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LAND
STATE PARKS

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

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MAR 08 2019

REF:OCCL:TM

Stable Road Groins DEA

FEB 26 2019

MEMORANDUM

TO: Scott Glenn, Director
Office of Environmental Quality Control

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

SUBJECT: 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

The Department of Land and Natural Resources has reviewed the DEA for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish notice of this project in the March 8, 2019 edition of *The Environmental Notice*. We have enclosed one (1) hard copy of the DEA and OEQC publication form, as well as one (1) CD of the same in pdf format and Word.

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

Attachments: *Draft EA, OEQC Pub Form, 1 CD*

RECEIVED
'19 FEB 26 P4:14
REC. OF ENVIRONMENTAL
QUALITY CONTROL

19-273

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 Permit; Coastal Zone Management Federal Consistency Review; Department of Health Section 401 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	Patti Cadiz, pbc5@mac.com, 808.283.5070, 600 Stable Road, 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**
_X___ 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.
____ 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.
____ FEIS	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 FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ 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.

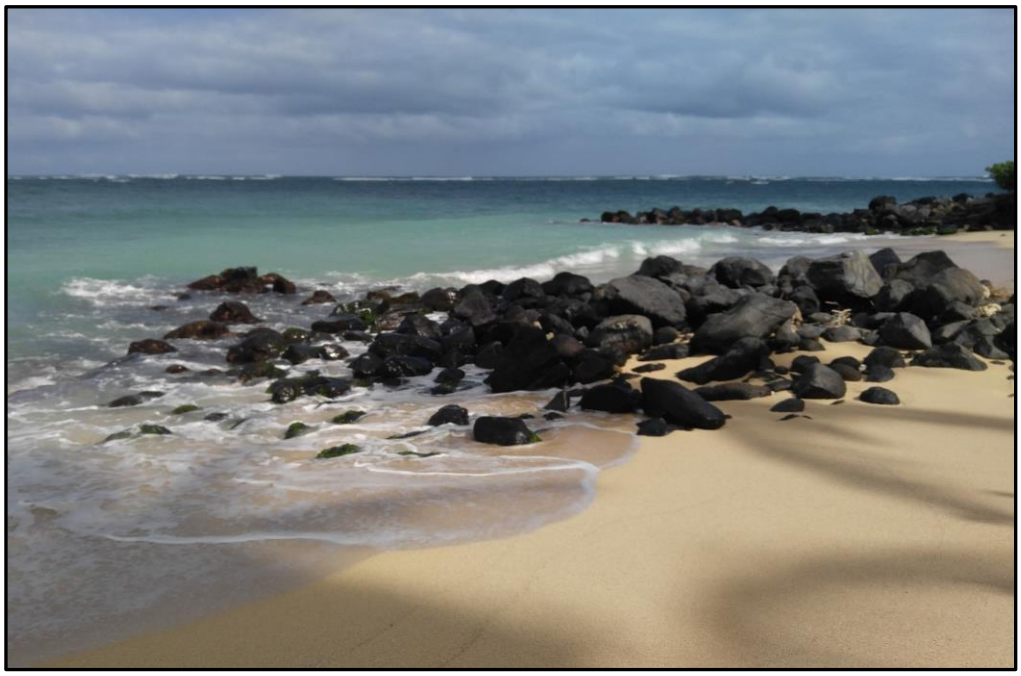
The project area is located on the north-central coast of Maui, just east of Wailuku/Kahului and seaward of the Kahului Airport. In the project area are seven rock groins that are believed to have been constructed pre-1944 and are presently in a deteriorated condition. The project area shoreline has 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 beach so that it can continue to provide its ecological function; to maintain beach recreational and aesthetic benefits; to facilitate lateral access along the shore; and to provide the first line of defense to the backshore area in the event of storm wave attack.

DRAFT ENVIRONMENTAL ASSESSMENT
STABLE ROAD WEST GROIN REPAIR AND REPLACEMENT

Paia, Maui, Hawaii

December 2018



Prepared for:
Community Beach Restoration Foundation
600 Stable Road
Paia, Maui, Hawaii 96779-9707

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 are threatening 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 beach so that it can provide its intended recreational and aesthetic benefits
- Facilitate lateral access along the shore
- Provide the first line of defense to the backshore area in the event of storm wave attack

The repaired groins are expected to improve beach stability, and a stable beach is expected to also help reduce the adverse impacts to marine biota of sand being 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 and additional 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. 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 provide stabilization for the beach and shoreline. The project would return the Groins 1-2 and 4-7 to their original configuration, thereby stabilizing the sand beach. Groin 3 would be replaced with a new engineered groin. The project is not expected to adversely alter or affect wave-driven currents, circulation patterns, overall water quality, or offshore wave breaking. 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, there would be no loss of marine habitat 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 consultation with the affiliated cultural groups prior to any undertaking that may directly or indirectly affect the historic sites. There is a high volume of human skeletal remains recovered from the shoreline in the Kanaha Pond area.

If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the 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.

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. 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 9).

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

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 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, '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. Furthermore, Section 6.2.2 and Section 9 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.

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. It is not expected to negatively alter erosion or coastal processes because it is an in-kind and in-place improvement to the existing groins. If the groins are not repaired, erosion is expected to continue and threaten the backshore properties. 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 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

Contacts:

Applicant: Community Beach Restoration Foundation
Attn: Patti Cadiz
600 Stable Road
Paia, HI 96779
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 Draft Environmental Assessment (DEA), 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 sam.j.lemmo@hawaii.gov
Applicant:	Community Beach Restoration Foundation 600 Stable Road Paia, Maui, Hawaii 96779-9707 Contact: Patti Cadiz Phone (808) 283-5070 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 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) Dept. of the Army Section 10 and Section 404

State Dept. 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

Anticipated 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 Summer or Fall of 2019. The construction period is estimated to be 45 to 60 days.

Anticipated Consultations - 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

Office of Environmental Quality Control
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

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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 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, 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
- Greg Chisholm, Director TMK (2) 3-8-002:050
- Terry Porter, Director TMK (2) 3-8-002:050

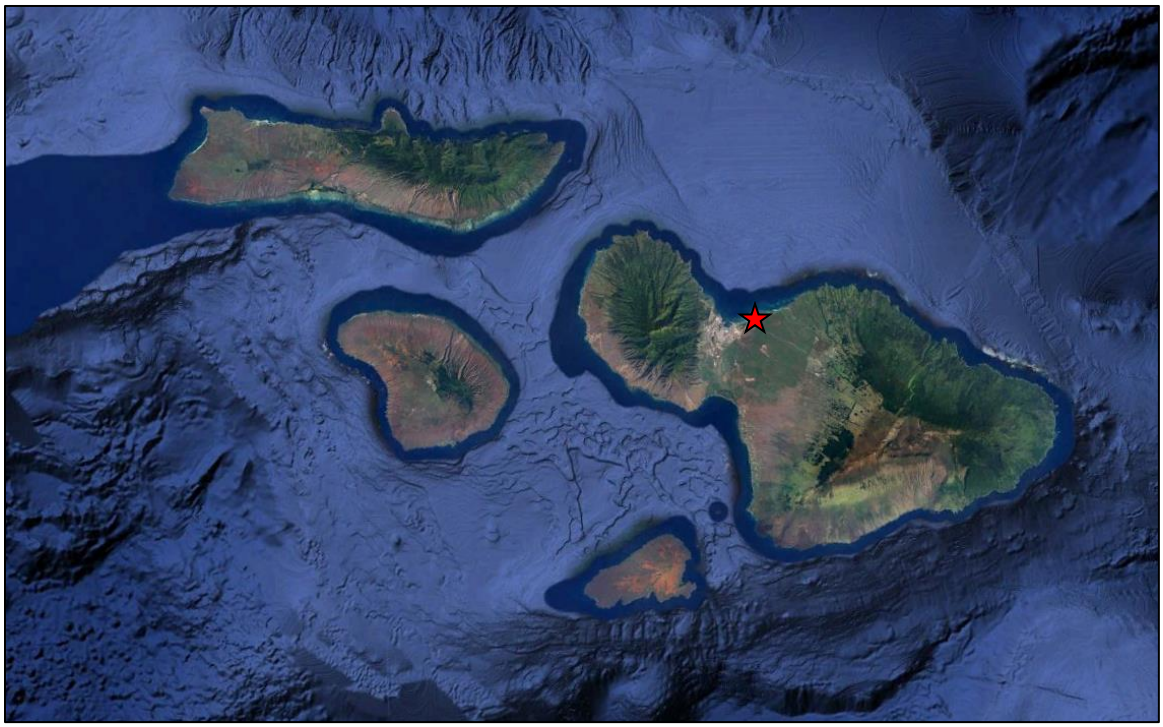

Figure 1-1. Maui Nui (Google Earth Image) with project area (red star)

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

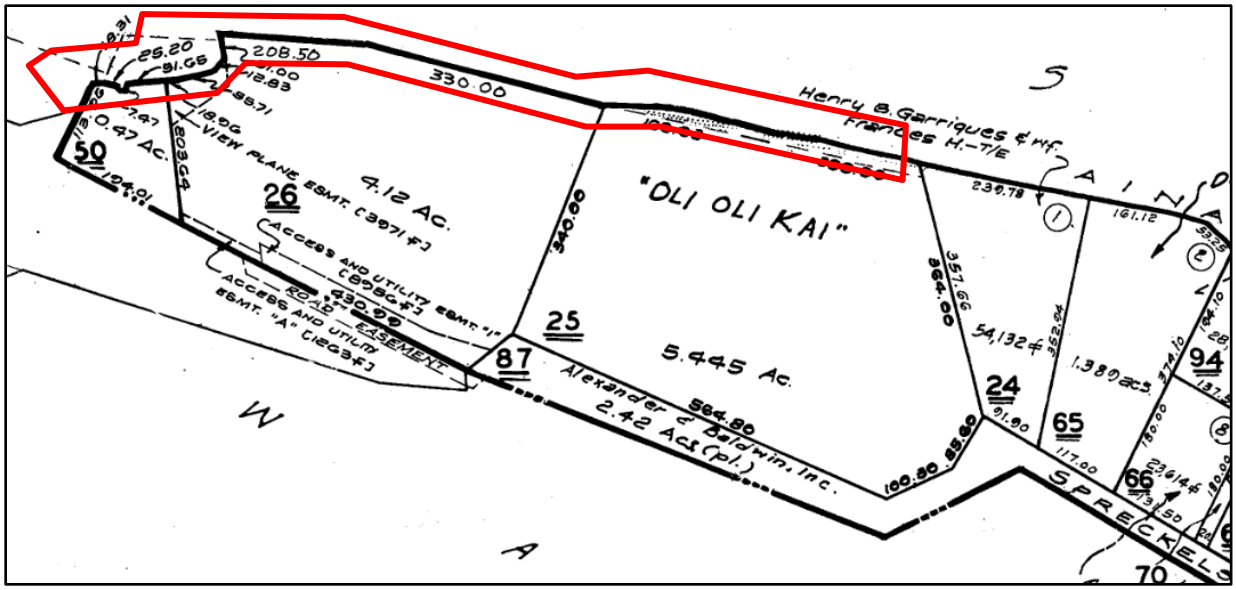

Figure 1-3. TMK map (red polygon indicates the project shoreline)

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 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 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 rock with a concrete core. Some of the rock is grouted into 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 is threatening 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 present project are:

- 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 beach so that it can provide its intended recreational and aesthetic benefits.
- Facilitate lateral access along the shore.
- Provide the first line of defense to the backshore area in the event of storm wave attack.

The repaired groins would improve beach stability, and a stable beach would also help reduce the 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 present project does not improve the design of those groins. The repair design would utilize existing stones.

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 betterment 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 with 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 repair for Groins 6 and 7 (others are similar)

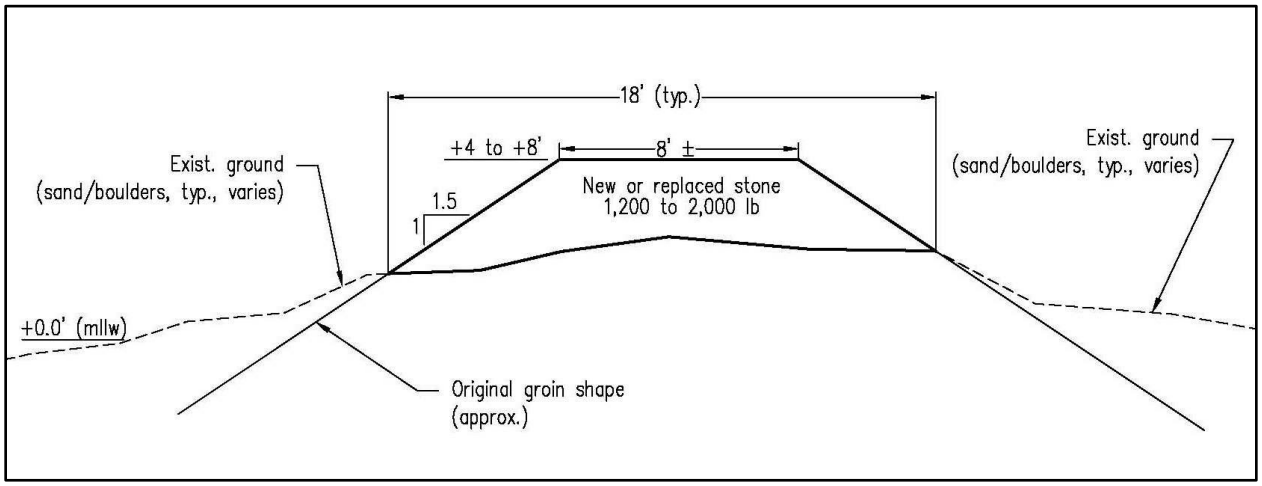

Figure 1-6 Cross section view of typical repair (Groins 1-2 and 4-7)

Groin 3 Repair

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

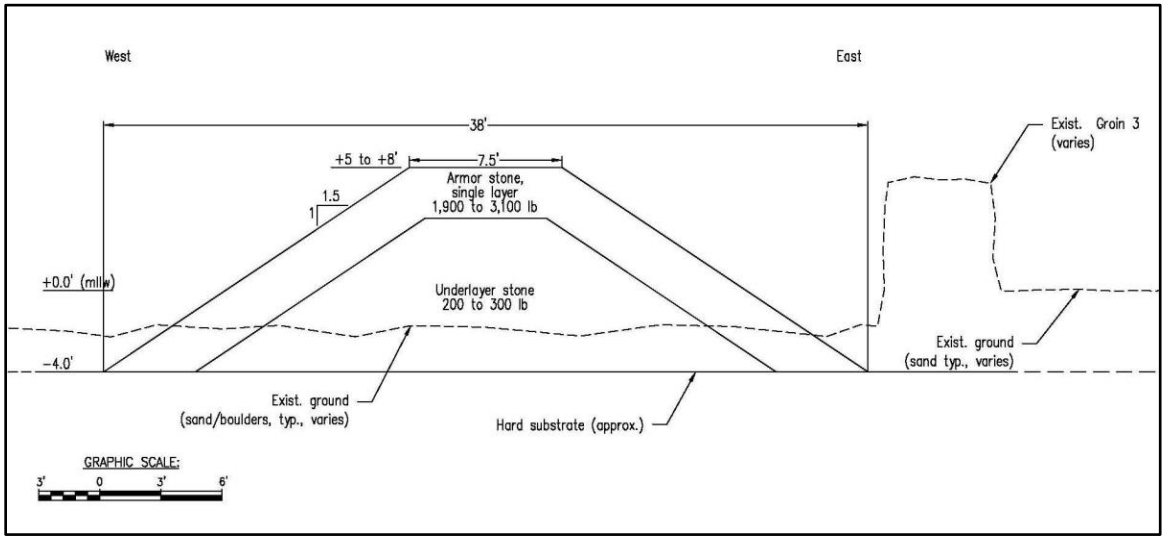

Figure 1-8 Cross section view of new Groin 3

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 70 years and the shoreline has equilibrated to the groins. In their state of disrepair, the groins are unlikely to perform well in the future, even with additional sand added to the system. 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 very fine and not likely to be suitable for this project. 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 too fine for most nourishment applications and is 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 proposed project, 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. The placement of sand fill would also convert some area of current marine habitat into sand beach. 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 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 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.

