

**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
Honolulu, Hawai'i**

June 26, 2026

180-Day Exp. Date: September 21, 2026

06/02/2026

Board of Land and
Natural Resources
State of Hawai'i
Honolulu, Hawai'i

Regarding: Conservation District Use Application (CDUA) OA-3994 for the Kalaeloa Hybrid Reef Project

Applicant: State of Hawai'i Department of Transportation, Administration Modal Unit

Landowner: State of Hawai'i

Location: Offshore of Kalaeloa Point on the island of O'ahu

Tax Map Key: (1) 9-1-014:049 (Seaward)

Area of Use: Approximately 8,945 ft²

Subzone: Resource

Exhibits:

- A. Location Map
- B. Conservation District Subzone Map
- C. Oahu Atlas Coastal Natural Hazards Map
- D. Proposed Hybrid Reef Layout
- E. Hybrid-Reef Design Rendering
- F. Monitoring Equipment
- G. Project Site Photos
- H. Proposed Construction Plans

Summary (Exhibit D & H)

The Hawai'i Department of Transportation (HDOT) states that the Kalaeloa Hybrid Reef Project as a prototype coastal defense system designed to evaluate the performance of hybrid reefs and their effectiveness in reducing wave energy. The hybrid reef prototypes, developed by the Defense Advanced Research Projects Agency (DARPA), will be transferred to HDOT upon deployment, at which point HDOT will assume long-term ownership, maintenance, and monitoring responsibilities.

The project proposes the deployment of an array of concrete structures measuring approximately 165 feet by 230 feet in water depths of 7–13 feet offshore of Campbell Industrial Park. The proposed project footprint is approximately 8,945 square feet.

The reef design incorporates features that mimic natural reef structures, including a “reef crest” (the highest point of the reef) and a “back reef” (the shallower, shoreward area). These structures are intended to be seeded with live coral to promote ecological function and habitat development. Exhibit H shows the design drawings of the reef back and crest.

The layout includes two rows of 20 reef crest structures (40 total) and 21 back reef structures positioned between the reef crest and the shoreline. Exhibit D shows the proposed hybrid reef layout.

Description of Area / Current Use (Exhibit A, B, & G)

The project site is located on the southwest side of O'ahu within submerged waters offshore of the Island Energy Services oil refinery, within the ahupua'a of Honouliuli, 'Ewa. The project area lies within the Resource subzone of the Conservation District makai of Tax Map Key: (1) 9-1-014:049. Exhibits A & B show the location map and Conservation District Subzone of where the project lies.

The Island Energy Services oil refinery occupies a 227.8-acre parcel within the James Campbell Industrial Park in Kapolei, a major regional center for energy production and manufacturing. Today, the broader Kalaeloa area supports a mix of industrial, commercial, recreational, and maritime uses, including Kalaeloa Harbor, a moderately deep-draft commercial port, and Barbers Point Marina, which serves recreational boating activities.

The Kalaeloa coastline is characterized by emergent reef formations with occasional deep sinkholes. Narrow sandy beach segments occur intermittently between exposed reef shelves and coastal vegetation. Artificially constructed lagoons are also present along the shoreline to capture and manage excess stormwater runoff. Stormwater outfall pipes associated with the Island Energy Services oil refinery are located east of the proposed project area. Exhibit G shows the existing site photos of the project area and surroundings.

The proposed project site consists of nearshore coastal waters characterized by wave-scoured hard-bottom seabed interspersed with patches of coral and sand. The hybrid reef structures are proposed to be deployed at depths ranging from approximately 2 to 4 meters.

Natural Hazards (Exhibit C)

Due to its southern exposure, Barbers Point is particularly vulnerable to Kona storms, tropical storms, and south-facing wave events. The primary natural hazards affecting the area are large storm-generated waves and swells. In addition, the region's low-lying coastal topography increases its susceptibility to coastal inundation and flooding associated with high-wave events and tsunamis, resulting in a high tsunami hazard potential.

These Hazards could potentially affect the project subjecting the hybrid reef structure and monitoring instruments to intense wave forces and strong currents which may increase maintenance requirements and challenge the long-term durability of the reef.

Aquatic Biota

Coral cover within the proposed project area is relatively low, comprising less than 5 percent of the benthic habitat. Any non-encrusting coral colonies greater than 4 inches (10 centimeters) in height would be carefully collected and temporarily relocated to nearby deeper-water sites prior to construction activities.

Vegetation: The proposed project area includes phytoplankton, seaweed, and seagrasses. According to the Environmental Assessment (EA), the distribution and abundance of marine vegetation in the project area are influenced by several environmental factors, including light availability, nutrient levels, water quality, salinity, seafloor substrate type, storms and ocean currents, temperature, and grazing pressure from herbivores.

The EA identifies several major groups of vegetation that may occur within the proposed action area, including diatoms, blue-green algae, dinoflagellates, coccolithophores, brown algae, green algae, and red algae. No ESA-listed plant or vegetation species are known to occur within the proposed project area.

Invertebrates: Invertebrates within the proposed project area are represented by a wide range of taxonomic groups, or phyla, occurring in both juvenile and adult life stages. According EA, major invertebrate groups that may occur within the proposed project area include foraminifera, radiolarians, ciliates, sponges, corals, hydroids, jellyfish, flatworms, ribbon worms, roundworms, segmented worms, bryozoans, cephalopods, bivalves, sea snails, chitons, shrimp, crabs, lobsters, barnacles, copepods, comb jellies, sea stars, sea urchins, and sea cucumbers.

No ESA-listed invertebrate species are expected to occur within the proposed action area.

Birds: Marine birds are a diverse group of species adapted to marine environments, utilizing nearshore waters, offshore habitats, and open-ocean areas for foraging, resting, and migration.

Bird species most likely to occur within or near the proposed project area are those that forage in coastal waters, such as waterfowl and seabirds that utilize the water's surface for feeding activities. These species could potentially be exposed to project-related activities occurring at or near the water surface. No ESA-listed bird species are expected to occur within the proposed action area.

Consultation with the NOAA Pacific Islands Regional Office (PIRO) Endangered Species Act (ESA) Team indicates the potential presence of the following ESA-listed species within the project vicinity:

1. Central North Pacific Green Sea Turtle – Threatened
2. Hawksbill Sea Turtle – Endangered
3. Hawaiian Monk Seal – Endangered
4. False Killer Whale – Endangered
5. Giant Manta Ray – Threatened

Fish: In the marine waters surrounding Hawai'i, fish communities tend to aggregate in areas with high habitat complexity, such as coral reef ecosystems. Coral reef fish assemblages within the Main Hawaiian Islands (MHI) are primarily composed of herbivorous species and low trophic-level carnivores, while apex predators account for only approximately three percent of total fish biomass.

