiian Islands. The direction of approach, like the trade winds themselves, varies between north-northeast and east-northeast and is centered on the northeast direction. The Stable Road project site is exposed to tradewind waves.

During the winter months in the northern hemisphere, strong storms are frequent in the North Pacific in the mid-latitudes and near the Aleutian Islands. These storms generate large North Pacific swells that range in direction from west-northwest to northeast and arrive at the northern Hawaiian shores with little attenuation of wave energy. Deepwater wave heights often reach 15 feet and in extreme cases can reach 30 feet. Wave periods vary between 12 and 20 seconds, depending on the location of the storm. The Stable Road project is exposed to waves approaching from the north and northwest, and these waves represent the greatest source of wave energy reaching the project site.

Southern swell is generated by storms in the southern hemisphere and is most prevalent during the summer months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively low deepwater wave heights of 1 to 4 feet and long periods of 14 to 20 seconds. Depending on the positions and tracks of the southern hemisphere storms, southern swell approaches from the southeast through southwest directions. The Stable Road project site is sheltered from swell from the southerly direction.

Kona storm waves are fairly infrequent, occurring only approximately 10 percent of the time during a typical year. Kona waves typically range in period from 6 to 10 seconds with heights of 5 to 10 feet and generally approach from the southwest. Deepwater wave heights during the severe Kona storm of January 1980, however, were approximately 24 feet. The waves during this event had a significant impact on the south and west shores of Oahu. The Stable Road project site is unlikely to be affected by Kona storms.

Severe tropical storms and hurricanes have the potential to generate extremely large waves, which in turn could potentially result in large waves at the project site. Recent hurricanes impacting the Hawaiian Islands include Hurricane Iwa in 1982 and Hurricane Iniki in 1992. Iniki directly hit the island of Kauai and resulted in large waves along the southern shores of all the Hawaiian Islands. Damage from these hurricanes was extensive. Although not frequent or even likely events, they are often considered for project design conditions, particularly with regard to shoreline structures.

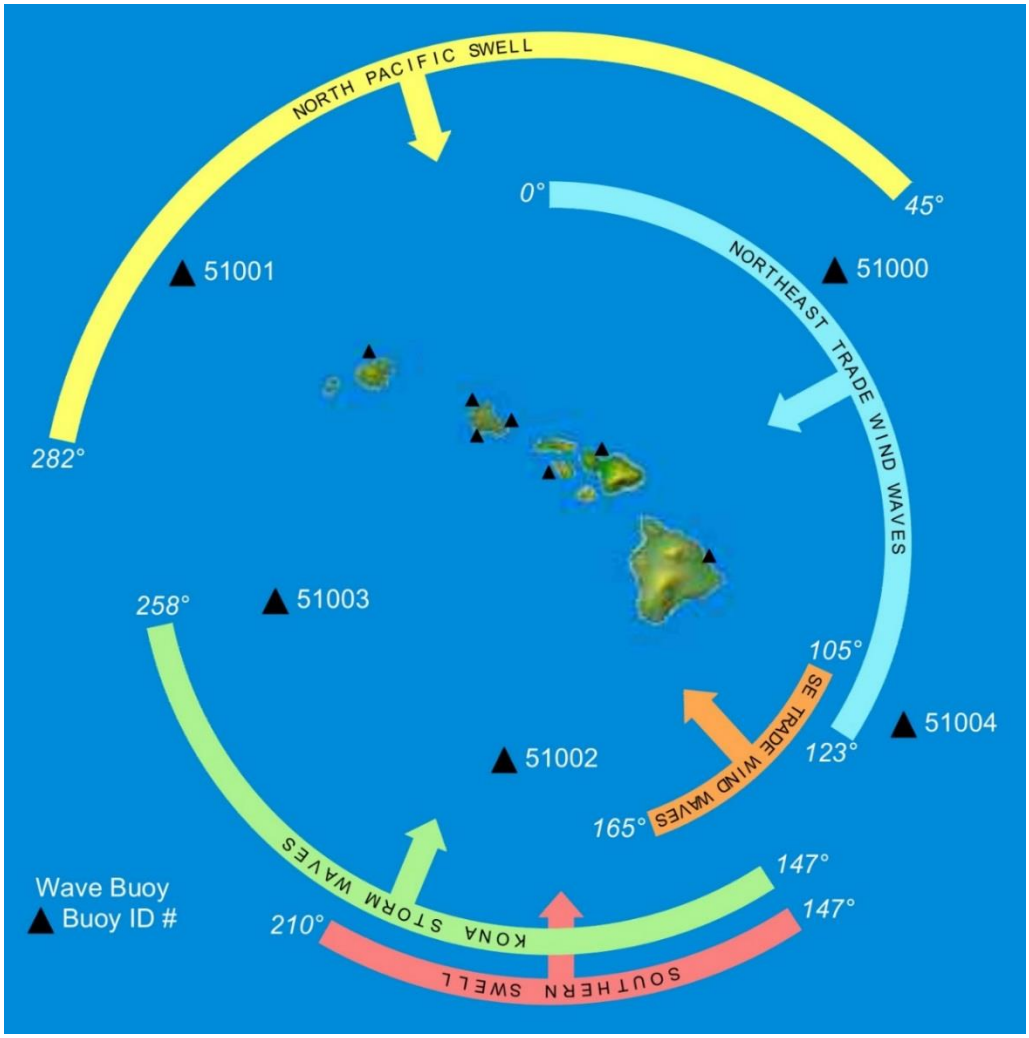

Figure 5-9. W**ave climate for the main Hawaiian Islands**

5.1.10.1 *Deepwater Wave Statistics (Prevailing Waves)*

Deepwater wave data for this project were obtained from offshore wave buoys and wave hindcasts. Wave hindcasting is a tool used to calculate past wave events based on weather models and historical data (Hubertz, 1992). With the proper inputs, wave hindcast models can calculate historical wave climates anywhere in the world. Hindcast model outputs are often recorded for a single location, known as a "virtual buoy".

WaveWatch III (WWIII) is a numerical wave model used to forecast and hindcast waves. Hindcast data for a 31-year period (1979-2010) are available around the Hawaiian Islands from NOAA/NCEP. For this study, hindcast data were obtained from virtual buoy WIS 82517, located 32.42 miles north of the project site (Figure 5-10).

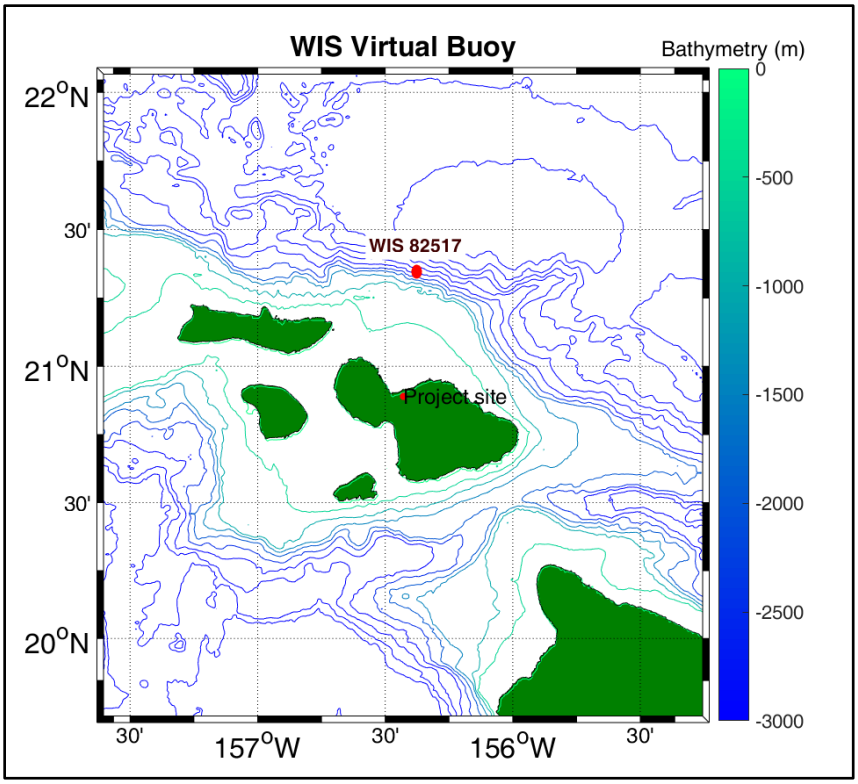

Figure 5-10. Project site and virtual buoy locations

It is rare for the sea state to consist of a singular wave condition. Wave events are described by wave height, peak period, and peak direction. The wave parameters from the hindcast model are calculated from a modeled wave spectrum. The spectrum shows the distribution of wave energy relative to wave frequency (wave frequency is the inverse of wave period). This methodology allows multiple wave conditions to be accounted for at the same time for a more accurate description of the sea state. These data are then used as a statistical basis for generating percent occurrence histograms and extreme wave return period information using an extreme value distribution (e.g., Weibull or Gumbel). Figure 5-11 is a wave height rose diagram that shows the percent occurrence of wave height and direction for waves as measured at WIS 82517. Table 5-3 is the corresponding histogram. Figure 5-12 is a wave period rose diagram that shows the percent occurrence of wave period and direction for waves as measured at WIS 82517. Table 5-4 is the corresponding histogram.

These figures and tables show that the Stable Road shoreline is exposed primarily to long-period swell from the northwest and shorter-period tradewind swell from the east. These wave patterns generally work during different seasons, with the tradewinds driving sand transport to the west, while the winter swell moves sand toward the east. The net transport is to the west.

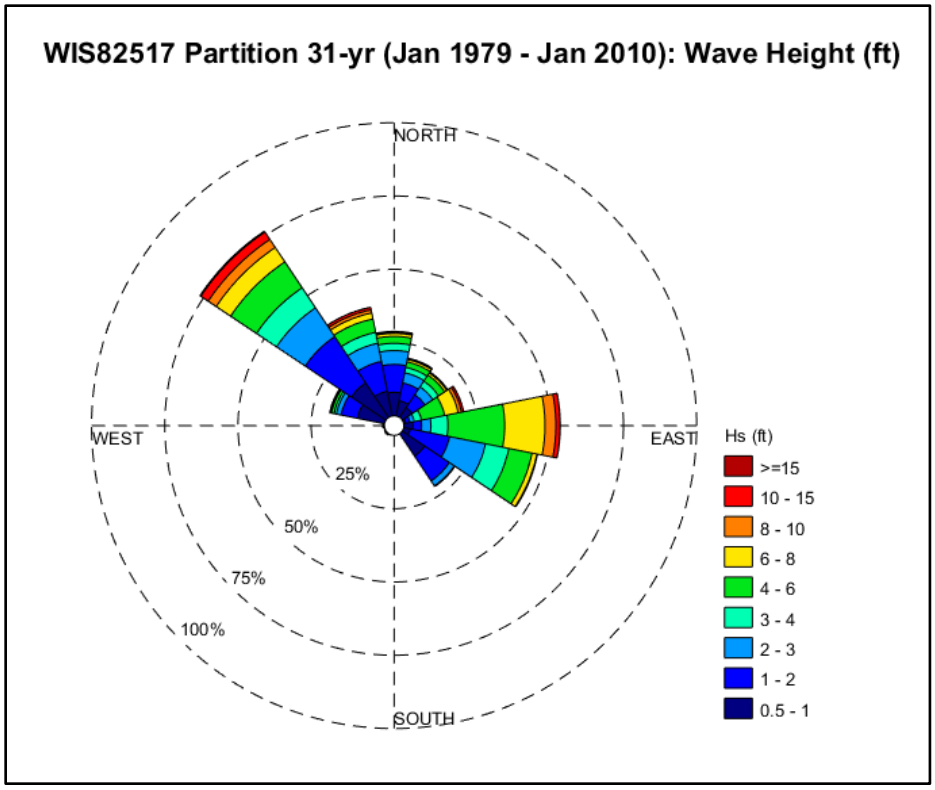

Figure 5-11. WIS 82517 virtual buoy wave height rose

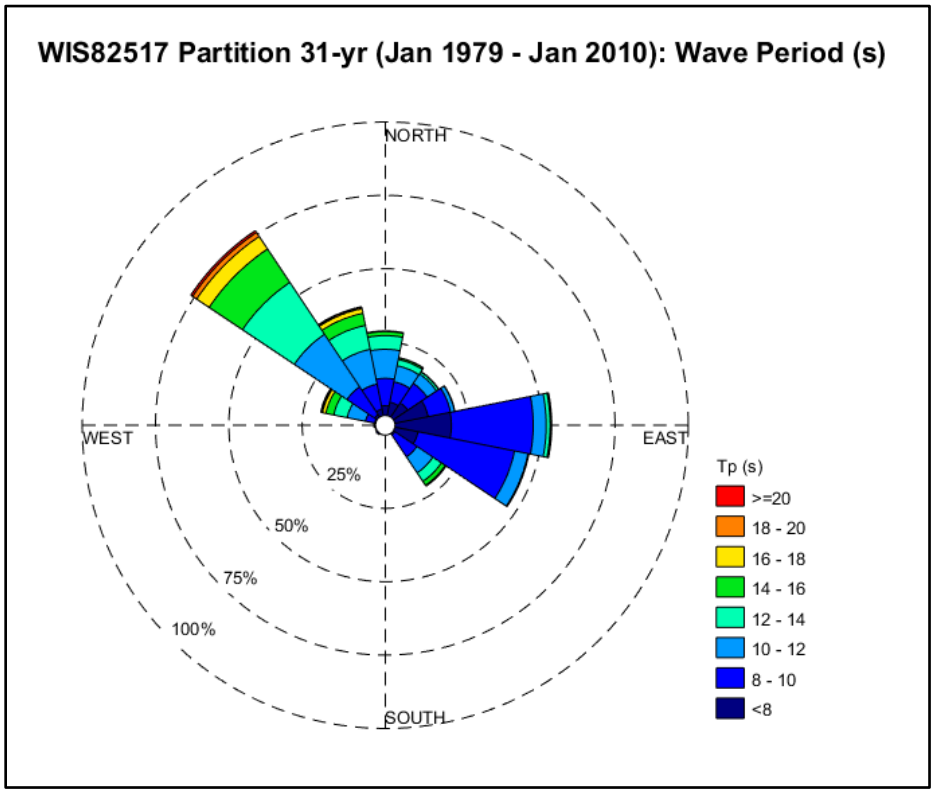

Figure 5-12. WIS 82517 virtual buoy wave period rose

Table 5-3. Deepwater wave height and direction histogram from WIS 82517

Hs (ft)\Dir	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Total
0.5-1	8.0	5.3	4.0	0.8	3.1	2.3	9.2	0.0	0.0		0.0	0.0	0.4	9.5	14.2	8.7	65.50
1-2	9.5	6.2	5.3	1.5	3.0	13.7	10.2	0.0	0.0	0.0	0.0	0.0	0.1	5.7	19.0	10.3	84.32
2-3	4.7	3.5	3.2	1.5	3.2	12.5	2.0	0.0	0.0	0.0	0.2	0.0	0.0	1.6	11.8	6.3	50.72
3-4	2.5	1.9	2.3	2.5	5.8	8.1	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.8	8.2	3.8	36.45
4-6	2.4	1.9	2.5	8.0	19.4	8.1	0.0			0.0	0.1	0.0	0.0	0.9	10.6	4.6	58.65
6-8	1.0	0.8	0.8	4.7	13.8	1.7	0.0			0.0	0.0	0.0	0.0	0.4	5.9	2.1	31.35
8-10	0.5	0.3	0.3	1.1	3.7	0.2		0.0		0.0	0.0	0.0	0.0	0.1	3.3	1.1	10.65
10-12	0.1	0.1	0.1	0.4	1.1	0.1						0.0	0.0	0.1	1.9	0.6	4.46
12-14	0.1	0.1	0.0	0.2	0.2	0.0							0.0	0.0	0.9	0.3	1.82
14-16	0.0	0.0	0.0	0.1	0.1									0.0	0.4	0.1	0.71
16-20	0.0	0.0	0.0	0.0	0.0									0.0	0.2	0.0	0.32
20+															0.0		0.02
Total	28.80	20.15	18.68	20.89	53.40	46.62	21.64	0.02	0.00	0.07	0.54	0.19	0.57	19.11	76.44	37.84	344.969
	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Overall
Mean	28.80	20.15	18.68	20.89	53.40	46.62	21.64	0.02	0.00	0.07	0.54	0.19	0.57	19.11	76.44	37.84	344.97
Std Dev	2.25	2.38	2.61	5.13	5.17	2.87	1.24	1.97	1.93	3.38	3.62	3.49	1.40	1.61	3.39	2.85	3.21
Min	1.94	2.04	2.00	2.45	2.37	1.53	0.58	1.32	1.16	0.97	1.28	2.47	1.51	1.62	2.97	2.52	2.56
Max	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.82	1.28	0.52	0.52	0.52	0.52	0.52	0.52	0.52

Table 5-4. Deepwater wave period and direction histogram from WIS 82517

Tp (sec)\Dir	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Total
4-6	0.3	0.4	0.6	1.0	2.2	1.1	0.1	0.0	0.0	0.1	0.5	0.1	0.1	0.1	0.1	0.1	6.81
6-8	3.0	4.2	5.3	10.6	17.0	7.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.9	2.2	51.26
8-10	9.3	7.1	8.0	7.8	27.9	33.5	9.0	0.0	0.0	0.0	0.0	0.0	0.2	3.1	11.3	8.7	125.87
10-12	9.9	5.6	3.8	1.4	4.4	4.7	6.5	0.0			0.0	0.0	0.1	6.4	21.6	12.1	76.45
12-14	4.7	2.2	0.9	0.2	1.3	0.3	3.5				0.0	0.0	0.1	4.7	21.3	8.3	47.28
14-16	1.3	0.6	0.1	0.0	0.4	0.1	1.6					0.0	0.0	2.7	13.7	4.2	24.74
16-20	0.2	0.1	0.0	0.0	0.1	0.0	0.3						0.0	1.2	5.1	1.6	8.75
18-20	0.0	0.0	0.0		0.0	0.0	0.0						0.0	0.4	1.6	0.5	2.62
20+	0.0	0.0			0.0		0.0							0.2	0.8	0.2	1.19
Total	28.80	20.15	18.68	20.89	53.40	46.62	21.64	0.02	0.00	0.07	0.54	0.19	0.57	19.11	76.44	37.84	344.969
	0	**22.5**	**45**	**67.5**	**90**	**112.5**	**135**	**157.5**	**180**	**202.5**	**225**	**247.5**	**270**	**292.5**	**315**	**337.5**	**Overall**
Mean	10.44	9.69	8.97	7.98	8.51	8.80	10.78	7.78	6.41	4.60	4.79	5.76	9.08	12.31	12.60	11.60	10.36
Std Dev	2.10	2.15	1.80	1.28	1.59	1.15	2.09	2.19	1.54	0.59	0.97	1.74	3.04	2.70	2.62	2.61	2.71
Min	4.01	4.01	4.02	4.01	4.01	4.01	4.03	4.01	4.43	4.01	4.01	4.01	4.01	4.01	4.02	4.05	4.01
Max	21.22	20.76	19.77	17.77	20.96	18.38	20.21	11.75	8.52	9.79	13.74	14.42	18.63	24.42	25.38	24.48	25.38

Measured data from CDIP Buoy 106, located near Waimea Bay on Oahu, were also used to analyze prevailing trade wind conditions (see Figure 5-10). The Waimea buoy was used because it has a clear view of the incoming northwest swell wave heights, has been in place collecting data for a long time, and is representative of the incoming wave climate to the project site.

Figure 5-13 is a wave directional spectrum that shows the wave energy and direction for waves as measured at CDIP 106. Circles out from the center indicate wave period, position around the circle indicates direction, and color indicates energy. Table 5-5 and Table 5-6 show the histograms for the northwest swell at the CDIP Waimea wave buoy. The histogram shows that waves typically range from 3 to 8 feet in height, with heights rarely larger than 12 feet. Northwest swell wave periods typically range from 7 to 15 seconds from 250° to 015° TN.

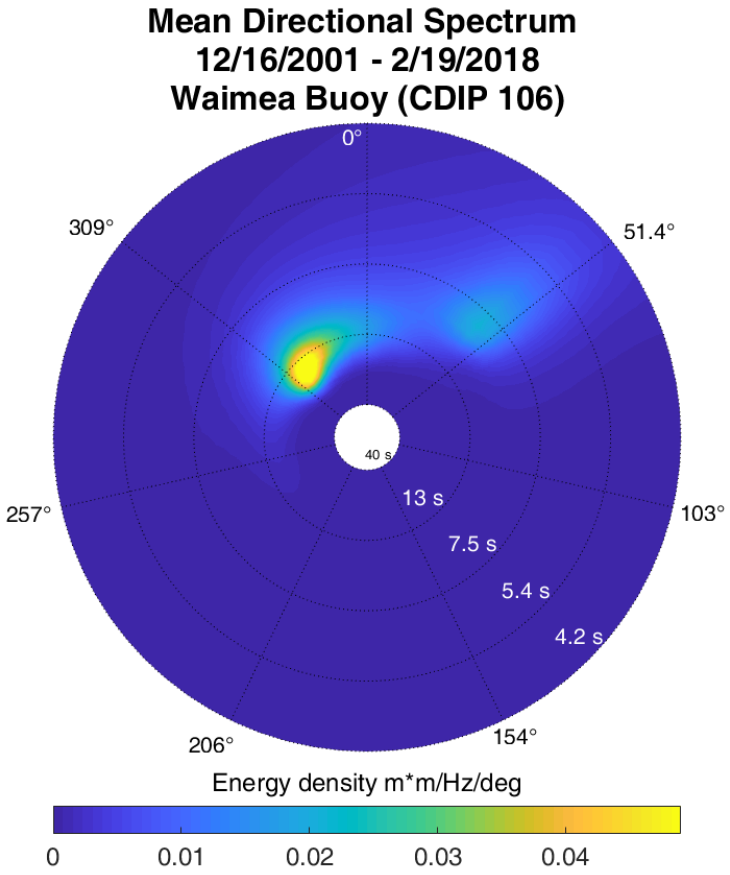

Figure 5-13. Deepwater wave directional spectrum from CDIP 106.

Table 5-5. Deepwater wave height and direction histogram from CDIP 106 for waves from 270° to 360°.

Hs (ft)\Dir	270	285	300	315	330	345	360	Total
0.5-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-2	0.01	0.02	0.04	0.08	0.07	0.07	0.02	0.31
2-3	0.05	0.12	0.32	0.67	0.77	0.80	0.36	3.09
3-4	0.05	0.16	0.67	2.14	2.26	1.69	0.71	7.68
4-6	0.01	0.09	1.27	6.45	6.15	3.81	1.41	19.19
6-8	0.01	0.01	0.68	4.73	4.10	2.42	0.71	12.67
8-10	0.00	0.01	0.37	2.39	2.02	1.10	0.42	6.32
10-12	0.00	0.00	0.17	1.21	0.91	0.45	0.14	2.89
12-14	0.00	0.00	0.09	0.59	0.43	0.17	0.06	1.35
14-16	0.00	0.00	0.02	0.26	0.16	0.04	0.02	0.51
16-20	0.00	0.00	0.01	0.16	0.09	0.01	0.01	0.29
20+	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.06
Total	0.14	0.40	3.66	18.72	16.99	10.57	3.87	54.36

Table 5-6. Deepwater wave period and direction histogram from CDIP 106 for waves from 270° to 360°.

Tp (sec)\Dir	270	285	300	315	330	345	360	Total
4-6	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03
6-8	0.01	0.01	0.01	0.01	0.06	0.24	0.19	0.53
8-10	0.00	0.02	0.07	0.58	1.51	2.47	1.29	5.94
10-12	0.01	0.04	0.49	3.71	6.03	4.47	1.49	16.25
12-14	0.05	0.17	0.97	5.78	5.49	2.43	0.64	15.55
14-16	0.05	0.13	1.35	5.87	3.02	0.81	0.22	11.46
16-18	0.01	0.02	0.42	1.69	0.57	0.09	0.02	2.82
18-20	0.00	0.01	0.24	0.81	0.22	0.04	0.00	1.32
20+	0.00	0.00	0.11	0.28	0.06	0.01	0.00	0.46
Total	0.14	0.40	3.66	18.72	16.99	10.57	3.87	54.36

The prevailing deep-water wave condition selected for the project site wave modeling was 4 feet at a period of 12 seconds from 315° (NW). The prevailing wave case was selected to investigate a possible relationship between the deepwater waves and nearshore wave patterns at the project site. These conditions were used to define the coastal processes and beach morphology at the project site. The prevailing conditions were chosen as representative waves by using the largest percent occurrence.

5.1.10.2 *Offshore Wave Transformation*

A nested four-grid setup in the SWAN wave model was used to propagate the deepwater waves to the project area. The wave conditions are applied along all boundaries of the largest grid, which has a resolution of 1,640 feet and nests an intermediate grid with a resolution of 100 meters (328 feet), another intermediate grid with a resolution of 50 meters (164 feet), and then a nearshore grid with a resolution of 10 meters (33 feet). Figure 5-14 and Figure 5-15 show the SWAN output for the prevailing wave condition and the transformation of a northwest deepwater swell as it approaches the project site.

SWAN models were run for the prevailing and offshore wave conditions described previously were used as input for the higher resolution, nearshore models (BOUSS2D) of waves and currents in the vicinity of the project site.

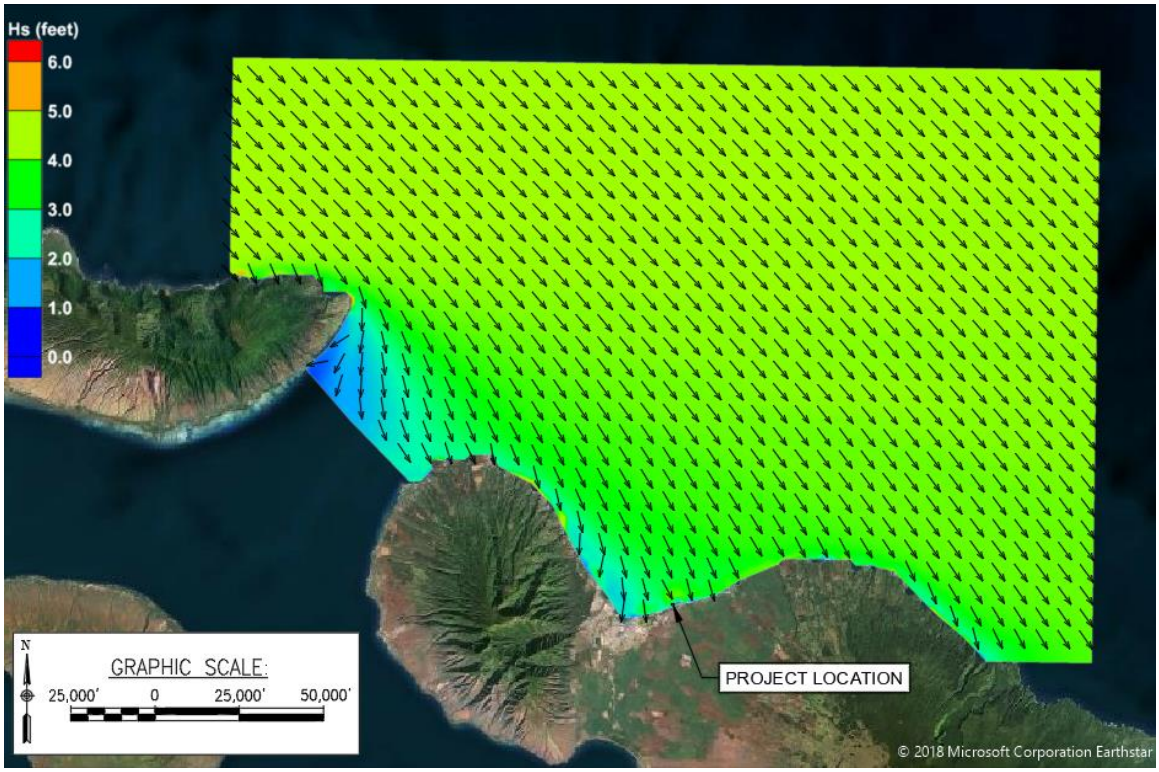

Figure 5-14. SWAN output wave height and approach vectors on the largest grid, NW prevailing condition

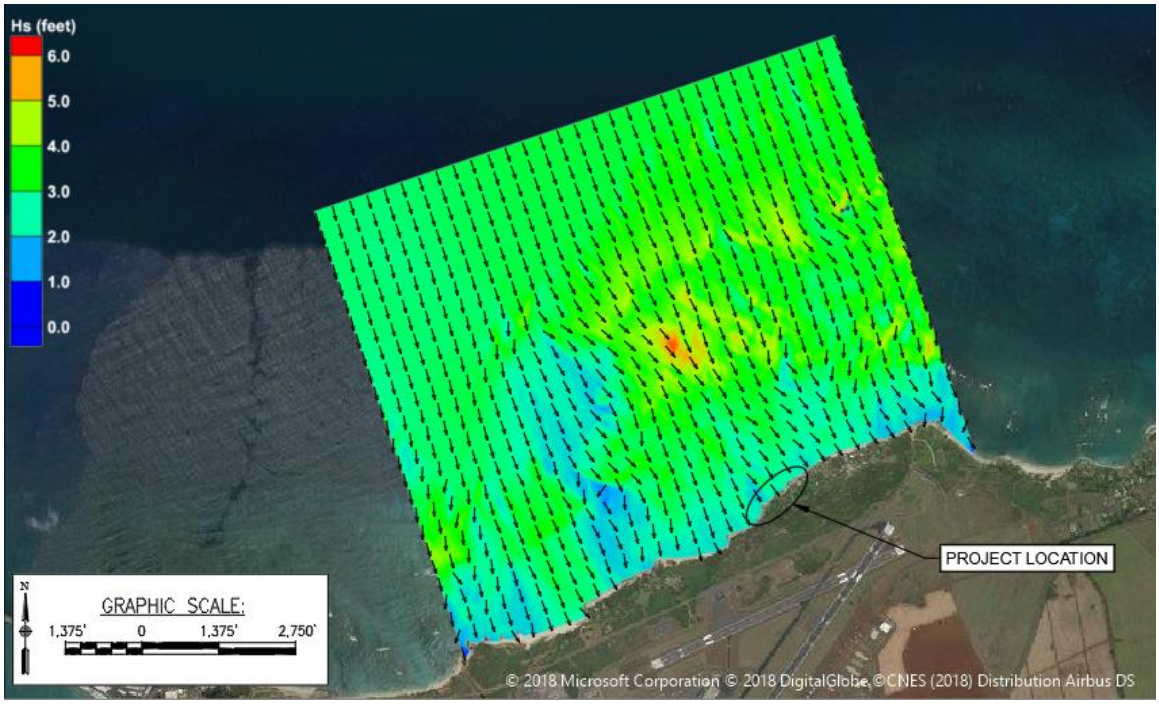

Figure 5-15. SWAN output wave height and approach vectors on the smallest grid, NW prevailing condition

5.1.10.3 *Extreme Wave Heights*

Applications in coastal engineering typically utilize a return period wave height such as the 50-yr wave for use in calculating design water levels or wave forces on shoreline structures. CDIP 106 wave buoy (Waimea Buoy) was selected for the extreme wave analysis due to its exposure to northwest swell. Figure 5-16 shows the wave height versus return period for CDIP 106 based on the wave statistics presented previously in Table 5-5 and Table 5-6. The data indicates that the design waves for this region are northwesterly with return period wave heights shown in Table 5-7; however, the data does not directly tell us the direction and period associated with those waves. To quantify these parameters, a simple average of the directions and periods was calculated, resulting in a peak period (T_p) of 17 s and a direction (θ) of 315° TN. This is considered a valid approximation because it can be seen from the table that the highest wave heights occur in a relatively narrow band of directions centered around 315° TN, and likewise with periods between 16 and 18 seconds.

