

DAVID Y. IGE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.8172

June 16, 2022

VIA the Office of Environmental Quality Control (Office of Planning and Sustainable Development) online Submittal Form. <https://planning.hawaii.gov/erp/submittal-form/>

TO: MARY ALICE EVANS
DIRECTOR
ENVIRONMENTAL REVIEW PROGRAM
OFFICE OF PLANNING AND SUSTAINABLE DEVELOPMENT
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT
AND TOURISM

FROM: JADE T. BUTAY 
DIRECTOR OF TRANSPORTATION

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT AND ANTICIPATED FINDING
OF NO SIGNIFICANT IMPACT FOR KAMEHAMEHA HIGHWAY AT
KAAAWA EROSION MITIGATION, KAAAWA, OAHU, HAWAII

With this letter, the State of Hawaii Department of Transportation (HDOT) transmits the Final Environmental Assessment and Anticipated Finding of No Significant Impact for the proposed Kamehameha Highway at Kaaawa Erosion Mitigation on the island of Oahu for publication in the next available edition of the Environmental Notice. All required information associated with this request for publication is being furnished using the Office of Environmental Quality Control's online submittal form.

Should you have any questions, please contact Ms. Jiangli Guo, HDOT Project Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118 or by email at jiangli.guo@hawaii.gov and reference letter number HWY-L 2.8172.

Enclosure

From: webmaster@hawaii.gov
To: [DBEDT OPSD Environmental Review Program](#)
Subject: New online submission for The Environmental Notice
Date: Tuesday, June 14, 2022 2:52:00 PM

Action Name

Kamehameha Highway at Kaaawa Erosion Mitigation

Type of Document/Determination

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

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds
- (2) Propose any use within any land classified as a conservation district
- (3) Propose any use within a shoreline area

Judicial district

Ko'olaupua, O'ahu

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

(1) 5-1-002:025

Action type

Agency

Other required permits and approvals

State Conservation District Use, Department of the Army

Proposing/determining agency

Hawaii Department of Transportation

Agency contact name

Jiangli Guo

Agency contact email (for info about the action)

jiangli.guo@hawaii.gov

Email address or URL for receiving comments

jiangli.guo@hawaii.gov

Agency contact phone

(808) 832-3405

Agency address

2530 Likelike Highway
Honolulu, Hawaii 96819
United States
[Map It](#)

Was this submittal prepared by a consultant?

Yes
Consultant
Sea Engineering, Inc.
Consultant contact name
Scott Sullivan
Consultant contact email
ssullivan@seaengineering.com
Consultant contact phone
(808) 460-3437
Consultant address
41-305 Kalanianaʻole Highway Waimanalo, HI 96795 United States Map It
Action summary
<p>The project site is an approximately 450-foot length of roadside shoreline along Hawaii State Route 83 (HI-83), known as Kamehameha Highway. Kamehameha Highway is the only highway serving windward Oahu coastal communities, and is the primary access for police, fire, and emergency medical services. The project site is located on the makai side of the highway, in the community of Kaaawa, and is located directly seaward of Kaaawa Elementary School. A 400-foot-long section of Kamehameha Highway has become undermined due to shoreline erosion. The undermining has destabilized the highway shoulder, and if it continues may result in damage to the highway itself. The proposed action is to construct an engineered sloping rock revetment to mitigate the erosion threat to the highway. The revetment crest will be +8 feet, and the structure will be approximately 24 feet wide and approximately 450 feet long.</p>
Reasons supporting determination
See FEA-FONSI pages i-v
Attached documents (signed agency letter & EA/EIS)
<ul style="list-style-type: none"> • Final-EA-06-09-22.pdf • FEA-Transmittal-Letter.pdf
Shapefile
<ul style="list-style-type: none"> • The location map for this Final EA is the same as the location map for the associated Draft EA.
Action location map
<ul style="list-style-type: none"> • Action-Location-Map-2.zip
Authorized individual
Scott P Sullivan
Authorization
<ul style="list-style-type: none"> • The above named authorized individual hereby certifies that he/she has the authority to make this submission.

KAMEHAMEHA HIGHWAY AT KAAAWA EROSION MITIGATION

FINAL ENVIRONMENTAL ASSESSMENT

KAAAWA, OAHU, HAWAII



*Proposing and Approving Agency:
State of Hawaii, Department of Transportation*

June 2022

FINDING OF NO SIGNIFICANT IMPACT (FONSI) KAMEHAMEHA HIGHWAY AT KAAAWA EROSION MITIGATION KAAAWA, OAHU, HAWAII

Proposing and

Approving Agency: Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Proposed Action: The existing stretch of Kamehameha Highway within the proposed area of mitigative activities—which is generally defined as the shoreline fronting Kaaawa Elementary School—is routinely overtopped during periods of extreme high tides or elevated surf, which has left the road shoulder dangerously undermined and cracked in many places. The highway serves as the only route of transportation for a number of isolated windward Oahu communities. A primary objective of the proposed project is to protect the threatened stretch of primary roadway from future collapse due to progressive erosion.

The proposed action consists of installing an approximately 450-ft long rock revetment to front of the existing shoreline erosion scarp, which supports portions of the existing road shoulder. The revetment is a sloping, permeable, un-cemented structure built of wave resistant material. A typical cross section of the proposed structure would start with an underlayment of geotextile filter cloth to form a base that prevents the erosion and loss of underlying sediments, followed by an underlayer of smaller stone, upon which an outer armor layer of larger armor stone units is placed, forming the complete revetment section.

A revetment is the preferred option because it is a longer-term solution for the protection of the critical roadway, which also minimizes reflected energy at the shoreline. Lateral access to the beach is expected to improve following the installment of the revetment due to the absorptive and permeable nature of rock revetments. Revetments generally tend to better facilitate sand deposition than do vertical earthen embankments like the existing condition.

Basis for Determination: The project is not expected to significantly alter or affect presently ongoing shoreline processes, wave-driven currents, circulation patterns, overall water quality, or offshore wave breaking. The construction activities have been designed to avoid and minimize impacts to marine biota so far as practicable, and no long-term impacts to marine biota are anticipated. The revetment will be placed on existing nearshore sand and rubble deposits; thus, there should be no significant loss of marine habitat. Construction Best Management Practices (BMPs) will be used to avoid impacts to the environment and protected marine species, such as the green sea turtle.

Chapter 343, Hawaii Revised Statutes (HRS), and Hawaii Administrative Rules (HAR) §11-200.1 establish certain categories of action that require the agency processing an applicant's request for approval to prepare an environmental assessment. HAR §11-200.1-11 establishes procedures for the determination of whether an environmental assessment (EA) is sufficient or whether an Environmental Impact Statement (EIS) should instead be prepared due to actions that may have a

significant effect on the environment. HAR §11-200.1-13(b) lists the following significance criteria to be used when making such a determination.

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

Installment of the engineered rock revetment protection is expected to stabilize the shoreline and backshore area, which includes two lanes of roadway forming Kamehameha Highway and Kaaawa's public elementary school beyond that. Currently, the shoreline of interest is hardened with a mixture of temporary un-engineered emergency repairs which are in a deteriorated and failing condition. Continued progressive failure of the existing non-engineered shore protection measures would further destabilize the 450-foot-long project shoreline, likely resulting in significant undermining and subsequent collapse, or partial collapse, of the highway. Further failure of the unprotected earthen slope that supports the roadway would result in a sudden and possibly continued release of backshore material, including harmful silts and clays, into the intertidal and nearshore waters. The proposed project would install a stable rock revetment with an appropriate filter cloth foundation, greatly reducing the likelihood of slope failure and nearshore water quality degradation.

There are no significant flora or fauna which would be lost due to the emplacement of an engineered revetment on the project shoreline. No threatened or endangered species would be impacted by the project. No known cultural resources are located in the project construction area.

The Kaaawa area has a rich historical and cultural legacy. However, two aspects of the project make it unlikely that it would have a significant adverse effect on historic or archaeological sites:

- 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. However, large changes in observed seasonal beach shape at this location suggest very limited, if any, portions of the beach remain undisturbed for more than several months.
- 2) Construction of the revetment would take place between the sandy beach and the existing road shoulder. Due to the previous construction of the highway, it is unlikely that construction of the revetment will involve modification of any previously undisturbed soft earthen deposits, which could reasonably be expected to have the potential to hide archaeological materials or burials.

There do not appear to be any known traditional Hawaiian cultural practices that would be adversely affected by the proposed project, nor is it expected that 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 that has been substantially altered by natural as well as anthropomorphic processes, where the existence of any cultural artifacts or remains is very unlikely. Based on this assertion, the proposed project is unlikely to have an adverse effect on rights customarily and traditionally exercised for subsistence, cultural, and religious purposes. In the unlikely event that cultural artifacts or remains are found during the installation of the riprap structure, construction activities will cease immediately, and the proper authorities will be

contacted.

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

Permeable rock revetment structures are intrinsically designed to absorb a significant fraction of incoming wave energy. Reducing the level of potentially harmful reflected waves, which tend to energize nearfield erosional processes.

No negative impact on public lateral access to the shoreline is expected. Once the revetment is installed, public lateral access to the shoreline is anticipated to remain the same. There are no expected impacts to fishing or other cultural activities on the reef flat seaward of the project site.

(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 proposed 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 proposed revetment is located within Conservation land and in designated critical habitat for the Hawaiian Monk Seal, as discussed in Section 3.7 in this EA. Section 3.7.4 includes a discussion of mitigation measures should there be a siting of rare, threatened, or endangered species during the construction of the proposed revetment. If endangered or threatened species are encountered, all Best Management Practices (BMPs) and mitigation measures will be implemented (Section 3.7.4 and Appendix B).

(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 on the state. The revetment is expected to have some positive economic impact to the applicant as it has been designed to reduce return wave energy reflected by the current shore protection and reduce the forces causing sinkholes and undermining damaging the roadway.

(5) Substantially affects public health.

The proposed project is expected to have no adverse public health impacts. 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.

(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 revetment has little potential to affect public infrastructure and services, other than to protect and maintain the critically important public roadway. Once in operation, it will not require water or electrical power. In and of itself, it does not generate a need for additional sanitary wastewater collection and treatment facilities, and it would not affect stormwater runoff that might impact the City's stormwater 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.

(7) Involves a substantial degradation of environmental quality.

The project is not expected to have significant long-term adverse environmental impacts, nor is it expected to degrade environmental quality. The project should not permanently degrade water quality nor impact marine flora and fauna. Reduced return wave energy from the revetment would decrease natural nearshore turbidity generated during wave and swell events and could promote beach accretion. In addition, the proposed rock revetment would be visually and environmentally consistent with much of the neighboring shoreline.

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

The proposed revetment would be a stand-alone project, with no cumulative impacts or commitment for larger actions. Its intended purpose is to protect the critically important public roadway from erosion damage. It will also improve long-term protection of the backshore.

(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 reducing erosion of earthen bank materials and return wave energy, possibly allowing sand to accumulate when there is available material in the littoral cell.

Per consultation with USFWS and NOAA Fisheries, the following are species that 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 Sections 3.7 for a detailed discussion and analysis on the potential impacts and mitigation measures for the five (5) species listed above. Furthermore, Section 3.7.4 lists Best Management Practices (BMPs) to mitigate impacts to rare, threatened, or endangered species and their habitats.

(10) Detrimentially affects air or water quality or ambient noise levels.

No debris, petroleum products, or other construction-related substances or materials will be allowed to flow, fall, leach, or otherwise enter the coastal waters. All construction material will be free of contaminants or pollutants. Best Management Practices will be adhered to during construction to minimize environmental pollution and damage. There is expected to be some additional noise above ambient during construction resulting from equipment operation.

(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 revetment is located along the eroding earthen embankment that is threatening the public roadway. The conditions may include prevailing wave environment at the shoreline, particularly during winter season high surf, storm conditions, and large Tradewind wave events. The proposed revetment is designed to protect the roadway from erosion damage. It is not expected to negatively alter erosion or coastal processes because it is an improvement to the existing, failing, non-engineered material that has been placed on the shoreline.

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

Scenic vistas and view planes are not expected to be negatively impacted by the proposed action. The revetment crest elevation is the same as the highway and backshore elevation.

(13) Requires substantial energy consumption.

The project is a passive structure and will require no additional energy consumption beyond that expended during construction operations.

Determination: In accordance with the potential impacts discussed in this Final Environmental Assessment, the provisions of Chapter 343 Hawaii Revised Statutes, and Hawaii Administrative Rules §11-200.1 significance criteria, the Approving Agency, the Department of Transportation, State of Hawaii, has made a Finding of No Significant Impact (FONSI); and therefore an Environmental Impact Statement will not be prepared.



Jade T. Butay, Director
Department of Transportation
State of Hawaii

05/26/22

Date

Project Information Summary

This Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, Hawaii Revised Statutes (HRS), and Title 11, Chapter 200.1, Hawaii Administrative Rules (HAR), Department of Health, which set for the requirements for the preparation of environmental assessments.

Type of Document:	Environmental Assessment (EA)
Project Name:	Kamehameha Highway at Kaaawa Erosion Mitigation
Proposing and Approving Agency:	Hawaii Department of Transportation 2530 Likelike Highway Honolulu, HI 96819 Contact: Jiangli Guo (808) 832-3405 jiangli.guo@hawaii.gov
Consultant:	Sea Engineering, Inc. 41-350 Kalanianaʻole Highway Waimanalo, Hawaii 97795 Contact: Scott Sullivan (808) 460-3437 ssullivan@seaengineering.com
EA Triggers:	Use of State lands, Use of State funds, Use of land in the conservation district, Use within a shoreline area
Project Location:	Kaaawa, Oahu, Hawaii
Tax Map Key (TMK):	(1) 5-1-002:025
Jurisdiction:	City and County of Honolulu, Department of Parks and Recreation
Project Area:	Approximately 450 linear feet of shoreline, 12,600 SF footprint
State Land Use District:	Urban and Conservation (Resource Subzone)
County Zoning:	P-1
Flood Zone:	VE

Proposed Action:	A 400-foot -long section of Kamehameha Highway passing through Kaaawa in the vicinity of the elementary school has become undermined due to chronic and episodic coastal erosion. The undermining extends up to 10 feet under the shoulder of the road, extending as far inshore as the makai travel way stripe. This section of road is in danger of failure and collapse. Kamehameha Highway is the only roadway providing access to windward communities from the south, and if this section of road fails, transportation services, emergency services, and commuter lines will be significantly impaired. The Hawaii Department of Transportation proposes to construct a rock revetment to mitigate the shoreline erosion and protect the highway.
Required Permits And Approvals:	HEPA Environmental Assessment and FONSI Department of the Army Permit (Nationwide 3-Maintenance) State Conservation District Use Permit
Determination:	Finding of No Significant Impact (FONSI)
Estimated Cost:	\$2,000,000
Time Frame:	Construction will begin when the necessary permits and approvals are obtained and a construction contract is awarded, currently estimated for Fall 2022. The on-site construction period is estimated to be 120 days.
Unresolved Issues:	Permit requirements

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 PROJECT LOCATION AND GENERAL DESCRIPTION	1
1.2 SITE CONDITION	3
1.3 PREVIOUS SHORE PROTECTION MEASURES	5
1.4 PURPOSE AND NEED	5
1.5 SUMMARY DESCRIPTION OF THE PROPOSED ACTION	5
1.6 ALTERNATIVES CONSIDERED	7
1.6.1 No-Action	7
1.6.2 Highway Relocation	7
1.6.3 Protective Beach	7
1.6.4 Alternative Revetment Material	8
1.7 REQUIRED FEDERAL AND STATE APPROVALS, AND APPLICABLE REGULATORY REQUIREMENTS	8
1.7.1 Required Federal Approvals	8
1.7.2 Required State of Hawaii Approvals	8
1.7.3 City and County of Honolulu Regulatory Requirements	8
1.7.4 Applicable Federal Laws, Regulations and Executive Orders	9
1.7.5 Property Information	10
1.7.6 Regulatory Shoreline	10
1.8 DECISION TO BE MADE	10
2. DETAILED DESCRIPTION OF THE PROPOSED ACTION.....	11
2.1 GENERAL DESCRIPTION OF RIPRAP REVETMENT	11
2.2 ROCK REVETMENT DESIGN	11
2.3 CONSTRUCTION METHODOLOGY	13
2.4 SUMMARY OF PROJECT COSTS	14
3. ENVIRONMENTAL SETTING, POTENTIAL IMPACTS, AND MITIGATION MEASURES	15
3.1 PHYSICAL SETTING	15
3.1.1 Existing Conditions	15
3.1.2 Anticipated Impacts and Mitigation Measures	20
3.2 SOILS AND GEOLOGICAL CONDITIONS	20
3.2.1 Existing Conditions	20
3.2.2 Anticipated Impacts and Mitigation Measures	21
3.3 CLIMATE	21
3.3.1 Temperature and Rainfall	22
3.3.2 Wind	23
3.3.3 Air Quality	26
3.3.4 Anticipated Impacts and Mitigation Measures	26
3.4 OCEANOGRAPHIC CONDITIONS	26
3.4.1 Water Level	26
3.4.2 General Hawaii Wave Conditions	30
3.4.3 Project Design Wave Heights	34

3.4.4	<i>Wave Heights and Water Level at the Shoreline</i>	38
3.4.5	<i>Anticipated Impacts and Mitigation Measures</i>	39
3.5	COASTAL HAZARDS	39
3.5.1	<i>Flooding.....</i>	39
3.5.2	<i>Tsunami.....</i>	41
3.5.3	<i>Hurricanes</i>	41
3.5.4	<i>Anticipated Impacts and Mitigation Measures</i>	42
3.6	MARINE BIOLOGICAL ENVIRONMENT	42
3.6.1	<i>Marine Biota</i>	42
3.6.2	<i>Essential Fish Habitat.....</i>	43
3.6.3	<i>Potential Impacts and Mitigation Measures</i>	44
3.7	PROTECTED SPECIES.....	44
3.7.1	<i>Marine Species.....</i>	44
3.7.2	<i>Flora</i>	47
3.7.3	<i>Fauna</i>	47
3.7.4	<i>Potential Impacts and Mitigation Measures</i>	48
3.8	WATER QUALITY	50
3.8.1	<i>Existing Conditions.....</i>	50
3.8.2	<i>Potential Impacts and Mitigation Measures</i>	51
3.9	NOISE.....	51
3.9.1	<i>Existing Conditions.....</i>	51
3.9.2	<i>Potential Impacts and Mitigation Measures</i>	52
3.10	HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES.....	53
3.10.1	<i>General History</i>	53
3.10.2	<i>Archaeology.....</i>	53
3.10.3	<i>Potential Impacts and Mitigation Measures</i>	54
3.11	RECREATION	54
3.12	SOCIO-ECONOMIC SETTING.....	54
3.13	SCENIC AND AESTHETIC RESOURCES	54
3.14	PUBLIC INFRASTRUCTURE AND SERVICES	54
3.14.1	<i>Transportation</i>	54
3.14.2	<i>Water.....</i>	55
3.14.3	<i>Telecommunication and Electric Power.....</i>	55
3.14.4	<i>Schools</i>	55
3.14.5	<i>Police, Fire, and Emergency Medical Services</i>	55
4.	RELATIONSHIP TO RELEVANT PLANS AND POLICIES.....	56
4.1	HAWAII STATE PLAN.....	56
4.2	HAWAII STATE LAND USE DISTRICT	57
4.3	HAWAII COASTAL ZONE MANAGEMENT	58
4.4	CITY AND COUNTY OF HONOLULU GENERAL PLAN	60
4.5	CITY AND COUNTY OF HONOLULU KOOLAU LOA SUSTAINABLE COMMUNITIES PLAN ...	61
4.6	OLA: OAHU RESILIENCE STRATEGY	62
5.	CONSULTATION.....	63
5.1	AGENCIES CONSULTED	63
5.2	LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING COPIES OF THE EA	63

5.3	EA PREPARERS	64
-----	--------------------	----

LIST OF FIGURES

FIGURE 1-1. PROJECT LOCATION MAP	2
FIGURE 1-2. PROJECT VICINITY MAP	2
FIGURE 1-3. PROJECT SITE MAP	4
FIGURE 1-4. EXISTING HIGHWAY SHOULDER CONDITION	4
FIGURE 1-5. ROCK REVETMENT, TYPICAL SECTION	6
FIGURE 1-6. ROCK REVETMENT, PLAN VIEW	6
FIGURE 2-1. RIPRAP ROCK REVETMENT TYPICAL SECTION	13
FIGURE 2-2. RIPRAP ROCK REVETMENT PLAN VIEW	13
FIGURE 3-1. PROJECT SITE TOPOGRAPHY AND BATHYMETRY CONTOURS AT A 2 FT INTERVALS (MSL)	16
FIGURE 3-2. SHORELINE CROSS SECTION PROFILE LOCATIONS.....	17
FIGURE 3-3. SHORELINE CROSS SECTION PROFILES (DISTANCES IN FEET)	18
FIGURE 3-4. PROJECT SITE SHORELINE	19
FIGURE 3-5. CONCRETE BLOCK SEAWALL IMMEDIATELY SOUTH OF PROJECT SITE	20
FIGURE 3-6. SOIL MAP OF PROJECT AREA (<i>SOURCE: USDA WEB SOIL SURVEY</i>).....	21
FIGURE 3-7. SEASONAL RAINFALL AND TEMPERATURE PATTERNS FOR HAWAII (1981-2010).....	23
FIGURE 3-8. WIND ROSE PLOT (FREQUENCY OF OCCURRENCE) FOR HNL, 1949 TO 1995.....	24
FIGURE 3-9. PREDICTED AND MEASURED TIDES AT MOKUOLOE (JANUARY 10, 2020)	28
FIGURE 3-10. MEAN SEA LEVEL TREND, HONOLULU HARBOR, 1905 TO 2019 (NOAA, 2020).....	28
FIGURE 3-11. HAWAII LOCAL MEAN SEA LEVEL RISE PROJECTION (ADAPTED FROM NOAA 2017) 30	
FIGURE 3-12. DOMINANT DEEPWATER WAVE EXPOSURES FOR HAWAII	31
FIGURE 3-13. FORECAST CONE FOR HURRICANE DOUGLAS, 27 JULY 2020. <i>SOURCE: NOAA NWS</i> CPHC.....	33
FIGURE 3-14. KAMEHAMEHA HIGHWAY AT KAAAWA, 27 JULY 2020.....	34
FIGURE 3-15. CDIP 098 WAVE HEIGHT ROSE (AUG 2000 TO JAN 2019).....	35
FIGURE 3-16. CDIP 098 WAVE PERIOD ROSE (AUG 2000 TO JAN 2019)	36
FIGURE 3-17. CDIP 098 RETURN PERIOD 17-YR (AUG 2000 – JAN 2019)	37
FIGURE 3-18. FLOOD HAZARD MAP FOR KAAAWA BEACH PARK PARCEL.....	40
FIGURE 3-19. KAAAWA BEACH PARK OFFSHORE BENTHIC BIOLOGY (<i>SOURCE: PACIOOS VOYAGER</i>)	43
FIGURE 3-20. HAWAIIAN MONK SEAL CRITICAL HABITAT AREA14, OAHU	46

LIST OF TABLES

TABLE 3-1. AVERAGE MONTHLY TEMPERATURE, RAINFALL, AND HUMIDITY AT HNL	22
TABLE 3-2. ANNUAL MAXIMUM 2-MINUTE WIND SPEED, RECORDED AT HNL.....	25
TABLE 3-3. EXTREME VALUE DISTRIBUTION FOR MAXIMUM WIND SPEEDS AT HNL (1969-2012) .	25
TABLE 3-4. WATER LEVEL DATA FOR MOKUOLOE, STATION 1612480 (NOAA)	27
TABLE 3-5. GLOBAL MEAN SEA LEVEL RISE SCENARIOS (NOAA, 2017)	29
TABLE 3-6. HAWAII LOCAL MEAN SEAL LEVEL RISE SCENARIOS (ADAPTED FROM NOAA, 2017) ..	29
TABLE 3-7. WAVE HEIGHT PERCENT FREQUENCY OF OCCURRENCE (AUG 2000 TO JAN 2019)	35

TABLE 3-8. WAVE PERIOD PERCENT FREQUENCY OF OCCURRENCE (AUG 2000 TO JAN 2019)	36
TABLE 3-9. RETURN PERIOD SIGNIFICANT WAVE HEIGHTS AT CDIP 098	38
TABLE 3-10. LIST OF ENDANGERED BIRDS LISTED FOR KAAAWA BEACH PARK AREA.....	48
TABLE 3-11. AVERAGE VALUES FOR PARAMETERS AT DOH CWB SITE 000179	50
TABLE 3-12. MAXIMUM PERMISSIBLE SOUND LEVELS IN DBA.....	52

APPENDICES

- A. BASELINE ASSESSMENT OF MARINE WATER CHEMISTRY AND BIOTIC COMMUNITIES
- B. BEST MANAGEMENT PRACTICES PLAN
- C. DRAFT EA COMMENTS AND RESPONSES

CONTENT CHECKLIST

The Draft EA, at a minimum, shall contain the following information as required by Hawaii Administrative Rules (HAR) Chapter 11-200.1-18.

HAR Section	Requirement	DEA Chapters/Sections
(d) (1)	Identification of the applicant	Project Summary
(d) (2)	Identification of the approving agency	Project Summary
(d) (3)	List of required permits and approvals	Project Summary / Section 1.7
(d) (3)	Approvals which necessitate environmental review	Section 1.7
(d) (4)	Identification of agency/community consultation	Section 6.1
(d) (5)	General description of the action's characteristics	Chapter 2
(d) (6)	Description of the affected environment	Chapter 3 / Appendix A
(d) (7)	Description of impacts and alternatives considered	Section 1.6 / Chapter 3
(d) (8)	Proposed mitigation measures	Appendix B
(d) (9)	Approving agency anticipated determination	Chapter 5
(d) (10)	Written comments and responses	To be determined

1. INTRODUCTION

The community of Kaaawa is located on a narrow strip of coastal plain between the steep Koolau mountains and the Pacific Ocean, on Oahu's northeast windward coastline. The approximately 1.9-mile-long intermittent sandy shoreline lies between Ka Oio Point to the south and Swanzey Beach Park to the north.

The project coastline is characterized by a wide and shallow fringing limestone reef flat stretching 1,000 to 3,000 feet offshore. The fringing reef is divided with deep channels and depressions at numerous locations with abundant sand patches. The fringing reef's shallow reef crest and reef flat protect the shoreline from direct wave action in many locations. During typical conditions, wave breaking over the shallow depths of the reef significantly reduces wave energy reaching the shoreline compared to the deep-water environment. Some energy does still reach the shore, particularly at higher water levels or periods of elevated surf. Nearshore currents are relatively persistent in Kaaawa, even during seemingly quiescent periods, but their intensity increases from low to high with increased wave heights.

The Kaaawa shoreline is shaped by its distinct geography and its interaction over the millennia with the prevailing trade wind-generated waves. These waves experience significant refraction and diffraction past the deeper outer reefs and again over the shallower fringing reefs, resulting in a very complex nearshore wave pattern. The Kaaawa Valley Stream, along with other smaller perennial streams, bisect the local shoreline in multiple places. The Kaaawa Stream, in particular, creates a large cobblestone alluvial apron at the shoreline, which functions much like a breakwater in stabilizing and accreting significant beach width at this location.

Oahu "Shoreline Study Erosion Maps" developed by the University of Hawaii's Coastal Geology Group indicate the shoreline in the project vicinity to be persistently and chronically eroding with an estimated long-term shoreline recession rate of 0.5 – 1 foot per year. Nearly 50 years ago, in 1975, a joint Army Corps of Engineers and City and County beach nourishment project placed 9,300 cubic yards of sand along this shoreline. However, no follow-on replenishment has been accomplished since that time. Following the recent renovation of the nearby Kaaawa Beach Park comfort station, erosion threatened the refurbished structure, and it was then protected by a grouted rock revetment.

1.1 Project Location and General Description

The project site is an approximately 450-foot length of roadside shoreline along Hawaii State Route 83 (HI-83), known as Kamehameha Highway. Kamehameha Highway extends from Kaneohe, near the east end of the island, and runs along the northeast (windward) coast up to and around Kahuku Point in the north. It then turns back west to the town of Haleiwa. It is the only highway connecting the coastal communities of Kaneohe, Kahaluu, Kaaawa, Punaluu, Hauula, and Laie, and is the primary access for police, fire, and emergency medical services. The Hawaii Department of Transportation-Highways Division (HDOT-H) records the Annual Average Daily Traffic count as 13,000 vehicles per day. Many portions of the highway directly follow the coastline and are within feet of the water line in places and only a few feet above it in other places. Coastal erosion and shoreline recession are an increasing threat to the highway. The project site is located on the makai side of the highway, in the community of Kaaawa, and is located directly seaward of Kaaawa Elementary School.

The specific area of interest is located between Kaaawa Beach Park to the north and a concrete seawall made from horizontal square piles fronting Kaaawa Elementary School to the south. The project site's shoreline is a narrow strand of sandy beach, with the mean higher high water (MHHW) waterline located between 25 to 70 feet seaward from the edge of the roadway. To the north of the site, at Kaaawa Beach Park, the highway is increasingly further from the shoreline, while to the south of the site, the shoreline is partially protected by the seawall. The project's location and vicinity are shown on Figure 1-1 and Figure 1-2.



Figure 1-1. Project location map

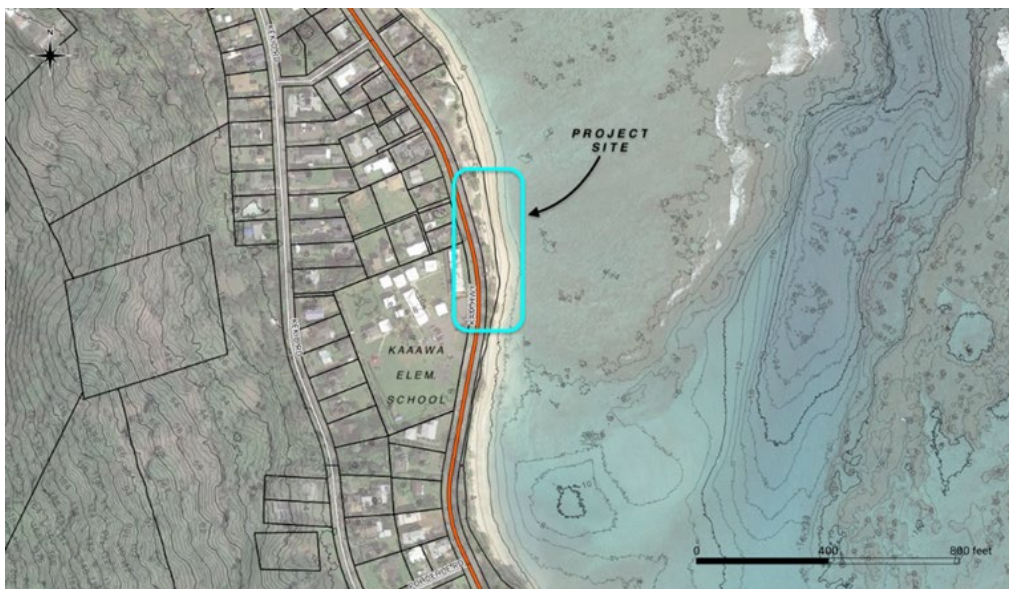


Figure 1-2. Project vicinity map

1.2 Site Condition

A project site investigation, which included a detailed inspection of the shoreline's existing condition was completed at the start of the project design effort in February 2021. A project site map is presented in Figure 1-3, and the existing shoreline condition is illustrated in Figure 1-4. A general summary of the existing conditions, as observed in early January 2021, is provided below.

- The shoulder and road deck elevation varies between +7 and +8 feet above mean sea level (MSL). The elevation of the nearshore fringing reef flat, where the end of the sandy beach slope intersects the underlying flat hard bottom, is approximately -3 feet MSL. The maximum vertical relief of the project site is approximately 10 ft.
- A series of large stones have been placed in discrete areas along the shoreline, as temporary measures to mitigate advancing erosion and protect the highway. Separate areas of low-strength concrete surfacing were also constructed between the highway's asphaltic pavement and the boulders to tie-in and stabilize the road shoulder. The sand, earth, and gravel materials forming the embankment are being eroded away, and the stone slope has settled significantly with many units displaced seaward. The existing stones are no longer effective at providing erosion protection.
- The roadside embankment and road shoulder are severely undermined, with void spaces extending up to approximately 10 feet under the concrete shoulder slab. The result has been destabilized concrete slabs on the road shoulder, which have cracked, tilted, separated, and displaced seaward. These failed concrete slabs are in the process of sliding onto the beach or into the water itself. If or when this occurs, it would reveal a vertical earthen embankment or scarp immediately seaward of the road. It is expected that rapid undermining of the highway's paved lanes of travel would then begin.
- There is a narrow low-lying strand of sandy beach along most of the shore at this location, which is often submerged at high tide. Due to the limited beach area fronting the project site, there is minimal natural protection against wave action on the shore, increasing the potential for further erosion.
- There are a number of severely undermined mature coconut trees and three *milo* trees growing along the shoreline, which will likely need removal prior to construction of any erosion control measure.

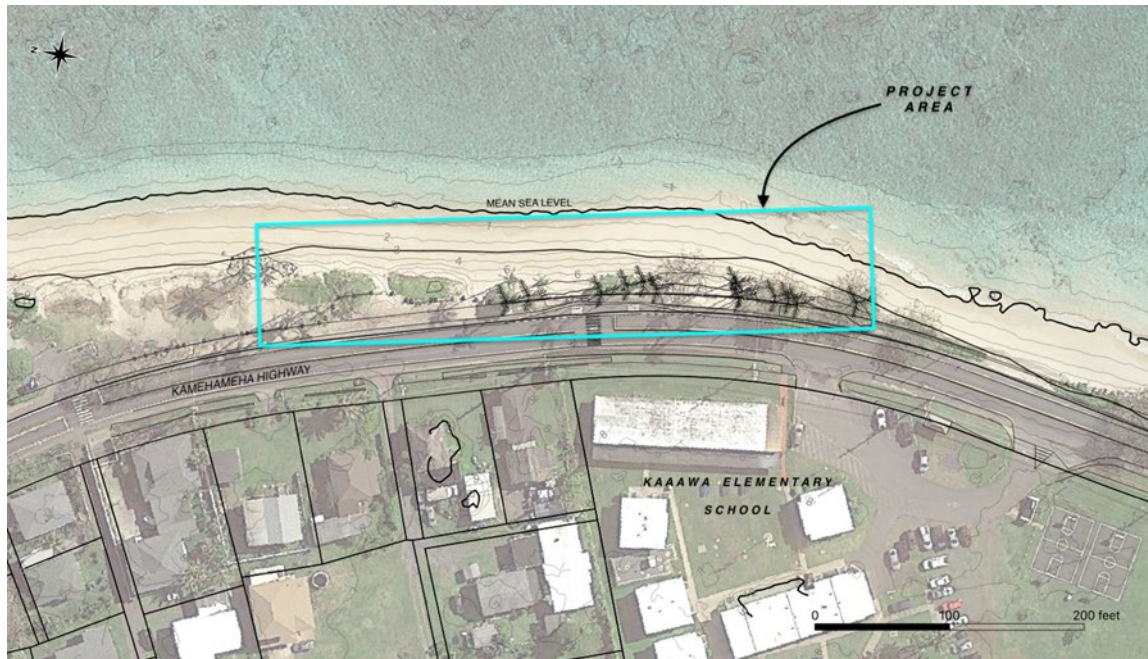


Figure 1-3. Project site map



Figure 1-4. Existing highway shoulder condition

1.3 Previous Shore Protection Measures

The shoreline in the project vicinity has been armored previously both north and south of the project site, and this armoring has typically been to protect the highway in response to an emergency situation. The existing shore protection measures at the project site are temporary in nature, and not engineered with respect to the required ocean engineering design conditions.

1.4 Purpose and Need

The intent of this project is to provide much needed erosion mitigation along the shoreline for a limited stretch of Kamehameha Highway. Kamehameha Highway extends from Kaneohe near the east end of the island along the northeast (Windward) coast to the North Shore town of Haleiwa. It is the only highway connecting the coastal communities of Kaneohe, Kahaluu, Kaaawa, Punaluu, Hauula, Laie, and Kahuku. The HDOT records the Annual Average Daily Vehicle Traffic count as 13,000 vehicles. It is the primary access for police, fire, and emergency medical vehicles. If the ongoing erosion forces closure of the highway at the project site all vehicles would have to detour through narrow backshore residential streets to bypass the closure, including trucks, busses, emergency vehicles, and commuters going to work. The proposed project would eliminate this possible significant impact on transportation in Kaaawa.

The project purpose is limited and focused on providing near to mid-term protection for a limited section of highway in the most effective and efficient manner possible. It is not, for instance, a response to possible future sea level rise.

The project's approximate design life is 25 years, which is considered to be a short-term to a medium-term solution with respect to typical infrastructure lifespans. Global climate change and sea level rise are affecting Hawaii's coastlines—from now into the future—and will necessitate long-term planning for the future, which may entail significant changes from current coastal land use and activities.

1.5 Summary Description of the Proposed Action

The proposed action is to construct an engineered rock revetment along the 450-foot length of the threatened project shoreline. The most common method of construction is to place layered riprap, sized according to the design wave height and other oceanographic design criteria, on top of a scour-reducing geotextile filter fabric. The goal of this design is to prevent progressive erosion and scour from undermining and destabilizing the northbound lane of Kamehameha Hwy. Porous rock revetments absorb a significant fraction of incoming wave energy and would prevent the downward motion of reflected wave energy from the currently vertical erosion scarp. This downward motion of reflected wave energy results in scour of the natural sediment at the base of the scarp.

The proposed revetment section is shown in Figure 1-5. The armor stone units would be basalt rock, with a median armor stone weight of 1,735 lbs and size range of 1,300 to 2,200 lbs, placed over 130 to 220 lb underlayer stone and geotextile filter fabric. The design crest elevation is +8 ft MSL, equivalent to the highway elevation, with a width of 10 ft, and a front slope of 1:1.5 (vertical-to-horizontal). A rock toe scour apron extends another 4.4 ft seaward. The horizontal footprint and general layout of the proposed revetment are illustrated in the plan view presented in Figure 1-6. In its completed form, the new revetment will be approximately 22 feet wide as measured

from the landward edge of the crest across to the seaward edge of the toe, and with a length of approximately 450 feet measured end to end.