Common fish species associated with Hawaiian coral reef habitats include wrasses, goatfishes, damselfishes, parrotfishes, filefishes, jacks, and sharks. According to the EA, the only ESA-listed fish species that may occur within the proposed project area is the giant manta ray. No designated critical habitat for ESA-listed fish species occurs within the proposed action area.

Sea Turtles: The green sea turtle and hawksbill sea turtle are the two sea turtle species expected to occur within the proposed project area, and both are listed under the ESA.

The green sea turtle is listed as threatened under the ESA. Green sea turtles are the most common sea turtle species found in waters surrounding the Hawaiian Islands. Adult green sea turtles are typically associated with shallow coastal waters containing abundant submerged aquatic vegetation near reefs or rocky habitats. Because the proposed project area contains limited to no submerged aquatic vegetation, adult green sea turtles would most likely transit through the area rather than use it for foraging.

The hawksbill sea turtle is listed as endangered under the ESA. Hawksbill sea turtles are the second most common sea turtle species in Hawaiian waters, although they occur in significantly lower numbers than green sea turtles. While hawksbill sea turtles are capable of long-distance migrations in the open ocean, they are more strongly associated with coastal habitats and tend to utilize nearshore environments more exclusively than other sea turtle species. Hawksbill

hatchlings are believed to occupy offshore oceanic habitats in waters deeper than approximately 656 feet (200 meters); therefore, this life stage is not expected to occur within the proposed action area.

Marine Mammals: The two ESA-listed marine mammal species that may occur within the proposed action area are the false killer whale and the Hawaiian monk seal.

The false killer whale is listed as endangered. The National Marine Fisheries Service (NMFS) designated critical habitat for this distinct population segment (DPS) in waters surrounding the main Hawaiian Islands at depths ranging from approximately 148 to 10,499 feet. Because the proposed project area is located in shallow nearshore waters, designated false killer whale critical habitat does not overlap with the proposed action area.

The Hawaiian monk seal is listed as endangered. Hawaiian monk seals primarily forage in nearshore, shallow marine habitats, although they are capable of traveling considerable distances in search of prey. An NMFS assessment concluded that, because the proposed project would occur entirely in the marine environment and would not involve terrestrial habitat disturbance.

Historic and Cultural Resources

Kalaeloa is rich with tradition in native Hawaiian history and stories. Many mo'olelo refer to the region of Kalaeloa as a landmark for travelers approaching the southern coast of O'ahu and as a launching point for travel to other islands.

Community members and cultural practitioners have shared place-based knowledge regarding the coastal resources of Kalaeloa. The closest known cultural resources are approximately 700 yards north of the proposed project upon fastlands: beach midden site (SIHP ID: 50-80-12-02722) and two subsurface cultural deposits (SIHP ID: 50-80-12-04526). None of the sites are expected to be impacted by the proposed work.

Proposed Land Uses (Exhibit E & F)

Project Description

The proposed project seeks to develop and test a "living" reef system designed to self-repair while enhancing coastal protection. The reef would function as an offshore barrier that reduces wave energy and helps mitigate flooding, shoreline erosion, and storm surge impacts that can damage roads and coastal infrastructures during storm events.

According to the applicant, the reef-mimicking structures are designed to serve three primary purposes: (1) to reduce wave energy, (2) to modify wave dynamics from plunging to spilling waves in order to improve conditions for coral settlement, and (3) to provide foundational structure for habitat creation supporting both coral and non-reef-building marine organisms.

Site selection for the project used the following criteria: (1) the presence of a shallow coastal shelf, (2) an existing reef with low coral cover, (3) sufficient wave energy, and (4) the absence of existing uses incompatible with coral reef restoration or a submerged breakwater system.

According to the applicant, the proposed hybrid reef structures have been successfully tested in wave flumes under simulated extreme wave conditions, demonstrating their potential resilience and effectiveness as a coastal protection measure.

In addition, the proposed project includes the following summarized scope of work to be completed shown in exhibit E & F:

- **Permanent Anchoring:** Some or all the units will require anchoring via drilled anchor steel bars. The steel bars will be drilled in a rock socket with a maximum of 10 ft embedment, held in place with epoxy resin. During installation, the reef prototypes will be transported from Kalaeloa harbor and divers will assist with anchoring and placements of the reef prototypes.
- **Moorings:** Up to three subsurface moorings may also be installed within the project area. Each subsurface float may be supported by up to two mooring plates (24 inches by 64 inches each), for a total of up to six mooring plates. The total potential area of seafloor contact by mooring plates is approximately 64.02 square feet. Each plate would be secured by up to three anchor bars connected to a chain and float system, with a design capacity of up to 90,000 pounds.
- **Coral Collection:** Coral within the approximately 37,674 square feet of installation footprint would be removed prior to deployment and installation activities. All coral greater than 4 inches in height, as well as any corals of opportunity, would be collected. These corals would be temporarily stored for future use on the hybrid reef. Coral collection, handling, and transport would be conducted by Kuleana Coral Restoration and University of Hawai'i divers.

Following installation of the hybrid reef structures, collected corals would be fragmented and transplanted onto the reef modules to support habitat enhancement and ecological recovery. Additional "corals of opportunity" identified within the project area may also be out planted onto the hybrid reef structures.

- **Acoustic Devices:** The project also includes the deployment of several monitoring and research components. Up to three acoustic devices in cylindrical pressure housings (approximately 3.3 feet long by 10 inches in diameter, weighing 50 pounds submerged each) may be mounted on or near reef units. These devices may transmit sound continuously for up to 12 hours, primarily during evening hours, with speakers positioned near the center of the array.
- **Cameras and Lights:** Up to 30 cameras may be installed in PVC housings (9 inches by 2 inches), secured to reef units using tie wraps and hose clamps. Approximately half of these camera units may include integrated lighting systems.

- **Acoustic Recorders:** Deployment of up to nine acoustic recorders, each approximately 12 cm by 4 cm in diameter, mounted on sand anchors directly on the seafloor, attached to other seafloor-mounted instruments, or affixed to the end of a two-foot rod secured to the reef unit.
- **Sensor Recorders:** Up to six sensor recorders would be evenly spaced along the structure, installed using sand anchors directly on the seafloor or mounted on other seafloor-deployed instruments. Each unit measures approximately 36 cm in length by 13 cm in diameter. In addition, two acoustic recorders designed for specialized detection of low-frequency fish sounds would be deployed for up to two months each year during the summer. These instruments, with a footprint of approximately 60 cm by 60 cm, would be secured directly to the seafloor using sand anchors or stakes.
- **Monitoring Structures:** A total of 56 monitoring structures, each consisting of up to 10 layers of plastic sheets measuring 20 cm x 20 cm x 20 cm, may be attached to 28 reef crest structures. These devices would be secured to the tops of the units using threaded bolts to evaluate coral growth and biodiversity.
- **Nighttime Feeding Lights:** Up to 10 units may be equipped with battery-powered lights programmed to activate for one hour each night, beginning approximately 30 minutes after sunset. The lighting would be visible only at the water's surface directly above each unit.
- **Umu Kai (Fish Houses):** Up to 40 Umu Kai would be assembled and deployed on the seafloor. These structures would consist of loosely stacked rocks or coral and would be placed either within or adjacent to the reef units.