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.

Table 2-1. Groin 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

Average of all the stones measured is 1,400 lbs.

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 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

Construction would proceed from shore seaward, recovering existing stone and building the groin foundation to about the +2 foot elevation, which would provide a platform on which an excavator could operate and maneuver. Construction to the +2 foot elevation would continue

until the excavator could reach the groin head, after which construction would reverse, finishing the groin to the design elevation as the excavator proceeds back toward shore. Additional stone would be transported to the site as necessary for completion of each groin. During the proposed project, signs would be posted in the project area 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 inspection of the work area would be conducted prior to any trimming to ensure there are no nests within the area.

Figure 2-1. Repaired groin plan, Groins 1 and 2

Figure 2-2. Repaired groin plan Groins 4 and 5

Figure 2-3. Repaired groin plan, Groins 6 and 7

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, being composed of concrete and cemented rock instead of 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 on the west side of the existing groin, after which the existing groin remnants would be removed.

The repair project would also include trimming vegetation between Groin 3 and Groin 4 along the shoreline to promote lateral access. An inspection of the work area would be conducted prior to any trimming to ensure there are no nests within the area.

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 (**S**imulating **W**aves **N**earshore). 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. 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 the +2-foot elevation (approximate mean high water), which would provide a platform for an excavator to work from. Construction to the +2 foot elevation would continue until the groin head was reached, after which construction would reverse, finishing the groin to the design lines and grades as the excavator proceeds back to 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. 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 groin plan, Groin 3

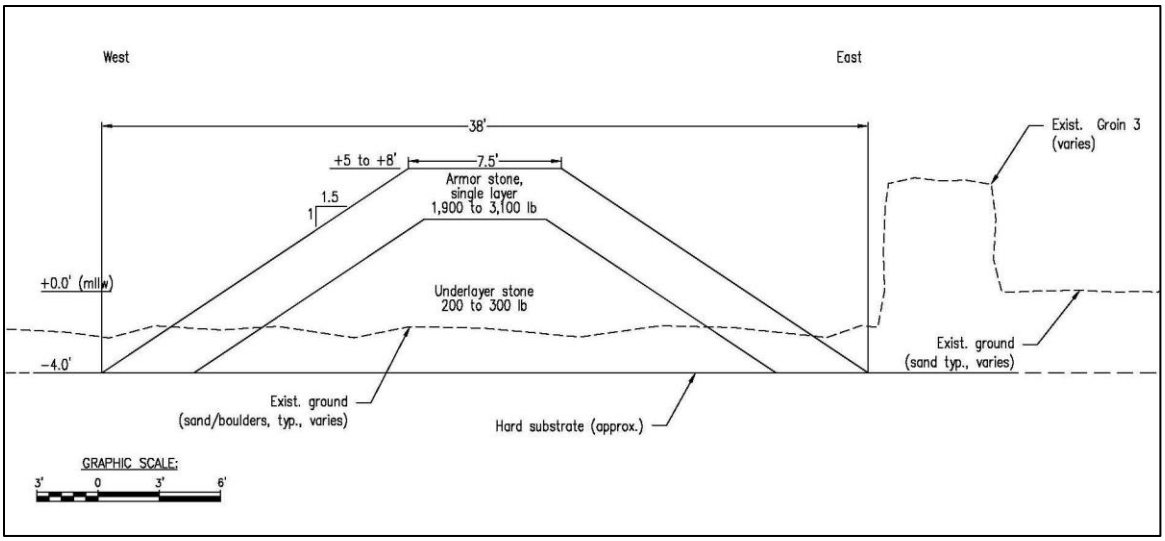

Figure 3-2. Replacement groin plan, Groin 3

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 over 70 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.

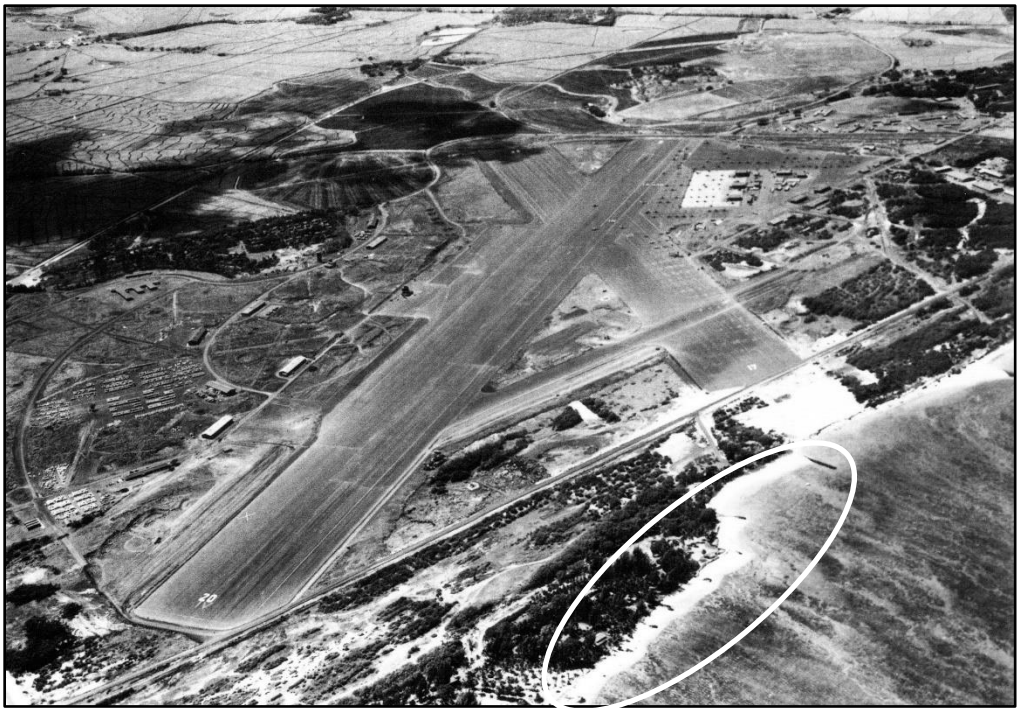

Figure 4-1. Stable Road project area in September 1944

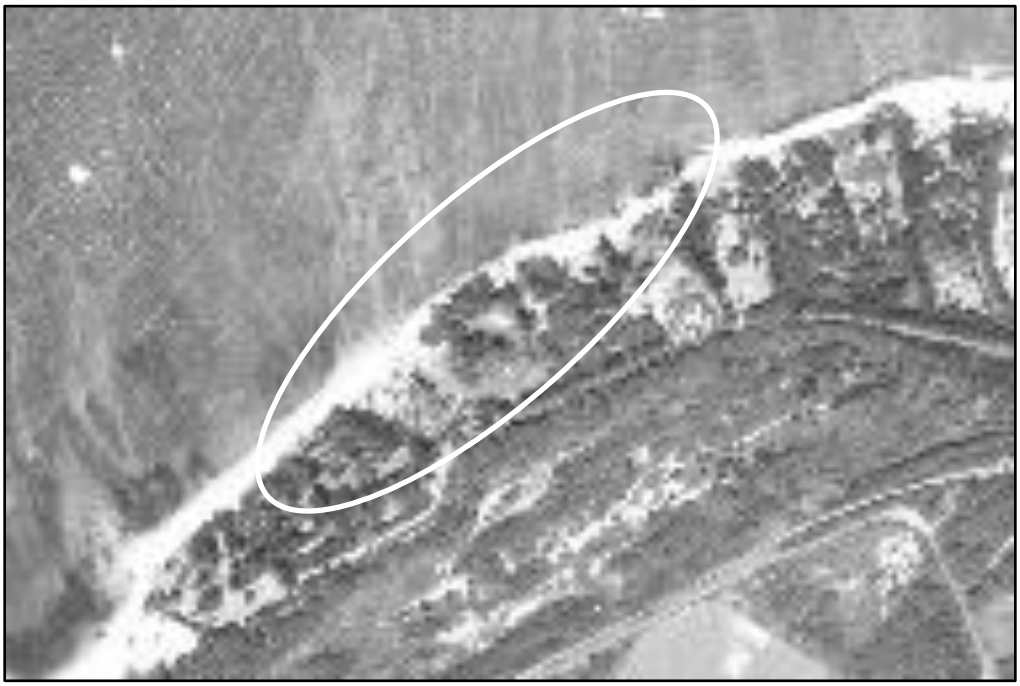

Figure 4-2. Stable Road project area on February 28, 1950

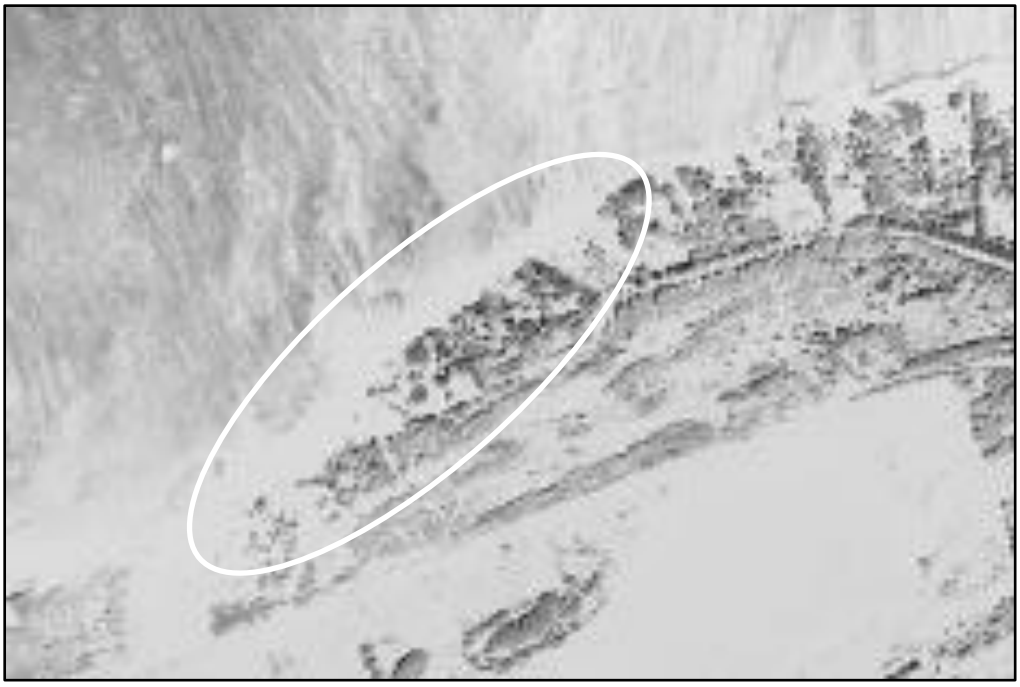

Figure 4-3. Stable Road project area in 1951

Figure 4-4. Stable Road groins in 1960

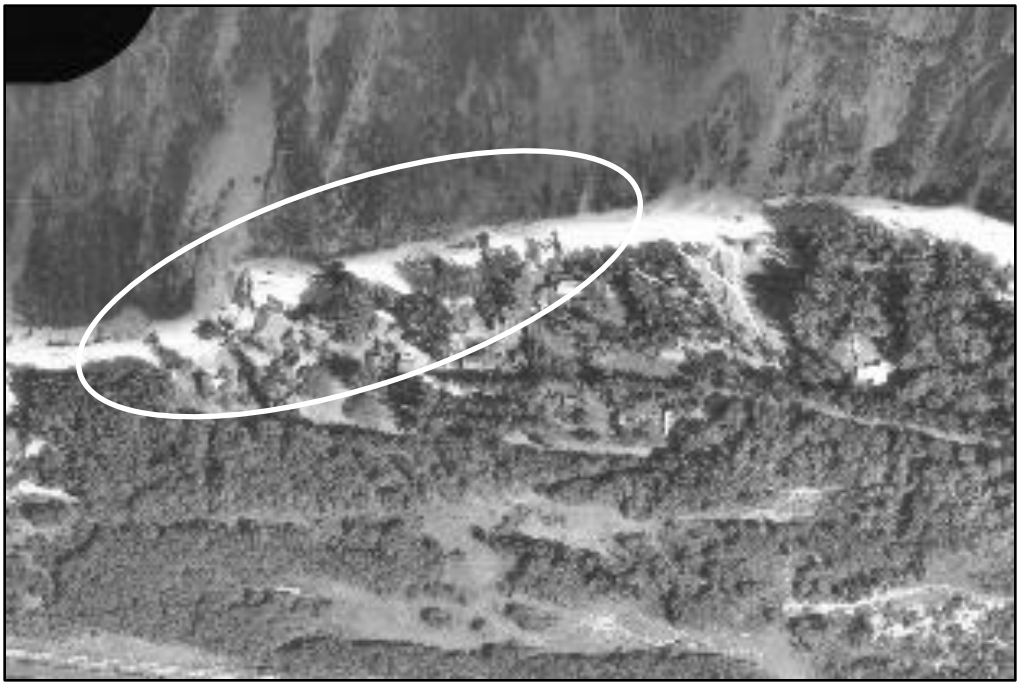

Figure 4-5. Stable Road groins on April 1, 1962

Figure 4-6. Stable Road groins in 1987

Figure 4-7. Stable Road groins in 1997

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 4-8. 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 4-9), 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 4-10.