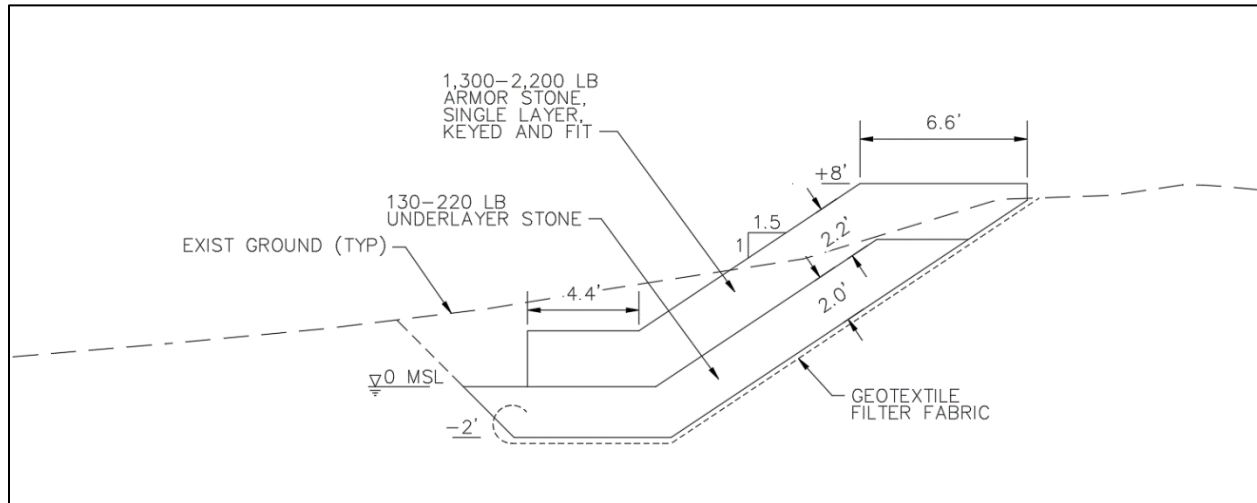


Figure 1-5. Rock revetment, typical section

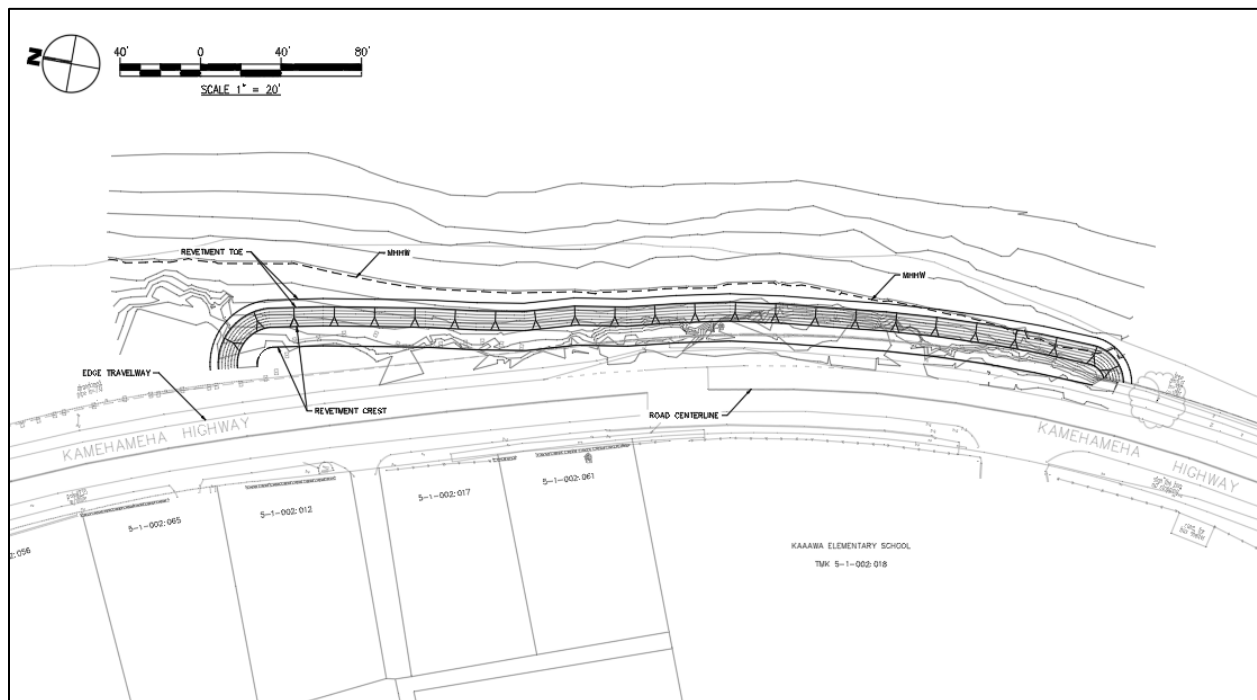


Figure 1-6. Rock revetment, plan view

Kamehameha Highway's paved shoulder is narrow at this location, and construction access is relatively limited. For this reason, closure of the northbound lane (makai side) will be required during active construction activities. There is a small open area at the south end of Kaaawa Beach Park, which would be the primary staging area. Revetment construction will be initiated from this area and proceed to the south. Construction will proceed incrementally in approximately 25-foot units with clearing, excavating, filling, grading, stockpiling of salvaged material (existing stone to

be incorporated into the revetment), slope preparation, geotextile filter fabric installation, underlayer stone placement, and finally armor layer stone placement. Underlayer stone placement will not advance more than 25 feet ahead of armor stone placement in case of an unforeseen increase in potentially damaging wave action. Excavated beach sand will be cast to the side on the beach above the MHHW water line (+1.1 ft MSL) to the north (updrift) side of the advancing revetment construction.

1.6 Alternatives Considered

1.6.1 No-Action

The no-action alternative comprises leaving the cracked and displaced concrete shoulder slabs, along with the slumped and scattered riprap, in place and as is, with no additional construction elements or actions. This condition is expected to result in continued erosion of the underlying and now exposed earthen embankment, the progressive undermining of the road shoulder, and the development and expansion of new void spaces beneath the pavement of the northbound lane of travel. Without appropriate erosion mitigation, Kamehameha Highway will likely become fully undermined, rendering it unusable until repair can be accomplished. This would result in significant disruption of a major transportation corridor, leaving residents and visitors without the primary access for critical services.

1.6.2 Highway Relocation

At the project site, Kamehameha Highway is immediately adjacent to Kaaawa Elementary School and a densely developed private residential property neighborhood. Residential streets which parallel the highway are very narrow and not designed for heavy vehicles such as trucks and busses that regularly transit the highway. Landward of the narrow strip of residential areas, the ground rises steeply into a conservation district with dense rainforest growth on the rugged coastal Koolau mountains. Highway relocation would require extensive alteration and grading, requiring a large amount of private land acquisition in order for highway bypass construction to proceed. Highway relocation is not considered practical or even feasible as an alternative for the 400-foot-long shoreline problem area.

1.6.3 Protective Beach

Constructing or nourishing a protective beach by placing suitable sand in an appropriately designed manner along a shoreline can be an effective and attractive means of mitigating beach loss, protecting against shoreline recession, protecting the backshore area, and providing for recreational and aesthetic enjoyment. Beach nourishment, however, requires a source of suitable beach quality sand and sufficient quantity to meet the needs of the project. Chronically eroding shorelines would require extensive regular nourishment in order to maintain the effectiveness of the beach for shore protection. The project site is a chronically eroding shoreline, and a previous attempt to simply place sand along the shore was not successful. The project shoreline is exposed to significant wave energy and wave driven longshore currents flowing north to south, which would quickly remove additional sand placed at the project site. Thus structures, such as groins, would be necessary to stabilize the beach fill. A groin is a shore perpendicular structure designed to prevent longshore transport of sand and slow sand movement and erosion of a beach. Groins can be used to trap sand and build a protective beach where there is significant longshore sand volume available and effects on the downdrift shoreline are not considered to be a concern. A series of groins is typically utilized when the shoreline reach is long. The sand resource in the

project vicinity is very limited, and outside sources of suitable beach sand are also very limited, which greatly constrains the implementation of a protective beach. Given the limited project purpose - to protect the highway in the most effective, efficient, and least impactful manner - and the short 400-foot-long project reach, construction of a large-scale stable protective beach is considered beyond the project scope.

1.6.4 Alternative Revetment Material

ElcoRock sand-filled geotextile containers were considered as an alternative means of revetment construction (refer to <https://www.geofabrics.co/products/elcorock>). ElcoRock is a proprietary coastal construction system utilizing robust geotextile containers designed to be filled on site with sand and then placed to form a stable and durable structure. Large 2.5m³ containers would be proposed for use, each weighing approximately 10,000 pounds, which will provide a very stable structure for the project site wave conditions. The large textile containers are also efficient to install and remove. The non-woven geotextile fabric is promoted as UV and vandal resistant, has excellent abrasion resistance, and its soft finish is attractive and non-abrasive. The ElcoRock filled dimensions are approximately 6ft by 8ft by 2ft high. However, ElcoRock nominal life span is about 10 years in the tropical sun and seawater environment and thus may not provide erosion protection for the 25-year design life project objective.

1.7 Required Federal and State Approvals, and Applicable Regulatory Requirements

1.7.1 Required Federal Approvals

Department of the Army (DA) permits are issued by the U.S. Army Corps of Engineers (COE) pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344). All work or structures in or affecting the course, condition, location, or capacity of navigable waters, including tidal wetlands, require DA authorization pursuant to Section 10. In addition, activities involving the discharge of dredged or fill material into waters of the United States requires a DA permit pursuant to Section 404. As the proposed project will be partially constructed in navigable waters of the U.S., it is expected to require a DA permit issued pursuant to Section 10 and Section 404. A DA Nationwide Permit #3 (Maintenance) for the project was issued on November 23, 2021.

1.7.2 Required State of Hawaii Approvals

The proposed project will require preparation of a Draft Environmental Assessment (DEA) and Final Environmental Assessment (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 200.1, 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 Transportation, the project is then allowed to 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).

1.7.3 City and County of Honolulu Regulatory Requirements

1.7.3.1 Special Management Area (ROH Chapter 25)

The Special Management Area (SMA) extends inland from the shoreline, and special controls are placed on development in the SMA to protect valuable coastal zone resources. The “shoreline” is defined as *the upper reaches of the wash of the waves, other than storm and tidal waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edges of vegetation growth or the upper limits of debris left by the wash of the waves* (ROH Chapter 25). A “certified shoreline” is one approved by the State Board of Land and Natural Resources. There is no current certified shoreline for the project area. During the winter north swell season the shoreline and highway are occasionally overtopped and flood the highway and deposit wave tossed debris on the road. Based on this it seems likely that a certified shoreline would be located on the landward side of the highway.

“Development” is defined uses, activities or operations on land, or in the water, within the SMA, other than excluded uses. ROH Chapter 25-1.3 “Development” (2) (B) does not include *Repair or Maintenance of roads and highways within existing rights-of way*.

Based on the above the project is not considered to be in the Special Management Area.

1.7.3.2 Shoreline Setback (ROH Chapter 23)

The shoreline setback area is located between the “shoreline” and the shoreline setback line, typically a distance of 40 feet inland. Construction within the shoreline setback area, other than relatively minor specific activities, requires a Shoreline Setback Variance (SSV). Given that the project is not considered to be landward of the shoreline, and thus not in the shoreline setback area, as discussed in Section 1.7.3.1 above, a SSV is not applicable.

1.7.3.3 Mayor’s Directive No. 18-2

The Mayor’s Directive No. 18-2, issued July 16, 2018, pertains to minimizing risks and adapting to sea level rise in accordance with the findings and recommendations of the City and County Climate Change Commission adopted on June 5, 2018. Based on the discussion in Section 1.7.3.1 the project is located seaward of City and County jurisdiction and completely in State jurisdiction. The State of Hawaii *Sea Level Rise Vulnerability and Adaptation Report (2017)* includes “Protection” as an adaptation strategy, and protection is considered the best strategy for the needs and purposes of this project. The project is designed for an approximate 25 year life and does include provisions for an estimated sea level rise by the year 2050 (1.7 feet).

1.7.4 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:

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

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

- 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.);
Executive Order (EO) 13089, Coral Reef Protection (63 FR 32701)

1.7.5 Property Information

The proposed revetment structure is planned for construction on a section of property listed by the City & County of Honolulu's (C&C) Department of Planning & Permitting (DPP) as 51-329 Kamehameha Highway, or otherwise known as Kaaawa Beach Park. The parcel's current tax map key (TMK) is 5-1-02:25, and is listed as having a building value of \$32,300 and a land value of \$45,000 for the 2-acre beachfront lot, owned by the C&C. The parcel is zoned as P-1, which is a restricted preservation zone, and lies in Federal Emergency Management Agency (FEMA) flood designation zones AE/VE, subject to the 100-year coastal flood condition and velocity hazard.

1.7.6 Regulatory Shoreline

There is no current shoreline certification for the project area. During the winter north swell season the shoreline and highway are occasionally overtopped by wave runup, and flood the highway and leave wave tossed debris on the road. Based on the definition of "shoreline" in HRS 205A-1, *the upper reaches of the wash of the waves...at high tide during the season of the year in which the highest wash of the waves occurs...*, it seems likely that the certified shoreline would be located on the landward side of the highway. The project is located entirely on State Land, portions of which are under the jurisdiction of HDOT-Highways (HDOT) as a Right-of-Way, and the jurisdiction of the City and County of Honolulu, Department of Parks and Recreation (DPR) as Kaaawa Beach Park. State and C&C agencies having land or permitting jurisdiction are being consulted and coordinated with, and all pertinent agencies having jurisdiction will have to concur in the project. Thus a formal current Shoreline Certification, which is typically used to delineate respective State and C&C jurisdiction, is not considered necessary. Portions of the project are in both State and C&C jurisdictions.

1.8 Decision to be Made

The U.S. Army Corps of Engineers, Honolulu District, and the State of Hawaii Department of Land and Natural Resources, 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. A Department of the Army Nationwide Permit #3 (Maintenance) was issued by the USACE Honolulu District on November 23, 2021.

2. DETAILED DESCRIPTION OF THE PROPOSED ACTION

The proposed action entails the construction of a permeable rock revetment constructed along a stretch of the highly eroded shoreline road shoulder. The erosion mitigation structure would extend for a length of approximately 450 ft, adjacent to the south end of Kaaawa Beach Park along the ocean (makai) side of Kamehameha Highway.

2.1 General Description of Riprap Revetment

A revetment is a sloping uncemented structure built of wave-resistant material. The most common method of revetment construction is to place an armor layer of stone, sized according to the design wave height, over an under-layer and filter designed to distribute the weight of the armor layer and to prevent loss of fine material through voids between stones. An important aspect of revetment design (or any type of structure) on a sandy shoreline is to prevent scour around the toe which could result in collapse and failure of the structure. Toe scour protection can be provided by excavating to place the toe on a solid substrate where possible, constructing the foundation below the maximum depth of anticipated scour, or extending the toe to provide a scour apron of excess stone. Properly designed and constructed rock revetments are durable, flexible, and highly resistant to wave damage. Damage from large waves is typically not catastrophic, and the revetment can still function effectively even if damage occurs. The rough and porous surface and flatter slope absorbs and dissipates wave energy, thus reducing wave reflection, run-up, and overtopping.

2.2 Rock Revetment Design

The revetment design follows the guidelines provided by the US Army Corps of Engineers (USACE) *Coastal Engineering Manual* (2006) and EM 1110-2-1614, *Design of Coastal Revetments, Seawalls, and Bulkheads*.

A site-specific wave modeling analysis has shown a near-structure wave height of 4.2 feet at the shoreline resulting from a 25-year return period deepwater wave offshore and a 5-foot water level rise (MHHW tide, +1.7' nearshore wave setup, +0.5' sea level anomaly, +1.7' future sea level rise).

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

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

where,

W_{50} = median weight in pounds of an individual armor stone

w_r = unit weight of the stone (160 lb/ft³)

H = wave height (4.2 ft)

K_r = stone stability coefficient (1.35, single layer keyed and fit)

S_r = specific gravity of the stone relative to seawater (2.5)

$\cot \theta$ = cotangent of the revetment face slope (1.5)

The resultant median armor stone weight is 1,735 lbs, and the allowable size range is 1,300 to 2,200 lbs.

The armor layer thickness, $T = 3.8$ feet, is determined from:

$$T = (W_{50} / w_r)^{1/3} \times 2$$

Underlayer - Underlayer stone size will be one-tenth of the armor stone weight, or 130 to 220 lbs.

The underlayer thickness, $T, = (W_{50} / w_r)^{1/3} \times 2 = 2$ feet.

The underlayer shall be placed over geotextile filter fabric.

Crest and Toe - The design revetment crest elevation is +8 feet which is the same elevation as the roadway and shoulder. The estimated runup elevation based on the XBeach-NH results and EurOtop empirical formula is +13.4 feet during the design water level and wave conditions. Thus, the revetment can be expected to significantly overtop, and, given the slightly lower ground elevation landward of the roadway, water would flow inland toward the school. A revetment crest width of 10 feet will help dissipate the overtopping water to a certain degree. However, given the significant wave overtopping during design, and even high prevailing, wave conditions, a scour resistant surface for the highway shoulder and drainage should be considered.

The sand beach at the revetment location will be excavated to place the toe at the -2-foot elevation, the approximate elevation of the reef flat at the shoreline. A stone toe scour apron overlying geotextile filter fabric will be used to provide for toe stability should scour result in some settling of the toe stone. The toe apron can articulate downward as scour occurs.

The north end of the revetment will be terminated by wrapping the end around to tie it into existing ground where the highway is further inland. The south end will tie-back into the existing concrete block seawall.

The revetment plan layout and typical section are shown on Figure 2-1 and Figure 2-2. The plan layout generally follows the existing bank to minimize excavation and loss of shoulder area and maintains a minimum 10-foot-wide road shoulder.

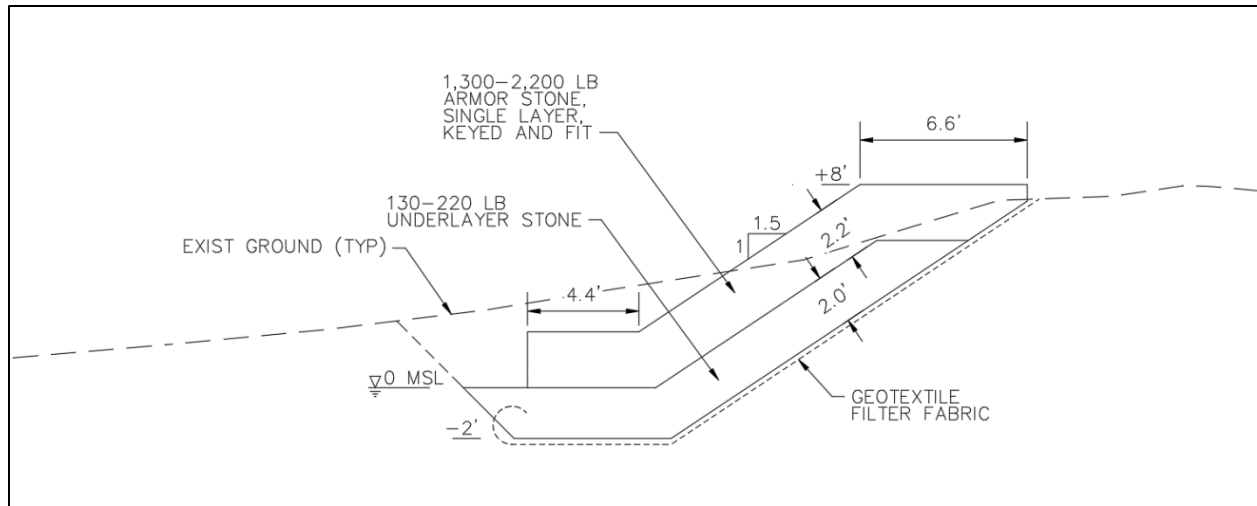


Figure 2-1. Riprap rock revetment typical section

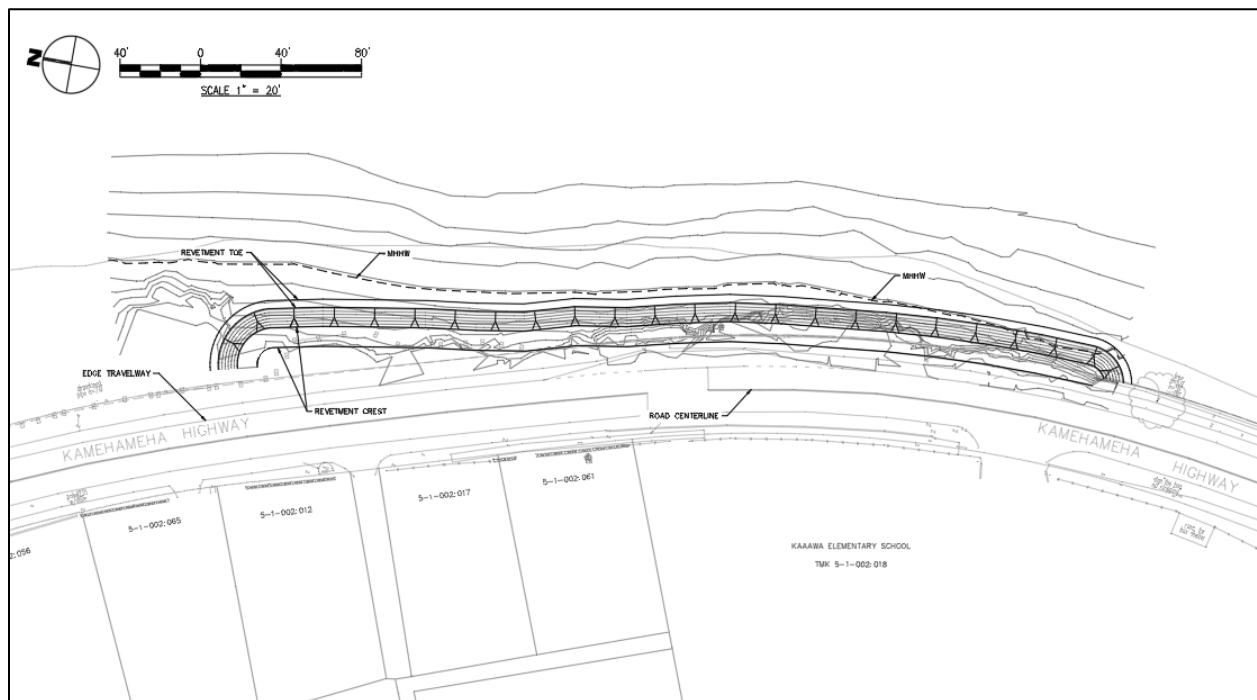


Figure 2-2. Riprap rock revetment plan view

2.3 Construction Methodology

The road shoulder is narrow at the project site, and construction access is anticipated to be limited. Closure of the northbound (makai) lane will likely be required during active construction. There is a small area at the north end of the site adjacent to Kaaawa Beach Park, which could serve as the primary staging area, and this is where construction would be initiated. Revetment construction will start at Station 0+00 and work toward Station 4+00 (Figure 2-2). Work will proceed in approximately 25 ft increments, with clearing, excavating, filling, grading, stockpiling

of salvaged material, slope preparation, geotextile filter fabric placement, underlayer stone placement, and finally armor stone placement. Underlayer or core stone placement shall not advance more than 25 feet ahead of cover stone installation in order to mitigate unforeseen environmental situations like sudden increases in nearshore wave heights or heavy rains. Excavated beach sand from the foundation and toe trench shall be stockpiled on the beach above the mean higher high-water line (+1.1 feet) to the north (updrift) side of the advancing revetment construction.

2.4 Summary of Project Costs

The estimated construction cost for the revetment is \$2,000,000.

3. ENVIRONMENTAL SETTING, POTENTIAL IMPACTS, AND MITIGATION MEASURES

3.1 Physical Setting

3.1.1 Existing Conditions

Kaaawa is situated on an approximately 500- to 1000-foot-wide coastal plain that lies between the steep windswept cliffs of the Koolau Mountains and the rough waters of the Pacific Ocean on Oahu's northeast windward coastline. The nearly two-mile-long intermittently sandy shoreline runs from Ka Oio Point to the south (back gate of Kualoa Ranch) and Swanzy Beach Park to the north just before Kahana Bay.

The project coastline is characterized by a wide and shallow fringing limestone reef flat stretching 1,000 to 3,000 feet offshore. The fringing reef is divided with deep channels and depressions at numerous locations with abundant sand patches. The fringing reef's shallow crest and broad profile typically provide significant protection to the shoreline from direct wave action.

The windward coastline of northeast Oahu (Koolauloa) is generally oriented along an axis that runs from southeast to northwest. However, at the project vicinity in Kaaawa, the shoreline veers more to a north-south orientation. The roughly 600-ft wide coastal plain at the project site is populated with a medium-density rural community with a mixture of private homes, farm and ranch land, and an elementary school. The two-laned primary roadway Kamehameha Highway dominates the eastern (makai) boundary of this strip of land, with houses seaward of the highway only in limited locations.

3.1.1.1 Topography and Bathymetry

The Kaaawa shoreline terrain is shaped by its distinct geography and its interaction over the millennia with the prevailing trade wind-generated waves and the perennial streams that cut through the backshore valleys. The dominant trade wind waves experience significant refraction and diffraction past the deeper outer reefs and again over the shallower fringing reefs resulting in a very complex nearshore wave pattern that has helped sculpt the nearshore environment and beach shape. The Kaaawa Valley Stream, along with other lesser perennial streams, bisect the local shoreline in multiple places. The Kaaawa Stream in particular has created a large cobblestone alluvial deposit feature at the shoreline, several hundred feet south of the project area, which functions much like a breakwater in stabilizing and accreting significant beach width at this location.

The dominant physical features defining the project's nearshore vicinity are a broad and shallow reef shelf that extends for hundreds of feet offshore, which is interrupted by a deep channel that bisects the fringing reef shelf along a roughly north-south axis. The channel lies to the south and offshore of the project site as shown in the topographic/bathymetric map provided in Figure 3-1. This figure has an aerial image overlaid with elevation contours at a two-foot interval highlighted bold every ten feet. All elevations are referenced to mean sea level (MSL). The topographic data is based on a 2013 light detection and ranging (LiDAR) survey conducted by the US Army Corps of Engineers. In this figure, the previously mentioned cobblestone stream mouth deposit is clearly visible near the bottom center, which appears to head the deep channel that runs offshore. The cobble deposit and deep channel are in fact related, in that both features were likely created by the Kaaawa Stream—built over centuries. The cobbles would have been washed down from the valley

and surrounding mountains by the stream during periods of heavy rain and flash flooding building up the stream mouth deposit to its current form. While even further back in time (thousands of years) during periods of much lower sea levels, the now submerged deep channel was once above sea level and was an active stream channel carved out by Kaaawa Stream.



Figure 3-1. Project site topography and bathymetry contours at a 2 ft intervals (MSL)

The extensive shallow reef shelf and adjacent deep channel combine to create the prevailing nearshore circulation pattern at Kaaawa Beach, which is a steady shore-parallel current, that flows along the beach in a north-to-south direction. This longshore current is generated by the mass flow of water driven over the shallow reef by persistent, short period, breaking waves from the prevailing trade winds. This relatively vigorous current terminates south of the project site as it flows off the shallow reef and into a small, slightly deeper (8-10 ft) basin just north of the cobble stream mouth deposit. Here, the current makes a U-turn as it empties into and flows back out through the submerged Kaaawa Stream channel. Local residents and surfers report that this current does not reverse direction but merely varies in intensity by increasing in velocity with increases in the offshore wave height.

A large sand deposit, likely fed by the longshore current, is located at the terminus of the current (directly south of the project shoreline) and is a clear indication of where a large fraction of the Kaaawa Beach sand budget is accruing (see Figure 3-1, center left). Beach material lost by littoral drift from the project site will most likely end up at this location which fittingly may also have the potential to be an appropriate borrow site to nourish Kaaawa Beach sometime in the future.

Elevation profiles were cut from the nearshore bathymetry along the transects shown in Figure 3-2, which were oriented to be roughly shore perpendicular. The eight individual cross sections are provided in Figure 3-3, which show the elevation (above MSL) and distance along profile given in feet.

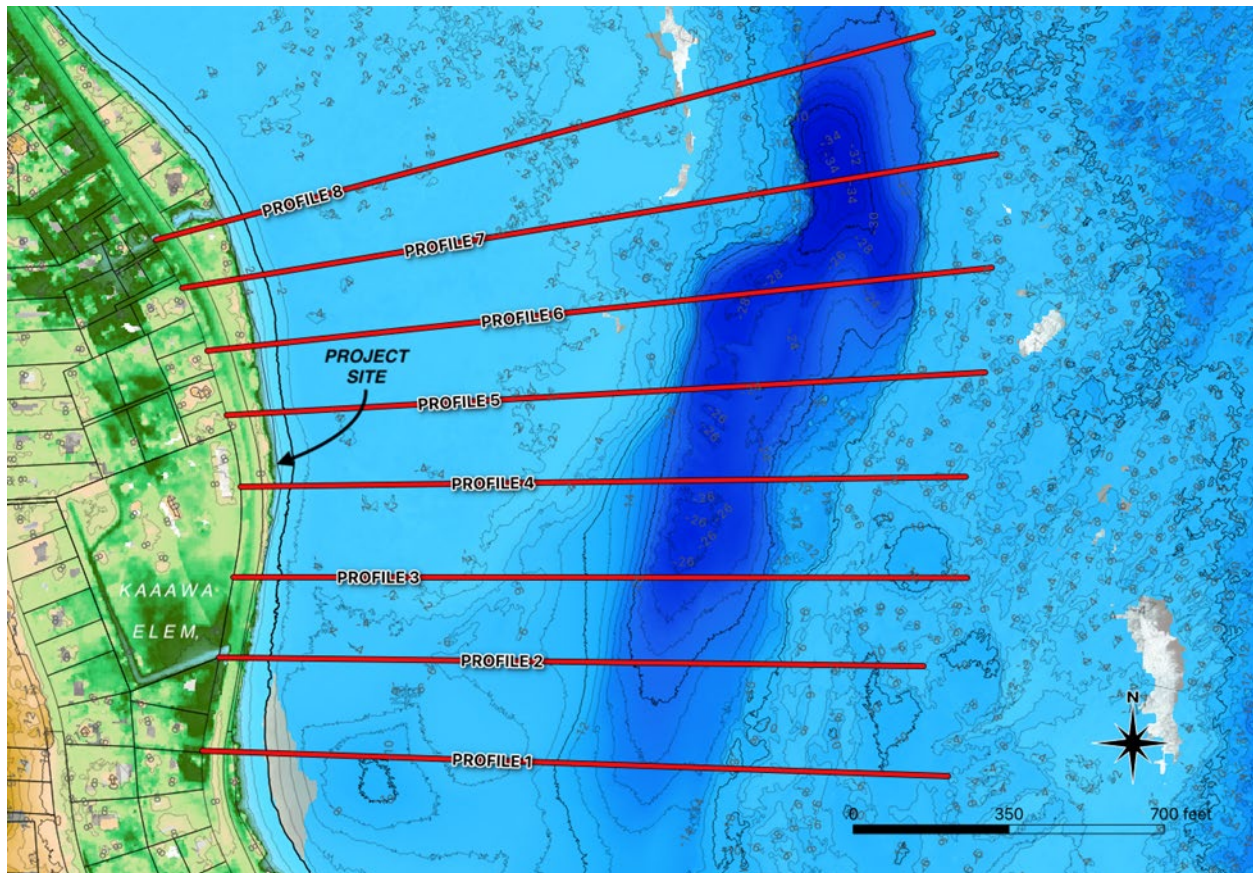


Figure 3-2. Shoreline cross section profile locations

The shoreline profiles in Figure 3-3 reveal the highway road deck at an elevation of approximately +8 feet, where it then quickly steps down to the beach at roughly +2 feet and then continues down to the submerged beach toe at approximately -2 ft. The southern two to three profiles (profile 1 to profile 3) exhibit a less extensive shelf and slightly deeper water than the remaining sections. These profiles, and profile 1 in particular, run through the transitional region between the end of the reef shelf and the start of the channel. The previously described small basin is seen at approximately the 400-ft mark on profile 1, while the peak of the sand deposit is seen at approximately 650 ft. The nearshore rim of the submerged stream channel ranges from 1,000 feet to 1,500 feet offshore and drops down to a maximum depth of nearly 35 feet, with a nominal width of approximately 200 ft.

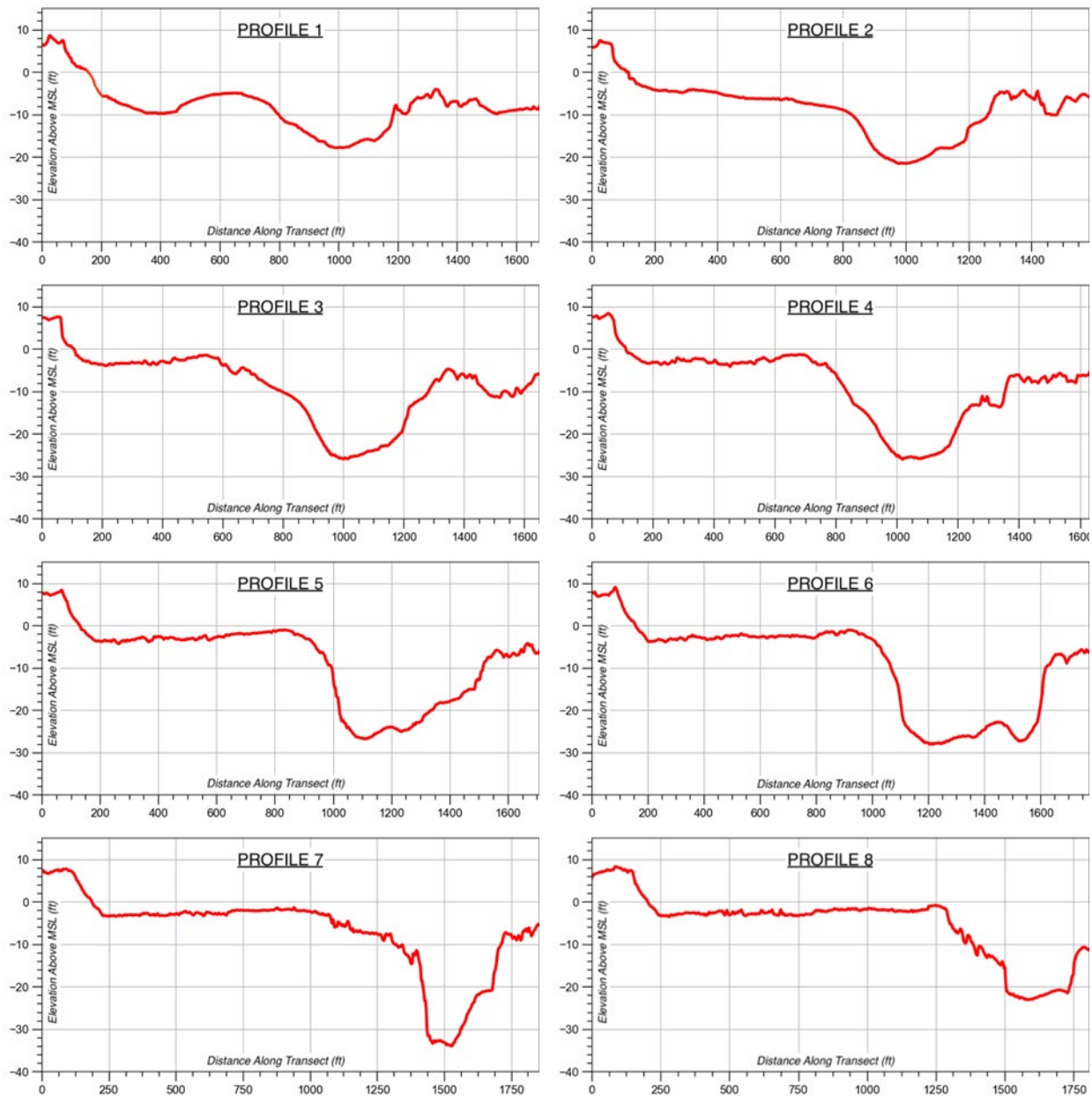


Figure 3-3. Shoreline cross section profiles (distances in feet)

3.1.1.2 Nearshore Coastal Processes

The nearshore coastal processes are primarily driven by the prevailing trade wind waves and the nearshore bathymetry. As previously stated, the extensive shallow reef shelf and adjacent deep channel combine to create the prevailing nearshore circulation pattern and longshore sand transport in the project area. There is a steady shore-parallel (longshore) current that flows along the beach in a north-to-south direction. This longshore current is generated by the mass flow of water-driven over the shallow reef by a persistent, short period, breaking waves from the prevailing trade winds. This relatively vigorous current terminates south of the project site as it flows off the shallow reef and into a small, slightly deeper (8-10 ft) basin just north of the cobble stream mouth deposit.

Here, the current makes a U-turn as it empties into and flows back out through the submerged Kaaawa Stream channel. This current does not reverse direction but simply varies in intensity by increasing in velocity with increases in the offshore wave height. This longshore current is strongest during periods of large winter season north swell wave events. The narrow strand beach along the shore varies in width seasonally and depending on the strength of the longshore current.

Oahu Shoreline Study Erosion Maps prepared by the University of Hawaii, Coastal Geology Group, show the shoreline in the project vicinity to be persistently and chronically eroding with long-term shoreline recession of 0.5 – 1 foot per year. In 1975, a joint Army Corps of Engineers and City and County beach nourishment project placed 9,300 cubic yards of sand along this shoreline. The sand did not stay long, and no re-nourishment has been accomplished since. Following the renovation of the Kaaawa Beach Park comfort station, erosion threatened the building, and it was protected by a cemented rock revetment. The project site is currently bound by the rock revetment to the north and a vertical concrete block seawall to the south.

Figure 3-4 shows the narrow beach fronting the project site, and Figure 3-5 shows the front of a vertical concrete block seawall immediately to the south (the proposed revetment will tie into this seawall).



Figure 3-4. Project site shoreline



Figure 3-5. Concrete block seawall immediately south of project site

3.1.2 Anticipated Impacts and Mitigation Measures

The proposed project will not alter the nearshore bathymetry and will not significantly alter the topography. The revetment will directly abut the existing shoreline bank and will change a near vertical eroding earthen and boulder scarp into a stable sloping porous rock face. It will not alter longshore current or longshore sand transport patterns. The porous revetment will dissipate more wave energy and be less reflective than the existing shoreline and thus may aid in retaining sand along the shoreline, particularly during high wave conditions.

3.2 Soils and Geological Conditions

3.2.1 Existing Conditions

Kaaawa, including the project site, lies on a narrow strip of relatively flat land between the ocean and the steep Koolau Mountains. A large portion of this strip of land rests on ancient beach material deposited during times of higher sea levels. This land is now capped by a stratum of organic material and clays. Soil types within the project area were identified by using data from the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS); formerly known as the Soil Conservation Service, and Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, (August 1972). As depicted in Figure 3-6, from the USDA NRCS Soils Map, the site consists of five main categories of soils. Starting from the shoreline and moving mauka, Kaaawa soils range as follows: Jaucas sand with slopes no greater than 15 percent (labeled as 2w02z); Mokuleia loam (labeled as hqh7); Waialua stony silty clay

with slopes between 3 and 8 percent (labeled as hqif); Waialua stony silty clay with slopes between 12 and 30 percent (labeled as hqig); and Rock outcrop (labeled as hqi).

Jaucas sand areas are mainly comprised of light-colored calcareous sands derived from coral and broken shell material from marine invertebrates. Inland areas are mixed-use and include residential and rural use such as farming and ranching, whereas the beach areas have no farming value. The project site lies entirely within the Jaucas sands classification.