Mitigation and Best Management Practices

Standard Operating Procedures, protective measures, best management practices, and conservation recommendations would be implemented for the duration of the project.

UH will conduct monitoring post-deployment, at two months post-deployment, and at five-year intervals to evaluate the performance and stability of the anchoring system. Monitoring activities would primarily be conducted offshore using small boats, with pedestrian access provided via Kalaeloa Beach Park or other nearby beach access points. The University of Hawai'i is currently seeking funding to support long-term monitoring of the site. There is anticipation of an award from the DoD Environmental Security Technology Certification Program (ESTCP) to conduct 3 additional years of monitoring to assess the longer-term performance of the array. Once more funding is secured, UH will conduct surveys regularly. Kuleana Coral Restoration would evaluate the anchoring and structural stability of nursery tables following major storm events.

Pre-deployment work would include photogrammetry mapping of the deployment area to assess baseline coral cover and support subsequent field activities. Following installation, the R3D hybrid reef system may be monitored in situ for the first two months to ensure that the reef modules remain securely anchored to the seabed and do not pose hazards to marine life or

interfere with navigation. Monitoring may also include the removal of derelict fishing gear or other marine debris that could pose entanglement risks.

Special Activity Permit (SAP) 2027-07 was issued on March 13, 2026, to UH for the collection, possession, transportation, out planting and/ or direct reattachment of regulated organisms (various spp. of coral colonies/fragments and live rock).

The Hawai'i Department of Transportation (HDOT), as the owner of the reef modular systems (RMSs) following deployment, has committed to conducting shoreline assessments following significant storm events, defined as those for which a storm warning is issued by an official weather service. If any structural displacement is observed, in-situ surveys would be conducted to assess anchoring integrity and overall system stability. Diver-based inspections may also document coral loss and remove or dispose of damaged or loose coral substrate modules (CSMs) or coral growth modules (CGMs) as needed. Once installed, the project will also be marked with U.S. Coast Guard approved navigational markings if required.

Mitigation: Entanglement prevention measures will include, but are not limited to, minimizing the use of structures or components that could pose entanglement risks during research operations, such as loops, holes, slack lines, or excess loose rope associated with vessels, structures, or sampling gear. In the event of any incidental entanglement involving protected species, DAR and the appropriate federal agency will be notified promptly to ensure proper reporting and response procedures are followed.

The Permittee will implement best management practices when monitoring coral specimens, including, but not limited to, ensuring that project personnel conduct activities in a manner that minimizes environmental impacts at monitoring sites. This includes reducing sedimentation associated with fieldwork and avoiding contact with existing organisms to the extent practicable.

Monitoring: The project will conduct monitoring in accordance with permitting requirements. Monitoring is expected to occur at one (1) month following out planting, and again at six (6) months, one (1) year, three (3) years, and five (5) years, unless otherwise specified in SAP conditions. Monitoring techniques will be updated as appropriate to reflect current best available methodologies, such as digital tracking using photomosaic mapping and Structure-from-Motion imaging, to the extent practicable. The project will also adhere to all photo documentation and monitoring requirements established by the Division.

Other Alternatives Considered

No Action: The Proposed Action would not occur. No deployment of hybrid reef would occur. This would result in no impacts on physical, biological socioeconomic, or cultural resources. No further research on shoreline protection alternatives to hard armoring.

Additional Array of Large Fore/ Back-Reef Structures: There would be an additional array of large fore-reef structures and larger array of back-reef structures. Through modeling and analysis of wave flume tests, it was determined that neither of these arrays of additional structures would provide enough wave-energy attenuation to justify the cost or potential impact to the site.

Summary of Comments

The Office of Conservation and Coastal Lands referred the application to the following agencies for review and comment:

State Agencies:

- DLNR: O'ahu District Land Office, Aquatic Resources, Forestry and Wildlife, Conservation and Resources Enforcement, Boating and Ocean Recreation, Historic Preservation
- Aha Moku Council

County Agencies:

- Department of Planning & Permitting

Federal Agencies:

- Fish and Wildlife Services, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration

This application was forwarded to the Kapolei Public Library and the Kapolei Neighborhood Board. Further, the application was made available on OCCL's website for those who may wish to review it. Additionally, notice of CDUA OA-3994 was published in the April 8, 2026, edition of *The Environmental Notice*.

Comments were received by the following agencies, and summarized by Staff as follows:

DLNR- O'ahu District Land Office

Any work and/or use of State Land makai of the title boundary and/or certified shoreline shall require a disposition from the Board of Land and Natural Resources.

Applicant's Response

HDOT acknowledges the comment that any work and/ or use of State Land makai of the title boundary and/or certified shoreline shall require a disposition from the Board of Land and Natural Resources and confirms that HDOT is coordinating with the DLNR Land Division to obtain the required disposition or authorization from the Board of Land and Natural Resources for the Kalaeloa Hybrid Reef Project.

Analysis

On March 3, 2026, the Department notified the applicant that:

1. The proposed use is an identified land use in the Resource subzone of the Conservation District, pursuant to the Hawai'i Administrative Rules (HAR), §13-5-24, R-5 MARINE CONSTRUCTION (D-1) *Dredging, filing, or construction on submerged lands, including construction of harbors, piers, marinas, and artificial reefs*; and (HAR), §13-5-22, P-1 DATA

COLLECTION (D-1) *Data Collection, research, education, and resource evaluation that involves permanent facilities or structures larger than 500 square feet or a land use causing significant ground disturbance or impact to a natural resource.* This land use requires a permit from Board of Land and Natural Resources. The Board has the final authority to grant, modify, or deny the proposal;

2. Pursuant to §13-5-40 of the HAR, a Public Hearing shall be required. Proposed use or public interest determined by the chair requires a public hearing on the application.
3. In conformance with Hawaii Revised Statutes (HRS), Chapter 343, as amended, and HAR Chapter 11-200.1, the Final Environmental Assessment has been reviewed. The Department of Transportation issued a finding of no significant impact (FONSI) that was published in the February 23, 2026, issue of The Environmental Notice;
4. The project appears to be outside the Special Management Area.

Public Hearing

A Public Hearing was held at the 'Ewa Beach Public Library on May 6, 2026, to accept any public testimony related to this project. Three members of OCCL staff and four members of the applicant's team attended the public hearing that was to commence at 5:30 pm. No one from the public attended the meeting.

Conservation Criteria

The following discussion evaluates the merits of the proposed land use by applying the criteria established in §13-5-30, HAR.

The proposed use is consistent with the purpose of the Conservation District.

