Day Mooring Installations
Best Management Practices
Kona 2021

Prepared for:

State of Hawaii
Department of Land and Natural Resources
Division of Boating and Ocean Recreation
(DOBOR)

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1.0 General Requirements

This Best Management Practices (BMP) Plan is provided in preparation for the proposed Day-Use Mooring Installations project. This Plan summarizes the minimum BMPs that shall be implemented over the course of the project to avoid and minimize impacts to the marine environment, including impacts to threatened or endangered species. These BMPs are based on recommended practices by the U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA).

The contractor shall comply with this BMP Plan and the specific requirements of all federal, state, municipal, and any other necessary permits put in place for the work. All workers associated with this project, irrespective of their employment arrangement or affiliation (e.g., employee, sub-contractor, etc.) shall be fully briefed on the BMPs and the requirement to adhere to the BMPs for the duration of their involvement in this project. BMPs shall be covered in the weekly toolbox safety meetings. The Project Superintendent shall be responsible to ensure compliance with the BMP plan. The Project Superintendent shall appoint and train a minimum of two (2) alternate individuals to comply with all aspects of the BMP plan. The Project Superintendent or trained alternate shall ensure that the employees and subcontractors are trained in the use of BMP materials.

The Project Superintendent or trained alternate shall conduct a visual inspection of all BMPs daily. The contractor shall fill in the Best Management Practice Plan (BMP) Inspection and Maintenance Form daily and to submit it to the DOBOR Engineer by 12:00 noon on the next working day (See Appendix C). The inspection and maintenance report form will be used by DOBOR to ensure that the required BMPs are practiced and functioning properly. This form will be submitted to DOH – Clean Water Branch in a timely manner.

The DOBOR Engineer will be responsible to fulfill all conditions of the Department of Army Permit and Section 401 Water Quality Certification.

All minor repairs and maintenance of the BMPs shall be completed within 24 hours of the inspection. Major repairs shall be completed as soon as practical but should be no later that 48 hours after the inspection. Any work that requires the BMPs will be immediately stopped and shall not resume until the BMP has been repaired. Inspections of all BMPs shall be made within 24 hours of any rainfall of 0.25 inch or greater and after periods of prolonged rainfall. Likewise, the in-water BMPs shall be inspected after severe ocean conditions to ensure that they are functioning properly.

The Applicable Monitoring and Assessment Plan (AMAP; Appendix D) for Clean Water Act – section 401 Water Quality Certification for the day-use mooring (DMB) installations have been prepared to accompany this BMP plan. It describes the water quality sampling and analysis plan that will produce representative data to monitor potential project impacts. The construction monitoring data will be transmitted by email to the Clean Water Branch with 24 hours or close of the next business day.

The contractor shall notify the DOBOR Engineer immediately of any changes to the BMPs, a BMP that is not functioning properly, and if a plume outside of the decision unit is generated by their construction activity. The activity that is causing the plume shall be stopped immediately and shall not resume until the problem is addressed to the satisfaction of the DOBOR Engineer.

2.0 Site Characterization

The work will be conducted within two sites along the Kona coast of Hawaii Island, Hawaii. Site 1 - Garden Eel Cove is a 38-acre zone at the back of Makako Bay. Vehicular access is by way of Makako Bay Drive through NELHA property. Site 2 - Kaukalaelae Point, is immediately south of Keauhou Bay. It can be accessed via Ehukai Road. Boat access to the sites is typically made from either the Honokohau or Keauhou boat ramps.

The existing installations at the Kona sites include DMBs that were installed and maintained by local tour companies and a nonprofit organization, Malama Kai. There are at least 6 known moorings at Garden Eel Cove and 4 at Kaukalaelae. Approximately a ½ mile offshore from the Garden Eel Cove site sits a series of aquaculture fish cages and a supporting matrix of moorings and feed vessels. Onshore by Garden Eel Cove, there are a series of water runways and associated facilities for algae aquaculture. The site at Kaukalaelae sits just south of a bay that houses a popular canoe club, beach, and boat ramp as well as residential housing. In addition, the Keauhou Sheraton sits immediately onshore from the intended ORMA site.

Underwater topography of the two Kona sites is typical of the leeward coastal reef structure. Garden Eel Cove has basalt boulders down to around 20', then lively coral reef to a depth of around 70', where the coral dissipates to sand. Kaukalaelae is similar except that the north boundary is an active boating channel with a sandy bottom.

3.0 Construction Sequence and Duration

The following is based on a likely sequence of general construction activities for the project. The construction could vary based on the contractor's operations and means and methods. Steps may occur concurrently or in a different order:

1. Place applicable construction BMPs prior to commencement of associated construction activities. BMPs, once placed, shall remain in place for the duration of the activities
- Construct new site civil works. (2 weeks concurrent with water activities)
    a. Excavate 2 holes per mooring site.
    b. Secure pin in place using cement or epoxy.
    c. Let the installation sit for 24 hours.
- Demolish existing moorings.
    a. Disassemble buoy, line, and ground tackle assemblies.
    b. Pull existing pins.
- Assemble new moorings.
    a. Buoy and line can be assembled topside.
    b. Install ground tackle including pin shackles and chain.
    c. Attach buoy/line assembly to ground tackle.
2. Remove temporary construction BMPs.

It is anticipated that the in-water work will require a total of 2 weeks to complete. The use of a turbidity curtain or vacuum will need only be deployed under the advisement of on-site DAR field agents. Topside activities are anticipated to occur concurrently with the in-water work. Construction for the moorings is anticipated to begin in July 2019 and end in August 2019.

4.0 Construction Methods

4.1 Demolition/Marine Debris Recovery and Disposal

In-water demolition and removal work will be conducted with hydraulic-operated equipment mounted on support vessels.

4.1.1 Recycled Materials

Debris and demolition waste from the shall be recycled to the maximum extent possible at Atlas Recycling, Big Island Scrap Metal, or other commercial metal recycling facility.

4.1.2 Disposed Materials

Acceptable waste material shall be disposed at Kealakehe Transfer Station, Keauhou Transfer Station, Waimea Landfill Facility, West Hawai'i Sanitary Landfill, or other approved local waste management facility. Material that is not acceptable at a local facility shall be shipped and disposed at an approved, mainland waste management facility.

4.3 Epoxy Construction

The cast-in-place epoxy elements are constructed by excavating the substrate, placing the pins, and then pumping the mixed epoxy into the excavation site by hand-held plunger style pump. Epoxy should be injected deep enough to prevent fresh epoxy from entering the water.

4.4 In Water Construction of Manta Anchors

In water construction of manta anchors will be driven under the sea bed using hydraulic and manual hammers. The anchor will be set using a hydraulic pull. This should not produce much disturbance. As above, the use of a turbidity curtain will be optional based on the recommendation of a DAR field agent.

5.0 Characteristics of the Discharge

Materials to be placed in State waters: temporary and permanent placement.

5.1 Temporary

The Contractor shall work from a motorized support vessel. This vessel will also be used to install and maintain any turbidity curtains and to transport personnel to the work site.