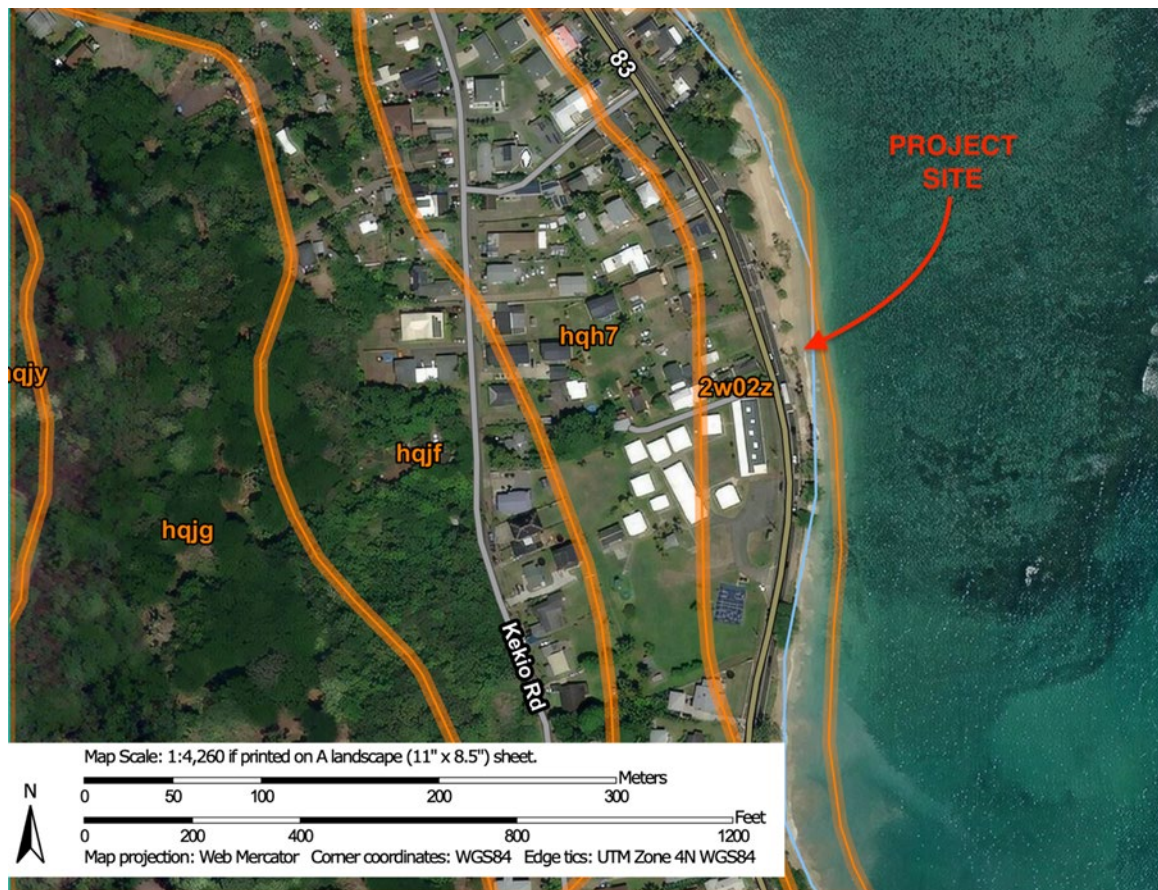


Figure 3-6. Soil map of project area (source: USDA Web Soil Survey)

3.2.2 Anticipated Impacts and Mitigation Measures

No impacts to existing soils or geological conditions are anticipated.

3.3 Climate

The Hawaiian Island chain is situated south of the large Eastern Pacific semi-permanent high-pressure cell, the dominant meteorological feature affecting air circulation in the Central Pacific basin. In the vicinity of the Hawaiian Islands, this high-pressure cell persistently produces northeasterly to east-northeasterly winds called trade winds. During the winter months, low-pressure systems and their associated cold fronts sweep across the north-central Pacific Ocean, bringing rain and stormy weather to the Hawaiian Islands, intermittently modifying the trade wind regime.

3.3.1 Temperature and Rainfall

Due to the tempering influence of the Pacific Ocean and the low-latitude tropical location of the Hawaiian Islands, the islands experience extremely small diurnal and seasonal variations in ambient temperature. Measured at Honolulu International Airport (HNL), the average temperatures in the coolest months are 72.9° Fahrenheit (F) and in the warmest months 81.4°F. The temperature variations are notably modest compared to those that occur in the mainland or the continental US. Additional temperature data from Honolulu International Airport is summarized in Table 3-1. Average monthly temperature, rainfall, and humidity at HNL.

Table 3-1. Average monthly temperature, rainfall, and humidity at HNL

Month	Normal Ambient Temperature (°F)		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).

The persistent northeast trade winds, in combination with the islands' high relief topography, evolved to become the two primary factors that influence the amount of precipitation that falls on a given location on Oahu or the rest of the Hawaiian Islands. On the windward side of Oahu, the summit areas of the Koolau mountain range that are fully exposed to the trade winds, rainfall is aided by orographic forcing, which typically averages nearly 250 inches per year (635 cm/year).

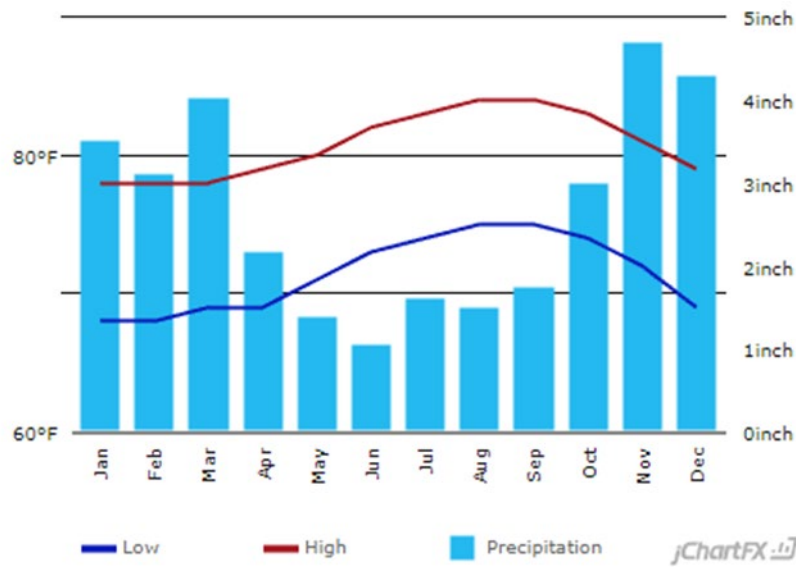


Figure 3-7. Seasonal rainfall and temperature patterns for Hawaii (1981-2010)

3.3.2 Wind

The prevailing trade winds coming from the northeast to the east-northeast blow almost directly onshore at the project area. The trade winds are typically present for approximately 80 percent of the time annually, mostly during the summer season from April to November, with nominal wind speeds of 10 to 20 mph. During the winter months, there is a general weakening of the driving meteorological features that power the trade winds, which allows for the intermittent occurrence of southerly to west-northwesterly winds (Kona winds). These sporadic spells of south and west winds are due to local low-pressure systems and their associated frontal boundaries passing near or through the islands. A wind rose plot of wind measurements at Honolulu International Airport are shown in Figure 3-8

A table of annual maximum wind speeds is summarized in Table 3-2. Annual maximum 2-minute wind speed, recorded at HNL, with values expressed as 2-minute averaged wind speeds, measured at Honolulu International Airport (HNL) for the 44-year period from 1969 to 2012, ordered by descending wind speed. Some of the annual maxima shown are associated with specific storm events. The highest value of 46 miles per hour, recorded in November of 1982, occurred during the passage of Hurricane Iwa. Other events include Hurricane Iniki in 1992 at 38 miles per hour, and several intense Kona (low-pressure) storms with wind speeds up to 40 miles per hour.

An extreme value distribution was applied to the 44 annual maximum 2-minute averaged wind speed records to develop expected extreme wind speeds for various return periods ranging from 1 to 100 years. The extreme value wind speeds are presented in Table 3-3. The maximum 2-minute averaged wind listed in Table 3-2 (46 mph) is equivalent to the 50-year wind speed from Table 3-3.

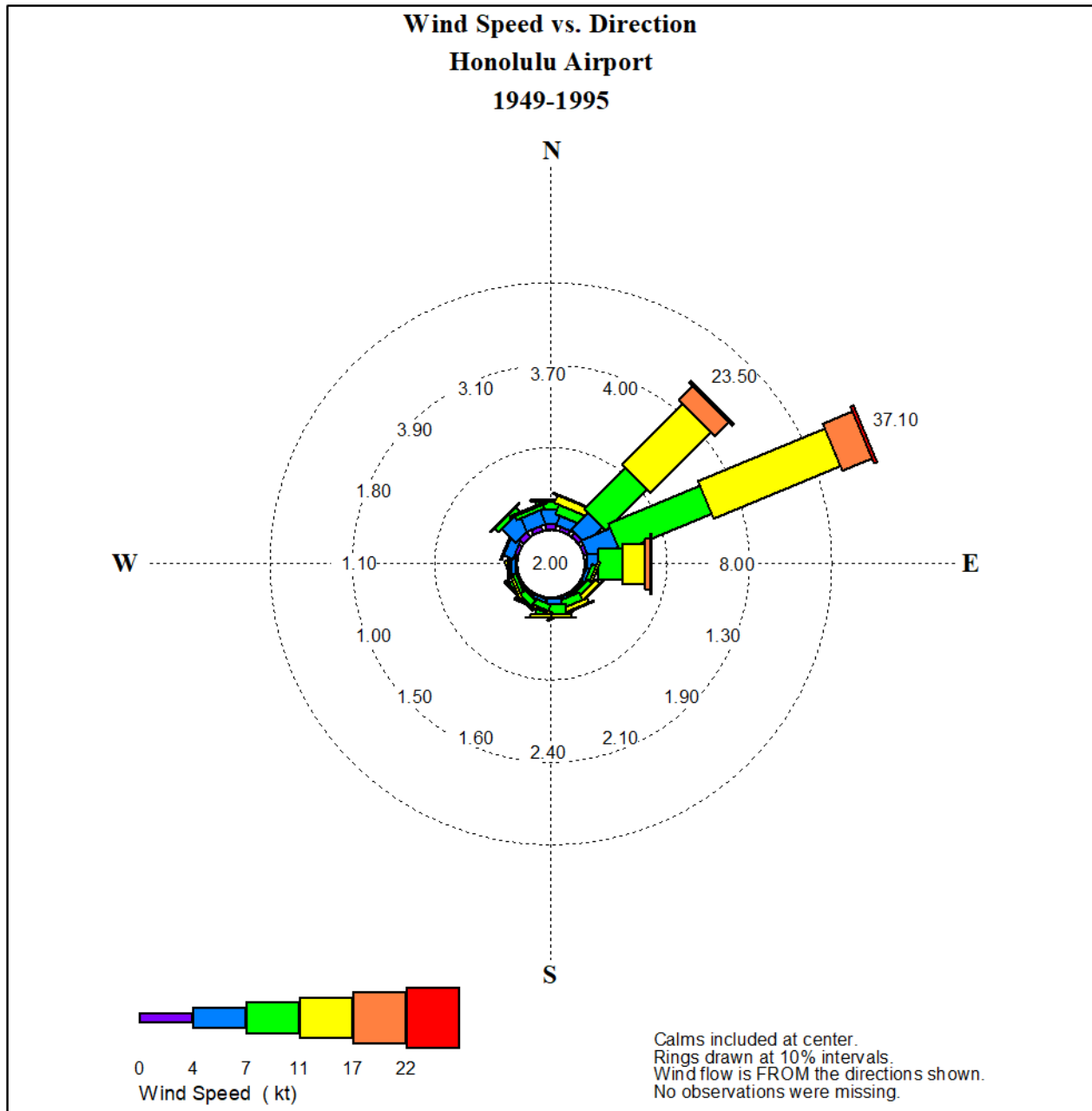


Figure 3-8. Wind rose plot (frequency of occurrence) for HNL, 1949 to 1995

Table 3-2. Annual maximum 2-minute wind speed, recorded at HNL

Year	Wind Speed (MPH)	Year	Wind Speed (MPH)
1982	46	1972	33
1969	40	1973	33
1970	40	1993	33
2004	40	1999	33
2007	39	2010	33
2011	39	1997	32
1976	38	2003	32
1992	38	2005	32
1977	37	1994	31
2008	37	2006	31
1975	36	1981	30
2002	36	1985	30
1980	35	1986	30
1990	35	1989	30
2000	35	2012	30
2001	35	1987	29
2009	35	1988	29
1971	34	1984	28
1974	34	1991	28
1978	34	1995	28
1979	34	1996	28
1998	34	1983	23

Table 3-3. Extreme value distribution for maximum wind speeds at HNL (1969-2012)

Return Period (years)	Wind Speed (MPH)
1	33.3
2	35.6
5	38.7
7	39.8
10	41.0
15	42.3
20	43.3
25	44.0
30	44.6
40	45.6
50	46.3
75	47.7
100	48.6

3.3.3 Air Quality

The U.S. Environmental Protection Agency (EPA) 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 PM₁₀), and airborne lead. These ambient air quality standards establish the maximum concentrations of pollution considered acceptable, with an adequate margin of safety, to protect public health and welfare. The State of Hawaii has additionally adopted ambient air quality standards for some pollutants. In some cases, the State requirements are more stringent than the Federal standards. At present, the State of Hawaii has set standards for five of the six criteria pollutants (excluding PM_{2.5}) in addition to hydrogen sulfide (DOH, 2003).

Air quality in the Islands is generally acknowledged as quite good due in part to the state's location in the middle of the Pacific Ocean, far away from any major sources of pollution. Air quality in the vicinity of the project site is typically excellent due to the steady and persistent onshore trade winds, which bring ashore clean air from the open ocean as well as quickly evacuating airborne pollutants. The State of Hawaii Department of Health (DOH) monitors ambient air quality on the island of Oahu using a system comprised of nine monitoring stations. The primary purpose of the monitoring network is to measure ambient air concentrations of the six criteria NAAQS pollutants. DOH monitoring data for the year 2008 show that air quality in the area during this year never exceeded the short-term or long-term State or National standards for the six pollutants measured [particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and hydrogen sulfide (H₂S)]. The Department of Health's only ozone monitoring station on Oahu is located on Sand Island. Existing ozone concentrations at that location also meet State and Federal ambient air quality standards.

3.3.4 Anticipated Impacts and Mitigation Measures

No impacts to the existing climate are anticipated.

3.4 Oceanographic Conditions

3.4.1 Water Level

The water level at the shoreline during typical prevailing conditions is comprised of the astronomical tide and typically occurring sea level anomalies. During high surf conditions, nearshore breaking waves can result in an increased water level at the shoreline (wave setup). Presently occurring climate change and related sea level rise is a factor that will greatly affect water levels in the future.

3.4.1.1 Astronomical Tides

Hawaii tides are semi-diurnal with pronounced diurnal inequalities (i.e., two high and low tides each 24-hour period with different elevations). Variation of the tidal range results from the relative position of the moon and the sun. During full moon and new moon phases, the moon and sun act together to produce larger "spring" tides; when the moon is in its first or last quarter, smaller "neap" tides occur. The cycle of spring to neap tides and back is half the 27-day period of the moon's revolution around the earth and is known as the fortnightly cycle. The combination of diurnal, semi-diurnal, and fortnightly cycles dominate variations in sea level throughout the Hawaiian Islands.

Tidal predictions and historical extreme water levels are provided by the National Ocean and Atmospheric Administration (NOAA) NOS Center for Operational Oceanographic Products and Services. A tide station is located at Mokuoloe (Coconut Island) in Kaneohe Bay, immediately south of the project site. Water level data based on the 1983 to 2001 tidal epoch is shown in Table 3-4.

Table 3-4. Water level data for Mokuoloe, Station 1612480 (NOAA)

Datum	Elevation (feet, MLLW)	Elevation (feet, MSL)
Mean Higher High Water (MHHW)	+2.1	+1.1
Mean High Water (MHW)	+1.8	+0.8
Mean Sea Level (MSL)	+1.1	0.0
Mean Low Water (MLW)	+0.3	-0.7
Mean Lower Low Water (MLLW)	0.0	-1.1

Elevations in this EA are referred to the MSL tidal datum. A tide elevation of +1.1 feet, the regularly occurring mean higher high water (MHHW), is used for design.

3.4.1.2 Sea level Anomaly

The ocean surface does not have a consistent elevation. Sea level anomalies (SLA) are defined as the difference between the measured and predicted tides recorded at tide stations. SLA exist as a result of such processes as El Nino, global warming, geostrophic currents due to the rotation of the earth, and mesoscale eddies that propagate across the ocean. 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). An additional temporary sea level rise on the order of 0.5 feet has also been associated with phenomena related to the El Niño /Southern Oscillation (ENSO). The start of 2020 marked an extended period of large SLA. Figure 3-9 illustrates the difference between measured and predicted tide at the Mokuoloe tide station. An SLA of 0.5 feet is used for design.

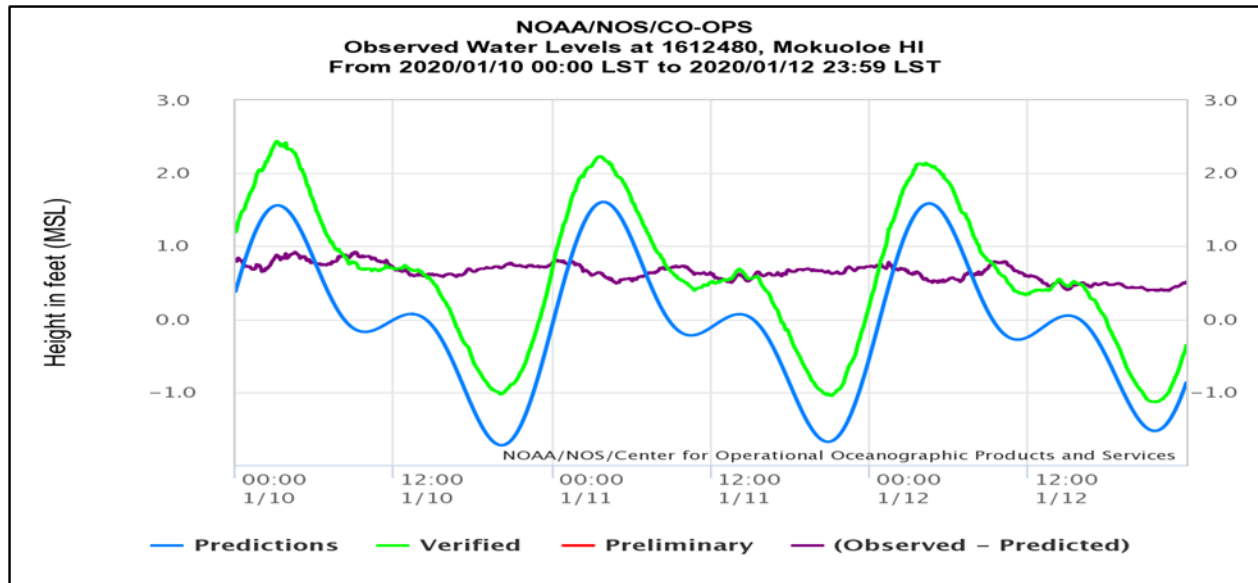


Figure 3-9. Predicted and measured tides at Mokuoloe (January 10, 2020)
Illustrating the occurrence of the sea level anomaly

3.4.1.3 Sea Level Rise

The present rate of global mean sea level change is $+3.4 \pm 0.4$ mm/yr (NOAA, 2017), where a positive number represents a rising sea level. Global mean sea level rise (SLR) has accelerated over preceding decades compared to the mean of the 20th century. Factors contributing to the rise in sea level include melting of land-based glaciers and ice sheets and thermal expansion of the ocean water column.

Rates of sea level rise are variable in time throughout the oceans due to variations in temperature, atmospheric pressure, winds, currents, and vertical land motion. The relative sea level trend for Honolulu Harbor for the period of 1905 to 2019 is shown in Figure 3-10 (NOAA, 2019). The rate of sea level change is shown in Figure 3-10 as being $+1.51 \pm 0.21$ mm/year based on monthly data for the period 1905 to present.

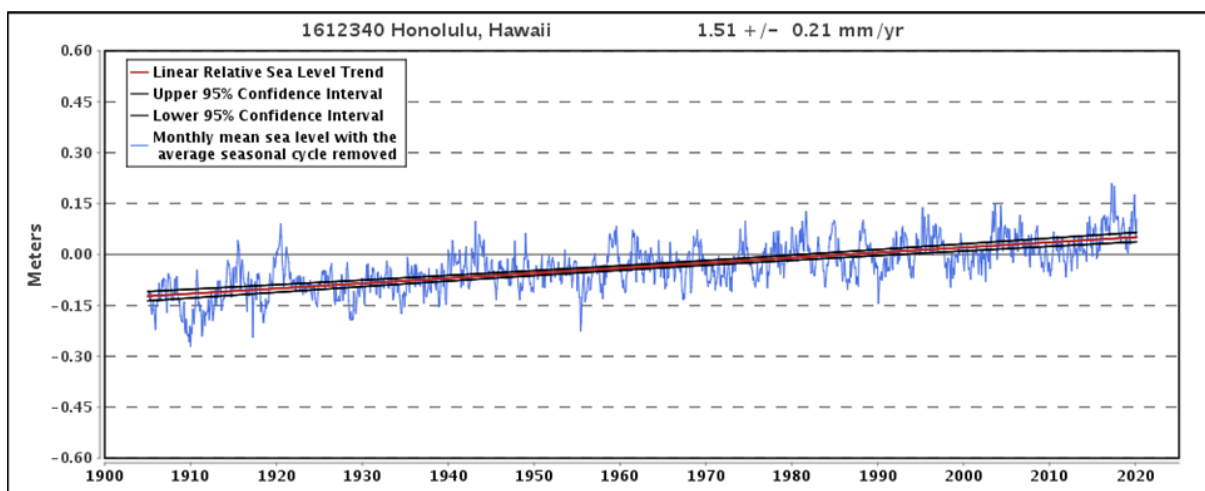


Figure 3-10. Mean sea level trend, Honolulu Harbor, 1905 to 2019 (NOAA, 2020)

NOAA recently revised their sea level change projections through 2100 taking into account up-to-date scientific research and measurements (Sweet et al. 2017). According to the NOAA global sea level rise projections, the Intermediate scenario represents approximately 3.3 feet of sea level rise by 2100 and the Extreme scenario represents more than 8 feet of sea level rise by 2100 (Table 3-5). The NOAA report describes the Extreme scenario as “physically plausible” and corresponds to a business as usual trajectory for increasing greenhouse gas emissions (i.e., no reductions in the increasing rate of emissions) and worst case for glacier and polar ice loss in this century.

Hawaii thus far has seen 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 nearer to the ice melt. Over the next few decades, this effect will spread to Hawaii, which is projected to experience sea level rise greater than the global average. Table 3-6 and Figure 3-11 present estimates of Hawaii’s mean sea level rise scenarios based on the revised NOAA (2017) 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 rise projections is a function of many parameters, including but not limited to existing uses and site conditions, presence and type(s) of infrastructure, design life, the potential for resilience, and socioeconomic value.

Table 3-5. Global mean sea level rise scenarios (NOAA, 2017)

Scenario (feet)	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Intermediate-Low	0.1	0.3	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.6
Intermediate	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.3	2.8	3.3
Intermediate-High	0.2	0.3	0.6	1.0	1.4	2.0	2.6	3.3	3.9	4.9
High	0.2	0.4	0.7	1.2	1.8	2.5	3.3	4.3	5.6	6.6
Extreme	0.2	0.4	0.8	1.3	2.1	3.0	3.9	5.2	6.6	8.2

Table 3-6. Hawaii local mean seal level rise scenarios (adapted from NOAA, 2017)

Scenario (feet)	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low	0.1	0.2	0.3	0.5	0.6	0.7	0.9	1.0	1.2	1.3
Intermediate-Low	0.1	0.3	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.1
Intermediate	0.1	0.4	0.6	1.0	1.3	1.8	2.3	2.9	3.5	4.2
Intermediate-High	0.2	0.4	0.7	1.1	1.7	2.4	3.2	4.1	5.0	6.3
High	0.2	0.4	0.8	1.4	2.1	3.0	4.0	5.3	7.0	8.4
Extreme	0.2	0.4	0.9	1.6	2.4	3.5	4.8	6.5	8.3	10.5

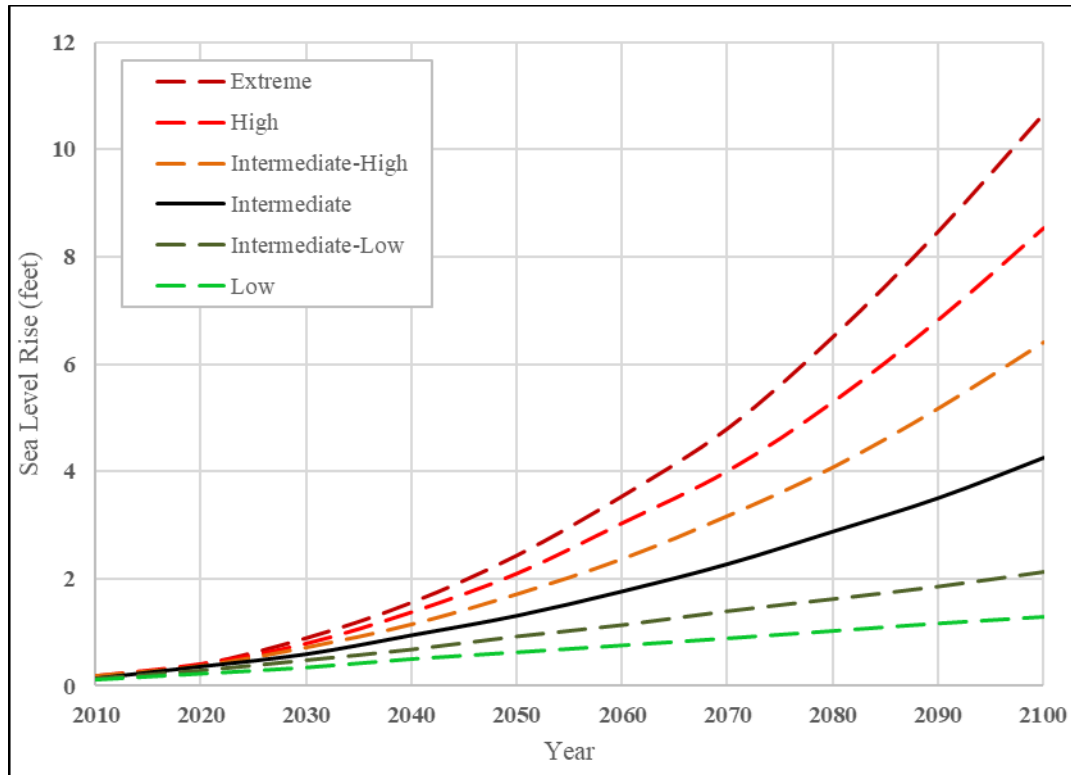


Figure 3-11. Hawaii local mean sea level rise projection (adapted from NOAA 2017)

Sea Engineering, Inc. participated in the Hawaiian Islands and Affiliated Pacific Islands regional climate assessment team, which contributed to the 4th National Climate Assessment (2018). The consensus from the regional team, which included representatives from NOAA, USGS, and UH, was that the NOAA Intermediate-High scenario projections are recommended for planning purposes in Hawaii. The Intermediate-High scenario projects that sea level in Hawaii will rise 1.7 feet by the year 2050, 3.2 feet by the year 2070, and 6.3 feet by the year 2100 (Table 3-6 and Figure 3-11). Given the mid-term (25 years) design life project purpose, a SLR of 1.7 feet is considered appropriate for project design.

3.4.1.4 Total Design Water Level

The total design water level is the sum of the astronomical tide (+1.1 feet), the sea level anomaly (0.5 feet), and sea level rise (1.7 feet), or 3.3 feet above MSL.

3.4.1.5 Wave Setup

Wave setup at the shoreline is the result of the shoreward mass transport of water by breaking waves in the nearshore zone and is typically about 10-12% of the incident breaker height. Numerical models used to calculate wave heights at the shoreline determined wave setup to be 1.7 feet during the design wave conditions.

3.4.2 General Hawaii Wave Conditions

Ocean waves that affect people and the built environment, on a normal basis, can generally be categorized into three groups (excluding tsunami), including: long period swell (characteristically

with periods¹ between 12 to 20+ seconds) generated by distant north or south Pacific storm systems; short period wind waves (typically with 6 to 12 second periods) generated by regional winds; and the unpredictable and episodic wave events associated with intense local storms (with periods often between 12 and 17 seconds). More specifically, the Hawaiian Islands receive waves from six well documented sources, which are: (1) northeast trade winds waves; (2) southeast trade winds waves; (3) south swells from the southern hemisphere; (4) north swells from the Aleutians or other parts of the North Pacific; (5) Kona storm wind waves; and (6) hurricane swells. Conceptually, the dominant deepwater wave exposure windows for Hawaii are as illustrated in Figure 3-12.

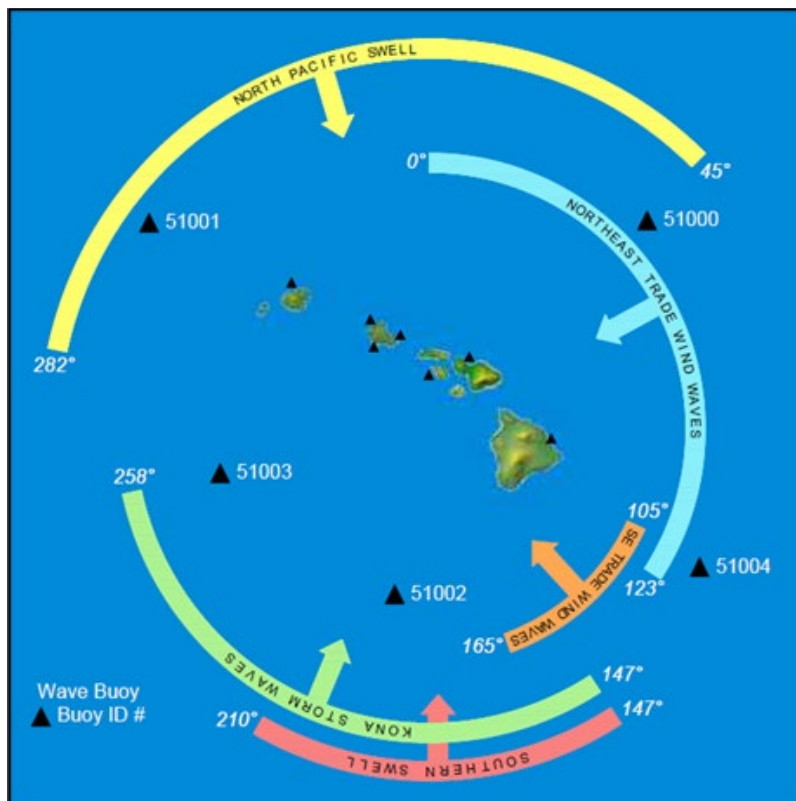


Figure 3-12. Dominant deepwater wave exposures for Hawaii

Trade wind waves occur throughout the year and are typically most persistent and intense from April through September when they tend to dominate the wave climate in Hawaiian waters. These waves are produced from the strong and steady trade winds generally blowing from the northeast quadrant, over long fetches of open ocean in the east and central pacific. The deep-water wave conditions for this source are typically between 3 to 8 feet high, with periods of 5 to 10 seconds depending on maximum wind speeds and how far east of the Hawaiian Islands the *fetch*² extends.

¹ Wave period is the time observed between two successive wave crests passing through a stationary observation position, measured in time (seconds). Wavelength is the distance between successive wave crests.

² A fetch is the area in which ocean waves are generated by the wind, or simply the length over which the wind is blowing to produce the waves.

The direction of approach, like the trade winds themselves, varies between north-northeast and east-southeast but is generally centered on the east-northeast direction.

During the winter months in the northern hemisphere, strong storms frequently track through the North Pacific's mid-latitudes (40 to 50 degrees north). Often near the Aleutian Islands, a string of volcanic islands that dot the very northern Pacific Ocean stretching from Alaska in the east to Eastern Asia (Russia) in the west. These powerful storms generate the large and infamous North Pacific swells that approach from west-northwest to the northeast and arrive at north-facing Hawaiian shores with little loss of energy. These are the waves that have made surfing beaches on the north shores of Oahu and Maui famous. Deep water wave heights often reach 15 feet and in extreme cases can reach 40 feet. The wave period for these northwest swells typically varies between 12 and 18 seconds (sometimes up to 21 seconds on rare occasions) depending on the track and intensity of the originating storm. Swells from the northwest can grow to exceptional heights and are very energetic. Because of this, they have the potential to bring a significant amount of energy to the northeast shorelines of Oahu as they refract around the northern tip of the island at Kahuku Point and wrap into the east side's fringing reefs. The project site is exposed to those winter swells, either large enough in size or with enough north in their approach angle to do just that.

South swells are generated by intense storms thousands of miles away in the southern hemisphere's mid-latitudes and are most prevalent during the late spring and summer months of April through September. Traveling distances of up to 5,000 miles, these waves arrive with relatively small deep-water wave heights of 1 to 5 feet but characteristically having long periods of 15 to 20 seconds or greater. South swells' direction of approach to the Islands is typically between southwest to southeast, depending on the originating storm's track across the Southern Ocean. South swells can occasionally become significant in size; however, there is no exposure to wave energy from the south in Kaaawa due to the site's northeastern orientation and the complete sheltering it receives from the island of Oahu's landmass to any swell from the south.

Wind swell from Kona storms is episodic and fairly infrequent, occurring usually about 10 percent of the time during a typical year. A Kona storm is a seasonal low-pressure system, generally classified as extratropical (cold core). These low-pressure systems typically approach the Islands with strong southerly and westerly winds that can also bring additional hazards. Hazards include heavy rain, flash flooding, hail, and even blizzards at high elevations as on the upper slopes of Mauna Kea or Haleakala. Kona storm wind waves are typically experienced as short period wind swells that range in periods from 6 to 10 seconds, along with wave heights of 5 to 20 feet. Deep-water wave heights generated during a particularly intense Kona storm of January 1980 were up to 17 feet. The combined large wave heights along with characteristically short periods result in a very steep and consistent wave field that can have a significant impact on the west-facing shores of Oahu. Depending on the Kona storm's track and position, the waves it produces typically approach the island from directions ranging between south and west. For this reason, as with south swells, there is no significant exposure at Kaaawa to wave energy from the south or west due to the site's northeastern orientation and the complete sheltering it receives from the island's landmass to any swell from the south or west.

Tropical storms and hurricanes (i.e., cyclonic storms, or cyclones) typically form during the months of June through November in the south-east and south-central North Pacific Ocean, when

large swathes of sea surface temperatures (SSTs) rise above the crucial threshold of 78° F (26° C). Severe tropical storms and hurricanes (warm core cyclonic storms) have the capacity to generate extremely large waves, which potentially could result in extreme wave heights at the project site. Since the 1980s, two powerful hurricanes, Iwa and Iniki, have significantly impacted Oahu in 1982 and 1992, respectively. In recent years there have been several close-approach hurricanes. Including Category 3, Hector (2018), which pounded south and west shores of Oahu with dangerously large surf, and Category 5 Lane (2018) which was forecasted to make landfall on Oahu but unexpectedly (and fortunately) weakened rapidly and veered off to open ocean just hours before its predicted impact. Two years later, in late July 2020, a Category 1 Hurricane Douglas was at one point forecast to directly strike the windward coast of Oahu, with its estimated track actually clipping Kahuku Point (see Figure 3-13). Although the storm eventually veered northward sending it further out to sea and avoiding landfall, Douglas still passed dangerously close to northeast Oahu. Wave heights climbed precipitously high offshore of the project site during the near miss, with a stretch of Kamehameha Highway along the project site becoming partially submerged and inundated by wave runup at times during the passage of the storm. The photograph in Figure 3-14 was taken at the project site in the hours following the passage of the storm and clearly illustrates the powerful hydrodynamic forces acting along the shoreline during the storm surge and elevated wave heights.

Notably, for as long as official records have been kept, tropical storms and hurricanes have had a relatively low probability of occurrence in the vicinity of the Hawaiian Islands. However, the potential for damage to Hawaii's offshore and coastal infrastructure is substantial. The frequency and severity of storms is expected to increase with global warming related climate change.

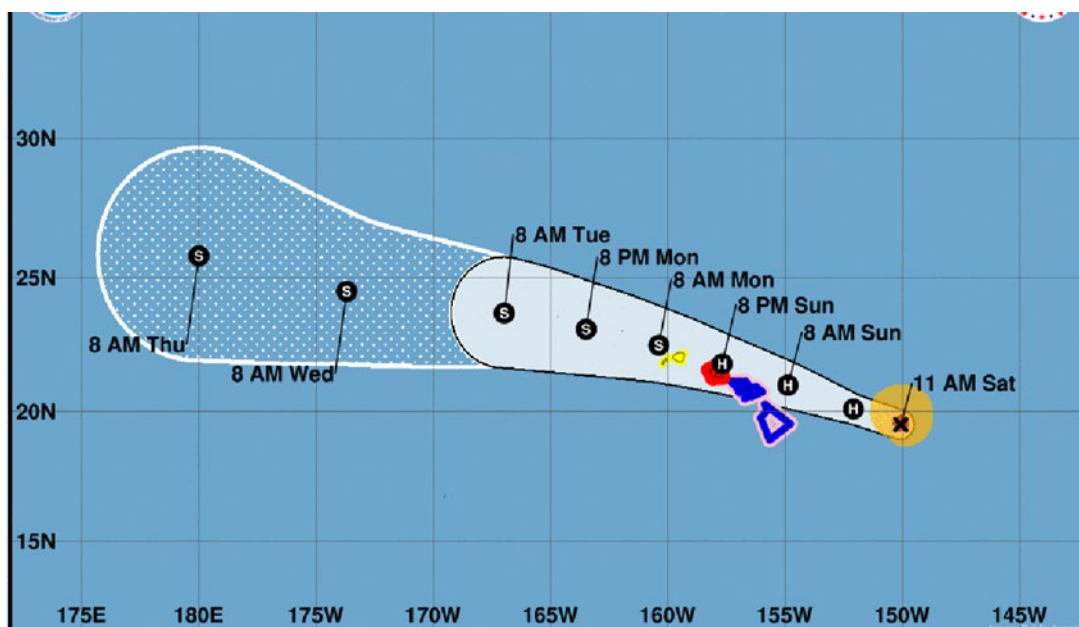


Figure 3-13. Forecast cone for Hurricane Douglas, 27 July 2020. Source: NOAA NWS CPHC



Figure 3-14. Kamehameha Highway at Kaaawa, 27 July 2020

3.4.3 Project Design Wave Heights

3.4.3.1 Prevailing Deepwater Waves

The deepwater wave conditions for the project site are well defined by the Coastal Data Information Program (CDIP) buoy station 098 (CDIP 098), located approximately 14.2 miles southeast of the project site. CDIP 098 is a Datawell directional buoy that measures wave height, wave direction, and peak period every half-hour. The buoy has recorded data continuously since it was installed in August 2000, with occasional data gaps due to maintenance.

The deepwater wave climate in the vicinity of CDIP 098 is dominated by the occurrence of Trade wind waves with a peak direction (D_p) from the northeast through east-northeast directions, clockwise. Buoy data shows that the area is also exposed to a longer period North swell. The percent occurrences of wave height by direction and wave period by direction are presented below. Figure 3-15 and Table 3-7 show the wave height rose diagram and histogram, respectively. Figure 3-16 and Table 3-8 show the wave period rose diagram and histogram, respectively. The color scheme on the histograms provides a visual aid to illustrate the differences in percent occurrence over time.

The figures show that waves are predominantly from the east-northeast and have a significant wave height (H_s) between 4 and 8-feet occurring 50 percent of the time, with peak periods typically between 6 to 10 seconds. The figures also show that the project site is exposed to longer period swells from the north with an average wave height of 6.3 feet.