Figure 4-8. Groin 1, looking to the east

Figure 4-9. Groin 1, sand overtopping groin crest and vertical beach offset

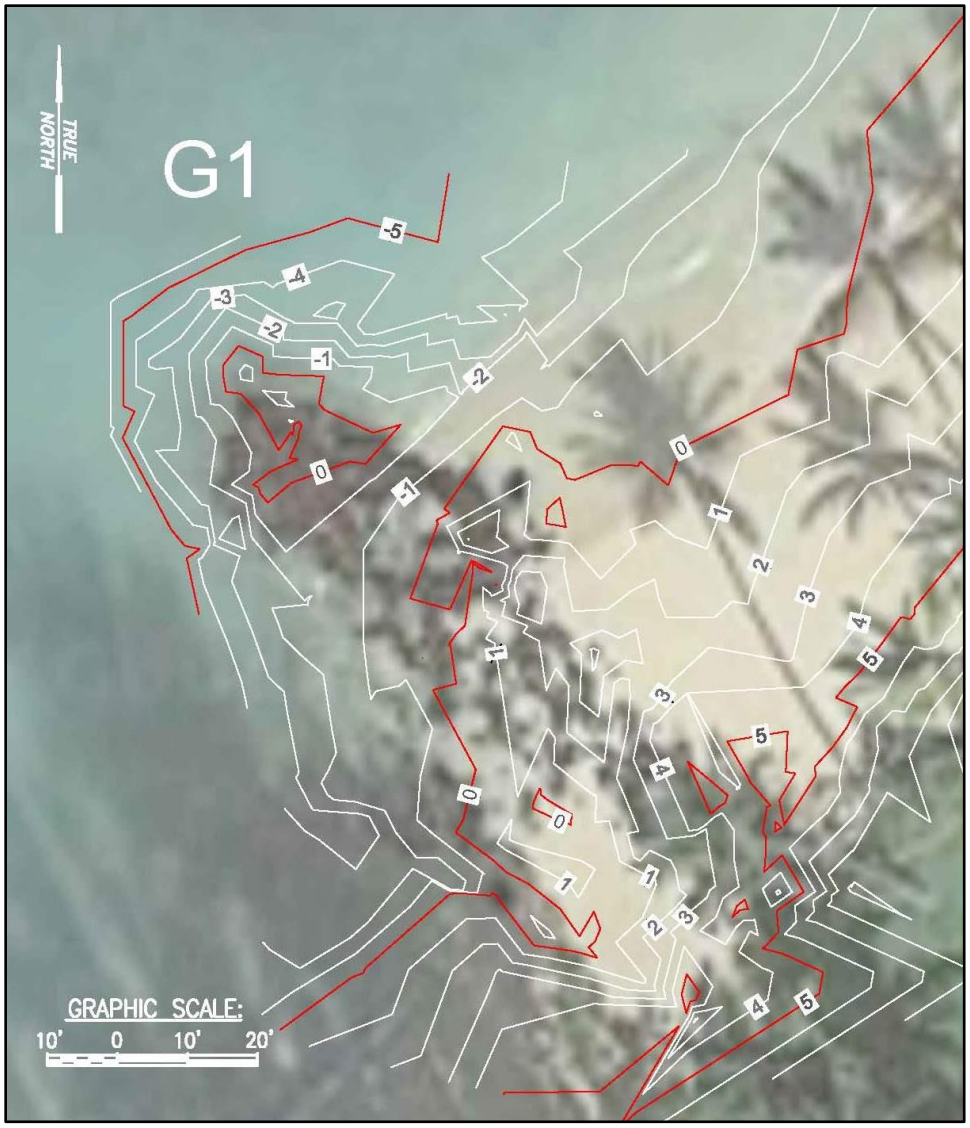

Figure 4-10. Elevation data in the Groin 1 area

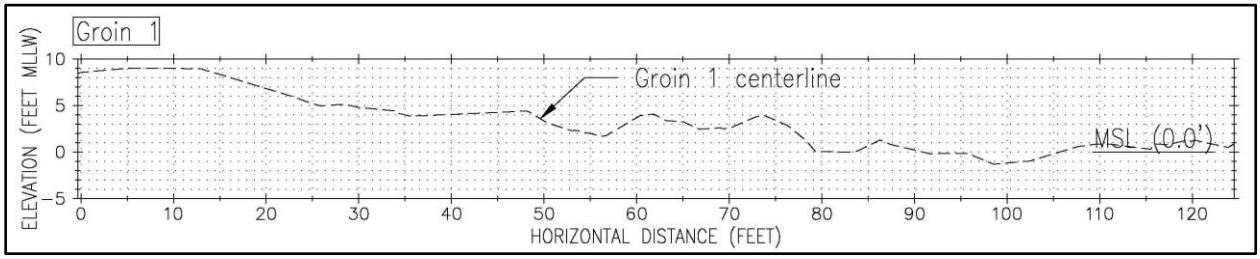

Figure 4-11. Elevation data in the Groin 1 area

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 4-12. 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 4-13 and Figure 4-14.

Figure 4-12. Groin 2, looking to the east

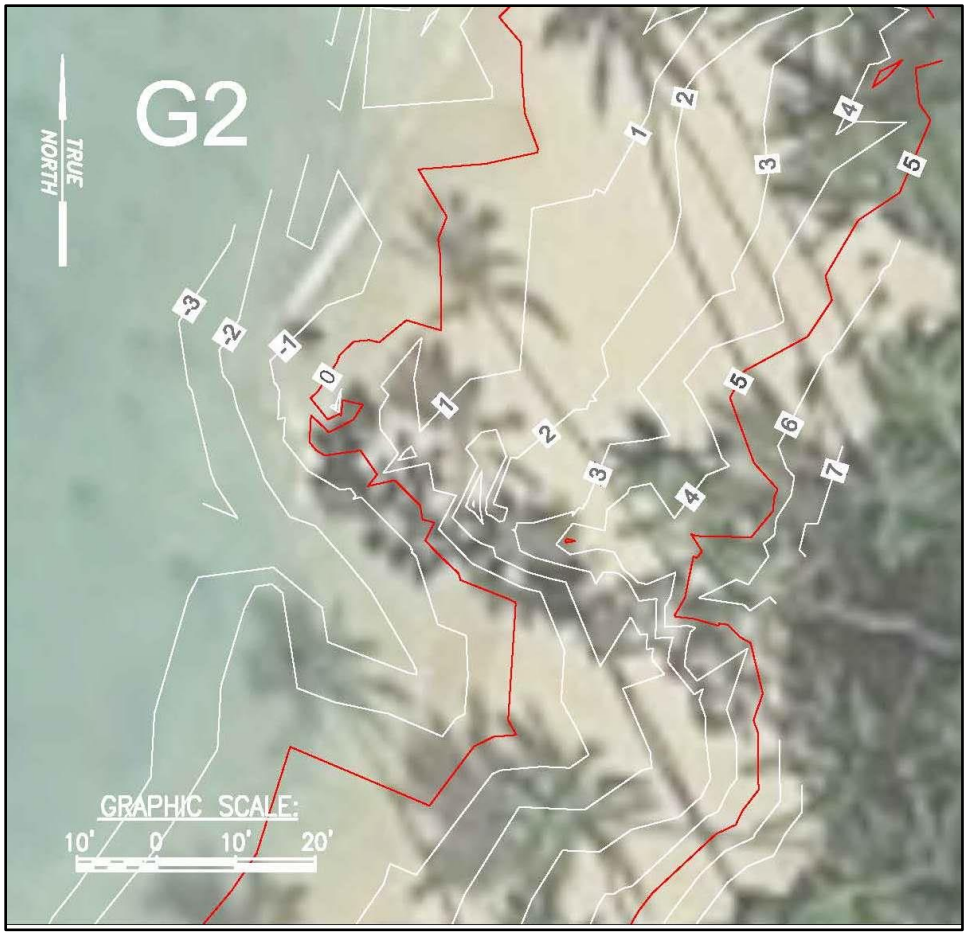

Figure 4-13. Elevation data in the Groin 2 area

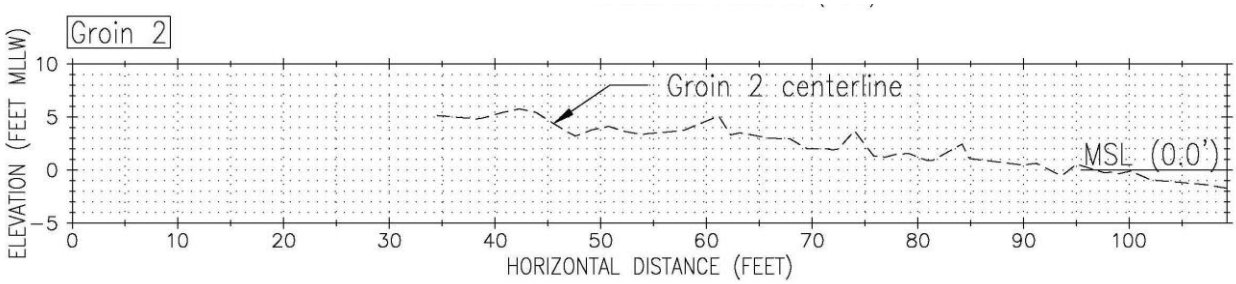

Figure 4-14. Groin 2 elevation

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 4-15); 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 4-16). Crest stones that were originally part of the western stone support structure were cemented to the concrete stem (Figure 4-17) 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 4-18). 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 4-19). 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 4-20). 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 4-21). 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 4-22 and the bags in their final configuration are shown in Figure 4-23.

The surveyed crest along with the updrift (east) side of Groin 3 is shown in Figure 4-24.

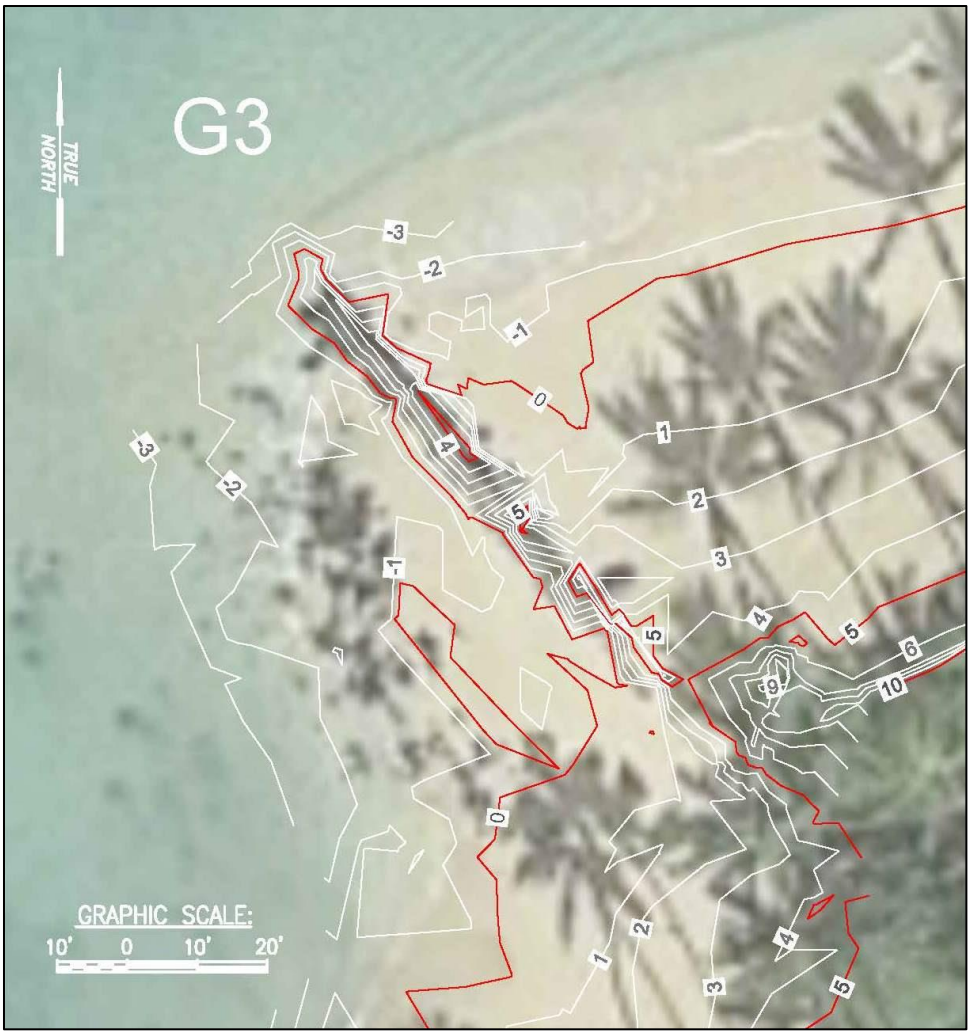

Figure 4-15. Elevation data in the Groin 3 area

Figure 4-16. Groin 3 at low tide, cemented basalt boulders hanging on the upper portion of the concrete groin stem, lower stones missing

Figure 4-17. Groin 3 at low tide, looking makai along the crest with basalt stones cemented to the upper part of the concrete structure

Figure 4-18. Groin 3 at low tide, east side of groin, major vertical cracks with horizontal off-sets (red ovals)

Figure 4-19. Groin 3 at low tide, failed 24 ft section of concrete groin stem in the foreground