The objective of the Conservation District is to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote long-term sustainability and the public health, safety, and welfare.

According to the applicant, the project has been designed and sited to test the performance of a prototype hybrid reef. The prototype hybrid reef that may attenuate wave energy more effectively than traditional hardscaping with added benefits to the marine environment and local communities. The need for the proposed project is to find cost-effective and novel solutions (i.e., alternatives to shoreline hardening) for protecting shorelines from storm surges and sea level rise which is consistent with the purpose of the Conservation District.

The proposed land use is consistent with the objectives of the Subzone of the land on which the use will occur.

The objective of the Resource subzone is to ensure, with proper management, the sustainable use of the natural resources of those areas. The proposed land use is an identified land use within the Resource subzone pursuant to (HAR), §13-5-24, R-5 MARINE CONSTRUCTION (D-1) *Dredging, filling, or construction on submerged lands, including construction of harbors, piers, marinas, and artificial reefs;* and HAR §13-5-22, P-1 DATA COLLECTION (D-1) *Data Collection, research, education, and resource evaluation that involves permanent facilities or structures*

larger than 500 square feet or a land use causing significant ground disturbance or impact to a natural resource. This land use requires a permit from Board of Land and Natural Resources. The Board has the final authority to grant, modify, or deny the proposal.

According to the applicant, this project would protect valuable natural and cultural resources (i.e., coral reefs and associated organisms) by enhancing the seafloor with structure to provide new suitable habitat for a coral reef ecosystem to exist, while also dissipating wave energy to protect geological resources near the shoreline. This hybrid reef prototype is intended to dissipate wave energy to protect lands susceptible to floods and soil erosion.

Staff anticipates minimal environmental effects, provided that Best Management Practices (BMPs) are implemented as outlined. The applicant has developed contingency plans, including measures and protocols for monitoring and maintaining the project during and after deployment of the hybrid reef. These measures are also subject to compliance with conditions established under the Special Activity Permit (SAP).

The proposed land use complies with the provisions and guidelines contained in Chapter 205A, HRS entitled "Coastal Zone Management", where applicable.

According to the applicant, the project complies with the requirements of the Coastal Zone Management Consistency Concurrence issued for the Nationwide Permit.

The Coastal Zone Management Area under Chapter 205A, Hawai'i Revised Statutes (HRS), encompasses most land, water, and marine areas of the State. Staff finds that the proposed land use is consistent with the provisions and guidelines of the Coastal Zone Management Area, including those related to recreational, historical, scenic, and open space resources, as well as coastal ecosystems.

The EA states access to the shoreline may potentially be limited temporarily during construction. Staff believes construction may not limit the shoreline access as the proposed project is in submerged waters. The project is not anticipated to result in significant adverse impacts to coastal ecosystems or marine resources.

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

The project has been sited and designed to avoid substantial adverse impacts on existing natural resources. The project would extend well below and beyond the shoreline and will not affect the coastline, lateral access or marine resources.

Staff believes the project will not have adverse impact on existing natural resources or change the existing land use. The proposed project appears to enhance the surrounding habitat using the hybrid reef structure. Any minor impact most likely will be temporary (e.g. ocean access to areas for fishing and gathering).

The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels.

Staff believes the proposed land use is compatible with the locality and surrounding areas, and appropriate to the physical conditions, and capabilities of the aquatic environment. The project located in the Conservation District will be entirely out of view in submerged waters. There are no known surf brakes, submerged pipelines, or anchorages exist in the proposed area.

The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable.

Staff believes the physical and environmental aspects of the submerged land may be improved from a moderate reef to a coral reef ecosystem. Most marine mammals would still be able to move above, below, through, and around the openings of the hybrid reef structures. With also the proposed 40 Umu Kais that would provide additional habitat for aquatic species.

However, drilling into the substrate during anchor bar installation may generate noise and vibration that act as environmental stressors. These disturbances can cause animals to vacate feeding or breeding habitats and may increase mortality risk by reducing their ability to detect and avoid predators.

Subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District.

No subdivision of land is being proposed.

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

By utilizing standard construction materials (e.g., concrete, GFRP, epoxy) and biological materials (e.g., seaweed, algae, and coral) existing in the environment the project appears not to be materially detrimental to public health, safety, and welfare. The inventory of regulated organisms (various spp. of coral colonies/fragments and live rock) maintained on site may need to be submitted to DAR. Since the project takes place 200 yds within the coastline which is considered the breaker zone of the coastal waters, it appears to have low interference with the public.

Customary & Traditional Practices

Articles IX and XII of the State Constitution, other state laws, and the courts of the State, require government agencies to promote and preserve cultural beliefs, practices, and resources of Native Hawaiian and other ethnic groups.

A Cultural Impact Assessment and Ka Pa'akai were completed for the project and included with the final Environmental Assessment. No significant cultural resources would be disturbed. Practices like subsistence fishing, education, and ceremonies (e.g., prayers and offerings) that reinforce ancestral connections to the sea maybe temporarily disrupted for safety.

During construction activities, the lateral shoreline access may be temporarily limited for fishing and gathering. Ocean activities such as, boating, surfing, diving, and swimming could take place during the installation process as long as it does not interfere with the project area.

The project application was sent to DLNR Ahu Moku Committee, the Office of Hawaiian Affairs, and the Kapolei Neighborhood Board for review during the public comment period, and no comments were received regarding the potential for cultural resources and practices to be possibly affected by the project.

Staff believes no action will be necessary by the Board of Land and Natural Resources as the project will not directly impact cultural resources and will only temporarily limit access during construction.

Discussion

The purpose of the project is for the Hawaii Department of Transportation to test and develop a hybrid reef pilot project. This includes the installation of individual base structures that mimic sections of a fringing reef. Coral growth modules would be attached to stimulate rapid coral growth to provide additional fish habitat, wave attenuation, and structural support. If successful, the proposed project aims to utilize hybrid reefs as an innovated method to protect infrastructure and communities from flooding, erosion, and storm surges.

There is minimal disruption to the environment and shoreline as the project is in submerged waters. The applicant has provided BMPs and SAP conditions that shall be observed that covers before, during, and after construction activities and provides contingency plans to deal with the unexpected during construction.

Based on the information provided, staff believe that the project will have negligible adverse environmental or ecological effects provided that best management practices and mitigation measures, as described in the application and as required by rules and laws, are fully implemented.

According to the applicant, unlike traditional hard-engineering solutions such as seawalls or concrete breakwaters, the hybrid reef integrates engineered structures with natural marine elements. Applicant states the approach is intended to provide additional ecological benefits, including the potential to support marine life and enhance local ecosystem function.

The applicant states that the project attempts to address a growing need for more affordable, sustainable, and effective shoreline protection strategies in the context of increasingly intense storms and rising sea levels, offering an alternative to reliance on conventional hard infrastructure alone.