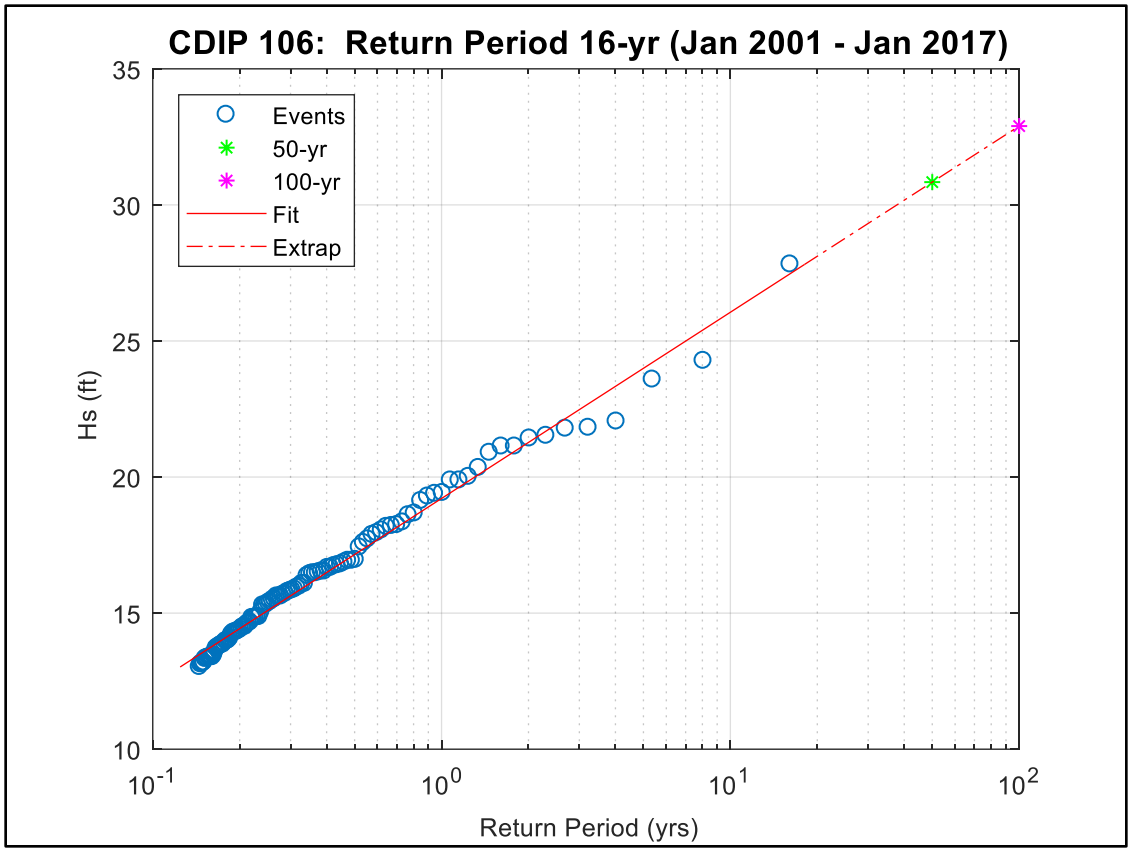

Figure 5-16 Wave height versus return period distribution for CDIP 106 wave buoy

Table 5-7 Return period wave heights for CDIP 106 wave buoy

Return Period	Hs (ft)
1	19.2
2	21.3
5	24.0
10	26.1
25	28.8
50	30.8
100	32.9

5.1.10.4 *Nearshore wave heights*

As waves move into shallow water, they interact with the bottom and dissipate energy through depth-induced breaking and bottom friction. Wave transformations are mathematically complex, and calculations over broad areas and complicated bathymetry require the use of numerical computer models. It is likely that the nearshore wave height, significantly reduced by the shallow reef, could be up to an order of magnitude less than the deepwater design wave heights.

Table 5-8. Deepwater wave parameters and design wave heights

Deepwater wave parameters	10-year NW Swell	25-year NW Swell	50-year NW Swell
H_s (feet)	26	29	31
T_p (sec)	17	17	17
Dir (° TN)	315	315	315
Water Level Rise (MLLW)			
Astronomical Tide (feet)	1.9	1.9	1.9
Sea Level Rise (feet)	1.5	1.5	1.5
Mesoscale eddy (feet)	0.5	0.5	0.5
Wave Setup (feet)	1.0	1.2	1.3
Total (feet)	**4.9**	**5.1**	**5.2**
Design Wave Height (SWAN)			
Groin #1, *Hs* (feet)	4.8	4.9	5.0
Groin #2, *Hs* (feet)	3.9	4.1	4.2
Groin #3, *Hs* (feet)	4.5	4.7	4.8
Groin #4, *Hs* (feet)	4.8	5.0	5.1
Groin #5, *Hs* (feet)	4.5	4.7	4.8
Groin #6, *Hs* (feet)	5.2	5.4	5.5
Groin #7, *Hs* (feet)	4.6	4.8	4.8
Average	**4.6**	**4.8**	**4.9**

6. POTENTIAL IMPACTS OF THE PROPOSED PROJECT

This chapter summarizes the probable adverse and beneficial effects that are likely to result from the proposed project. The discussion is organized by type of potential resource impact (e.g., coastal processes effects, marine biological effects, water quality effects, etc.). Good project design and implementation integrate features and practices intended to avoid or mitigate potential environmental effects into the overall design of the project. Because of this, in most cases, the discussion of "mitigation measures" is integrated into the overall discussion rather than limited to a separate section of the report. Each resource section in this chapter includes a discussion of criteria used to determine the significant effects on the resource.

6.1 Impacts on the Physical Environment

6.1.1 *Impacts on Bathymetry and Nearshore Bottom Conditions*

The following criteria are considered in determining whether the effects that the proposed action would have on the physical characteristics of the seafloor and shoreline processes would be significant:

- Interfere with existing sand transport processes and beach stability/erosion;
- Affect the shape of the shoreline or the bottom in such a way as to interfere with existing recreational or commercial uses;
- Permanently alter a unique or recognized shoreline or bottom feature;
- Affect the bottom in such a way as to degrade the quality of waves used by surfers; and
- Conflict with existing federal, state, or county statutes or regulations.

The proposed project is not anticipated to have a significant impact on the existing sand transport processes in the region as these groins have existed along the shoreline for nearly 80 years and the shoreline has equilibrated to their presence. This equilibrium has resulted in sediment storage between the groins and only a limited amount of transport past the groins. Recreational or commercial uses are not anticipated to be impacted. There is currently lateral public access across the groins that would be maintained with the proposed project. Future sand slopes on the sides of the groins are anticipated to be gentler after the proposed project is implemented allowing for easier access across the groins.

6.1.1.1 *Impacts During Construction*

In-water construction impacts would be limited to the immediate area of each groin repair. The new groin footprint areas would be carefully delineated, and no construction activities or in-water material storage would be permitted outside of this area. The seafloor in the project area is primarily sand. Repair of the groins would alter the bathymetry and topography in the immediate area of rock relocation and placement. Once construction of the project begins, swimmers and other users of the nearshore area at the project site would be redirected around this section of shoreline. Construction would be in accordance with all necessary permits and approvals necessary for the project.

6.1.1.2 *Long-Term Effects on the Shoreline*

Long-term impacts to the seafloor and bathymetry would be limited to the actual footprint of the groins. Repair of the groins is expected to result in some natural accretion and retention of sand by reducing the porosity of the groins, likely returning the groin field to its previous function. Lateral access is expected to be improved by the project when sand accretes along the shoreline.

6.1.2 *Impacts on Climate*

The proposed project is not anticipated to have any impacts on temperature or rainfall. Because most of the work that will take place on the sandy shoreline, the proposed project differs from many construction projects in that it involves little or no on-site soil disturbance that could result in particulate emissions. Potential sources of air pollution as a result of the project are related to the construction phase.

During the actual construction process, construction activities will create temporary degradation in air quality in the immediate vicinity of the project area. This negative impact on air quality will be limited to typical work hours and will end once the repairs are constructed. The emissions from these internal combustion engines are expected to be too small to have a significant or lasting effect on air quality. As part of the construction process, the contractor will observe all BMPs to keep construction-related emissions to the lowest practicable levels.

Short-term degradation of air quality may occur due to emissions from construction equipment and would include carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), directly-emitted particulate matter (PM_{10} and $PM_{2.5}$), and toxic air contaminants such as diesel exhaust particulate matter. Sulfur dioxide (SO_2) is generated by oxidation during combustion of organic sulfur compounds contained in diesel fuel. Off-road diesel fuel meeting Federal standards can contain up to 5,000 parts per million (ppm) of sulfur, whereas on-road diesel is restricted to less than 15 ppm of sulfur.

These construction impacts to air quality are short-term in duration and, therefore, are not expected to result in adverse or long-term conditions. Implementation of the following measures will reduce any air quality impacts resulting from construction activities:

- Apply water or dust palliative to the site and equipment as frequently as necessary to control fugitive dust emissions.
- Properly tune and maintain construction equipment and vehicles.
- Locate equipment and materials storage sites as far away from hotels and commercial uses as practical. Keep construction areas clean and orderly.

Once construction is completed, the project would have no long-term air emissions or impact on air quality.

6.1.3 *Impacts on Waves*

The proposed groin repair is designed to restore the pre-existing pattern of longshore sand transport/littoral drift along the shoreline, thereby stabilizing the beach. The interaction with waves would occur very near the shoreline and is likely to cause accretion. There are no

anticipated short-term or long-term impacts on the larger-scale regional coastal wave environment. This project is intended to restore the status quo regional conditions along the shoreline.

6.1.4 *Impacts on Nearshore Coastal Processes*

The proposed groin repair is designed to restore longshore sand transport/littoral drift patterns along the shoreline, thereby stabilizing the beach. The restoration is anticipated to have a positive impact on sand accretion at the project site as was the original function of the groins. There are no anticipated short-term or long-term impacts on the larger-scale regional coastal wave environment.

6.1.5 *Impacts on Natural Hazards*

The proposed repair project is located makai of several properties. The repaired groins would be essentially perpendicular to shore with elevations varying from +4 ft to +8 feet mllw. Because the groins are low elevation and perpendicular to the shore, repair is expected to have no impact on natural hazards such as hurricanes or tsunamis. The groins are expected to accrete sand under prevailing conditions; however, that amount of sand is expected to have only a small impact on hurricane or tsunami inundation.

The proposed groin repair is in an area that does not receive runoff from adjacent areas. It is not within the floodplain of a stream or canal. Hence, there is no potential for increased risk from this source, and the physical change in the shore that is proposed is not expected to alter storm runoff in adjacent areas.

6.2 Impacts to the Biological Environment

6.2.1 *Biology and Geomorphology*

Several aspects of the proposed project have the potential to affect marine biota. These include the following:

1. Direct physical disturbance of the seafloor and water column during construction.
2. Indirect effects associated with project related changes in water quality.
3. Indirect effects related to re-colonization patterns as biota re-establishes itself in areas that were disturbed by temporary construction activities following the completion of construction.

This section of the report describes those potential biological effects. Effects are considered to be significant to the extent that they exceed the following criteria:

- Change environmental conditions (e.g., water quality, ambient noise level, wave energy, etc.) within a substantial part of the range of an important marine community.
- Involve work in a habitat believed to be used by known sensitive species (Federal or State listed endangered, essential fish habitat, etc.) or in a conservation district.
- Substantially affect the spawning area available to a marine species.

6.2.1.1 *Construction Period Impacts*

Direct impacts to marine biological resources at the groin repair project site are expected to result in the loss of microbial habitat at the toe of the existing groins and on submerged armor stones. Most adult fish in the project vicinity are mobile and are expected to actively avoid direct impacts from project activities. There is potential for demersal fish eggs to be buried; however, new hard substrate created by the repaired groins would provide a greater surface area for these species to lay eggs in the future. Turbidity containment barriers will be deployed to isolate the construction activities from the adjacent seafloor and water column; thus, impacts to marine biota are expected to be limited to the immediate construction area. Groin repair would occur on a primarily sand and rubble seafloor, with no obvious benthic biota. The area is affected by shifting sands and tends to have little algal or macro-invertebrate diversity.

6.2.1.2 *Long-Term Impacts*

The groin repair would provide additional bare, stable surfaces for recruitment of corals, algae, and other invertebrates. The groins would be porous, permeable structures. Obligate reef dwellers are often limited by the availability of suitable shelter, especially juveniles. Reef fishes prefer reef holes and crevices commensurate with the size of the fish. The interstitial spaces between stones would also provide habitat for benthic (crabs, shrimps, worms, etc.) and sessile (sponges and tunicates) organisms which would provide additional foraging resources for fishes. The stones also provide a hard, stable surface for coral colonization, and elevate them above the shifting sand and rubble bottom.

6.2.2 *Impacts on Protected Species*

<u>Wedge-Tailed Shearwater</u>
As advised by the USFWS and the State of Hawaii Division of Forestry and Wildlife, the following mitigation measures should be implemented:

1. Native seabird nest along the coastline in burrows, among littoral vegetation. Nesting adults, eggs, and chicks are particularly susceptible to impacts from human disturbance and predators. Surveys should be conducted throughout the project area during the peak breeding season (March 16 through December 14) to determine the presence and location of nesting areas. If it is found that nesting sites are within the proposed project area, the Division of Forestry and Wildlife will be consulted.

2. To minimize and avoid artificial lighting impacts to sea turtles and seabirds, a lighting plan should be developed and incorporated into the project description, including educating all project staff with information about seabird fallout and that downed birds can be taken to an approved location for rehabilitation. If lights cannot be eliminated due to safety or security concerns then they should be positioned low to the ground, be motion-triggered and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below and use the lowest wattage bulbs possible. Construction activities should occur during daylight hours only.

The proposed groin repair will not include artificial lighting, thus resulting in no impact on seabirds' ability to orient themselves is expected. All construction activities will occur during

daylight hours. Within one week prior to construction, a bird monitor would survey the project area for protected or endangered bird nests or active brood sites to ensure that nesting sites are not disturbed.

The following relates to the preservation of all trees and vegetation surrounding the proposed action to ensure minimal impacts to seabirds in the area.

1. All existing trees, shrubs, and surrounding vegetation shall be preserved and protected so far as practicable. Removal and replacement shall be coordinated with and approved by the owner.

Hawksbill Sea Turtle, honu'ea (*Eretmochelys imbricata*)
Hawksbill turtles have been observed near the project site. Turtles would be expected to instinctively move away from the construction activities, and as the impact area is relatively small and primarily on sandy bottom. The repairs would not affect turtle foraging areas. Groin repair would not involve extensive in-water work, such as pile driving, which would be expected to result in significant underwater sound that would adversely affect marine creatures.

General threats to Hawksbill Sea Turtles and other Marine Turtles:

- habitat loss of coral reef communities
- harvest of their eggs and meat
- commercial exploitation (historically, but still permitted in some parts of the world)
- increased recreational and commercial use of nesting beaches in the Pacific
- incidental capture in fishing gear
- general threats to marine turtles

Hawksbills face threats on both nesting beaches and in the marine environment. The primary global threat to hawksbills is habitat loss of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities. The groin repair is not expected to result in any coral reef habitat loss that would affect the Hawksbill Sea Turtle. However, the project is expected to improve the beach ecosystem along the coastline, creating a potentially positive impact for the species.

Construction best management practices include stopping work immediately if a turtle comes near the project site.

Green Sea Turtle
As advised by USFWS and NOAA, the following mitigation measures should be implemented for any shoreline work:

- Have qualified personnel conduct a visual survey of the project site just prior to commencement or resumption of construction activities to ensure that no green sea turtles or nests are present;
- If sea turtles are found within the project area, or approach the project area while construction is occurring, all potentially disruptive activities (including human activity,

mechanical or construction disturbance) will be stopped until the animal(s) voluntarily leave the area.

- Have qualified personnel conduct a thorough survey for the presence of sea turtles or nesting activity within 300 feet of the project site. If there is evidence of an active nest in the vicinity of the proposed project, maintain a 100-foot buffer in which no work activities will be allowed within the buffer.
- When entering and exiting the site, heavy equipment and vehicle operators would use the same ruts as the day before to minimize the footprint of the project. The ruts on the beach will be smoothed out upon completion of the project.
- Avoid nighttime work during the nesting season. If lighting is used, use light shields that are completely opaque, sufficiently large, and positioned so that the bulb is only visible from below and that light from the shielded source cannot be seen from the beach.
- Remove any construction-related debris that may pose an entanglement threat to green sea turtles from the project site if not actively being used and at the conclusion of the project. No project-related materials should be stockpiled in the intertidal zone, reef flats, or stream channels.

As previously stated in this report, the proposed groin repair will not include artificial lighting, thus resulting in no impact on the green sea turtles' ability to orient themselves. All construction activities will occur during daylight hours.

The project is expected to improve the beach ecosystem along the coastline, creating a potentially positive impact for the species.

<u>Hawaiian Monk Seal</u>
The proposed groin repair will be located within the Hawaiian Monk Seal terrestrial critical habitat. Without the repairs, the project shoreline is expected to continue to erode and the beach will continue to become narrower. With the groin repairs, the transport of sand is expected to be reduced and accretion is expected. The build-up of sand on the beach would add to Hawaiian Monk Seal habitat.

The following Best Management Practices (BMPs) as typically recommended by the National Marine Fisheries Service (NMFS) will be adhered to during construction of the project to avoid impacts to the turtles or other marine protected species:

1. Conduct a survey for marine protected species before any work in the water starts, and if a marine protected species is in the area, a 150-foot buffer must be observed between the protected species and the work zone.
2. Establish a safety zone around the project area whereby observers will visually monitor this zone for marine protected species 30 minutes prior to, during, and 30 minutes post project in-water activity. Record information on the species, numbers, behavior, time of observation, location, start and end times of project activity, sex or age class (when possible) and any other disturbances (visual or acoustic).
3. Conduct activities only if the safety zone is clear of all marine protected species.
4. Upon sighting of a marine protected species within the safety zone during project activity, immediately halt the activity until the animal has left the zone. In the event that a marine protected species enters the safety zone and the project activity cannot be halted, conduct

observations and immediately contact NMFS staff in Honolulu to facilitate agency assessment of collected data.
5. For on-site project personnel that may interact with a marine protected species potentially present in the project area, provide education on the status of any listed species and the protections afforded to those species under Federal laws.

The project is expected to improve the beach ecosystem along the coastline, creating a potentially positive impact for the species.

A summary of anticipated effects on endangered species is as follows:

1. By using the above BMPs, noise/physical disturbance to green sea turtles is expected to be temporary and insignificant and not result in adverse behavioral changes.
2. Based on the in-water work being conducted in very shallow water with turbidity containment barriers surrounding the work area, any exposure of marine protected species to turbidity and sedimentation is expected to be temporary and not significant.

6.2.3 *Impacts on Water Quality*

The following criteria are considered in the evaluation of whether the effects of the proposed action on water quality would be significant:

1. Consistency with the provisions of the Clean Water Act;
2. The degree to which it would comply with applicable water quality standards or with other regulatory requirements related to protecting or managing water resources; and
3. The extent to which it would degrade water quality in a manner that would reduce the existing or potential beneficial uses of the water.

6.2.3.1 *Impacts During Construction*

Construction would be accomplished using conventional heavy equipment and would proceed from shore with the placement of stone from a working platform, and then working back to shore placing stone to the finished groin lines and grades. A temporary increase in turbidity levels in the immediate area of construction is expected; however, this would be mitigated by the employment of Best Management Practices (BMPs). BMPs and environmental protection measures to be employed are summarized in Section 10. Water quality protection measures will include the following general requirements:

- Turbidity containment barriers shall be installed and maintained to completely surround the work area so as to control and contain construction generated turbidity.
- The water area affected by construction shall be monitored, and if monitoring indicates that the turbidity standards are being exceeded, construction shall be suspended until the condition is corrected.
- The construction contractor shall be required to employ standard BMPs for construction in coastal waters, such as daily inspection of equipment for conditions that could cause spills or leaks; cleaning of equipment prior to operation near the water; proper location of

storage, refueling, and servicing sites away from the water; implementation of adequate on-site spill response procedures; and stormy weather preparation plans.
- All construction activities shall be confined to the immediate area of construction, and no excess construction material shall be stockpiled in the water.
- Construction materials (e.g., stone and concrete) shall be inert and free of earthen and any other deleterious substances.

6.2.3.2 *Long-Term Effect on Water Quality*

Following completion of construction and removal of turbidity containment devices, the affected water body is expected to return to its pre-construction condition. No long-term effects on water quality or water circulation in the project area are expected.

6.3 Impacts on the Human Environment

6.3.1 *Impacts on Noise*

The following measures would be implemented and the guidelines in Section 10 will be followed.

1. Construction activities including heavy machinery operation at the project site will be limited to the hours between 7:00 a.m. and 7:00 p.m.
2. Broadband noise backup alarms in lieu of higher frequency beepers will be recommended for construction vehicles and equipment. Broadband noise alarms tend to be less audible and intrusive with distance as they blend in with other background noise sources.
3. The project will require the use of the quietest locally available equipment, e.g., high insertion loss mufflers, fully enclosed engines, and rubber-tired equipment when possible.
4. The use of horns for signaling will be prohibited.
5. Worker training on ways to minimize impact noise and banging will be required.

6.3.2 *Impacts on Historic, Cultural, and Archaeological Resources*

There are two subsurface cultural deposits near the project site (Site 50-50-05-01799 and 50-50-05-01798). Site 50-50-04-01783, known as the Kanaha Pond, is less than two miles south of the project area. The pond is said to have been built by Kiha-a-Pi‘ilani in the early 1500s. Kiha-a-Pi‘ilani was the brother-in-law of ‘Umi-a-Līloa, a ruling ali‘i-ai-moku (district high chief of Hawai'i). The nearest documented cultural sites to the project area are on a parcel owned by the airport. The proposed project includes preparation of an Archaeological Monitoring Plan by an archaeological consultant prior to construction. During construction, an archaeological monitor would be present during any backshore excavation. An end-of-work Archaeological Monitoring Report would be prepared to document the findings or lack thereof during construction.

If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the Maui Police Department, the State Historic Preservation Division, and the Division of Conservation and Resources Enforcement will be notified.

1 Care will be taken when working on the beach to avoid disturbing previously undisturbed sandy sediments that might hide subsurface deposits.

There do not appear to be any known traditional Hawaiian cultural practices that would be adversely affected by the proposed project, nor does it seem like the activities associated with the project will conflict with traditional cultural practices as expressed in legend. The proposed project would be accomplished in an area which has been substantially altered and is entirely makai (seaward) of the shoreline. We will continue to consult with the State Historic Preservation Division regarding the development of the long-term stabilization management plan.

6.3.3 *Impacts on Recreation*

The proposed groin repairs will take place on groins that already exist. The groin repair would be located well landward of the nearby surf breaks. A turbidity containment barrier will surround the in-water construction activity and effectively "fence" off the work from people in the water, impacting swimming in the immediate vicinity during construction. The proposed project is not expected to significantly affect fishing in the area during construction.

The proposed project is expected to result in a more stable recreational shoreline area and improve lateral access with sand accretion. No long-term adverse impacts to recreational uses are expected. In addition, the relatively low elevations of the groin crests are not expected to block the view plane from the properties along the project shoreline.

6.3.4 *Impacts on Scenic and Aesthetic Resources*

Due to its low elevation and profile, the proposed project does not have the potential to impact scenic views. Construction equipment, material stockpiles, and construction activities will be present within the project area for several weeks during the construction of the project. These impacts are temporary and are not expected to be present once the construction phase of the project is completed.

6.3.5 *Impacts on Public Infrastructure and Services*

The proposed groin repairs have little potential to affect public infrastructure and services. Once in operation, they will not require water or electrical power. In and of itself, they do not generate a need for additional sanitary wastewater collection and treatment facilities and it would not affect storm water runoff that might impact the County's storm water system. Most people visiting that end of the beach would come by foot rather than in vehicles, and the improvements are not expected to increase the resident or visitor population of the island.

The contractor will be required to provide ample clearance for emergency vehicles at all times. The proposed project does not involve any activities that would permanently alter the need for, or ability to provide, emergency services.

Construction of the project will involve a relatively small construction crew, estimated to range between three and five workers onshore. During most of the construction, these workers can park in private driveways. Mobilization and demobilization of the on-shore equipment and materials will involve some heavy truck traffic through the community; however, this would be of limited duration. Equipment and materials would be transported along Stable Road to the

project site. The delivery of materials and equipment would be timed such that impact on residents and beach users would be minimized.

Because of the small number of vehicle-trips involved, construction worker and equipment/material delivery trips are not expected to substantially affect traffic volumes and/or the level of service on area roadways and do not require substantial mitigation efforts.

6.3.6 *Impacts on Socio-Economics*

The proposed groin repairs are not anticipated to have an impact on socio-economics in the area [HAR § 11-200-10(4)]. The groin repairs are not expected to cause more people to move into or out of the area. The distribution of residents by age and ethnicity is also not anticipated to be influenced by the groin repairs. The groins would not create any new permanent jobs that would influence the local economy.

7. POTENTIAL IMPACTS OF NO ACTION

The no-action alternative involves leaving the deteriorated groins in place with no additional construction elements. This is expected to result in continued sand loss and coastal erosion, with eventual failure of the groin field, which the coastline has equilibrated with over nearly 80 years. As wave action continues to move sand alongshore and away from the beach, erosion of the vegetation line is expected to continue with the erosion scarp advancing landward. Without the groin repairs, erosion will likely continue and may also result in structural instability of homes.

The existing beach and offshore sand deposits can affect coastal water quality by producing turbidity. During periods of high surf, there is typically a general increase in nearshore water turbidity due to the suspension of fine bottom material by wave action, and this can be expected to continue with or without the proposed project. The "No Action" alternative could exacerbate the turbidity problem as a result of exposure of backshore sediment and release into the marine environment.

"No Action" could also adversely affect the nearshore biological environment. Progressive erosion of the coastline may also result in beach narrowing and loss, similar to other north Maui coastlines. In the event of beach narrowing or loss, there would be a negative impact to species, including protected and endangered, that rely on the sandy coastal ecosystem.

"No Action" is unlikely to affect historic, cultural, and archaeological resources based on existing data.

"No Action" could have a very significant impact on shoreline-related recreation resources. The diminished shoreline area would decrease the access for swimming, surfing, and other water recreation activities.

No-Action is not a practical solution for this project, as it is not a long-term solution and does not minimize beach loss and coastal erosion.

8. RELATIONSHIP TO RELEVANT PLANS, POLICIES, AND CONTROLS

This chapter discusses the compliance and compatibility of the proposed groin repair with pertinent plans, policies, and regulations at the county, state, and federal levels.

8.1 County of Maui

8.1.1 *Maui County General Plan*

The Maui County General Plan (1990 update) sets broad objectives and policies to guide the long-range development of the County. Under the subject of Public Safety, it is the policy of the General Plan to:

- Maintain a state of preparedness for man-made or natural disasters
- Encourage industries to provide for themselves protection services to meet their special needs

8.1.2 *Countywide Policy Plan of 2010 (Maui County General Plan 2030)*

The Countywide Policy Plan took effect on March 24, 2010, and provides broad goals, objectives, policies, and implementing actions that portray the desired direction of the future of Maui County. The core themes and key strategies of the Plan are to:

- Protect the Natural Environment
- Preserve Local Cultures and Traditions
- Improve Education
- Strengthen Social and Healthcare Services
- Expand Housing Opportunities for Residents
- Strengthen the Local Economy
- Improve Parks and Public Facilities
- Diversify Transportation Options
- Improve Physical Infrastructure
- Promote Sustainable Land Use and Growth Management
- Strive for Good Governance

Objectives, and policies related to the coastal environment and that pertain to the project include:

> Objective: Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island
>
> Policy: Protect and restore nearshore reef environments and water quality
> Policy: Protect marine resources and valued wildlife
> Policy: Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs

Implementing Actions: Develop regulations to minimize runoff of pollutants into nearshore waters and reduce nonpoint and point source pollution

Discussion:
The groin repair is expected to protect the nearshore reef environments and water quality from excess turbidity that is caused by erosion of backshore material.

Objective: Improve the stewardship of the natural environment

Policy: Provide public access to beaches and shorelines for recreational and cultural purposes where appropriate.

Discussion:
The groin repair is expected to reduce erosion and potentially accrete sand along the beach, thereby preserving lateral public access to and along the shoreline.

8.1.3 *Maui Island Plan*

The Maui Island Plan was adopted in December of 2012 and provides recommendations for community development looking forward through 2030. The Plan is founded on core values that break down into goals, objectives, policies, and actions.

Goals, objectives, and policies of the Plan related to the coastal environment and that pertain to the project include:
Goal:

- An intact, ecologically functional system of reef, shoreline, and nearshore waters that are protected in perpetuity.

Objective:

- Improved reef health, coastal water quality, and marine life.