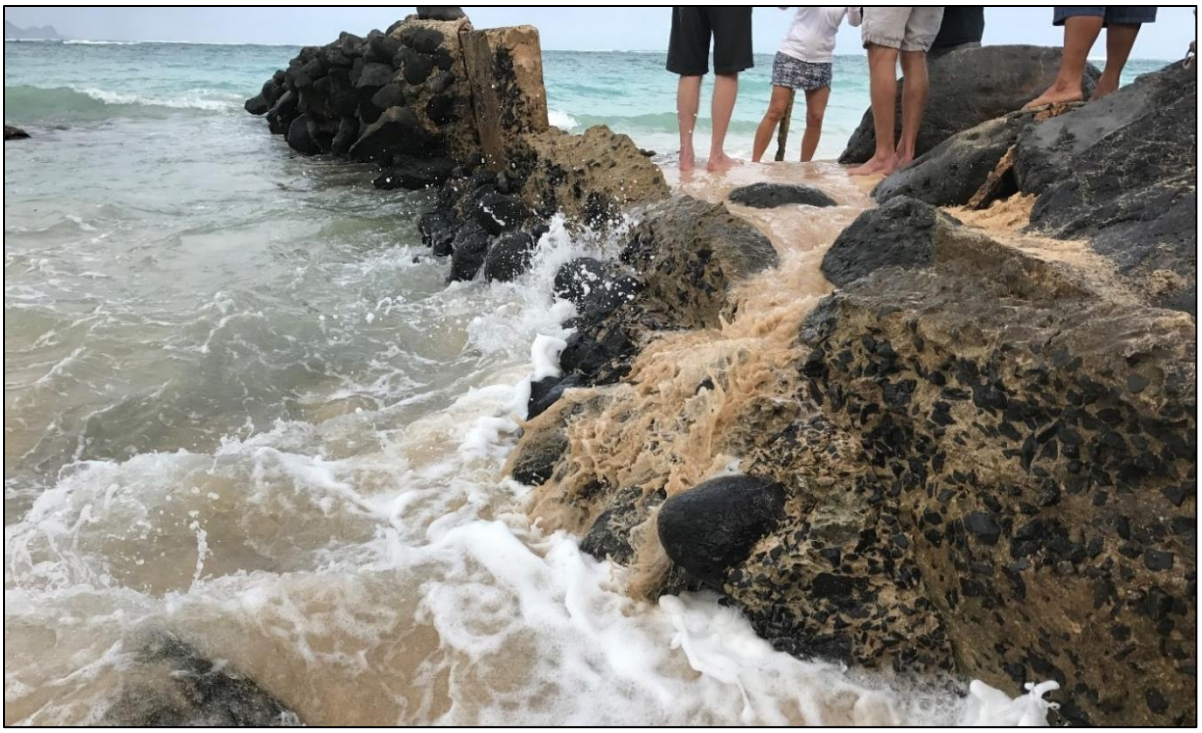

Figure 4-20. Groin 3, wave wash running across the eastern beach and broken stem of the groin, draining back beach sand to the west side

Figure 4-21. Erosion scarp to the east of Groin 3

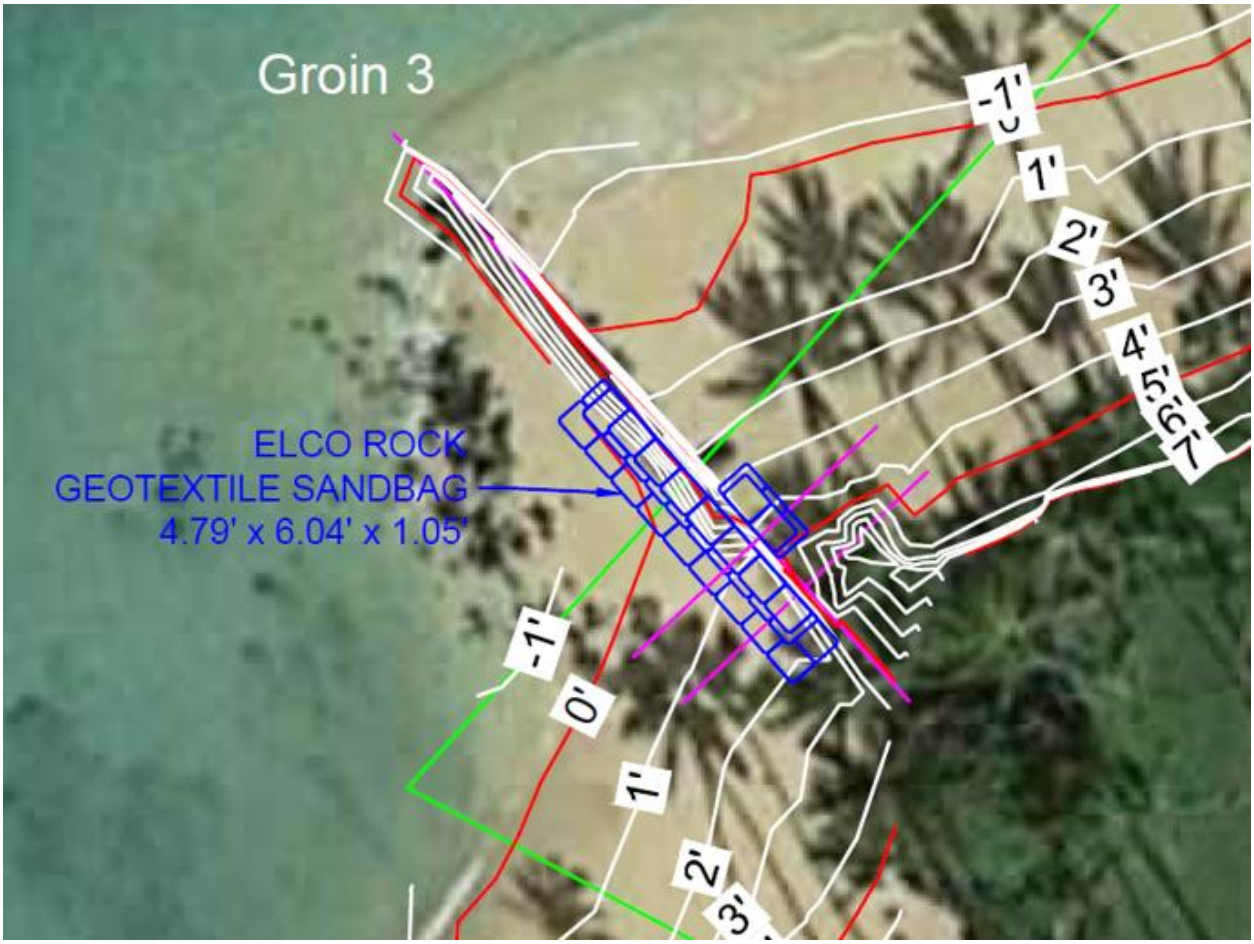

Figure 4-22. Groin 3 sandbag design placement

Figure 4-23. Groin 3 sandbags installed (photo date: September 7, 2018)

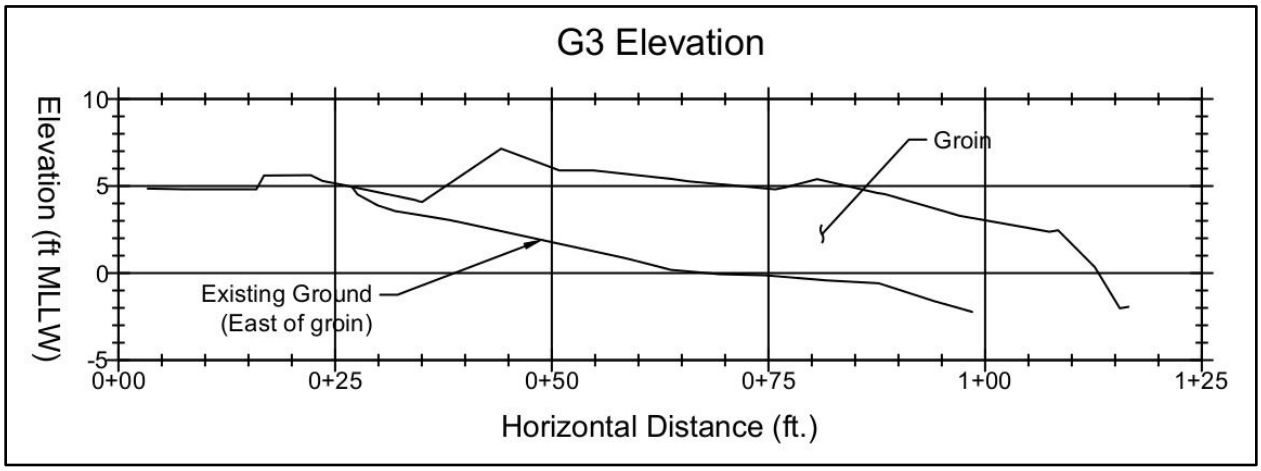

Figure 4-24. Groin 3 elevation

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 4-25). 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 4-26). 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 4-27). 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 4-28). 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 4-25. Groin 4, looking to the east

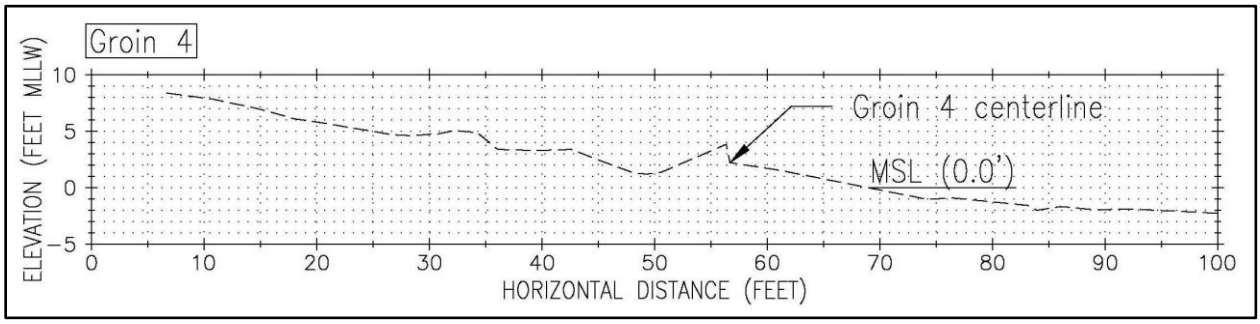

Figure 4-26. Groin 4 elevation

Figure 4-27. Heavily eroded vegetation and concrete/rock wall to the west of Groin 4

Figure 4-28. 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 4-29). 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 4-30). 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 4-31 and Figure 4-32). 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 4-29. Groin 5, looking to the east

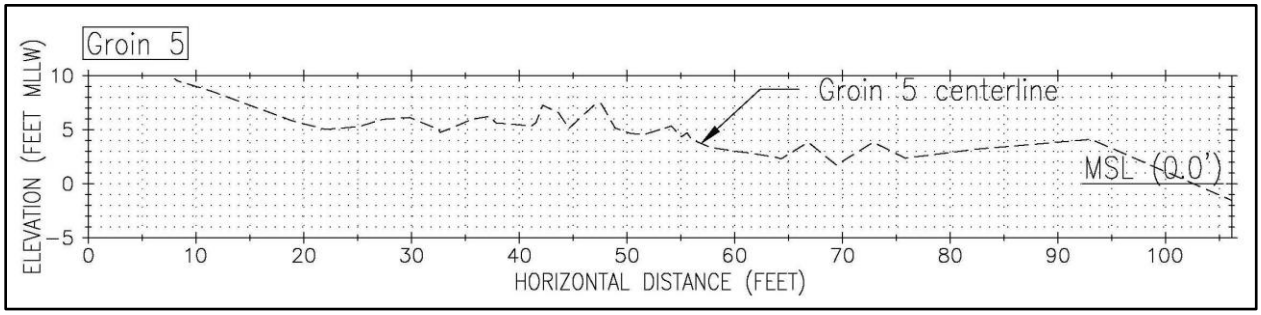

Figure 4-30. Groin 5 elevation

Figure 4-31. Groin 5, gap between vegetation and groin root

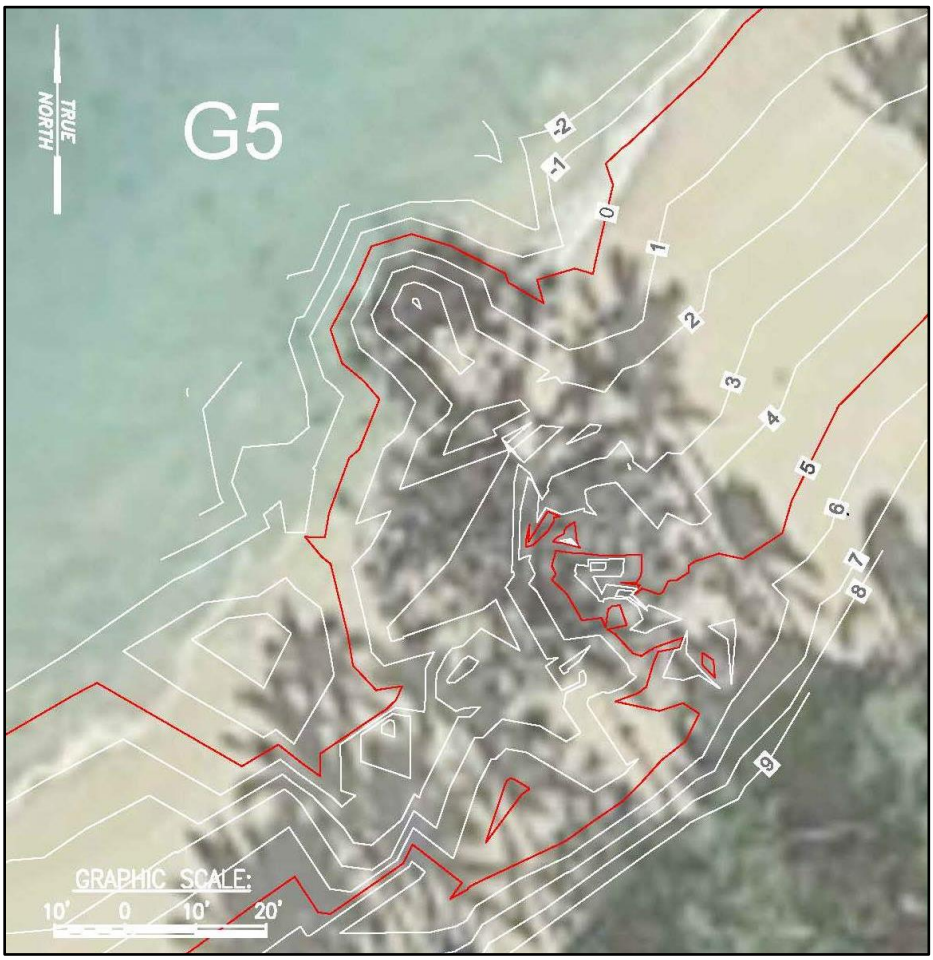

Figure 4-32. Elevation data in the Groin 5 area

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 4-33). 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 4-34). 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 4-35), although suspended sediment was observed to wash through and over the structure.