A turbidity curtain may be installed based on the advice of a DAR representative. Should a curtain be deemed necessary, it will remain installed for the duration of the in-water work. It will be secured using small steel anchors.

5.2 Permanent

The following permanent discharges are associated with the intended construction activities

Contractor will place manta anchors in the sandy bottoms of the sites. Manta anchors consist of a central galvanized steel shaft and 2 galvanized locking plates.

The Contractor will place pins in hard substrates. The pins are ¾ galvanized rods.

The pins or manta anchors will connect to a series of stainless steel chain, shackles, thimbles, nylon line, and foam filled mooring buoys.

6.0 Proposed Control Measures and/or Treatment

6.1 General Site Best Management Practices

6.1.1 Miscellaneous

Construction debris and trash are to be disposed of at an appropriate facility.

6.1.2 Materials Storage

Materials shall be properly stored in a container, on dunnage, or as required by the manufacturer to avoid contact with storm water in order to control spills.

6.2 In-Water and Above-Water Work

6.2.1 Turbidity Curtain Placement

A weighted turbidity curtain shall be used when deemed necessary by DAR staff to enclose the work area to control turbidity during the performance of in-water work such as bottom drilling and epoxying pins. Harbor waters within and outside the turbidity curtain shall be monitored (visually) and sampling shall be performed in accordance with the Applicable Monitoring and Assessment Plan. In addition to water sampling, the contractor will be required to inspect the BMPs and submit a daily inspection report of their findings to the Engineer, as exhibited in Appendix C. If construction results in turbidity outside the turbidity curtain, immediate corrective action shall be taken to repair or adjust the curtain. The activity suspected to generate the turbidity shall be stopped immediately and the Engineer notified.

6.2.2 Turbidity Curtain Maintenance

The contractor shall inspect the turbidity curtains at the start of the day's construction to assess their condition and shall monitor the effectiveness of the turbidity curtains throughout the construction period. If a failure of the turbidity curtain to contain turbidity within the enclosed area is identified, in-water work that may result in turbidity will not continue until the problem has been resolved. The contractor shall maintain at least 200 feet of additional turbidity curtain on-site in case emergency containment of turbidity outside of an installed turbidity curtain or eventual replacement of an installed turbidity curtain (once the turbidity has subsided) is needed. If turbidity curtain replacement is required, in-water construction that may result in turbidity will not continue until successful installation, repair, or replacement of the turbidity curtain is achieved. Maintenance of turbidity curtains shall be in accordance with the turbidity curtain manufacturer's recommendations.

6.3 Spill Prevention

Precautions shall be taken to prevent spills of oil and other hazardous substances from entering the water. All waste and hazardous materials shall be properly managed, stored and handled, and secondary containment shall be provided as applicable. Fueling, lubricating, and maintenance of equipment, motor vehicles, and vessels shall be conducted in such a manner to prevent spills, and these shall not be conducted over water unless secondary containment is provided. Bulk fuel storage containers shall be provided with a secondary containment system. A spill kit will be kept on site.

Oil Spill Contingency Plan: In the event of a spill, the following actions shall be taken:

1. STOP FUELING/OILING IMMEDIATELY!

2. Reduce the amount of the spill by shutting down the equipment, shutting off the valve, shutting off the pump or up righting the container, etc. Place a pan or bucket under the leak to catch as much of the spill as possible.
3. Confine fuel to containment areas as much as possible. If on a crane barge, then confine the fuel to the deck and out of the water.
4. Should an overboard spill occur on the crane barge, use sorbent pads and deploy 200-foot long (minimum) oil containment boom to minimize the limits of thespill.
5. Immediately notify the contractor's company Spill Response Safety Officer by radio or telephone. He/ She shall take over coordination of operations and further notifications. Whether assistance is required or not, all supervisors and personnel shall follow these notifications steps.
6. If the spill is too large to handle with on-site resources, then the Emergency Spill Clean-up Contractor, a subcontractor of the prime contractor, shall be notified and mobilized.
7. Notify the Department of Transportation, Harbors DivisionEngineer immediately.
8. The Emergency Spill Clean-up Contractor shall take over containment, clean-up and disposal of the spill and any contaminated material in accordance with their established procedures. The contractor shall provide whatever aid the Emergency Spill Clean-up Contractorrequires

6.4 Protected Species

Project personnel shall be briefed on the recognition of protected species such as: green sea turtles, hawksbill sea turtles, humpback whales, and Hawaiian monk seals.

Active areas of operation shall incorporate the following site-specific avoidance and minimization measures:

1. Surveys for marine life shall be made prior to the start of work each day, and periodically during the day, including prior to resumption of work following any break of more than one half hour.
2. All in-water work shall be postponed or halted when ESA-listed marine species are within designated standoff distances of the proposed work, and may 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 must stop and may only begin / resume after the animals have voluntarily departed the area beyond the designated standoff distances. The designated standoff distances shall be established through coordination with appropriate federal agencies.
3. When piloting vessels, vessel operators shall alter course to remain at least 100 yards from whales, and at least 50 yards from other marine mammals and sea turtles.
4. Reduce vessel speed to 10 knots or less when piloting vessels in the proximity of marine mammals and turtles. If practicable, reduce vessel speed to 5 knots or less when piloting vessels in areas of known or suspected turtle activity.
5. If approached by a marine mammal or turtle, put the engine in neutral and allow the animal to pass.
6. Marine mammals and sea turtles should not be encircled or trapped between multiple vessels or between vessels and the shore.
7. Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.
8. 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. Information explaining laws and regulations for listed species in Hawaii may be downloaded at http://www.nmfs.noaa.gov/pr/education/hawaii. The contractor's designated point-of-contact (POC) shall ensure that protocols and observers to avoid the potential for contact or harassment with ESA- listed species of record are followed during all periods of in-water work.

9. Records of observations of ESA-listed species observed in the project area for the duration of in- water activities shall be documented in daily construction inspection and maintenance reports.
10. Any incidental take of marine mammals must be reported immediately to NOAA Fisheries' 24-hour hotline at 1-888-256-9840. Any injuries to sea turtles must be reported immediately to NOAA Fisheries at 1-808-725-5730, Monday – Friday, 7 a.m. – 4 p.m., and 286-4377 on weekends, holidays and after-hours. Information reported must include the name and phone number of a point of contact, location of the incident, and nature of the take and / or injury.

6.5 Protection of the Marine Environment

Specific measures shall be employed to prevent contamination of the marine environment from project-related activities.