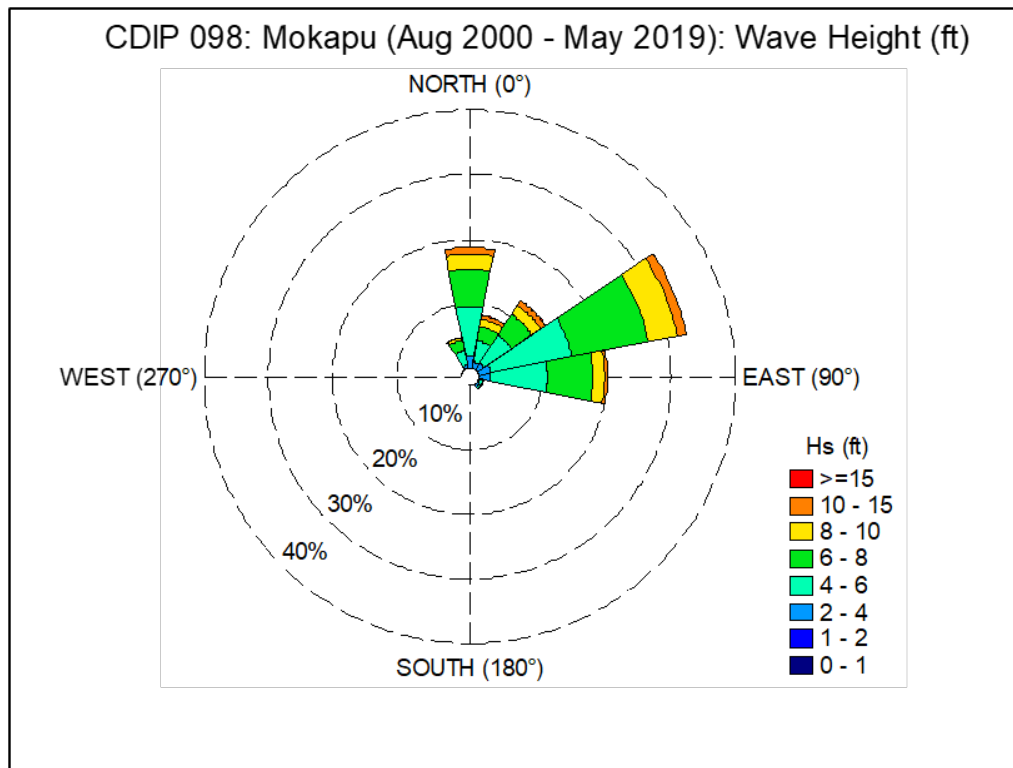


Figure 3-15. CDIP 098 wave height rose (Aug 2000 to Jan 2019)

Table 3-7. Wave height percent frequency of occurrence (Aug 2000 to Jan 2019)

Hs (ft)\Dir (deg)	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
0-1																	0.00
1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0										0.01
2-3	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.0	0.0						0.0	0.1	1.44
3-4	1.8	0.9	1.1	1.7	1.6	0.2	0.3	0.0	0.0					0.0	0.0	0.5	8.14
4-6	7.5	3.3	5.2	12.8	8.9	0.4	0.4	0.0								2.3	40.81
6-8	5.9	2.3	3.8	12.1	7.1	0.1	0.1	0.0							0.0	1.6	32.99
8-10	2.4	1.1	1.7	4.5	1.9	0.0	0.0									0.5	12.08
10-12	0.8	0.5	0.6	1.2	0.4	0.0	0.0									0.1	3.53
12-14	0.2	0.1	0.2	0.2	0.0	0.0										0.0	0.80
14-16	0.0	0.0	0.0	0.0	0.0												0.14
16-20	0.0	0.0	0.0	0.0	0.0												0.05
20+			0.0		0.0												0.00
Total	18.75	8.43	12.88	33.00	20.08	0.89	0.86	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.01	100.000
	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	6.3	6.3	6.4	6.4	6.0	4.7	4.2	3.9	3.0	0.0	0.0	0.0	0.0	3.3	5.2	5.9	6.2
StDev	2.0	2.3	2.2	1.8	1.7	1.4	1.3	0.9	0.4	0.0	0.0	0.0	0.0	0.0	1.9	1.6	1.9
Min	1.8	1.7	1.8	1.9	1.9	1.8	1.8	2.1	2.7	0.0	0.0	0.0	0.0	3.3	2.9	2.1	1.7
Max	18.4	20.0	20.5	19.1	21.2	12.3	10.4	7.5	3.3	0.0	0.0	0.0	0.0	3.3	7.0	14.0	21.2

Note: The color scheme on the histogram is a visual aid to help view the differences in percent occurrence. Empty cells indicate where the value is precisely zero. Cells ranging from green to yellow to red indicate lower to intermediate to higher values, respectively.

Legend: Hs (ft) = wave height in feet; Dp = peak direction; deg = degree

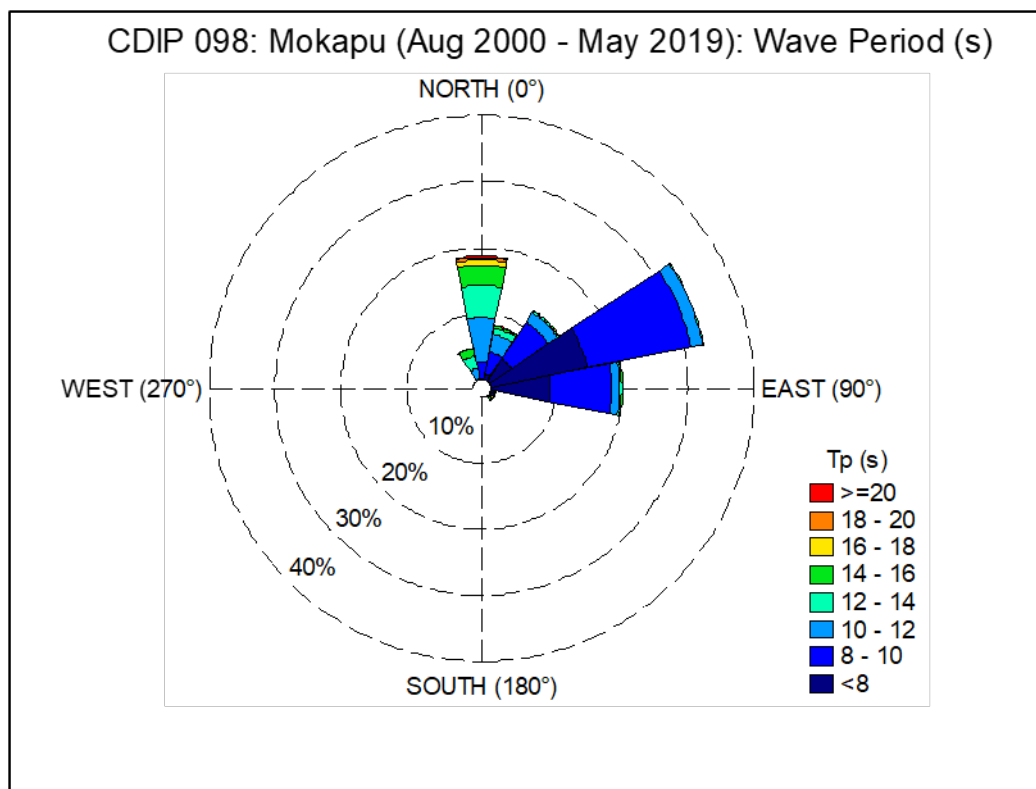


Table 3-8. Wave period percent frequency of occurrence (Aug 2000 to Jan 2019)

Tp (s)\Dir (deg)	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
3-6	0.0	0.1	0.4	2.4	2.5	0.1	0.0	0.0								0.0	5.44
6-8	0.2	0.9	3.8	12.7	6.7	0.3	0.1	0.0								0.0	24.56
8-10	2.5	3.4	6.7	16.0	9.1	0.3	0.1	0.0								0.2	38.27
10-12	6.6	2.7	1.7	1.8	1.2	0.1	0.0	0.0								1.6	15.86
12-14	4.9	1.0	0.3	0.1	0.3	0.1	0.1	0.0	0.0					0.0	0.0	1.9	8.65
14-16	3.1	0.3	0.1	0.0	0.2	0.1	0.3	0.1	0.0						0.0	1.2	5.35
16-18	0.8	0.0	0.0	0.0	0.0	0.0	0.2	0.0								0.1	1.14
18-20	0.4	0.0	0.0			0.0	0.1	0.0								0.0	0.51
20+	0.2	0.0				0.0	0.0									0.0	0.21
Total	18.75	8.43	12.88	33.00	20.08	0.89	0.86	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.01	100.000
	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	12.4	10.3	8.8	8.1	8.1	9.0	14.3	13.6	14.4	0.0	0.0	0.0	0.0	13.3	14.1	12.8	9.5
StDev	2.3	2.0	1.6	1.4	1.7	2.7	3.2	2.3	1.4	0.0	0.0	0.0	0.0	0.0	0.4	1.6	2.6
Min	3.6	3.9	3.9	3.7	3.9	3.9	5.3	5.3	13.3	0.0	0.0	0.0	0.0	13.3	13.3	3.9	3.6
Max	25.0	25.0	18.2	16.7	16.7	20.0	20.0	18.2	15.4	0.0	0.0	0.0	0.0	13.3	14.3	20.0	25.0

Note: The color scheme on the histogram is a visual aid to help view the differences in percent occurrence. Empty cells indicate where the value is precisely zero. Cells ranging from green to yellow to red indicate lower to intermediate to higher values, respectively.

Legend: Hs (ft) = wave height in feet; Dp = peak direction; deg = degree

3.4.3.2 Extreme Deepwater Waves

Historical wave buoy data allows a statistical basis for the prediction of the return period for various frequency of occurrence wave events. These are infrequent, larger, low probability wave events that are typically used for design purposes. For example, a 25-year return period wave event is an extreme event with a 1/25 (i.e. 4%) chance of occurring in any given year.

The extreme wave height data were used to generate a Weibull extreme value distribution for return period wave heights. The Weibull Distribution is a tool for looking at the relationship between the size of waves and how frequently they occur at a given location. Analysis requires a long-term data set with well-documented wave events. These events are sorted by size, and frequency of occurrence can be assessed by how often these events occur in the record. The relationship is logarithmic, and a linear fit can be established with a best fit linear regression of the data. Though not all wave events will be co-located on the line, its general trend represents the nature of the size and frequency relationship of wave events at a specific location.

Extreme wave height versus return period is shown in Figure 3-17 and Table 3-9.

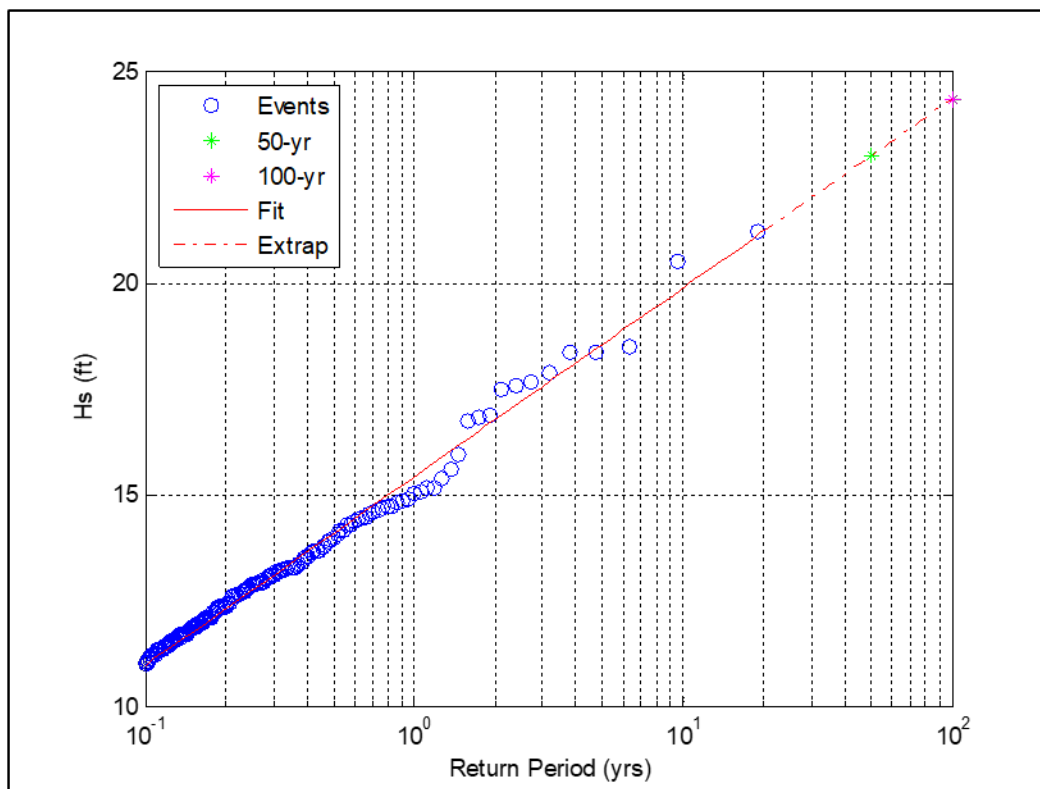


Figure 3-17. CDIP 098 return period 17-yr (Aug 2000 – Jan 2019)

Table 3-9. Return period significant wave heights at CDIP 098

Return Period (yrs)	Hs (ft)
1	15.4
2	16.8
5	18.5
10	19.9
25	21.7
50	23.0

Note that there is little difference in the 5-year return period wave event and the 50-year event, indicating that the project site is regularly exposed to large deepwater waves. For this project, a 25-year return period deepwater wave height of 21.7 feet is selected for design, consistent with the mid-term (25-year) design life objective.

3.4.4 Wave Heights and Water Level at the Shoreline

Nearshore bathymetry and water depths are available from the 2013 USACE SHOALS LiDAR dataset. This was supplemented by topographic surveys of the beach and reef flat fronting the beach. The project site is fronted by a wide (500 feet plus), shallow (-2 to -4 feet) fringing reef. Deepwater waves approaching the shore initially break on the reef edge, expending most of their energy, and then proceed shoreward as smaller reformed waves. Wave energy is further dissipated by bottom friction as they propagate across the reef. Waves that reach the shore are “depth limited”, i.e. their height is a function of and limited by the water depth at the shoreline. Thus, while there may be large differences in the wave heights for different return periods (frequency of occurrence) deepwater waves, there is less variability in the water depth at the shoreline and so less difference in return period wave heights at the shoreline.

The one-dimensional numerical wave model XBeach-NH was used to estimate wave height at the shoreline for the selected deepwater wave. XBeach-NH propagates waves from offshore to the shoreline along a bottom profile corresponding to the local bathymetry derived from the USACE SHOALS dataset. The model includes shoaling as waves move into shallower water, bottom friction energy dissipation, and energy dissipation due to wave breaking. Model output includes the time-varying water surface elevation, which is used to determine the significant wave height and wave setup at the shoreline.

The model results show a wave height of 4.2 feet at the shoreline, which is used for structural design. Wave setup at the shoreline is modeled to be +1.7 feet above the still water level (total design water level = +5.0 feet MSL). Wave runup was determined using an empirical formula for wave runup on armored slopes based on the EurOtop Manual (EurOtop, 2018). For armored slopes in shallow water the runup level, above the still water level, is two times the wave height at the toe of the structure. Therefore, the total runup elevation above MSL is 13.4 feet. The runup elevation exceeds the road and backshore elevation, which shows that during the design event there would be considerable wave overtopping of the proposed revetment and inundation of the roadway and backshore.

3.4.5 Anticipated Impacts and Mitigation Measures

The proposed project would not alter existing oceanographic conditions in the project vicinity.

3.5 Coastal Hazards

3.5.1 Flooding

The National Flood Insurance Program (NFIP), administered by FEMA (the Federal Emergency Management Agency), produces maps identifying flood hazards and associated zones of risk, known as Flood Insurance Rate Maps or FIRMs. Figure 3-18 presents the FEMA flood hazard map for the project site, with Kaaawa Beach Park's parcel highlighted with the cyan outline. This map indicates that the parcel is rated as Flood Zone VE (EL 10) over the north half and changes to Zone AE (EL 10) over the southern portion. Zone VE indicates a coastal flood zone with a velocity hazard, along with a base flood elevation (BFE) value of 10 feet in parentheses. For the southern half of the property, a Zone AE designation means that a BFE has been calculated for these areas; however, without an additional velocity hazard. A BFE value represents the water surface elevation for a 1% annual chance flood (in this case, based on the 100-yr tsunami inundation limits). The BFE can also be defined as the elevation—expressed as a height above mean sea level—that floodwaters are estimated to have a 1 percent chance of reaching or exceeding in any given year. The BFE value for the northern and southern portions of the property are equivalent, at 10 ft above MSL. Roughly 400 to 500 feet inland from the site, the designation turns to Zone X, which is an area that is determined to be outside of the 0.2% chance (500-year) flood plain, due to the steeply rising terrain.

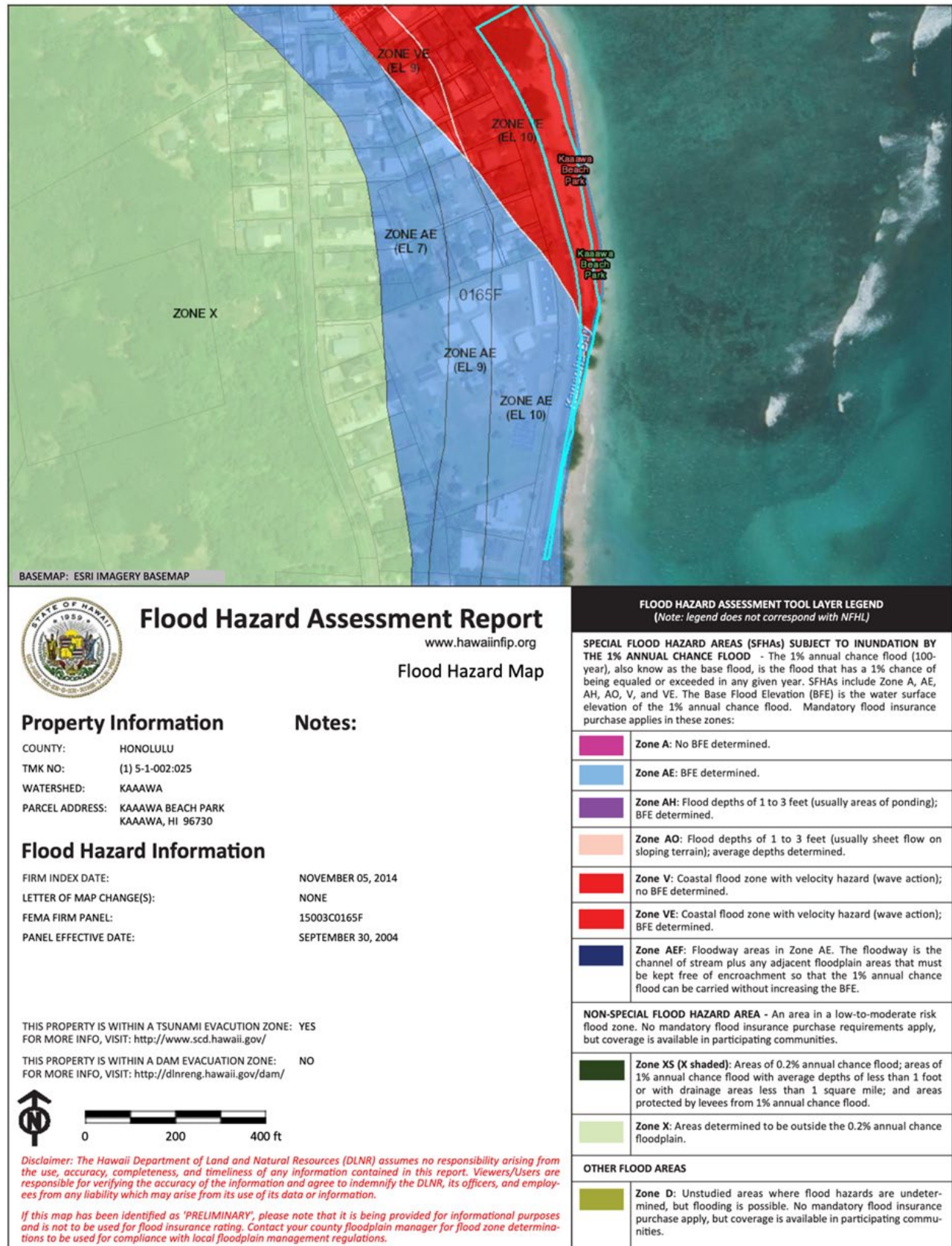


Figure 3-18. Flood hazard map for Kaaawa Beach Park parcel

3.5.2 Tsunami

Tsunamis are long-period solitary waves that typically result from large-scale seafloor displacements. Tsunamis are commonly caused by seismic events such as earthquakes that occur adjacent to or under the ocean and involve significant vertical motions of large areas of the substrate. Regular oscillatory waves—which are simply wind-generated waves, such as the waves one typically sees at the beach—have orbital velocity fields under the wave that decay exponentially with depth from their maxima at the surface and typically vanish within hundreds of feet from the surface. In contrast, the velocity field of tsunami extends vertically through the entire water column, from the ocean surface down to the seafloor—which could be miles deep. Tsunami wave heights have been observed as 1-2 ft (or less than a meter) when measured in deep water far at sea and quickly rise in height as they approach coastal areas. Increasingly shallower water forces the tsunami's extensive velocity field to swell upward. Tsunamis can have wavelengths on the order of hundreds of miles and travel at speeds near 500 miles per hour (equivalent to the speed of trans-pacific airline flights).

Most tsunamis that have impacted the State of Hawaii have originated from the tectonically active areas that ring the Pacific (a.k.a., The Ring of Fire) such as Japan, the Aleutian Islands, Alaska, Chile, etc. Seismic waves originating from earthquakes in these locations take hours to reach Hawaii even at jetliner speeds. The network of sensors that are part of the Pacific tsunami warning system can give Hawaii several hours of advance warning of a tsunami from these locations. Less commonly, tsunamis can and have originated from seismic activity locally within the Hawaiian Islands and by virtue of its proximity, there is also much less advance warning for the arrival of these waves. The 1975 Halape earthquake on the east coast of Hawaii Island registered as a 7.4 magnitude tremor. The shock affected several of the Hawaiian Islands and resulted in two deaths and 28 injured. The east side of the Big Island suffered over \$4 million in damage from the event. The earthquake generated a large tsunami that was estimated at 47 feet (14 m) at Halape, on the Big Island. Major alterations to the existing shoreline were found along the south side of the Big Island, with subsidence of up to 12 feet (3.7 m) observed in places, permanently submerging some nearshore areas. The source of the quake was determined to be the Hilina Slump, near Kilauea, which was also deemed responsible for the more powerful 1868 Hawaii earthquake and tsunami.

Fletcher et al. (2002) report that 10 of the 26 tsunamis with flood elevations greater than 3.3 feet (1 m) that have made landfall in the Hawaiian Islands during recorded history have had “significant damaging effects on Oahu.” This means that, on average, one damaging tsunami reaches Oahu every 19 years. The recent record (1946 to the present) has seen four tsunami cause damage on Oahu, a rate that is very close to the longer-term average.

3.5.3 Hurricanes

Tropical cyclones originate over warm ocean waters, and they are considered hurricane strength when they generate sustained wind speeds over 64 knots (74 mph). Hurricanes form near the equator, and in the central North Pacific usually move toward the west or northwest. During the primary hurricane season of July through September, hurricanes generally form off the west coast of Mexico and move westward across the Central Pacific. Based on storms observed over the past several decades, these cyclones typically pass south of the Hawaiian Islands but occasionally have a northward curvature, taking them near the islands. Late season hurricanes appear to follow a somewhat different pattern, forming south of Hawaii and moving north toward the islands. Three hurricanes have passed over or through the Hawaiian Islands in the past 25 years, including:

Hurricane Iwa in 1982 passing near the island of Kauai, Iniki in 1992 passing over the island of Kauai, and Hurricane Iselle in 2014 passing over the island of Hawaii. These storms caused extremely high surf and wave damage on multiple shores of the islands. Section 3.4.2 above also presents a discussion on hurricane-related waves. The Windward Oahu Hurricane Vulnerability Study (Sea Engineering, 1990) indicates that a theoretical model hurricane passing over the island from the south/southwest could result in deep-water waves 44.2 feet high with periods of 14.6 seconds for Oahu North and East shores.

3.5.4 Anticipated Impacts and Mitigation Measures

The proposed project is not expected to affect the project area exposure to coastal hazards. The proposed erosion mitigation would, however, help protect the highway during coastal hazard conditions.

3.6 Marine Biological Environment

3.6.1 Marine Biota

The Pacific Island Ocean Observing System's (PacIOOS) mapping program, Voyager, displays the National Oceanographic and Atmospheric Administration's (NOAA) benthic maps for the region. These maps show coral reef geomorphology and biology for the Kaaawa Beach Park area. Figure 3-19 illustrates the benthic biology of the reef flat offshore of the project site, as classified by NOAA scientists and biologists. Immediately adjacent to the shoreline and parallel to the beach park and moving south into the channel is a strip of nearshore sand that is classified as uncolonized. Moving offshore from that zone, the substrate transitions to macroalgae with a coverage of 10-50%, while further offshore the edge of the reef transitions to coralline algae at a coverage of 10-50%, and finally to the reef face with live coral at 10-50% coverage.



Figure 3-19. Kaaawa Beach Park offshore benthic biology (source: PacIOOS Voyager)

A biological survey of the nearshore project site was conducted in January 2021 (Marine Research Consultants, Inc., 2021), which covered the entire shoreline area fronting the project area and included the reef flat out to 50 m from the shoreline. The complete survey results are provided in Appendix A. Results of the biological survey indicate that the marine habitat was essentially unchanging from the shoreline to the outer limits of the survey and consisted of a flat sand/rubble surface with little vertical relief. Several piles of large stones or boulders were interspersed over the area. The most abundant benthic biota were various species of algae. The most common were *Acanthophora specifera*, *Halimeda spp.*, *Caulerpa spp.* and *Padina spp.* Corals were relatively rare and consisted primarily of small, isolated colonies of typical Hawaiian reef species of *Porites* and *Pocillopora*. Fish communities were notably lacking in numbers of individuals and variety of species. The few fish observed during the survey were all small in size. The lack of fish and the overall small size of individuals is likely a response to heavy fishing pressure in the area, in turn owing to the proximity to the shoreline and major roadway.

3.6.2 Essential Fish Habitat

The 1996 Sustainable Fishery Act amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and subsequent Essential Fish Habitat (EFH) Regulatory Guidelines (NOAA, 2002) describe provisions to identify and protect habitats of federally managed marine and anadromous fish species. Under the various provisions, federal agencies that fund, permit, or undertake activities that may adversely affect EFH are required to consult with the National Marine Fisheries Service (NMFS). EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH is further defined

by existing regulations as (MSFCMA, 1996; NOAA, 2002). “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” is defined as required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ life cycle.

The marine water column from the surface to a depth of 1,000 meters from the shoreline to the outer boundary of the Exclusive Economic Zone (EEZ) (5,150 kilometers/200 nautical miles/ 230 miles), and the seafloor from the shoreline out to a depth of 700 m around each of the Hawaiian Islands, have been designated as Essential Fish Habitat (EFH). As such, the water column in the proposed project area is designated as EFH and supports various life stages for the management unit species (MUS) identified under the Western Pacific Regional Fishery Management Council’s Pelagic and Hawaii Archipelago Fishery Management Plan. There are no areas within the project area that have been designated as Habitat Areas of Particular Concern (HAPC) under the EFH regulations, and no portion of the proposed project area would qualify as an HAPC.

The project area is located on a highly utilized shoreline for fishing, swimming, and other nearshore recreation and is immediately adjacent to a beach park. Consequently, the project area is subject to chronic anthropogenic impacts from human use.

3.6.3 Potential Impacts and Mitigation Measures

The revetment would be constructed almost entirely landward of the water line, with only a portion of the toe scour apron extending seaward of mean higher high water (+1.1 feet), with a footprint of 0.01 acre. This footprint area is also a shifting sand shoreline, essentially devoid of marine life. Thus, the project impacts on the marine biological environment are not considered significant.

The only potential negative effect to the marine environment that could arise from the proposed project could be temporary increases in turbidity. Results of the marine survey indicate that the marine habitats fronting the project site do not represent fragile or unique areas that would be susceptible to such temporary impacts. As the area is subjected to persistent longshore currents, any increase in turbidity would be temporary in nature, and would not likely settle on the bottom. The paucity of corals in the area indicates it is not an ideal habitat for reef development, and the existing corals are pre-adapted to stressful conditions. The present lack of fish indicates that there is little potential for any effect on the existing populations from temporary increases in turbidity (MRC, 2021). Silt curtains would be deployed around areas of active construction to contain and control potential turbidity.

3.7 Protected Species

3.7.1 Marine Species

Listed species, such as sea turtles, Hawaiian monk seals, and humpback whales, can occur in the general project vicinity. No listed endangered or threatened species (USFWS, 2013) were observed during the January 2021 marine surveys. State protected species, such as hermatypic corals, were not observed at the project site.

Sea turtles—Of the sea turtles found in the Hawaiian Islands, only the green sea turtle (*Chelonia mydas*) is common in the project vicinity. In 1978, the green sea turtle was listed as a threatened

species under the Endangered Species Act (ESA; USFWS, 1978, 2001). Since protection, the green sea turtle has become the most common sea turtle in Hawaiian waters with a steadily growing population (Chaloupka et al., 2008). Threats to the green sea turtle in Hawaii include disease and parasites, accidental fishing take, boat collisions, entanglement in marine debris, loss of foraging habitat to development, and ingestion of marine debris (NMFS-USFWS, 1998). Green sea turtle nesting mostly occurs on beaches of the Northwestern Hawaiian Islands, with 90% occurring at French Frigate Shoals (Balazs et al., 1992). Green sea turtles are not known to nest in the project vicinity.

The green sea turtle diet consists primarily of benthic macroalgae (Arthur and Balazs, 2008), which the shallow reefs of the main Hawaiian Islands provide in abundance. Red macroalgae generally make up 78% of their diet, whereas green macroalgae make up 12%. Turbidity (murky water) does not appear to deter green sea turtles from foraging and resting. Green sea turtles are adaptable and tolerant of construction-related disturbances (Brock, 1998a,b). During the January 2021 marine survey, no green sea turtles were observed, although algal food species are found here.

Hawaiian monk seals - The beaches and coastline of Oahu are used by the endangered Hawaiian monk seal (*Monachus schauinslandi*) for hauling out and for pupping and nursing. The majority of monk seal sighting information collected in the main Hawaiian Islands is reported by the general public and is highly biased by location and reporting effort. Systematic monk seal count data come from aerial surveys conducted by the Pacific Islands Fisheries Science Center (PIFSC). Aerial surveys of all the main Hawaiian Islands were conducted in 2000-2001 and 2008 (Baker and Johanos, 2004, PIFSC unpublished data). One complete survey of Oahu was conducted for each of these years. The 2000 survey was conducted from an airplane and the 2001 and 2008 surveys were conducted by helicopter. No Hawaiian monk seals were sighted in the project area during any of the three surveys.

Hawaiian monk seal critical habitat for the island of Oahu is shown in Figure 3-20 (Federal Register, Volume 80, No. 162 published on August 21, 2015). The project area is not considered critical habitat.

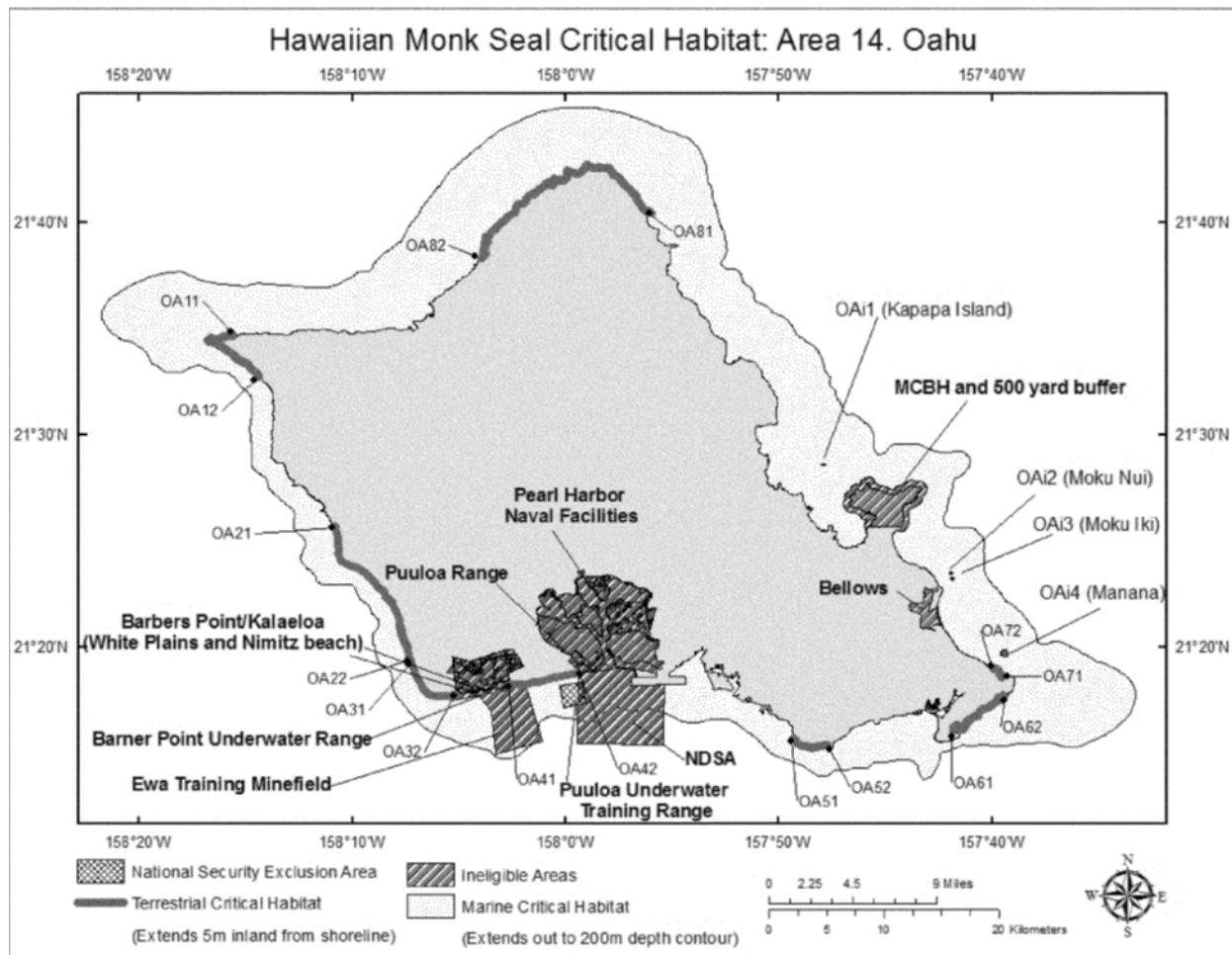


Figure 3-20. Hawaiian Monk Seal Critical Habitat Area14, Oahu

Humpback whales - The humpback whale, or *koholā* (*Megaptera novaeangliae*), was listed as endangered in 1970 under the ESA. In 1993 it was estimated that there were 6,000 humpback whales in the North Pacific Ocean and that 4,000 of these regularly came to the Hawaiian Islands. The population is estimated to be growing at between 4 and 7% per year. Today, as many as 10,000 humpback whales may visit Hawaii each year (HIHWNMS, 2014).

Humpback whales normally occur in Hawaiian waters annually from November to May, with the peak between January and March and can be observed along the windward coast offshore of the project site. However, the wide and shallow fringing reef in the project vicinity prevents whales from nearing the shore. The project will not directly affect humpback whales, and sounds generated from revetment construction activities are not anticipated to be substantial enough to cause an acoustic disturbance to protected species in nearshore waters.

Coral—Coral species are protected under Hawaii State law, which prohibits “breaking or damaging, with any implement, any stony coral from the waters of Hawaii, including any reef or mushroom coral” (HAR §13-95-70, DLNR, 2010). It is also unlawful to take, break or damage

with any implement, any rock or coral to which marine life of any type is visibly attached (HAR §13-95-71, DLNR, 2002). No coral would be directly impacted by the project.

3.7.2 Flora

The only flora listed by U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website and database for the general project vicinity is the flowering plant known as Kauila (*Colubrina oppositifolia*), which is listed as endangered. Kauila is a native Hawaiian tree that grows to a height of 15 to 30 ft and is hardy enough to tolerate the briny soils and salty air of nearshore terrain. It is one of the hardest of all native woods and is in fact so dense it will sink in water. Its wood is prized by woodworkers due to its rarity and difficulty to acquire. No Kauila would be affected by the proposed project. Several coconut palms and milo trees are located within the footprint of the proposed revetment, and these would require removal.

3.7.3 Fauna

Hawaiian hoary bat, *ope'ape'a* (*Lasiurus cinereus semotus*) - The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15-feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing would be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Birds - Several bird species, including wetland, forest, and sea birds are listed for the general project vicinity. A summary of these bird species and their endangered status is provided in Table 3-10. Two species of sea birds were listed, the Band-rumped Storm-petrel and the Short-tailed albatross. Sea birds fly at night and are attracted to artificially lighted areas which can result in disorientation and subsequent fallout due to exhaustion or collision with objects such as utility lines, guy wires, and towers that protrude above the vegetation layer. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality. Project construction would not involve nighttime work or any new/additional lighting.

Table 3-10. List of endangered birds listed for Kaaawa Beach Park area

Common Name	Scientific Name	Status
ʻIiwi	<i>Drepanis coccinea</i>	Threatened
Band-rumped Storm-petrel	<i>Oceanodroma castro</i>	Endangered
Hawaiian Duck - koloa	<i>Anas wyvilliana</i>	Endangered
Hawaiian Common Gallinule	<i>Gallinula galeata sandvicensis</i>	Endangered
Hawaiian Coot	<i>Fulica americana alai</i>	Endangered
Hawaiian Stilt	<i>Himantopus mexicanus knudseni</i>	Endangered
Newell's Townsend's Shearwater	<i>Puffinus auricularis newelli</i>	Threatened
Oahu Creeper	<i>Paroreomyza maculate</i>	Endangered
Oahu Elepaio	<i>Chasiempis ibidis</i>	Endangered
Short-tailed Albatross	<i>Phoebastria albatrus</i>	Endangered

3.7.4 Potential Impacts and Mitigation Measures

The project area is fronted by a wide, shallow reef flat. Green sea turtles are not commonly seen foraging in the nearshore waters or nesting in the area. Turtles would be expected to move away from the construction activities, and as the impact area is very small and primarily on sandy bottom construction would not significantly affect turtle foraging area. Hawaiian monk seals are also not commonly observed in the project vicinity. Construction of the groin will not involve in-water work, such as pile driving, which could be expected to result in significant underwater sound that would adversely affect marine creatures. Endangered Humpback whales can regularly be seen in Hawaiian waters during the winter; however, the shallow nearshore waters prevent them from coming close to shore. The project area has not been designated as critical habitat by the Federal Government or the State of Hawaii for endangered species.

The following Best Management Practices (BMPs) and avoidance and minimization measures, as typically recommended by the U.S. Fish and Wildlife Service and NOAA-National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act for federally listed threatened and endangered species, will be implemented.

1. Turbidity containment devices (silt curtains) shall be installed around the area of groin construction, sand recovery, and sand placement.
2. Visual monitoring for turbidity outside the confines of the silt curtains shall be conducted. In the event that turbidity is observed outside of the silt curtains, work shall stop, and the silt curtains shall remain in place until the turbidity dissipates. Silt curtains shall be inspected after dissipation and prior to returning to project operations.
3. All construction personnel on site shall be informed of the potential for endangered species that may occur within or transit through the project area. It shall be made clear that any intentional physical interactions with identified threatened or endangered species is explicitly prohibited.
4. A competent observer shall be designated to observe the construction work areas and areas immediately adjacent to the work for the presence of federally listed species, including but not limited to, green sea turtles, hawksbill sea turtles, and Hawaiian monk seals. Visual

surveys for these 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 within 150 feet of the work area. The construction areas include both in-water areas as well as beach areas, as shown on the construction plans.

5. A 150-foot safety zone shall be established around the project area where a competent observer shall visually monitor the zone for the presence of marine protected species 30 minutes prior to and 30 minutes post-project in-water activity. The observer shall record information on the species, numbers, behavior, time of observation, location, start and end time of project activity, characteristics of the marine species, and any observed disturbances of the work on the species (visual or acoustic).
6. Activity shall be conducted only if the safety zone is clear of all marine federally protected species.
7. Upon sighting of a marine federally protected species within the safety zone during project activity the activity shall immediately halt until the animal has left the zone. In the event that a protected species enters the safety zone and the project activity cannot be halted, observations shall be made, and NOAA-NMFS staff in Honolulu shall be immediately contacted to facilitate agency assessment of collected data. Work may continue only if there is no possibility for the activity to adversely affect the animal.
8. All 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 shoreline or water quality.
9. Cease construction work if unusual conditions, such as large tidal events or high surf conditions, affect the project site, except for efforts to avoid or minimize damage to natural resources, such as the temporary removal of silt curtains.
10. Construction site inspections and debris sweeps will be made at the end of each workday, and all project-related debris and trash shall be removed and disposed of. Equipment that is not actively being used shall be properly stored and secured so as not to cause unintended damage to the beach or adversely affect federally listed and endangered species. A full inspection of the project site shall be conducted at the end of the project to ensure that no visible debris or project waste is present upon completion of the project.
11. Nighttime work and/or work requiring artificial light sources is prohibited. No new permanent lighting shall result from this project.
12. Any incidental injuries or take of green or hawksbill sea turtles on land shall be immediately reported to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office at (808) 792-9400, and the Army Corps of Engineers at (808) 835-4303 and CEPOH-RO@usace.army.mil. Similarly, any incidental injury or take of green or hawksbill sea turtle or monk seal in the water shall be immediately reported to NOAA-NMFS 24-hour hotline at 1-888-256-9840, and the Corps at (808) 835-4303 and CEPOH-RO@usace.army.mil. The incident should also be reported to the Pacific Island Protected Species Program Manager, Southwest Region, (808) 973-2987.