Staff have expressed concerns regarding the long-term monitoring and maintenance of the project once funding is exhausted. While damaged instruments are expected to be removed during the funded period, it remains unclear how the array will be managed, maintained, and monitored after project funding ends, particularly given that the divers and monitoring personnel are being provided by UH. This uncertainty raises the possibility that the project area could remain unmonitored for an extended period.

In addition, based on the information provided, the hybrid reef appears to constitute a permanent structure once deployed. This further emphasizes the need for a clearly defined post-funding management, maintenance, and monitoring plan to ensure the long-term stewardship of the project site.

Recommendation

Based on the preceding analysis, staff recommends that the Board of Land and Natural Resources approve Conservation District Use Application OA-3994 for Hawaii Department of Transportation's Hybrid Reef Project located Offshore of Kalaeloa Point on the island of O'ahu, Makai of Tax Map Key: (1) 9-1-014:049, subject to the following conditions:

1. The permittee shall comply with all applicable statutes, ordinances, rules, and regulations of the federal, state, and county governments, and applicable parts of this chapter;
2. The permittee shall obtain appropriate authorization from the department for the occupancy of state lands, if applicable;
3. The permittee shall comply with all applicable department of health administrative rules;
4. Before proceeding with any work authorized by the department or the board, the permittee shall submit four copies of the construction plans and specifications to the chairperson or an authorized representative for approval for consistency with the conditions of the permit and the declarations set forth in the permit application. Three of the copies will be returned to the permittee. Plan approval by the chairperson does not constitute approval required from other agencies;
5. Unless otherwise authorized, any work or construction to be done on the land shall be initiated within one year of the approval of such use, in accordance with construction plans that have been signed by the chairperson, and shall be completed within three years of the approval of such use. The permittee shall notify the department in writing when construction activity is initiated and when it is completed;
6. In issuing the permit, the department and board have relied on the information and data that the permittee has provided in connection with the permit application. If, subsequent to the issuance of the permit such information and data prove to be false, incomplete, or inaccurate, this permit may be modified, suspended, or revoked, in whole or in part, and the department may, in addition, institute appropriate legal proceedings;
7. The permittee shall utilize Best Management Practices outlined in the Final Environmental Assessment (FEA) and conditions in the Special Activity Permit (SAP) shall be implemented during the construction of the proposed project;
8. Where any interference, nuisance, or harm may be caused, or hazard established by the use, the permittee shall be required to take measures to minimize or eliminate the interference, nuisance, harm, or hazard;
9. Obstruction of public roads, trails, lateral shoreline access, and pathways shall be avoided or minimized. If obstruction is unavoidable, the permittee shall provide alternative roads, trails, lateral beach access, or pathways acceptable to the department;

10. During construction, appropriate mitigation measures shall be implemented to minimize impacts to off-site roadways, utilities, and public facilities;
11. The permittee shall provide public notification to inform the public of the project;
12. The permittee acknowledges that the approved work shall not hamper, impede, or otherwise limit the exercise of traditional, customary, or religious practices of native Hawaiians in the immediate area, to the extent the practices are provided for by the Constitution of the State of Hawaii, and by Hawai'i statutory and case law;
13. Should historic remains such as artifacts, burials or concentration of charcoal be encountered during construction activities, work shall cease immediately in the vicinity of the find, and the find shall be protected from further damage. The contractor shall immediately contact HPD (692-8015), which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary;
14. The use shall not adversely affect a federally listed threatened or endangered species or a species proposed for such designation, or destroy or adversely modify its designated critical habitat;
15. The activity/use shall not substantially disrupt the movement of those species of aquatic life indigenous to the area, including those species, which normally migrate through the area;
16. No contamination of the marine or coastal environment (trash or debris) shall result from project-related authorized activities/uses;
17. The Office of Conservation and Coastal Lands shall be notified in advance of the anticipated construction dates and shall be notified immediately if any changes to the scope of work are anticipated;
18. Other terms and conditions as prescribed by the chairperson.
19. Failure to comply with any of these conditions shall render a permit void under the chapter, as determined by the chairperson or board.

Respectfully submitted,

Raymond Lei

Raymond Lei, Staff Planner
Office of Conservation and Coastal Lands *mc*

Approved for submittal:



Dawn N. S. Chang, Chairperson
Board of Land and Natural Resources

Exhibits

Exhibit A: Location Map

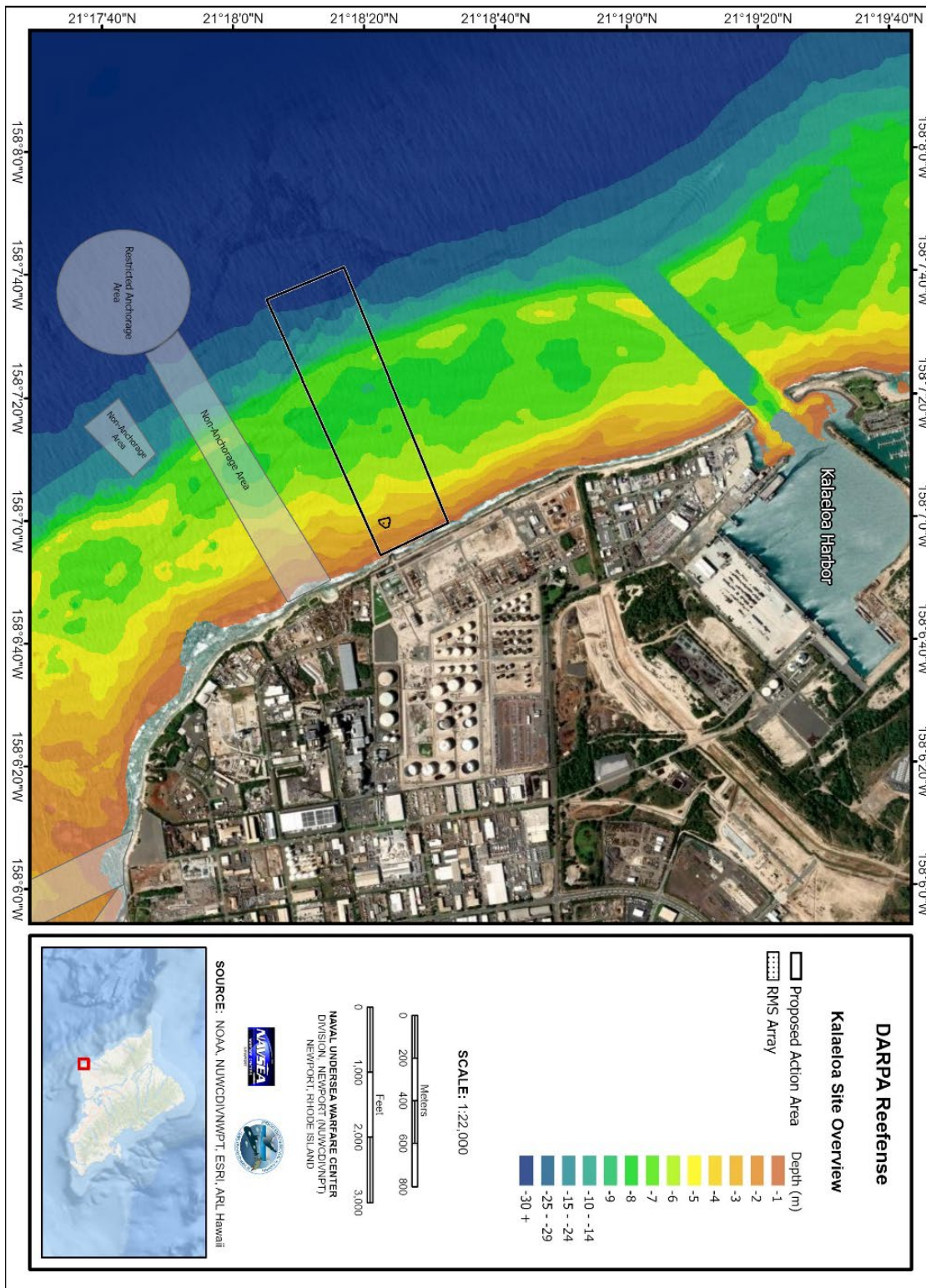


Exhibit D: Proposed Hybrid Reef Layout

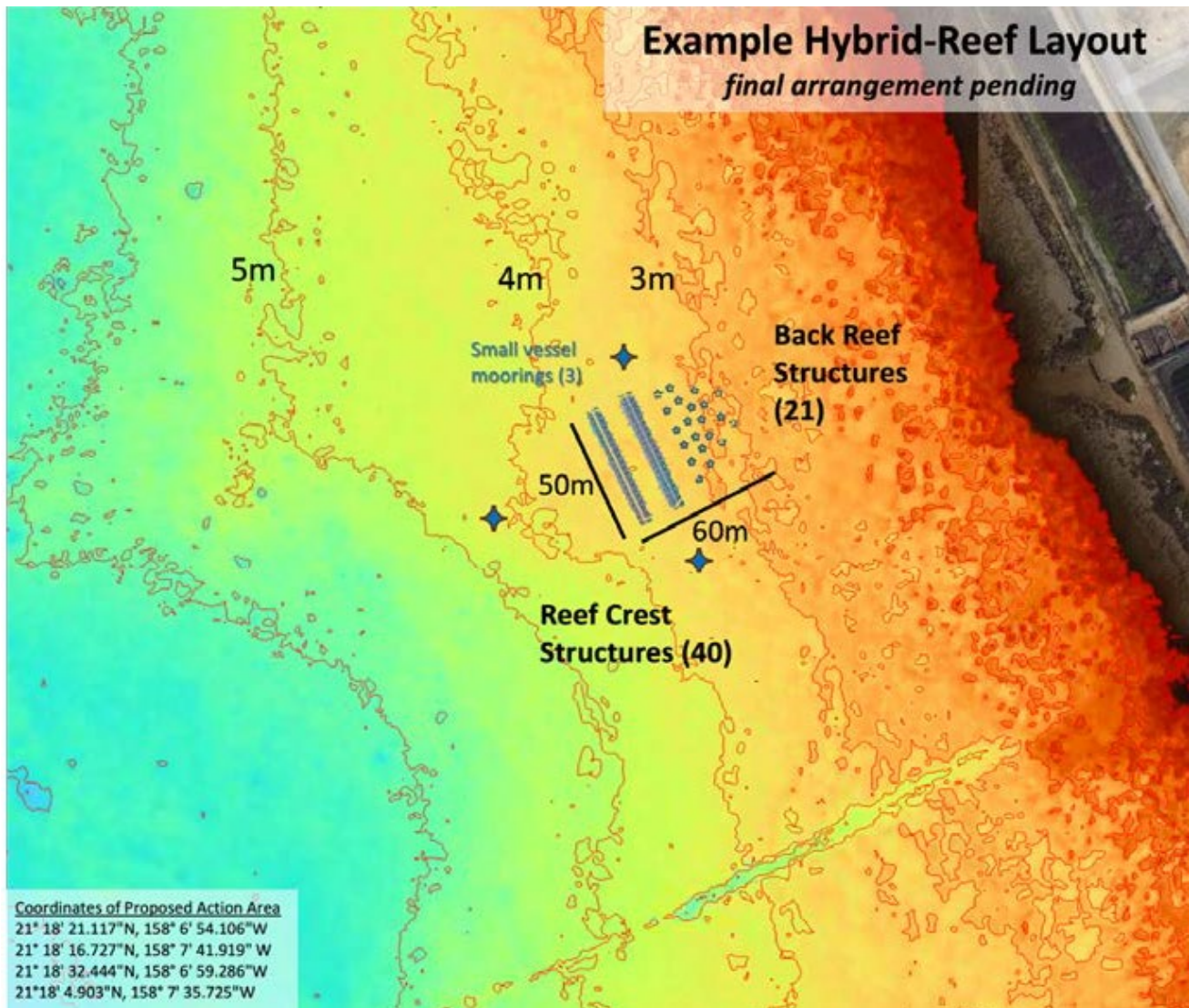


Exhibit E: Hybrid-Reef Design Rendering

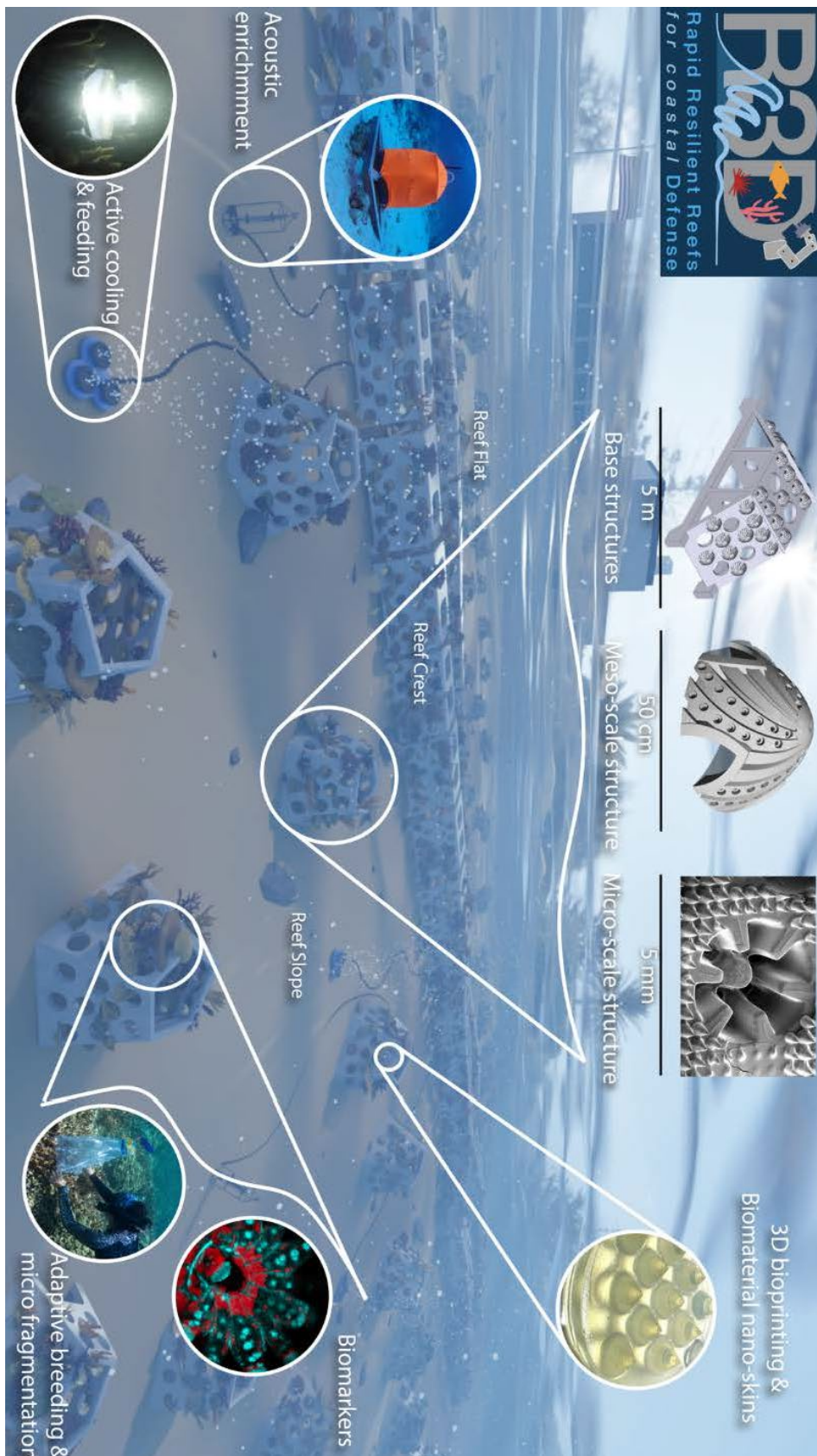
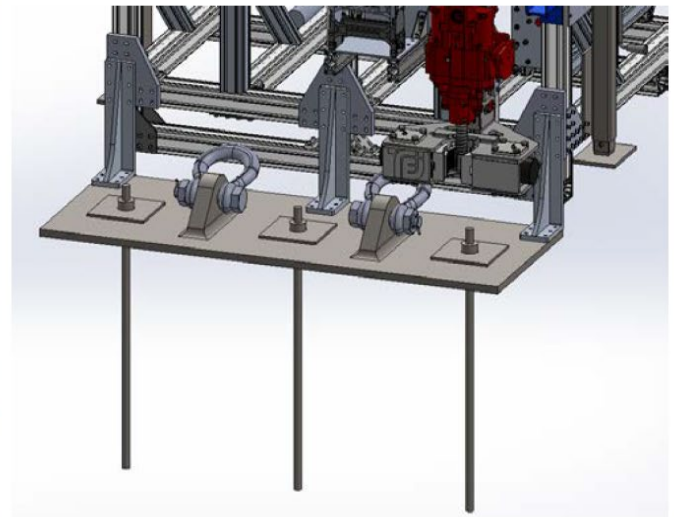