Figure 4-33. Groin 6, looking to the east

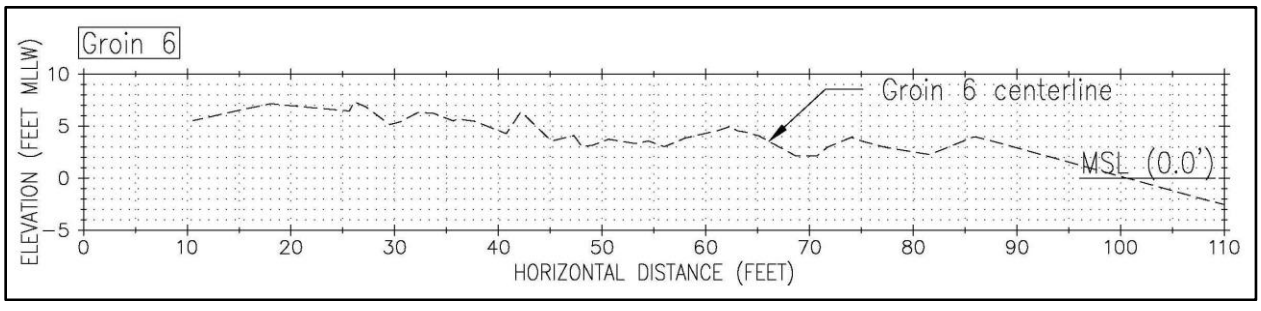

Figure 4-34. Groin 6 elevation

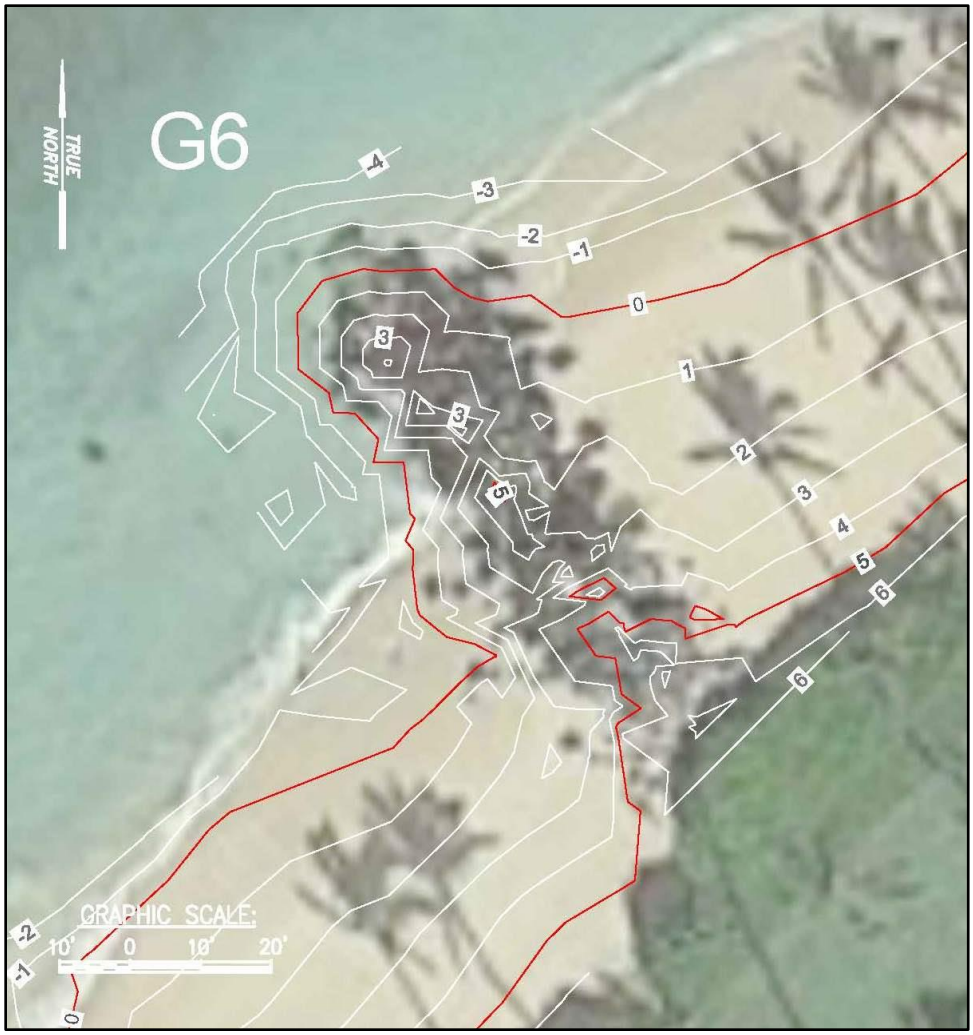

Figure 4-35. Elevation data in the Groin 6 area

4.1.7 *Groin 7*

Groin 7, shown in Figure 4-36, 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 4-37). 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 4-38). 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 4-39), 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 4-40), at the time of the survey.

Figure 4-36. Groin 7, looking to the east

Figure 4-37. 17-foot gap between Groin 7 root and vegetation line

Figure 4-38. Eroded vegetation and exposed roots directly east of Groin 7

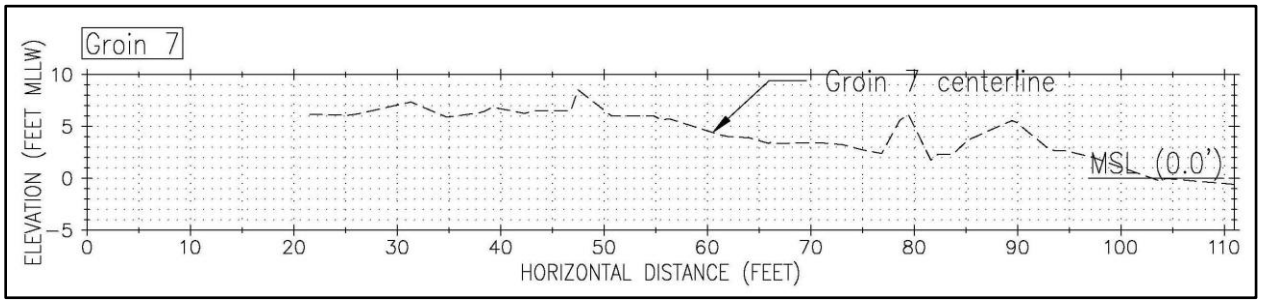

Figure 4-39. Groin 7 elevation

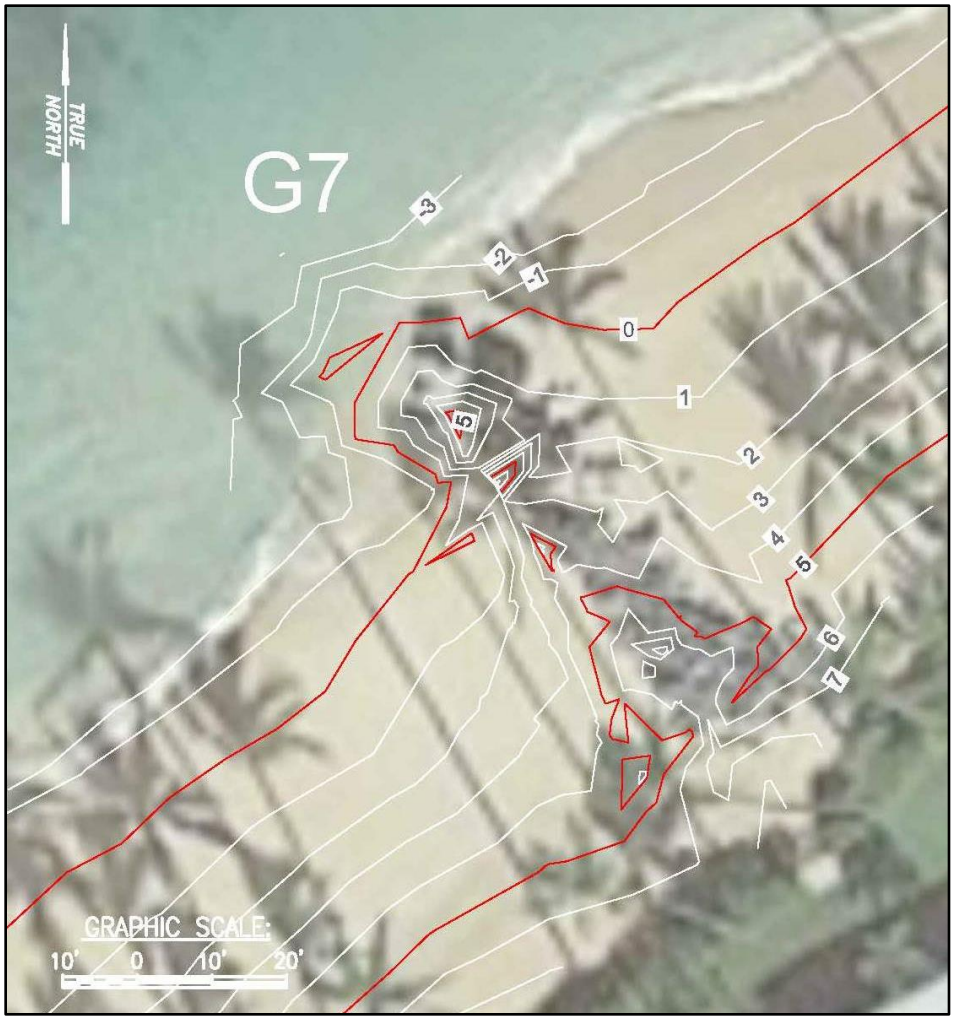

Figure 4-40. Elevation data in the Groin 7 area

4.1.8 *Summary*

Groin specifications including median armor stone size and weight, groin length, width, and crest height are shown in Table 4-1.

Table 4-1. Groin Summary

Groin	Mean Stone Diameter (ft)	Mean Stone Weight (lbs)	Groin Length (ft)	Groin Width (ft)	Max. Crest Height (ft)
1	2.0	1,340	100	35	5.5
2	1.9	1,080	70	15	5
3	2.2	1,630	115	10	7.5
4	2.0	1,230	70	55	4.5
5	2.0	1,300	80	40	8
6	2.2	1,670	90	35	7.5
7	2.1	1,540	75	25	8

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)].