By using the above BMPs, noise/physical disturbance to green sea turtles and Hawaiian monk seals is expected to be temporary and insignificant and not result in adverse behavioral changes.

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 is expected to be temporary and not significant. There would be no loss of turtle foraging area.

3.8 Water Quality

3.8.1 Existing Conditions

The waters offshore of the project site are classified in the Hawaii Water Quality Standards (HDOH, 2012) as (a) marine waters, (b) open coastal, (c) reef flat, (d) Class A, and (e) Class II marine bottom ecosystem. It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Other uses are permitted as long as compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. Class A waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control.

State water quality criteria for open coastal marine waters incorporate “wet” and “dry” criteria values based on the average percent of freshwater inflow, where terrestrial freshwater input exceeds three million gallons per day, wet criteria are applied; where the freshwater input is less than three million gallons per day, dry criteria apply. There is a DOH Clean Water Branch Water Quality Sampling Site at Kaaawa Beach Park (Site 000179) located just south of the restroom structure, at the shoreline of the project site. Shown in Table 3-11 are the averages of the parameters measured at that site from 2005 to 2020.

Table 3-11. Average values for parameters at DOH CWB Site 000179

Variable	Average
Clostridium (CFU/100mL)	2.183
Enterococcus (CFU/100mL)	16.511
Water Temperature (°C)	24.569
Salinity (PSU)	34.202
Turbidity (NTU)	2.615
Dissolved Oxygen (mg/L)	5.835
Oxygen Saturation (%)	86.422
pH	7.891

Project site water quality investigations were conducted on January 3, 2021, and the detailed results are provided in Appendix A. Water quality constituents included all specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) (Open Coastal Waters) of the State Department of Health Water Quality Standards. These include total nitrogen, nitrate + nitrite nitrogen, ammonium nitrogen, total phosphorus, chlorophyll α , turbidity, temperature, pH, and salinity. In addition, dissolved silica and orthophosphate phosphorus were measured as these are indicators of biological activity and the degree of groundwater mixing. The measurements showed several patterns of constituent distribution, the dissolved nutrients silica (Si) and nitrate + nitrite (NO₃) showed a progressive decrease in concentration with distance from the shoreline, and salinity displayed the opposite trend. As there were no streams discharging to the ocean at the time of the sampling, the horizontal gradients of these constituents likely represent groundwater

flow to the ocean near the shoreline. However, the gradients were relatively small, indicating only low volume groundwater discharge. The distributions of turbidity and chlorophyll α also showed the highest values near shore. This is likely due to the suspension of fine-grained particulate material, including plant fragments, by breaking waves in the nearshore zone and on the shoreline. None of the dissolved nutrient constituents exceeded Water Quality Standards for the “not to exceed more than 10% of the time” criteria. However, all measured values of turbidity exceeded the 10% criteria.

3.8.2 Potential Impacts and Mitigation Measures

None of the water quality parameters are likely to be affected beyond the range of natural variability by the proposed project. Silt curtains will be deployed to contain/control turbidity around the limited areas of actual construction in the water. All stone would be washed and clean of earthen and other deleterious material.

3.9 Noise

3.9.1 Existing Conditions

Hawaii Administrative Rules §11-46, “Community Noise Control” establishes maximum permissible sound levels (see allowable levels summarized in Table 3-12) and provides for the prevention, control, and abatement of noise pollution in the State from stationary noise sources and from equipment related to agricultural, construction, and industrial activities. The standards are also intended to protect public health and welfare and to prevent the significant degradation of the environment and quality of life. The limits are applicable at the property line rather than at a selectively pre-determined distance from the sound source. HAR §11-46-7 grants the Director of the Department of Health the authority to issue permits to operate a noise source that emits sound in excess of the maximum permissible levels specified in Table 3-12 if it is in the public interest; however, it may be subject to reasonable conditions. Those conditions can include requirements to employ the best available noise control technology.

Existing ambient noise levels vary considerably within the project temporally (i.e., from one time to another), but in general, existing background levels at the project site can be relatively high due to its proximity to Kamehameha Highway. During peak commute times in the early morning and late afternoon, and midday during weekends and holidays, traffic levels at the site can be quite high, and the amount of vehicular noise generated during those periods can therefore also be elevated.

Table 3-12. Maximum permissible sound levels in dBA

Zoning Districts	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Class A	55	45
Class B	60	50
Class C	70	70
<p>Table Notes:</p> <ol style="list-style-type: none"> (1) Class A zoning districts include all areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type. (2) Class B zoning districts include all areas equivalent to lands zoned for multi-family dwellings, apartments, business, commercial, hotel, resort, or similar type. (3) Class C zoning districts include all areas equivalent to lands zoned agriculture, country, industrial, or similar type. (4) The maximum permissible sound levels apply to any excessive noise source emanating within the specified zoning district, and at any point at or beyond (past) the property line of the premises. Noise levels may exceed the limit up to 10% of the time within any 20-minute period. Higher noise levels are allowed only by permit or variance issued under sections 11-46-7 and 11-46-8. (5) For mixed zoning districts, the primary land use designation is used to determine the applicable zoning district class and the maximum permissible sound level. (6) The maximum permissible sound level for impulsive noise is 10 dBA (as measured by the “Fast” meter response) above the maximum permissible sound levels shown. <p><i>Source: Hawaii Administrative Rules §11-46, “Community Noise Control”</i></p>		

3.9.2 Potential Impacts and Mitigation Measures

It is not feasible to mitigate construction noise to the extent that it does not at times exceed existing background noise levels or is inaudible to nearby residents. The noise impact is also exacerbated by the presence of Kaaawa Elementary School immediately *mauka* (landward) of the project site. Some noise reduction is practical, however, and the following measures would be implemented.

- Equipment operation on the shoreline will be limited to the hours between 7:30 am and 5 pm.
- Broadband noise backup alarms in lieu of higher frequency beepers will be required 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.
- The project will specify the use of the quietest locally available equipment, e.g., high insertion loss mufflers, fully enclosed engines, and rubber-tired equipment when possible.
- The use of horns for signaling will be prohibited.
- Worker training on ways to minimize impact noise and banging will be required.

3.10 Historic, Cultural, and Archaeological Resources

3.10.1 General History

International Archaeology, LLC (IA) conducted a review of historic documents pertaining to the project area to support the permit and approval process and consultation with agencies such as the State Historic Preservation Division. The following discussion is taken from the IA study report.

The literal translation of Kaaawa is “the yellow wrasse”, which is a common Hawaiian reef food fish. An alternate interpretation refers to the broad reef passage (*awa*) that exposes the shoreline to northern swells. A traditional Hawaiian *‘olelo no’eau* notes the dynamic geomorphology of Kaaawa’s coastal landscape: “*He kai ‘a’ao ko Ka’a’awa*” (Kaaawa has a sea that wears away the land – which seems apt given the documented erosion of the shoreline. The *ahupua’a* of Kaaawa is mentioned in numerous legends beginning as early as the 1300’s AD. Unfortunately, early (pre-western contact) settlement of the area is poorly documented. Missionary records from the 1830s indicate that several hundred people lived in Kaaawa, and less than 3,000 in the entire district of Koolauloa. The mid-19th century Mahele, which divided the land among the king, chiefs, and the government, introduced private land ownership to Hawaii. The majority of Kaaawa Valley was purchased by Dr. Gerrit P. Judd in 1870 and became Oahu Plantation and later Kualoa Ranch Ltd. in 1927. Also, in 1927 the Kaaawa Military Reservation was established to support the Jungle Warfare Center in Kahana Valley. This was located approximately where Swanzy Beach Park is today. The reservation land was returned to the Territory of Hawaii in 1953. Kaaawa Elementary School, directly landward of the project site was founded in 1904 and is one of the longest continuously operating public elementary schools in the state.

Kamehameha Highway, as a modern paved automobile roadway, was constructed along the Ko’olauloa coastline during the late 1920s. The modern road was constructed on top of the 19th century coastal government road known as the Alanui Aupuni, which in turn followed the same path as a pre-Contact trail documented in the earliest historical records. The highway in Kaaawa was severely damaged by a tsunami in 1946.

3.10.2 Archaeology

Only a relatively small number of archaeological investigations have been conducted in the Kaaawa area, which is attributable to the limited development of this rural area. Many of the archaeological investigations have been in response to inadvertent discoveries of human skeletal remains, and others are small archaeological inventory surveys and monitoring projects, all of which were close to the coast. No large landscape-scale archaeological inventory surveys have been completed in Kaaawa and knowledge about the archaeological record of the mauka area is lacking.

McAllister (1933) included Kaaawa in his island-wide reconnaissance survey, which was primarily focused on monument features (e.g., heiau) and traditional sites in oral history. However, McAllister did document human remains eroding out of the beach berm south of the project site. More recently numerous inadvertent burials have been documented, at least 20 traditional Hawaiian burials (or fragmentary remains) have been documented along the coastline of Kaaawa Ahupua’a. Investigation of one burial site between 1991 and 2017 has shown not only traditional Hawaiian materials and burials but also a small amount of post-Contact material has been found in the deposit. This suggests that this paleosurface was used spanning Contact, or that

materials from more recent times have been introduced down into the deposit by mechanical, erosional, or other means. Radiocarbon dates place the age of this deposit sometime between the early 1800s and the first half of the 1900s.

3.10.3 Potential Impacts and Mitigation Measures

Construction of the project would involve a very small amount of excavation in a dynamic and already heavily altered sand and sediment shoreline bank; thus, the discovery of archaeological remains is considered unlikely.

3.11 Recreation

The relatively calm shoreline conditions and narrow sand beach make Kaaawa Beach Park and project vicinity an ideal location for coastal recreation, and the shoreline is heavily utilized by the local community. The broad offshore reef helps dissipate wave energy allowing for year-round use by shoreline fisherman, snorkelers, swimmers, paddlers, sailors, surfers, and spearfishermen. On weekends the park and adjacent shoreline are crowded with people. The proposed project would result in temporary shoreline recreation impacts during construction but would not result in long-term recreation impacts.

3.12 Socio-Economic Setting

Kaaawa is a rural Oahu middle-class community with primarily modest homes and a very “local” population. Many families have lived here for generations. There is no business or commercial activity, except for a post office, gas station and 7-11 convenience store, and a small barbeque restaurant. The proposed project would not alter the existing community setting.

3.13 Scenic and Aesthetic Resources

The coastal highway along the Windward coast of Oahu is a very scenic drive, with the ocean view only occasionally obstructed by homes. The proposed revetment crest would be the same as the highway elevation, so it would not obstruct the view. While the revetment would have an obvious man-made look to it, it would be constructed of native basalt rock and would not look unlike much of the rocky windward coast. Numerous locations on the Windward coast have rock revetment protection for the highway, and this project would look the same.

3.14 Public Infrastructure and Services

3.14.1 Transportation

Kamehameha Highway extends from Kaneohe near the east end of the island along the northeast (Windward) coast to the North Shore town of Haleiwa. It is the only highway connecting the coastal communities of Kaneohe, Kahaluu, Kaaawa, Punaluu, Hauula, Laie, and Kahuku. The HDOT records the Annual Average Daily Vehicle Traffic count as 13,000 vehicles. It is the primary access for police, fire, and emergency medical vehicles. If the ongoing erosion forces closure of the highway at the project site all vehicles would have to detour through narrow backshore residential streets to bypass the closure, including trucks, busses, emergency vehicles, and commuters going to work. The proposed project would eliminate this possible significant impact on transportation in Kaaawa.

Project construction will require some closure the closure of the northbound (makai) lane during periods of active construction activity. Closure would be limited to the hours of 8:30 am to 3:30

pm Monday – Friday. No work would be permitted on weekends or State holidays. A traffic control plan will be utilized to manage traffic flow during periods of the lane closure.

3.14.2 Water

The Honolulu Board of Water Supply (BWS) is responsible for Oahu’s municipal water system, an integrated, island-wide system with interconnections between water sources and service areas. No BWS pipelines or other facilities are present on the makai side of the highway or in the construction area.

3.14.3 Telecommunication and Electric Power

Telecommunication and power lines are located mauka of the highway and would not be affected by the proposed project. One power pole guy wire pole is located on the makai side within the project footprint, and temporary stabilization of the power pole will be required during construction. The existing guy wire configuration will be replaced following the completion of construction.

3.14.4 Schools

Kaaawa Elementary School is located immediately makai of the project site. Construction activity will result in some noise and access impacts to the school. Construction noise mitigation measures as discussed in section 3.9.2 will be utilized.

3.14.5 Police, Fire, and Emergency Medical Services

The Kaaawa area is served by the Honolulu Police Department District 4, which covers the area from Waimanalo to Kahuku. The Kaneohe Substation is located approximately 11 miles south of the project site. The Kaaawa Fire Station is located immediately north of the project site, and also provides emergency medical services. The nearest medical clinic (Kaiser Koolau) is located in Kaneohe.

Potential highway damage and closure would adversely affect access and response time for emergency vehicles. The proposed project would eliminate this adverse impact.

4. RELATIONSHIP TO RELEVANT PLANS AND POLICIES

4.1 Hawaii State Plan

The Hawaii State Planning Act (Chapter 226 HRS) establishes a statewide planning system that provides goals, objectives, and policies that detail priority directions and concerns of the State. Specific objectives and policies of the State Plan that pertain to the project are as follows.

Section 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

- (a) Planning for the State’s physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:*
 - (1) Prudent use of Hawaii’s land-based, shoreline, and marine resources.*
 - (2) Effective protection of Hawaii’s unique and fragile environmental resources.*
- (b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:*
 - (1) Exercise an overall conservation ethic in the use of Hawaii’s natural resources.*
 - (2) Take into account the physical attributes of areas when planning and designing activities and facilities.*
 - (3) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*
 - (4) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.*
 - (5) Pursue compatible relationships among activities, facilities, and natural resources.*

Discussion: The project’s use of the area is consistent with State and County land use districts and zoning designations. No endangered plant species, animal species, or habitats are found in the project area. The project is not anticipated to pose threats to Native Hawaiian endangered plant or animal species or habitats. However, as noted in Section 3.7.1 the federally listed threatened green sea turtle may be found in the project area. NOAA-NMFS recommended turtle avoidance procedures will be utilized during construction to avoid potential impacts.

Construction activities will be limited to daylight hours and will not use construction work lights in order to avoid attracting seabirds or disorienting sea turtles. The project has minimal intrusion into the marine environment and is not anticipated to have significant or substantial impacts on environmental and marine resources.

Section 226-12 Objectives and policies for the physical environment – scenic, natural beauty, and historic resources.

- (a) Planning for the State’s physical environment shall be directed towards achievement of the objective of enhancement of Hawaii’s scenic assets, natural beauty, and multi-cultural/historical resources.*
- (b) To achieve the scenic, natural beauty, and historic resources objectives, it shall be the policy of the State to:*
 - (1) Promote the preservation and restoration of significant natural and historic resources.*

- (2) Promote the preservation of views and vistas to enhance the landscapes, and other natural features.*
- (3) Encourage the design of developments and activities that complement the natural beauty of the islands.*

Discussion: The project will not result in adverse impacts to existing scenic vistas or archaeological/historical resources at the project site. The proposed revetment crest elevation is the same as the adjacent shoreline/highway elevation, thus it will not block the seaward vista. The rock revetment will be similar in appearance to other nearby natural and manmade rocky shorelines. A historical/archaeological literature review was conducted for the project, and no effects on historical or archaeological resources are anticipated. The project involves minimal excavation on the shoreline.

Section 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.*
 - (b) To achieve the land, air, and water quality objectives, it shall be the policy of the State to:*
 - (1) Promote the proper management of Hawaii’s land and water resources.*
 - (2) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*
 - (3) Encourage design and construction practices that enhance the physical qualities of Hawaii’s communities.*

Discussion: The proposed project will eliminate the significant threat to important public infrastructure, the primary highway access for Windward Oahu communities, due to chronic shoreline erosion. The project is appropriately scaled and will not adversely affect coastal resources. Use of Construction Best Management Practices will minimize adverse effects to land, air, and water quality.

4.2 Hawaii State Land Use District

Under Chapter 205 HRS, all lands of the State are to be classified in one of four categories: urban, rural, agricultural, and conservation lands. The Urban district generally includes lands characterized by “city-like” concentrations of people, structures, and services. The Conservation district includes all coastal marine waters.

Discussion: The project site is located within the State Urban District, and the project is consistent with permitted uses for the Urban District. It will not require district reclassification to amend the existing land use designation. A portion of the revetment is also located in the Conservation District (Resource Subzone), and thus will require a Conservation District Use Permit from the State Department of Land and Natural Resources.

4.3 Hawaii Coastal Zone Management

The Coastal Zone Management Act of 1972 (16 USC Section 1451) created the coastal management program and the National Estuarine Research Reserve. The Hawaii Coastal Zone Management (CZM) Program received federal approval in the late 1970s. The objectives of the State's CZM Program as stated in Chapter 205A-2 HRS are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values, and recreational opportunities. The objectives are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone.

Discussion: The project is generally consistent with the CZM Program Objectives and policies.

Recreational Resources: Provide coastal recreational opportunities accessible to the public.

The project site is along a sandy shoreline within the area designated as Kaaawa Beach Park and under the jurisdiction of the City and County of Honolulu. The project area is a popular local recreation, gathering and shoreline fishing area. However, given that the project site shoreline is in a very degraded and unsafe condition, and contains numerous rocks and boulders, the shoreline revetment is not expected to significantly alter the existing recreational resources. (see Section 3.11)

Historic Resources: 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.

As discussed in Section 3.10 the Kaaawa area is mentioned in numerous legends beginning as early as the 1300's. In 1870 the majority of Kaaawa Valley became Oahu Plantation and later Kualoa Ranch. Kamehameha Highway was constructed as a paved automobile roadway in the late 1920s, on top of the 19th century coastal government road which in turn followed a pre-contact trail. Construction of the project would protect the highway and shoreline. Construction would entail very limited excavation in a dynamic and already heavily altered shoreline, thus discovery of archaeological remains or burials is considered unlikely. The project will be coordinated with the State Historic Preservation Division, and conditions/requirements they impose on the project will be followed. (see Section 3.10)

Scenic and Open Space Resources: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

The coastal highway along the Windward coast of Oahu is a very scenic coastal drive, with much unobstructed ocean view. The proposed revetment crest would be the same as the highway elevation, so it would not obstruct the view. While the revetment would have an obvious man-made look to it, it would be constructed of native basalt rock and would look similar to numerous existing locations on the Windward coast where the highway is protected by rock revetment. (see Section 3.13)

Coastal Ecosystems: Protect valuable coastal ecosystems, including reefs, beaches, and coastal dunes, from disruption and minimize adverse impacts on all coastal ecosystems.

The project is located within the State Conservation District, and a Conservation District Use Permit is required. The revetment will involve the placement of a small amount of stone on the shoreline below the mean higher high water line. The revetment would be constructed almost entirely landward of the water line, in an eroding and shifting sand shoreline essentially devoid

of marine life. Results of marine ecosystem investigations show the most abundant benthic biota to be algae, corals are rare, and fish communities lacking in numbers and variety. The lack of fish and the small size likely reflects heavy fishing pressure. The project will reduce erosion of the earthen shoreline and nearshore turbidity. Best Management Practices including environmental protection and turbidity containment barriers around active construction will be implemented to protect the coastal ecosystem. Recommendations of the U.S. Fish and Wildlife Service and NOAA-National Marine Fisheries Service will be followed for the protection of threatened and endangered species, such as the green sea turtle and Hawaiian Monk seal. (see Sections 3.6 and 3.7)

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

The project provides no economic facilities or improvements. However it does protect and maintain the only highway connecting the coastal communities of Kaneohe, Kahaluu, Kaaawa, Punaluu, Hauula, Laie and Kahuku, and their economic benefit. (see Sections 3.13 and 3.14)

Coastal Hazards: Reduce hazard to life and property from coastal hazards.

The Kaaawa area is subject to high waves, coastal flooding, potential tsunamis, and hurricanes. The proposed project would not affect the project area exposure to coastal hazards. The proposed erosion mitigation would, however, help protect the highway and maintain its useability for emergency vehicles during hazardous conditions. (see Sections 3.4 and 3.5)

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

The project requires the following primary Federal and State permits and approvals.

- Department of the Army (DA) permit for work in navigable waters of the U.S. A DA Nationwide Permit #3 (Maintenance) for the project was issued on November 23, 2021.
- An Environmental Assessment in accordance with HRS Chapter 343.
- A Conservation District Use Permit pursuant to HAR Title 13 Chapter 5.

The Kaaawa Community Association has been consulted and a virtual meeting held, and they have submitted a letter of support for the project. They have also stated their concern that the existing highway shoulder condition is a serious public safety hazard.

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

A Draft EA has been circulated for public review and comment, including to the Koolauloa Neighborhood Board and the Kaaawa Community Association. A virtual meeting was held with the Kaaawa Community Association to discuss the project. A public meeting will be held during processing of the State Conservation District Use Application. (see Section 6)

Beach and Coastal Dune Protection: Protect beaches and coastal dunes, and coordinate and fund beach management and protection.

The nearshore coastal processes are primarily driven by the prevailing trade wind waves and the nearshore bathymetry. As previously stated, the extensive shallow reef shelf and adjacent deep channel combine to create the prevailing nearshore circulation pattern and longshore sand transport in the project area. There is a steady shore-parallel (longshore) current that flows along

the beach in a north-to-south direction. This longshore current is generated by the mass flow of water-driven over the shallow reef by a persistent, short period, breaking waves from the prevailing trade winds. This relatively vigorous current terminates south of the project site as it flows off the shallow reef and into a small, slightly deeper (8-10 ft) basin just north of the cobble stream mouth deposit. Here, the current makes a U-turn as it empties into and flows back out through the submerged Kaaawa Stream channel. This current does not reverse direction but simply varies in intensity by increasing in velocity with increases in the offshore wave height. This longshore current is strongest during periods of large winter season north swell wave events. The narrow strand beach along the shore varies in width seasonally and depending on the strength of the longshore current. The project is located on a shoreline parcel and adjacent to Kaaawa Beach Park. The project will impact recreational activities and public access to the shoreline during construction, but post-construction the project is not expected significantly alter the existing shoreline activities. (see Sections 3.1 and 3.11)

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

The project would not involve the significant use of or have an affect on the development of marine or coastal resources.

4.4 City and County of Honolulu General Plan

The General Plan for the City and County of Honolulu (1992 Edition, amended in 2002, Revised General Plan submitted to the City Council April 2018) sets for the long-range objectives for the general welfare and prosperity for the people of Oahu and broad policies to obtain those objectives. The project is consistent with the applicable objectives and policies of the City and County of Honolulu Revised 2035 Oahu General Plan described below.

Natural Environment

Objective A: To protect and preserve the natural environment.

- *Policy 1: Protect Oahu's natural environment, especially the shoreline, valleys, and ridges from incompatible development.*
- *Policy 2: Seek the restoration of environmentally damaged areas and natural resources,*
- *Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive landforms, and existing vegetation, as well as plan for coastal hazards that threaten life and property.*
- *Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.*
- *Policy 8: Protect plants, birds, and other animals that are unique to the State of Hawaii and the island of Oahu and protect their habitats.*

Objective B: To preserve and enhance natural landmarks and scenic views of Oahu for the benefit of both residents and visitors as well as future generations.

- *Policy 2: Protect Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.*

- *Policy 4: Promote public access to the natural environment for recreational, educational, and cultural purposes and the maintenance thereof in a way that does not damage natural or cultural resources.*

Public Safety and Community Resilience

Objective B: To protect residents and visitors and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.

- *Policy 2: Require all developments in areas subject to floods and tsunamis, and coastal erosion, to be located and constructed in a manner that will not create any health or safety hazards or cause harm to natural and public resources.*

Culture and Recreation

Objective B: To protect, preserve and enhance Oahu's cultural, historic, architectural, and archaeological resources.

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

Objective D: To provide a wide range of recreational facilities and services that are readily available to residents and visitors alike, and to balance access to natural areas with the protection of those areas.

- *Policy 7: Ensure and maintain convenient and safe access to beaches, ocean environments, and mauka recreation areas in a manner that protects natural and cultural resources.*

Discussion: The project supports the objectives of the Revised General Plan Update, including:

- Protects existing highway infrastructure from damage due to chronic shoreline erosion.
- Eliminates a coastal safety hazard resulting from shoreline erosion.
- Does not affect scenic views from the coastal highway travel way.
- Does not affect natural or cultural resources.
- Construction Best Management Practices will be utilized to prevent adverse impacts on the natural environment.
- No impacts to historic/archaeologic sites are anticipated.
- Use of existing shoreline recreation opportunities will be maintained.

4.5 City and County of Honolulu Koolau Loa Sustainable Communities Plan

The Koolau Loa Sustainable Communities Plan (KSCP) (adopted January 2021) seeks to preserve Koolau Loa's country character and distinctive sense of "old Hawaii". It includes policies that define how community needs should be balanced with the protection and enhancement of Koolau Loa's spectacular natural, scenic, and cultural qualities. Pertinent subjects discussed in the KSCP include transportation, parks and recreation, and plan implementation.

Transportation - Transportation systems are addressed in the plan, including Kamehameha Highway as "*the only roadway linking the northerly windward Oahu coastline communities to the North Shore to the west and Koolau Poko to the southeast*" ... "*Planned highway improvements*

include a long-term bridge replacement program, shoreline reinforcement in areas such as Kaaawa, Punaluu, and Hauula where coastal erosion has impacted Kamehameha Highway...”

Parks and Recreation – The project site is adjacent to Kaaawa Beach Park, and is in the TMK designated as “Kaaawa Beach Park” and is under the jurisdiction of the C&C Department of Parks and Recreation. The developed portion of the park is approximately 2 acres immediately north of the project site. The park shoreline is subject to chronic erosion, and recent improvements to the park comfort station have been protected by a cemented rock revetment. While classified as an island-wide park, it functions more like a community gathering place. The park is very popular and very crowded on weekends. The proposed project does not directly affect the developed portion of the park. The project plan includes a stable 10-foot-wide road shoulder, which will provide much needed weekend roadside parking.

Implementation – The plan discusses means of accomplishing the desired policies, and an Implementation Matrix (Table 5-1 of KSCP) summarizes Policies and Guidelines. Pertinent Open Space and Natural Environment-Shoreline Areas policies include the following.

- *Maintain/enhance shoreline areas* – The project will stabilize a severely eroding shoreline.
- *Identify and protect endangered species habitats* – The project plan includes specific measures for the protection of endangered species, including green sea turtles and Hawaiian monk seals.
- *Maintain makai views along the coastal highway* – The revetment crest elevation is +8 feet, the same elevation as the highway and backshore, thus it will not affect the view from the highway.
- *Maintain and enhance public access to the shoreline and lateral access along the coast, including the provision of parking areas* – The project will not block lateral access along the shore. A 10-foot-wide highway shoulder will provide for roadside parking.
- *Implement strategies to protect unstable sandy beach areas that impact Kamehameha Highway along the Kaaawa shoreline* – The project purpose is to mitigate severe erosion that threatens Kamehameha Highway, and maintain this critical transportation infrastructure.
- *Implement management practices that protect nearshore coral reefs from damaging activities such as soil erosion* – The project will stabilize an eroding sand and soil shoreline and reduce suspended sediment and turbidity in nearshore waters.

4.6 Ola: Oahu Resilience Strategy

The Office of Climate Change, Sustainability, and Resiliency (OCCSR) was established in 2016 and tasked with tracking climate change science and its potential impacts, as well as developing a resiliency strategy. OCCSR published Ola: Resilience Strategy in May 2019. One of the Strategy goals is Pre-Disaster Preparation.

Discussion: The project site is directly exposed to natural hazards approaching from the north and east. The proposed project is consistent with the Strategy’s goals for pre-disaster preparation – protection against shoreline erosion and highway damage associated with natural hazards. The proposed revetment stone size design incorporates a Sea Level Rise (SLR) of 1.7 feet, presently estimated to occur by the year 2050. However, the project is not a response to possible future sea level rise.

5. CONSULTATION

5.1 Agencies Consulted

Consultation has been initiated with the following agencies and community groups.

Federal

U.S. Army Corps of Engineers, Honolulu District (Nationwide Permit #3 [Maintenance] issued November 23, 2021)

NOAA-National Marine Fisheries Service, Protected Resource Division (Essential Fish Habitat, Endangered Species Act)

U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office (Endangered Species Act)

State

Department of Land and Natural Resources, Office of Conservation and Coastal Land
State Senator Gil Riviere

City and County of Honolulu

Department of Planning and Permitting

Department of Parks and Recreation

Community Groups and the Public

Kaaawa Community Association

5.2 List of Agencies, Organizations, and Individuals Receiving Copies of the EA

The following agencies and organizations will be provided copies of the Final EA.

	<u>Receiving Draft EA</u>	<u>Comments Received</u>	<u>Receiving Final EA/FONSI</u>
<u>Federal Agencies</u>			
U.S. Army Corps of Engineers	X		X
U.S. Fish and Wildlife Service	X		X
NOAA- NMFS	X		X
<u>State of Hawaii Agencies</u>			
Dept. of Accounting and General Services	X		X
DBEDT-Office of Planning	X		X
Dept. of Health	X	X	X
Dept. of Land and Natural Resources (DLNR)	X		X
DLNR – DAR	X		X
DLNR – SHPD	X		X
DLNR – OCCL	X	X	X
HDOT – Highways Division	X		X
Office of Hawaiian Affairs	X		X
UH Environmental Center	X		X

State Senator Gil Riviere	X		X
State Representative Sean Quinlan	X		X
<u>City and County of Honolulu Agencies</u>			
Dept. of Design and Construction	X	X	X
Dept. of Facility Maintenance	X		X
Dept. of Planning and Permitting	X	X	X
Dept. of Parks and Recreation	X		X
Office of Climate Change, Sustainability and Resiliency	X		X
Council Member Heidi Tsuneyoshi	X		X
Kaaawa Community Association	X	X	X
Koolauloa Neighborhood Board	X		X
<u>Public</u>			
Douglas Meller			X

5.3 EA Preparers

The Kamehameha Highway at Kaaawa Erosion Mitigation DEA has been prepared by Sea Engineering, Inc. Mr. Scott P. Sullivan, MS Ocean Engineering, was the Principal-in Charge. Technical consultants included Marine Research Consultants Inc. (marine biology and water quality) and International Archaeology LLC (historical context and archaeology).

APPENDIX A

Baseline Assessment of Marine Water Chemistry and Biotic Communities

**BASELINE ASSESSMENT OF
MARINE WATER CHEMISTRY AND BIOTIC COMMUNITIES
KAMEHAMEHA HIGHWAY SHORELINE EROSION MITIGATION
AT KA'A'AWA, OAHU, HAWAII**

Prepared for:

Sea Engineering, Inc.
Makai Research Pier
41-305 Kalaniana'ole Hwy
Waimanalo, HI 96795

By:



MARINE RESEARCH CONSULTANTS, INC.

1039 Waakaua Pl.
Honolulu, HI 96822

May 2021

INTRODUCTION AND PURPOSE

Kamehameha Highway extends from Kaneohe near the east end of the island of Oahu along the northeast (windward) coast to the north shore town of Haleiwa. It is the only highway connecting the coastal communities of Kaneohe, Kahalu'u, Ka'a'awa, Punalu'u, Hau'ula, and La'ie, and is the primary access for police, fire, and emergency medical vehicles. The State Department of Transportation-Highways Division (DOT-H) records the Annual Average Daily Traffic count as 13,000 vehicles. Many portions of the highway follow the coastline, within feet of the waterline, and only a few feet above it. Coastal erosion and shoreline recession are an increasing threat to the highway. A 400 foot (120 meters [m]) section of Kamehameha Highway passing through the community of Ka'a'awa has become undermined as a result of both chronic and episodic coastal erosion. The undermining extends up to 3 m under the shoulder of the road, extending as far inshore as the makai shoulder stripe. This section of road is in danger of imminent failure and collapse. Sea Engineering, Inc. and AECOM are working with the State DOT-Highways to develop a plan for erosion mitigation to protect the highway.

The purpose of this document is to provide the results of a rapid ecological assessment (REA) of two aspects of the marine ecosystem fronting the affected area of Kamehameha Highway. Water chemistry was assessed by collecting a set of samples along three transects extending from the shoreline to the open coastal ocean directly fronting the project area. The physical composition of marine habitats as well as biotic community structure were also documented. One primary focus of the assessment of biotic communities is coral reef assemblages. As coral communities are both long-lived and attached to the bottom, they serve as the best indicators of the time-integrated forces that affect offshore reef areas. Evaluation of the existing condition of the water chemistry and marine communities provides an insight into the physical and chemical factors that influence the marine setting. Understanding the existing physical, chemical, and biological conditions of the marine environment provides a basis for predicting potential affects that might occur as a result of the proposed shoreline erosion mitigation.

II. METHODS

A. Water Quality/Chemistry

Water chemistry fieldwork was conducted on January 3, 2021, by swimmers working from shore. Water chemistry was assessed along three survey transects that spanned the length of the Kamehameha Highway shoreline mitigation site, and extended perpendicular to the shoreline originating at the sand-water interface of the beach for a distance of approximately 75 m offshore. Water samples were collected at four locations along each transect at distances of approximately 1, 10, 25, and 75 m from the shoreline (Figure 1). Such a sampling scheme is designed to span the greatest distance from shore that could potentially experience impacts from the shoreline work. Sampling was more concentrated in

the nearshore zone because this area receives the most terrestrial input, and hence is most important with respect to identifying the effects of shoreline modification. Owing to the shallow depth of the near-shore shelf (~ 2 m), only surface samples (within 20 centimeters [cm] of the surface) were collected.

Water quality constituents evaluated included all specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) (Open Coastal waters) of the State of Hawaii Department of Health (DOH) Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen ($\text{NO}_3^- + \text{NO}_2^-$, hereafter referred to as NO_3^-), ammonium nitrogen (NH_4^+), total phosphorus (TP), Chlorophyll a (Chl a), turbidity, temperature, pH, and salinity. In addition, dissolved silica (Si) and orthophosphate phosphorus (PO_4^{3-}) were also reported as these constituents are sensitive indicators of biological activity and the degree of groundwater mixing.

Laboratory analyses were conducted by Marine Consulting and Analytical Resources LLC (MCAR) (Lab number HI 00928). Analyses for Si, NH_4^+ , PO_4^{3-} , and NO_3^- were performed with a Seal Analytical AutoAnalyzer 3 HR (AA3HR) using standard methods for seawater analysis. TN and TP were analyzed in a similar fashion following digestion. Salinity was determined using a Mettler Toledo Seven Excellence Multi-parameter meter with an InLab 731-ISM conductivity probe.

Chl a was measured by filtering 150 ml through a GFF/F glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -20 °C for 24 hours. Fluorescence of the extract was measured with a Turner Designs Trilogy Fluorometer model 7200-000 equipped with an extracted chlorophyll non-acidification module. Salinity was determined using a Mettler Toledo Seven Excellence Multi-parameter meter with an InLab 731-ISM conductivity probe, calibrated to a Hach Instruments traceable salinity standard of 35.00 parts per thousand (‰ or ppt), 53.0 mS/cm, with a readability of 0.01 ppt. Turbidity was determined using a Hanna Instruments Model #HI88703 Turbidimeter and reported in nephelometric turbidity units (NTU) (precision of 0.01 NTU).

In situ field measurements of water temperature, pH, dissolved oxygen, and salinity were acquired using RBR Concerto CTDs calibrated to factory specifications. The CTD has a readability of 0.001°C, 0.001pH units, 0.001% saturation, and 0.001 ppt (salinity).

EPA and Standard Methods (SM) methods that were employed for chemical analyses, as well as detection limits, are listed in the Code of Federal Regulations (CRF) Title 40, Chapter 1, Part 136, are as follows:

NH_4^+ : EPA 350.1, Rev. 2.0 or SM4500-NH3 G, detection limit 0.042 µg/L.

$\text{NO}_3^- + \text{NO}_2^-$: EPA 353.2, Rev. 2.0 or SM4500-NO3F, detection limit 0.084 µg/L

PO_4^{3-} : EPA 365.5 or SM4500-P F, detection limit 0.28 µg/L.

Total P: EPA 365.1, Rev. 2.0 or SM4500-P E J, detection limit 0.93 µg/L.

Total N: SM 4500-N C., detection limit 1.96 µg/L.

Si: EPA 370.1 or SM 4500 SiO₂ E, detection limit 0.45 µg/L.

Chlorophyll *a*: SM 10200, detection limit 0.006 µg/L.

pH: EPA 150.1 or SM4500H+B, detection limit 0.002 pH units

Turbidity: EPA 180.1, Rev. 2.0 or SM2130 B, detection limit 0.008 NTU.

Temperature: SM 2550 B, detection limit 0.01 degrees centigrade.

Salinity: SM 2520, detection limit 0.003 ppt.

Dissolved Oxygen: SM4500 O G, and detection limit 0.01% sat.

All fieldwork was conducted by Dr. Steven Dollar and Ms. Andrea Millan.

B. Marine Biotic Community Structure

Physical and biotic composition of the survey area was assessed by divers using snorkel and working from shore. Dive surveys were conducted by swimming in a zigzag pattern from the shoreline to approximately 75 m offshore throughout the area that fronted the Kamehameha Hwy mitigation project area (Figure 1). During these underwater investigations, notes on species composition were recorded, and numerous digital photographs recorded the existing conditions of the area. The baseline assessment was conducted by Dr. Steven Dollar and Ms. Andrea Millan

III. RESULTS

A. Water Quality/Chemistry

1. Distribution of Chemical Constituents

Table 1 shows results of all water chemistry analyses on samples collected along three transects off Kamehameha Hwy shoreline mitigation project site on January 3, 2021. Several patterns of distribution are evident in Table 1. It can be seen that the dissolved nutrients, Si and NO₃⁻, display a progressive decrease in concentrations with distance from the shoreline. While not as consistent as Si and NO₃⁻ salinity displays the opposite trend, with lower concentrations in the nearshore samples (Table 1). Over the entire sampling area, the range in NO₃⁻ is approximately 5 µg/L, while the range of salinity is approximately 0.15 ppt.

As there were no streams discharging to the ocean at the time of the sampling, the horizontal gradients of Si, NO₃⁻, and salinity likely represent input of groundwater to the ocean near the shoreline. Low salinity groundwater, which typically contains high concentrations of Si and NO₃⁻, percolates to the ocean at the shoreline, resulting in a nearshore zone of mixing. In many areas of the Hawaiian Islands, such groundwater percolation results in steep horizontal gradients of increasing salinity and decreasing nutrients with increasing distance from shore. The gradients in the nearshore zone off the Kamehameha Hwy mitigation site in Ka'a'awa, however, are comparatively small, indicating only low volume groundwater discharge. PO₄⁻³ is also generally elevated in groundwater relative to ocean water. In the

data set collected off the Kamehameha Hwy mitigation site, there is a pattern of decreasing concentration of PO_4^{-3} with respect to distance from the shoreline suggesting some groundwater flux. Horizontal gradients of TN/TON and TP/TOP mirror the patterns of NO_3^- and PO_4^{-3} , respectively.