1. The contractor is prohibited from storing hazardous materials on-site.
2. Appropriate materials to contain and clean potential oil/fuel spills shall be stored at the work site and be readily available.
3. The contractor's superintendent and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected and shall not proceed until the leak is repaired and equipment cleaned. Fueling of land-based vehicles and equipment shall take place at least 50 feet away from harbor waters over an impervious surface with drip pans.
4. No project-related materials (fill, sediment stockpile, rock, etc.) shall be stockpiled within 50 feet of harbor waters. Material staging and storage area(s) shall be designated within project's facility footprint and equipped with sediment control BMPs to prevent loss of material due to erosion or leaks.
5. Any materials or equipment to be used to carry out the authorized work must be cleaned of pollutants before use on-site. The contractor is required to use stone that is free of organic matter, clay, silt, dirt, or any deleterious material as stated in the contract specifications.
6. No land-based heavy equipment shall be operated directly in State waters. Work adjacent to State waters must occur above the mean higher high water level.
7. Revetment construction activities (excavation and rock placement) landward of the existing shoreline shall occur during relatively calm wave conditions.
8. Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices and the curtailment of work during adverse weather and tidal/flow conditions. Erosion control practices shall include a silt fence around all disturbed areas landward of the existing shoreline. A double sediment control silt fence shall be maintained along the waterfront edge of the project site.

9. The contractor shall conduct daily visual observations to ensure that all BMPs and erosion control measures shown on the BMP plans are in place and functioning properly. If an activity-related turbidity plume is observed outside of the turbidity curtain during periods of in-water construction, the contractor shall stop that activity and take immediate corrective action by repairing the turbidity curtain. Activity shall resume only after the problem is corrected.
10. Water quality monitoring shall be performed in accordance with the 401 Water Quality Certification issued for the project by the Department of Health (see Appendix D).
11. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland waste management site.

6.6 Protection of Upland Resources

Additional measures shall be employed to prevent contamination of upland areas using appropriate "good housekeeping" BMPs for site management and storm water management BMPs for erosion and sediment control.

1. The construction entrance and roadways shall be stabilized to prevent tracking of materials to/from the project site.
2. Specific and contained areas shall be designated for vehicle and equipment cleaning and fueling to prevent discharges of polluted wash water, fuel spills or leaks.
3. The discharge of pollutants from material delivery and storage areas to the storm water system or marine environment shall be prevented by minimizing the storage of hazardous materials on-site, storing materials in watertight containers and/or a completely enclosing designated areas, installing secondary containment, conducting regular inspections, and training employees and subcontractors.
4. Stockpiles shall be located away from the marine environment and any storm water facility. Stockpiles shall be equipped with erosion prevention BMPs such as plastic coverings to protect against wind or rainfall and containment BMPs such as berms, silt fences, or dikes to protect stockpiled material from run-on or runoff discharges.
5. Existing vegetation shall be preserved to the extent possible to avoid any unnecessary disturbance to native materials.
6. During earthwork activities, sediment control BMPs such as silt fences, fiber rolls/wattles, and sandbags shall be used to prevent discharge of sediment-laden water.
7. At the completion of work, hydraulic mulch or hydroseed shall be applied to unpaved areas to encourage re-establishment of vegetation.

6.7 Protected Species BMPs

(Taken from National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Island Regional Office, Protected Resources Division)

The National Marine Fisheries Service, Pacific Islands Regional Office recommends that the following measures, as appropriate and germane to specific projects, be incorporated into projects to minimize impacts on protected resources. These supplement, but do not supersede the BMPs above.

1. Turbidity and siltation from project-related work should be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and curtailment of work during adverse tidal and weather conditions.

2. Any construction-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 work.
3. All project-related materials and equipment placed in the water should be free of pollutants.
4. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, etc.).
5. No contamination (trash or debris disposal, alien species introductions, etc.) of marine environments (reef flats, lagoons, open ocean, etc.) adjacent to the project site should result from project-related activities.
6. Fueling of project-related vehicles and equipment should take place away from the water. A contingency plan to control the accidental spills of petroleum products at the construction site should be developed. Absorbent pads, containment booms, and skimmers will be stored on-site to facilitate the cleanup of petroleum spills.
7. Return flow or run-off from material stored at inland dewatering or storage sites must be prevented.

APPENDICES

Appendix A: Site Maps

Figure 1: Proposed mooring configuration Makako Bay (Garden Eel Cove)

Figure 2: Proposed mooring configuration Kaukalaelae Point (Keauhou Bay)

Figure 3: Proposed mooring configuration with depths at Kaukalaelae Point.

Figure 4: Proposed mooring configuration with depths at Garden Eel Cove (Makako Bay)