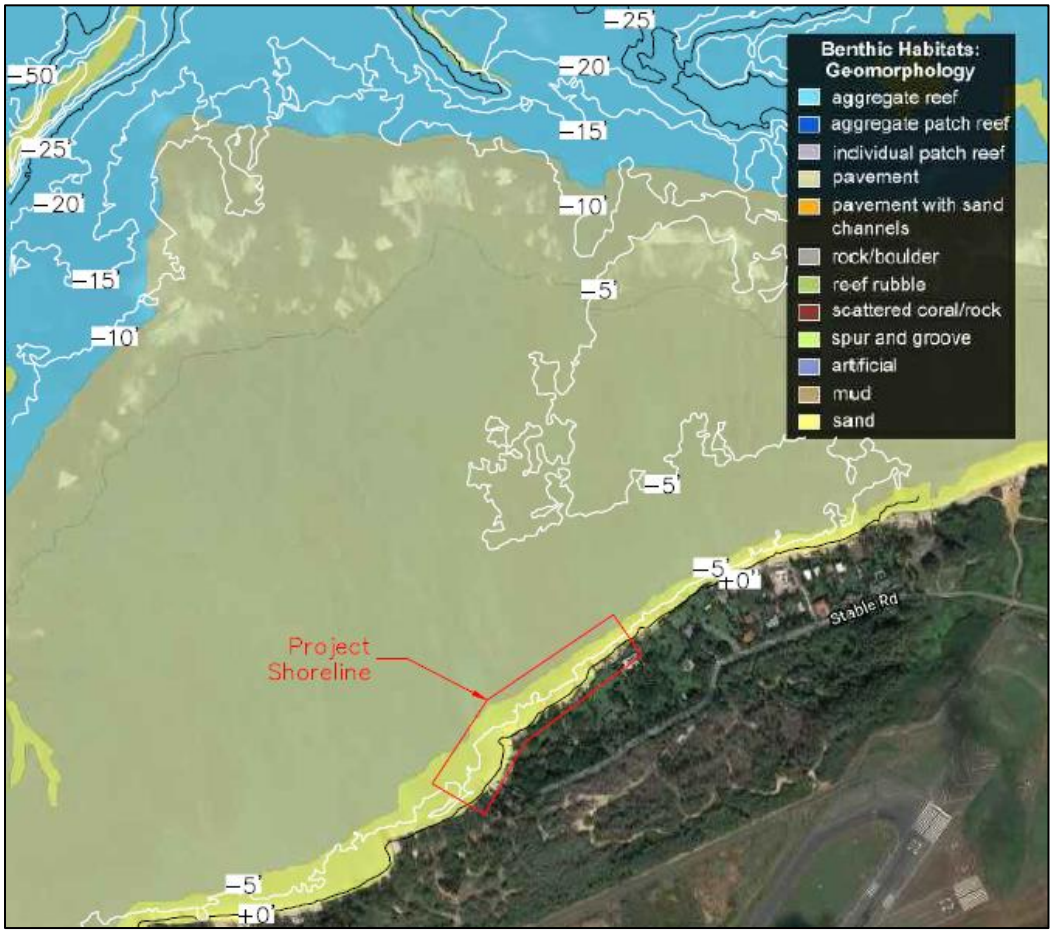

Figure 5-1. Offshore bathymetry and geomorphology at Stable Road

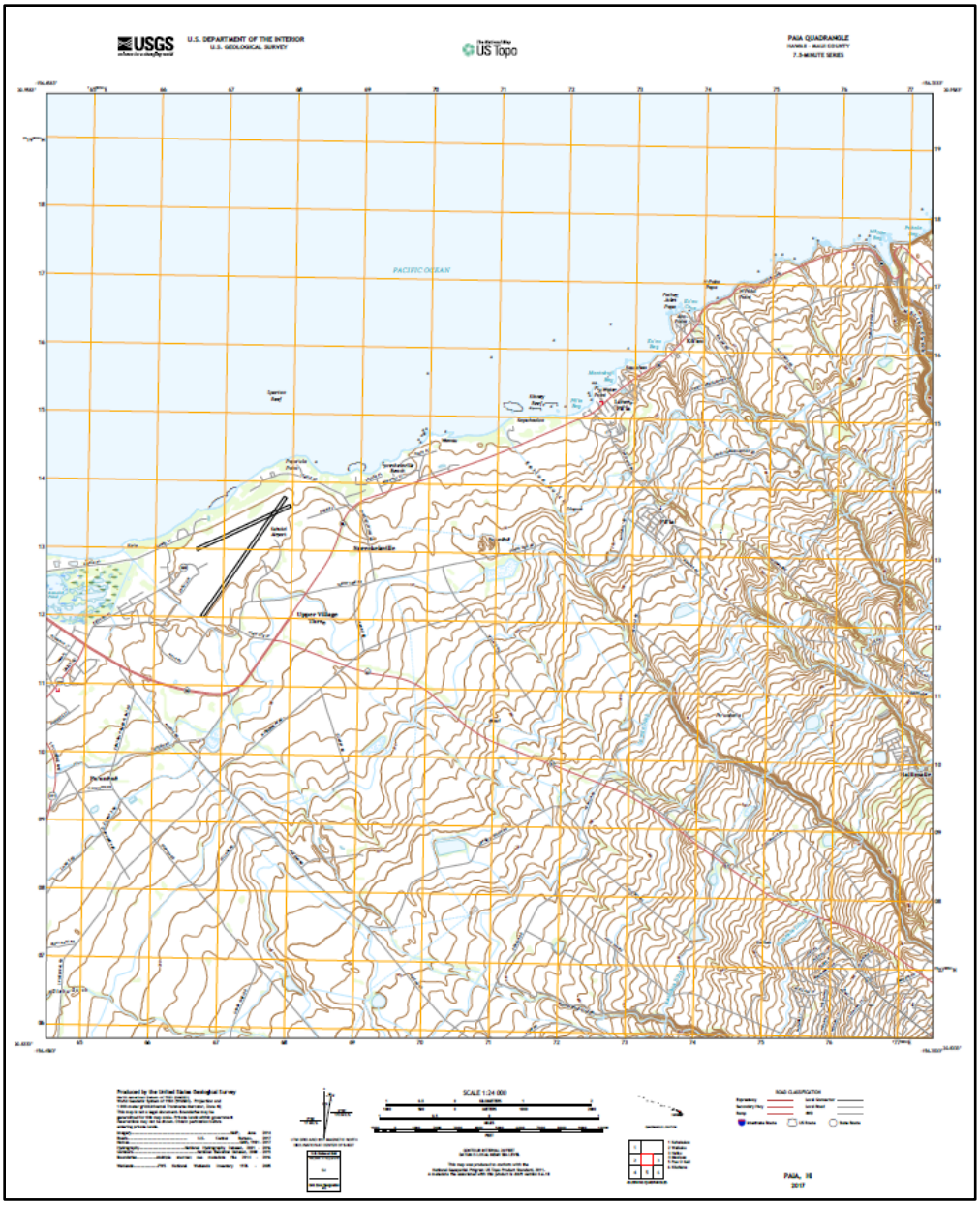

Figure 5-2. USGS Topography Quad Map for the project region

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.

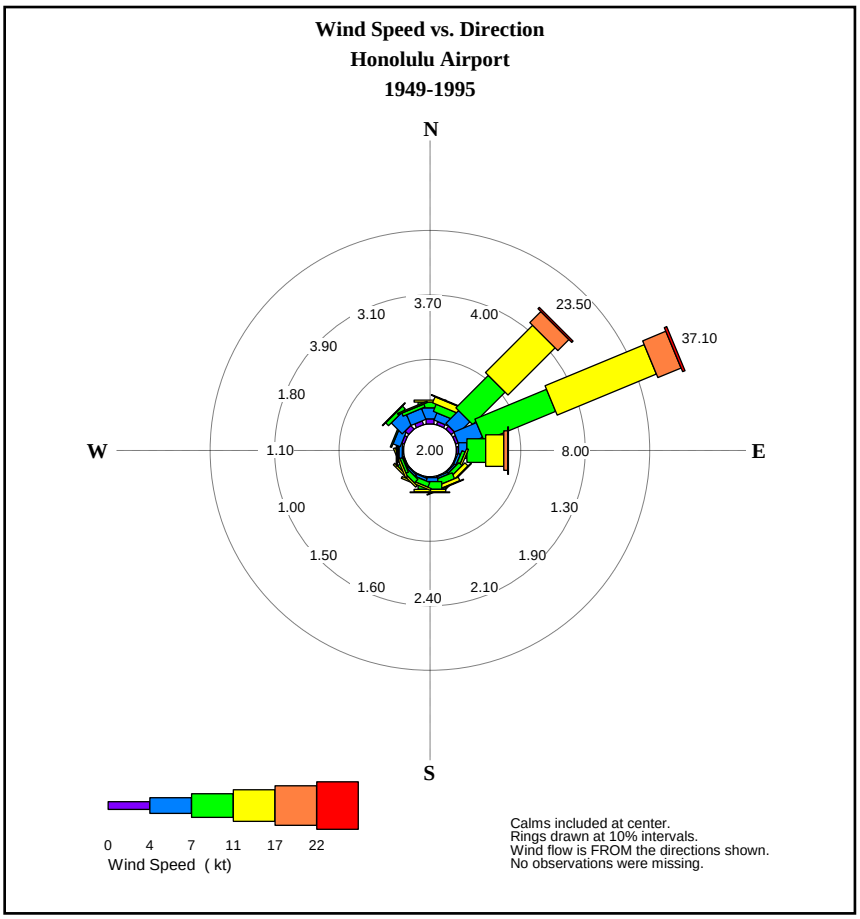

Figure 5-3. Wind rose for Honolulu Airport (1949 to 1995)

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 *Tide and Sea Level Change*

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.

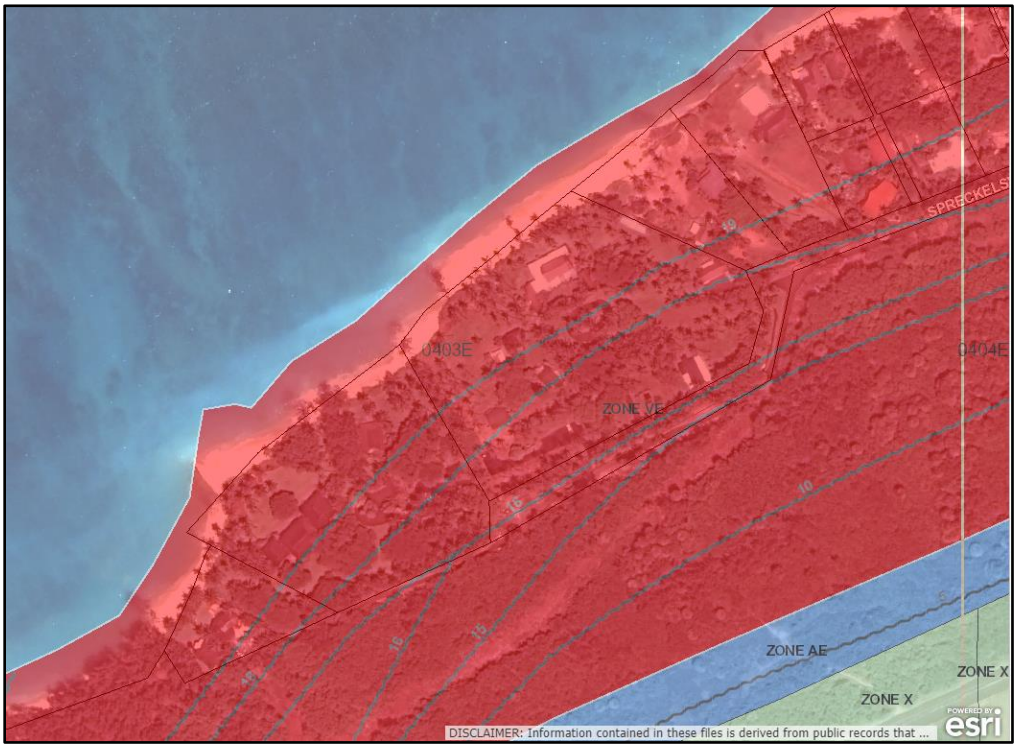

Figure 5-4. Flood Insurance Rate Map for the project area (Zone VE, Flood Hazard Assessment Tool)

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.

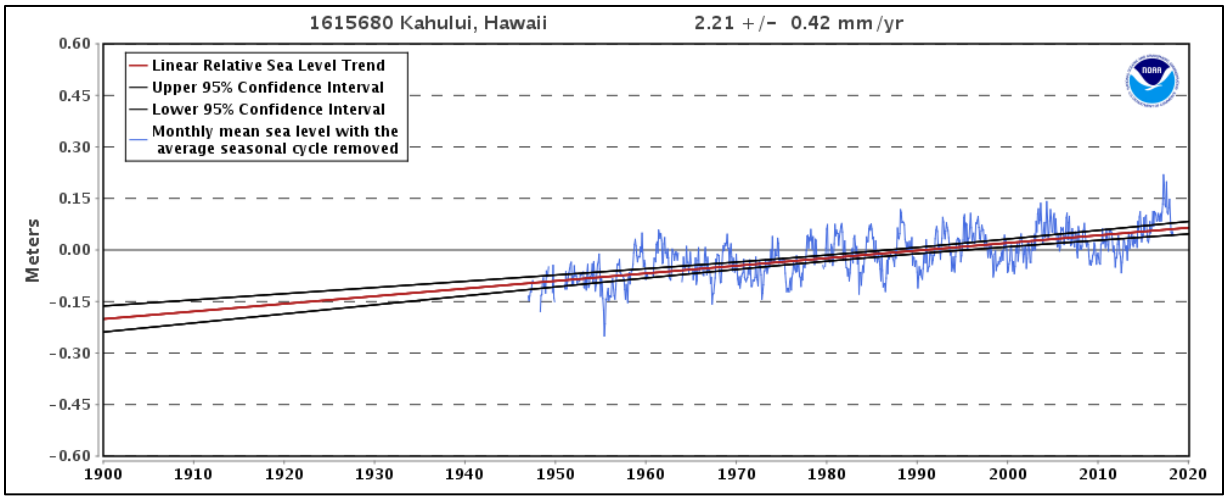

Figure 5-5 Mean sea level trend, Honolulu Harbor, Station 1612340, 1905 to present (NOAA, 2017)

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.

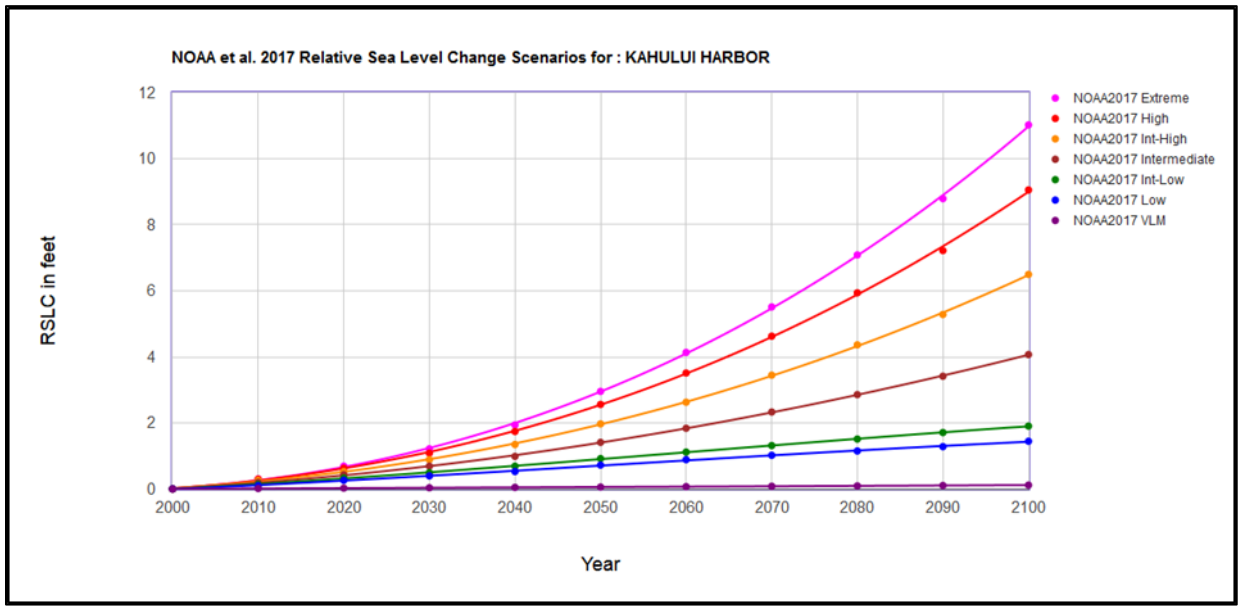

Figure 5-6 Hawaii sea level rise projections (adapted from NOAA, 2017)

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.

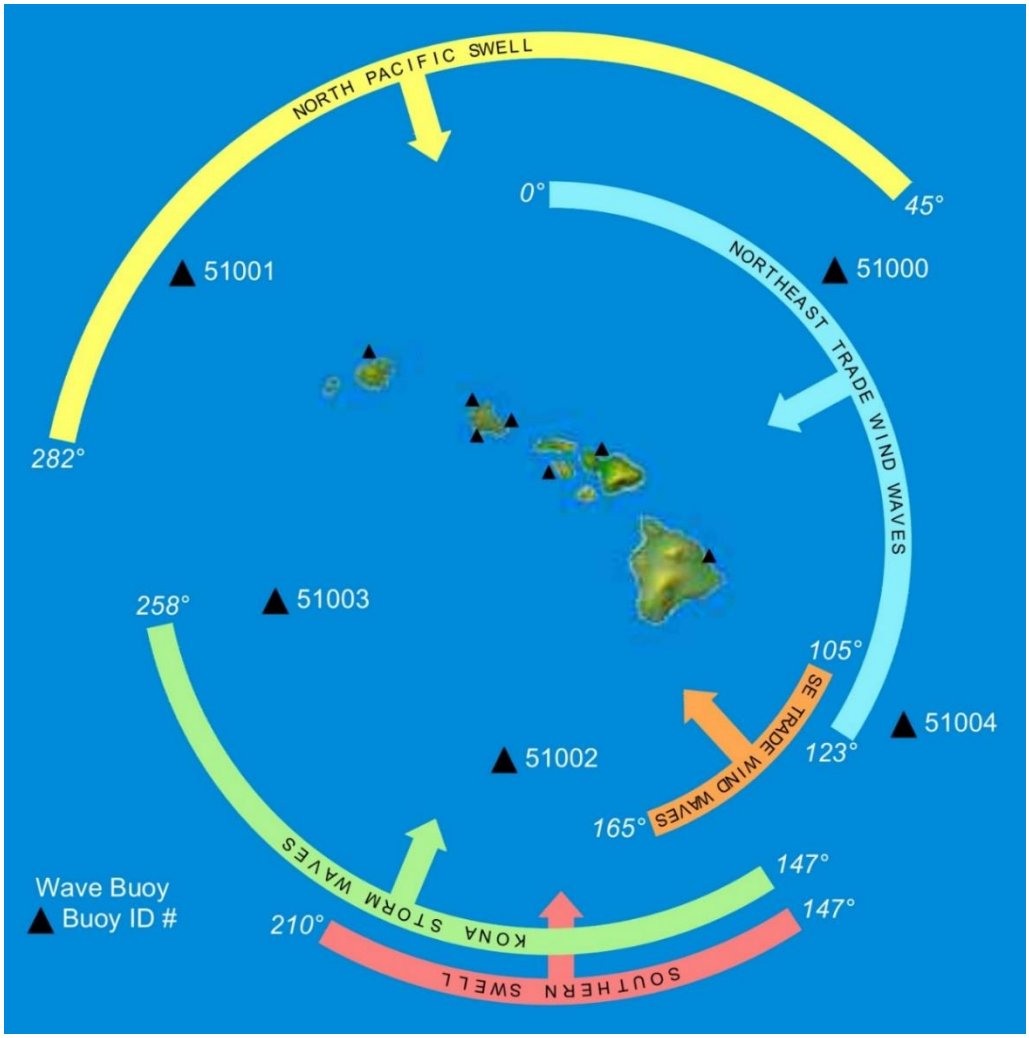

Figure 5-9. W**ave climate for the main Hawaiian Islands**

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).