Ammonium nitrogen (NH_4^+) is usually not elevated in groundwater relative to ocean water. However, concentrations of NH_4^+ on the transects off of the Kamehameha Hwy mitigation site also show weak gradients of decreasing values with distance from the shoreline (Table 1). It is not evident if these gradients originate from groundwater discharge or biotic metabolic activity.

Similar to the patterns of dissolved inorganic nutrients (Si and NO_3^-), the distributions of turbidity and Chl *a* also display highest values near the shoreline, with diminishing values moving seaward (Table 1). Overall, values of Chlorophyll *a* are considered low with all values below 0.30 $\mu\text{g/L}$. The progressive decrease in values of turbidity and Chl *a* with distance from shore is likely a response to resuspension of fine-grained particulate material, including plant fragments, stirred by breaking waves in the nearshore zone. With decreasing wave energy and increasing water depth, turbidity in the water column decreases. Temperature and dissolved oxygen displays no gradient of consistent change across the transects (Table 1).

2. Compliance with DOH Criteria

State of Hawaii Department of Health Water Quality Standards (HDOH-WQS) that apply to the areas offshore of Kaanapali Beach Club area are listed as “open coastal water” in HRS Chapter § 11-54-6(b). Two sets of standards are listed depending on whether an area receives more than 3 million gallons per day (mgd) of freshwater input per shoreline mile (“wet standards”), or less than 3 mgd of freshwater input per shoreline mile (“dry”). As the Ka'a'awa shoreline area probably receives less than 3 mgd per mile, dry criteria were used for this evaluation.

The HDOH-WQS are also separated into three standards: geometric means, “not to exceed more than 10% of the time,” and “not to exceed more than 2% of the time.” As these classifications require multiple samplings, they cannot be used for a strict evaluation of whether waters at the sampling site were within compliance standards. However, these values provide a guideline to evaluate the overall status of sampled waters in terms of the relation with State standards.

It can be seen in Table 1 that none of the dissolved nutrient constituents exceeded State of Hawaii water quality standards for the most stringent percentage standard “not to exceed more than 10% of the time” criteria under dry conditions. However, all measured values of turbidity exceeded the 10% criterion on all three transects. The elevated concentrations of turbidity are likely a result of resuspension of fine-grained, naturally occurring sediment by breaking waves in the nearshore zone.

B. Coral Reef Community Structure

1. Physical Structure

The section of Kamehameha Hwy in Ka'a'awa where shoreline mitigation is planned abuts a steep eroded soil and rock escarpment that terminates in a sand beach (Figure 1). The sand extends through the intertidal zone where it abruptly transitions into a mixed sand and rubble zone (Figures 1 and 2). The sand and rubble zone extends seaward for the entire offshore range of the study area and beyond. With distance offshore, the amount of sand decreases while the amount of solid rock bottom increases (Figure 3). In the approximate center of the study area, off the terminus of Transect 2, an isolated aggregation of large rocks was piled on the bottom (Figure 3). It is not apparent if the rock pile is a natural feature or of human origin.

The entire sand/rubble/rock zone is shallow in depth, never exceeding approximately two m. The offshore area beyond the sand intertidal area displays is overall a homogeneous environment with little distinct zonation in physical structure in either the offshore or alongshore directions.

2. Biotic Community Structure

Biotic composition of the reef communities fronting the survey section of Kamehameha Highway can be generally considered an algal dominated system. Most of the sand and rubble/rock surfaces were covered with a variety of turf or filamentous algae (Table 2, Figures 4-5). The most common macroalgae is the invasive alien red alga *Acanthophora specifera*, which is ubiquitous throughout the Ka'a'awa reef flat. In the 50 years since its unintended introduction from Guam, *Acanthophora specifera* has become one of the most successful and abundant algae on Hawaiian reef flats. (Figure 4). Other common species were *Halimeda opuntia*, *Gracilaria salicornia*, *Asparagopsis taxifolia* and encrusting calcareous algae (Table 2, Figure 5).

Reef building corals occur throughout the rubble and rock zones, although colonies are generally isolated with no true accreting "reef structure." Over the entire survey area, it was estimated that stony corals accounted for no more than 1% of bottom cover. The most common corals are those typically found on shallow reef flats, including *Porites lutea*, *P. compressa*, *Pocillopora meandrina*, *P. damicornis*, and *Montipora* spp. (Table 2, Figures 6, 7 and 8). Some of the larger corals are truncated with flat upper surfaces, likely as a response to reaching the upper limit of growth in the shallow water column (Figure 8). Several corals were considered rare in occurrence, with only several observations. These rare corals included *Psammocora stellata* and *Cyphastrea ocellina* (Figure 9). While coral occurrence was generally sparse, there were several area at the outer limits of the study approximately 75 m from shore where mixed assemblages of several species occurred in a small area (Figure 10).

Other macro-invertebrates that were observed on the surface of the outer reef were several species of sea urchins (*Echinometra matheai*, *Echinothrix diadema*, *Tripneustes gratilla*, and *Heterocentrotus mammilatus*) (Table 2). The only urchin that was considered common was *Echinometra matheai* which bores into the limestone surface of reef rock. The only other

common non-coral invertebrate were sea cucumbers (*Actinopyga* spp.) which were observed on sand patches (Figure 10).

Reef fish were relatively uncommon on the reef flat, and the fish that were observed were generally small in size (less than 20 cm) (Table 3). The most common and conspicuous fish were the surgeonfish *Acanthurus nigrofuscus* and *A. triostegus* occupying the water column over the reef platform. Other commonly observed fish were five species of Labridae (wrasses) and the damselfish *Dascyllus albisella*. Of note is that butterfly fish (Chaetodontidae) were conspicuously rare over the entire reef. The relative paucity of fish, and the small size, is likely a response to heavy fishing pressure in the area.

Green sea turtles (*Chelonia mydas*) are commonly found within the nearshore areas of the northeast coast of Oahu. However, no turtles were observed during the present survey, although they undoubtedly occur on the reefs off the Kamehameha Highway site.

IV. DISCUSSION and CONCLUSIONS

The purpose of this assessment is to assemble the information to make valid evaluations of the potential for impact to the marine environment from the proposed shoreline erosion mitigation fronting Kamehameha Highway in Ka'a'awa, on the northeast shoreline of Oahu, Hawaii. Permanent shore protection is intended to prevent future erosion damage and avoid recurring efforts at temporary emergency protection measures. The information collected in this study provides a baseline data set that describes the physical, chemical and biotic composition of the area, as well as the processes driving such structure. Such information can be used to address any concerns that might be raised concerning effects to the marine environment that might arise during the planning process for the shoreline mitigation.

Results of this baseline study reveal that the composition of the nearshore area consists of a homogeneous shallow sand and rubble/rock reef flat. The predominant biotic composition of the area is a varied assemblage of filamentous macroalgae. The most common alga is the alien invasive species *Acanthophora specifera*, which occurs ubiquitously throughout the survey area. Beyond the nearshore zone, corals are present, but in relatively low abundance, most likely in response to shallow water depth, and effects of wave-generated energy which limits settlement and growth. Fish community structure was noticeably depauperate, likely in response to high fishing pressure.

Results of analyses of water chemistry indicate a small component of groundwater entering the ocean near the shoreline. The groundwater input is rapidly mixed to background coastal oceanic values through wind, wave and current action. The magnitude of effect from such terrestrial input is so low that it does not result in elevation above State of Hawaii DOH water quality standards. The only constituent with values above DOH limits is turbidity, which peaks at the shoreline and decreases steadily with distance from shore as a result of wave resuspension of naturally occurring bottom sediments. None of these factors are likely to be affected beyond the range of natural variability by the proposed erosion mitigation program.

In summary, it is not likely that the proposed action to stabilize shoreline erosion adjacent to Kamehameha Highway in Ka'a'awa would have any negative effect to existing biotic communities. Best Management Practices (BMPs) will be implemented to restrict or eliminate any transfer of terrigenous material to the marine environment. The nearshore sand and rubble zones extends seaward to a distance that is likely beyond the limit of influence of any shoreline activities. As the area is essentially an open coastline subjected to wind, waves, and tides, normal currents flush the area on a regular basis, preventing the buildup of any input of materials from land. In addition, biota inhabiting the area appear to be pre-adapted to resuspension of sediment as sand is a major component of the nearshore habitat. Perhaps most importantly, the ongoing erosion of the shoreline is likely causing some input of terrigenous material to the nearshore ocean. The proposed mitigation is intended to halt such erosion along with any associated detrimental effects. Thus, the proposed project has the potential to eliminate any such impacts, and may provide long-term improvement to both water quality and marine biota resources.

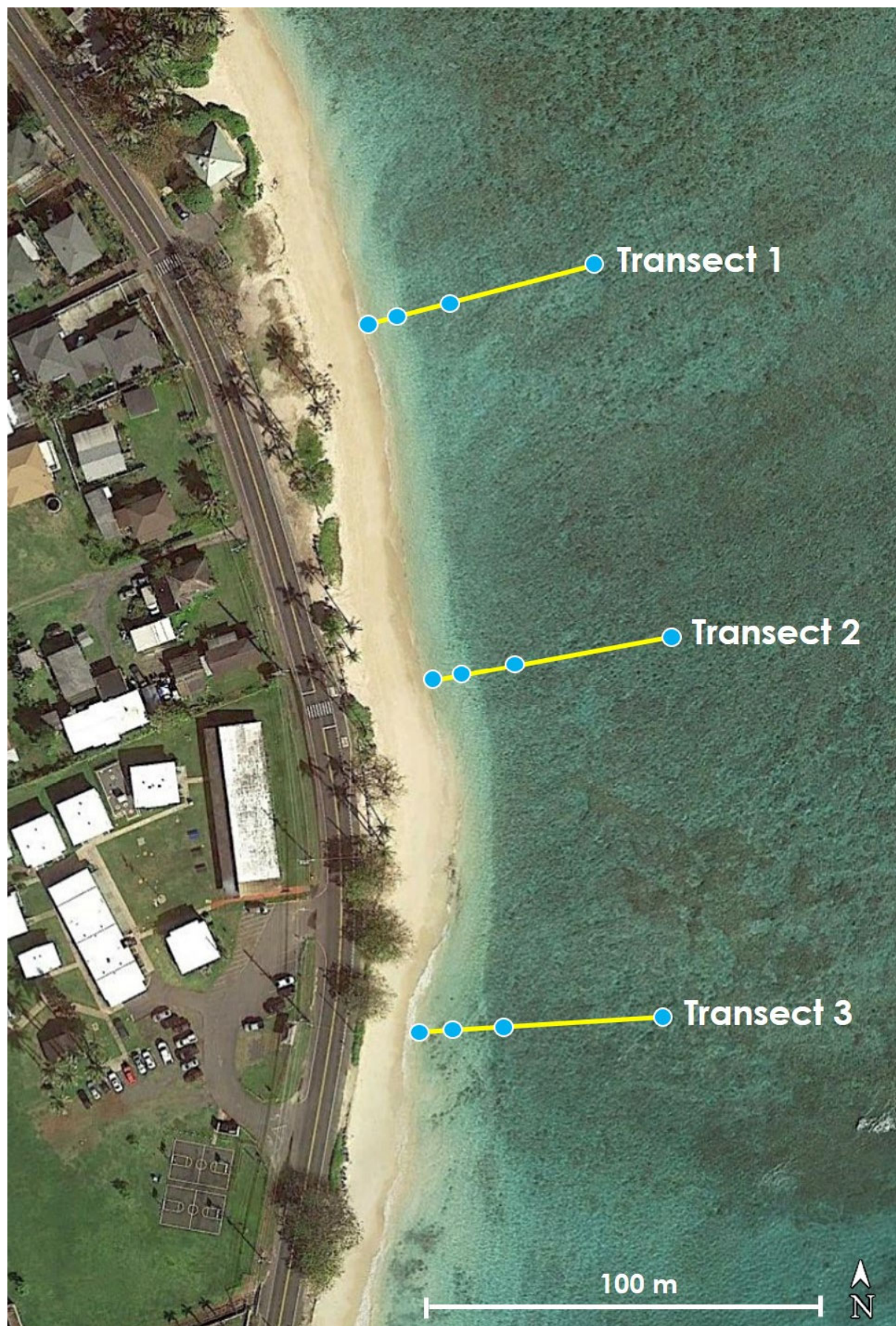


FIGURE 1. Aerial view of portion of Kamehameha Highway in Ka'a'awa, Oahu, Hawaii where shoreline erosion mitigation is proposed. Note that right side of highway abuts sand beach. Also shown are the locations of three water sampling transects. Water samples were collected along each transect at distances of 1, 10, 25 and 75 meters from shore (blue circles). Marine biological community structure was assessed from the shoreline to approximately 100 meters offshore.

TABLE 1. Results of water chemistry analyses from three ocean sampling transects in the vicinity of the Kamehameha Highway Shore Protection at Kawaaa Project. Samples were collected on January 3, 2021, 2021. See Figure 1 for locations of sampling stations. Also shown are DOH WQS for "open coastal waters" under "wet" and "dry" conditions, "not to exceed more than 10% and 2% of the time" criteria. Shaded values exceed the "not to exceed more than 10% of the time under dry conditions" standards.

SITE	DFS	DEPTH	PO ₄ ³⁻	NO ₃ ⁻ +NO ₂ ⁻	NH ₄ ⁺	Si	TP	TN	TOP	TON	TURB	SALT	pH	Chl-a	TEMP	Diss. O ₂
	(m)	(m)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(NTU)	(o/oo)	(std. units)	(µg/L)	deg. C	% sat.
T-1	1	0.1	4.40	4.05	1.47	97.68	12.00	80.84	7.42	90.22	2.07	34.69	8.02	0.30	24.70	100.5
	10	0.5	3.81	3.22	2.21	68.46	10.96	84.45	7.03	82.42	1.84	34.80	8.03	0.24	24.85	100.8
	25	1.0	3.50	2.16	1.16	56.46	10.52	87.29	7.31	76.98	1.73	34.72	8.04	0.26	24.79	98.9
	75	2.0	2.76	0.97	1.12	37.86	9.58	80.21	7.24	64.42	0.81	34.76	8.06	0.22	24.98	104.1
T-2	1	0.1	4.59	5.29	3.12	71.84	11.60	97.41	6.62	109.99	1.66	34.72	8.04	0.22	24.82	102.4
	10	0.5	2.88	2.69	1.90	51.57	10.11	89.88	7.02	101.45	1.06	34.76	8.05	0.21	24.84	103.9
	25	1.0	2.54	0.87	2.07	35.57	9.67	86.16	7.55	86.75	0.57	34.84	8.06	0.22	24.61	108.1
	75	2.0	2.57	0.75	1.71	34.40	9.88	87.15	7.33	89.72	1.08	34.84	8.07	0.20	24.40	104.6
T-3	1	0.1	4.43	3.01	4.77	67.62	11.17	91.87	8.38	101.94	2.09	34.80	8.05	0.22	24.24	104.6
	10	0.5	3.53	1.88	4.07	58.08	10.21	87.42	8.76	87.48	1.48	34.76	8.05	0.21	24.03	102.4
	25	1.0	2.76	BDL	1.60	37.16	9.90	84.42	7.81	74.36	1.28	34.84	8.07	0.19	24.10	101.4
	75	2.0	2.67	2.72	1.75	34.73	10.05	90.02	7.45	83.56	0.94	34.83	8.07	0.19	24.22	100.6
DOH WQS	DRY	GEOMEAN		3.50	2.00		16.00	110.00			0.20	*	**	0.15	***	****
		10%		10.00	5.00	-	30.00	180.00			0.50	*	**	0.50	***	****
		2%		20.00	9.00	-	45.00	250.00			1.00	*	**	1.00	***	****
	WET	GEOMEAN		5.00	3.50		20.00	150.00			0.50	*	**	0.30	***	****
		10%		14.00	8.50	-	40.00	250.00			1.25	*	**	0.90	***	****
		2%		25.00	15.00	-	60.00	350.00			2.00	*	**	1.75	***	****

* = Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

** = pH shall not deviate more than 0.5 units from a value of 8.1.

*** = Temperature shall not vary more than one degree C. from ambient conditions.

**** = Dissolved Oxygen not less than 75% saturation

DOH = Department of Health

µg/L = micrograms per liter

BDL = below detection limit

WQS = water quality standards

NTU = nephelometric turbidity units



FIGURE 2. Intertidal sand plains off Kamehameha Highway Ka'a'awa shoreline mitigation area (top). Transition for sand to mixed sand and rock/rubble zone that originates at seaward edge of sand plain (bottom).



FIGURE 3. Offshore rock/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area (top). Boulder pile in the at the offshore terminus of Transect 2 (bottom).

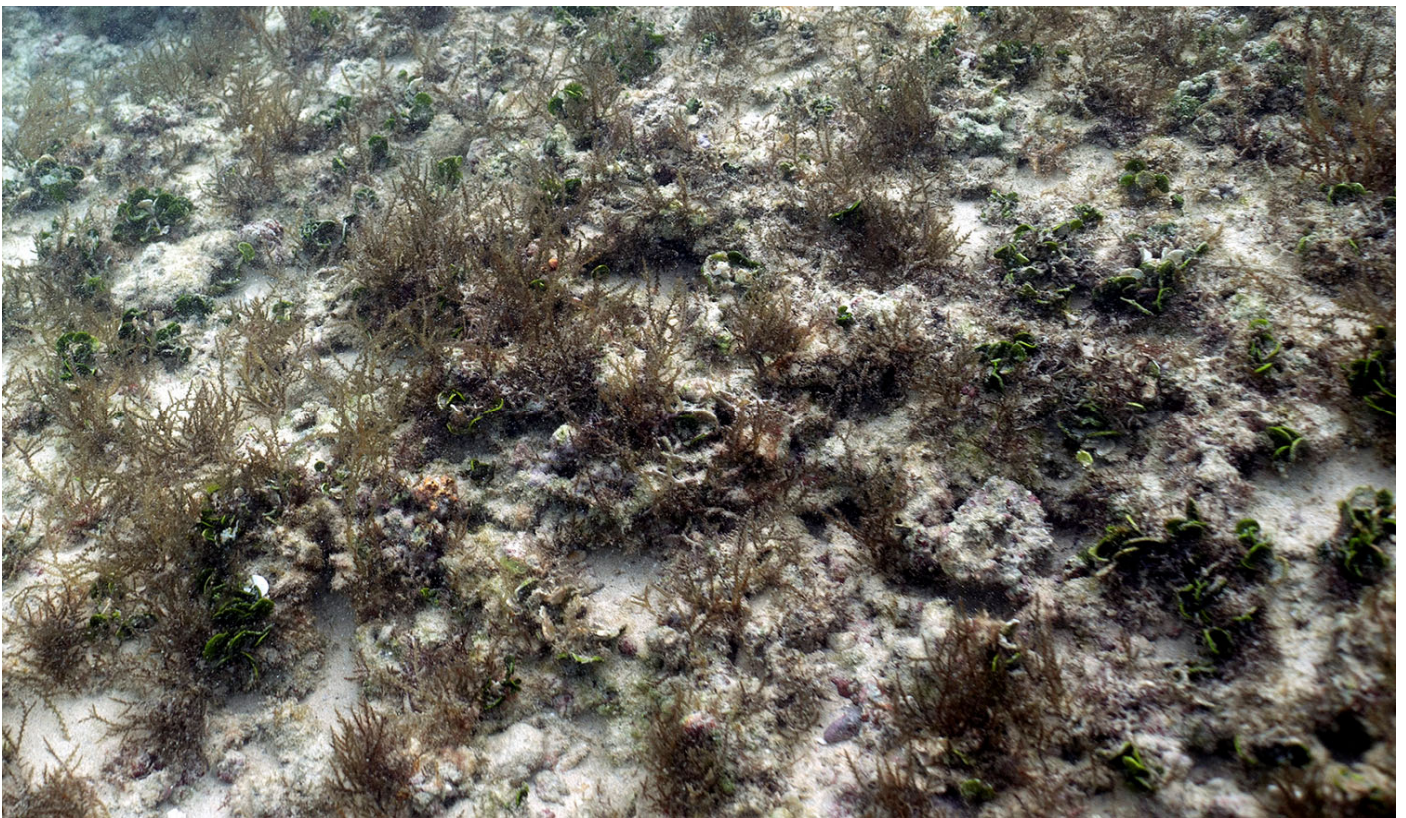


FIGURE 4. Dominant species of algae in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area: *Acanthophora specifera* and *Halimeda opunita* (top), *Acanthophora specifera* (bottom). Water depth is approximately 1.5 meters.

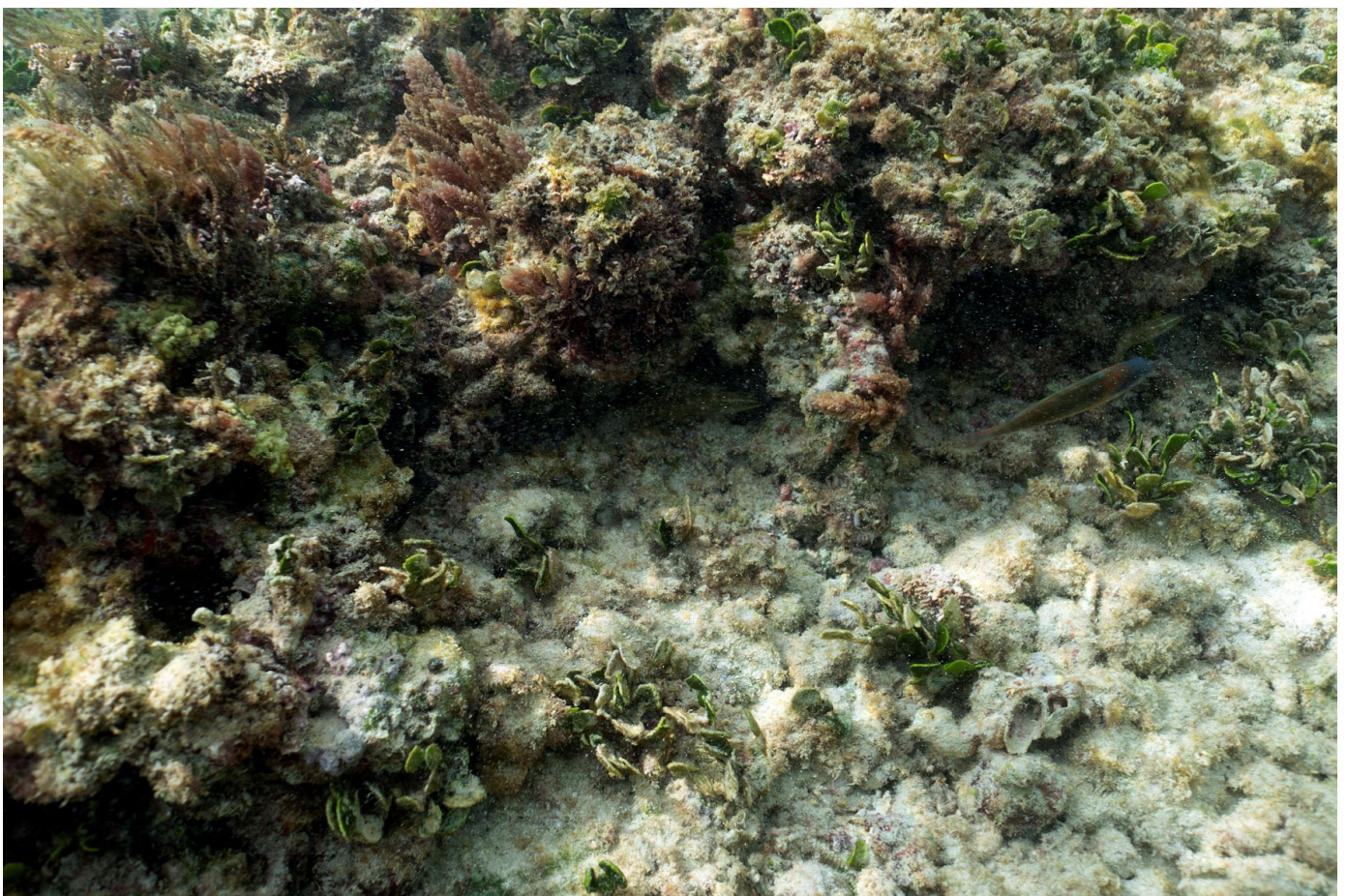


FIGURE 5. Mixed assemblages of common species of algae in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area. Water depth is approximately 1.5 meters.

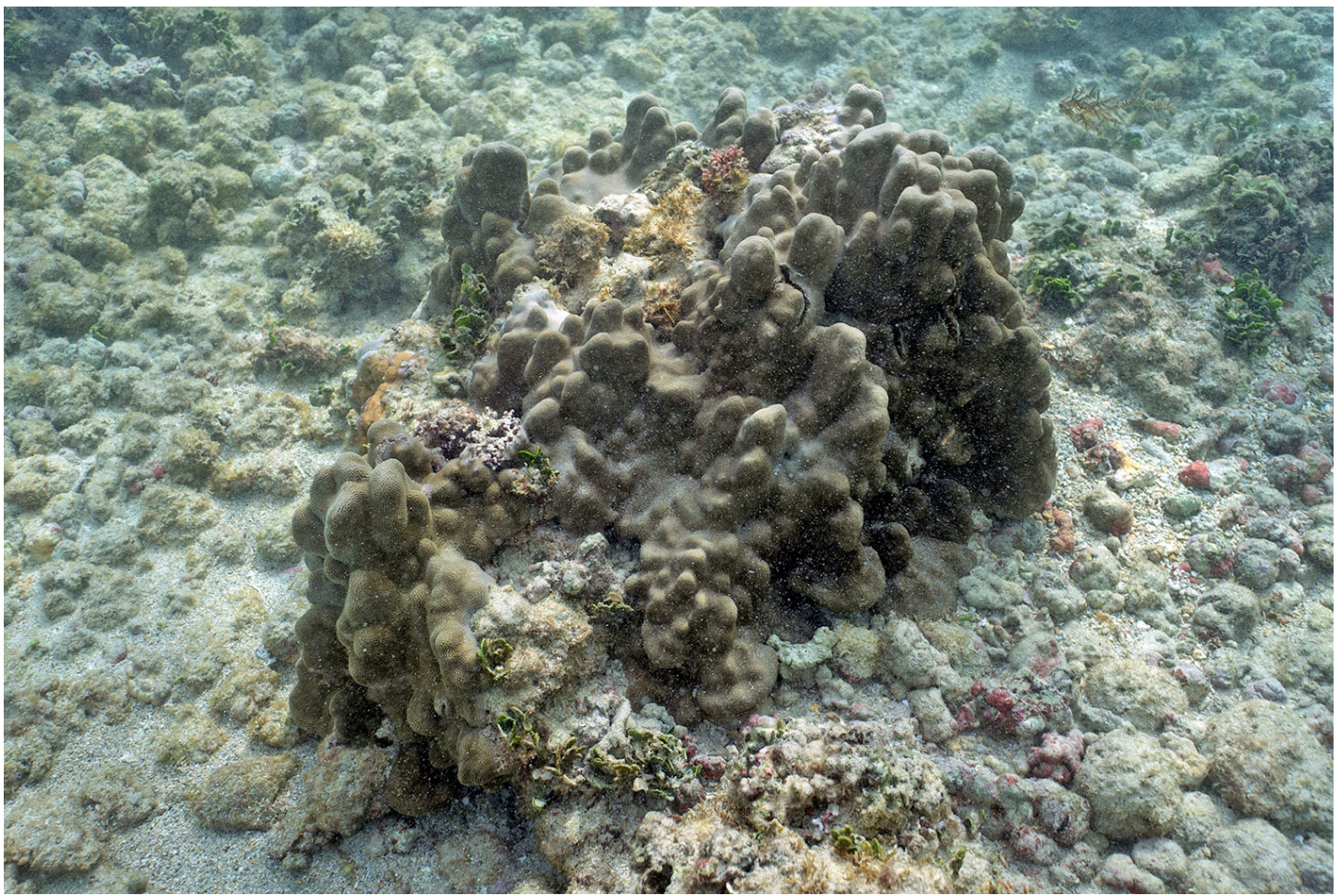


FIGURE 6. Common species of coral in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area: *Porites lutea* (top), *Porites compressa* (bottom). Water depth is approximately 2 meters.



FIGURE 7. Common species of coral in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area: *Pocillopora meandrina* (top), *Pocillopora damicornis* (bottom). Water depth is approximately 2 meters.

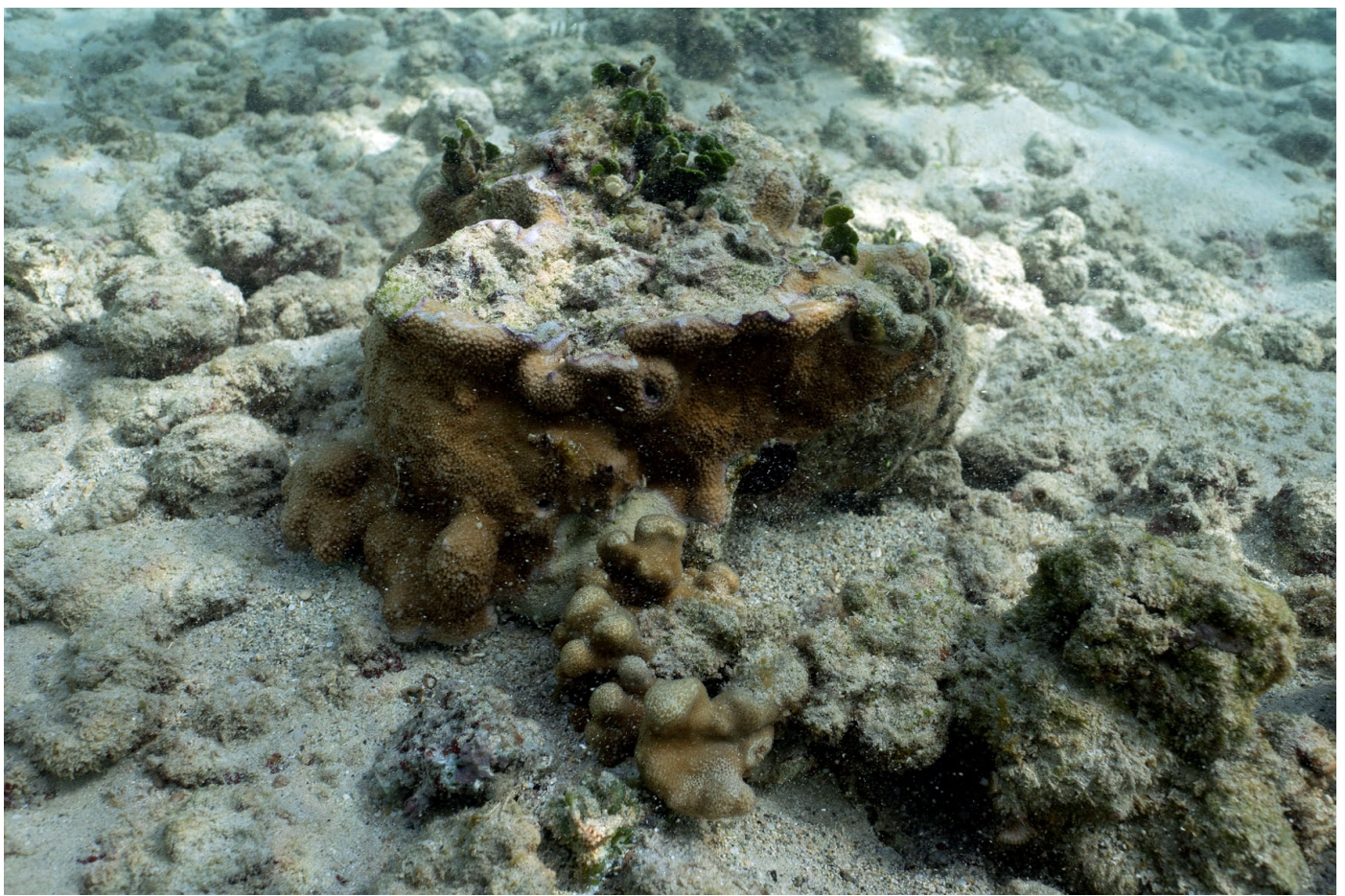


FIGURE 8. Common species of coral in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area: *Montipora capitata*, *Porites compressa* (top), *Porites lobata* (bottom). Water depth is approximately 2 meters.

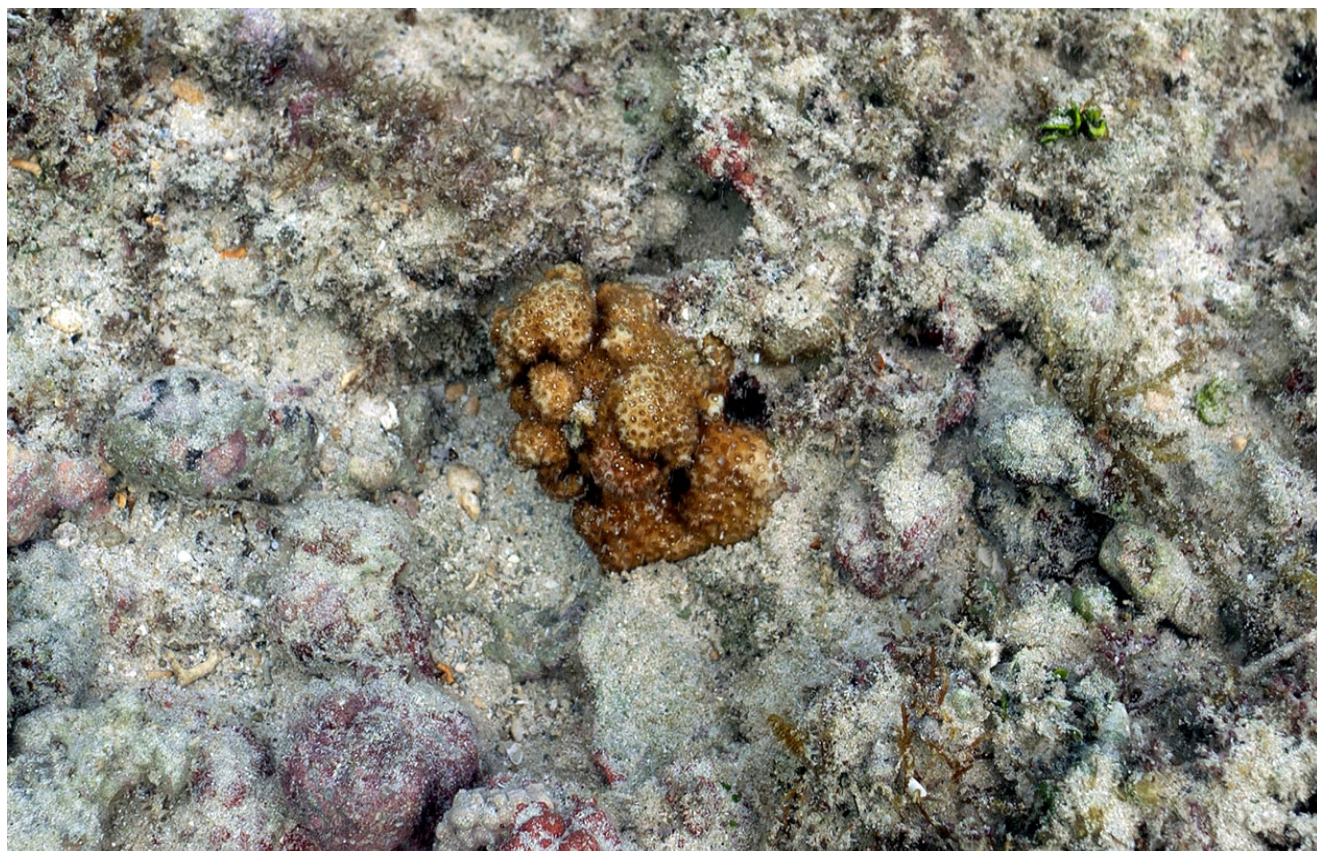


FIGURE 9. Uncommon species of coral in the sand/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area: *Psammocora stellata* (top), *Cyphastrea ocellina* (bottom). Water depth is approximately 2 meters.

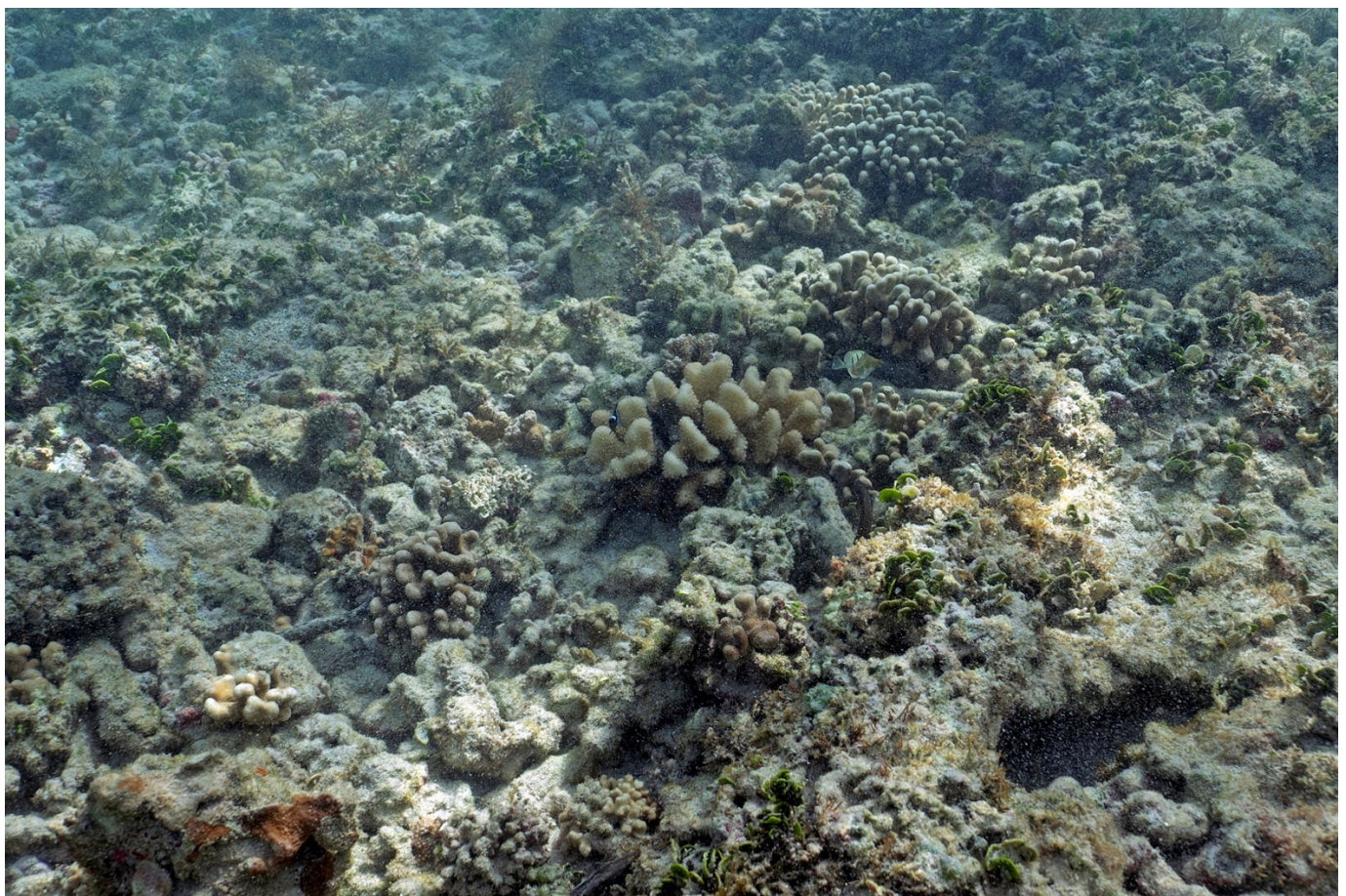


FIGURE 10. Mixed species of corals in the rock/rubble zone off Kamehameha Highway Ka'a'awa shoreline mitigation area (top). Sea cucumber *Actinopyga* sp. (bottom). Water depth is approximately 2.5 meters.