Appendix B: Mooring Buoy Systems

Figure 5: Hawaiian Eye Mooring

Figure 6: Manta Mooring

Appendix C: BMP Inspection & Maintenance Form

Appendix D: AMAP DOH Water Quality Certification

Appendix A: Site Maps

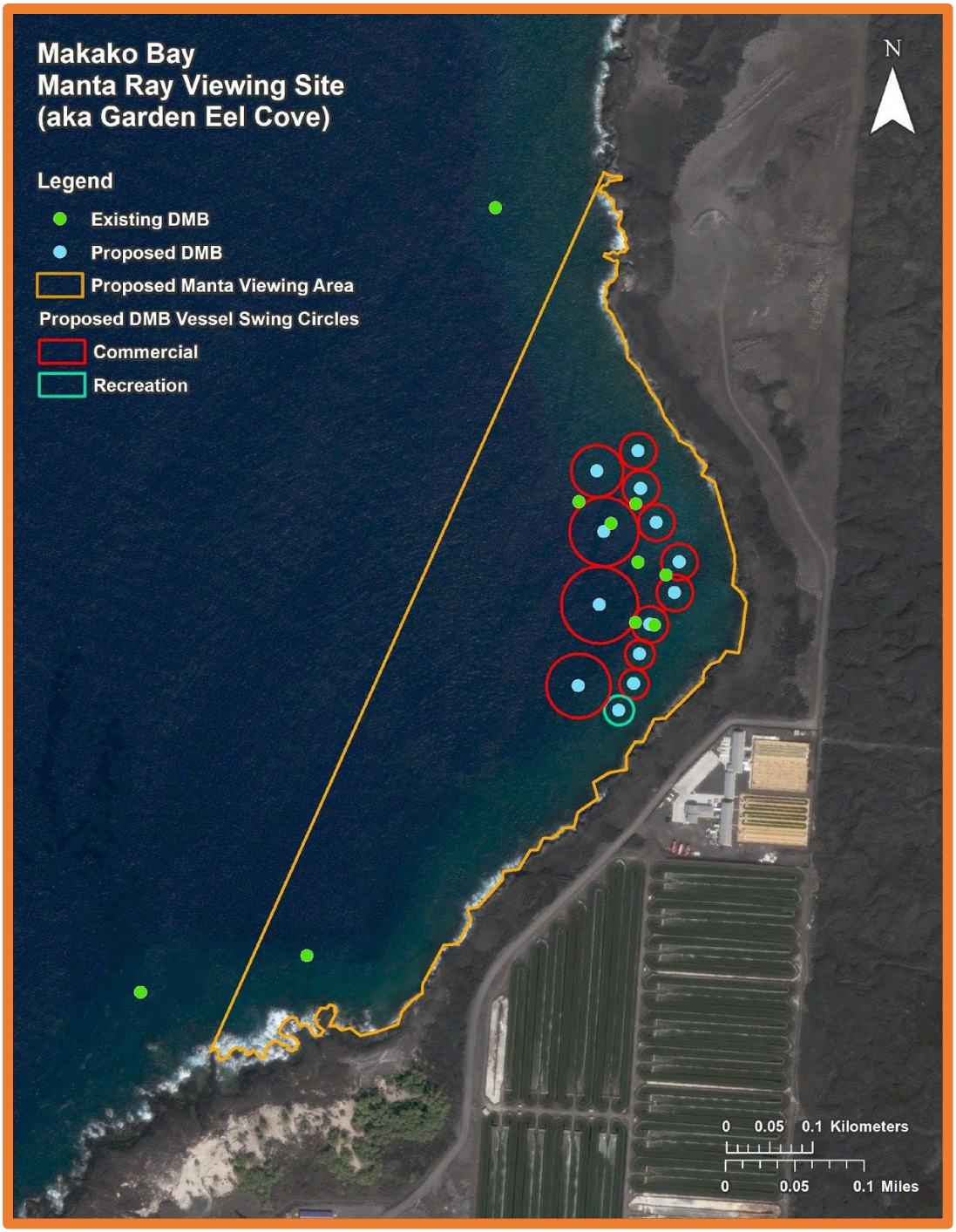

Figure 1: Map of the proposed mooring configuration and site location of the Makako Bay (Garden Eel Cove) site

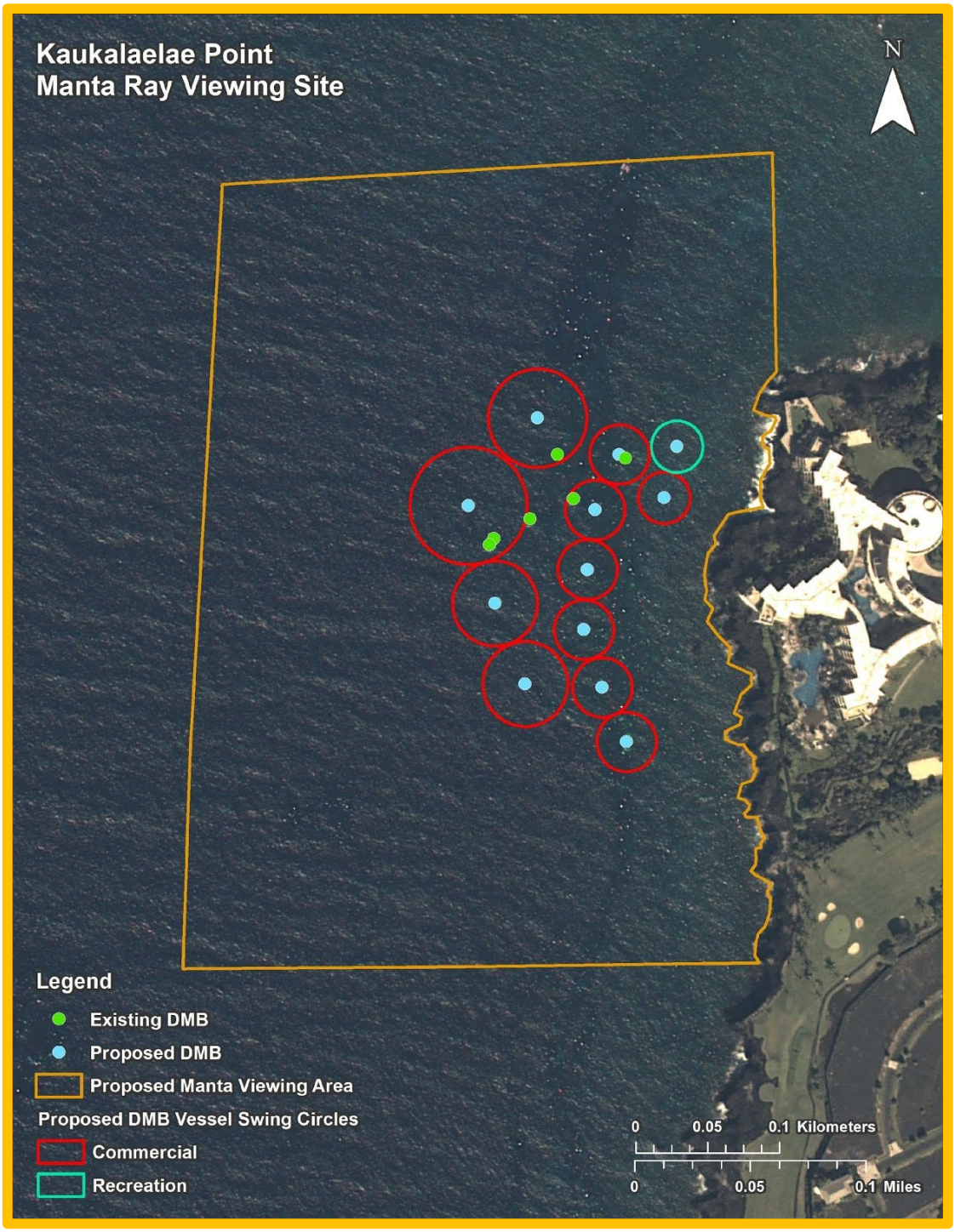

Figure 2: Map of the proposed mooring configuration and site location of the Kaukalaelae Point (Keauhou Bay) site