Policies:

- Strictly regulate shoreline armoring in accordance with adopted Shoreline Rules, with an intent to protect the coastal and marine ecosystem.

Discussion:
The groin repair would occur on a shoreline that is already armored. The footprint of the structures would not change.

Objective:

- Water quality that meets or exceeds State Clean Water Act standards.

Policies:

- Ensure that the County upholds its affirmative duty under the Clean Water Act by monitoring and reducing point and NPS pollution to help safeguard coastal waters.

Discussion:
The groin repair is expected to protect the nearshore reef environments and water quality from excess turbidity that is caused by erosion of the backshore material in the erosion scarp. This protection is a result of the erosion mitigation impacts of the groin field.

Objective:

- Acquire additional shoreline lands and shoreline access rights.

Policies:

- Require the dedication of public beach and rocky shoreline access ways to and along the shoreline where it serves a practical public interest as a condition of development or subdivision approval.

Discussion:
The groin repair is expected to restore the status quo function of the coastline, and may cause stabilization and possibly accretion along the beach. The beach is the primary lateral shoreline access through the region.

Goal:

- Maui will continue to be a beautiful island steeped in coastal, mountain, open space, and historically significant views that are preserved to enrich the residents' quality of life, attract visitors, provide a connection to the past, and promote a sense of place.

Objective:

- A greater level of protection for scenic resources.

Policies:

- Protect views to include, but not be limited to, Haleakala, Iao Valley, the Mauna Kahalawai (West Maui Mountains), Puu Olai, Kahoolawe, Molokini, Molokai, and Lanai, Mauna Kea, Mauna Loa, sea stacks, the Pacific Ocean, and significant water features, ridgelines, and landforms.
- Identify, preserve, and provide ongoing management of important scenic vistas and open space resources, including mauka-to-makai and makai-to-mauka view planes.

Discussion:
The groin repair restores the crest elevation, which is low profile and is not expected to obstruct existing viewplanes.

8.2 State of Hawaii Laws and Regulations

8.2.1 *Hawaii State Planning Act*

The Hawaii State Planning Act (Chapter 226, Hawaii Revised Statutes, as amended) outlines themes, goals, guidelines, and policies for statewide planning. The proposed groin repair project relates to the following objectives stated in §226-11: "*Objectives and policies for the physical environment--land-based, shoreline, and marine resources*":

1. Exercise an overall conservation ethic in the use of Hawaii's natural resources.
2. Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

3. Take into account the physical attributes of areas when planning and designing activities and facilities.
4. Manage natural resources and environs to encourage their beneficial and multiple uses without generating costly or irreparable environmental damage.
5. Pursue compatible relationships among activities, facilities, and natural resources.
6. Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes [L 1978, c 100, pt of §2; am L 1986, c 276, §10].

Discussion:
Coastal erosion is degrading the beach resource and eroding backshore property. The groin repair project would re-place stones on the groins to better stabilize the beach sand and reduce the likelihood of backshore erosion. Beach loss and coastal erosion would result in a restriction of lateral shoreline access and could quickly threaten homes. Implementation of the project would maintain the access, while limiting the release of terrestrial substrate, including soil, into the coastal waters. The project would maintain backshore activities and would not restrict coastal activities. Thus, the groin repair project is consistent with the above objectives.

The proposed project relates to the following objectives stated in §226-12: "Objective and policies for the physical environment--scenic, natural beauty, and historic resources.":

1. Promote the preservation and restoration of significant natural and historic resources.
2. Provide incentives to maintain and enhance historic, cultural, and scenic amenities.
3. Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.
4. Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.
5. Encourage the design of developments and activities that complement the natural beauty of the islands. [L 1978, c 100, pt of §2; am L 1986, c 276, §11].

Discussion:
The proposed project is intended to restore function to the groin structures in order to prevent destabilization of the shoreline. Stabilization of the shoreline will maintain the beach so that it can provide its intended recreational and aesthetic benefits. It will also serve to facilitate lateral access along the shore and provide a first line of defense to the backshore area in the event of storm wave attack. By maintaining the beach, the proposed project would also be maintaining the public's coastal lateral access path, a scenic amenity. The proposed maintenance would use natural stone to be consistent with the existing groins.

The proposed project also relates to the following objectives stated in §226-13, "*Objectives and policies for the physical environment-land, air, and water quality*:"

(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:
1 Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.
2 Greater public awareness and appreciation of Hawaii's environmental resources.

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

1 Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.
2 Promote the proper management of Hawaii's land and water resources.
3 Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.
4 Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.
5 Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.
6 Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.
7 Encourage urban developments in close proximity to existing services and facilities.
8 Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures and visitors. [L 1978, c 100, pt of §2; am L 1986, c 276, §12]

Discussion:

The groin repair is expected to help to maintain the water quality in nearshore waters that become degraded by coastal erosion of backshore material. Stabilizing an eroding shoreline when it approaches infrastructure is a significant and necessary step in coastal erosion mitigation. Stabilizing the shoreline would reduce the threat to public safety that could occur if the groins fail. If the existing groins were to fail, it could allow backshore erosion that leads to a decrease in the quality of Hawaii's land and water resources. The proposed maintenance is an action that would maintain and improve the environment promoting the enhancement of health and well-being of Hawaii's people who visit the shoreline.

The proposed groin repair project relates to the following objectives stated in §226-109: "Climate change adaptation priority guidelines."

1 Ensure that Hawaii's people are educated, informed, and aware of the impacts climate change may have on their communities;
2 Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;
3 Invest in continued monitoring and research of Hawaii's climate and the impacts of climate change on the State;
4 Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;
5 Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change;
6 Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;
7 Promote sector resilience in areas such as water, roads, airports, and public health, by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options;

8 Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities;
9 Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans; and
10 Encourage planning and management of the natural and built environments that effectively integrate climate change policy. [L 2012, c 286, §2]

Discussion:
The proposed maintenance would promote sector resilience to public health by mitigating the ongoing destabilization of the shoreline that would have impacts on public users. The groins have been designed for the present sea level conditions in a manner that would allow for additional stone to augment the groins as the sea level rises. Planning for 3.2 feet of sea level rise today would result in a very large and obtrusive structure that would extend further seaward. The groins, however, have the potential to be resilient against sea level rise. As sea level rises, stone could be added periodically to make the design current based on sea level and wave conditions, rising the structures to match the seas.

8.2.2 *State Land Use Laws*

The Board of Land and Natural Resources (BLNR) regulates uses of the State Conservation District by issuing Conservation District Use Permits (CDUP) for approved activities. The criteria that the Office of Conservation and Coastal Lands (OCCL) will use in evaluating the project are outlined in Hawaii Administrative Rules §13-5-30. Each criterion is listed below, followed by a discussion of how the preferred alternative complies with it.

- The proposed land use is consistent with the purpose of the Conservation District;

Discussion:
The purpose of the Conservation District is to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public's health, safety, and welfare (HAR §13-5-1). The sandy beach on this coastline is an important public trusts resource. Protection and restoration of this sandy beach is an important purpose in the Conservation District and is a key aspect of the proposed project.

In addition, public access along the shoreline is predominately along the existing beach. Loss of beach sand would limit public access along the narrowing beach. As discussed throughout this FEA, this groin repair and replacement project is expected to promote, and restore beach stability, thereby maintaining lateral beach access. Without the project, continued erosion would limit lateral shoreline access and restrict both backshore and shoreline activities.

Maintaining the groins allows for the long-term protection and maintenance of the public trust resource and continuation of the current use levels of the natural resources in the region, including both environmental and recreational. Thus, it is in keeping with the purpose of the Conservation District.

- The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur;

Discussion: The groin repair project is in the Resource Subzone of the Conservation District and consists of land use activities consistent with use P-15 Erosion Control Structure (D-1) (HAR §13-5-22). The resource subzone, as defined by HAR §13-5-13 is intended to "ensure sustained use of the natural resources" of that subzone. The proposed groin repair project would provide protection and restoration of the public beach and its ecosystem, while also providing erosion mitigation. This is in keeping with the BLNR-approved guidance document, COEMAP, to provide necessary protection to the beach resource and coastal lateral access resource.

As specified in HAR §13-5-24(c)(4), the proposed land use is permitted in the Resource Subzone with the acquisition of a Conservation District Use Permit approved by the Board of Land and Natural Resources. The applicant is seeking this permit coverage for the project.

- The proposed land use complies with provisions and guidelines contained in chapter 205A, HRS, entitled "Coastal Zone Management," where applicable;

Discussion:
A Hawaii Coastal Zone Management Program Consistency Review will be accomplished to confirm the consistency of the project with the Coastal Zone Management Act and the objectives outlined in Chapter 205A, HRS (see Section 8.3.5).

- The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community, or region;

Discussion:
The proposed project is designed to protect and restore the coastal natural resources through stabilization of the coastline. The groin repair involves replacing stones to stabilize the beach and protect the shoreline from continued erosion. A portion of the work would be performed in the marine environment. A turbidity containment device will be deployed around the immediate work area to contain any temporary turbidity that might be caused by the project. Containment of turbidity will prevent impact to the nearshore reef. The project is also expected to reduce the release of backshore material, including soil, into the nearshore waters, which would adversely impact habitat.

- The proposed land use, including buildings, structures, and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels; and
- The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable;

Discussion:
The repaired groins will have crest elevations of +4 ft mllw at the heads and +8 ft mllw where they meet the vegetation line, consistent with what is believed to be the original construction. The original groins were in place for nearly 80 years and have stabilized the entire coastline

through their presence. The long-term stability, and compatibility, of the coastline is evidenced through the zero foot per year average annual erosion rate for the region. The project is not expected to obstruct the existing viewplanes. The groin stones will be the same color as the existing stones. The new Groin 3 will be constructed of stone with similar appearance as the other groins.

- Subdivision of land will not be utilized to increase the intensity of land uses in the conservation district;

Discussion:
No property subdivision is needed for the preferred alternative.

- The proposed land use will not be materially detrimental to public health, safety, and welfare.

Discussion:
Once the proposed groin repair has been constructed, there will be no regular sources of emissions or waste that could prove detrimental to public health. Stones that have been dislodged and are in the beach face will be replaced on the groins, removing them from the beach face. All offshore uses have inherent safety risks to users (e.g., inclement weather, rough seas, potentially dangerous marine life). However, the project is not expected to create a significant hazard to public safety and welfare.

8.2.3 *Hawaii Coastal Erosion Management Plan*

The Hawaii Coastal Erosion Management Plan (COEMAP) is a technical document prepared by the Department of Land and Natural Resources and the University of Hawaii School of Ocean and Earth Science and Technology adopted by the Board of Land and Natural Resources (BLNR) in 2000 to be used as a guide for the Department. COEMAP discourages shoreline hardening in favor of "soft" solutions such as beach nourishment.

Discussion:
Figure 8-1 shows the COEMAP model of beach loss in the presence of shoreline hardening, which relies on the following assumptions:

1. The eroding upland is composed of beach quality sand;
2. The release of this sand due to shoreline retreat provides a significant contribution to the sand budget of the beach.

In addition, the model is active in only one horizontal dimension (i.e. cross-shore).

COEMAP recommends several treatments for interim erosion control:

1. "Two technical approaches have potential to fulfill emergency needs: large, protective sand bags, and small-scale sand nourishment (see Recommendation 11, above). Large 1-ton sand-filled "sea bags" are being used successfully to protect property on Oahu, Maui,

Molokai, and Kauai. These projects utilize sandbag revetments constructed at a low slope, ideally attended by small scale sand nourishment."

2. "In certain settings, a small groin or the use of detached breakwaters may be desirable to stabilize the fill. Landowners should be prepared to renourish the fronting beach as long as the sea bags remain. Maintaining public access, and the ecological characteristics of the beach, should be given high priority."

Discussion:

The purpose of the proposed groin maintenance project is to restore functionality to a series of small groins. For nearly 80 years, this groin field has stabilized the coastline and the sandy beach.

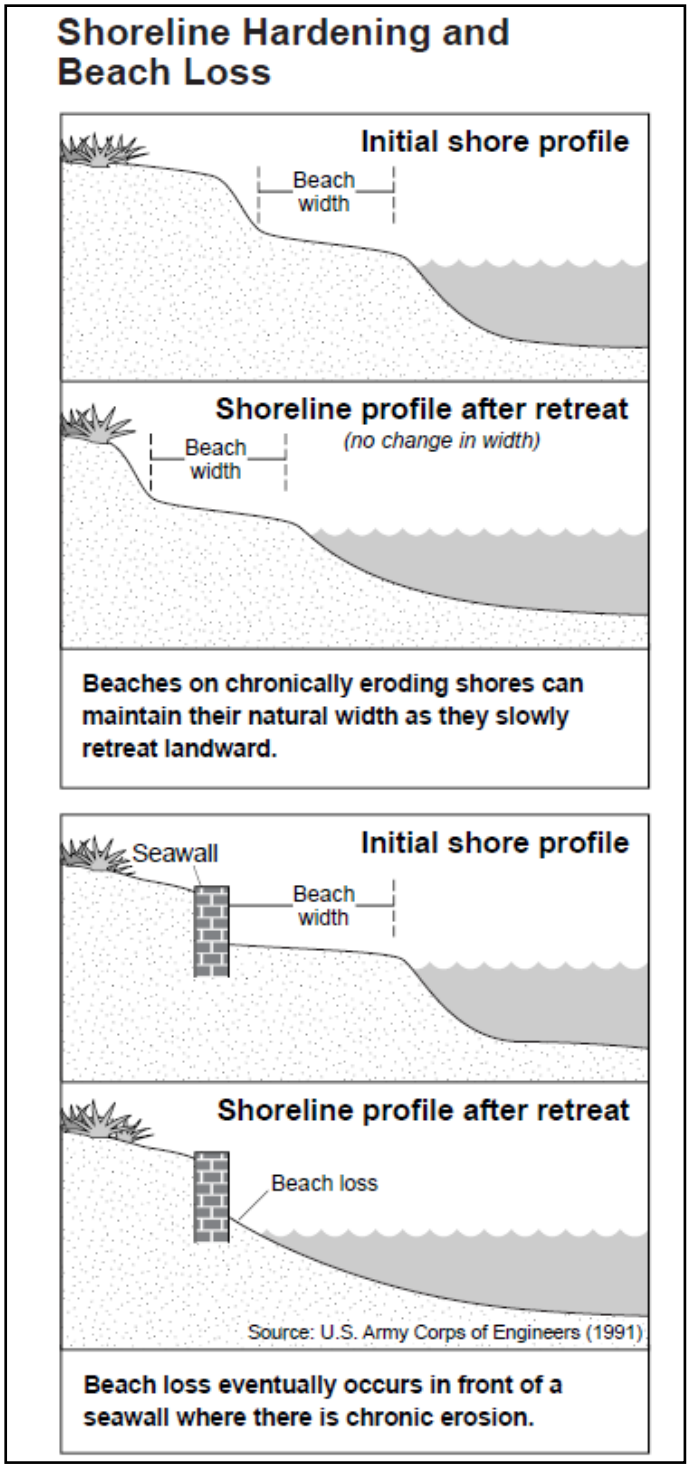

Figure 8-1 COEMAP model for beach loss relies on an extensive and homogeneous sand continuum between the beach and upland areas.

8.3 Federal Acts and Legislation

8.3.1 *Archaeological and Historic Preservation Acts*

Consultation with the State Historic Preservation Division will be accomplished to ensure that the project complies with the provisions of the Archaeological and Historic Preservation Act (16 U.S.C. § 469a-1) and the National Historic Preservation Act (NHPA) (16 U.S.C. § 470(f)).

Discussion:
If necessary, a NHPA Section 106 review will be accomplished during federal (Department of the Army) permit processing for work in the water. To initiate the process, discussions with the DLNR – State Historic Preservation Division (SHPD), produced the following recommendations: (1) Narrative description of the proposed project, including total area in acres and nature of any land alteration, new construction, demolition or modification of existing structures; (2) TMK map showing the full extent of the project area within the affected parcel; (3) Description and photographs of current vegetation cover and condition of the project area, including structures, roads, wall or other features within the project area; (4) Summary of land use history, such as previous intensive cultivation, grubbing or grading; and (5) Copies or dates of previously approved permits, survey reports, and/or prior SHPD review letters that pertain to the property. There will be limited excavation in the coastal plain to extend several groins' roots.

8.3.2 *Clean Air Act (42 U.S.C. § 7506(c))*

The only emissions associated with the project would be during construction. Once construction is completed the proposed project is not expected to produce any emissions. The proposed project is consistent with the provisions of the Clean Air Act.

8.3.3 *Clean Water Act (CWA) of 1977, as amended (33 USC §§1251-1387)*

The Clean Water Act (CWA) is the key legislation governing surface water quality protection in the United States. Sections 401, 402, and 404 of the Act require permits for actions that involve wastewater discharges or discharge of dredged or fill material into waters of the United States. The placement of stone into nearshore marine waters constitutes fill as defined in the CWA and is subject to regulations implementing the CWA.

Discussion:
The proposed project would restack existing rock and place new rock within the existing groins' footprints. The repairs and improvements would constitute fill activities within State waters. An application will be made to the Department of the Army for authorization to construct the project under Section 404 of the CWA. As a corollary, a Section 401 Water Quality Certification application will be submitted to the State of Hawaii Department of Health Clean Water Branch.

8.3.4 *Rivers and Harbors Act (33 USC §403)*

Section 10 of the Rivers and Harbors Act, 33 USC §403, requires a Department of the Army (DA) permit for any activity that obstructs or alters navigable waters of the U.S., or the course, location, condition, or capacity of any port, harbor, refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water.

Discussion:
The proposed project would restack existing rock and place new rock within the existing groins' footprints. An application will be made to the Department of the Army for authorization to construct the project under Section 10 of the River and Harbors Act.

8.3.5 *Coastal Zone Management Act (16 U.S.C. § 1456(c) (1))*

Enacted as Chapter 205A, HRS, the Hawaii Coastal Zone Management (CZM) Program was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. The CZM area encompasses the entire state, including all marine waters seaward to the extent of the state's police power and management authority, as well as the 12-mile U.S. territorial sea and all archipelagic waters.

Discussion:
Application will be made to the State Office of Planning, CZM Program, for a CZM Federal Consistency Determination and to the County of Maui for a Special Management Area Permit.

8.3.5.1 *Recreational Resources*

Objective: Provide coastal recreational opportunities accessible to the public.

Policies:

- Improve coordination and funding of coastal recreational planning and management;
- Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area;
- Protect coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
- Require replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;
- Provide and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
- Provide an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
- Ensure public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
- Adopt water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;
- Develop new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

- Encourage reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the Land Use Commission, Board of Land and Natural Resources, and county authorities.

Discussion:
The primary purpose of the project is to maintain the pre-existing groin field. The groin field has been stabilizing the coastline for nearly 80 years, and littoral processes have equilibrated to the presence of the structures. Failure of the groin field would result in large scale destabilization of the regional coastline, which would likely have an immediate and pronounced negative impact on regional recreational resources. Alternately, the proposed project maintains the existing recreational resources in the region.

8.3.5.2 *Historic Resources*

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

Policies:

- Identify and analyze significant archaeological resources;
- Maximize information retention through preservation of remains and artifacts or salvage operations; and
- Support state goals for protection, restoration, interpretation, and display of historic resources.

Discussion:
In consultation with the DLNR – State Historic Preservation Division (SHPD), the following recommendations include: (1) The structures should be evaluated appropriately prior to any modification as they may be eligible for listing on the Hawaii and/or National Registers of Historic Places. (2) If ground alterations occur at the project site or along access for ingress and egress, an archaeological monitor should be present. (3) Consult SHPD if native vegetation plantings are to take place on State-owned or privately-owned land in the Special Management Area. (4) Keep in mind that there is a high volume of human skeletal remains recovered from the shoreline in this area. If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the State Historic Preservation Division, Maui Police Department and the Division of Conservation, and Resources Enforcement (DOCARE) should be notified.

8.3.5.3 *Scenic and Open Space Resources*

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

Policies:

- Identify valued scenic resources in the coastal zone management area;

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

Discussion:
The proposed project would place rock in the same location of the existing groins. The highest elevation of rock would be +8.0 ft msl, consistent with the existing elevation. Much of the stone would be placed below msl, thus having no appreciable effect on scenery and open spaces. The proposed project would preserve the quality of coastal scenic and open space resources by continuing beach stabilization. The project would also protect against failure of the groins and sudden release of backshore sediment into nearshore waters, which would cause turbidity and negatively impact the scenic view of the nearshore waters.

8.3.5.4 *Coastal Ecosystems*

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

Policies:

- Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
- Improve the technical basis for natural resource management;
- Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
- Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
- Promote water quantity and quality planning and management practices that reflect the tolerance of freshwater and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Discussion:
The proposed project would maintain existing groin structures by restoring the rock to what is thought to have been the original design within the existing footprint. The proposed action is not anticipated to have a negative effect on the valuable coastal ecosystem. Coral reefs and other biology are sparse in the vicinity of the groins along the shoreline. The project implementation would include an Applicable Monitoring and Assessment Plan that would be followed to promote water quality management practices to observe impacts to water and alert the construction manager if a water quality contingency plan needs to be implemented. The project

construction specifications will include requirements that will reduce, minimize, and avoid the potential for adverse impacts during construction. The long-term result of the proposed maintenance project is likely to be a stabilization of the sandy nearshore and shoreline ecosystem that is currently at risk. Stabilization of this ecosystem is a benefit to the native, protected, and endangered species that depend on sand beaches and sandy nearshore marine substrate.

8.3.5.5 *Economic Uses*

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

Policies:

- Concentrate coastal dependent development in appropriate areas;
- Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
- Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
- Use of presently designated locations is not feasible;
- Adverse environmental effects are minimized; and
- The development is important to the State's economy.

Discussion:
Maintenance of the groins would employ local contractors and laborers, thus adding revenue to the State's economy. Once constructed, the proposed maintenance project is expected to have no long-term economic impact on the State of Hawaii. Beach stabilization would maintain an existing economic resource of the State of Hawaii.

8.3.5.6 *Coastal Hazards*

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

Policies:

- Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
- Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;
- Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
- Prevent coastal flooding from inland projects.

Discussion:
The proposed project is designed to stabilize the shoreline, maintaining the space between the water and land-side development. This would support the ability of the beach to dissipate wave energy and reduce runup, substantially reducing the risk of shoreline destabilization, and protecting backshore structures. The proposed project is maintenance of existing structures and is not anticipated to have a significant effect on coastal inundation due to tsunamis or storms.

The no action alternative, however, allows the structures to continue to degrade and destabilizes the coastline, which exacerbates coastal natural hazard exposure in the region.

8.3.5.7 *Managing Development*

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

Policies:

- Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;
- Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and
- Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Discussion:
The proposed project permitting and approval process will provide an opportunity for public participation in the plan formulation process. Of the seven groins, groin 3 currently has temporary sandbags alongside the structure to stabilize the degraded structure. A requirement of the sandbag permit, is that the bags are removed by June 19, 2023 allowing time for this regional groin repair and replacement plan to be designed, reviewed and permitted, and implemented.

8.3.5.8 *Public Participation*

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

Policies:

- Promote public involvement in coastal zone management processes;
- Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and
- Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion:
The public has had an opportunity to review and comment on this EA as part of

the public review process. Additionally, other permits may require public notices and comment periods prior to approval promoting more public involvement in coastal zone management processes. During the proposed project, signs would be posted at the project site to disseminate information about project activities.

8.3.6 *Beach Protection*

Objective: Protect beaches for public use and recreation.

Policies:

- Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;
- Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
- Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion:
The goal of proposed project is intended to maintain the existing structures that stabilize the coastline. The regional groin field has been in place for nearly 80 years and the littoral processes are equilibrated to and stabilized by their presence. The proposed project is intended to protect and maintain the sandy beach. This goal would help minimize loss of improvements due to erosion and result in improved aesthetic and engineering solutions to erosion along the shoreline without interfering with existing recreational and waterline activities. The proposed project maintains the existing beach in its stabile, historic condition.

8.3.7 *Marine Resources*

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

Policies:

- Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
- Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;
- Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
- Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
- Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion:
The proposed project is expected to maintain the nearshore and coastal ecosystem, and will likely have a positive effect on marine and coastal resources when compared with the no-action alternative. The project plan would be fully coordinated with federal and state marine resource agencies, including NOAA/NMFS, USFWS, USEPA, and DLNR/DAR.

8.3.8 *Endangered Species Act (16 U.S.C. 1536(a)(2) and (4))*

The Endangered Species Act (16 U.S.C. §§ 1531-1544, December 28, 1973, as amended 1976-1982, 1984 and 1988) provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the U.S. or elsewhere. The Act mandates that federal agencies seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes. It provides for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, and contains exceptions and exemptions.

Discussion:
Existing biota on and near the project site and potential impacts of the proposed project are discussed in Section 5 and 6 of this FEA. Endangered turtles and monk seals are known to frequent the project area. The Best Management Practices Plan outlines a plan for avoiding impacts endangered species in the work area. Additional requirements to avoid impacts to endangered species may be imposed by marine resource agencies during the permitting and review process.

8.3.9 *Fish and Wildlife Coordination Act (FWCA) of 1934, as amended (16 USC §§661-666[c] et seq.)*

The FWCA provides for consultation with the USFWS and other relevant Federal and State agencies when a Federal action proposes to modify or control U.S. waters for any purpose.

Discussion:
This consultation will be initiated during the federal permitting process.

8.3.10 *Magnuson-Stevens Fishery Conservation and Management Act (16 USC §1801 et seq.)*

The Magnuson-Stevens Act (16 USC §1801 et seq.), as amended by the Sustainable Fisheries Act, PL 104-297, calls for action to stop or reverse the loss of marine fish habitat. The waters out to 200 miles (mi) around the Hawaiian Islands are under the jurisdiction of the Western Pacific Regional Fishery Management Council (WPRFMC). The WPRFMC has approved a Fisheries Management Plans (FMP) for Hawaii that designates all the ocean waters surrounding Oahu, from the shore to depths of over 100 feet, including the area that would be affected by the proposed project as “Essential Fish Habitat” (EFH).

The WPRFMC has also identified “Habitat Areas of Particular Concern” (HAPC). As defined in the 1996 amendments to the Act, these habitats are a subset of EFH that are “rare, particularly

susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area."

Discussion:
The area that would be affected by the proposed project is not within a HAPC, as it is not on hardbottom as established for the coral HAPC in Maui Nui.

8.3.11 *Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC §§1361-1421(h) et seq.)*

Reauthorized in 1994, the MMPA establishes a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas and on importing of marine mammals and marine mammal products into the U.S.

Discussion:
The proposed project will be accomplished in accord with the requirements of the MMPA.

8.3.12 *Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC §§703 712 et seq.)*

The Migratory Bird Treaty Act (MBTA) is a bilateral migratory bird treaty with Canada, Mexico, Japan, and Russia. Sections 703 to 712 of the Act prohibit the taking of migratory birds in the absence of a permit.

Discussion:
The Best Management Practices Plan includes methods of reducing impacts to birds within the project area. Within one week prior to construction, a bird monitor would survey the project area for protected or endangered bird nests or active brood sites. Additional requirements may be imposed by resource agencies during the permit review process to minimize impacts to migratory birds.

8.3.13 *National Historic Preservation Act (NHPA) of 1966 (16 USC §470 et seq.)*

Section 106 of the NHPA of 1966, 16 USC §470(f), as amended, requires Federal agencies having direct or indirect jurisdiction over a Federal undertaking to take into account effects on any district, site, building, structure, or object that is included or is eligible for inclusion in the National Register of Historic Places (NRHP) prior to the approval of expenditure of any funds or issuance of any license or permit.

Discussion:
The groins were built prior to October 1, 1964 and may be evaluated as historic structures during the permit review process. An application for shoreline encroachment has been submitted to the Department of Land and Natural Resources.

8.3.14 *Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC §3001)*

NAGPRA provides for the protection and repatriation of Native American and Native Hawaiian human remains and cultural items discovered on Federal lands.

Discussion:
The Proposed Action does not involve the use of Federal land and is not, therefore, subject to the Act.

8.3.15 *EO 13089, Coral Reef Protection (63 FR 32701)*

EO 13089, dated June 11, 1998, directs all Federal agencies whose actions may affect U.S. coral reef ecosystems to:

1. Identify their actions that may affect U.S. coral reef ecosystems;
2. Utilize programs and authorities to protect and enhance the condition of such ecosystems; and
3. Ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems.

Discussion:
A benthic assessment of the proposed action found the area surrounding the groins to be a sand rubble bottom with some tufts of blue-green algae. There are also some opihi on the existing boulders. Potential impacts to the environment are discussed in Section 6. An Applicable Monitoring and Assessment Plan would be utilized during the proposed project to monitor impacts to the ecosystem and alert the construction manager to any triggers to implement additional Best Management Practices.

8.3.16 *EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (16 USC §§ 703-711) (66 FR 3853)*

Under EO 13186, dated January 10, 2001, all Federal agencies taking actions that have, or are likely to have, a measurable negative impact on migratory bird populations are directed to develop and implement a Memorandum of Understanding (MOU) with USFWS that promotes the conservation of migratory bird populations.

Discussion:
Best Management Practices would be used to minimize impacts to migratory birds in the project area. Within one week prior to construction, a bird monitor would survey the project area for protected or endangered bird nests or active brood sites. Additional measures may be required by resource agencies to protect birds. The proposed project is not anticipated to have a measurable negative impact on migratory bird populations.

8.3.17 *EO 12898, Environmental Justice*

Under EO 12898, dated February 11, 1994, Federal agencies are required to address the potential for disproportionately high and adverse environmental effects of their actions on minority and low-income populations. Agencies are required to ensure that their programs and activities that affect human health or the environment do not directly or indirectly use criteria, methods, or practices that discriminate on the basis of race, color, or national origin. NEPA documents are specifically required to analyze effects of Federal actions on minority and low-income populations and, whenever feasible, to develop mitigation measures to address significant and adverse effects on such communities. The EO states that the public, including minority and low-

income communities, should have adequate access to public information relating to human health or environmental planning, regulation, and enforcement.

Discussion:
The proposed project would promote beach stabilization and increase public lateral access along the shoreline, including members of low-income and minority groups. Unless information to the contrary arises out of the environmental review process, there does not appear to be any mechanism through which the proposed project could impose disproportionately high adverse effects on minority or low-income populations.

8.3.18 *EO 13123, Greening the Government through Efficient Energy Management (65 FR 24595)*

E0 13123, Part 2, Section 204, dated April 21, 2000, states "each agency shall strive to expand the use of renewable energy within its facilities and in its activities by implementing renewable energy projects and by purchasing electricity from renewable energy sources."