TABLE 2. Coral, algae and non-coral invertebrate species abundance off Kamehameha Highway at Ka'a'awa Erosion Mitigation area.

ALGAE SPECIES	ABUNDANCE
<i>Acanthophora spicifera</i>	Common
<i>Asparagopsis taxifolia</i>	Common
<i>Gracilaria salicornia</i>	Common
<i>Halimeda</i> spp.	Common
<i>Neomeris annulata</i>	Common
CORAL SPECIES	
<i>Cyphastrea ocellina</i>	Rare
<i>Montipora capitata</i>	Common
<i>Montipora patula</i>	Common
<i>Palythoa tuberculosa</i> *	Occasional
<i>Pocillopora damicornis</i>	Occasional
<i>Pocillopora meandrina</i>	Common
<i>Porites compressa</i>	Occasional
<i>Porites lobata</i>	Common
<i>Porites lutea</i>	Common
<i>Psammacora stellata</i>	Rare
NON-CORAL INVERTEBRATES	
<i>Tripneustes gratilla</i>	Rare
<i>Echinometra matheai</i>	Common
<i>Echinothrix diadema</i>	Rare
<i>Heterocentrotus mammilatus</i>	Rare
<i>Actinopyga</i> spp.	Rare
<i>Palythoa tuberculosa</i>	Rare
Sponges	Rare

TABLE 3. Fish species abundance off Kamehameha Highway at Ka'a'awa Erosion Mitigation area.

Acanthuridae (Surgeonfishes)	ABUNDANCE
<i>Acanthurus nigrofuscus</i>	Common
<i>A. triostegus</i>	Common
Labridae (Wrasses)	
<i>Cheilio inermis</i>	Rare
<i>Novaculichthys taeniourus</i>	Rare
<i>Stethojulis balteata</i>	Rare
<i>Thalassoma duperrey</i>	Common
<i>Thalassoma purpureum</i>	Rare
Ostraciidae (Boxfishes)	
<i>Ostracion meleagris</i>	Occasional
Pomocentridae (Damselfishes)	
<i>Dascyllus albisella</i>	Common
TOTAL FISH SPECIES	9

APPENDIX B

BEST MANAGEMENT PRACTICES PLAN

GENERAL REQUIREMENTS

This section covers the requirements of environmental and pollution control during construction activities. The Contractor shall be responsible for conformance to all appropriate State of Hawaii Statutes.

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. This includes Water Pollution, as defined by Hawaii Revised Statute Title 19, Chapter 342D.1.
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 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.

PROJECT RELATED PRACTICES

Material Management

1. All 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 materials shall be free from any objectionable sludge, oil, grease, scum, excessive silt, organic material or other floating material.
3. Only a minimum quantity of materials necessary for the work will be stored on site.
4. Mean higher high water (mhhw), also representing mean high water mark, will be marked along the shoreline prior to conducting operations to ensure that no unauthorized fill is placed, nor unauthorized equipment operated below mhhw.
5. All flammable and reactive liquids will be kept in sealed and clearly labeled original or compatible containers and stored under cover more than fifty (50) feet from the edge of the property and away from the nearest drain and receiving waters.
6. Storage and stockpiling area on land or onboard boats will be kept clean and well organized to prevent spills or run out.
7. Materials will be used in strict accordance with the manufacturer's instructions.
8. All asbestos-containing material must be double wrapped in plastic while wet, labeled as asbestos-containing material and disposed of in an approved asbestos landfill. Verification of proper handling and disposal shall be required. Transportation requirements for hazardous materials found in 49 CFR 172-177 shall be strictly followed.
9. Submit Material Safety Data Sheets (MSDS) for all hazardous materials to be brought to the work site. This includes, but is not limited to, paints, solvents, welding rods and fluxes, petroleum products, caulking, and sealant. This submittal shall also include a list showing the quantities of hazardous materials to be stored on-site.
10. Use of calcium chloride in any concrete is prohibited.

Waste Management

Note: No hazardous wastes are anticipated for this project.

1. A Solid Waste Disclosure Form must be completed and submitted to the HDOH in accordance with WQC0901. The form can be downloaded at:
<https://health.hawaii.gov/shwb/files/2013/06/swdiscformnov2008.pdf>
2. All waste will be collected and placed daily in the container located in the upland area inshore of the project area and then disposed of off-site.

3. The Contractor will arrange for pick up and disposal of the filled container as necessary.
4. Cleanup of waste will be conducted through sweeping, shoveling, or vacuuming operations only.
5. Pick up solid wastes, and place in covered containers which are regularly emptied. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged.
6. Manage spent hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, as per environmental law.
7. Non-hazardous or less hazardous materials should be used whenever possible.
8. Hazardous waste shall be placed in secondary containment.
9. Hazardous waste shall not be mixed with other waste and repair debris placed in the dumpster.
10. Flammable or reactive waste will be placed in a separate area more than 50 feet from the edge of the property, nearest drain inlet, and the shoreline.
10. The Contractor and the owner are responsible for the proper handling, storage and/or disposal of all waste generated by project activities.
11. Any construction 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 construction activity.
12. The Contractor shall not dispose of any concrete, steel, wood, and any other debris into State or Federal waters. Any debris that falls into the State and Federal water shall be removed at the Contractor's own expense.
13. No contamination (trash or debris disposal, alien species introductions, etc.) of marine (reef flats, lagoons, open oceans, etc.) environments adjacent to the project site shall result from project related activities.
14. The Contractor shall remove all floating or submerged materials and/or debris at the end of each day, with the exception of any silt or debris containment devices.
15. In the event that floating hydrocarbon (oil, gas) products are observed, the Contractor or his designated individual will be responsible for directing that in-water work be halted so that appropriate corrective measures are taken in accordance with the Oil Spill Response Plan. Work may continue only after the issue is no longer visible.
16. No contamination of the marine environment shall result from the permitted activities. Particular care must be taken to ensure that no petroleum products, trash or other debris enter

near-shore and open ocean waters. When such material is found within the project area, the Contractor, or his designated construction agent, shall collect and dispose of this material at an approved upland disposal site.

17. Waste materials and waste waters directly derived from construction activities shall not be allowed to leak, leach or otherwise enter marine waters.
18. All debris shall have a sheet of plastic under the pile and plastic over the pile to prevent exposure to rainwater and the generation of runoff into the existing drainage system.
19. A job site dumpster will remain on site throughout the duration of the project to collect any construction-related waste or debris.
20. Construction 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.
21. Care shall be exercised in the removal and transporting of debris and rubbish for disposal.
22. Any spillage on the work surfaces will be cleaned up immediately.
23. Loads will be covered when transported.
24. A debris containment device will be under the workspace to catch falling materials during work.
25. No debris shall be allowed to enter the water. The contractor shall provide a temporary platform or other suitable positive means of capturing debris from construction and demolition operations. These facilities shall be in place prior to starting demolition work.
26. Project site inspection and debris sweeps will be completed at the end of each work day. A full inspection of the project site will be conducted at the end of the project to ensure that no visible debris or project waste is present at the site upon completion of the project.

Vehicle and Equipment Management

1. Fueling operations will be monitored to prevent spills, leaks, and overflows. Equipment will be fueled away from any drain or shoreline. A spill pan will be used to catch spill/leaks. Equipment will not be “topped off.” Spill cleanup materials will be readily accessible.
2. Construction equipment (except small tools, generators, welders, etc.) shall be maintained off-site. If emergency repairs or maintenance on large equipment must be performed, drip pans or drop cloth will be placed under the vehicle or equipment to catch any spills/leaks.
3. Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. Manage all used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a

hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste.

4. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Wastewater shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basin unless treated to comply with the State Department of Health water pollution regulations.
5. Fuel tanks are required to have secondary containment in accordance with 40 CFR112 (SPCC). Secondary containment design includes but is not limited to berms and double wall construction.
6. An operators daily checklist shall be filled out prior to operation of equipment on a daily basis. Any leaks or deterioration of hoses shall be noted and corrected prior to operation on equipment. At the end of a shift, the manlift or equipment shall be positioned or located away from nearby drains and drip cloth shall be placed under the equipment. Spill kits shall be staged within close proximity to the manlift or equipment.

Historic or Cultural Features

1. No adverse impacts to any historical or cultural feature are expected since the project involves only minimal excavation or alteration of existing fast land inland of the shoreline.
2. 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.

Environmental Protection

1. All permits and clearances shall be obtained prior to the start of any construction activities. The Contractor and his sub-contractors shall ensure that all construction work complies with all permit conditions and commitments made with environmental agencies.
2. Any project related debris that may pose an entanglement hazard to protected species must be removed from the project site if not actively being used and/or at the conclusion of construction activities.
3. All construction activities shall be confined to areas defined by the drawings and specifications. No project materials shall be stockpiled in the marine environment outside of the immediate project area.
4. Visual inspections will be documented with photographs and written descriptions, if necessary.
5. The Contractor shall perform the work in a manner that minimizes environmental pollution and damage as a result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected

during the entire duration of the construction activities.

6. The contractor shall complete daily inspection of equipment for conditions that could cause spills or leaks; clean equipment prior to operation near the water; properly site storage, refueling, and servicing sites; and implement spill response procedures and stormy weather preparation plans.
7. The project shall be completed in accordance with all applicable State and County health and safety regulations.
8. 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.
9. Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.
10. Do not intentionally disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.
11. Provide and maintain, during the life of the contract, environmental protection measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Protected Species

1. The project manager shall designate a competent observer, who has been apprised of any listed species potentially present in the project area and the protections afforded to those species under federal laws, to survey the marine areas adjacent to the proposed action for ESA-listed marine species, including but not limited to the green sea turtle, hawksbill sea turtle, and Hawaiian monk seal.
2. Constant vigilance shall be kept for the presence of Federally Listed Species.
3. Visual surveys for ESA-listed species shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one-half hour, to ensure that no protected species are in the area (typically within 50 yards of the proposed work). During the survey period, the Observer shall record the environmental and project-related information, including but not limited to date, time, weather, action undertaken, and any ESA-listed marine animals. If no ESA-listed marine animal is sighted during the survey period, the project activities may commence. If an ESA-listed marine animal is sighted during the survey period, the Observer shall alert the on-site construction supervisor immediately, and the animal shall be monitored continuously. If the animal is within 50 yards (150 feet) of construction activity,

animal behavior observations shall be recorded. Work may not commence until the animal departs the area voluntarily or after 30 minutes passed since the last animal sighting.

4. Work shall be postponed or halted when ESA-listed species are within 50 yards of the proposed work, and shall only begin/resume after the animals have voluntarily departed the area. If ESA-listed marine species are noticed after work has already begun, that work may continue only if there is no way for the activity to adversely affect the animal(s). For example, divers performing surveys or underwater work (excluding the use of toxic chemicals) is likely safe. The use of heavy machinery is not.
5. Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA listed species.
6. All on-site project personnel must be apprised of the status of any listed species potentially present in the project area and the protections afforded to those species under federal laws.
7. 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 808-835-4303. In Hawaii, any injuries incidents of disturbance or injury to sea turtles must be immediately reported and must include the name and phone number of a point of contact, the location of the incident, and the nature of the take and/or injury. The incident should also be reported to the Pacific Island Protected Species Program Manager, Southwest Region (Tel: 808-973-2987, fax: 808-973-2941).
8. Before any equipment or material enters the water, a responsible party shall verify that no ESA-listed species are in the area where the equipment or materials are expected to contact the substrate.
9. All objects lowered to the bottom shall be lowered in a controlled manner. This can be achieved through the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of decent.
10. 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.
11. Should protected species enter the area while in-water work is already in progress, the activity may continue only when that activity has no reasonable expectation to adversely affect the animal(s).

Oil and Spill Containment

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

2. Any spills or other contaminations shall be immediately reported to the DOH Clean Water Branch (808-586-4309) and through email: cleanwaterbranch@doh.hawaii.gov.
3. Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with temporary berms or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 2 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.
4. Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release.
5. Maintain spill cleanup equipment and materials at the work site. Clean up all hazardous and non-hazardous waste spills.

Monitoring/Measures for Visually Detected Containment

1. All work operations shall be performed in conformance with the applicable provisions of the Hawaii Administrative Rules (HAR), Title 11 Chapter 55 Water Pollution Control and Title 11, Chapter 54 Water Quality Standards, and to the Erosion and Sedimentation Control Standards and Guidelines of the Department of Public Works, State of Hawaii.
2. The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface or marine waters. Daily visual inspection of the construction site and its environs will be conducted to verify that the permitted activities do not result in uncontrolled adverse environmental impacts. Visual inspections will be documented with photographs, a photo orientation map, and written descriptions, if necessary.
3. Daily Inspection: The project site will be inspected daily to ensure BMP's are maintained to confine and isolate potential pollutants from being discharged into surrounding areas. The site will be inspected to ensure that materials are properly stored, rubbish is being collected and disposed of properly, etc.
4. Deficiencies identified by daily inspections shall be corrected immediately. Work activities will stop and remain stopped until the deficiencies have been corrected.

Water Quality Monitoring (If Applicable)

1. The Contractor shall follow the accepted Water Quality Monitoring Plan and Applicable Monitoring and Assessment Program.
2. The Contractor shall incorporate all erosion control measures shown in the drawings and the BMPP for this project. The plans may be modified as necessary to adjust to conditions that

develop during construction. Any changes to the BMPP must be submitted immediately to the DOH for review. The project may only proceed after DOH issues a written acceptance of the modified BMPP.

3. Turbidity outside the active project site shall not exceed the baseline turbidity geometric value. The Contractor shall cease all work if unusual turbidity is observed and take the necessary remedial action to correct the problem.
4. Applicable Water Quality Monitoring and Assessment Program: Trained professionals (with degrees in marine sciences) will be conducting the monitoring, including pre-construction, during construction and post-construction monitoring. Monitoring and sample testing shall comply with the DOH CWB – “General Monitoring Guideline for Section 401 Water Quality Certification Projects.”

Erosion and Sediment Control Measures

1. A silt curtain as shown on the construction plans will be installed around the project area.
2. Silt curtains and/or silt fences will be individually anchored and regularly inspected during project operations.
3. Silt curtains and/or silt fences will be left in place each night. All anchors will be inspected prior to sunset.
6. Visual inspections will include monitoring of the effectiveness of the debris containment device and silt curtain to ensure proper function.
7. Visual inspections will be documented with photographs and written descriptions, if necessary.
8. Construction shall not be done during storms or periods of high surf.
9. Visual monitoring will include ongoing inspections for turbidity outside of the confines of the silt curtains. In the event that turbidity is observed outside of the silt curtains, work shall stop and the silt curtains shall remain in place until the turbidity dissipates. Silt curtains shall be inspected after dissipation and prior to returning to construction operations.
10. 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, fences, or other silt contaminant devices as required to correct the problem.
11. Should excessive siltation or turbidity, as defined in HAR Title 11 Chapter 54.4 and HAR Title 11 Chapter 54.6, result from the Contractor's method of operation, the Contractor shall install additional silt curtains or other silt contaminant devices as required to correct the problem.

Noise Control

1. Best management practices shall be utilized to minimize adverse effects to air quality and noise

levels, including the use of emission control devices and noise attenuating devices.

2. Noise shall be kept within acceptable levels at all times in conformance with HAR Title 11 Chapter 46 Community Noise Control, State Department of Health, Public Health Regulations. The contractor shall obtain and pay for a community noise permit from the State Department of Health when equipment or other devices emit noise at levels exceeding the allowable limits.
3. Equipment shall be equipped with suitable mufflers to maintain noise within levels complying with applicable regulations.
4. Starting of equipment meeting allowable noise limits shall not be done prior to 7:00 a.m. without prior approval. Equipment exceeding allowable noise limits shall not be started up prior to 7:30 a.m. Equipment meeting allowable noise limits shall not be operated after 10:00 p.m. without prior approval.
5. Make the maximum use of low-noise-emission products, as certified by the EPA.

Dust Control

1. If necessary, containment methods shall be employed to prevent uncontrolled release of dust or debris outside the designated construction and/or abatement control barriers/boundaries.
2. Dust, which could damage crops, orchards, cultivated fields, and dwellings, or cause nuisance to persons, shall be abated and control measures shall be performed. If there is dust, standard dust mitigation procedures will be used.
3. 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.
4. 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.
5. Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, flooding, or pollution. Vacuum or sweep the work area daily.

Air Pollution Control

1. Emission: The Contractor shall not be allowed to operate equipment and vehicles that show excessive emissions of exhaust gases until corrective repairs or adjustments are made.
2. The contractor shall not use nighttime lighting at the project site so as so not disorient any birds.

Operational Controls

1. This plan will be reviewed with the project field staff prior to the start of work.
2. All activities significantly impacting the environment will not begin until appropriate BMP's are properly installed.
3. Construction will be immediately stopped, reduced or modified; and/or new or revised BMP's will be immediately implemented as needed to stop or prevent polluted discharges to receiving waters. New or revised BMP's will be approved by appropriate regulatory agencies prior to re-commencing work.
4. The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. Submit copies of all regulatory notifications to the Contracting Officer prior to the commencement of work activities.
5. The Contractor is responsible for meeting all permit requirements and including how they will be addressed in the work plans. The Contractor will provide the personnel, materials, and equipment necessary to meet the permit requirements for the project.

Structure, Authority, and Responsibility

1. The Project Manager/Superintendent/Project Engineer will ensure compliance with this plan.
2. The Project Manager/Superintendent/Project Engineer will appoint and train one (1) additional individual to properly install all BMP's and to comply with all aspects of this plan.
3. The Property Owner(s) is also responsible for compliance to the BMPP.

Training

1. Employees will be instructed in the proper installation of the BMPP materials.
2. BMP's will be covered in a toolbox safety meeting.
3. BMP's will be discussed, as applicable, for each new phase of work.
4. Train each employee performing work that disturbs lead, who performs MCL/PWL disposal, and air sampling operations prior to the job in accordance with 29 CFR 1926.21, 29 CFR

1926.62, and State and local regulations where appropriate.

Inspection and Monitoring

1. The Project Manager/Superintendent/Project Engineer or the assigned trained individual will conduct a visual inspection of all BMPP's daily.
2. All minor repairs and maintenance of the BMP's will be completed within 48 hours of detection. Major repairs of BMP's shall be completed as soon as practical, and in-water work shall be stopped until repairs are complete.
3. If any BMPP is damaged, work will immediately be stopped and shall not resume until repairs to the BMPP have been completed.

Emergency Procedures

1. Natural disaster-related pollutant discharge: See Contingency Plan
2. Spill prevention and control: See Emergency Spill Response Plan.

Record Keeping and Documentation

1. A copy of this plan will be kept on site.
2. All BMP inspection reports will be kept on site.

Suspension of Work

1. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Technical Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due to the Contractor for remedial measures to correct the offense. Also, no extension of time will be granted for delays caused by such suspensions.
2. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by the Owner, the Owner reserves the right to take whatever action is necessary to correct the situation and to deduct all cost incurred by the Owner in taking such action from monies due to the Contractor.
3. The Owner may also suspend any operations which they feel are creating pollution problems although they may not be in violation of the above-mentioned requirements. In this instance, the work shall be done by force account.

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.

Contractor will follow this plan when a severe storm is either forecast or anticipated. Contractor 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.
2. 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 this BMPP. This includes BMPs for materials management, spill prevention, and erosion and sediment control.
4. 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.
4. 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.
5. 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.

Emergency Spill Response Plan

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 and resubmitted to the appropriate regulatory agencies.
- 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.

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.

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.

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 is 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 City & County of Honolulu 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 City & County of Honolulu and State regulations and manufacturer's instructions (if source of spill or release is known).

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.

Safe Distance Staging Area

- a. A staging area at a 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.

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.

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.

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 an 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.

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.

After the Spill Procedures

- a. The ERC will review what happened and implement changes, corrections, and/or improvements to prevent the 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.

Emergency Contacts

Control Tower, Port Operation, Pearl Harbor	<i>1-808-474-6262</i>
National Response Center (NRC)	<i>1-800-424-8802</i>
Coast Guard Operations Center, Honolulu	
(working hours)	<i>1-808-522-8264</i>
(after hours)	<i>1-808-927-0830</i>
Hawaii State Department of Health	
Hawaii Evaluation and Emergency Response (HEER)	<i>1-808-586-4249</i>
State Historic Preservation Division	<i>1-808-692-8015</i>
Honolulu Fire Department	<i>911</i>
In the event that a release enters the storm or sewer system, the ERC will immediately notify NRC and HEER	<i>1-808-935-2785</i>
Project Manager, State DOT-Highways <i>TBD</i>	<i>1-808-TBD</i>
Scott Sullivan, Design Engineer and Permit Agent, Sea Engineering, Inc.	<i>1-808-460-3437</i>

ATTACHMENTS:

- 1. Inspection and Maintenance Report Form**
- 2. Pac-SLOPES General Conditions**
- 3. Pac-SLOPES Activity-Specific Conditions**

Best Management Practice Plan (BMPP)
Inspection and Maintenance Report Form

Report No. _____ Weather: _____ Date: ____/____/____

Activities: _____

Type of Report: ☐ Daily ☐ Weekly ☐ Other: _____

DUST CONTROL MEASURES:	YES	NO	N/A
Are adequate dust control measures employed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the nearshore waters and travel ways kept clean of waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the loads in the truck beds covered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUST CONTROL MEASURES REQUIRED:			

IN-WATER CONFINEMENT MEASURES:	YES	NO	N/A
Are silt curtains deployed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are stakes placed in correct locations and orientation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are joins between curtain segments securely connected?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is turbidity apparent outside of the silt curtains?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do the turbidity values at the IDU exceed the thresholds?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the control measures adequate to prevent water and/or sediment from being discharged into the ocean?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IN-WATER CONFINEMENT MEASURES REQUIRED:			

PROTECTION AROUND CRITICAL AREAS:	YES	NO	N/A
Is there someone on-site during construction to monitor for endangered species?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did the on-site observer observe any protected and/or endangered species (i.e. green sea turtle, hawksbill sea turtle, Hawaiian Monk seal, etc.) prior to start of work? Time and Description: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If protected and endangered species present, were photographs taken to assist with identification of the protected and endangered species?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If protected and endangered species present, was work ceased until the species voluntarily left the project site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If protected and endangered species present, were any agencies notified of the species? If yes, agency: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have any historic properties been identified in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROTECTION OF CRITICAL AREAS REQUIRED:			

HOUSEKEEPING:	YES	NO	N/A
Are areas kept clean of rubbish, construction debris, spills, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is waste frequently vacuumed/cleaned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOUSEKEEPING REQUIRED:			

MATERIAL/WASTE MANAGEMENT:

Are materials stored under shelter or covered and above ground?
Are flammable/reactive materials stored properly?
Are material containers in good condition (not rusted, damaged or leaking)?
Are all construction debris collected and placed daily in the covered dumpster?

YES	NO	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CORRECTIVE MEASURES REQUIRED:

VEHICLE AND EQUIPMENT MANAGEMENT:

Are vehicles and equipment cleaned before being brought on-site?
Is equipment fueled away from any drain or the shoreline?
Are spill cleanup materials readily accessible?
Is all equipment leak free or if leaking, a spill pan placed to catch the leaks?

YES	NO	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CORRECTIVE MEASURES REQUIRED:

PUBLIC PROTECTION:

Are protective measures installed around the work site to prevent pedestrians from entering?
Are there signs informing the public of the project activities?

YES	NO	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

MAINTENANCE PUBLIC PROTECTION REQUIRED:

Photographs shall be date stamped and attached to the applicable Report Form.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Inspected by: _____ Title: _____

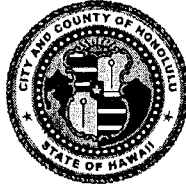
Signature: _____ Date: ____/____/____

APPENDIX C

DEA REVIEW COMMENTS AND RESPONSES

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honolulu.gov • CITY WEB SITE: www.honolulu.gov



RICK BLANGIARDI
MAYOR

DEAN UCHIDA
DIRECTOR

DAWN TAKEUCHI APUNA
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

February 7, 2022

2022/ELOG-67(ST)

Mr. Scott P. Sullivan
Sea Engineering
41-350 Kalanianaʻole Highway
Waimanalo, Hawaii 97795

ssullivan@seaengineering.com

Dear Mr. Sullivan:

SUBJECT: Draft Environmental Assessment (EA)
Chapter 343, Hawaii Revised Statutes (HRS)
Kamehameha Highway Erosion Mitigation
51-329 Kamehameha Highway - Kaaawa
Tax Map Key 5-1-002: 025

The following are our comments on the Draft EA for the above Project:

1. Project Information Summary: The summary in the Final EA should list the City and County of Honolulu, Department of Parks and Recreation as the owner of the Project site, which is the 65,340-square-foot parcel referred to as Kaaawa Beach Park.
2. Section 1.7 Required Federal and State Approvals, and Applicable Regulatory Requirements: The site is located within the Special Management Area (SMA). Section 1.7 must be expanded to discuss the applicability of the SMA Ordinance, Chapter 25, Revised Ordinances of Honolulu (ROH), and address any approvals necessary to comply with SMA requirements. An exhibit showing the location of the SMA boundary relative to the Project site, should also be included.

In addition, the location of the regulatory shoreline, as defined by the State Coastal Zone Regulations Chapter 205A-1, HRS, must be shown (i.e., a revised Figure 2-1, p. 12). A discussion of the applicability of the Shoreline Setback Ordinance Chapter 23, ROH, which generally prohibits all structures (i.e., artificial hardening), especially those with sand beaches, should be included in the Final EA.

3. Section 4.3 Hawaii Coastal Zone Management (CZM): The "Discussion" in the Final EA should be expanded to comprehensively address the Project's consistency with each of the Objectives and Policies of the State CZM regulations, Chapter 205A-2, HRS. Section 4.3 should disclose that Act 16 (2020) State Legislature of Hawaii amended the CZM regulations on September 15, 2020, which among other changes, enhanced the *Beach Protection* policy (Section 205A-2(c)(9)(C) HRS) to minimize the construction of public shoreline hardening structures at sites having sand beaches.

The Final EA should include the Mayor's Directive 18-02 issued on July 16, 2018, which requires all City Departments and Agencies to conserve and enhance a natural, dynamic shorelines wherever possible, as well as recognize climate change mitigation and adaptation as an urgent matter, and use the Sea Level Rise (SLR) Guidance and Hawaii SLR Vulnerability and Adaptation Report in planning decisions. The proposed revetment generally conflicts with these objectives.

4. Koolau Loa Sustainable Communities Plan (KSCP): The Final EA should expand the discussion regarding how the Project conforms to other Policies regarding Parks and Recreation (3.3.1) and the KSCP Implementation Matrix relative to *Open Space and Natural Environment –Shoreline Areas (Table 5-1)* of the updated KSCP adopted on February 11, 2021.

Should you have any questions, please contact Steve Tagawa of our staff, at (808) 768-8024.

Very truly yours,


for Dean Uchida
Director

cc: Department of Land and Natural Resources,
Office of Conservation and Coastal Land
Office of Planning, Environmental Review Program



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.7896

May 4, 2022

VIA EMAIL: stagawa@honolulu.gov

Mr. Dean Uchida
Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Steve Tagawa

Dear Mr. Uchida:

Thank you for your comment letter (Letter No. 2022/ELOG-67(ST)) dated February 7, 2022, regarding the Draft Environmental Assessment (EA) for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment 1: Project Information Summary. The summary in the Final EA should list the City and County of Honolulu, Department of Parks and Recreation as the owner of the Project site, which is the 65,340-square-foot parcel referred to as Kaaawa Beach Park.

Response: The HDOT has added language in the Final EA to cite the City and County of Honolulu, Department of Parks and Recreation as the owner of the Project site (TMK 5-1-002:025).

Comment 2: Section 1.7 Required Federal and State Approvals, and Applicable Regulatory Requirements. The site is located within the Special Management Area (SMA). Section 1.7 must be expanded to discuss the applicability of the SMA Ordinance, Chapter 25, Revised Ordinances of Honolulu (ROH), and address any approvals necessary to comply with SMA requirements. An exhibit showing the location of the SMA boundary relative to the Project site, should also be included. In addition, the location of the regulatory shoreline, as defined by the State Coastal Zone Regulations Chapter 205A-1, Hawaii Revised Statutes (HRS), must be shown (i.e., a revised Figure 2-1, p. 12). A discussion of the applicability of the Shoreline Setback Ordinance Chapter 23, ROH, which generally prohibits all structures (i.e., artificial hardening), especially those with sand beaches, should be included in the Final EA.

Mr. Dean Uchida
May 4, 2022
Page 2

HWY-L 2.7896

Response: The HDOT has revised and expanded Section 1.7 of the Final EA to include a discussion of the SMA, ROH Chapter 25, and Shoreline Setback, ROH Chapter 23 applicability to the project. The HDOT has also included a discussion of the regulatory shoreline as defined by HRS Chapter 205A in the Final EA.

Comment 3: Section 4.3 Hawaii Coastal Zone Management (CZM). The "Discussion" in the Final EA should be expanded to comprehensively address the Project's consistency with each of the Objectives and Policies of the State CZM regulations. The Final EA should include the Mayor's Directive 18-02 issued on July 16, 2018.

Response: The HDOT has expanded Section 4.3 of the Final EA to include detailed discussion of the project CZM consistency. A discussion of the project relative to the "Mayor's Directive 18-02" has been added to Section 1.7.3.

Comment 4: Koolau Loa Sustainable Communities Plan (KSCP). The Final EA should expand the discussion regarding how the Project conforms to other Policies regarding Parks and Recreation (3.3.1) and the KSCP Implementation Matrix relative to Open Space and Natural Environment-Shoreline Areas (Table 5-1) of the updated KSCP adopted on February 11, 2021.

Response: The HDOT has expanded Section 4.5 of the Final EA to include additional discussion of the project's relationship with the KSCP.

The HDOT will transmit a copy of the Final EA to your office once it is published.

If there are any future questions or concerns, please contact our Project Manager, Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

Sincerely,



JADE T. BUTAY
Director of Transportation

DIR 2194

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • web: www.honolulu.gov

RICK BLANGIARDI
MAYOR



J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP1/22-872433

February 7, 2022

Mr. Jade T. Butay, Director
State of Hawaii
Department of Transportation
Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Attention: Ms. Jiangli Guo
HDOT Project Engineer

DIRECTOR'S OFFICE
DEPT. OF
TRANSPORTATION
2022 FEB -9 A 8:21

Dear Mr. Butay:

Thank you for the opportunity to provide written comments regarding the Draft Environmental Assessment and Anticipated Finding of No Significant Impact for Kamehameha Highway at Kaaawa Erosion Mitigation, Kaaawa, Oahu, Hawaii. We have the following comments.

1. **Bus Stops.** The project site is in the immediate vicinity of bus stops. Please coordinate roadway improvements with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov
2. **Neighborhood Impacts.** The area representatives, neighborhood board, as well as the area residents, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.
3. **Disability and Communication Access Board (DCAB).** Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.

Mr. Jade T. Butay, Director
February 7, 2022
Page 2

Should you have any questions, please contact Greg Tsugawa, of my staff, at
(808) 768-6683.

Very truly yours,

A handwritten signature in blue ink, appearing to read "J. Morton", with a stylized flourish extending from the end.

J. Roger Morton
Director

DAVID Y. IGE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:
DIR 0194
HWY-L 2.7696

March 24, 2022

VIA EMAIL: roger.morton@honolulu.gov

Mr. Roger Morton
Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, Third Floor
Honolulu, Hawaii 96813

Attention: Mr. Greg Tsugawa

Dear Mr. Morton:

Thank you for your letter dated February 7, 2022, and comments regarding the draft Environmental Assessment for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment: Bus Stops. The project site is in the immediate vicinity of bus stops. Please coordinate roadway improvements with Department of Transportation Services (DTS), Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov.

Response: The HDOT will add language in the construction plans and specifications to require the contractors to coordinate bus stop and traffic control with DTS.

Comment: Neighborhood Impacts. The area representatives, neighborhood board, as well as the area residents, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandiVan), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.

Response: The HDOT will add language in the specifications to require the contractors to coordinate construction activities with the impacted parties noted.

Mr. Roger Morton
March 24, 2022
Page 2

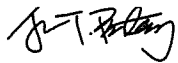
HWY-L 2.7696

Comment: Disability and Communication Access Board (DCAB). Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.

Response: The HDOT will submit the construction plans for DCAB for review and approval.

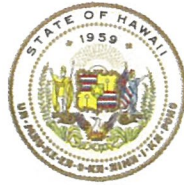
Should you have any questions, please contact our Project Manager, Ms. Jiangli Guo, at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov, Civil Engineer, Materials Testing and Research Branch, Highways Division.

Sincerely,



JADE T. BUTAY
Director of Transportation

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

REF:OCCL:SS

Correspondence: OA 22-100

FEB 24 2022

Sea Engineering, Inc.,
c/o Scott Sullivan
Makai Research Pier
41-305 Kalaniana'ole Highway
Waimānalo, HI 96795

SUBJECT: Draft Environmental Assessment (DEA) for Kamehameha Highway Erosion Mitigation Project in Ka'a'awa
LOCATION: Ka'a'awa, Island of O'ahu
Tax Map Key (TMK): (1) 5-1-002:005
APPLICANT: State of Hawai'i, Department of Transportation

The Office of Conservation and Coastal Lands (OCCL) has reviewed the Draft Environmental Assessment for the Kamehameha Highway Erosion Mitigation Project in Ka'a'awa, O'ahu. The applicant, the State of Hawai'i's Department of Transportation, is proposing to construct a continuous sloping rock riprap revetment fronting the Kamehameha Highway along approximately 450 linear feet of the shoreline in the area near Ka'a'awa Elementary School. The OCCL offers the following comments:

- Both a recently done shoreline certification as well as a State Historic Preservation Division HRS 6E Submittal Form must be submitted to OCCL along with the actual Conservation District Use Application (CDUA) in order for it to be processed. Neither document was included within the DEA, and it is unknown if they exist;
- The alternatives presented in the DEA should be thoroughly discussed and given serious consideration. We recognize that there is an immediate need to address the erosion of the roadway as this stretch of highway is the only access to the northeastern sections of the island. However, whether or not the proposed revetment is constructed, it is absolutely imperative that a long-term plan is formed in the near future to address the inevitable scenario of the ocean meeting the roadway;
- The documents provided stated that the life expectancy of the proposed rock revetment is 25 years. Our office would like to note that, while the need to protect heavily utilized public infrastructure is recognized, projects involving armoring of the shoreline – which State Bill 2060 relating to coastal zone management states is illegal for private landowners and should be minimized for public projects/use -

should have a longer expected lifespan than 25 years. It would be preferred that alternative proposals are given a deeper consideration;

- In section 3.4.1, the section on sea level rise analysis states that the project designed used a sea level rise projection of 1.7 feet due to the mid-term life expectancy of the structure (25 years). It is preferred, as stated in the Hawai'i Sea Level Rise Vulnerability and Adaptation Report, that we should already be planning for 3.2 feet of sea level rise for any projects near the coastline. Our office would like to see this project take into account 3.2 feet of sea level rise as opposed to 1.7, as was done in the studies for the DEA. **Figure 1**, shown below, is a screengrab of the Hawai'i Sea Level Rise Viewer's interactive map showing the project area to give a visual image of the severity of the situation in this area. Note that this projection only accounts for 2.0 feet of expected sea level rise, not 3.2 feet. Additionally, please expand more in section 3.4.1 regarding water levels and other sea level rise and climate change issues;

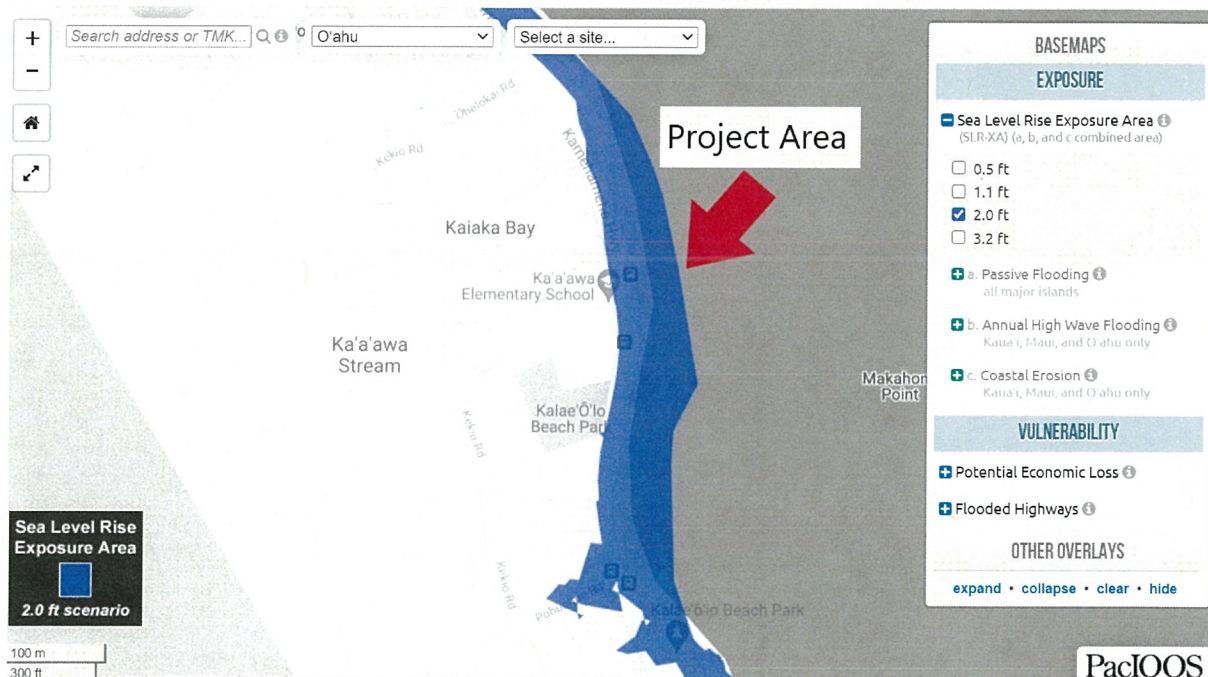


Figure 1: Sea Level Rise Exposure Area Map of Project Area, Showing 2.0 Feet of Expected SLR

- In section 2.2, *Riprap Revetment Design*, it reads, "...the estimated runup elevation is +13.4 feet during the design water level and wave conditions. Thus, the revetment can be expected to significantly overtop, and water would flow inland toward the school due to lower inland ground elevation mauka of the roadway revetment crest width of 10 feet will help dissipate the overtopping water to a certain degree. However, given the significant wave overtopping during design, and even high prevailing, wave conditions, a scour resistant surface for the highway shoulder and drainage should be considered." The OCCL is

concerned that a planned coastal hardening project is expected to overtop to this degree that “a scour resistant surface for the highway shoulder and drainage should be considered”. It is also important to note that this expected overtopping is found using the design parameters of 1.7 feet of expected sea level rise when the project should be using 3.2 feet of expected sea level rise, per the Hawai'i Sea Level Rise Vulnerability and Adaptation Report. Additionally, based on the level of concern portrayed in the DEA, roadway/shoulder drainage should be implemented as a part of this project;

- The documentation states that the design wave height used in the design of the revetment was 4.2 feet. It is suggested that the revetment take into account a higher design wave height, as the document also suggests that the revetment as proposed is essentially guaranteed to be overtopped by waves as well as the fact that 1.7 feet of expected sea level rise were used in the project design instead of the 3.2 feet of expected sea level rise that should have been used;
- In section 5.1, it states that the proposed revetment is expected to improve lateral access along the beach in the subject area “due to the absorptive and permeable nature of rock revetments”. Coastal armoring constructed on Hawai'i beaches in response to coastal erosion has been shown to lead to beach narrowing and loss, as well as increased rates of “flanking” erosion on beaches adjacent to the structures^{1,2}. Studies done by researchers at the University of Hawai'i and the United States Geological Survey find the majority, or 70%, of Hawai'i's beaches are chronically eroding. Over 13 miles of Hawai'i's beaches were completely lost to erosion over the past century. Nearly the entire extent of beach that was lost was fronting seawalls or other coastal armoring, installed to protect development and infrastructure from land loss and flooding. When beaches erode, shoreline access is lost, recreation and cultural activities are limited, coastal habitat is impacted, and our visitor economy suffers. The OCCL suggests the Department of Transportation carefully considers the effects and impacts the proposed project could have on the surrounding beach and coastal resources present in the area;
- We recommend that the applicant identifies as many mitigation measures as possible, such as best management practices and environmental protection measures, to be implemented during revetment construction and a marine species protection plan for possible encounters with endangered species. This includes species of seabirds that may be endangered or threatened that usually nest in the coastal areas between the months of March and December;
- The DEA states that excavated beach sand for armor stone placement will be cast to the side on the beach above the mean higher high water (mhhw). It is imperative that monitoring takes place during this process, as it is possible that archaeological or historical artifacts and/or remains could be found in the beach sand. Additionally, more mitigation measures should be provided in the

¹ Fletcher, C.H., *et al.* (1997) Beach loss along armored shorelines on O'ahu, Hawaiian Islands

² B.M. Romine and C.H. Fletcher (2012), Armoring on Eroding Coasts Leads to Beach Narrowing and Loss on O'ahu, Hawai'i

document regarding historical and cultural resources, and a 6E submittal form must be completed with the State Historic Preservation Division (SHPD) in order to apply for a CDUA from our office;

- It is imperative that best management practices and mitigation plans are followed for storage of any equipment, materials, vehicles, etc., and that these are carefully monitored to avoid any negative effects to the environment from spills, disturbances, etc.;
- In section 3.7.4, titled *Potential Impacts and Mitigation Measures*, it refers to the construction of a groin in relation to turbidity control devices. In no other portion of the DEA is a groin mentioned. Please clarify if there is a groin intended to be constructed as a part of this project;
- The OCCL suggests the applicant includes more details on the design and construction methods of the proposed revetment, such as drawings, plan sheets, diagrams, etc.;
- It is noted that construction will start at the southern end of Ka'a'awa Beach Park and proceed south. Please clarify if the construction crew will be performing the work from the roadway above, or if the crew would have to maneuver around the just-constructed section on the sandy beach in order to move on to the next section at any given time;
- The document states that the existing stone in the area will be used for riprap, but it seems unlikely that there is enough stone in the area – regarding both the type of rock to fit into the revetment design as well as the sheer quantity of stones itself - to fulfill the project need. Please clarify where any stones and rocks will come from that will not be from the immediate area; and
- It is stated that the proposed revetment will tie into the vertical concrete block seawall that currently exists immediately to the south. Please expand on the means and methods of how this will be done, if the wall is owned by the City or State and if not do they have landowner permission, and other related information regarding the tying of the revetment into the adjacent seawall.