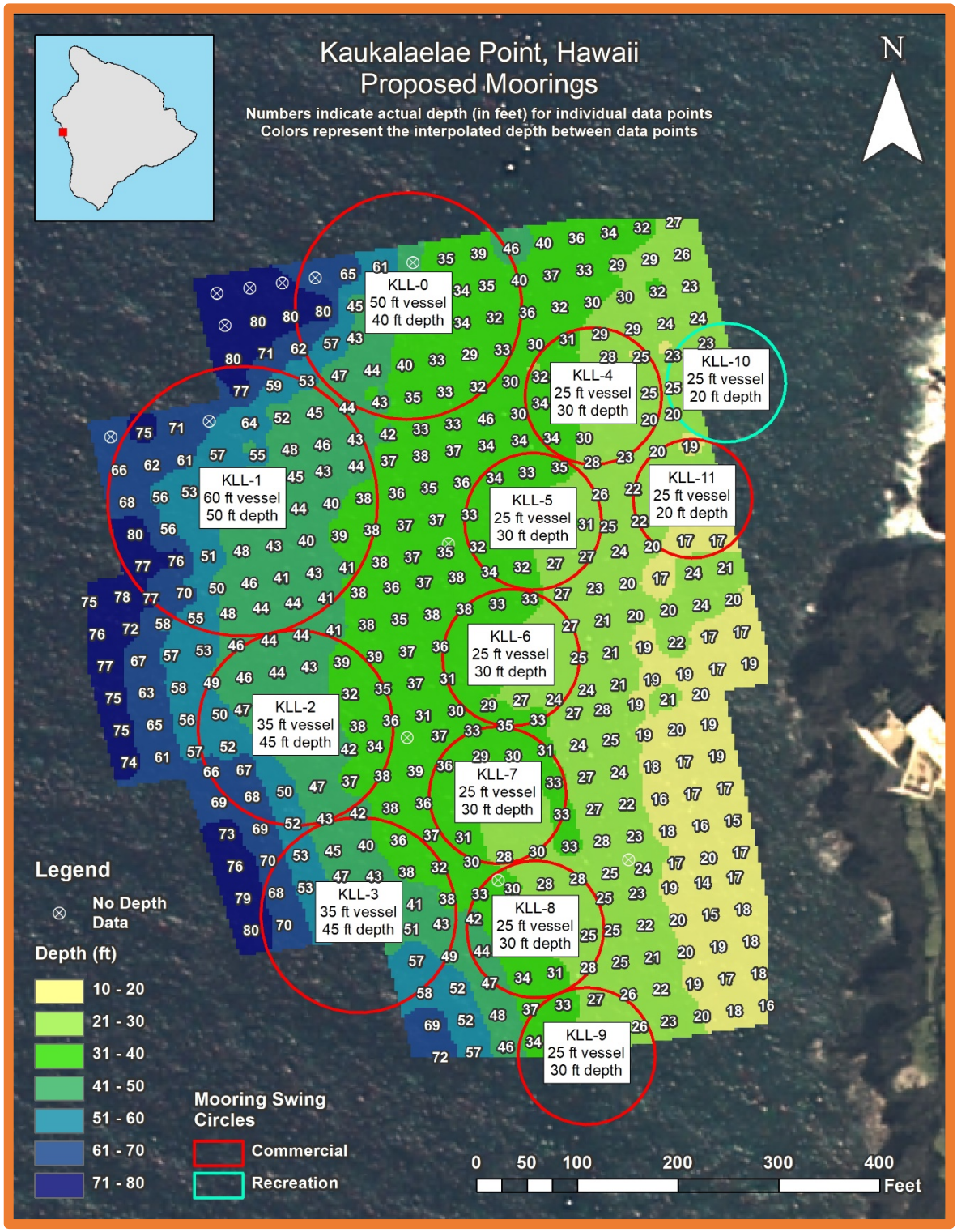

Figure 3: Map of the proposed mooring configuration with depths at Kaukalaelae Point.

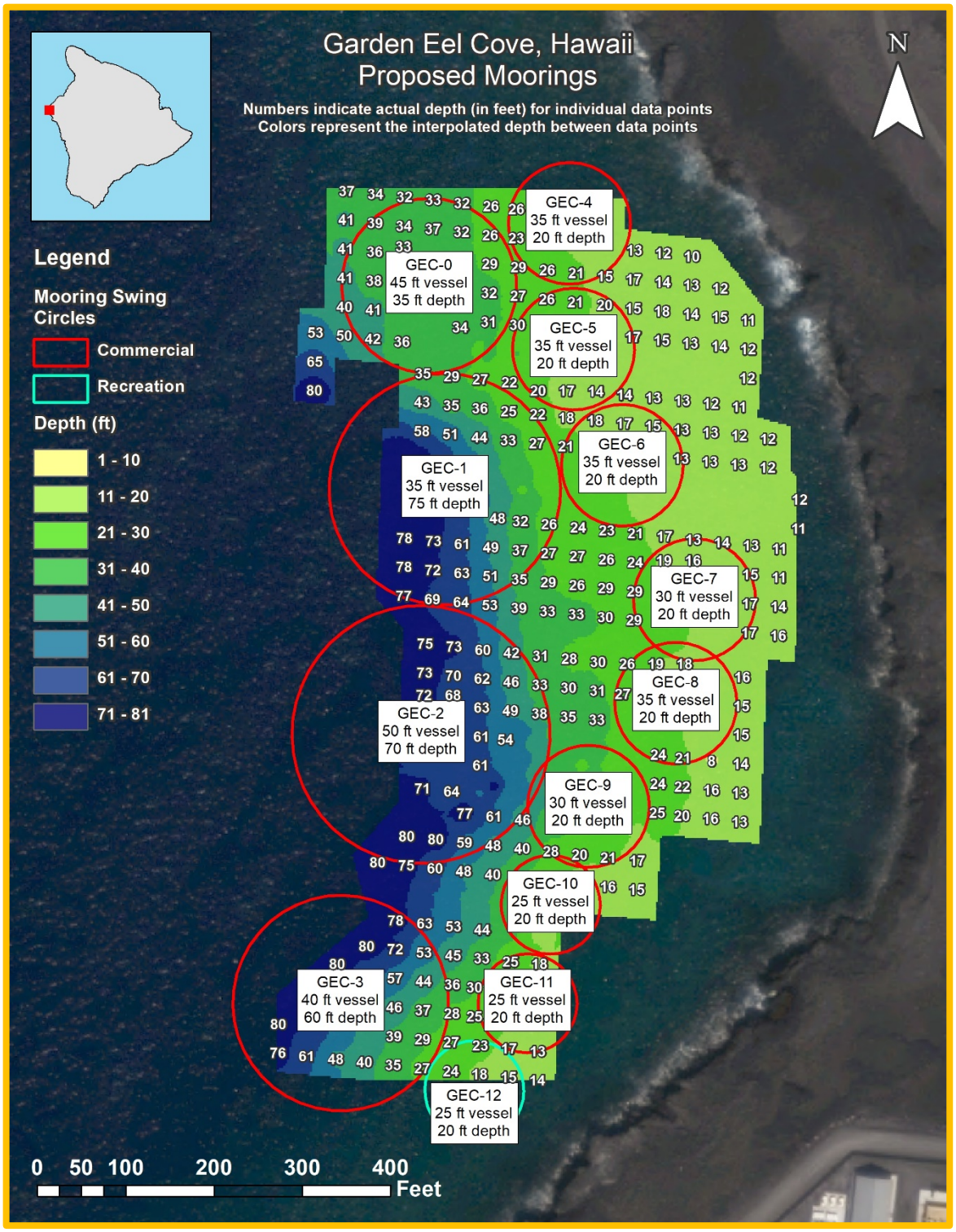

Figure 4: Map of the proposed mooring configuration with depths at Garden Eel Cove (Makako Bay)

Appendix B: Mooring Buoy Systems

HAWAII DAY-USE MOORING BUOY SYSTEM INSTALLATION PROCEDURES AND MAINTENACE GUIDE[1]