Discussion:
Maintenance of the existing groins does not involve the ongoing use of electricity.

9. SIGNIFICANCE CRITERIA

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

- The beach is experiencing both chronic and episodic erosion, and the backshore erosion is evident by the erosion scarps.
    - The proposed project, groin repair and reconstruction, is expected to stabilize the shoreline and reduce erosion of the natural resource.
    - The no action alternative results in failure of the groin system, in particular Groin 3, which is expected to destabilize the shoreline and cause significant erosion along the entire region.
- There are no significant flora or fauna expected to be lost due to the proposed groin repair and replacement project.
    - No threatened or endangered species are expected to be impacted by the project.
- There are two subsurface cultural deposits near the project site (Site 50-50-05-01799 and 50-50-05-01798). Site 50-50-04-01783, known as the Kanaha Pond is less than two miles south of the project area. The pond is said to have been built by Kiha-a-Pi‘ilani in the early 1500s. He Kiha-a-Pi‘ilani was the brother-in-law of ‘Umi-a-Līloa, a ruling ali‘i-ai-moku (district high chief of Hawai‘i).
    - The proposed project includes preparation of an Archaeological Monitoring Plan by an archaeological consultant prior to construction to document the historical significance of the groins and project area.
    - During construction, an archaeological monitor would be present during any backshore excavation. If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the State Historic Preservation Division, Maui Police Department, and the Division of Conservation and Resources Enforcement will be notified. The State Historic Preservation Division will be contacted by one of these agencies if needed.
    - An end-of-work Archaeological Monitoring Report would be prepared to document the findings or lack thereof during construction.
- The proposed project is unlikely to have any significant adverse effect on known cultural or traditional Hawaiian practices, as the placement location is within an active beach face.
    - The repaired and replaced groins are expected to provide protection to prevent loss or destruction of natural and cultural resources that may be located in the un-eroded backshore environment. In addition, archaeological monitoring will be conducted during the construction project.
    - The no action alternative is likely to result in erosion of the backshore, resulting in the potential exposure of natural and cultural resources.

2. Curtails the range of beneficial uses of the environment.

- There may be temporary short-term impacts during construction; however, these are not anticipated to be significant and will be mitigated to the maximum extent practicable by the use of Best Management Practices (BMPs) and monitoring procedures.

- The groin repair and replacement project would provide stabilization of the beach and backshore. No adverse long-term impacts to the environment are anticipated to result from this project.
    - The proposed project is expected to preserve the beneficial use of the shoreline area by preserving public coastal lateral access along this segment of the shoreline.
    - The no action alternative is likely to result in degradation of beneficial uses of the environment as it results in continued degradation of the beach and access.

3. *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*

- The groin repair and replacement project is consistent with Hawaii's State Environmental Policy as established in Chapter 343(4)(A), HRS, to establish, preserve, and maintain recreation areas, including the shoreline, for public recreational use.
    - The preferred activity is needed to preserve public coastal lateral access along the shoreline.
- The proposed groin repair and replacement project is located within Conservation land and in designated critical habitat for the Hawaiian Monk Seal as discussed in Section 6.2.2 *Impacts on Protected Species* in this EA. That section includes a discussion of mitigation measures should there be a siting of rare, threatened, or endangered species during the construction of the proposed groin project. If endangered or threatened species are encountered, all BMPs and mitigation measures will be implemented (Section 6.2.2 and Section 10).

4. *Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.*

- The project would have no adverse social or economic impact to the State. The groin repair and replacement project is expected to have some positive economic impact to the applicant as it is expected to stabilize the beach and shoreline.
- The proposed project may also have a positive economic impact on the State's ownership of the coastal area by promoting accretion and increasing public lateral access to the beach.

5. *Substantially affects public health.*

- The proposed project, when implemented, is expected to have no adverse public health impacts.
- During construction, the contractor will be required to provide ample clearance for emergency vehicles at all times.
- The proposed project does not involve any activities that would permanently alter the need for, or ability to provide, emergency services.
- The construction site, by nature, could be a health and safety hazard to the public. The construction site will be clearly marked and shoreline users would be required to take a more seaward route around the construction site.

6. *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

- The project is not expected to alter the existing land use pattern in and around the project site.
- The proposed project is not expected to affect public infrastructure and services.
- The proposed groin repair and replacement project has little potential to affect public infrastructure and services.
- Once in operation, it will not require water or electrical power.
- In and of themselves, the groins do not generate a need for additional sanitary wastewater collection and treatment facilities and it would not affect stormwater runoff that might impact the County's stormwater system.
- Most people visiting that section of the beach would arrive by foot rather than in vehicles, and the improvements are not expected to increase the resident or visitor population of the island.

7. *Involves a substantial degradation of environmental quality.*

- Other than temporary, short-term environmental impacts during construction, which are generally not considered significant, the proposed project is not expected to result in impacts which would degrade the environmental quality in the project area.
    - The groin repair and replacement should improve existing environmental conditions by mitigating ongoing erosion and decreasing the amount of sediment released into nearshore waters from the erosion scarp. The project should not permanently degrade water quality, nor impact marine flora and fauna
    - The no action alternative is likely to result in increased erosion and the consequent release of sediment and backshore sediment into the nearshore waters.

8. *Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.*

- The proposed groin repair and replacement project would be a stand-alone project, with no cumulative impacts or commitment for larger actions. Its intended purpose is to stabilize the beach and shoreline.

9. *Substantially affects a rare, threatened, or endangered species, or its habitat.*

- The proposed project should have a long-term positive effect on the coastal environment by stabilizing the shoreline and allowing sand to accumulate when there is available material in the littoral cell.
- The following are species are believed to be in the project area and may be impacted by the proposed action: 1) Hawaiian hoary bat, ope'ape'a (Lasiurus cinereus semotus), 2) Wedge-Tailed Shearwater, ʻuaʻu kani (Puffinus pacificus), 3) Hawksbill Sea Turtle, honu'ea (Eretmochelys imbricata), 4) Green Sea Turtle, honu (Chelonia mydas), 5) Hawaiian Monk Seal, ʻilio holo I ka uaua (Neomonachus schauinslandi). Please refer to Section 6.2.2 of this Environmental Assessment for a detailed discussion and analysis on the potential impacts and mitigation measures for the five (5) species listed above.

Furthermore, Section 6.2.2 and Section 10 list BMPs to mitigate impacts to rare, threatened, or endangered species and their habitats.

10. Detrimentally affects air or water quality or ambient noise levels.

- There will be some temporary, short-term impacts to air and water quality, and noise levels during construction. However, these impacts would be limited to the construction period and are not expected to be significant.
    - BMPs will be in effect to help minimize the construction impacts.
    - Once construction is complete there will be no activity or mechanism for further air, water, or noise impacts.
- In addition, the proposed project stabilizes the shoreline and prevents the release of terrigenous fine material into the nearshore waters.
    - The no action alternative is likely to result in increased erosion and the consequent release of sediment and backshore sediment into the nearshore waters.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

- The proposed groin repair and replacement will be subject to the same conditions as the existing groins. The conditions may include prevailing wave environment at the shoreline, particularly during winter season high surf, storm conditions, and large trade wind wave events.
- The proposed project is expected to promote beach accretion between the groins and should continue to mitigate the erosion hazard once the groin field is returned to normal function. It is not expected to negatively alter erosion or negatively affect coastal processes because it is an in-kind and in-place improvement to the existing groins.
    - The groins repair project is not expected to change the shoreline elevation and would not change the existing tsunami or storm wave flood hazard.
    - If the groins are not repaired under the no action alternative, erosion is expected to continue and threaten the backshore properties.

12. Substantially affects scenic vista and view planes identified in county or state plans or studies.

- The proposed project is expected to protect and improve the natural environment, restore natural resources, retain scenic resources, and enhance scenic views.
- The repair project will remove rock from the beach and place the rock on the groins, improving the appearance of the beach.
- The groins are not expected to impact view plane when viewed from the backshore.

13. Requires substantial energy consumption.

- Other than energy expended during construction operations, the groin repair and replacement will require no additional energy consumption.

Considering the sum of the effects of every phase of the proposed project on the quality of the environment, including the overall and cumulative effects, the expected primary and secondary consequences, and the cumulative as well as short-term and long-term effects of the proposed

project, the proposed project is not anticipated to have a significant effect on the environment. [HAR § 11-200-12]

10. Mitigation – BEST MANAGEMENT PRACTICES

10.1 Best Management Practices Plan

Although no significant adverse environmental impacts are anticipated to arise from the proposed project, this Best Management Practices Plan (BMPP) has been developed as a mitigation measure to ensure that adequate protective measures are in place during the groin repair at the subject property's shoreline. This plan is designed to prevent, if possible, or minimize adverse impacts to the environment. The project specifications will require the Contractor to adhere to environmental protection measures, including, but not limited to, those included in this plan.

10.1.1 *General*

This section covers the requirements of environmental and pollution control during construction activities. The Contractor shall be responsible for conformance to Title 11, Chapter 60 of the Public Health Regulations, Department of Health, State of Hawaii.

1. With the exception of those measures set forth elsewhere in this plan, environmental protection shall consist of the prevention of environmental pollution as the result of construction operations under this project. For the purpose of this plan, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, affect other species of importance to man, or degrade the utilization of the environment for aesthetic and recreational purposes.

2. The work shall include the following:

    A. Make sure that all permits required for this plan are obtained and valid for the construction period.

    B. Provide all facilities, equipment and structural controls for minimizing adverse impacts upon the environment during the construction period.

3. Applicable Regulations: In order to provide for abatement and control of environmental pollution arising from the construction activities of the Contractor and his subcontractors in the performance of the work, work performed shall comply with the intent of the applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement, including, but not limited to the following regulations:

    A. State of Hawaii, Department of Health, Administrative Rules. Chapter 55. WATER POLLUTION CONTROL: Chapter 54, WATER QUALITY STANDARDS.

    B. State of Hawaii, Department of Health, Administrative Rules, Chapter 59, AMBIENT AIR QUALITY: Chapter 60, AIR POLLUTION CONTROL LAW.

    C. State of Hawaii, Occupational Safety and Health Standards, Title 12, Department of Labor and Industrial Relations, Subtitle 8, Division of Occupational Safety and Health, Subparagraph 12-202-13, ASBESTOS DUST: Environmental Protection Agency,

Code of Federal Regulations Title 40, Part 61 Subpart A, NATIONAL EMISSION STANDARDS FOR AIR POLLUTANTS and Subpart B, NATIONAL EMISSION STANDARDS FOR ASBESTOS; and U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Asbestos Regulations, Code of Federal Regulations Title 29, Part 1910.

10.1.2 *Material Management*

1. All maintenance equipment and material shall be free of contaminants of any kind including excessive silt, sludge, anoxic or decaying organic matter, clay, dirt, oil, floating debris, grease, foam, or any other pollutant that would produce an undesirable condition to the beach or water quality.

2. All maintenance materials shall be free from any objectionable sludge, oil, grease, scum, excessive silt, organic material or other floating material.

3. Only a minimum quantity of materials necessary for the work will be stored on site.

4. Mean higher high water (mhhw), also representing mean high water mark, will be marked along the shoreline prior to conducting operations to ensure that no unauthorized fill is placed, nor unauthorized equipment operated below mhhw.

5. All flammable and reactive liquids will be kept in sealed and clearly labeled original or compatible containers and stored under cover more than fifty (50) feet from the edge of the property and away from the nearest drain and receiving waters.

6. Storage and stockpiling area on land or onboard boats will be kept clean and well organized to prevent spills or run out.

7. Materials will be used in strict accordance with the manufacturer's instructions.

10.1.3 *Waste Management*

Note: No hazardous wastes are anticipated for this project.

1. All waste will be collected and placed daily in the container located in the upland area inshore of the project area and then disposed of off-site.

2. The Contractor will arrange for pick up and disposal of the filled container as necessary.

3. Cleanup of waste will be conducted through sweeping, shoveling, or vacuuming operations only.

4. Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food at the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged.

5. Flammable or reactive waste will be placed in a separate area more than 50 feet from the edge of the property, nearest drain inlet, and the shoreline.

10. The Contractor and the owner are responsible for the proper handling, storage and/or disposal of all waste generated by project activities.

11. Any maintenance activity related debris that may pose an entanglement hazard to marine protected species must be removed from the project site if not actively being used and/or at the conclusion of the maintenance activity.

12. The Contractor shall not dispose of any concrete, steel, wood, and any other debris into State or Federal waters. Any debris that falls into the State and Federal water shall be removed at the Contractor's own expense.

13. No contamination (trash or debris disposal, alien species introductions, etc.) of marine (reef flats, lagoons, open oceans, etc.) environments adjacent to the project site shall result from project related activities.

14. The Contractor shall remove all floating or submerged materials and/or debris at the end of each day, with the exception of any silt or debris containment devices.

15. In the event that floating hydrocarbon (oil, gas) products are observed, the Contractor or his designated individual will be responsible for directing that in-water work be halted so that appropriate corrective measures are taken in accordance with the Oil Spill Response Plan. The Department of Land and Natural Resources shall be notified as soon as practicable, and the activity causing the plume will be modified by containment. The responsible individual will document the event and the measures taken to correct the issue and will report the incident (with photographs) to the Office of Conservation and Coastal Lands and the Department of the Army Regulatory Office as soon as is practicable. Work may continue only after the issue is no longer visible.

16. No contamination of the marine environment shall result from the permitted activities. Particular care must be taken to ensure that no petroleum products, trash or other debris enter near-shore and open ocean waters. When such material is found within the project area, the Contractor, or his designated construction agent, shall collect and dispose of this material at an approved upland disposal site.

17. Waste materials and waste waters directly derived from maintenance activities shall not be allowed to leak, leach or otherwise enter marine waters.

18. Maintenance operations shall be conducted so as to prevent the discharge or accidental spillage of pollutants, solid waste, debris, and other objectionable wastes in surface waters and underground water sources.

19. Care shall be exercised in the removal and transporting of debris and rubbish for disposal.

20. Any spillage on the work surfaces will be cleaned up immediately.

21. Loads will be covered when transported.

22. Project site inspection and debris sweeps will be completed at the end of each work day. A full inspection of the project site will be conducted at the end of the project to ensure that no visible debris or project waste is present at the site upon completion of the project.

10.1.4 *Vehicle and Equipment Management*

1. Fueling operations will be monitored to prevent spills, leaks, and overflows. Equipment will be fueled away from any drain or shoreline. A spill pan will be used to catch spill/leaks. Equipment will not be "topped off." Spill cleanup materials will be readily accessible.

2. Construction equipment (except small tools) shall be maintained off-site. If emergency repairs or maintenance on large equipment must be performed, drip pans or drop cloth will be placed under the vehicle or equipment to catch any spills/leaks.

3. Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. Manage all used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste.

4. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Wastewater shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basin unless treated to comply with the State Department of Health water pollution regulations.

10.1.5 *Historic or Cultural Features*

1. No adverse impacts to any historical or cultural feature are expected since the project is the maintenance of existing structures.

2. An archaeological monitor shall be present during project operations.

3. Should any unanticipated archaeological site(s), such as walls, platforms, pavements, mounds, or remains such as artifacts, burials, or concentrations of charcoal or shells be uncovered by the work activity, all work shall cease in the immediate area and the contractor shall notify the State Historic Preservation Division at 808-692-8015. No work shall resume until the owner/contractor obtains clearance from the Historic Preservation Division.

10.1.6 *Environmental Protection*

1. All permits and clearances shall be obtained prior to the start of any maintenance activities. The Contractor and his sub-contractors shall ensure that all maintenance work complies with all permit conditions and commitments made with environmental agencies.

2. Any project related debris that may pose an entanglement hazard to protected species must be removed from the project site if not actively being used and/or at the conclusion of the proposed project.

3. All project activities shall be confined to areas defined by the drawings and specifications. No project materials shall be stockpiled in the marine environment outside of the immediate project area.

4. Visual inspections will be documented with photographs and written descriptions, if necessary.

5. The Contractor shall perform the work in a manner that minimizes environmental pollution and damage as a result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of the maintenance activities.

6. The contractor shall complete daily inspection of equipment for conditions that could cause spills or leaks; clean equipment prior to operation near the water; properly site storage, refueling, and servicing sites; and implement spill response procedures and stormy weather preparation plans.

7. The project shall be completed in accordance with all applicable State and County health and safety regulations.

8. The Contractor shall provide notifications to the National Marine Fisheries Services, efhesaconsult@noaa.gov, at least 72 hours prior to the scheduled start of maintenance activities. The notification shall include the associated permit numbers, a project description, and who the client is.

9. Project operations must cease if unusual conditions, such as large tidal events and high surf conditions affect the project site, except for efforts to avoid or minimize resource damage.

10. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.

11. Do not intentionally disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

12. Provide and maintain, during the life of the contract, environmental protection measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project.

Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

10.1.7 *Oil and Spill Containment*

1. The Contractor shall ensure that the Emergency Spill Response Plan, detailed in this document, is in place which shall detail procedures for managing the accidental release of petroleum products to the aquatic environment during construction. Fueling of project related vehicles and equipment should take place away from the water. Absorbent pads, containment booms, and skimmers will be stored on site to facilitate the cleanup of petroleum spills.

2. Any spills or other contaminations shall be immediately reported to the DOH Clean Water Branch (808-586-4309) and through email: cleanwaterbranch@doh.hawaii.gov.

3. Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with temporary berms or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 2 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

4. Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release.

5. Maintain spill cleanup equipment and materials at the work site. Clean up all hazardous and non-hazardous waste spills.

10.1.8 *Monitoring Measures for Visually Detected Contaminant*

1. All work operations shall be performed in conformance with the applicable provisions of the Hawaii Administrative Rules (HAR), Title 11 Chapter 55 Water Pollution Control and Title 11, Chapter 54 Water Quality Standards, and to the Erosion and Sedimentation Control Standards and Guidelines of the Department of Public Works, State of Hawaii.

2. The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface or marine waters. Daily visual inspection of the construction site and its environs will be conducted by a designated individual, or his representative, to verify that the permitted activities do not result in uncontrolled adverse environmental impacts. Visual inspections will be documented with photographs and written descriptions, if necessary.

    a. Daily Inspection: The project site will be inspected daily to ensure BMP's are maintained to confine and isolate potential pollutants from being discharged into

surrounding areas. The site will be inspected to ensure that materials are properly stored, rubbish is being collected and disposed of properly, etc.

b. Deficiencies identified by daily inspections shall be corrected immediately. Work activities will stop and remain stopped until the deficiencies have been corrected.

10.1.9 *Water Quality Monitoring*

1. The Contractor shall follow the approved Water Quality Monitoring Plan and Applicable Monitoring and Assessment Program.

2. The Contractor shall incorporate all erosion control measures shown in the drawings and the BMPP for this project. The plans may be modified as necessary to adjust to conditions that develop during construction. Any changes to the BMPP must be submitted immediately to the DOH for review.

3. Prior to the start of construction, the Contractor shall establish a baseline turbidity geometric value in the area surrounding the construction operation. The turbidity measurements shall be in accordance with standard methods. The baseline value will be the maximum pre-construction turbidity level, plus 10%.

4. Turbidity outside the active project site shall not exceed the baseline turbidity geometric value. The Contractor shall cease all work if unusual turbidity is observed and take the necessary remedial action to correct the problem.

5. Ambient Water Quality Monitoring Assessment Program: Trained professionals will be conducting the monitoring, including pre-construction, during construction and post-construction monitoring. Monitoring and sample testing shall comply with the DOH CWB – "General Monitoring Guideline for Section 401 Water Quality Certification Projects."

10.1.10 *Erosion Control and Silt Containment*

1. A 3-foot depth silt curtain/boom will be installed around the in-water boundaries of the project area. A silt fence will be installed on the landward boundaries of the project area.

2. Silt curtains and silt fences will be individually anchored and regularly inspected during project operations.

3. Silt curtains/booms and silt fences will be left in place each night. All anchors will be inspected prior to sunset.

6. Visual inspections will include monitoring of the effectiveness of the silt curtain and silt fences to ensure proper function.

7. Visual inspections will be documented with photographs and written descriptions, if necessary.

8. In the event that turbidity is observed outside the silt curtains and the BMPs are insufficient, a contingency full-depth curtain will be installed around the work site.

9. Maintenance shall not be done during storms or periods of high surf.

10. Visual monitoring will include ongoing inspections for turbidity outside of the confines of the silt curtains. In the event that turbidity is observed outside of the silt curtains, work shall stop and the silt curtains shall remain in place until the turbidity dissipates. Silt curtains and anchors shall be inspected after dissipation and prior to returning to maintenance operations.

11. Drainage outlets shall be maintained to minimize erosion and pollution of the waterways during construction. Surface runoff shall be controlled in order to minimize silt and other contaminants entering the water. Should excessive siltation or turbidity result from the Contractor's method of operation, the Contractor shall install silt curtains or other silt contaminant devices as required to correct the problem.

12. Should excessive siltation or turbidity, as defined in HAR Title 11 Chapter 54.4 and HAR Title 11 Chapter 54.6, result from the Contractor's method of operation, the Contractor shall install additional silt curtains or other silt contaminant devices as required to correct the problem.

10.1.11 *Health and Safety Plan*

1. Personnel shall wear and use protective clothing and equipment as specified by the contractor.

2. Operational bounds on land will be marked with traffic cones or caution tape to ensure that members of the public do not enter the project area.

3. Signs will be posted to warn and educate the public about project activities.

4. Project implementation will not interfere with the public's right to reasonable navigation.

10.1.12 *Noise Control*

1. Best management practices shall be utilized to minimize adverse effects to air quality and noise levels, including the use of emission control devices and noise attenuating devices.

2. Noise shall be kept within acceptable levels at all times in conformance with HAR Title 11 § 46 Community Noise Control, State Department of Health, Public Health Regulations. The contractor shall obtain and pay for a community noise permit from the State Department of Health when equipment or other devices emit noise at levels exceeding the allowable limits.

3. Equipment shall be equipped with suitable mufflers to maintain noise within levels complying with applicable regulations.

4. Starting of equipment meeting allowable noise limits shall not be done prior to 7:00 a.m. without prior approval. Equipment exceeding allowable noise limits shall not be started up prior to 7:30 a.m. Equipment meeting allowable noise limits shall not be done after 10:00 p.m. without prior approval.

5. Make the maximum use of low-noise-emission products, as certified by the EPA.

10.1.13 *Dust Control*

1. Dust, which could damage crops, orchards, cultivated fields, and dwellings, or cause nuisance to persons, shall be abated and control measures shall be performed. If there is dust, standard dust mitigation procedures will be used.

2. The Contractor, for the duration of the contract, shall maintain all excavations, embankments, haul roads, permanent access roads, plant sites, waste disposal areas, borrow areas, and all other work areas within or without the project limits free from dust which would cause a hazard to the work, or the operations of other contractors, or to persons or property. Industry accepted methods of stabilization suitable for the area involved, such as sprinkling or similar methods will be permitted. Chemicals or oil treating shall not be used.

3. The Contractor shall prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 60 - Air Pollution Control.

4. Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, flooding, or pollution. Vacuum or sweep the work area daily.

10.1.14 *Air Pollution Control*

1. Emission: The Contractor shall not be allowed to operate equipment and vehicles that show excessive emissions of exhaust gases until corrective repairs or adjustments are made.

2. The contractor shall not use nighttime lighting at the project site so as so not disorient any birds.

10.1.15 *Protected Species*

1. The project manager shall designate a competent observer to survey the marine areas adjacent to the proposed action for ESA-listed marine species, including but not limited to the green sea turtle, hawksbill sea turtle, and Hawaiian monk seal.

2. Constant vigilance shall be kept for the presence of Federally Listed Species.

3. Visual surveys for ESA-listed species shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one-half hour, to ensure that no protected species are in the area (typically within 50 yards of the proposed work).

4. Work shall be postponed or halted when ESA-listed species are within 50 yards of the proposed work, and shall only begin/resume after the animals have voluntarily departed the area. If ESA-listed marine species are noticed after work has already begun, that work may continue only if there is no way for the activity to adversely affect the animal(s). For example, divers performing surveys or underwater work (excluding the use of toxic chemicals) is likely safe. The use of heavy machinery is not.

5. Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA listed species.

6. All on-site project personnel must be apprised of the status of any listed species potentially present in the project area and the protections afforded to those species under federal laws. A handbook explaining the laws and guidelines for listed species in Hawaii may be downloaded from: http://www.fpir.noaa.gov/Library/PRD/Laws%20and%20Policies/HawaiiOceanUsersGuide_2004.pdf

7. The Contractor shall keep a record of all protected species sightings, incidents of disturbance, or injury, and shall provide a report to the State and the National Marine Fisheries Service (NMFS), and will be the contact person for any issues involving green sea turtles during maintenance activities.

8. Upon sighting of a monk seal or turtle within the safety zone during project activity, immediately halt the activity until the animal has left the zone. In the event that a marine protected species enters the safety zone and the project activity cannot be halted, conduct observations and immediately contact NMFS staff in Honolulu to facilitate agency assessment of collected data. For monk seals contact the Marine Mammal Response Coordinator, David Schofield, at 808-944-2269, as well as the monk seal hotline at 1-888-256-9840. For turtles, contact the turtle hotline at 808-983-5730.

9. The Contractor shall immediately report any incidental take of marine mammals. The incident must be reported immediately to NOAA Fisheries' 24-hour hotline at 1-888-256-9840, and the Regulatory Branch of the USACE at 808-438-9258. In Hawaii, any injuries incidents of disturbance or injury to sea turtles must be immediately reported and must include the name and phone number of a point of contact, the location of the incident, and the nature of the take and/or injury. The incident should also be reported to the Pacific Island Protected Species Program Manager, Southwest Region (Tel: 808-973-2987, fax: 808-973-2941).

10. Before any equipment, anchors(s), or material enters the water, a responsible party shall verify that no ESA-listed species are in the area where the equipment, anchor(s), or materials are expected to contact the substrate. If practicable, the use of divers to visually confirm that the area is clear is preferred.

11. Equipment operators shall employ "soft starts" when initiating work that directly impacts the bottom. Buckets and other equipment shall be sent to the bottom in a slow and controlled manner for the first several cycles before achieving full operational impact strength or tempo.

12. All objects lowered to the bottom shall be lowered in a controlled manner. This can be achieved through the use of buoyancy controls such as cranes, winches, or other equipment that affect positive control over the rate of decent.

13. Equipment, anchor(s), or material shall not be deployed in areas containing live corals, seagrass beds, or other significant resources.

14. For any equipment used in undertaking the authorized work, the 160 dB and 120 dB isopleths shall not exceed the 50-yard shut-down range for impulsive and continuous sounds sources, respectively.

15. Should protected species enter the area while in-water work is already in progress, the activity may continue only when that activity has no reasonable expectation to adversely affect the animal(s).

10.1.16 *Operational Controls*

1. This plan will be reviewed with the project field staff prior to the start of work.

2. All activities significantly impacting the environment will not begin until appropriate BMP's are properly installed.

3. Construction will be immediately stopped, reduced or modified; and/or new or revised BMP's will be immediately implemented as needed to stop or prevent polluted discharges to receiving waters. New or revised BMP's will be approved by appropriate regulatory agencies prior to re-commencing work.

4. The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. Submit copies of all regulatory notifications to the Contracting Officer prior to the commencement of work activities.

5. The Contractor is responsible for meeting all permit requirements and including how they will be addressed in the work plans. The Contractor will provide the personnel, materials, and equipment necessary to meet the permit requirements for the project.

10.1.17 *Structure, Authority, and Responsibility*

1. The Project Manager/Superintendent/Project Engineer will ensure compliance with this plan.

2. The Project Manager/Superintendent/Project Engineer will appoint and train one (1) additional individual to properly install all BMP's and to comply with all aspects of this plan.

3. The Property Owner(s) is also responsible for compliance to the BMPP.

10.2 Contingency Plan

The following plan will be implemented by the Contractor to prevent/respond to polluted discharges resulting from a severe storm or natural disaster. It is the Contractor's responsibility to abide by the following plan as well as any other binding plan, agreement, regulation, rule, law, or ordinance applicable.

All contractors associated with the construction project will follow this plan when a severe storm is either forecast or anticipated. Contractors must:

a. Regularly monitor local weather reports for forecasted and/or anticipated severe storm events, advisories, watches, warnings or alerts. The contractor shall inspect and document the condition of all erosion control measures on that day prior, during, and after the event. The contractor shall prepare for forecasted and/or anticipated severe weather events to minimize the potential for polluted discharges.

b. Secure the construction site. Securing the site should generally include:
   i. Removing or securing equipment, machinery, and maintenance materials.
   ii. Cleaning up all maintenance debris.
   iii. Implementing all Best Management Practices (BMPs) detailed in the BMPP. This includes BMPs for materials management, spill prevention, and erosion and sediment control.

c. In the event of a severe weather advisory (hurricanes, tropical storms, natural disasters) or when deemed necessary, cease regular construction operations. Work crews must finalize securing the project site, and evacuate until the severe weather condition has passed.

d. Upon return to the site, all BMPs shall be inspected, repaired, and/or re-installed as needed. If repair is necessary, it shall be initiated immediately after the inspection and repairs or replacement will be complete within 48 hours. To facilitate repair or replacement, the contractor will be required to store surplus material on the project site if the site is located where replacement materials will not be readily available.

e. When there either has been a discharge which violates Hawaii Water Pollution rules and regulations OR there is an imminent threat of a discharge which violates Hawaii Water Pollution rules and regulations and/or endangers human and/or environmental health, the permittee shall at a minimum execute the following steps:
   i. Assess whether construction needs to stop or if additional BMPs are needed to stop or prevent a violation.
   ii. Take all reasonable measures to protect human and environmental health.
   iii. Immediately notify the DOH of the incident. The notification shall also include the identity of the pollutant sources and the implemented control or mitigation measures.
      1. Department of Health Clean Water Branch (during regular working hours): 808-586-4309;
      2. Hawaii State Hospital Operator (after hours): 808-247-2191
   iv. Document corrective actions, take photographs of discharge and receiving waters.
   v. Revise BMPP to prevent future discharges of a similar nature.