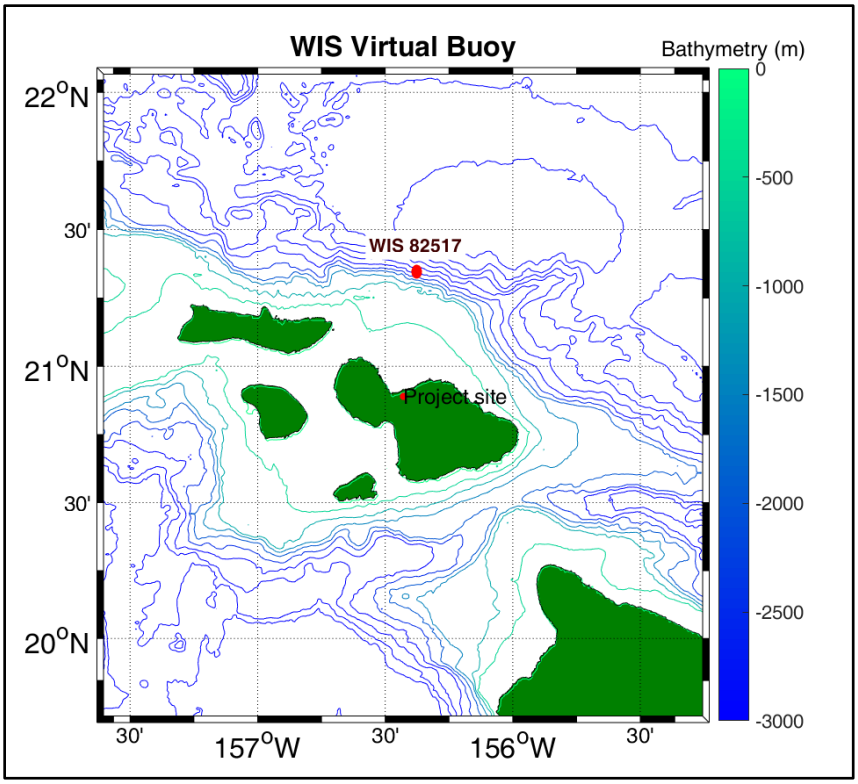

Figure 5-10. Project site and virtual buoy locations

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.

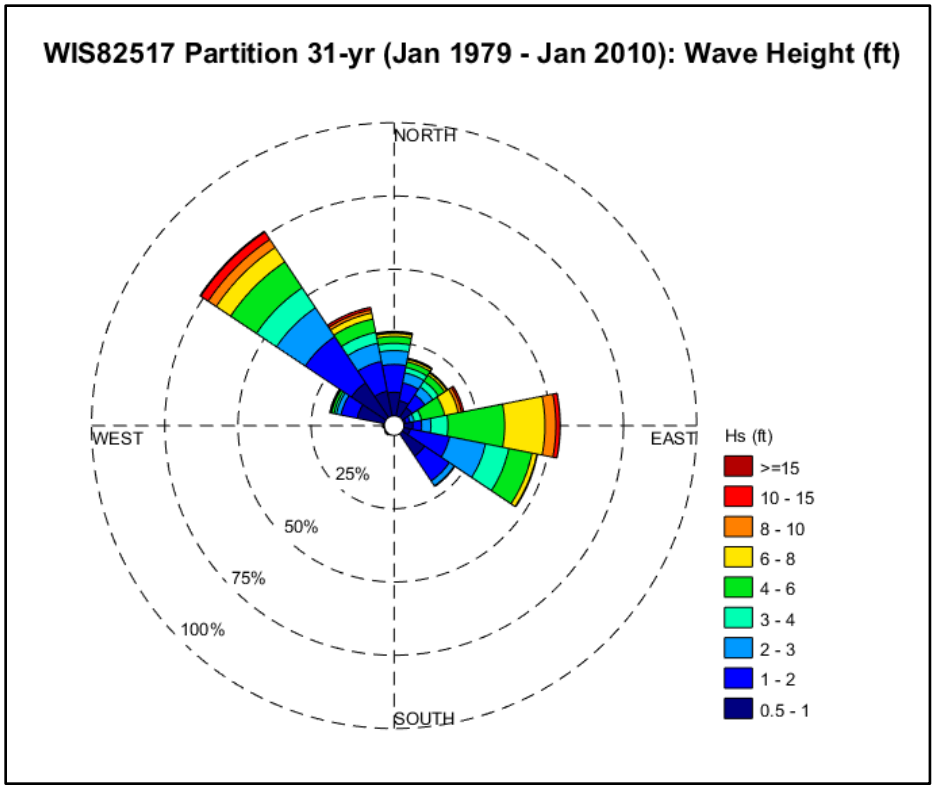

Figure 5-11. WIS 82517 virtual buoy wave height rose

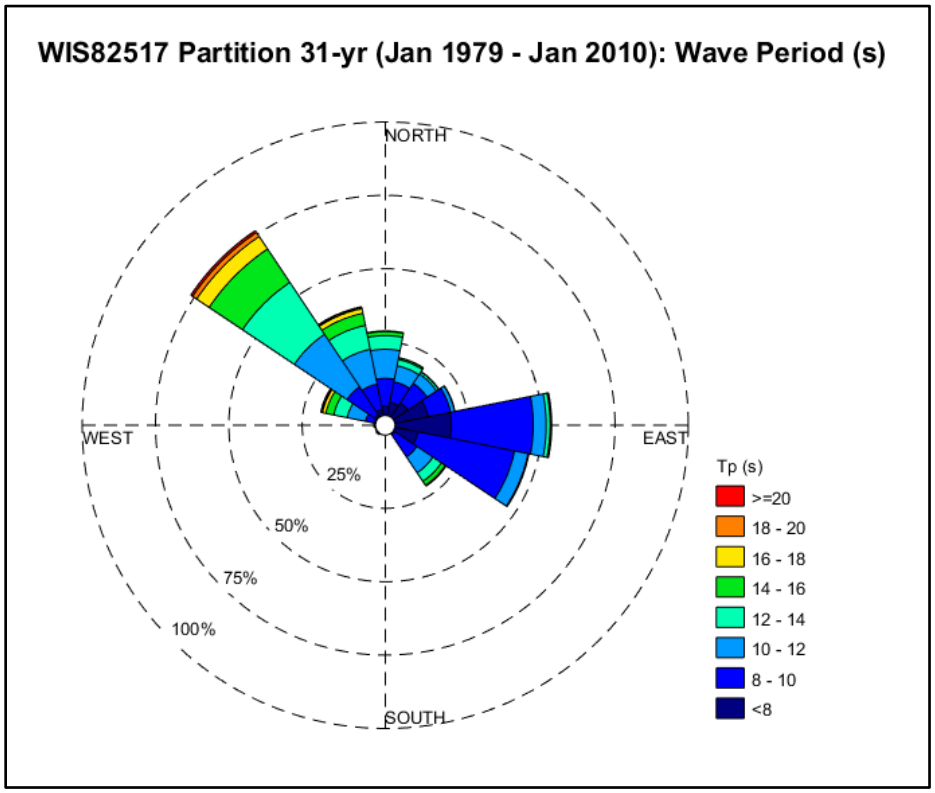

Figure 5-12. WIS 82517 virtual buoy wave period rose

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.

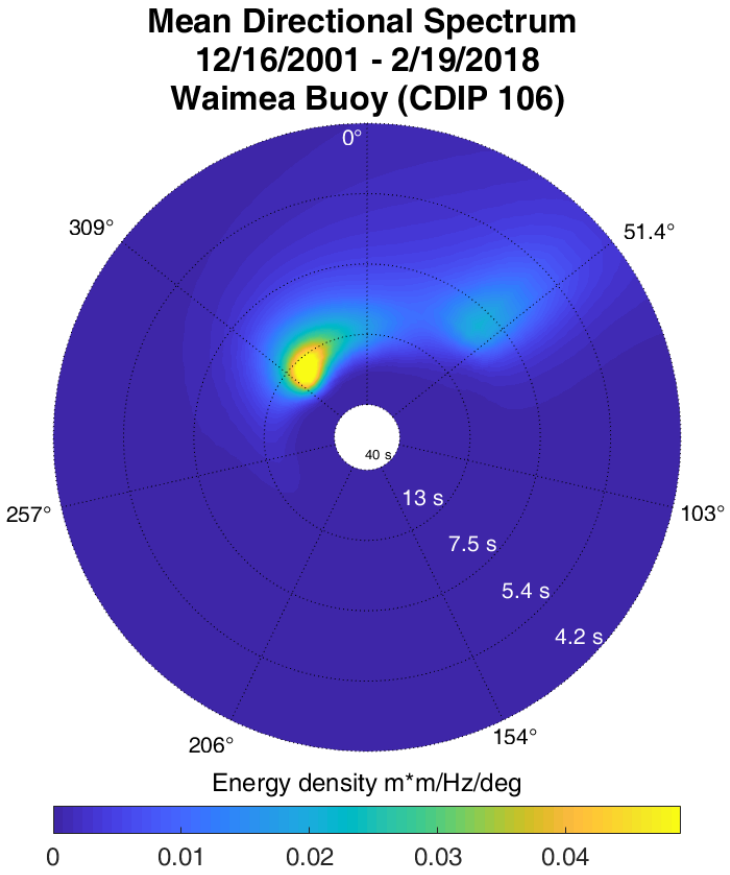

Figure 5-13. Deepwater wave directional spectrum from CDIP 106.

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.

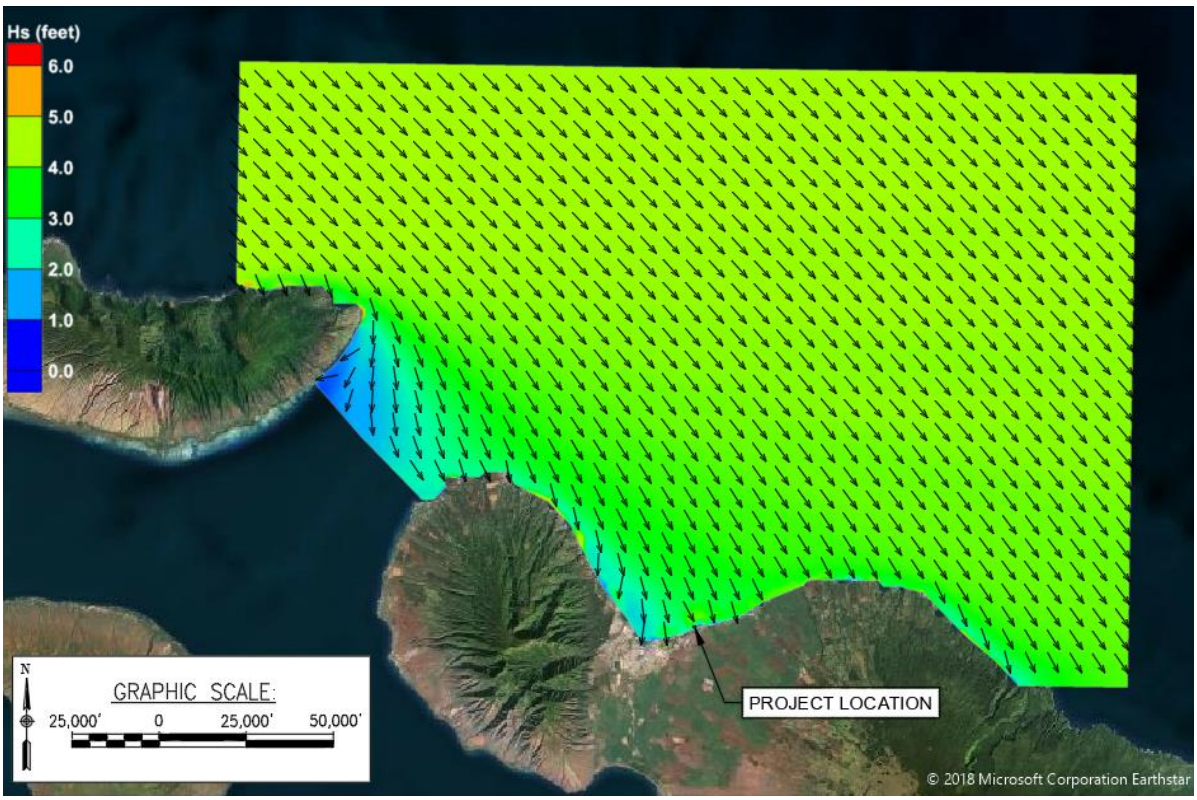

Figure 5-14. SWAN output wave height and approach vectors on the largest grid, NW prevailing condition

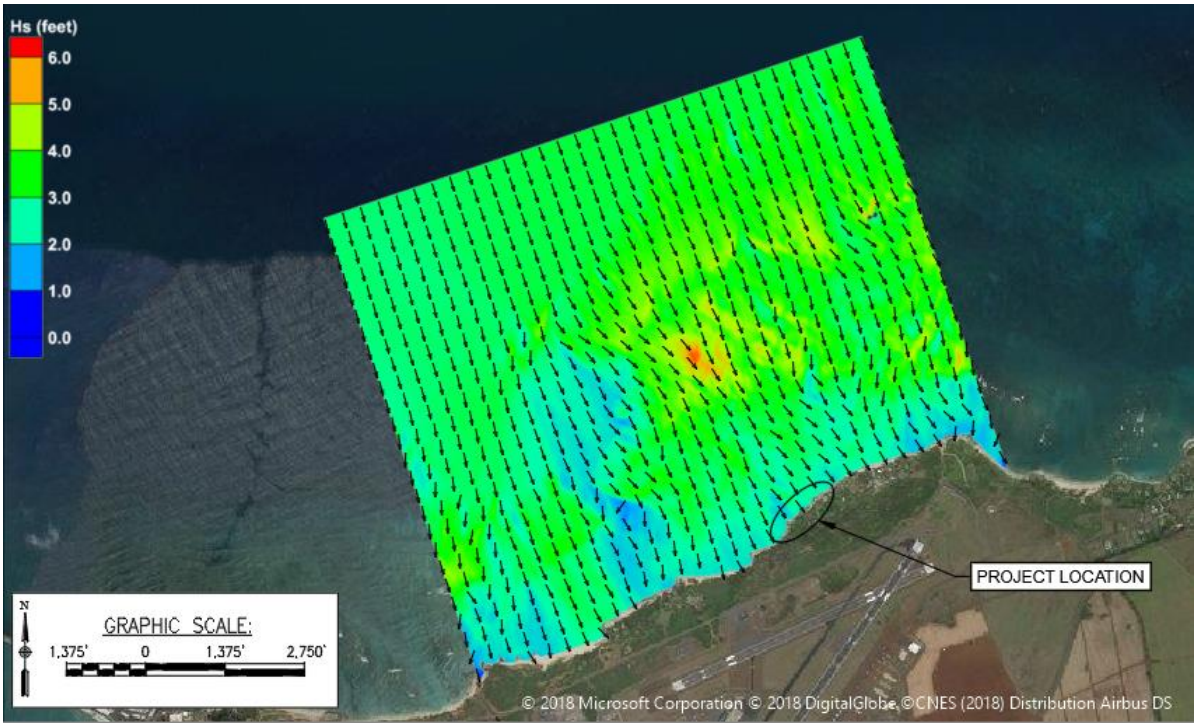

Figure 5-15. SWAN output wave height and approach vectors on the smallest grid, NW prevailing condition

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.