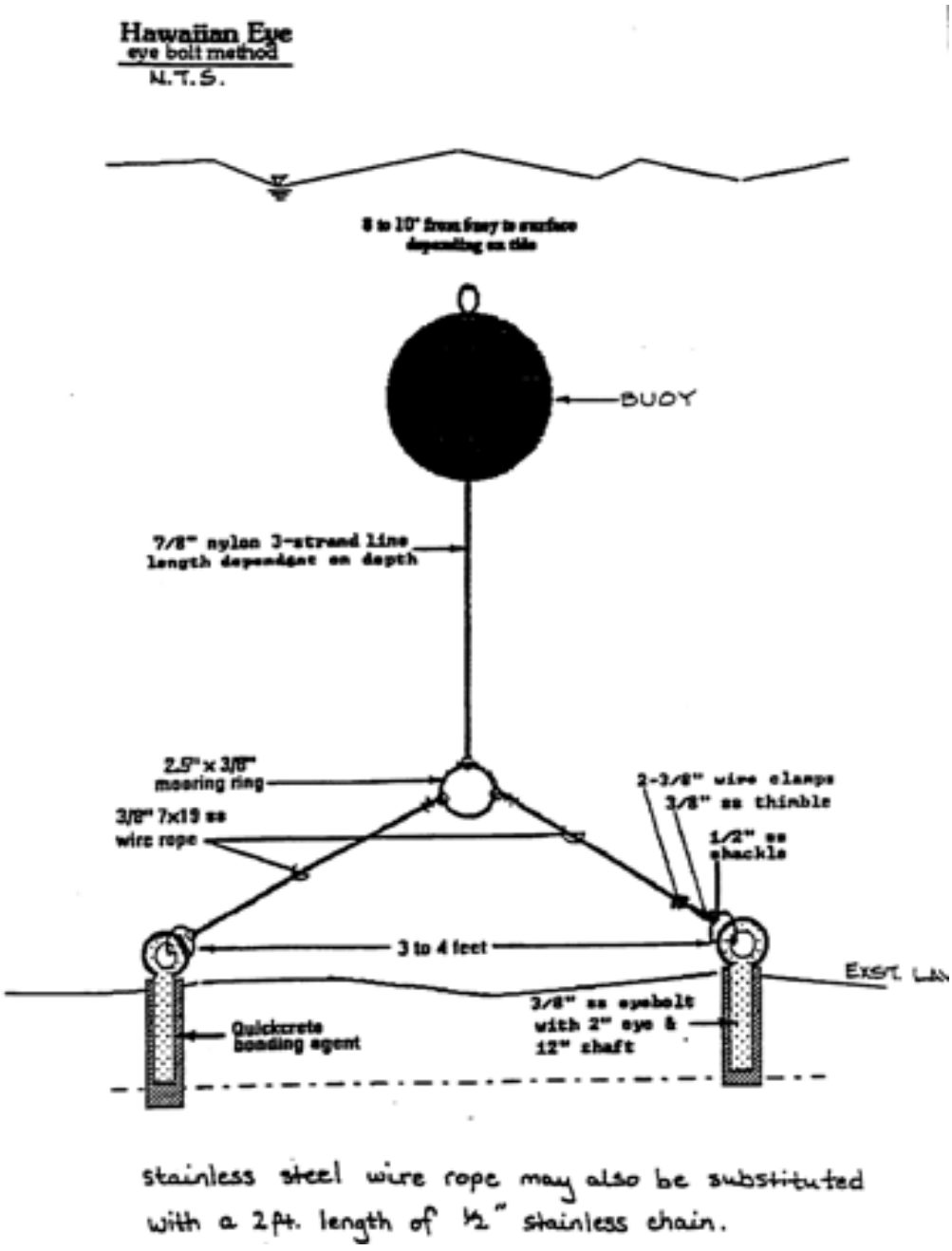

Figure 5. Diagram of a two-pin Hawaiian Eye mooring installation

[1] This appendix is adapted from, Hawaii Day-Use Mooring Buoy System Background, Site Selection Criteria, Installation, and Maintenance Procedures Manual, Malama Kai Foundation February, 2009; and Mooring Buoy Planning Guide, International PADI, Inc., March 2005.

HAWAII DAY-USE MOORING BUOY SYSTEM INSTALLATION PROCEDURES AND MAINTENACE GUIDE[2]

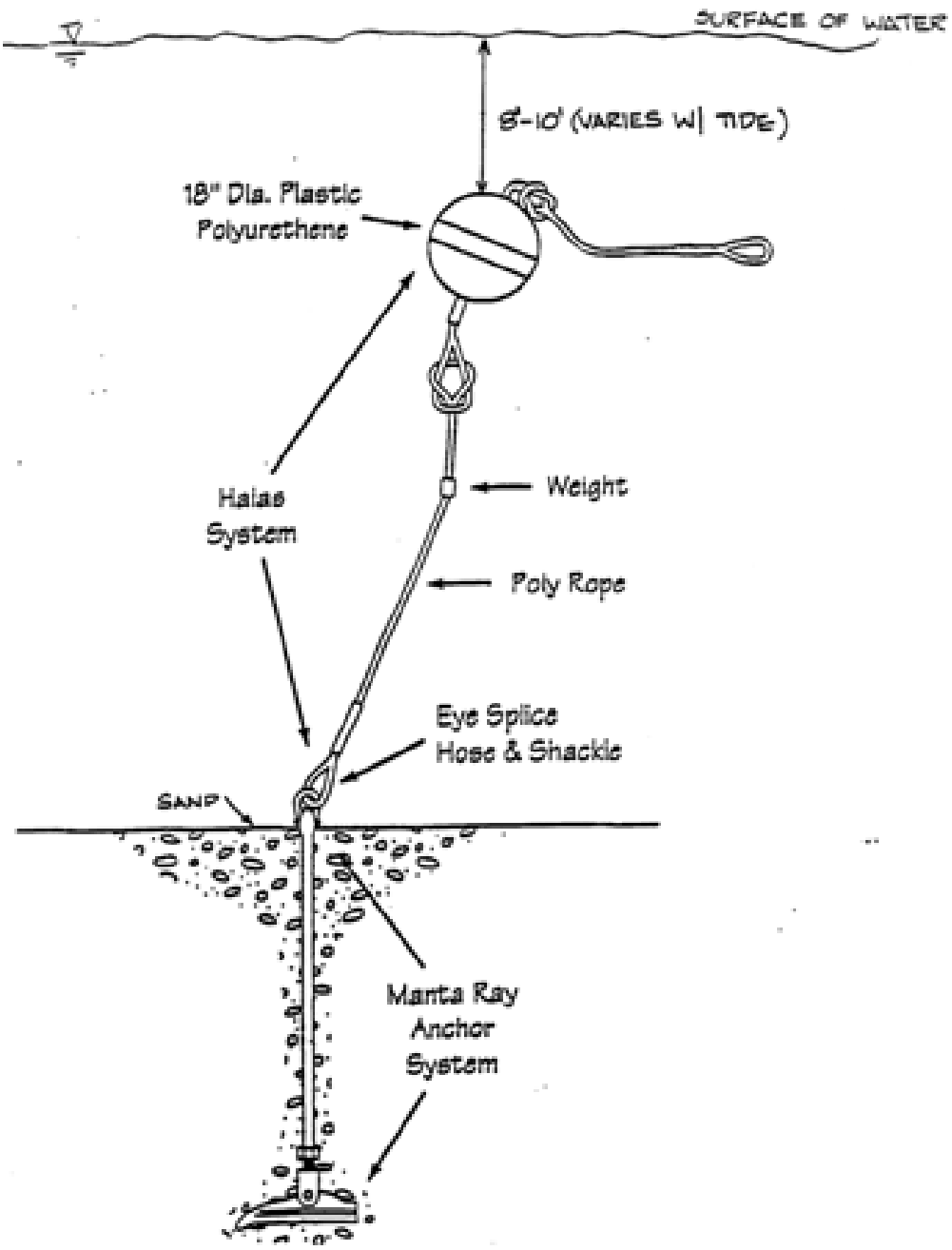

Figure 6. Diagram of a sand-embedded manta ray anchor system

[2] This appendix is adapted from, Hawaii Day-Use Mooring Buoy System Background, Site Selection Criteria, Installation, and Maintenance Procedures Manual, Malama Kai Foundation February, 2009; and Mooring Buoy Planning Guide, International PADI, Inc., March 2005.