10.3 Emergency Spill Response Plan

10.3.1 *Pre-Emergency Planning*

a. An initial and periodic assessment shall be made of the project site and potential hazardous spills that may be encountered during the normal course of work. This plan is not intended to address issues relating to materials such as PCB, Lead, Asbestos, etc., since these types of materials would have specific work plans already developed. This plan should be revised as necessary to correspond to the assessment.
b. A Hazardous Materials inventory list and MSDS sheets, to include subcontractors' materials, will be filed in a binder and located in the Project Office. The inventory list and MSDS sheets will be updated and maintained by the Project Manager and site safety officer as new materials are added.
c. Personnel will consult the applicable MSDS sheet prior to its use.
d. Personnel will handle hazardous materials safely and use personal protective equipment (PPE), recommended/required by the MSDS when handling hazardous materials.
e. Personnel will receive "Hazard Communication" training within three (3) working days of arrival and "product specific" training prior to the initial use/exposure of a product. This training will be conducted by the Project Manager/Superintendent or site safety officer.
f. All personnel will be trained on the contents of this plan within the first month of maintenance and at least annually thereafter. The training should include a rehearsal of this plan. An attendance sheet will be kept on file at the Project Office.
g. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or DOT approved containers shall be used for the handling and use of flammable liquids in quantities of five (5) gallons or less. For quantities of one (1) gallon or less, only the original container or approved metal safety can shall be used, for storage, use and handling of flammable liquids.
h. Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for the safe passage of people.

10.3.2 *Personal Protective and Emergency Spill Response Equipment*

a. ABC fire extinguishers will be located in the project field office and in each of the company vehicles. There will be at least one fire extinguisher, rated at not less than 10B, within 50 feet of any stockpile of 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas storage.

   NOTE: Fire extinguishers should not be located "directly" with hazardous materials, so as to endanger first responders.

b. Spill kits will be located at the project field office and/or within 50 feet of the hazardous material storage area. The spill kit contents shall be determined by the Project Manager/Superintendent based on the anticipated hazardous materials to

be stored and/or used on the project. The spill kits will be inventoried quarterly, and appropriate logbook entries made.

c. Emergency response personal protective equipment (PPE) consists of:
    i. Face shield
    ii. Tyvex coveralls
    iii. Rubber gloves
    iv. Air-purifying respirators with HEPA and organic vapor combination cartridges will be issued to the Emergency Response Team members and maintained in the project office. Separate Respiratory Protection Equipment shall be designated and labeled as such; this equipment will be inspected at least every 30 calendar days and appropriate logbook entries made.

10.3.3 *Personnel Roles, Lines of Authority and Communication*

a. Emergency Response Coordinator (ERC)
    i. The Project Superintendent is the designated ERC. If the Project Superintendent is not available, the safety officer is the designated ERC.
    ii. The ERC will be in charge of and will coordinate the appropriate emergency response procedures in this plan.

b. Emergency Response Team (ERT)
    i. The ERT consists of Construction General Foreman, Labor Foreman, and a Laborer designated by the Project Superintendent.
    ii. The ERT will appropriately respond to the emergency in accordance with this plan at the direction of the ERC.

10.3.4 *Emergency Alerting and Response Procedures*

a. Any person causing or discovering a known hazardous or unknown release or spill will:
    i. Immediately alert nearby personnel who may be exposed to the effects of the release or spill.
    ii. Report the release or spill immediately to the ERC and the ERT. All pertinent information regarding the release should be provided to the ERC, such as the amount and type of material released, location of the release, and other factors, which may affect the response operation.
    iii. If the spill or release of a petroleum product or known non-toxic chemical, the person will take immediate and appropriate measures to stop or limit the rate of release, (i.e., close the spigot to the drum or form oil or curing compound) and or contain or stop the migration of the release (i.e., create a berm of dirt around the release) until the ERC and ERT arrive.
    iv. If the spill release is a toxic, highly flammable, or unknown chemical, the person will first notify the ERC before approaching the spill area from upwind to determine the source, type, and quantity of the release. The person should monitor the spill until the ERC and ERT arrive.
    v. The ERC will assess possible hazards to human health or the environment that may result from the release, fire, or explosion.

vi. If the spill or release is less than 25 gallons of a known petroleum product or non-toxic chemical, the ERC will direct the ERT to contain and cleanup the spill or release.

vii. If the spill or release is toxic or unknown, the ERC will immediately notify the County of Hawaii Fire Department and ask for assistance from the HAZMAT Response Team.

viii. Immediately after the emergency, the ERC will arrange for disposing of the recovered waste, contaminated soil or any other material that results from the release, fire, or explosion at the project site in accordance with the County of Hawaii and State regulations and manufacturer's instructions (if source of spill or release is known).

10.3.5 *Emergency Notification and Reporting Procedures*

a. In the event that a release enters the storm or sewer system, the ERC will immediately notify the National Response Center (NRC) at 1-800-424-8802, and the Hawaii Department of Health, Hazard Evaluation and Emergency Response Office (HEER) at 808-586-4249.
b. The ERC will immediately notify appropriate agencies and submit written follow-up notification in accordance with the Hazardous Substance Release Notification Guideline.

10.3.6 *Safe Distance Staging Area*

a. A staging area at safe distance upwind and higher than the location of the spill or release and its source will be immediately established.
b. Access to the spill or release location will be cleared for emergency vehicles and equipment to be used to contain and clean up the spill or release.

10.3.7 *Site Security and Control*

a. If the spill or release is located on or near the roadway, stop all traffic until the release is cleaned up.
b. If the spill or release is located away from vehicle or pedestrian traffic, install barricades/safety fencing around the affected area.
c. If the spill or release occurs during night operations, provide adequate light and use ground guides to escort emergency vehicles to the affected area.

10.3.8 *Evacuation Routes and Procedures*

a. Persons injured during the emergency condition will be evacuated to the staging area where they will be treated and or further evacuated to the nearest medical facility. The appropriate MSDS(s) will be provided to emergency service personnel and are intended to be delivered to the emergency room physicians.
b. Persons working at the affected area and who are not needed in the response effort will report to the staging areas for accountability.

10.3.9 *Decontamination and Disposal Procedures*

a. Persons involved in the spill clean-up are required to perform personal hygiene, utilizing soap and fresh water prior to eating, drinking, or smoking.
b. Contaminated PPE shall be appropriately cleaned and disinfected if possible. If this is not possible it shall be disposed of per the same requirements of the contaminated substance.
c. Sorbent pads/materials and the spilled substance will be placed in appropriate containers and disposed of as specified by the appropriate MSDS.
d. Contaminated soil will be placed in the appropriate container(s) or on plastic sheeting. The ERC will arrange with an environmental services company to properly characterize, prepare the manifest, label the containers, transport, and dispose of the contaminated soil. The generator's copy of the manifest will be kept in the project files for a minimum of three (3) years.
e. In the event of a substantial release (25 gallons or more) of a suspected or known toxic chemical, the Fire Department HAZMAT Response Team will be called to control/cleanup the release. They will establish and provide the decontamination operations as required.

10.3.10 *Emergency Medical Treatment and First Aid*

a. First aid kits will be maintained at the project field office, all company vehicles, and gang boxes.
b. Injured person(s) will be treated at the staging area by a certified first aid trained individual at the project site until the ambulance arrives or they are evacuated to the nearest medical facility.
c. The appropriate MSDS(s) will be provided to emergency service personnel and are intended to be delivered to the emergency room physicians.

10.3.11 *After the Spill Procedures*

a. The ERC will review what happened and implement changes, corrections, and/or improvements to prevent spill from occurring and to improve the spill response and clean-up procedures. This plan will be revised to reflect those changes, corrections, and/or improvements implemented.
b. The ERC will prepare a record of the spill response and keep it in the project files for a minimum of three (3) years.
c. The ERC will submit Follow-up Notification to HEER when required.
d. Spill response kits shall be replenished directly after the emergency.

10.4 Emergency Contacts

National Response Center (NRC)		1-800-424-8802
Coast Guard Operations Center, Honolulu		
	(working hours)	1-808-522-8264
	(after hours)	1-808-927-0830
Hawaii State Department of Health Hawaii Evaluation and Emergency Response (HEER)		1-808-586-4249
State Historic Preservation Division		1-808-692-8015
Maui County Fire Department		911 / 1-808-270-7561
Construction Project Manager, Company (TBD)		*TBD*
In the event that a release enters the storm or sewer system, the ERC will immediately notify NRC and HEER		1-808-935-2785

10.5 NOAA NMFS Pac-SLOPES

Specific guidance has been provided by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service with regard to operational considerations for protection of endangered species. Pac-SLOPES guidance will be followed during construction activities.

11. CONSULTATION

11.1 Parties Consulted

The names of individuals and organizations contacted to provide pre-consultation for the project are summarized below. Those who responded to requests for consultation through Sea Engineering are indicated by asterisks.

Consultation letters and responses are included in Appendix A.

Federal

U.S. Army Corps of Engineers, Honolulu District, Regulatory Branch
U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

State of Hawaii

Department of Land and Natural Resources
- Historic Preservation Division
- Office of Conservation and Coastal Lands*
- Division of Aquatic Resources*

Department of Health
- Office of Environmental Quality Control
- Office of Environmental Planning

Office of Hawaiian Affairs*
Department of Business, Economic Development, Tourism – Office of Planning
University of Hawai`i Environmental Center

County of Maui

Board of Water Supply
Department of Planning
Fire Department
Police Department

11.2 EA Preparers

The Groin Repair and Replacement FEA was prepared by Sea Engineering, Inc. The respective contributions of individuals are as follows:

David A. Smith Ph.D. Ocean Engineering P.E. Civil Engineering	Primary Author
Alyssa Agustin M.S. Physical Oceanography	Contributing Author
Chris Conger M.S. Geology and Geophysics	Contributing Author

12. REFERENCES

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APPENDIX A – CONSULTATION LETTERS AND RESPONSES

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
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

Stable Road West DEA

APR 15 2019

Chris Conger
Sea Engineering, Inc.
Makai Research Pier
Waimanalo, HI 96795

SUBJECT: Draft Environmental Assessment (EA) for the Stable Road West Groin Repair and Replacement Located at Sprecklesville Beach Lots, Wailuku, Maui, Makai of TMKs: (2) 3-8-002: 025, 026 & 050 upon submerged land

Dear Mr. Conger:

This letter is regarding the processing of the draft EA for the subject project. The public and agency comment period has closed (April 8, 2019). Attached to this letter are copies of the comments received by the Office of Conservation and Coastal Lands (OCCL) regarding your client's draft EA. Please send copies of your responses to the questions raised in these letters directly to the authoring agency. The final copy of this project's EA must include your responses to the queries raised in these letters. These responses can be attached to the end of the Final EA document.

Upon completion of the final EA, please send 2 hard copies of the Final EA and 2 digital copies on CD or USB drive in searchable pdf. format that is ADA compliant [readable by "screen reader" eff. 7/1/2018] to the OCCL. You may wish to include an electronic copy of the Office of Environmental Quality Control (OEQC) Publication Form in Word as part of your digital copy or you may send an electronic copy of the Publication Form to staff at kimberly.mills@hawaii.gov. If the project summary has changed, include a new summary. Please include a hard copy of the submitted publication form with the Final EAs.

Should you have any questions, please contact Tiger Mills of our Office of Conservation and Coastal Lands at (808) 587-0382.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

Sea Engineering, Inc.
Makai Research Pier • 41-305 Kalanianaole Hwy • Waimanalo, Hawaii 96795-1820
Phone: (808) 259-7966 • E-mail: dsmith@seaengineering.com • Website: www.seaengineering.com

May 28, 2019

Mr. Brian Neilson
Administrator
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street Room 330
Honolulu, HI 96813

Attn: Mr. Russell Sparks
DAR Reference Number: 5883

Dear Mr. Neilson:

Subject: Response to Draft Environmental Assessment Comment Letter
Stable Road West Groin Repair and Replacement
Makai of TMKs (2) 3-8-002:025, 026, & 050 Stable Road, Spreckelsville, Paia, Maui.

Thank you for your letter dated March 20, 2019, containing comments on, and no objections for, the Draft Environmental Assessment for the Stable Road West Groin Repair and Replacement project Makai of TMKs (2) 3-8-002:025, 026, & 050 along Stable Road on Maui. As the agent for the Applicant, Community Beach Restoration Foundation, Inc. (CBRF), we appreciate your support and comments.

Thank you for noting that chronic erosion of this section of Maui's north coastline is an ongoing problem. You support maintenance and repair of these structures as necessary, given your observations of the past success of these sand stabilization and coastal erosion structures, and the projected increase of erosion in the future. We agree that the no activity option would likely result in ongoing damage to coastal properties and increased sedimentation of the nearshore from the erosion of fine clay deposits on land.

The proposed project will have another opportunity to provide comments with the publication of the Final Environmental Assessment. We welcome any further comments your office may have at that time. Should you have any questions or desire additional information please contact me at (808) 259-7966 x30 or dsmith@seaengineering.com.

Sincerely,

David A. Smith

David A. Smith, Ph.D., P.E.
Project Manager

Cc: DLNR-OCCL

P 1:15

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

Stable Road West DEA

MAR - 7 2019

MEMORANDUM

TO:

	State Agencies		Maui County
✓	DLNR-Aquatic Resources	___	Department of Planning
___	DLNR- Historic Preservation [via Email]		
___	DLNR-Resource Enforcement		**Federal Agencies**
___	DLNR-Land Division	___	Dept. of the Army
___	DLNR-Forestry & Wildlife	___	National Oceanic Atmospheric Admin.
___	Office of Hawaiian Affairs	___	US Fish & Wildlife Services

FROM: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Draft Environmental Assessment (EA) for the Stable Road West Groin Repair and Replacement

APPLICANT: Community Beach Restoration Foundation
LOCATION: Sprecklesville Beach Lots, Wailuku, Maui
TMKs: Makai of (2) 3-8-002: 025, 026 & 050 upon submerged land

---

We would appreciate your agency's review and comment on this draft EA that may be found on the OCCL website at https://dlnr.hawaii.gov/occl/files/2019/03/25553-Stable-Road-DEA-Submitted-12-12-2018.pdf or via the March 8, 2019 Environmental Notice that can be found at http://health.hawaii.gov/oeqc/ . **The deadline to provide comments to the OCCL is April 8, 2019.** Should there be any question regarding this matter, contact Tiger Mills of our Office at (808) 587-0382.

(✓) Comments Attached
( ) No Comments
(✓) No Objections

Brian Neilson 3/26/19
Print Name and Date
DAR Administrator

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

Date: March 19, 2019
DAR #5883

MEMORANDUM

TO: Brian J. Neilson
Acting DAR Administrator

FROM: Russell Sparks, Aquatic Biologist

SUBJECT: Draft EA for the Stable Road West Groin Repair and Replacement Project

Request Submitted by: Samuel J. Lemmo, OCCL Administrator

Location of Project: Specklesville Beach Lots, Wailuku, Maui TMK (2) 3-8-002: 025, 026 & 0

Brief Description of Project:

A draft EA evaluating a proposed project to repair and replace as needed existing groins along the Specklesville coastline in North Maui.

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: 3/20/19
Brian J. Neilson
Acting DAR Administrator

DAR# 5883

Comments

Coastal erosion of this section of Maui's north coastline is an on going problem that was initially addressed with some degree of success using a series of rock groins perpendicular to the shoreline that were originally put in place sometime prior to 1944. Given the past success of this coastal erosion control project and the projected increase of erosion in the future, it makes sense to maintain and repair these structures as necessary. The no activity option would likely result in ongoing damage to coastal properties, and increased sedimentation from the erosion of fine sediment clay deposits on land.

Sea Engineering, Inc.
Makai Research Pier • 41-305 Kalanianaole Hwy • Waimanalo, Hawaii 96795-1820
Phone: (808) 259-7966 • E-mail: dsmith@seaengineering.com • Website: www.seaengineering.com

May 28, 2019

Mr. Paul Hanada
Via email

Dear Mr. Hanada:

Subject: Response to Draft Environmental Assessment Comment Letter
Stable Road West Groin Repair and Replacement
Makai of TMKs (2) 3-8-002:025, 026, & 050 Stable Road, Spreckelsville, Paia, Maui.

We received your letter dated March 15, 2019, containing your comments on the Draft Environmental Assessment for the Stable Road West Groin Repair and Replacement project Makai of TMKs (2) 3-8-002:025, 026, & 050 along Stable Road on Maui. As the agent for the Applicant, Community Beach Restoration Foundation, Inc. (CBRF), we provide the following responses to your comments.

1. We understand that use inland sand may be of concern to members of the community. The proposed project does not include the placement of inland sand at this time.

2. The current groin field has been in place since the 1940s. Coastal processes, as documented in the Environmental Assessment, are equilibrated with the presence and function of the existing groins. Ocean and beach conditions are discussed in Section 5 and potential impacts, or the lack there of, are discussed in Section 6. Removal or failure of the groins will result in an imbalance in the existing littoral system. Maintenance of the groins maintains status quo conditions for the coastline. Currently, maintenance of status quo conditions is not discussed as an impact, since the nearly 80-year-old system will not be altered.

3. Public access along the beach will be improved through maintenance of the existing groins. There is a distinct and identifiable improvement to public access associated with the proposed project. There are no plans associated with the proposed project to develop additional public parking or mauka beach access amenities.

4. This project does not include maintenance of or funding for the State parcel to the west. That parcel is a State owned and maintained property. We suggest you contact the State with your concerns about obstacles to lateral access on that parcel.

5. The State requires maintenance of vegetation along the shoreline. The properties within the project area are in compliance with State laws, including the coastal lateral access requirements. Boulders located in and along the project area are part of the non-conforming structures, which are proposed for maintenance.

6. Project boundaries are identified in the Environmental Assessment. All property transactions and modifications are legal processes conducted through either Land Court or Regular System. Modification of the individual property descriptions or bounds or both is not proposed as part of this project.

7. At this time, an archeological monitoring company has not been contracted for the project. After the project has been reviewed by the agencies and necessary approvals have been obtained, an archaeological monitoring company will be contracted. The monitor will observe any backshore area that may be impacted to ensure that no Iwi Kupuna are disturbed. If any cultural or historical resources are discovered, work will stop and the monitor will follow the State mandated protocol by contacting the State Historic Preservation Division (SHPD), as required by law. Work may begin again after SHPD is consulted and the situation is resolved.

Please consider this our response to your comments.

Sincerely,

David A. Smith, Ph.D, P.E.
Project Manager

CC: DLNR-OCCL

March 15, 2019

Re: Draft Environmental Assessment (DEA) for the Stable Road West Groin Repair and Replacement Located at Hamakuapoko Maui, portions of and makai of Tax Map Keys: (2) 3-8-002: 025, 026 &050

Aloha,

It is well established that the coastline around Maui, the State of Hawaii and the world is moving inland. It is also understandable why the owners along the shoreline would want to protect the value of their properties. However, not everyone acknowledges the fact that protecting the sandy beach fronting their properties is only a temporary measure. It will also negatively impact adjacent properties.

There are a few concerns that need to be addressed.

1. Use of fine grained, culturally sensitive inland sand should be prohibited as a source of nourishment sand for all beaches. This sand is part of an ancient inland sand dune ecosystem. There are a countless number of Iwi Kupuna located in the inland sand dunes. Desecrating the ancient burial sites by sand mining is extremely disrespectful and use of this sand should stop. Placing inland sand onto a marine ecosystem is environmentally irresponsible. The fine grained silty dirty sand destroys the marine organisms by suffocation and reduction of sunlight. This degradation and destruction continues decades after placement. It will be stated that the project and property owners will NOT use this sand at any time. Placement of this sand on all beaches should be prohibited.
2. The intent of the project is to capture sand by repair and rebuilding of existing rock jetties. This will reduce the amount of sand moving to the down current property, which is Kanaha Beach Park (KBP). Will this project accept responsibility for the loss of sand at KBP? Down current properties of the project should be documented and monitored for shoreline erosion. Remediation costs to KBP should be the responsibility of the project. The Stable Road Beach Restoration project east of this proposed project was very successful in capturing and holding sand. However, the negative consequence to down current properties has prompted the Stable Road West project.
3. Improvements to public property have no value to the public if the public cannot access it. Where is the closest public access? What are the State of Hawaii and County of Maui requirements to allow public beach access? An access with parking should be created to allow the general public to use this beach.

4. Safe lateral access should also be provided. Any obstacle created by the project to prevent lateral access will be corrected by the landowners and the project. One concern would be the encroaching shoreline fronting the iron wood trees to the west of the project. Further encroachment will result in more fallen trees across the beach preventing safe lateral access. The project will be responsible for removal of the obstructions before and after the project commences. It will be the State's responsibility to ensure compliance.
5. All vegetation will be trimmed regularly for safety and to prevent encroachment on public property. Any rock boulders on public property between public and private properties will be removed before starting the project. There have been rock boulders placed on public property by private landowners with the intent to "protect" their property but it has only made the situation worse. These boulders should be removed before the start of the project.
6. All properties and boundaries will be determined and delineated before any work begins. The boundaries between public and private properties will be marked, maintained and displayed for perpetuity. This boundary can never move seaward and or be claimed as private property. This survey will also include KBP to document the shoreline.
7. What archeological monitor company will oversee the project and what procedures will be taken while excavating. All Iwi Kupuna when uncovered will be left in place. It is their final resting place and should not be disturbed for any reason. SHPD is not the entity that should be determining the Iwi Kupuna's fate. The Iwi Kupuna's descendants are the only entity that can. If descendants cannot be found, the Iwi Kupuna will remain in place and construction at the discovery site will cease.
8. There will be a period to comment on answers or comments made to this letter. Rebuttal is an essential part of the process and should be allowed.

Mahalo,

Paul Hanada

Sea Engineering, Inc.
Makai Research Pier • 41-305 Kalanianaole Hwy • Waimanalo, Hawaii 96795-1820
Phone: (808) 259-7966 • E-mail: dsmith@seaengineering.com • Website: www.seaengineering.com

July 31, 2019

Mr. Paul Hanada
Via email

Dear Mr. Hanada:

Subject: Response to Draft Environmental Assessment Comments on Response Letter, Revision 1
Stable Road West Groin Repair and Replacement
Makai of TMKs (2) 3-8-002:025, 026, & 050 Stable Road, Spreckelsville, Paia, Maui.

We received your second comment letter dated June 3, 2019, containing your comments on the responses to your comments on the Draft Environmental Assessment for the Stable Road West Groin Repair and Replacement project Makai of TMKs (2) 3-8-002:025, 026, & 050 along Stable Road on Maui. As the agent for the Applicant, Community Beach Restoration Foundation, Inc. (CBRF), we provide the responses below to your second round of comments. We believe this to round of responses fully resolves the comments you presented in your first correspondence. Responses below are organized by Paul Hanada's first comment letter (PH1), Sea Engineering's first response (SEI1), Paul Hanada's second comment letter (PH2), and Sea Engineering's second response (SEI2).

Comment #1

PH1: "Use of fine grained, culturally sensitive inland sand should be prohibited as a source of nourishment sand for all beaches. This sand is part of an ancient inland sand dune ecosystem. There are a countless number of Iwi Kupuna located in the inland sand dunes. Desecrating the ancient burial sites by sand mining is extremely disrespectful and use of this sand should stop. Placing inland sand onto a marine ecosystem is environmentally irresponsible. The fine grained silty dirty sand destroys the marine organisms by suffocation and reduction of sunlight. This degradation and destruction continues decades after placement. It will be stated that the project and property owners will NOT use this sand at any time. Placement of this sand on all beaches should be prohibited."

SEI1: We understand that use inland sand may be of concern to members of the community. The proposed project does not include the placement of inland sand at this time.

PH2: "It appears your project is determined to use dirty culturally sensitive inland sand."

SEI2: The proposed project **does not** include the placement of inland sand.

Comment #2

PH1: "The intent of the project is to capture sand by repair and rebuilding of existing rock jetties. This will reduce the amount of sand moving to the down current property, which is Kanaha Beach Park (KBP). Will this project accept responsibility for the loss of sand at KBP? Down current properties of the project should be documented and monitored for shoreline erosion. Remediation costs to KBP should be the responsibility of the project. The Stable Road Beach

Restoration project east of this proposed project was very successful in capturing and holding sand. However, the negative consequence to down current properties has prompted the Stable Road West project."

SEI1: The current groin field has been in place since the 1940s. Coastal processes, as documented in the Environmental Assessment, are equilibrated with the presence and function of the existing groins. Ocean and beach conditions are discussed in Section 5 and potential impacts, or the lack there of, are discussed in Section 6. Removal or failure of the groins will result in an imbalance in the existing littoral system. Maintenance of the groins maintains status quo conditions for the coastline. Currently, maintenance of status quo conditions is not discussed as an impact, since the nearly 80-year-old system will not be altered.

PH2: "If the current groin field has been in place since the 1940's and has achieved equilibrium, won't changes to the present condition upset the equilibrium? How can maintenance and replacement of the groins maintain status quo? Your statements are contradictory. Isn't the intent of repairing and replacement of the groins to capture and retain more sand preventing it from moving laterally?"

SEI2: The equilibrium of the shoreline had been achieved with functional groins. The groins have now deteriorated from age and exposure to the marine environment. The ongoing degradation of the regional groin field has led to shoreline recession disrupting the equilibrium. The proposed project would make the groins functional again and is anticipated to maintain the groin field and coastline in the equilibrium state they have been in for nearly 80 years.

Comment #3

PH1: "Improvements to public property have no value to the public if the public cannot access it. Where is the closest public access? What are the State of Hawaii and County of Maui requirements to allow public beach access? An access with parking should be created to allow the general public to use this beach. "

SEI1: Public access along the beach will be improved through maintenance of the existing groins. There is a distinct and identifiable improvement to public access associated with the proposed project. There are no plans associated with the proposed project to develop additional public parking or mauka beach access amenities.

PH2: "Please understand there is a difference between public beach access and lateral access. Currently there is only lateral access. The closest public beach access is approximately 2000 ft away. You did not address public beach access. In the 60's and 70's we would access the state property via Stable Road. Not sure why it was closed."

SEI2: The nearest public access to the east is approximately 640 feet away from the project site. The State parcel that was used for public access was closed by Airports Division many years ago. We do not know the reason for its closure. The adjacent parcel further eastward is open to the public and it is more directly under the takeoff pattern. Public access on the west side of the property is available through the adjacent Airports Division parcel from the bike path directly behind. West of that is Kanaha Beach Park which also provides access as well as plenty of public parking. Moreover, once users have accessed the shoreline through one of these public access points, there will be a noticeable and distinct improvement in coastal lateral access.

Comment #4

PH1: "Safe lateral access should also be provided. Any obstacle created by the project to

prevent lateral access will be corrected by the landowners and the project. One concern would be the encroaching shoreline fronting the iron wood trees to the west of the project. Further encroachment will result in more fallen trees across the beach preventing safe lateral access. The project will be responsible for removal of the obstructions before and after the project commences. It will be the State's responsibility to ensure compliance."
SEI1: This project does not include maintenance of or funding for the State parcel to the west. That parcel is a State owned and maintained property. We suggest you contact the State with your concerns about obstacles to lateral access on that parcel.

> PH2: "The State is responsible for its own property. However, since I am a tax paying resident, I consider myself as being part of the State. Preventing normal sand flow along the shoreline will negatively impact the adjacent State owned property. The shoreline down current from the proposed project will encroach inland at a higher rate causing more trees to fall. Maintenance will be at taxpayer's (my) expense. The project should be held responsible and accountable for its actions."
> SEI2: Long-term stability of the project area is discussed in the EA. Though erosion pressure has been present on adjacent parcels and in other locations in the region, it is not directly attributable to the presence or maintenance of the project area groin field. The north shore of Maui has experienced on-going and pronounced erosion pressure along much of this region. Interestingly, the western abutting parcel has a tendency to amass sand volume in the winter months, as Pacific north-west swell pushes sand toward Groin 1. Maintenance of Groin 1 is therefore expected to result in a continuation of winter sand accretion to the west of the groin. On longer time scales, the western State parcel and its own groin field have been erosional. The groin field west of the project area was constructed at around the same time as the project area's groins. Proper design, function, and maintenance of this section of coastline and its attendant groins is outside of this project's scope. We sincerely suggest that you contact the landowner (State) with your concerns.

Comment #5

PH1: "All vegetation will be trimmed regularly for safety and to prevent encroachment on public property. Any rock boulders on public property between public and private properties will be removed before starting the project. There have been rock boulders placed on public property by private landowners with the intent to "protect" their property but it has only made the situation worse. These boulders should be removed before the start of the project."
SEI1: The State requires maintenance of vegetation along the shoreline. The properties within the project area are in compliance with State laws, including the coastal lateral access requirements. Boulders located in and along the project area are part of the non-conforming structures, which are proposed for maintenance.

> PH2: "Please clarify how placement of boulders by private property owners on State property is used for maintenance. I have photos taken recently that shows vegetation not in compliance restricting lateral access. I also have photos of boulders placed on State property exacerbating their situation. As stated in my original comments and concerns, the boundaries should be delineated. Certified boundaries should be determined and documented BEFORE any project begins to prevent conflicts in the future."
> SEI2: We believe the most important aspect of the project, with respect to this

concern, is the reuse of existing rock material for the groin repairs. Each groin will be repaired first with the existing groin materials in the immediate area. Only after the existing, suitable rock is used, will new material be brought to the site to make up the difference in the required volume for the maintenance effort. It is likely that the difference in volume is a result of the original groin rocks being spread across and buried within the beach face. Exploratory efforts to find and recover these rocks would cause more harm to the beach and ecosystem than is advisable. Moreover, we are not aware of any State or County violations for the placement of rocks on the shoreline at the project site.

Comment #6

PH1: "All properties and boundaries will be determined and delineated before any work begins. The boundaries between public and private properties will be marked, maintained and displayed for perpetuity. This boundary can never move seaward and or be claimed as private property. This survey will also include KBP to document the shoreline."

SEI1: Project boundaries are identified in the Environmental Assessment. All property transactions and modifications are legal processes conducted through either Land Court or Regular System. Modification of the individual property descriptions or bounds or both is not proposed as part of this project.

Comment #7

PH1: "What archeological monitor company will oversee the project and what procedures will be taken while excavating. All Iwi Kupuna when uncovered will be left in place. It is their final resting place and should not be disturbed for any reason. SHPD is not the entity that should be determining the Iwi Kupuna's fate. The Iwi Kupuna's descendants are the only entity that can. If descendants cannot be found, the Iwi Kupuna will remain in place and construction at the discovery site will cease. "

SEI1: At this time, an archeological monitoring company has not been contracted for the project. After the project has been reviewed by the agencies and necessary approvals have been obtained, an archaeological monitoring company will be contracted. The monitor will observe any backshore area that may be impacted to ensure that no Iwi Kupuna are disturbed. If any cultural or historical resources are discovered, work will stop and the monitor will follow the State mandated protocol by contacting the State Historic Preservation Division (SHPD), as required by law. Work may begin again after SHPD is consulted and the situation is resolved.