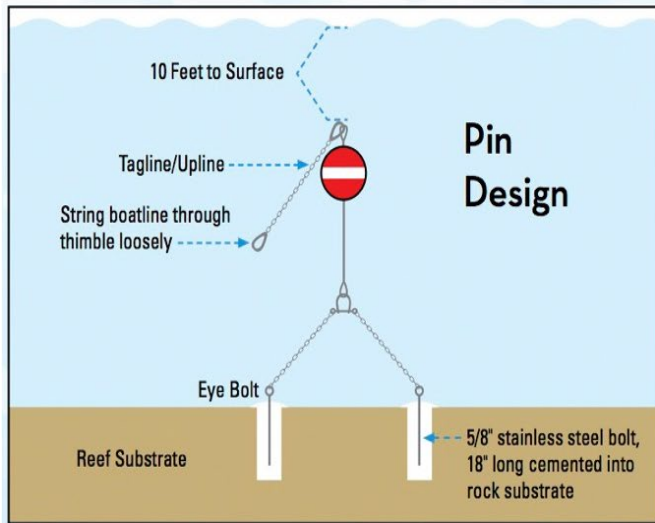
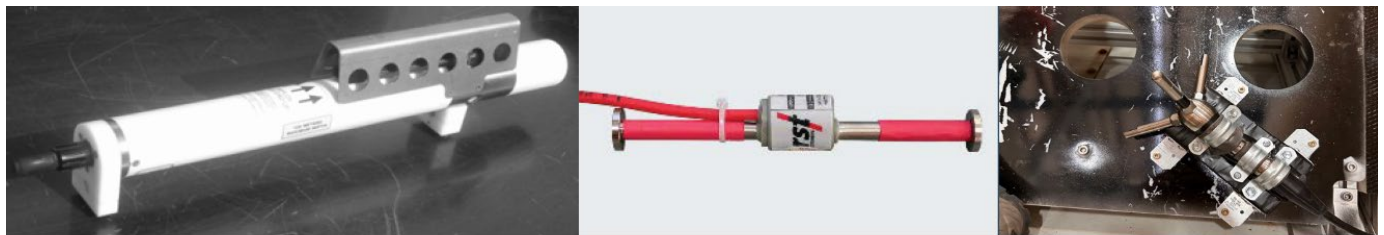


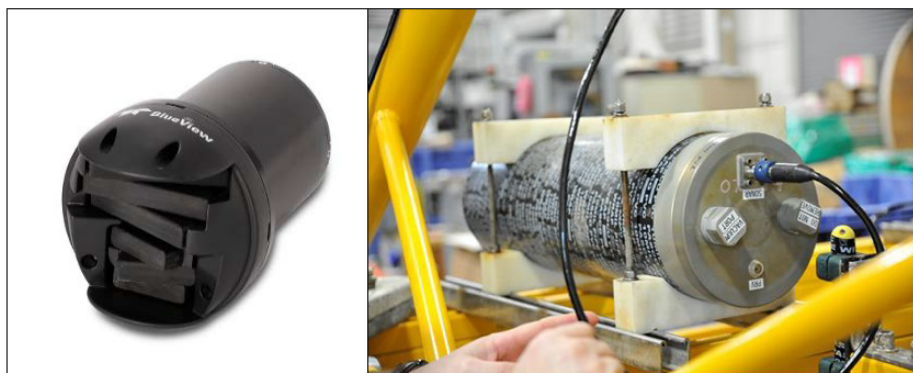
Exhibit F: Monitoring Equipment



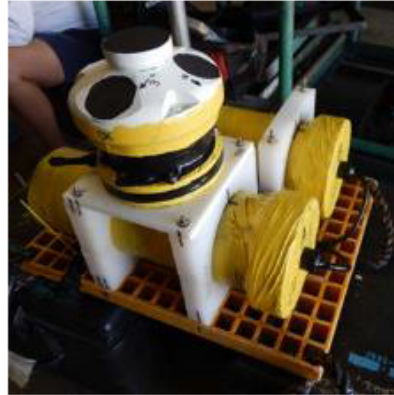
Subsurface Moorings Design



RBR Solo-DWave16 Data Logger (left); Strain Gauges (middle), Acoustic Doppler Velocimeter (right)