Appendix C: BMP Inspection & Maintenance Form

BMP Inspection and Maintenance Report Form

To be completed daily during dive work

Report No._____Weather: _____Tide:_____Date:_____

Type of Report: ☐ Daily ☐ Within 24 hours of a rainfall event of 0.5 inches or more

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N-WATER TURBIDITY CONTROL MEASURES (Provide Date Stamped Photograph):	**YES**	**NO**	**N/A**
Are turbidity curtains functioning properly?	☐	☐	☐
Are the bin(s) on the support platform, landing craft or barge water tight?	☐	☐	☐
Are the control measures on the platform, landing craft or barge adequate to prevent?	☐	☐	☐
Water/sediment from being discharged into the ocean?	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

_____

PERFORMED BY: _____

PROTECTION AROUND CRITICAL AREAS (Provide Date Stamped Photograph):	**YES**	**NO**	**N/A**
Are berm or dike properly installed/maintained?	☐	☐	☐
Are run-on/run-off controls installed to prevent discharge to areas and harbor?	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

_____

PERFORMED BY: _____

HOUSEKEEPING:	**YES**	**NO**	**N/A**
Are areas kept clean of rubbish, construction debris, spills, etc.?	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

_____

PERFORMED BY: _____

MATERIAL/WASTE MANAGEMENT:	**YES**	**NO**	**N/A**
Are material 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 covered dumpster?	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

PERFORMED BY:

VEHICLE AND EQUIPMENT MANAGEMENT:

	YES	**NO**	**N/A**
Are vehicles and equipment cleaned before brought on-site?	☐	☐	☐
Are equipment fueled away from any drain or edge of harbor?	☐	☐	☐
Are spill cleanup material readily accessible?	☐	☐	☐
Are all equipment leak free or if leaking, a spill pan placed to catch the leaks?	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

PERFORMED BY:

PROTECTED OR ENDANGERED SPECIES MANAGEMENT:	**YES**	**NO**	**N/A**
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? :_____	☐	☐	☐
If protected and endangered species present, were photographs taken to assist with identification of the protected and endangered species? Photo IDs:_____	☐	☐	☐

CORRECTIVE MEASURES REQUIRED:

PERFORMED BY_____ Date:_____

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 knowingviolations.

APPROVED BY:_____ TITLE:_____

SIGNATURE:_____ DATE:_____

Appendix D: AMAP DOH Water Quality Certification

APPLICABLE MONITORING AND ASSESSMENT PLAN FOR CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION

INSTALLATION OF DAY USE MOORING BUOYS ON HAWAII ISLAND

KAILUA-KONA, ISLAND OF HAWAII, HAWAII

JUNE 2019

Updated January 2021

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1 Introduction

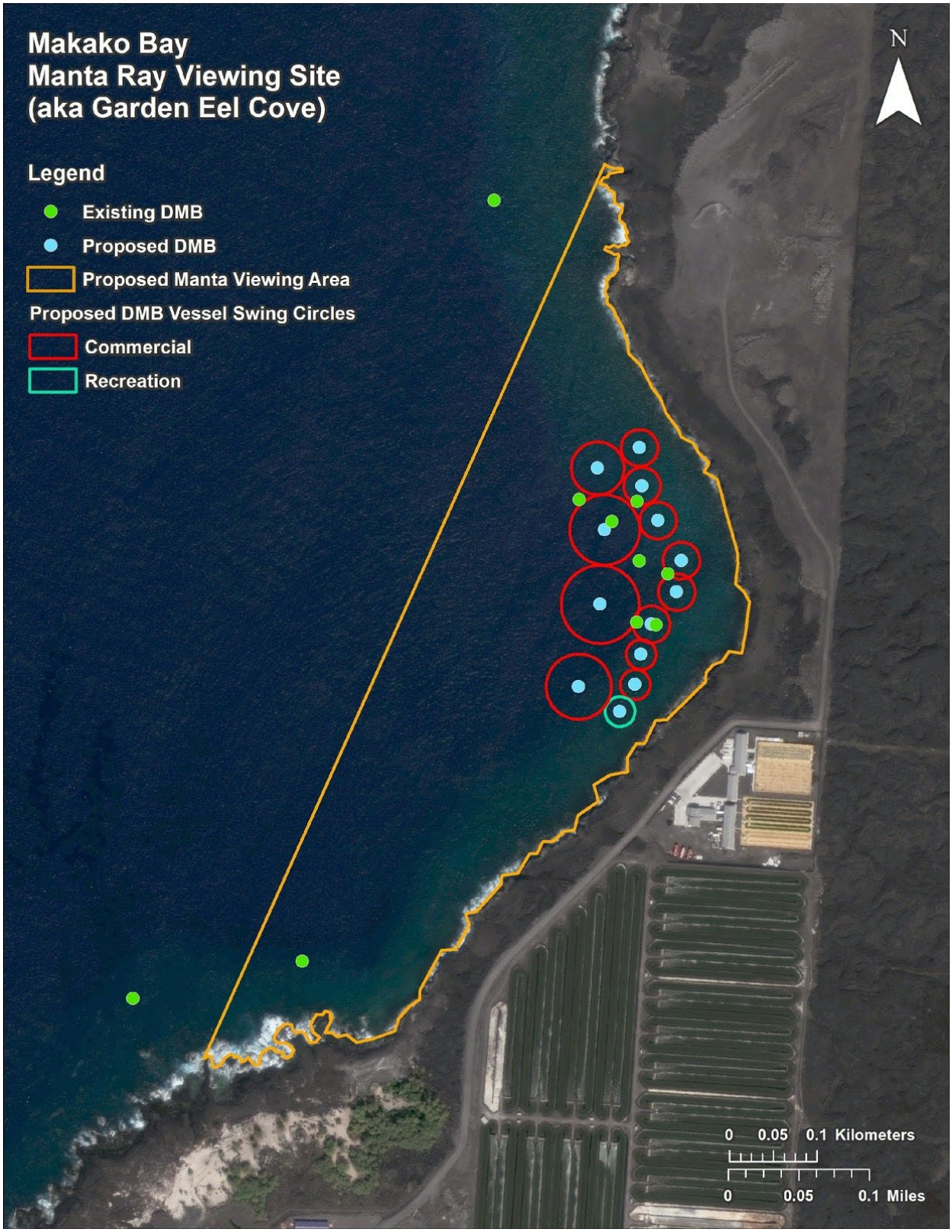
This Applicable Monitoring and Assessment Plan (AMAP) details implementation of a monitoring and assessment program before, during, and after project construction to both ensure that implemented Best Management Practices (BMPs) are effective, and to facilitate response if indications of a release are discovered through monitoring. Monitoring includes visual observation and photo documentation of the project site including BMPs and surrounding areas. Assessment includes both qualitative and quantitative measures. Decision criteria for exceeding water quality criteria are specified in Section 4.5.