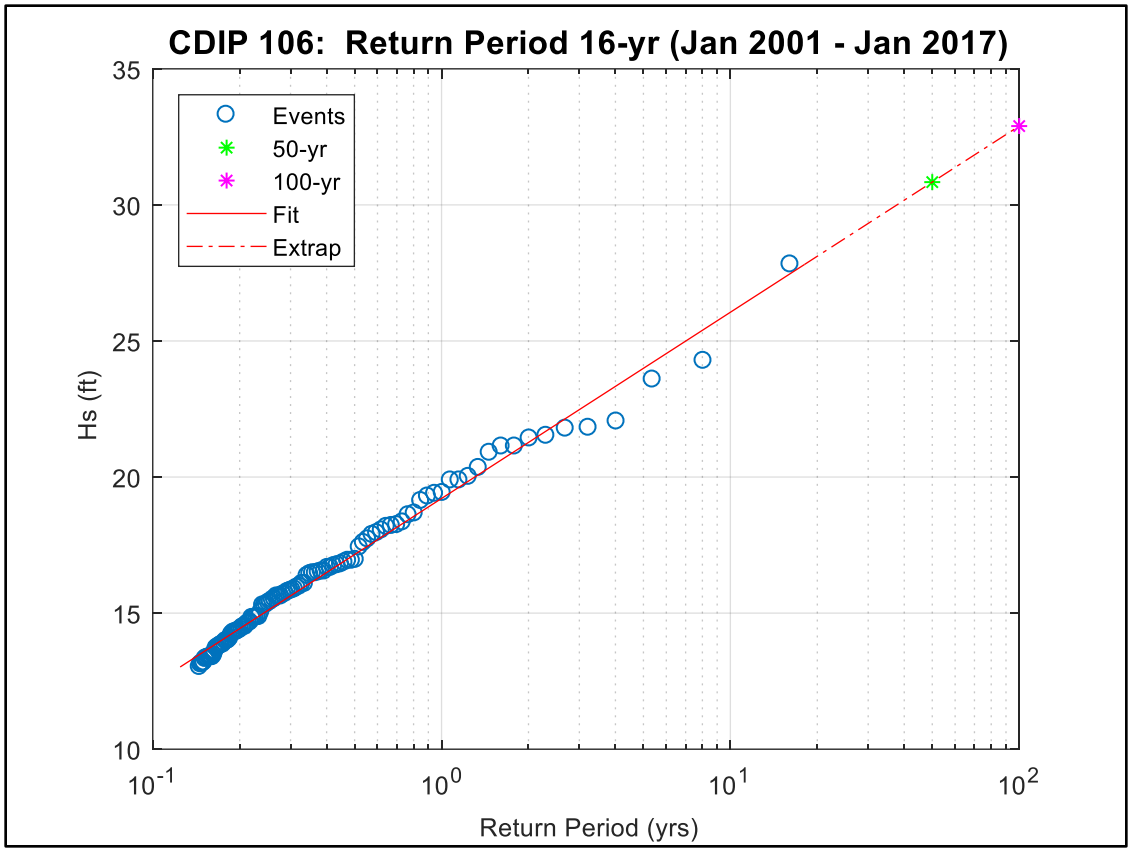

Figure 5-16 Wave height versus return period distribution for CDIP 106 wave buoy

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 more than 70 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 required to take a more seaward route past 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 will 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. 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 reduce 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.

6.1.4 *Impacts on Nearshore Coastal Processes*

The proposed groin repair is designed to reduce longshore sand transport/littoral drift along the shoreline, thereby stabilizing the beach. The reduction 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 will front ineffectively armored 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 is 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*

Wedge-Tailed Shearwater

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 (December 15 through March 15) 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. The immediate work area will be searched for nest at the beginning of work each morning to ensure that there are no nesting sites within the area. 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. 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.

Hawaiian Monk Seal

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.

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 9. 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 9 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 proposed project includes consultation with the affiliated cultural groups prior to any undertaking that may directly or indirectly affect the historic sites. There is a high volume of human skeletal remains recovered from the shoreline in the Kanaha Pond area.

If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the 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.

1 Implementation of the project does not involve construction on or excavation of backshore land areas that might contain physical remains. 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. 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 sand loss offshore.

"No Action" could also adversely affect the nearshore biological environment. Potential sand movement offshore would abrade and smother benthic biota, and further worsen the marine biota environment in the Paia/Kahului region and the growth of invasive algae. However, "No Action" is not expected to affect protected or endangered species.

"No Action" would not affect historic, cultural, and archaeological resources, with the exception of whatever historic/cultural significance the existing beach has.

"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 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 maintain 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 Riprap Scour Apron 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 DEA, the groin repair and replacement 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 protection and restoration of the public trust resource and continuation of the current use levels of the natural resources in the region. 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 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 6.3.5).

- 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 over 70 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 groin repair is to restore functionality to a series of small groins. For over 70 years, this groin field has stabilized the coastline and the sandy beach.

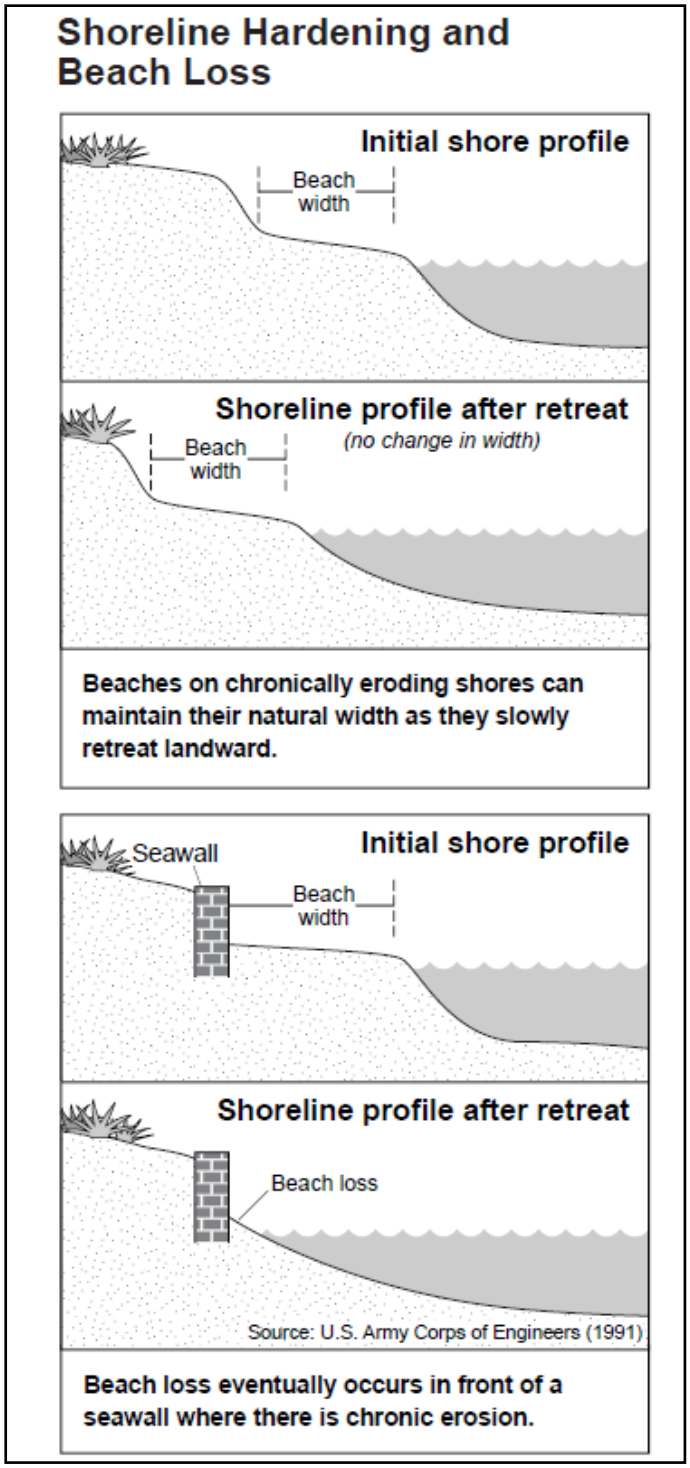

Figure 8-1 COEMAP model for beach loss relies on an extensive and homogeneous sand continuum between the beach and upland areas.

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.

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 restore the pre-existing groin field. The groin field has been stabilizing the coastline for over 70 years and has equilibrated to the presence of the structures. Failure of the groin field would result in large scale destabilization of the regional coastline.

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 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 promoting 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 fresh water 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.

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 will have 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 by protecting and restoring 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.

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 not expected to significantly affect marine and coastal resources. 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 DEA. 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. 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. 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 consultation with the affiliated cultural groups prior to any undertaking that may directly or indirectly affect the historic sites. There is a high volume of human skeletal remains recovered from the shoreline in the Kanaha Pond area.
    - If any human skeletal material is observed on or offshore (including underwater), work must stop in the vicinity immediately and the 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.
- 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 9).

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 9 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. It is not expected to negatively alter erosion or 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 *Suitable Material*

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.

10.1.3 *Historic or Cultural Features*

1. No adverse impacts to any historical or cultural feature are expected since the project is located within the active beach face.

2. Archaeological monitoring will be conducted during the portions of the project where excavation is required.

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. In addition, the Office of Hawaiian Affairs will be updated.

10.1.4 *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. 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.

3. 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.

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

5. 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.

10.1.5 *Solid Waste and Disposal*

1. 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.

2. The Contractor shall not dispose of any concrete, steel, wood, or any other debris into ocean waters.

3. 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.

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

5. The Contractor shall ensure that an Oil Spill Response Plan is in place which shall detail procedures for managing the accidental release of petroleum products to the aquatic environment during construction. Absorbent pads, containment booms, and skimmers will be available to facilitate the cleanup of petroleum spills.

6. Any spills or other contaminations shall be immediately reported to the DOH Clean Water Branch (808-586-4309).

7. 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, 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.

8. 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.

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

10.1.6 *Waste Waters*

1. 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.

10.1.7 *Erosion Control and Silt Containment*

1. Silt curtains and/or booms may be deployed, as needed. If deployed, curtains and/or booms will be individually anchored and regularly inspected during groin repair operations, as needed.

2. If deployed, silt curtains and/or booms will be left in place each night, as needed. All anchors and booms will be inspected prior to sunset.

3. Silt fence will be erected along the mauka margin of the work area.

4. The Contractor is responsible for the proper handling, storage and/or disposal of all waste generated by maintenance activities.

5. The Contractor shall confine all maintenance activities to areas defined by the drawings and specifications. No materials shall be stockpiled in the marine environment.

6. The Contractor shall keep maintenance activities under surveillance, management and control to avoid pollution of surface or marine waters. Daily visual inspection of the project 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.

7. Visual inspections will include monitoring of the effectiveness of the silt fences, curtains, and/or booms if deployed, to ensure proper function.

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

9. Project construction 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 project area and containment devices. In the event that turbidity is observed outside of the containment devices, work shall stop, and the containment devices shall remain in place until the turbidity dissipates. Silt fences, curtains, booms, 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. 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. Waste water shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

13. 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.

14. Construction must avoid exposing hardpan clay deposits to direct contact with ocean waters.

10.1.8 *Public Access and Signage*

1. Operational bounds on land will be marked with traffic cones or a temporary fence and patrolled by project staff as needed to protect the public from the hazards of construction.

2. Project implementation will not interfere with the public's right to reasonable navigation. The beach will be passable, or alternate routes provided, for the duration of the project.

3. All work areas will have posted signs advising the public of current construction activities and related hazard warnings, to include a listing of the applicable permits.

10.1.9 *Dust Control*

1. Dust, which could damage crops, orchards, cultivated fields and dwellings, or cause a nuisance to persons, shall be abated and control measures shall be performed.

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.

10.1.10 *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.

10.1.11 *Protected Marine 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. Visual surveys for ESA-listed marine 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).

3. Work shall be postponed or halted when ESA-listed marine 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.

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

5. 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. The laws and guidelines for listed species in Hawaii may be viewed at: http://www.nmfs.noaa.gov/pr/education/hawaii/

6. 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.

7. 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, 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.

8. 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 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).

9. 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 or swimmers to visually confirm that the area is clear is preferred.

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

11. 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.

10.1.12 *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 BMPs have been properly installed.

3. Construction will be immediately stopped, reduced or modified, and/or new or revised BMPs will be immediately implemented as needed to stop or prevent polluted discharges to receiving waters.

10.1.13 *Structure, Authority, and Responsibility*

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

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

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 that may be contacted to provide pre-consultation for the project are summarized below.

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
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 Riprap Scour Apron DEA 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

11.3 DEA Distribution

Notice of availability of the DEA and the start of the 30-day public review and comment period will be published in The Environmental Notice. The DEA will be 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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