Please consider this our response to your comments.

Sincerely,

David A. Smith, Ph.D, P.E.
Project Manager

CC: DLNR-OCCL

June 3, 2019

David A Smith
Project manager: Stable Road West Groin Repair and Replacement

Re: Response to Draft Environmental Assessment Comment Letter
Stable Road West Groin Repair and Replacement
Makai of TMKs (2) 3-8-002:025, 026, & 050 Stable Road, Spreckelsville, Paia, Maui.

Aloha Mr. Smith,

Thank you for your response emailed by Chris Conger dated May 28, 2019.

1. It appears your project is determined to use dirty culturally sensitive inland sand.
2. If the current groin field has been in place since the 1940's and has achieved equilibrium, won't changes to the present condition upset the equilibrium? How can maintenance and replacement of the groins maintain status quo? Your statements are contradictory. Isn't the intent of repairing and replacement of the groins to capture and retain more sand preventing it from moving laterally?
3. Please understand there is a difference between public beach access and lateral access. Currently there is only lateral access. The closest public beach access is approximately 2000 ft away. You did not address public beach access. In the 60's and 70's we would access the state property via Stable Road. Not sure why it was closed.
4. The State is responsible for its own property. However, since I am a tax paying resident, I consider myself as being part of the State. Preventing normal sand flow along the shoreline will negatively impact the adjacent State owned property. The shoreline down current from the proposed project will encroach inland at a higher rate causing more trees to fall. Maintenance will be at taxpayer's (my) expense. The project should be held responsible and accountable for its actions.
5. Please clarify how placement of boulders by private property owners on State property is used for maintenance. I have photos taken recently that shows vegetation not in compliance restricting lateral access. I also have photos of boulders placed on State property exacerbating their situation. As stated in my original comments and concerns, the boundaries should be delineated. Certified boundaries should be determined and documented BEFORE any project begins to prevent conflicts in the future.

Using dirty fine grained culturally sensitive inland sand from an inland sand dune ecosystem and placing it in a marine ecosystem is criminal and should never be allowed anywhere. It destroys the marine ecosystem.

This link demonstrates how dirty the inland sand is. Please keep in mind it has been "certified" as clean and meets all government standards. https://vimeo.com/194574469

As a suggestion, stating in writing that this project will not use this sand will make the project more acceptable.

Ua Mau ke Ea o ka ʻĀina i ka Pono

Paul Hanada

Sea Engineering, Inc.
Makai Research Pier • 41-305 Kalanianaole Hwy • Waimanalo, Hawaii 96795-1820
Phone: (808) 259-7966 • E-mail: dsmith@seaengineering.com • Website: www.seaengineering.com

May 28, 2019

Mr. Jerome Yasuhara
Compliance Specialist
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, HI 96817

Dear Mr. Yasuhara:

Subject: Response to Draft Environmental Assessment Comment Letter
Stable Road West Groin Repair and Replacement
Makai of TMKs (2) 3-8-002:025, 026, & 050 Stable Road, Spreckelsville, Paia, Maui.

Thank you for your email dated March 25, 2019, containing comments on the Draft Environmental Assessment for the Stable Road West Groin Repair and Replacement project Makai of TMKs (2) 3-8-002:025, 026, & 050 along Stable Road on Maui. As the agent for the Applicant, Community Beach Restoration Foundation, Inc. (CBRF), we are pleased to provide the following response to your comments.

We understand that the Office of Hawaiian Affairs is interested in the source of the replacement stones for the project. The stones would likely be field stone purchased from Launiupoko; however, the final source will be the local business with competitive pricing when factoring in both stone and delivery costs. The final source will be chosen through a bidding process.

Should you have any questions or desire additional information please contact me by telephone at (808) 259-7966 x30 or by email at dsmith@seaengineering.com.

Sincerely,

David A. Smith

David A. Smith, Ph.D., P.E.
Project Manager

CC: DLNR-OCCL

Mills, Kimberly T

From:	Jerome K. Yasuhara <jeromey@oha.org>
Sent:	Monday, March 25, 2019 10:59 AM
To:	'dsmith@seaengineering.com'
Cc:	Mills, Kimberly T
Subject:	REQUEST FOR COMMENTS; Draft EA (DEA) for the Stable Road West Groin Repair/Replacement; Makai of TMK (2)3-8-002: 025, 026 & 050 upon submerged land

Aloha Mr. Smith,

The Office of Hawaiian Affairs (OHA) appreciates the opportunity to review and comment upon the subject DEA pertaining to proposed groin repair and replacement work. As a preliminary matter, in the interest of clarifying project boundaries and its area of potential effect, please identify from what location(s) the so-called replacement stones will be sourced. The current submittal published in The Environmental Notice (03-08-2019) indicates how a substantial amount of stones needed to complete project goals will be transported from offsite locations to the existing groins. Given community challenges behind the current sand-mining moratorium on Maui, for instance, OHA inquires now whether similar concerns would follow with respect to this proposal's sourcing of replacement stones, and therefore to additionally identify and analyze those source locations within this DEA process. Please advise.

Thank you in advance.

Me ka ha`aha`a,
Jerome Yasuhara

Jerome Yasuhara | Ka `Aho Pueo, Kia`i Kānāwai | **Compliance Specialist**
OFFICE OF HAWAIIAN AFFAIRS

OFFICE OF HAWAIIAN AFFAIRS
560 N. Nimitz Highway, Suite 200 | Honolulu, HI 96817
☎: 808.594.0129 | 🖷: 808.594.1825 | ✉: jeromey@oha.org

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
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

Stable Road West DEA

MAR - 7 2019

MEMORANDUM

TO:

State Agencies	**Maui County**
____ DLNR-Aquatic Resources	____ Department of Planning
____ DLNR- Historic Preservation [via Email]	
✓ DLNR-Resource Enforcement	**Federal Agencies**
____ DLNR-Land Division	____ Dept. of the Army
____ DLNR-Forestry & Wildlife	____ National Oceanic Atmospheric Admin.
____ Office of Hawaiian Affairs	____ US Fish & Wildlife Services

FROM: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Draft Environmental Assessment (EA) for the Stable Road West Groin Repair and Replacement

APPLICANT: Community Beach Restoration Foundation
LOCATION: Specklesville Beach Lots, Wailuku, Maui
TMKs: Makai of (2) 3-8-002: 025, 026 & 050 upon submerged land

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We would appreciate your agency's review and comment on this draft EA that may be found on the OCCL website at https://dlnr.hawaii.gov/occl/files/2019/03/25553-Stable-Road-DEA-Submitted-12-12-2018.pdf or via the March 8, 2019 Environmental Notice that can be found at http://health.hawaii.gov/oeqc/ . **The deadline to provide comments to the OCCL is April 8, 2019.** Should there be any question regarding this matter, contact Tiger Mills of our Office at (808) 587-0382.

( ) Comments Attached
(✓) No Comments
( ) No Objections

Jason K Redulla / DLNR-DOCARE 3-18-19
Print Name and Date

Gmail

Christopher Conger <conger.c.l@gmail.com>

FW: ASSIGNED TO ARCHAEOLOGY WITH LOG 2019.00512 *** RE: Draft EA Request for Comments STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT

1 message

Mills, Kimberly T <kimberly.mills@hawaii.gov> Fri, Mar 8, 2019 at 3:13 PM
To: Chris Conger <cconger@seaengineering.com>

FYI, request for comments for the DEA sent to SHPD

DEA got published today

HAPPY WEEKEND!

~Tiger

K. Tiger Mills, Staff Planner

State of Hawai`i

Department of Land and Natural Resources

Office of Conservation And Coastal Lands

P.O. Box 621

Honolulu, Hawai`i 96809

www.dlnr.hawaii.gov/occl

From: DLNR.Intake.SHPD
Sent: Friday, March 08, 2019 2:33 PM
To: Mills, Kimberly T <kimberly.mills@hawaii.gov>; Lebo, Susan A <susan.a.lebo@hawaii.gov>; Soares, Lehua K <lehua.k.soares@hawaii.gov>; Clark, Garnet K <garnet.k.clark@hawaii.gov>
Cc: DePonte, Ellen M <ellen.m.deponte@hawaii.gov>; DLNR.Intake.SHPD <dlnr.intake.shpd@hawaii.gov>
Subject: ASSIGNED TO ARCHAEOLOGY WITH LOG 2019.00512 *** RE: Draft EA Request for Comments STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT

Aloha, your submittal is in the queue for review by the Archaeology Branch and is assigned log 2019.00512 for reference.

Direct all inquiries hereafter on this matter to Dr. Lebo, Ms. Soares and Ms. Clark at their emails above.

Mahalo,

SHPD Intake Specialist

From: Mills, Kimberly T
Sent: Friday, March 8, 2019 2:20 PM
To: DLNR.Intake.SHPD <dlnr.intake.shpd@hawaii.gov>
Subject: Draft EA Request for Comments

Attached please find our Offices notice regarding solicitation for comments in regards to an draft Environmental Assessment for the Stable Road West Groin Repair and Replacement project.

Should there be questions or comments feel free to contact me here or at 587-0382.

The deadline to provide comments for the draft EA is April 8, 2019.

Thank you

~Tiger

K. Tiger Mills, Staff Planner

State of Hawai`i

Department of Land and Natural Resources

Office of Conservation And Coastal Lands

P.O. Box 621

Honolulu, Hawai`i 96809

www.dlnr.hawaii.gov/occl

APPENDIX B – ASSESSMENT OF THE MARINE ENVIRONMENT

BASELINE ASSESSMENT OF MARINE WATER CHEMISTRY AND MARINE BIOTIC COMMUNITIES STABLE ROAD GROIN REPAIR AND REPLACEMENT PROJECT WAILUKU, MAUI, HAWAII

Prepared for:

Sea Engineering, Inc.
Makai Research Pier
Waimanalo, HI

By:

MARINE RESEARCH CONSULTANTS, INC.
1039 Waakaua Pl.
Honolulu, HI 96822

October 2017

I. INTRODUCTION AND PURPOSE

The property owners at the west end of Stable Road, Spreckelsville, Wailuku, Maui, Hawaii, (Figure 1) are working to assess the condition of the beach and sand retention structures that are currently in place along the shoreline fronting their parcels. This group intends to develop a long-term management plan for the shoreline. Currently, there are seven (7) shoreline stabilizing structures (groins) that have been in existence along the coastline since before 1960, and have equilibrated with the coastal processes. However, progressive erosion along the stretch of coastline makai of Tax Map Key (TMK) (2) 3-8-002:024, 025, 026, and 050, has resulted in beach deflation and landward migration of the erosion scarp. This erosion trend accelerated as a result of the 2011 Tsunami and the 2016 El Nino winter, creating a potentially serious situation at the west end of the beach.

The proposed project is to repair seven groins seaward of Stable Road on the North Shore of Maui. The existing groins have deteriorated from age and exposure to the marine environment. The ongoing degradation of the regional groin field has led to shoreline recession. The proposed work would include repairs to the damaged groins (1-2 and 4-7). Groin 3 is in critical condition and would be replaced with a new groin that matches the design of the other six groins. The project duration is approximately 43 to 111 days.

The purpose of this document is to provide the results of rapid ecological assessments (REAs) of two aspects of the marine ecosystem fronting the Stable Road project site described above. Water chemistry was assessed by collecting a set of samples extending from the shoreline to beyond the seaward ends of three of the groins. Marine community structure in the vicinity of the groins, primarily in terms of coral reef assemblages was also described based on in-water surveys. The purpose of these REAs is to provide a description of the existing condition of the marine environment. Evaluation of the existing condition of the water chemistry and marine communities provides an insight into the physical and chemical factors that influence the marine setting. As coral communities are both long-lived and attached to the bottom, they serve as the best indicators of the time-integrated forces that affect offshore reef areas. In addition, algal communities provide an insight into the existing physical/chemical conditions of the region. Understanding the existing physical, chemical and biological conditions of the marine environment that presently occur provides a basis for predicting potential affects that might occur as a result of the proposed groin restoration.

II. METHODS

A. Water Quality/Chemistry

Water chemistry field collection was conducted on June 9, 2017. All samples were collected by swimmers, working from the shoreline. Water chemistry was assessed along three survey transects that extended approximately perpendicular to the shoreline originating at the sand-water interface of the beach adjacent to groins Nos 1, 3 and 6. Each transect extended approximately 110-150 feet offshore. Water samples were collected at seven locations along each transect (Figure 1). Such a sampling scheme is designed to span the greatest range of salinity with respect to potential freshwater efflux at the shoreline. Sampling was more concentrated in the nearshore zone because this area receives the majority of groundwater discharge, and hence is most important with respect to identifying the effects of shoreline

modification. Owing to the shallow water depth of the area, samples were collected at a single depth approximately in the mid-point of the water column.

Water quality parameters evaluated included all specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) (Open Coastal waters) of the State of Hawaii Department of Health (DOH) Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen (NO_3^- + NO_2^-, hereafter referred to as NO_3^-), ammonium nitrogen (NH_4^+), total phosphorus (TP), Chlorophyll a (Chl *a*), turbidity, temperature, pH and salinity. In addition, silica (Si) and orthophosphate phosphorus (PO_4^{-3}) were also reported because these parameters are sensitive indicators of biological activity and the degree of groundwater mixing.

Water samples were collected by filling pre-rinsed 500-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice. Analyses for Si, NH_4^+, PO_4^{3-}, and NO_3^- were performed with a Technicon Autoanalyzer using standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TN and TP were analyzed in a similar fashion following digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between TDN and dissolved inorganic N and TDP and dissolved inorganic P, respectively.

Water for other analyses was sub-sampled from 1-liter polyethylene bottles and kept chilled until analysis. Chl *a* was measured by filtering 300 ml of water through glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -20° C for 12-24 hours. Fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001I (ppt). Turbidity was determined using a 90-degree nephelometer, and reported in nephelometric turbidity units (NTU) (precision of 0.01 NTU). Vertical profiles of salinity, temperature and depth were acquired using a RBR-Concerto CTD calibrated to factory standards.

EPA and Standard Methods (SM) methods that were employed for chemical analyses, as well as detection limits, are listed in the Code of Federal Regulations (CRF) Title 40, Chapter 1, Part 136, are as follows:

NH_4^+: EPA 350.1, Rev. 2.0 or SM4500-NH3 G, detection limit 0.42 µg/L.
NO_3^- + NO_2^-: EPA 353.2, Rev. 2.0 or SM4500-NO3F, detection limit 0.28 µg/L
PO_4^{-3}: EPA 365.5 or SM4500-P F, detection limit 0.31 µg/L.
Total P: EPA 365.1, Rev. 2.0 or SM4500-P E J, detection limit 0.62 µg/L.
Total N: SM 4500-N C., detection limit 5.60 µg/L.
Si: EPA 370.1 or SM 4500 SiO2 E, detection limit 5.32 µg/L.
Chlorophyll *a*: SM 10200, detection limit 0.006 µg/L.
pH: EPA 150.1 or SM4500H+B, detection limit 0.002 pH units
Turbidity: EPA 180.1, Rev. 2.0 or SM2130 B, detection limit 0.008 NTU.
Temperature: SM 2550 B, detection limit 0.01 degrees centigrade.
Salinity: SM 2520, detection limit 0.003 ppt.
Dissolved Oxygen: SM4500 O G, and detection limit 0.01% sat.

All fieldwork was conducted by Dr. Steven Dollar and Ms. Andrea Millan. All laboratory

analyses were conducted by Marine Analytical Specialists located in Honolulu, HI (Labcode: HI 00009). This analytical laboratory possesses acceptable ratings from EPA-compliant proficiency and quality control testing.

B. Marine Biotic Community Structure

Biotic composition of the survey area was assessed by divers working from the shoreline. Dive surveys were conducted by swimming in a zigzag pattern adjacent to each of the seven groins shown in Figure 1. These surveys covered a corridor approximately 50 feet wide along each side of each groin, and extended approximately 50 feet beyond the seaward ends of the groins. During these underwater investigations, notes on species composition were recorded, and numerous digital photographs recorded the existing conditions of the area. The baseline assessment was conducted by S. Dollar and A. Millan.

III. RESULTS

A. Water Quality/Chemistry

1. Distribution of Chemical Constituents

Tables 1 and 2 show results of all water chemistry analyses on samples collected off the Stable Road Groins Project site on June 9, 2017. Table 1 shows concentrations of nutrients as micromoles (µM), while Table 2 shows nutrient concentrations as micrograms per liter (µg/L). Concentrations of eight dissolved nutrient constituents are plotted as functions of distance from the shoreline in Figure 2; values of salinity, Chl *a*, turbidity, pH and dissolved oxygen are plotted as functions of distance from shore are shown in Figure 3.

Several patterns of distribution are evident in Table1 and Figures 2 and 3. Most evident is that the values of all but one nutrient constituent (TOP) off Groin 3 were substantially different than off Groins 1 and 6. It can be seen in Figure 2 that the dissolved inorganic nutrients Si, NO_3^- and PO_4^{3-}display distinctly elevated concentrations in the samples collected at the shoreline, and progressively decrease in value with distance seaward for a distance of approximately 100 feet before values coincide with the other two groin sites (Figure 2). Salinity displays the opposite trend, with sharply lower concentrations in the nearshore samples from Groin 3, and progressive increase to a distance of about 100 feet offshore (Figure 3). Beyond 100 feet from the shoreline, concentrations of Si, NO_3^- and salinity are essentially constant and similar to the other groin sites (Figures 2 and 3). Over the entire sampling span, the range in NO_3^- is about 157 µM (2.2 mg/L) from the shoreline to 150 feet offshore at Groin 3, while there was virtually no gradient in concentrations of NO_3^- at Groins 1 and 6. Horizontal gradients of TN and TP reflect the concentrations of NO_3^- and PO_4^{3-} showing the same steep gradients from the shoreline (Figure 2).

As there are were no streams discharging to the ocean in the vicinity of Groin 3, the strong gradients of Si, NO_3^- and salinity reflect input of groundwater to the ocean near the shoreline. Low salinity groundwater, which typically contains high concentrations of Si, NO_3^- and PO_4^{3-} percolates to the ocean at the shoreline, resulting in a nearshore zone of mixing. In many areas of the Hawaiian Islands, such groundwater percolation results in steep horizontal

gradients of increasing salinity and decreasing nutrients with increasing distance from shore, as is evident at the Groin 3 site.

As the sampling site off the Stable Road groins is an open coastal area exposed to wind and wave, the zone of groundwater-ocean water mixing is small, extending only to distances of several meters from shore. These gradients are far less pronounced than at other areas of West Maui where either semi-enclosed embayments occur or physical mixing processes are less vigorous.

Similar to the patterns of dissolved inorganic nutrients (Si and NO_3^-), the distribution of Chl *a* also display peaks near the shoreline at Groin 3, with rapidly diminishing values seaward of the shoreline (Table 1, Figure 3). Temperature displays a similar pattern with lowest values at the shoreline and progressively increasing values with distance from shore (Figure 3). The distribution of turbidity is similar at all three groin sites, with highest values nearest the shoreline, with progressive decreases with distance from shore. It is likely that such a pattern reflects resuspension of fine-grained sediment by wave action in the nearshore zone.

Of note is that the apparent discharge of groundwater at the shoreline only occurs in the localized area adjacent to Groin 3. As noted above the relatively constant values from the shoreline to the most seaward sampling stations at Groins 1 and 6 indicate that there is little or no groundwater input at these locations. It is not obvious why there should be such localized shoreline input in the vicinity of Groin 3 that does not extend to neighboring areas.

It is also important to note that the magnitude of the nutrient concentrations in the nearshore waters surrounding at Groin 3 are far above those found in most areas of Maui. In comparison, the peak value of NO_3^- at Kaanapali Maui from samples collected by Marine Research Consultants in June 2017 was about 16 µM, compared to 170 µM at the shoreline off Groin 3. When the concentrations of NO_3^- are subjected to linear regression versus salinity, the Y-intercept, which represents the concentration at a salinity of zero, is 63 µM at Kaanapali and 355 µM at Groin 3. These order of magnitude increases suggests that groundwater at the Stable Road site is subsidized by additional nutrient sources.

2. Compliance with DOH Criteria

State of Hawaii Department of Health Water Quality Standards (HDOH-WQS) that apply to the areas offshore of the Stable Road Groins are listed as "open coastal water" in HRS Chapter §11-54-6(b). Two sets of standards are listed depending on whether an area receives more than 3 million gallons per day (mgd) of freshwater input per shoreline mile ("wet standards"), or less than 3 mgd of freshwater input per shoreline mile ("dry"). While the study area probably receives less than 3 mgd per mile, both wet and dry criteria were used for this evaluation.

The HDOH-WQS are also separated into three standards: geometric means, "not to exceed more than 10% of the time" and "not to exceed more than 2% of the time." As these classifications require multiple samplings, they cannot be used for a strict evaluation of whether waters at the sampling site were within compliance standards. However, these values provide a guideline to evaluate the overall status of sampled waters in terms of the relation with State standards.

It can be seen in Tables 1 and 2 that all values of nitrate nitrogen (NO_3^-) exceed all DOH

standards by one to two orders of magnitude. All values of TN at Groin 1 and most at Groin 3 exceed the most lenient DOH specific criterion (not to exceed more than 2% of the time under wet conditions). The nearshore values of ammonium nitrogen (NH_4^+) within 70 feet of the shoreline off Groin 3 also exceed the most lenient DOH criteria. As discussed above, the elevated concentration of dissolved nutrients near the shoreline is likely a result of mixing of groundwater with ocean water, while the elevated concentrations of turbidity near the shoreline are likely a result of resuspension of fine-grained naturally occurring sediment by breaking waves in the nearshore zone.

B. Benthic Marine Community Structure

The offshore marine environment at the Stable Road areas is essentially homogenous at all seven groins. Physical composition of the survey area consists of submerged, or partially submerged basaltic boulders that form the groin structures. Complete inspection of all of the boulders revealed that there was no colonization of reef-building corals on any of the rock surfaces. Rather, biotic colonization of the boulders consisted entirely of a cover of turf algae (Figures 5-8). The only other observed colonizer of the boulder surfaces were numerous limpets (opihi, *Cellana* sp.) that occupied boulders at Groin 7 (Figure 9).

The ocean bottom adjacent to all of the groins consisted of a mixture of sand and rubble. The most common biota were numerous small solitary sea anemones (*Gyractis sesere*) that occurred in patches seaward of the groins (Figure 4). The other dominant benthos were mats of the colonial "soft coral" *Zoanthus* sp. (Figure 5). No stony reef building corals were observed on the seafloor of the survey area.

IV. DISCUSSION and CONCLUSIONS

The purpose of this assessment is to assemble the information to make valid evaluations of the potential for impact to the marine environment from the proposed restoration of existing boulder groins off the Stable Road area of Wailuku, Maui. The information collected in this study provides the basis to understand some of the important processes that are operating in the nearshore ocean, so as to be able to address any concerns that might be raised in the planning process for the beach stabilization.

Results of this baseline study reveal that the marine habitats surrounding the groins consists of a mix of sand and rubble. The existing boulders and surrounding seafloor do not function as settling sites for reef-building corals, likely as a result of excessive wave impacts during the winter season. The major biotic inhabitants of the area are aggregations of both a species of solitary sea anemone, and a colonial soft coral. One species of a gastropod mollusk (opihi) was common on the exposed boulders of Groin 7. All of these organisms are commonly observed in shallow water habitats around the north shore of Maui.

Results of the water quality reconnaissance survey indicate an input of groundwater entering the ocean near the shoreline that is restricted to the area off of Groin 3. The groundwater input is rapidly mixed to background coastal oceanic values through wave action, and likely only

affects the zone within a distance that equals the seaward extension of the groin. However, the magnitude of nutrient concentrations within the zone where groundwater mixes with ocean water are of such high values that it is apparent that there is a component of the groundwater that is a subsidy from some kind of land-based human activity.

Based on the results of this survey, it can be concluded that the proposed groin maintenance project will not impact any stony reef-building corals, marine algae or seagrass beds. In addition, there should be no effects to sea turtles or marine mammals, including monk seals and humpback whales. The proposed project to repair seven groins seaward of Stable Road on the North Shore of Maui should not affect long-term water quality in either a positive or negative manner. Though nutrient concentrations near Groin 3 are high relative to adjacent nearshore areas, the scope of the proposed project is not likely to either increase or decrease the rate of discharge, or composition of groundwater entering the marine environment.

REFERENCES CITED

Grasshoff, K. 1983. Methods of seawater analysis. Verlag Chemie, Weinheim, 419 pp.

Strickland J. D. H. and T. R. Parsons. 1968. A practical handbook of sea-water analysis. Fisheries Research Bd. of Canada, Bull. 167. 311 p.

FIGURE 1. Aerial view of shoreline and nearshore ocean off of Stable Rd., north Maui, Hawaii. Also shown are the location of seven rock groins (G1 – G7) that traverse the beach. Water samples were collected at three groin locations (G-1, G-3 and G-6), extending from the shoreline adjacent to the groins to a distance of about 50 feet off the seaward ends of the groins. Water sample locations are depicted by red circles; numbers adjacent to circles indicate sample designation for analytical results shown in Table 1.

TABLE 1. Results of water sampling off the groins along Stable Rd, Maui conducted on June 9, 2017. Nutrient concentrations are shown as micromoles ((µM). Also shown are the State of Hawaii, Department of Health Water Quality Standards (DOH WQS) "not to exceed more than 10% of the time" and "not to exceed more than 2% of the time" criteria for open coastal waters under "dry" and "wet" conditions. Shaded shaded values exceed DOH 2% "wet" standards. For groin and sampling station locations, see Figure 1.

GROIN	Sample No.	DFS (feet)	PO_4^{3-} (µM)	$NO_3^-+NO_2^-$ (µM)	NH_4^+ (µM)	Si (µM)	TOP (µM)	TON (µM)	TP (µM)	TN (µM)	TURB (NTU)	SALINITY (o/oo)	pH (std. units)	Chl-a (µg/l)	TEMP deg. C	Diss. O_2 % sat.
1	1	0	0.10	16.84	0.18	60.62	0.41	7.96	0.51	24.98	1.21	32.52	8.032	0.693	25.53	90.56
	2	10	0.10	17.10	0.02	61.05	0.41	8.00	0.51	25.12	1.59	32.93	8.014	0.537	25.53	84.78
	3	25	0.17	17.83	0.35	62.40	0.35	8.24	0.52	26.42	1.57	32.78	7.997	0.506	25.51	77.36
	4	50	0.15	18.73	0.59	64.75	0.35	8.26	0.50	27.58	1.39	32.68	7.992	0.506	25.53	68.97
	5	70	0.17	19.38	0.72	66.41	0.36	8.72	0.53	28.82	1.04	32.54	7.994	0.475	25.54	69.78
	6	90	0.15	23.84	0.64	77.11	0.38	9.00	0.53	33.48	0.87	32.21	8.000	0.569	25.51	71.93
	7	110	0.13	19.12	0.50	64.69	0.41	8.94	0.54	28.56	0.68	32.61	8.027	0.428	25.50	79.42
3	8	0	0.48	170.88	1.72	460.70	0.38	16.79	0.86	189.39	1.01	17.47	7.783	5.866	24.85	75.96
	9	20	0.45	133.53	2.33	350.16	0.38	17.19	0.83	153.05	1.33	22.07	7.855	5.718	25.25	95.66
	10	50	0.38	101.62	1.32	269.47	0.32	11.83	0.70	114.77	0.91	25.18	7.927	1.628	25.55	94.79
	11	70	0.16	43.83	1.26	123.81	0.43	9.88	0.59	54.97	0.88	30.51	8.015	1.371	25.55	96.90
	12	95	0.12	22.98	0.15	74.38	0.40	8.35	0.52	31.48	1.03	32.48	8.016	0.576	25.57	89.53
	13	120	0.10	16.80	0.23	61.14	0.41	7.31	0.51	24.34	0.81	32.79	8.039	0.405	25.59	89.02
	14	150	0.08	13.42	0.30	54.38	0.41	7.20	0.49	20.92	0.40	33.12	8.072	1.091	25.59	90.56
6	15	0	0.13	9.38	0.55	41.61	0.47	8.43	0.60	18.36	1.98	33.28	8.115	1.792	25.97	100.54
	16	20	0.11	9.22	0.88	42.98	0.42	7.79	0.53	17.89	1.37	33.24	8.122	0.989	26.01	101.45
	17	40	0.09	9.00	0.59	42.50	0.49	8.41	0.58	18.00	1.23	33.28	8.120	0.826	26.01	101.31
	18	60	0.09	9.37	0.23	43.56	0.46	9.37	0.55	18.97	0.92	33.35	8.130	0.553	25.99	104.52
	19	80	0.10	10.78	0.47	46.61	0.44	8.65	0.54	19.90	0.56	33.43	8.147	0.530	25.96	105.35
	20	100	0.10	10.55	0.19	44.20	0.36	7.43	0.46	18.17	0.31	33.51	8.172	0.358	25.88	112.86
	21	120	0.10	9.39	0.37	40.36	0.29	7.78	0.39	17.54	0.30	33.58	8.187	0.234	25.89	117.69
DOH WQS	DRY	NTE 10%		0.71	0.36				0.97	12.86	0.50	*	**	0.50	***	****
		NTE 2%		1.43	0.64				1.45	17.86	1.00	*	**	1.00	***	****
	WET	NTE 10%		1.00	0.61				1.29	17.86	1.25	*	**	0.90	***	****
		NTE 2%		1.79	1.07				1.94	25.00	2.00	*	**	1.75	***	****
Analytical Method			EPA 365.3	EPA 353.2	EPA 350.1	EPA 370.1			SM 4500P B5	SM 4500N C	SM 2130B	SM 2520	EPA 150.1	SM 10200	SM 2550B	SM 4500 OG

* = Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

** = pH shall not deviate more than 0.5 units from a value of 8.1.

*** = Temperature shall not vary more than one degree C. from ambient conditions.

**** = Dissolved Oxygen not less than 75% saturation

TABLE 2. Results of water sampling off the groins along Stable Rd, Maui conducted on June 9, 2017. Nutrient concentrations are shown as micrograms per liter ((µg/L). Also shown are the State of Hawaii, Department of Health Water Quality Standards (DOH WQS) "not to exceed more than 10% of the time" and "not to exceed more than 2% of the time" water quality standards for open coastal waters under "dry" and "wet" conditions. Shaded shaded values exceed DOH 2% "wet" standards. For groin and sampling station locations, see Figure 1.