Continuing to build structures within areas where known coastal hazards exists (areas that will experience severe sea level rise effects) is inconsistent with the direction in which we are attempting to move to address coastal resiliency in the face of sea level rise. However, The OCCL recognizes the importance of this section of the Kamehameha Highway as the only main access road in this section of the island. We recommend giving serious consideration of alternatives to the preferred action, or alternatively if the preferred alternative is pursued, we strongly recommended that consideration of the design life for the perimeter deck plan consider the effects of sea level rise into account in a way that is specifically addressed in its design.

Thank you for the opportunity to comment on the DEA for the proposed project. If you have any questions, please feel free to contact Salvatore Saluga in the Office of Conservation and Coastal Lands at salvatore.j.saluga@hawaii.gov.

Sincerely,

S Michael Cain

MICHAEL CAIN, ACTING ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS

DAVID Y. IGE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
EDWIN H. SNIFFEN

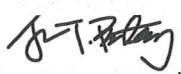
IN REPLY REFER TO:

HWY-L 2.8171

June 14, 2022

VIA EMAIL: michael.cain@hawaii.gov

TO: MICHAEL CAIN
ACTING ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS (OCCL)
DEPARTMENT OF LAND AND NATURAL RESOURCES (DLNR)

FROM: JADE T. BUTAY 
DIRECTOR OF TRANSPORTATION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR
KAMEHAMEHA HIGHWAY AT KAAAWA EROSION MITIGATION

Thank you for your comment letter (Letter No. OA 22-100) dated February 24, 2022, regarding the Draft Environmental Assessment (DEA) for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

As mentioned in the DEA, section 1.4, the project purpose is limited and focused on providing near to mid-term protection for a limited section (400 feet) of highway in the most efficient and effective manner possible. It is not, for instance, a response to possible future Sea Level Rise (SLR). The project's approximate design life is 25 years, which is considered to be a short-term to a medium-term solution with respect to typical infrastructure lifespans.

Global climate change and SLR are affecting Hawaii's coastlines. This will necessitate long-term planning, which may entail significant changes from current coastal land use and activities.

Comment 1: Shoreline Certification and Historic Preservation Division Hawaii Revised Statutes (HRS) 6E Submittal. Both a recently done shoreline certification as well as a State HRS 6E Submittal Form must be submitted to the OCCL along with the actual Conservation District Use Application (CDUA) in order for it to be processed. Neither document was included within the DEA, and it is unknown if they exist.

Response: Shoreline Certification. A shoreline Certification is not required in this project. The definition of "shoreline" in HRS §205A-1, is "the upper reaches of the wash of the waves...at high tide during the season of the year in which the highest wash of the waves occur..."

A "certified shoreline" is the one approved by the Board of Land and Natural Resources. There is no current certified shoreline for the project area.

During the winter north swell season, the shoreline and highway are occasionally overtopped by wave runup which floods the highway and leaves wave tossed debris on the road. The certified shoreline is likely to be located on the landward side of the Kamehameha Highway. A discussion of the shoreline location has been included in the Final Environmental Assessment (EA) (see section 1.7.6).

A formal current Shoreline Certification, which is typically used to delineate respective State and City and County of Honolulu (CCH) jurisdiction and to establish building setbacks, are not applicable to this project site because the project is entirely located on State Land, portions of which are under the jurisdiction of the HDOT Highways as a Right-of-Way, and portions are under the jurisdiction of the CCH, Department of Parks and Recreation as Kaaawa Beach Park.

All State and CCH agencies who have land jurisdiction or permitting jurisdiction are being consulted and coordinated with.

The HDOT will submit an HRS 6E Submittal Form along with the CDUA to the OCCL for review and approval.

Comment 2: Alternatives and Long-Term Plan. The alternatives presented in the DEA should be thoroughly discussed and given serious consideration. We recognize that there is an immediate need to address the erosion of the roadway as this stretch of highway is the only access to the northeastern sections of the island. However, whether or not the proposed revetment is constructed, it is absolutely imperative that a long-term plan is formed in the near future to address the inevitable scenario of the ocean meeting the roadway.

Response: The HDOT fully agrees that a long-term plan is needed. We are actively working toward developing a long-term plan in cooperation with other State and CCH agencies, however this will take major coordination and planning. In the meantime, we need to take actions to maintain threatened critical infrastructures such as the proposed project to protect Kamehameha Highway at Kaaawa in a timely manner.

This project limited in scale and scope is in response to a serious and imminent threat to the continued functioning of Kamehameha Highway. We have to mitigate the shoreline erosion threat with the quickest, most efficient, and cost-effective manner. It is not feasible to re-route the highway or take other major actions to fix this small (400 feet) problem area.

Comment 3: Minimize Shoreline Armoring and Extend Project Life. The documents provided stated that the life expectancy of the proposed rock revetment is 25 years. Our office would like to note that, while the need to protect heavily utilized public infrastructure is recognized, projects involving armoring of the shoreline - which State Bill 2060 relating to coastal zone management, states, it is illegal for private landowners and should be minimized for public projects/use should have a longer expected lifespan than 25 years. It would be preferred that alternative proposals are given a deeper consideration.

Response: The HDOT recognizes the State's desire to minimize shoreline armoring, however in Hawaii Administrative Rules (HAR) §13-5-22, P-15 SHORELINE EROSION CONTROL, the State also recognizes the need to protect critical infrastructure, and states "Seawall, revetment, groin...to control erosion of land...(3) public facilities (e.g., public roads) critical to public health, safety, and welfare would be severely damaged or destroyed without a shoreline control structure, and there are no reasonable alternatives (e.g., relocation)..."

The situation above is what the proposed project consists of and addresses.

The purpose of this project is specifically designed as an interim mid-term action to protect the highway while regional large scale long-term coastal planning can be accomplished.

Comment 4: SLR. Our office would like to see this project take into account, 3.2 feet of SLR as opposed to 1.7, as was done in the studies for the DEA. Additionally, please expand more in section 3.4.1 regarding water levels and other SLR and climate change issues.

Response: SLR is an estimation, the guidelines are revised as more data becomes available. While we recognize the current State recommendation to plan for 3.2 feet of SLR by 2100, however, it does not seem reasonable to arbitrarily apply this to all coastal projects, particularly when the stated project life is only 25 years. The current State recommendation is also primarily based on the 2017 National Oceanic and Atmospheric Administration (NOAA) projected SLR. Recently, 2022 NOAA recommendations, appear to reduce the Hawaii SLR projections, at least in the short (50 year) time frame. The proposed project is designed for an Intermediate-High SLR of 1.7 feet, currently estimated to occur around the year 2050.

Comment 5: Wave Overtopping and Roadway/Shoulder Drainage. The OCCL is concerned that a planned coastal hardening project is expected to overtop to this degree that "a scour resistant surface for the highway shoulder and drainage should be considered." It is also important to note that this expected overtopping is found using the design parameters of 1.7 feet of expected SLR when the project should be using 3.2 feet of expected SLR, per the Hawaii SLR Vulnerability and Adaptation Report. Additionally, based on the level of concern portrayed in the EA, roadway/shoulder drainage should be implemented as a part of this project.

Response: The Windward Oahu coastal highway is generally very low lying. During winter season high tide and waves often overtop the road, with salt water and coastal material depositing onto the highway, at numerous locations.

The project site is about 8 feet above sea level, as is the road both north and south. It is not feasible to raise the highway elevation for a 400-foot-long stretch, and even if we did, it could still flood from both ends. To prevent wave overtopping during design wave and water level conditions, the revetment would have to extend 5 feet above the road which will completely block the seaward vista. Considering the overall scope and scale of the proposed project, a revetment crest with the same elevation as the road is considered reasonable.

The sloping rock revetment and rock crest would dissipate incoming wave energy and reduce wave overtopping, however, it would not prevent occasional salt water on the highway. The road shoulder would be sloped seaward for drainage, and the porous rock revetment would not pond water against the crest. Use of permeable asphalt pavement is planned for the makai shoulders.

Comment 6: Design Wave Height. The documentation states that the design wave height used in the design of the revetment was 4.2 feet. It is suggested that the revetment take into account a higher design wave height, as the document also suggest that the revetment as proposed is essentially guaranteed to be overtopped by waves as well as the fact that 1.7 feet of expected SLR was used in the project design instead of the 3.2 feet of expected SLR that should have been used.

Response: The design wave and water level conditions are designed accordingly to the project purpose, scale, scope, and design life.

A more permanent design will entail a much bigger regional approach, and likely involve much more than the highway itself. It will also require development and cooperation with the communities, numerous State and CCH agencies.

Comment 7: Lateral Shoreline Access. Coastal armoring constructed on Hawaii beaches in response to coastal erosion has been shown to lead to beach narrowing and loss, as well as increased rates of "flanking" erosion on beaches adjacent to the structures. The OCCL suggests the HDOT carefully considers the effects and impacts the proposed project could have on the surrounding beach and coastal resources present in the area.

Response: The project site is directly exposed to incident deep water wave energy year-round, and as a result, the shoreline is very dynamic and variable. As stated in section 3.1.1.2 of the DEA:

"The nearshore coastal processes are primarily driven by the prevailing trade wind waves and the nearshore bathymetry. As previously stated, the extensive shallow reef shelf and adjacent deep channel combine to create the prevailing nearshore circulation pattern and longshore sand transport in the project area. There is a steady shore-parallel (longshore)

current that flows along the beach in a north-to-south direction. This longshore current is generated by the mass flow of water-driven over the shallow reef by a persistent, short period, breaking waves from the prevailing trade winds. This relatively vigorous current terminates south of the project site as it flows off the shallow reef and into a small, slightly deeper (8-10 ft) basin just north of the cobble stream mouth deposit. Here, the current makes a U-turn as it empties into and flows back out through the submerged Kaaawa Stream channel. This current does not reverse direction but simply varies in intensity by increasing in velocity with increases in the offshore wave height. This longshore current is strongest during periods of large winter season north swell wave events. The narrow strand beach along the shore varies in width seasonally and depending on the strength of the longshore current."

EA Figure 3-5 shows a sand beach fronting a vertical concrete seawall at the south end of the project site. This beach constantly varies in width and elevation depending on the prevailing wave and current conditions, sometimes it's wide and above high tide as shown in the picture, sometimes it's narrow and submerged. However, this is a function of the sand availability and waves and current and does not appear affected by the presence of the seawall. If there is sand available and coastal conditions permit the beach accretes, when conditions change it can disappear, in a variable cycle of accretion and loss. We do not expect the proposed project to significantly change the coastal processes in the project vicinity.

Flanking effect should not occur since the project work extends to the ocean channel where, current and sediment flow to, as shown in the picture below. The red highlight represents project limits, and the red arrows represents ocean currents and sediment transport directions.



Comment 8: Construction Best Management Practices (BMPs). We recommend that the applicant identifies as many mitigation measures as possible, such as BMPs and environmental protection measures, to be implemented during revetment construction and a marine species protection plan for possible encounters with endangered species. This includes species of seabirds that may be endangered or threatened that usually nest in the coastal areas between the months of March and December.

Response: A detailed BMPs Plan is presented in Appendix B of the EA. This includes measures for Environmental Protection and Protection of Endangered Species. A detailed discussion of the Marine Biological Environment, Protected Species found in the project area, as well as expected Impacts and Mitigation Measures, can be found in sections 3.6 and 3.7 of the EA.

Comment 9: Construction Monitoring. The EA states that excavated beach sand for armor stone placement will be cast to the side on the beach above the mean higher high water. It is imperative that monitoring takes place during this process, as it is possible that archaeological or historical artifacts and/or remains could be found in the beach sand. Additionally, more mitigation measures should be provided in the document regarding historical and cultural resources, and a 6E submittal form must be completed with the State Historic Preservation Division (SHPD) in order to apply for a CDUA from our office.

Response: Historic, Cultural, and Archaeological Resources in the project area are discussed in section 3.10 of the DEA. A review of historic documents and previous archaeological investigations in the Kaaawa area indicates the likelihood of undiscovered shoreline burials. Residents also reported that bones have been uncovered by shoreline erosion and recession. The project is being coordinated with SHPD, and their recommendations will be followed.

Comment 10: Groin. Please clarify if there is a groin intended to be constructed as a part of this project.

Response: The use of the term "groin" is an error, it should read revetment. This project does not intend to build a Groin.

Comment 11: Construction Plans. The OCCL suggests the applicant includes more details on the design and construction methods of the proposed revetment, such as drawings, plan sheets, diagrams, etc.

Response: Detailed construction plans have been prepared and will be submitted with permit applications such as the CDUA.

Comment 12: Construction Methodology. Please clarify if the construction crew will be performing the work from the roadway above, or if the crew would have to maneuver around the just-constructed section on the sandy beach in order to move on to the next section at any given time.

Response: Revetment construction will be accomplished from the roadway shoulder, and equipment will not operate in the water. A small bulldozer may be used to move, and grade excavated beach sand, however this will also be accomplished above the water line.

Comment 13: Stone Source. Please clarify where any stones and rocks will come from that will not be from the immediate area.

Response: Existing stones that are already on the shoreline will be utilized to the maximum extent. Additional basalt stone will be sourced from an existing permitted quarry on Oahu.

Comment 14: Tie into Existing Seawall. It is stated that the proposed revetment will tie into the vertical concrete block seawall that currently exists immediately to the south. Please expand on the means and methods of how this will be done, if the wall is owned by the City or State and if not, do they have landowner permission, and other related information regarding the tying of the revetment into the adjacent seawall.

Response: At the south end, the revetment will wrap around and overlap and abut the north end of the existing seawall. And will not affect the integrity of the seawall. The project site is all State land, with some overlapping State and CCH jurisdiction. No private land is involved.

For reasons stated above, and outlined in the DEA, the HDOT considers the proposed plan to be the most effective and least impactful alternative that given the purpose, scope, and scale, and intended design life for this short reach of coastal highway. We will continue to coordinate with DLNR-OCCL and would be very happy to meet with you and discuss any aspect of the project as needed. We also recognize that the project requires approval by OCCL in the form of a CDUA.

The HDOT will transmit a copy of the Final EA to your office once it is published.

Should you have any questions, please contact our Project Manager, Ms. Jiangli Guo, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

From: [Cab General](#)
To: [Guo, Jiangli](#); [Scott Sullivan](#)
Subject: Kamehameha Highway at Ka'a'awa Erosion Mitigation--Draft EA (AFNSI)
Date: Tuesday, February 8, 2022 3:25:52 PM

Aloha

Thank you for the opportunity to provide comments on the subject project. I apologize for sending this past the deadline.

Please see our standard comments at:

<https://health.hawaii.gov/cab/files/2019/08/Standard-Comments-Clean-Air-Branch-2019.pdf>

Please let me know if you have any Questions

Lisa M.M. Wallace
EHS QA Officer
Clean Air Branch
Environmental Health Office
Hilo, Hawaii 96720



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.7893

April 21, 2022

VIA EMAIL: Cab.General@doh.hawaii.gov

Ms. Lisa M.M. Wallace
EHS QA Officer
Clean Air Branch
Environmental Health Office
Hilo, Hawaii 96720

Attention: cab@doh.hawaii.gov

Dear Ms. Wallace:

Thank you for your email comments on February 8, 2022, regarding the draft Environmental Assessment for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment 1: Requires an Air Pollution Control Permit. You must obtain an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch.

Response: Air Pollution Control Permit is not required for this project.

Comment 2: Includes construction or demolition activities that involve asbestos. You must contact the Asbestos Abatement Office in the Indoor and Radiological Health Branch.

Response: There are no asbestos in this project.

Comment 3: Has the potential to generate fugitive dust. You must control the generation of all airborne, visible fugitive dust.

Response: It is a standard practice for HDOT to implement Best Management Plan for all construction projects, including dust control.

HDOT will transmit a copy of the Final Environmental Assessment to your office once it is published.

Ms. Lisa M.M. Wallace
April 21, 2022
Page 2

HWY-L 2.7893

If there are any future questions or concerns, please contact our Project Manager,
Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division
at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jade T. Butay".

JADE T. BUTAY
Director of Transportation

Douglas Meller
email: douglasmeller@gmail.com
January 10, 2022

Scott Sullivan
email: ssullivan@seaengineering.com

Jiangli Guo
email: jiangli.guo@hawaii.gov

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA)
KAMEHAMEHA HIGHWAY AT KAAWA EROSION MITIGATION
(public notice published 1/8/22 in *The Environmental Notice*)

Thank you for the opportunity to comment. I have no comments on the proposed project design. However, I request that the Final EA respond to my following comments about regulatory requirements and impacts.

On page 56 the Draft EA alleges that “The project site is located within the State Urban District.... A portion of the revetment is also located in the Conservation District....” Since the Draft EA neither includes a valid certified shoreline survey, nor proposes that the DOT obtain BLNR certification of a shoreline survey, the Final EA should explain when and how the DOT will resolve City permits required for the portion of the revetment in the Urban District.

DOT development of a portion of a revetment mauka of the BLNR certified regulatory “shoreline” requires City approval of a shoreline setback variance and may also require City approval of a special management area (SMA) permit. And if a SMA permit is required to authorize development of a revetment which straddles the shoreline, then under §205A-29, Hawaii Revised Statutes, the required SMA permit is a prerequisite to BLNR approval of a Conservation District Use Application (CDUA) to authorize the portion of the revetment makai of the shoreline.

§205A-29 Special management area use permit procedure. . . .

(b) No agency authorized to issue permits pertaining to any development within the special management area shall authorize any development unless approval is first received in accordance with the procedures adopted pursuant to this part....

Since the design of the proposed project may affect the inland wash of waves, the Final EA also should explain whether/how the proposed project might affect future BLNR determination of the regulatory “shoreline”. My understanding of attached BLNR rules for shoreline certification is that if all required permits are obtained, DOT construction of a new revetment can relocate the regulatory “shoreline” further makai.

Electronic Attachment: Chapter 222, Title 13, Hawaii Administrative Rules



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.7899

May 4, 2022

VIA EMAIL: douglasmeller@gmail.com

Mr. Douglas Meller
2615 Aaliamanu Place
Honolulu, Hawaii 96813

Dear Mr. Meller:

Thank you for your comment letter dated January 10, 2022, regarding the Draft Environmental Assessment (EA) for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment 1: The Draft EA neither includes a valid certified shoreline survey, nor proposes that the HDOT obtain Board of Land and Natural Resources (BLNR) certification of a shoreline survey. The Final EA should explain when and how the HDOT will resolve City permits required for the portion of the revetment in the Urban District.

Response: Shoreline Certification is not required in this project.

The definition of "shoreline" in Hawaii Revised Statutes (HRS) §205A-1, is "the upper reaches of the wash of the waves...at high tide during the season of the year in which the highest wash of the waves occurs..." A "certified shoreline" is the one approved by the BLNR. There is no current certified shoreline for the project area.

During the winter north swell season, the shoreline and highway are occasionally overtopped by wave runup which floods the highway and leaves wave tossed debris on the road. A discussion of the shoreline location has been included in the Final EA (see section 1.7.6).

A formal current Shoreline Certification, which is typically used to delineate respective State and City and County of Honolulu (CCH) jurisdiction and to establish building setbacks, is not applicable to this project site because the project is located entirely on State Land, portions of which are under the jurisdiction of the HDOT highways as a Right-of-Way, and portions are under the jurisdiction of the CCH, Department of Parks and Recreation as Kaaawa Beach Park.

All State and CCH agencies who have land jurisdiction or permitting jurisdiction are being consulted and coordinated with.

Mr. Douglas Meller
May 4, 2022
Page 2

HWY-L 2.7899

The final determination of the Shoreline Certification will be made during processing of a State Conservation District Use Application (CDUA).

Comments 2: Special Management Area (SMA) / Shoreline Setback Variance (SSV).
The HDOT development of a portion of a revetment mauka of the BLNR certified regulatory "shoreline" requires City approval of a shoreline setback variance and may also require City approval of a SMA permit. And if a SMA permit is required to authorize development of a revetment which straddles the shoreline, then under §205A-29, HRS, the required SMA permit is a prerequisite to BLNR approval of a CDUA to authorize the portion of the revetment makai of the shoreline.

Response: SMA and SSV will not be required for this project.
"Development" is defined as, activities, or operations on land, or in the water, within the SMA, other than excluded uses. The Revised Ordinances of Honolulu Chapter 25-1.3
"Development" (2) (B) does not include Repair or Maintenance of roads and highways within existing rights-of-way..."

The SMA extends inland from the shoreline, and special controls are placed on development in the SMA to protect valuable coastal zone resources.

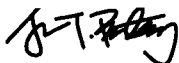
Based on the definition discussion of "development" and "shoreline" above, the project is not considered to be a development in the SMA.

The proposed rock revetment will better dissipate wave energy, and thus reduce the frequency and severity of wave overtopping. However, the revetment crest elevation is the same as the existing shoreline elevation, and some overtopping during the winter high wave season is expected to still occur. Thus, the project may not change the regulatory definition of "shoreline", or change where the "shoreline" would be located. Therefore, the SSV is not applicable for this project.

The HDOT will transmit a copy of the Final EA to your office once it is published.

If there are any future questions or concerns, please contact our Project Manager, Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

Sincerely,



JADE T. BUTAY
Director of Transportation

From: [Kaaawa Community](#)
To: [Scott Sullivan](#)
Subject: Re: Kamehameha Highway DEA
Date: Thursday, February 3, 2022 8:38:07 PM

Aloha Scott,

Thank you for your patience. I have reviewed the revetment proposed plan and have tried my best to understand the language. Based on discussions I've had, I have come to understand that an engineered revetment is basically our best option. With this being said, I do support the proposed plan, however there are a couple of key points that I would like to place emphasis upon as concerns and items in which we as a community would appreciate particular attention to. Listing below:

1. Alteration of existing sand levels. I do particularly hope that the revetment as installed to your designed specification will still retain a comparable area of sandy beach. I do fully support the engineering which recommends a longer and less drastic grade of elevation to existing road crown.
2. Extreme attention to disturbance of potential burial sites and "iwi as we have had an increased amount of naturally occurring disturbed burial sites in the past two years.
3. Re-evaluation of Ka'a'awa Beach park dirt lot parking areas as previously "designed" at the affected coastal area. I believe that parking may no longer be prudent at this site as the revetment is designed.
4. Monitoring of introduced nuisance, invasive species and other pests. Community members have noted multiple incidents of rodent activity and habitation within the current failed revetment attempts.
5. Community member also request well planned lane closure with minimized impact to the current and vital 2 lanes of the highway.

I greatly appreciate the time and care you have taken to attend to this dire and critical matter. The repair is long overdue, though I know the true process is a long and tedious one, I do appreciate and understand that there is a quick way, and a correct way. I am looking forward to seeing this project moving forward.

Mahalo nui,
Kealoha Domingo
Ka'a'awa Community Association President

On Jan 11, 2022, at 4:28 PM, Scott Sullivan <ssullivan@seaengineering.com> wrote:

Aloha Kealoha,
We recently sent you a notice of the availability of the DEA for public review and

comment. I have also attached the DEA to this email. Would you please forward this to anyone in the Kaaawa community who you think would be interested. Comments are due by February 7 and can be sent to me. As we discussed at the community meeting last November support from the community can be very beneficial to keep this project moving.

Mahalo, Scott

Scott Sullivan

Vice President

Sea Engineering, Inc. | <http://www.seaengineering.com>

A: 41-305 Kalanianaʻole Hwy, Makai Research Pier, Waimanalo, HI 96795

O: 808.259.7966 ext. 204 | D: 808.460.3437 | M: 808.294.8409 | E:

ssullivan@seaengineering.com

Disclaimer: This email message is intended solely for the person or entity to which it is addressed and should not be opened, read, or utilized by any other party. If you have received this email in error, please contact the sender immediately and delete the material from any computer that has received it.

<Draft EA Kamehameha Hwy at Kaaawa Erosion Mitigation 12-2021.pdf>



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.7894

April 21, 2022

VIA EMAIL: alohakaawa@gmail.com

Mr. Kealoha Domingo
President
Kaaawa Community Association
P.O. Box 33
Kaaawa, Hawaii 96730

Dear Mr. Domingo:

Thank you for your email comments on February 3, 2022, regarding the draft Environmental Assessment for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment 1: Alteration of existing sand levels. I do particularly hope that the revetment as installed to your designed specification will still retain a comparable area of sandy beach. I do fully support the engineering which recommends a longer and less drastic grade of elevation to existing road crown.

Response: Thank you for your support. The porous revetment will dissipate more wave energy and be less reflective than the existing shoreline, and may aid in retaining sand along the shoreline during high wave conditions. However, it is expected that the beach will continue to be very dynamic and will continue to vary in width/size depending on ocean conditions and sand moving through the system.

Comment 2: Extreme attention to disturbance of potential burial sites and "iwi" as we have had an increased amount of naturally occurring disturbed burial sites in the past two years.

Response: The project will include consultation with the State Historic Preservation Division, and construction will be done in accordance with their directives regarding protection of burial and other archaeological remains should they be discovered.

Comment 3: Re-evaluation of Kaaawa Beach park dirt lot parking areas as previously "designed" at the affected coastal area. I believe that parking may no longer be prudent at this site as the revetment is designed.

Mr. Kealoha Domingo
April 21, 2022
Page 2

HWY-L 2.7894

Response: The project is being designed to preserve as many parking along the shoreline as practicable within the project limits. The project will include a stable 10-foot-wide highway shoulder.

Comment 4: Monitoring of introduced nuisance, invasive species, and other pests. Community members have noted multiple incidents of rodent activity and habitation within the current failed revetment attempts.

Response: Pests and invasive species will not be introduced during the project construction. The boulders to be brought in for construction of revetment will be cleaned. The proposed rock revetment will be thicker than the previous rock revetment. It will have an engineered gradation and have a flatter front face. This will create a more stable rock revetment that will not allow for large voids to be created within the revetment for large habitation of pests and invasive species.

Comment 5: Community members also request well planned lane closure with minimized impact to the current and vital 2 lanes of the highway.

Response: The HDOT confirms that road closures will require a traffic control plan to minimize impact to the public to the extent practicable.

If there are any future questions or concerns, please contact our Project Manager, Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

Sincerely,



JADE T. BUTAY
Director of Transportation

To:

Jade T. Butay
Director of Transportation
State Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

From:

R. Kealoha Domingo
Ka'a'awa Community Association President
P.O. Box 33
Ka'a'awa, HI 9673

Re:

Kamehameha Highway Shoreline Erosion Mitigation at Kaaawa, Oahu

February 4, 2022

Aloha Ms. Butay,

I am writing on behalf of the Ka'a'awa Community Association as the current Board President. We greatly appreciate the Department of Transportation moving forward with the long overdue shoreline erosion mitigation project off of Kamehameha Hwy. in Ka'a'awa.

I write in strong support of this project as we have had the opportunity to hear the proposed plans as present Scott Sullivan and his team at Sea Engineering. We have also submitted to Mr. Sullivan some requested items related to the draft EA for attention in which we ask to be taken into consideration as the planning process commences.

We also ask that all possible measures be taken to expedite this project, as it has been reported as an extreme safety hazard back in July of 2020, with no physical action taken besides placing of safety tape and roadway warning devices.

There are large boulders that appear to be held up suspended with unknown integrity and a void under the boulder that could easily cause physical harm or death to public beach users, especially children who may wander with curiosity into what may seem like a "cave".

I also have witnessed foolish activity by beach goers including setting up picnic sites and even parking cars on the broken slab, in fact just yesterday this occurred.

Thank you again for your attention to this matter and I would greatly appreciate any communications or questions sent to me directly via email at alohakaaawa@gmail.com.

Mahalo,
R. Kealoha Domingo
Ka'a'awa Community Association President
(808)753-3132



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.7895

April 25, 2022

VIA EMAIL: alohakaawa@gmail.com

Mr. Kealoha Domingo
President
Kaaawa Community Association
P.O. Box 33
Kaaawa, Hawaii 96730

Dear Mr. Domingo:

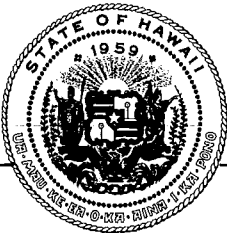
Thank you very much for your letter of support dated February 4, 2022, for the proposed erosion mitigation project to protect and maintain Kamehameha Highway in the vicinity of the Kaaawa Elementary School. Please be assured that this project is considered critical, and the Hawaii Department of Transportation (HDOT) is working diligently to accomplish its implementation. The HDOT will continue to coordinate with the Kaaawa Community Association and will keep you apprised of the project's progress.

If there are any future questions or concerns, please contact our Project Manager, Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jade T. Butay", is written over a horizontal line.

JADE T. BUTAY
Director of Transportation



**STATE OF HAWAII
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT**

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR

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

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

DTS202201120748NA

Coastal Zone
Management
Program

February 7, 2022

Environmental
Review Program

Land Use
Commission

Land Use Division

Special Plans
Branch

State Transit-
Oriented
Development

Statewide
Geographic
Information System

Statewide
Sustainability
Program

To: Jade Butay, Director
Department of Transportation

From: Mary Alice Evans, Director *Mary Alice Evans*
Office of Planning and Sustainable Development

Attention: Jiangli Guo, Project Engineer
Materials Testing and Research Branch, Highways Division

Subject: Draft Environmental Assessment - Kamehameha Highway at
Ka'a'awa Erosion Mitigation, Island of O'ahu

Thank you for the opportunity to provide comments on the Draft Environmental Assessment (Draft EA) for the proposed Kamehameha Highway Erosion Mitigation project located at Ka'a'awa, O'ahu. The Draft EA notification was received by our office via memo dated December 27, 2021.

It is our understanding that the project site is an approximately 450-foot length of roadside shoreline along Kamehameha Highway, Hawai'i State Route 83 (HI-83). HI-83 is the only highway serving Windward O'ahu coastal communities, and is the primary access for police, fire, and emergency medical services to and from these communities.

The project site is located on the makai side of the highway and is directly seaward of Ka'a'awa Elementary School. A 400-foot-long section of HI-83 has become undermined due to shoreline erosion. The undermining of this roadway has destabilized the highway shoulder, and if allowed to continue may result in severe damage to the highway itself. The proposed action is to construct an engineered sloping rock riprap revetment to mitigate the erosion threat to the highway. The revetment crest will be 8 feet or greater. The structure will be approximately 25 feet wide and approximately 450 feet long.

The Office of Planning and Sustainable Development (OPSD) has reviewed the transmitted material, and have the following comments to offer:

1. Coastal Zone Management Act (CZMA) Federal Consistency

We note that, Section 1.7 page 8 of the Draft EA, states that a Department of the Army (DA) Nationwide Permit (NWP) #3 (Maintenance) was issued by the U.S. Army Corps of Engineers (USACE), Honolulu District on November 23, 2021. It also states that as the proposed project will be partially constructed in navigable waters of the U.S., it is expected to require a DA permit issued pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 and Section 404 of the Clean Water Act (CWA). An NWP #3 Maintenance permit is not subject to a CZMA federal consistency requirements; however a Section 10 RHA or Section 404 CWA DA permit may require a federal consistency determination.

Section 1.8, page 9 of the Draft EA states the USACE, along with the Department of Land and Natural Resources, will review the analyses and conclusions drawn in this Environmental Assessment (EA) and decide whether to issue the necessary permits and approvals that the applicant has requested. If it is deemed by USACE that a DA permit is needed, then this project may also be subject to a CZMA federal consistency review.

OPSD is the lead state agency with the authority to conduct CZMA federal consistency reviews. We recommend that HDOT consult with our office on the applicability of CZMA federal consistency requirements if a DA permit is required.

2. The Hawaii Coastal Zone Management Program

Section 4.3, page 57 of the Draft EA provides a very brief overview of Hawai'i Coastal Zone Management (CZM) Program and provides only one point of discussion by stating: "The project is generally consistent with the CZM Program Objectives and policies. Implementation of the proposed project will mitigate a significant coastal hazard to the existing primary highway serving the Windward coast."

Hawai'i Revised Statutes (HRS) § 205A-4(a) states that in implementing the objectives of the CZM program, agencies shall give full consideration to ecological, cultural, historic, esthetic, recreational, scenic, and open space values, coastal hazards, and economic development. Additionally, HRS § 205A-5(b) requires all state and county agencies to enforce the CZM objectives and supporting policies.

As this project is being proposed by a State agency, the Final Environmental Assessment (Final EA) should include a full assessment as to how the proposed action conforms with the provisions of HRS § 205A-2. Furthermore, HRS § 205A-2 forms the foundation of the enforceable policies of the Hawai'i CZM Program. If a federal consistency review is needed, this detailed examination can be used as support material by HDOT in its federal consistency determination.

3. Special Management Area (SMA) / Shoreline Setback Variance (SSV)

There is no discussion on SMA/SSV as they relate to this project. As the proposed action is situated along the shoreline and impact submerged lands, we recommend that HDOT verify

Mr. Jade Butay
February 7, 2022
Page 3

with the City and County of Honolulu, Department of Planning and Permitting that SMA Use permitting, and Shoreline Setback Variance are not required for the proposed action.

If you have any questions, please contact Joshua Hekeia on EA concerns as they relate to this OPSD response letter at (808) 587-2845, or Debra Mendes on CZMA federal consistency at (808) 587-2840.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR


Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
EDWIN H. SNIFFEN

IN REPLY REFER TO:

HWY-L 2.8167

May 25, 2022

TO: MARY ALICE EVANS
DIRECTOR
ENVIRONMENTAL REVIEW PROGRAM
OFFICE OF PLANNING AND SUSTAINABLE DEVELOPMENT (OPSD)
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT
AND TOURISM (DBEDT)

FROM: JADE T. BUTAY 
DIRECTOR OF TRANSPORTATION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR
KAMEHAMEHA HIGHWAY AT KAAAWA EROSION MITIGATION

Thank you for your comment letter (Letter No. DTS202201120748NA) dated February 7, 2022, regarding the Draft Environmental Assessment (EA) for Kamehameha Highway at Kaaawa Erosion Mitigation at Kaaawa Elementary School. The Hawaii Department of Transportation (HDOT) would like to provide the following responses.

Comment 1: Coastal Zone Management Act (CZMA) Federal Consistency.

We note that, Section 1.7 page 8 of the Draft EA, states that a Department of the Army (DA) Nationwide Permit (NWP) 3 Maintenance, was issued by the United States (U.S.) Army Corps of Engineers (USACE), Honolulu District on November 23, 2021. It also states that as the proposed project will be partially constructed in navigable waters of the U.S., it is expected to require a DA permit issued pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 and Section 404 of the Clean Water Act (CWA). An NWP 3 Maintenance permit is not subject to a CZMA federal consistency requirements; however, a Section 10 RHA or Section 404 CWA DA permit may require a federal consistency determination.

Section 1.8, page 9 of the Draft EA states the USACE, along with the Department of Land and Natural Resources, 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. If it is deemed by the USACE that a DA permit is needed, then this project may also be subject to a CZMA federal consistency review.

The OPSD is the lead state agency with the authority to conduct CZMA federal consistency reviews. We recommend that the HDOT consult with our office on the applicability of CZMA federal consistency requirements if a DA permit is required.

Response: The project has been verified by the USACE, Honolulu District, to be consistent with the DA NWP 3 Maintenance, which is not subject to CZMA federal consistency review.

We will consult with the OPSD on the applicability of CZMA federal consistency requirements if a DA permit is required.

Comment 2: The Hawaii Coastal Zone Management (CZM) Program. Hawaii Revised Statutes (HRS) § 205A-4(a) states that in implementing the objectives of the CZM program, agencies shall give full consideration to ecological, cultural, historic, esthetic, recreational, scenic, and open space values, coastal hazards, and economic development. Additionally, HRS § 205A-5(b) requires all state and county agencies to enforce the CZM objectives and supporting policies.

As this project is being proposed by a State agency, the Final EA should include a full assessment as to how the proposed action conforms with the provisions of HRS § 205A-2. Furthermore, HRS § 205A-2 forms the foundation of the enforceable policies of the Hawaii CZM Program. If a federal consistency review is needed, this detailed examination can be used as support material by the HDOT in its federal consistency determination.

Response: The Section 4.3 has been expanded in the Final EA to include a complete summary of the proposed project with respect to the Hawaii CZM Program.

Comment 3: Special Management Area (SMA) / Shoreline Setback Variance (SSV). There is no discussion on SMA/SSV as they relate to this project. As the proposed action is situated along the shoreline and impact submerged lands, we recommend that the HDOT verify with the City and County of Honolulu, Department of Planning and Permitting that SMA Use permitting, and SSV are not required for the proposed action.

Response: We have consulted with the City and County of Honolulu, Department of Planning and Permitting. A discussion of the applicability of the SMA and SSV requirements have been added to the Final EA (see section 1.7.3).

The HDOT will transmit a copy of the Final EA to your office once it is published.

If there are any future questions or concerns, please contact our Project Manager, Ms. Jiangli Guo, Civil Engineer, Materials Testing and Research Branch, Highways Division at (808) 832-3405 extension 118, or by email at jiangli.guo@hawaii.gov.

c: DBEDT OPSD Joshua Hekeia, Debra Mendes