SeaBASS System Blueview M900-2250 Sonar (left); SeaBASS System Main Bottle with Cable (right)

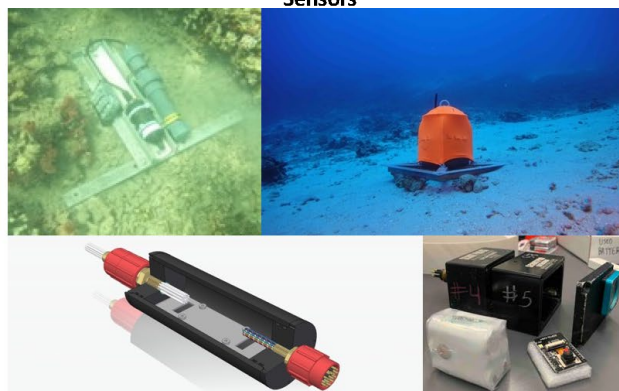


Instrument Deployment #1. A Nortek Acoustic Wave and Current Profiler (AWAC) and Two Battery Canisters Attached to a Flat Gridded Plate (600 kHz Acoustic Transmission with Four Beams; Three are Slanted at 25 degrees and One is Vertical with 3.1 Degree Beam Width)

Deployed



Instrument Deployment #2/#3: One Nortek Signature 1000 (right); One RBR Virtuoso Dwave Logger (left; black star); One Seabird MicroCAT (bottom right); One RBR Tu (middle-bottom; blue star) Deployed Together on a Ballasted Frame with a Vertical Bar for Securing the Sensors



Reef Sounds can be Recorded using a Soundtrap (top left), DASAR (top right), or Wilcoxon Recorder (bottom left). Productivity at a Playback Site would be Monitored by Kilocams (bottom right).

Exhibit G: Site Photos



East of Proposed Project Area



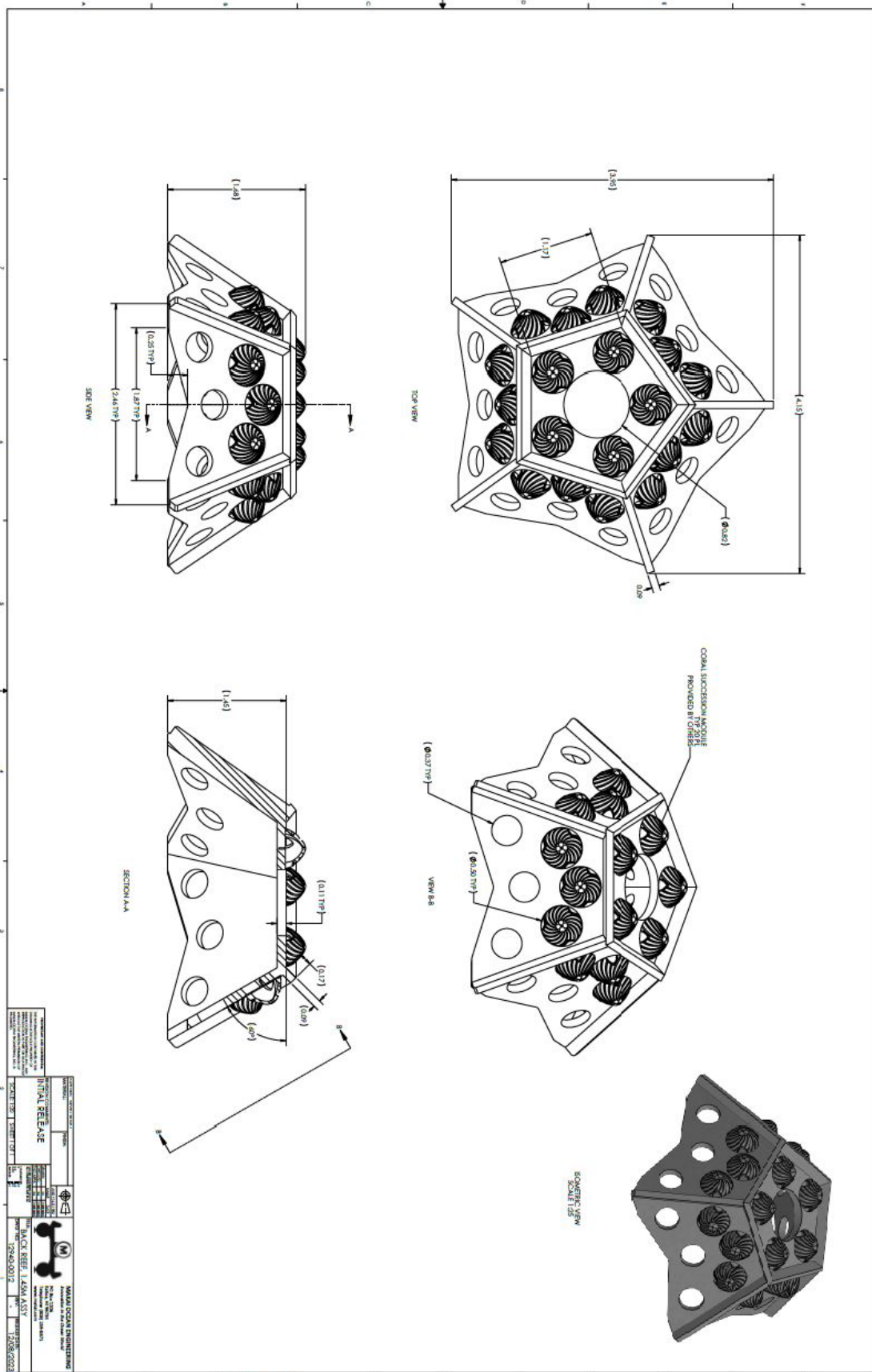
Shoreline Condition East of Proposed Project Area



Looking Makai Towards Proposed Project Area



Looking Mauka Towards Island Energy Services Storm Water Pipes



Back Reef Design Drawings (units in meters)