GROIN	Sample No.	DFS (feet)	PO_4^{3-} (µg/L)	$NO_3^-+NO_2^-$ (µg/L)	NH_4^+ (µg/L)	Si (µg/L)	TOP (µg/L)	TON (µg/L)	TP (µg/L)	TN (µg/L)	TURB (NTU)	SALINITY (o/oo)	pH (std. units)	Chl-a (µg/l)	TEMP deg. C	Diss. O_2 % sat.
1	1	0	3.10	235.76	2.52	1697.36	12.71	111.44	15.81	349.72	1.21	32.52	8.032	0.693	25.53	90.56
	2	10	3.10	239.40	0.28	1709.40	12.71	112.00	15.81	351.68	1.59	32.93	8.014	0.537	25.53	84.78
	3	25	5.27	249.62	4.90	1747.20	10.85	115.36	16.12	369.88	1.57	32.78	7.997	0.506	25.51	77.36
	4	50	4.65	262.22	8.26	1813.00	10.85	115.64	15.50	386.12	1.39	32.68	7.992	0.506	25.53	68.97
	5	70	5.27	271.32	10.08	1859.48	11.16	122.08	16.43	403.48	1.04	32.54	7.994	0.475	25.54	69.78
	6	90	4.65	333.76	8.96	2159.08	11.78	126.00	16.43	468.72	0.87	32.21	8.000	0.569	25.51	71.93
	7	110	4.03	267.68	7.00	1811.32	12.71	125.16	16.74	399.84	0.68	32.61	8.027	0.428	25.50	79.42
3	8	0	14.88	2392.32	24.08	12899.60	11.78	235.06	26.66	2651.46	1.01	17.47	7.783	5.866	24.85	75.96
	9	20	13.95	1869.42	32.62	9804.48	11.78	240.66	25.73	2142.70	1.33	22.07	7.855	5.718	25.25	95.66
	10	50	11.78	1422.68	18.48	7545.16	9.92	165.62	21.70	1606.78	0.91	25.18	7.927	1.628	25.55	94.79
	11	70	4.96	613.62	17.64	3466.68	13.33	138.32	18.29	769.58	0.88	30.51	8.015	1.371	25.55	96.90
	12	95	3.72	321.72	2.10	2082.64	12.40	116.90	16.12	440.72	1.03	32.48	8.016	0.576	25.57	89.53
	13	120	3.10	235.20	3.22	1711.92	12.71	102.34	15.81	340.76	0.81	32.79	8.039	0.405	25.59	89.02
	14	150	2.48	187.88	4.20	1522.64	12.71	100.80	15.19	292.88	0.40	33.12	8.072	1.091	25.59	90.56
6	15	0	4.03	131.32	7.70	1165.08	14.57	118.02	18.60	257.04	1.98	33.28	8.115	1.792	25.97	100.54
	16	20	3.41	129.08	12.32	1203.44	13.02	109.06	16.43	250.46	1.37	33.24	8.122	0.989	26.01	101.45
	17	40	2.79	126.00	8.26	1190.00	15.19	117.74	17.98	252.00	1.23	33.28	8.120	0.826	26.01	101.31
	18	60	2.79	131.18	3.22	1219.68	14.26	131.18	17.05	265.58	0.92	33.35	8.130	0.553	25.99	104.52
	19	80	3.10	150.92	6.58	1305.08	13.64	121.10	16.74	278.60	0.56	33.43	8.147	0.530	25.96	105.35
	20	100	3.10	147.70	2.66	1237.60	11.16	104.02	14.26	254.38	0.31	33.51	8.172	0.358	25.88	112.86
	21	120	3.10	131.46	5.18	1130.08	8.99	108.92	12.09	245.56	0.30	33.58	8.187	0.234	25.89	117.69
DOH WQS	DRY	NTE 10%		10.00	5.00				30.00	180.00	0.50	*	**	0.50	***	****
		NTE 2%		20.00	9.00				45.00	250.00	1.00	*	**	1.00	***	****
	WET	NTE 10%		14.00	8.50				40.00	250.00	1.25	*	**	0.90	***	****
		NTE 2%		25.00	15.00				60.00	350.00	2.00	*	**	1.75	***	****
Analytical Method			EPA 365.3	EPA 353.2	EPA 350.1	EPA 370.1			SM 4500P B5	SM 4500N C	SM 2130B	SM 2520	EPA 150.1	SM 10200	SM 2550B	SM 4500 OG

* = Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

** = pH shall not deviate more than 0.5 units from a value of 8.1.

*** = Temperature shall not vary more than one degree C. from ambient conditions.

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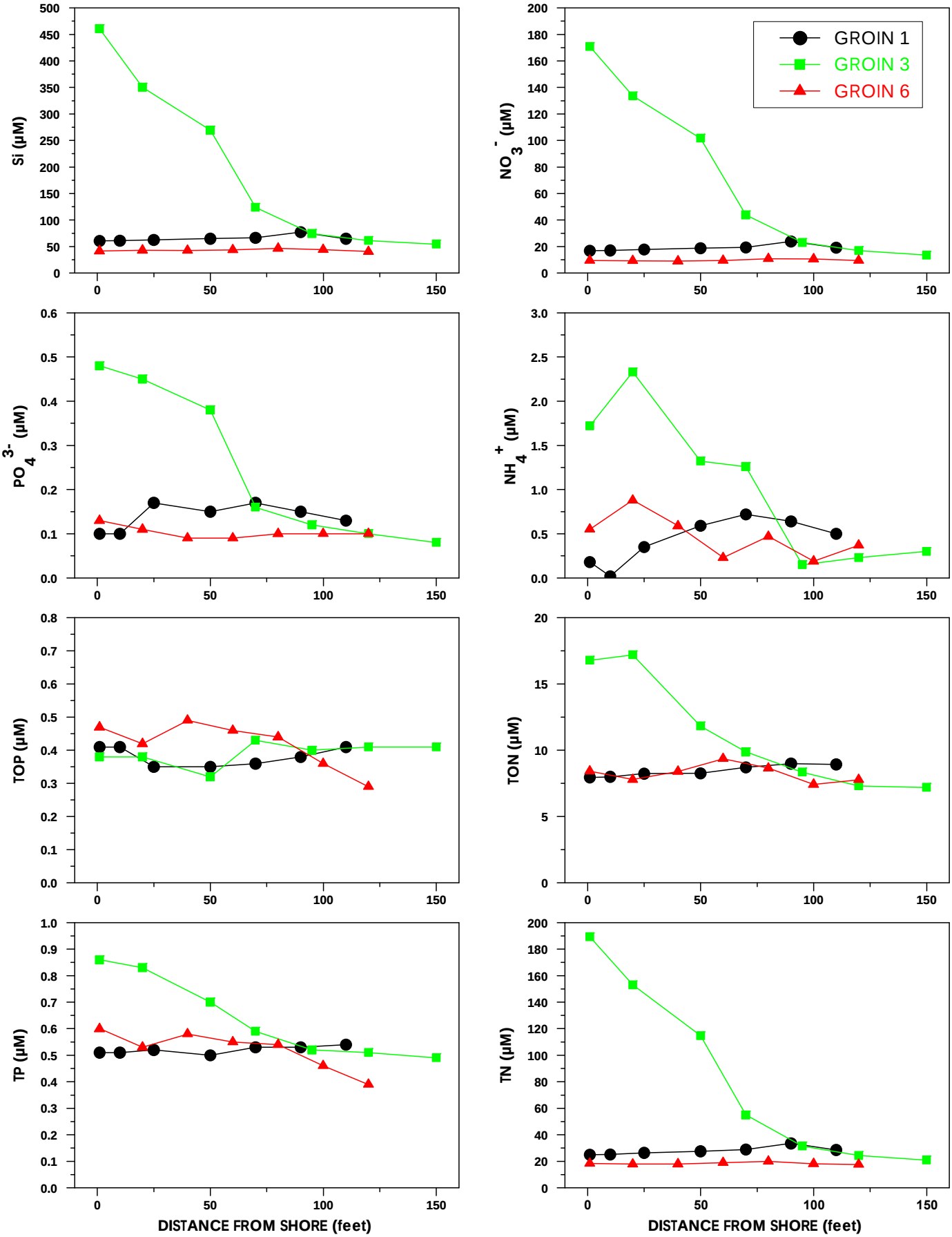

FIGURE 2. Plots of dissolved nutrients in surface and deep samples collected on June 9, 2017 as functions of distance from the shoreline along three transects in the vicinity of the Stable Road Groins, North Maui, Hawaii. For locations of groins and sampling stations, see Figure 1.

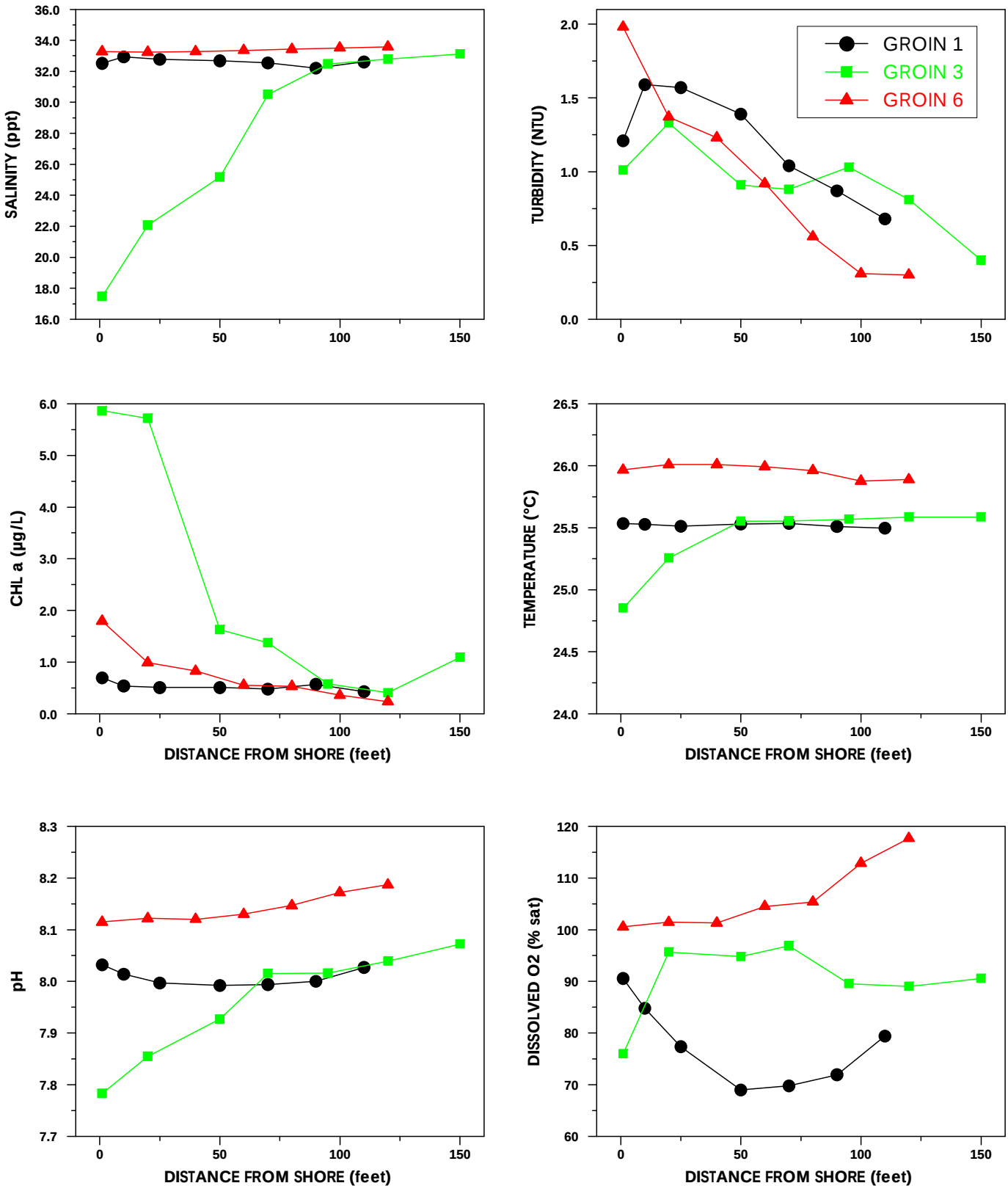

FIGURE 3. Plots of water chemistry constituents in samples collected on June 9, 2017 as functions of distance from the shoreline along three transects off the Stable Road Groins, North Maui, Hawaii. For locations of groins and sampling stations, see Figure 1.

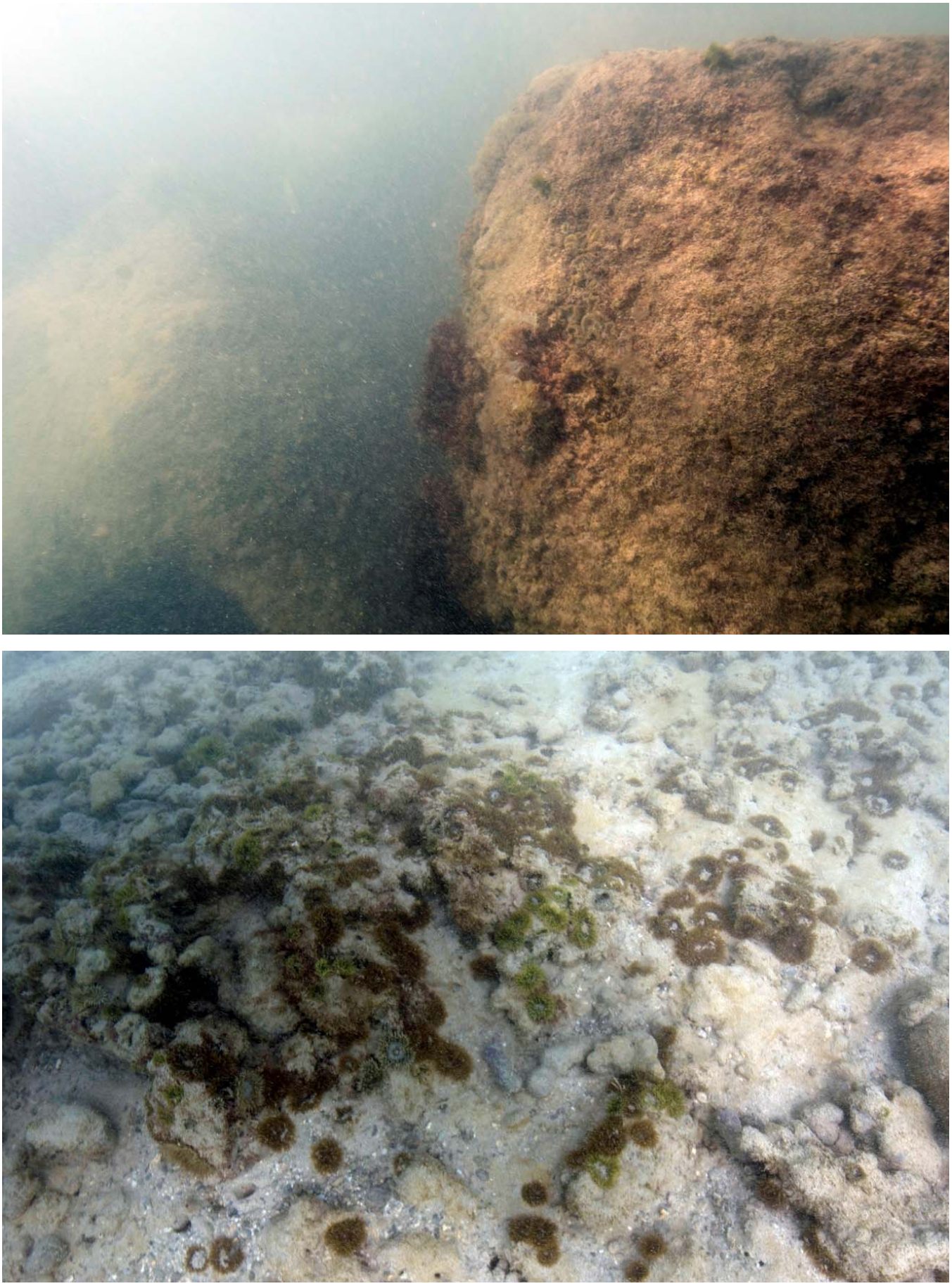

FIGURE 4. Top photo shows side of submerged boulder comprising Groin 1. Bottom photo shows sand rubble bottom off the end of Groin 1. Green material in bottom photo are numerous sea anemones *Gyractis sesere*.

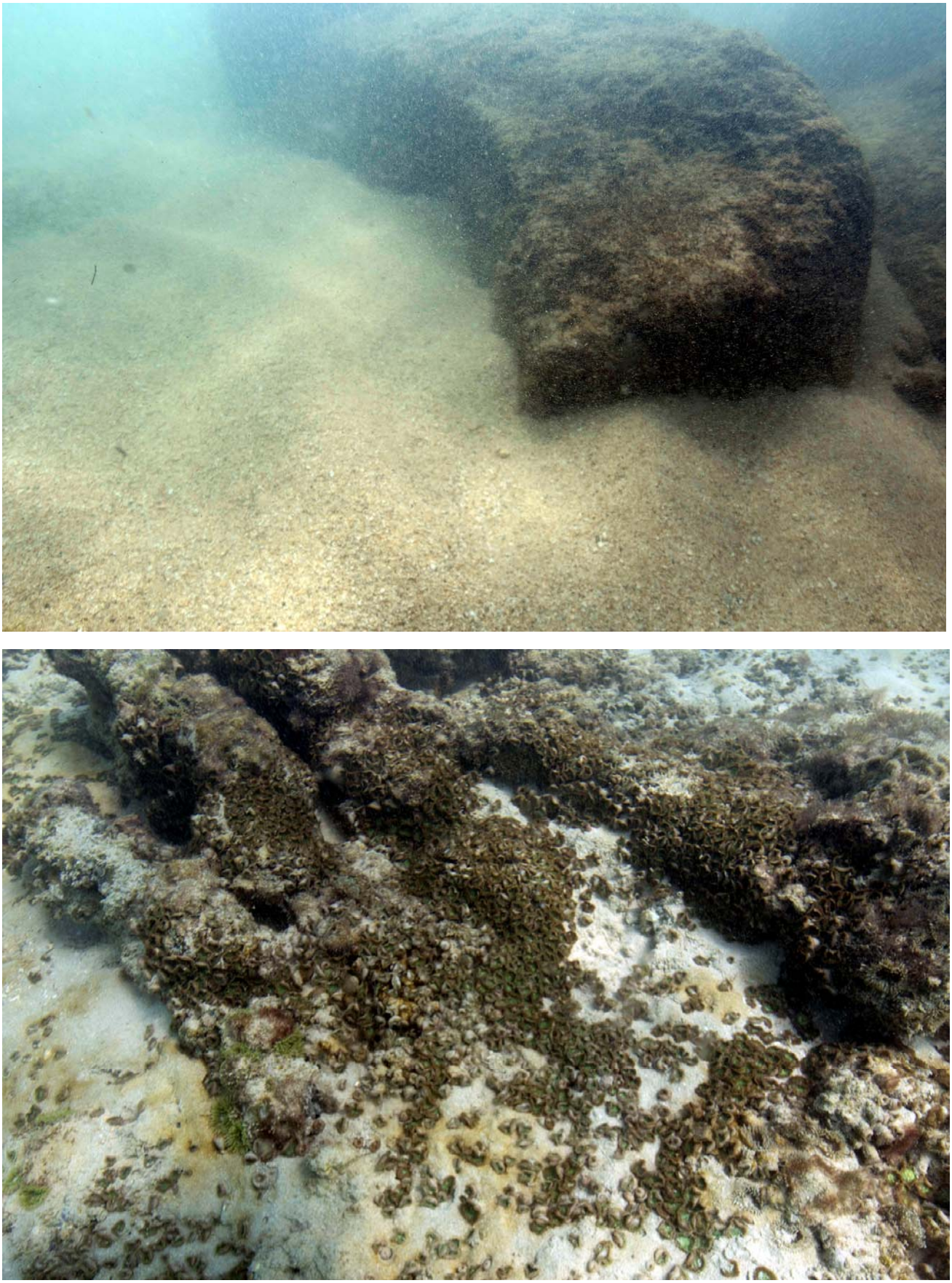

FIGURE 5. Top photo shows side of submerged boulder comprising Groin 3. Bottom photo shows sand rubble bottom off the end of Groin 3. Green material in bottom photo are numerous patches of colonial soft coral *Zoanthus* sp that grow partially submerged in the sand bottom.

FIGURE 6. Top photo shows emergent boulders at shoreline comprising Groin 4. Bottom photo shows sand rubble bottom and submerged boulders off the end of Groin 4. Green material on boulders is tufts of blue-green algae.

FIGURE 8. Two views of seafloor seaward of boulders comprising Groin 6. Bottom photo shows sand rubble bottom and submerged boulders off the end of Groin 6.

FIGURE 9. Top photo shows boulder extension into shoreline sand at Groin 7 colonized by numerous opihi (*Cellana* sp.) Bottom photo shows boulders in nearshore zone colonized by opihi as well as tufts of algae *Anhfeltia concinna*.

APPENDIX C – APPLICABLE MONITORING AND ASSESSMENT PLAN

Applicable Monitoring and Assessment Program for Clean Water Act (CWA) Section 401 Water Quality Certification

STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT

Version 1

Prepared for:

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41-305 Kalanianaole Hwy
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By:

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June 7, 2019

I. INTRODUCTION

This Applicable Monitoring and Assessment Plan (AMAP) accompanies the Clean Water Act (CWA) Section 401 Water Quality Certification (WQC) for the proposed project "Stable Road West Groin Repair and Replacement" (Stable Road Groin Repairs). This AMAP describes the requirements to be met during water quality monitoring efforts for the 401 WQC.

The intent of this AMAP is to conduct water quality sampling, analysis, and observation to monitor the effectiveness of the contractor Best Management Practices (BMPs). The BMPs are intended to prevent impacts to surrounding waters caused by the in-water work of the project. The most likely contaminant will be resuspended sediment (sand) that is resuspended in the water column from the ocean floor and shoreline. In order to confirm that contractor BMPs are preventing resuspended sediment from the repair activities is not impacting coastal waters, measurements of turbidity in the area are needed. Such data will be collected as part of the AMAP and will be used to assess adequacy of the contractor BMPs in protecting the quality of the coastal waters and biotic communities in the vicinity of the project. If monitoring data shows that BMPs are not adequately maintaining water quality, repair activities may be suspended until protective measures are modified. The AMAP includes Pre-Construction (baseline), Construction, and Post-Construction monitoring.

The project site is makai of the Kahului Airport at the west end of Stable Road in Paia, Maui, Hawaii (Figures 1 and 2). Seven rock groins were constructed along the shoreline before 1960 for the purpose of retaining sand (Figure 3). Sea Engineering, Inc., (SEI) has been working with property owners to assess the condition of the beach and sand retention structures currently in place. In the fall of 2018, temporary repairs were performed on Groin 3, which had become severely destabilized, resulting in a potentially threatening situation to the single-family residence just east of Groin 4. The proposed work which is the subject of this AMAP includes repairs to damaged Groins 1-2 and 4-7, and replacement of Groin 3. The project duration is expected to be between 43 and 111 days.

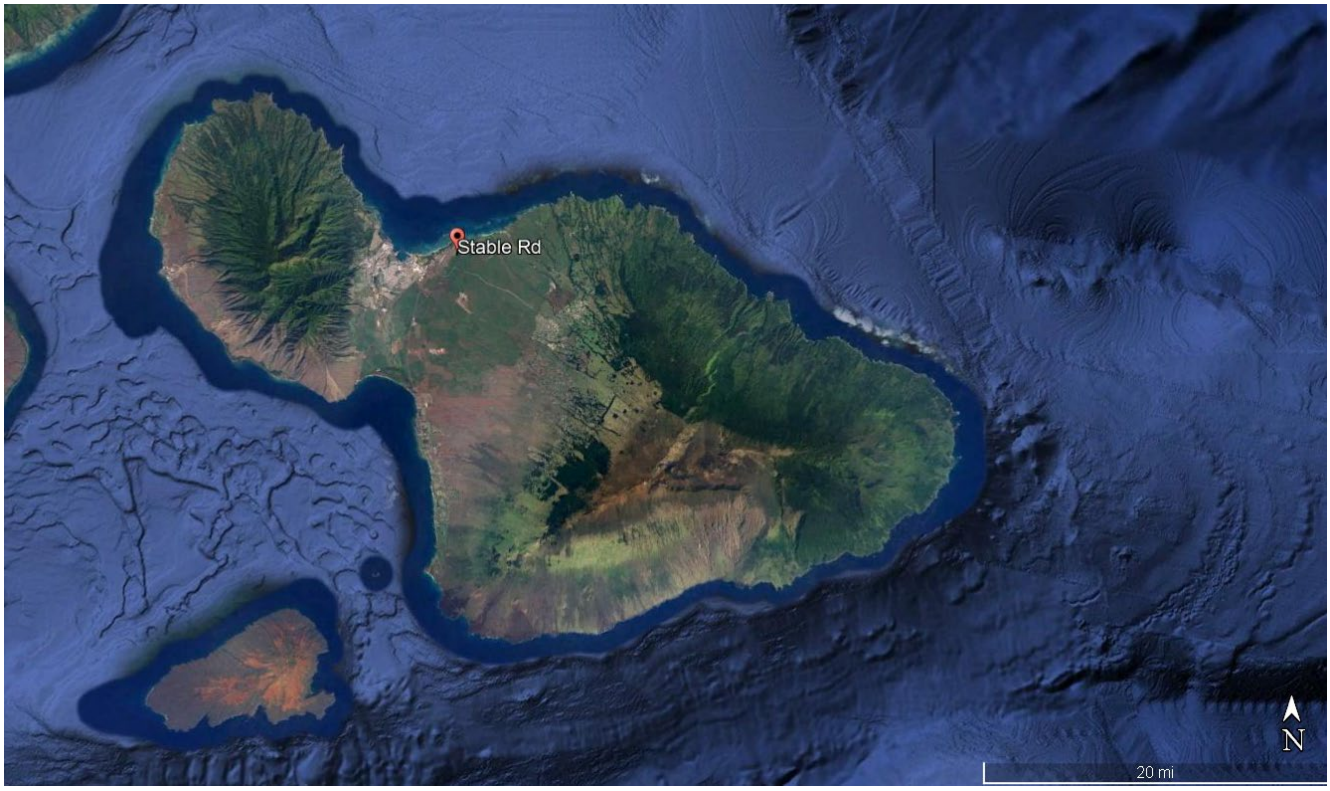

Figure 1. Stable Road Groin Repairs site on the island of Maui in Wailuku, Spreckelsville.

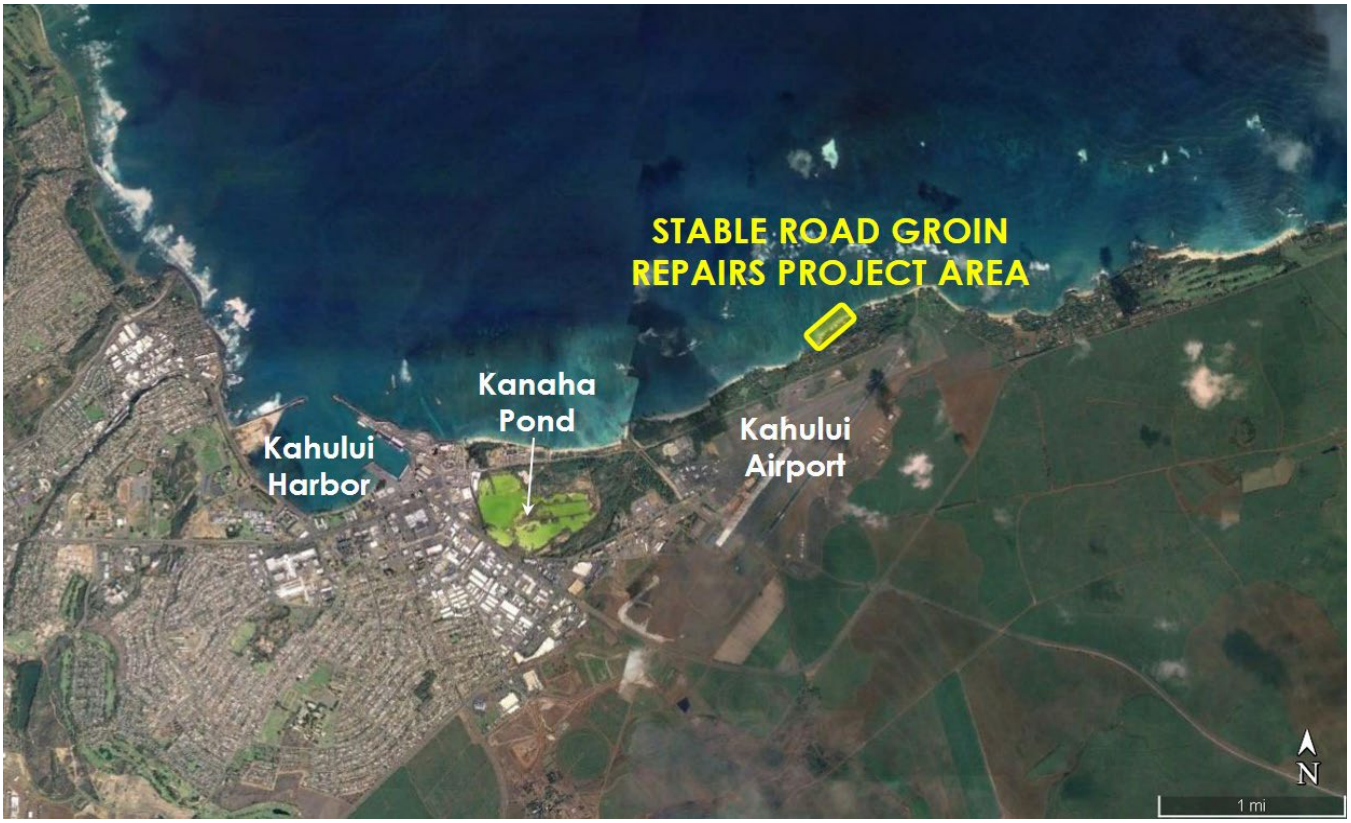

Figure 2. Stable Road Groin Repairs vicinity map.

Figure 3. Location of Stable Road Groins 1-7.

II. PROPOSED ACTIVITIES

Work will begin at Groin 1 and proceed to the northeast. Following the completion of work on each groin, equipment will be moved to the next groin. For Groins 1-2 and 4-7, a medium sized excavator will be used to obtain stones from within the existing groin's footprint. These stones will be used to rebuild the foundation of the groin to +2 ft mean sea level (MSL). Construction will proceed from the shoreline seaward to provide a platform on which the excavator can operate and maneuver. If additional stones are necessary to complete the groin, they will be transported to the site by dump trucks backing out onto the stone platform. Construction to +2 ft MSL would continue until the excavator reaches the groin head (Figure 4). After finishing the groin head, the excavator will work toward shore, completing the groin to final lines and grades.

Work at Groin 3 will begin with the removal of the existing temporary sandbags. Following removal of the sandbags, construction of Groin 3 will proceed in the same manner as for the other 6 groins (Figure 4). After construction of Groin 3 is completed, the sandbags and any other leftover materials will be disposed of at an approved upland facility.

Figure 4. Left: Plan view of proposed Groins 6 and 7 (1-2 and 4-5 are similar). Right: Plan view of proposed Groin 3.

Construction will begin when the necessary permits and approvals are obtained, and a construction contract is awarded. The current estimate for startup is summer or fall of 2019. The construction period is estimated to be 43 to 111 days. Within that duration, the preliminary schedule of tasks is:

1. Mobilize and install BMPs (1-3 days)
2. Trim vegetation (1-3 days)
3. Groin 1 repairs (5-14 days)
4. Groin 2 repairs (5-14 days)
5. Groin 3 replacement (10-20 days)
6. Groin 4 repairs (5-14 days)
7. Groin 5 repairs (5-14 days)
8. Groin 6 repairs (5-14 days)
9. Groin 7 repairs (5-14 days)
10. Demobilize (1 day)

Best Management Practices (BMPs) will include the use of a three-foot silt curtain deployed around each groin to retain any potential turbidity caused by re-suspended sediment. The silt curtain will be deployed only around the groin where construction work is taking place. If turbidity is observed outside the silt curtain and the BMPs are deemed insufficient, a contingency full-depth silt curtain (kept in the staging area) will be installed around the work site. As no dredging is planned, it is unlikely that substantial turbidity will be created. Other BMPs will include a silt fence on the dry beach; a filter sock around the staging areas; and the use of traffic cones, caution tape, and marked signs to educate the public and redirect foot traffic around the project site.

III. MONITORING PROGRAM

1. Organization and Responsibilities

Water sampling and analysis will be performed by Marine Research Consultants, Inc., (MRCI). Should the prime contractor employ other sub-contractors to perform the monitoring, similar levels of expertise and qualifications as well as revision of the AMAP will be required. Table 1 shows a summary of responsibilities and qualifications for all personnel involved in the water quality monitoring activities.

Table 1. Organizational chart for Stable Road Groin Repair project.

Name	Role, Responsibilities, Qualifications	Organization	Email	Phone
Patricia Cadiz	Owner's representative.	Community Beach Restoration Foundation	Pbc5@mac.com	(808) 283-5070
Steven Dollar, PhD	Water Monitoring Supervisor. Conduct water monitoring program. PhD in Oceanography. 35 years of experience with design and implementation of water quality monitoring programs.	Marine Research Consultants, Inc.	sdollar@mrc-hawaii.com	(808) 779-4009
Andrea Millan, MS	Water Monitoring Manager. MS in Oceanography. 10 years of experience with oceanographic sampling and water quality monitoring programs.	Marine Research Consultants, Inc.	andrealmillan@gmail.com	(808) 384-2272
Christine Andrews, MS	Water Monitoring Technician. MS in Oceanography. 20 years of experience with oceanographic sampling.	Marine Research Consultants, Inc.	mauietcservices@gmail.com	(808) 276-4844
Dr. Doug Rice	Water Monitoring Technician. PhD in Microbiology. 20 years of experience with oceanographic sampling.	Marine Research Consultants, Inc.	mauietcservices@gmail.com	(808) 283-8024
Moriah Johnson	Water Monitoring Technician. BS in Marine Biology. 7 years of experience in aquatic science.	Marine Research Consultants, Inc.	moriahr27@gmail.com	(808)797-4888
TBD	Construction Project Manager			

2. *Sampling Constituents*

Sampling and analysis of nearshore ocean water quality will be collected before, during, and after construction. The following parameters will be tested in accordance with the General Monitoring Guideline for Section 401 Water Quality Certification Projects (HDOH 2000): salinity, dissolved oxygen (DO), pH, temperature, and turbidity. Measurements of these constituents will be used to make a decision about acceptable risk-based thresholds to determine if the BMPs are adequate or if modifications must be made. Table 2 lists each constituent, method, method reference, instrument, and instrument sensitivity.

Table 2. Analytical constituents, method, method references, instruments, and minimum sensitivity for sampling of the Stable Road Groin Repair project.

Analysis	Method	Reference	Instrument (minimum sensitivity)
Salinity* (practical salinity units [psu])	SM 2520 (EPA 120.1)	Standard Methods, 23rd Edition (2018)	YSI Pro2030 (0.1 psu); RBR Concerto (<0.001 psu)
Dissolved Oxygen* (% saturation, mg/L)	SM 4500-O G (EPA 360.1)	Standard Methods, 23rd Edition (2018)	YSI Pro2030 (0.01 %sat.); RBR Concerto (<0.001 %sat)
pH* (standard units)	SM 4500 H+ (EPA 150.1)	Standard Methods, 23rd Edition (2018)	Thermo Scientific Orion Star, 8107UWMMD electrode (0.01 pH units); RBR Concerto (<0.001 pH units)
Temperature* (degrees C)	SM 2550 B (EPA 170.1)	Standard Methods, 23rd Edition (2018)	YSI Pro2030 (0.1°C); RBR Concerto (<0.001 °C)
Turbidity** (nephelometric turbidity units [NTU])	EPA 180.1 Rev 2.0	EPA (1993)	Hach 2100Q (0.01, 0.1 NTU dependent on range); RBR Duo3 (<0.001 NTU)

*Analyses conducted within 15 minutes of collection, no field preservation.
**hold time <2 hours, no field preservation.

3. *Sampling Locations*

3.1 Pre-Construction and Post-Construction Monitoring Locations

Sampling locations will consist of "decision units" (DUs) that are composed of a volume of water extending from the air-water interface to just above the ocean floor. Three DUs with surface dimensions of 5m x 5m square will be established for Pre-Construction and Post-Construction AMAP monitoring of the Stable Road Groin Repair project (see Figure 4).

1. Pre- and Post-Construction Decision Unit-1 (PDU-1) will be located along the shoreline between Groin 1 and Groin 2.
2. Pre- and Post-Construction Decision Unit-2 (PDU-2) will be located along the shoreline between Groin 4 and Groin 5.
3. Pre- and Post-Construction Decision Unit-3 (PDU-3) will be located along the shoreline between Groin 6 and Groin 7.

These three DUs will represent background conditions within the influence of the construction activities. MULTI INCREMENTAL® sampling as described in the section below will be conducted at these three locations. GPS coordinates of the sampling locations will be determined during the initial sampling event and recorded using a handheld differential GPS (WGS-84 datum). During each of the subsequent Pre-Construction and Post-Construction sampling events, the exact same positions will be replicated using these GPS coordinates.

Figure 4. Layout of decision units for Pre-Construction and Post-Construction monitoring. Sampling will be conducted 10 times prior to the commencement of construction and at least three times after the completion of construction on all groins.

3.2 Construction Monitoring Locations

"Impact decision units" (IDUs) are defined as the volume of water extending one meter out from the outer surface of the turbidity containment devices (i.e., silt curtains) that separate the work location from the ocean. A single IDU will be established for each day of construction AMAP monitoring. This DU will extend from the outer face of the silt curtain to one meter from the silt curtain, extend the entire length of the silt curtain, and extend from the surface of the water to just above the ocean floor.

In addition, two "Control decision units" (CDUs), will be established with surface dimensions of 3-m by 3-m (10 ft by 10 ft), and will extend from the surface to just above the seafloor. CDU-1 will be located approximately 15 m (50 feet) along the shoreline southwest of the repair site, and CDU-2 will be located 15 m along the shoreline northeast of the repair site (see Figure 5). During each sampling event, GPS coordinates (datum WGS84) of the centers of all DUs will be recorded. Samplers will also determine and record direction of the current at the time of monitoring.

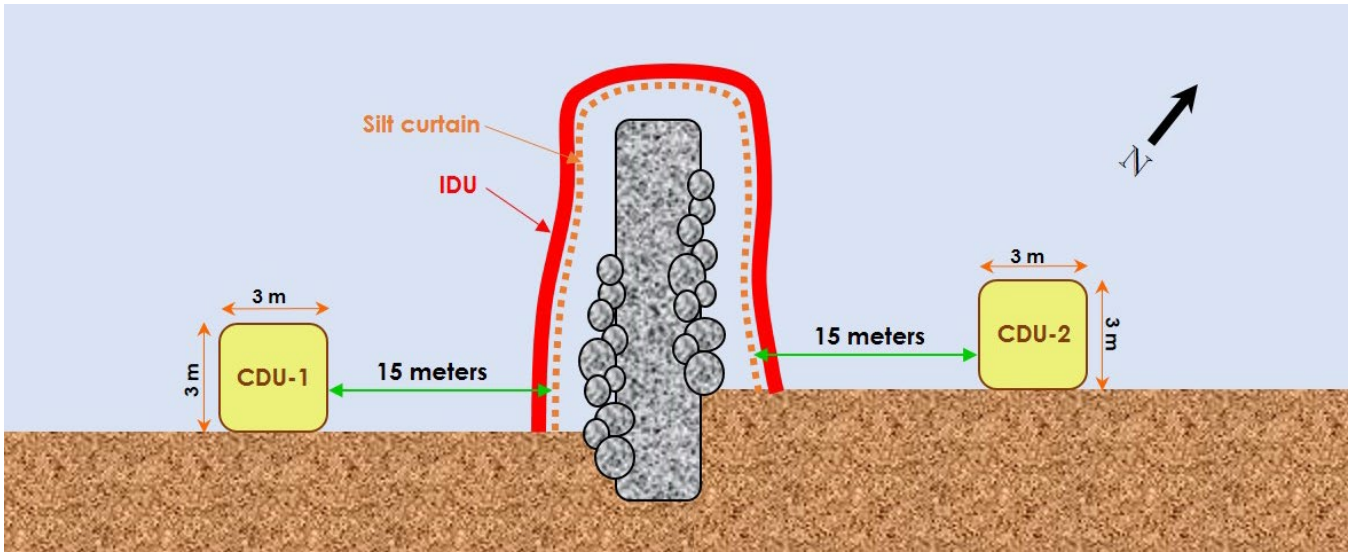

Figure 5. Diagram of typical layout of silt curtain and decision units for monitoring during construction activities.

The overall goal of the AMAP is to conduct a sampling and monitoring program that provides the maximum quality information to interpret the effect of the construction project activities with respect to non-construction related activities that may affect the waters surrounding the project site. If monitoring data or visual observations indicate that other processes may be affecting water quality, additional DUs may be instituted in the AMAP program to identify these sources of impact to the surrounding waters.

4. Sampling Methodology

All sampling will be conducted during days when work operations are in progress, and at least one-hour after the commencement of in-water work. Sampling at each DU will employ the *MULTI INCREMENT*® method (*MULTI INCREMENT*® is a registered trademark of EnviroStat, Inc). Field procedures will involve one of two methods.

The first field procedure method utilizes a weighted bottle with holes in the top to continuously collect water throughout the water column within the boundaries of the DUs. After triple rinsing the collection bottle with water from the DU, the bottle will be moved throughout the water column within the DU until the collection bottle is full (two to three minutes). Following the completion of the sample collection cycle, water within the sample bottle will be thoroughly mixed. A 250 ml graduated cylinder will be rinsed with water from the DU before being filled with water from the collection bottle. This subsample will be used immediately to measure salinity, dissolved oxygen, temperature, and pH using field instruments with submersible sensors, such as a YSI Pro2030 (salinity, temperature, and dissolved oxygen) and a Thermo Scientific Orion Star meter (pH). A 10-ml aliquot will also be removed from the sample collection bottle and used to measure turbidity with a Hach 2100Q. The collection of water and the measurement procedures will be repeated in triplicate at each DU location.

The second field procedure method employs continuous logging instruments (e.g., RBR Concerto and RBR Duo^3) that will be moved throughout the water column within the boundaries of the DU. Data from the loggers will be downloaded and all logged values within the DU will be averaged to give a multi-incremental value for the DU under investigation. The web addresses for the operation manuals for the YSI Pro2030, ThermoFisher Orion Star A320, Hach 2100Q, and RBR loggers showing Quality Assurances (QA) procedures are:

https://www.ysi.com/File%20Library/Documents/Manuals/YSI-ProDSS-110714-Rev-B-626973-User-Manual.pdf.

https://www.thermofisher.com/order/catalog/product/STARA3290

https://www.hach.com/asset-get.download.jsa?id=7639982324

http://rbr-global.com/wp-content/uploads/2019/03/Ruskin-User-Guide-Standard-loggers-0006105revE.pdf

Calibration of field instruments and secondary Quality Control (QC) checks will be conducted prior to each day of sampling and checked again following completion of

sampling. Field measurements will be recorded on field data sheets, along with calibration data, date, time of collection, and time of sampling for each sample. Sampling personnel will also perform visual inspections while sampling and record at a minimum: date, time, weather conditions, description of the construction activity, location, and condition of any BMPs, and any other observed activities (related or unrelated to construction) that may affect water quality. Sampler observations will be included with the individual sampling reports. Photographs of each monitoring station and construction activities will be taken at the time of sampling, and locations of photos will be shown on a site map. Photographs of the DUs will have a time and date stamp. Photos included in monitoring reports will contain a narrative describing activities and locations.

5. Sampling Frequency

5.1. Pre-Construction Sampling

Ten sets of Pre-Construction samples will be collected prior to construction, meeting the requirement as specified in the "General Monitoring Guideline for Section 401 Water Quality Certification Projects." Pre-Construction monitoring will take place over a period of not less than two weeks. The Pre-Construction sampling is intended to establish a baseline for the existing nearshore water quality conditions encompassing the repair site.

5.2. During Construction Sampling

The construction period is estimated to be between 43 and 111 days with work at each groin lasting between 5 and 20 days. Water quality monitoring will be conducted three times per week during each day of construction during work at the first two groins (Groins 1 and 2). Should results show no adverse impacts to water quality, monitoring will be reduced to once per week. During construction monitoring, each sampling event will include monitoring at the IDU and both CDUs described in the section above. If deemed necessary, additional DUs may be added during the construction monitoring.

5.3. Post-Construction Sampling

Approximately one week after completion of the project and removal of BMPs, Post-Construction surveys will commence. Three Post-Construction surveys will be

completed separated by approximately one week between surveys. Monitoring locations for the Post-Construction surveys will be the same as for the Pre-Construction surveys (See Figure 4). Should the Post-Construction surveys reveal no significant changes relative to the Pre-Construction sampling, the AMAP monitoring program will be considered complete. Should the Post-Construction sampling indicate that water quality remains impaired relative to Pre-Construction conditions, and there are no readily identifiable factors that are not associated with the construction activities, consultation with DOH-CWB will determine if, and at what level, monitoring may continue.

6. Analytical Methods

When field sampling is "representative," multiple measurements within the same DU would be expected to estimate the average value. To evaluate the degree of similarity of replicates, a calculation of standard deviation is used to determine the variation from the mean among a group of samples. The lower the standard deviation (the closer the replicate data are to the mean) the more precise the site data are as an estimate of the average in the DU under investigation.

Typically, the Relative Standard Deviation (RSD) of the field replicates (triplicates) is used for this evaluation. The RSD is expressed as a percentage and is calculated using the following formula:

%RSD = 100% X Standard Deviation / Average

The lower the %RSD of the replicate data the better. Generally, a %RSD of 20% or less indicates the amount of variability is within an acceptable range for decision making.

7. Reporting

Photographs and monitoring results for field measured constituents will be emailed to DOH-CWB (cleanwaterbranch@doh.hawaii.gov) by close of the next business day following sampling. If there is a detected or observed adverse impact resulting from construction activities, the construction contractor will notify DOH-CWB as soon as possible, but no later than the end of the next business day. Any modifications to the BMPs to remediate the impact will be employed in a timely manner and DOH-CWB will be notified immediately.

8. Quality Assurance Program Organization

Field monitoring and reporting will be performed by personnel suitably qualified and experienced to perform these tasks (see Table 1). All measurements of temperature, dissolved oxygen, salinity, pH, and turbidity will be conducted in the field. The field meters/field equipment will be maintained and calibrated according to manufacturer instructions. Operation and calibration will only be performed by personnel who have been properly trained in these procedures. Documentation of calibration and any maintenance information will be maintained in appropriate field sheets or logbooks. Appendix A includes a sample field sheet for the Stable Road Groin Repairs project.

Secondary QC checks of probes for field measured constituents will be performed prior to analyzing collected samples, and again following completion of sampling. QC checks will consist of the measurement of solutions with known properties: 100% air-saturated water or water-saturated air for dissolved oxygen, 7.00 buffer for pH, 35.0 psu solution for salinity, and 10.0 NTU standard for turbidity. Analysis of temperature, dissolved oxygen, pH, and salinity will be conducted immediately (not more than fifteen minutes) following collection of water samples. Measurement of turbidity will be conducted within two hours of sample collection. The time of both sample collection and analysis will be noted in field logs.

The monitoring entity will retain in its records the analytical procedures used, any relevant QA/QC information, and instrument calibration information pertaining to the specific analysis. All analytical results and field notes will be scanned, and electronic files will be stored in multiple computers and in the cloud to prevent loss. All data will be included in a final report prepared for the monitoring program. These files will be available for inspection by DOH-CWB authorized personnel on request.

In addition to the water quality monitoring described above, the construction contractor will assign a representative to perform daily visual inspections of the construction site including condition of all BMPs to ensure that the construction activities do not result in adverse impacts to the surrounding waters. Information recorded by the contractor's representative will include at a minimum: description of the construction activity, date, time, weather conditions, location and condition of any BMPs, and any other observed activities (related or unrelated to construction) that may affect water quality. Contractor observations will be available on-site while the project is on-going.

If visual observations include negative impacts to the marine environment, such as turbidity plumes or fish kills, the DOH-CWB will be notified immediately by telephone or email (DOH-CWB will not be notified if daily observations do not reveal visible negative impacts). Photographs will be taken to document such visible impacts and work will cease until the source of the problem has been identified. Photographs will have a time and date stamp and will be included in the documentation with a written descriptive narrative and a site map showing location and orientation. A written report of action taken will be submitted by the permittee or authorized representative to the DOH-CWB within five business days.

Upon project completion, all observations and field books will be available for inspection by DOH-CWB-authorized personnel. DOH-CWB shall be notified of any modifications to the work plan, BMPs, or AMAP. Any changes must be approved by DOH-CWB prior to implementation.

IV. DATA QUALITY OBJECTIVES

"The Data Quality Objectives (DQO) process is used to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study" (EPA QA/G-4). It consists of seven iterative steps that outline an efficient data collection system.

STEP 1 – State the Problem

a. Describing the Problem: Repairs of Stable Road Groins 1-7 could adversely impact the waters in the vicinity of the proposed project site. A water quality monitoring plan will be implemented to evaluate the condition of coastal waters to determine if water quality is degraded by the project beyond the limits of naturally existing conditions.

b. Establishing the planning team:
The planning team includes:

- Sea Engineering, Inc
- Contractor, TBD
- Water Quality Monitors and Analysts: Marine Research Consultants, Inc.

See Table 1 for all personnel and associated responsibilities.

c. Describing the conceptual model of the potential hazard: The most probable contaminant is sediment that could potentially be introduced into the water column in the vicinity of the groins. Appropriate Best Management Practices (BMPs), primarily in the form of a silt curtain, will be utilized to mitigate the potential impacts.

d. Identifying available resources, constraints, and deadlines: The responsibility of the monitoring program lies with the contractor who is awarded the contract. The contractor will subcontract a company qualified to perform the AMAP field data analysis and reporting (MRCI). Water quality monitoring deadlines are as follows:

- Pre-Construction report: Within ten business days of completion of Pre-Construction monitoring.
- During construction data, photographs, and site orientation map: By the end of the following business day.
- Final report: Within twenty business days of completion of Post-Construction monitoring.

STEP 2 – Identify the Goal of the Study

a. Specifying the primary question: Is the contaminant concentration statistically above Pre-Construction levels and control station values, thereby requiring a different approach in mitigating the discharge of pollutants?
Determining alternative actions: Possible alternative actions are as follows:
- Modify BMPs depending on which contaminant exceeds background conditions.
- Take no action.

b. Specifying the decision statement: Determine whether water quality is adversely affected by groin maintenance and determine the effectiveness of the BMPs.

STEP 3 – Identify Information Inputs

a. Identifying the source of information: New data will be obtained from water quality surveys performed before, during, and after construction. Additional information may be obtained from state agencies including the DOH-CWB and members of the planning team.

b. Identifying how the action level will be determined. Three "action levels" are specified. One action level is defined as the value of each constituent that equals the highest daily geometric mean, or range of daily geometric means, of the Pre-Construction surveys. Thus, if the value at the IDU during construction does not exceed the Pre-Construction mean or range of mean values, then it can be considered that the values are within the natural range of variability and do not constitute construction-related non-compliance.

The second action level consists of the comparison of concurrent values at the IDU and CDUs during each day of construction activities. If values measured at the IDU during construction activities statistically exceed those measured at the CDUs on the same day, then possible actions will be considered to modify the BMPs. If water quality data at CDUs show values that exceed Pre-Construction values or values at the IDU, it will be assumed that other sources, not the construction activities, can be considered responsible for the measured values.

A third action level consists of a value or range of values for a given constituent. This action level only applies to pH and dissolved oxygen.

In addition to these three action levels, visual observation of adverse impacts on the waters off the project site from contactor supervised inspections can also dictate implementation of an action level. A discussion of procedures for when observational impacts occur are included above in section III.8.

c. Identifying appropriate sampling and analysis methods. Nearshore water samples will be measured according to the methods designated in Table 2. Monitoring will be conducted before, during, and after construction as described in this document.

STEP 4 – Define the Boundaries of the Study

a. Specifying the target population: The target population consists of the DUs in waters surrounding the Stable Road Groin Repairs site. The IDU is defined as the 3-dimensional volume of water within one meter from the outer surface of the silt curtain that will span the length of the work area. Sampling within the decision unit will consist of triplicate collection of water throughout the decision unit using a *MULTI INCREMENT®* technique. Replicate samples are statistically analyzed to determine if conditions of acceptable variance are met.

b. Specifying spatial and temporal boundaries and other practical constraints: All measured constituents are dependent on a range of natural factors, including rainfall, runoff, stage of tide, and wave action. For example, heavy rainfall and ensuing surface runoff from land into the ocean could increase turbidity, and may cause decreases in temperature, dissolved oxygen, and salinity. Therefore, the sampling data will include weather conditions as well as indications of whether results reflect effects of such weather conditions, particularly with respect to control decision units. This will ensure timely sampling and decision making. The spatial boundaries of this study are within 50 feet of the project area. The temporal boundaries of this study are from the start of Pre-Construction monitoring to the end of Post-Construction monitoring.

c. Specify the scale of inference for decision making: The scale of inference consists of the DUs described above and is relevant to the nearshore waters adjacent to the Stable Road Groin Repairs project site.

STEP 5 – Develop the Analytic Approach

Specifying the Action Level: The first action level compares water quality measurements at the IDU during construction with baseline measurements acquired during Pre-Construction sampling. It is defined as the value of each constituent that equals the highest geometric mean, or range of geometric means, from the ten Pre-Construction surveys. The second action level considers the values at the CDUs relative to values at the IDU during one day of construction activities. A third action level exists only for dissolved oxygen and pH and involves a specific range of values.

Dissolved Oxygen:

Action Level: Geometric mean value at IDU less than 75% saturation.

Salinity:

Action Level 1: Geometric mean value at IDU differs from baseline levels by more than 10%.

Action Level 2: Geometric mean value at IDU differs from CDU by more than 10%.

pH:

Action Level 1: Outside the Pre-Construction range of daily geometric means.

Action Level 2: More than 0.5 pH units from the geometric means at the CDUs.

Action Level 3: Outside the range of 7.0 to 8.6 pH units.

Turbidity:

Action Level 1: Geometric mean value at the IDU is statistically greater than the baseline Pre-Construction maximum daily geometric mean value.

Action Level 2: Geometric mean value at the IDU is statistically greater than the geometric mean value at both CDUs collected on the same day of construction monitoring.

In addition, impacted water conditions resulting from construction may be identified through visual inspection.

STEP 6 – Specify Performance or Acceptance Criteria

When field sampling is "representative," replicate measurements within the same DU would be expected to estimate the average value. To evaluate the degree of similarity of replicates, a calculation of standard deviation is used to determine the variation from the mean among a group of samples. The lower the standard deviation (the closer the replicate data are to the mean) the more precise the site data are as an estimate of the average in the DU under investigation. See Section III.6 for details of acceptance criteria.

A "false acceptance decision error" corresponds to deciding that a water sample within the IDU does not exceed the specified limits when it is in exceedance. A "false rejection decision error" corresponds to deciding that a water sample within the IDU does not meet specified criteria, when values actually are within the specified limits.

Consequences for each decision error:

- Making a false acceptance decision error may result in the potential for adversely impacting the health of surrounding waters and its aquatic inhabitants. The owners of the project would be held accountable and this could result in costly environmental clean-up procedures.

- Making a false rejection decision error may unnecessarily require the reevaluation of the construction site's BMPs and increase the cost to the owner of the project for modifications of those BMPs deemed inadequate.

STEP 7 – Develop the Plan for Obtaining Data

a. Selecting a sampling design: This project will follow the "General Monitoring Guideline for Section 401 Water Quality Certification Projects" as issued by the DOH-

CWB. The sampling frequency and methods have been discussed in previous sections and will be based on agreement between the contractor and DOH-CWB. The contractor will do a daily routine check of the BMPs during ongoing construction activities. If there are malfunctions with the BMPs or their effectiveness in maintaining water quality is compromised, necessary measures will be implemented to modify the BMPs. DOH-CWB will be notified immediately.

b. Chain of Custody Procedures: The present monitoring protocol does not call for any external analyses. However, in the event that samples are sent out to a lab, a written record of the chain of custody (COC) of the samples will be generated by the field technician and will accompany the samples to the laboratory. The COC form will include sample identification numbers, the date and time of transfers, and the associated personnel in possession of the samples. Each person in possession of the samples will print and sign their name on the COC form.

c. Field Analysis Quality Control: All instrument calibration and secondary checks will be performed by experienced personnel in accordance with manufacturer instructions before field samples are taken. This calibration will be recorded in the field notebook or on the fieldsheet. All equipment used for the sampling analyses will be checked for accuracy and precision, and if deemed that there is a malfunction will be taken out of service until properly repaired. An example fieldsheet is appended to this report (Appendix A).

V. REPORTS/ASSESSMENT

All sampling results and meta-data will be recorded on waterproof fieldsheets kept by the monitoring subcontractor and made available for DOH-CWB personnel inspection during normal business hours.

The Pre-Construction monitoring report will be prepared by the contractor and submitted to DOH-CWB within ten workdays of completion of the final Pre-Construction sampling event. During in-water construction, *in situ* sampling data (including copies of fieldsheets), a photo-orientation map, photographs, and a summary of daily results/compliance will be sent via email to DOH-CWB by the end of the next business day.

A final report containing the results from Pre-Construction, during construction, and Post-Construction monitoring will be prepared by the contractor within 20 business days of the last Post-Construction sampling event. An analysis and comparison of this

data will determine if there have been any adverse impacts on the surrounding nearshore waters at any phase of construction, and if there are any permanent or persistent adverse effects.

VI. REFERENCES

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State of Hawai'i, Department of Health, Clean Water Branch. August 14, 2015. Applicable Monitoring and Assessment Plan General Instruction, Version 1.

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APPENDIX A: STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT FIELD SHEET

MARINE RESEARCH CONSULTANTS, INC.
1039 Waakaua Pl. Honolulu, Hawaii 96822
808.779.4009 sdollar@mrc-hawaii.com

STABLE ROAD GROIN REPAIRS
PRE-CONSTRUCTION MONITORING
PERMIT NO. XXXXX
SURVEY NUMBER:

DATE:			**START TIME:**	**END TIME:**
WEATHER:			**WATER CONDITIONS:**	
LOCATION:	**PDU-1**	**LATITUDE:**	**LONGITUDE:**	
LOCATION:	**PDU-2**	**LATITUDE:**	**LONGITUDE:**	
LOCATION:	**PDU-3**	**LATITUDE:**	**LONGITUDE:**	
IN-WATER ACTIVITY:				

DU STATION	REP.	BOTTLE #	TIME COLLECT T, O2, SALT.pH,turb	TIME MEASURE T, O2, SALT.pH	TEMPERATURE degree C	DISS. O2 % sat	DISS. O2 mg/L	SALINITY ppt	pH	TIME MEASURE TURB	TURBIDITY (NTU)
PDU-1	1	1									
	2	2									
	3	3									
PDU-2	1	4									
	2	5									
	3	6									
PDU-3	1	7									
	2	8									
	3	9									

ALL MEASUREMENTS OF pH, DISSOLVED OXYGEN, TEMPERATURE, AND SALINTY DONE WITHIN 15 MINUTES OF SAMPLE COLLECTION

	Diss. O_2		Salinity		pH		Turbidity	
	Standard value	Measured value	Standard value	Measured value	Standard value	Measured value	Standard value	Measured value
Calibration time:								
Calibration check value :	100%		34.5		7.00		10.0	
Post monitoring calibration check time:								
Post monitoring calibration check value:	100%		34.5		7.00		10.0	

SAMPLING CONDUCTED BY:

_____ _____

(PRINT) **DATE**

_____

(SIGNATURE)

NOTES: _____