This AMAP accompanies the Section 401 Water Quality Certification (WQC) application for the proposed Installation of Day Use Mooring Buoys on Hawaii Island ("the project"). This plan has been prepared in accordance with water quality regulations promulgated in Hawaii Administrative Rules (HAR) Chapter 11-54 (HDOH 2014) and guidance from the General Monitoring Guideline for Section 401 WQC projects (HDOH 2000). This AMAP relies upon systematic planning using the data quality objectives process (EPA 2006).

2 Project Description

There are two project sites located within the West Hawaii Ocean Recreation Management Area (ORMA). Makako Bay (Fig. 1) is located immediately west of Kailua-Kona International Airport and the Natural Energy Laboratory campus. The second site, Kaukalaelae (Fig. 2), is located on the point immediately south of Keauhou Bay. The sites are in state of Hawaii waters and would fall under management by the Department of Land and Natural Resources (DLNR) Division of Boating and Ocean Recreation (DOBOR). DLNR-DOBOR is proposing to install up to 13 moorings at each Kona site, each of which would require drilling two holes in the ocean substrate that measure 1.5" x 18", or 830 cubic inches. The activities are expected to occur over 30 days.

Site-specific BMP may recommend the use of a full-depth turbidity curtain for in-water work under specific site conditions.



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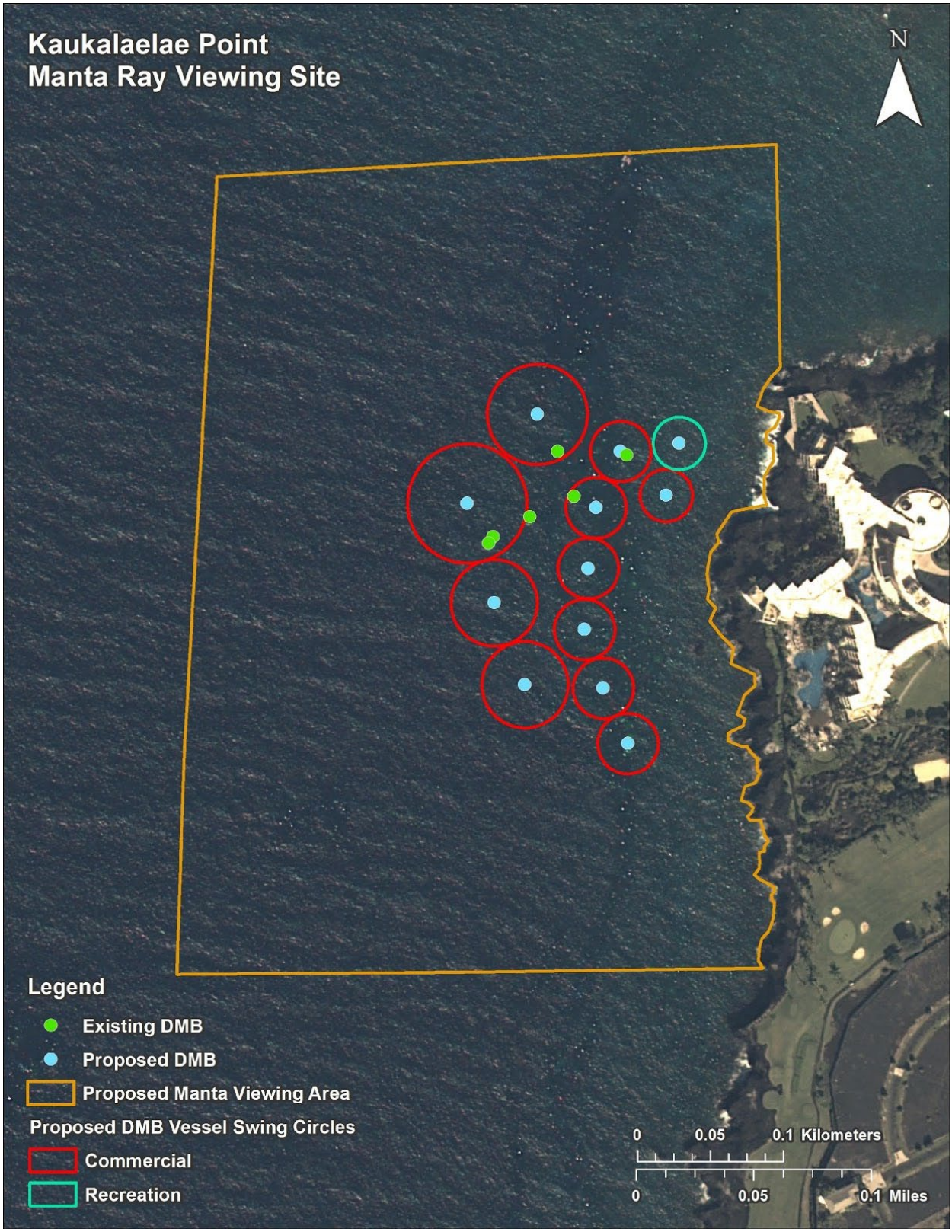

Figure 4: Map of the proposed mooring configuration and site location of the Kaukalaelae Point (Keauhou Bay) site

3 Methodology

This section reviews the water quality parameters to be sampled, analyzed and monitored, sampling locations, and finally, the specific sampling protocols that will be performed on a routine basis over the project duration.

3.1 Monitoring Parameters

WQC monitoring and analysis parameters are detailed in the General Monitoring Guideline for Section 401 Water Quality Certification projects (HDOH CWB 2000). Based on the proposed construction schedule, pre-construction sampling will consist of the following:

3.1.1 Monitoring Parameters

Monitoring, sampling, and analysis will be performed for the following parameters and by the following methods at **every pin installation location**.

- Photo documentation
- Visual observation
- pH
- Turbidity
- Dissolved Oxygen
- Salinity
- Temperature

3.1.2 Data Storage

All digital data will be stored on both a computer and external storage hard disk, and will be backed up on a daily basis. All field logs will be photocopied on a weekly basis and copies stored with the water quality monitoring firm assigned to the project.

3.1.3 Photo Documentation

Photographs of the sampling locations, turbidity curtains, and work site prior to each sampling event will be tagged with the date and time of the photograph, and a log kept of all photographs with a description of any particular observations made at the time. This complete set will be made available in the daily and final reports along with a photo-orientation map displaying the locations of photographs taken.

3.1.4 In-Situ Measurements

Two field instruments will be used to measure the water quality parameters at the project site. A nephelometer will be used to measure turbidity from sampled aliquots. The YSI, model 556 MOPS or similar, will be used to measure pH, temperature, conductivity (i.e., salinity) and dissolved oxygen.

3.2 Personnel

The contractor awarded the dredging contract will determine the personnel assigned to perform the various functions of the water quality monitoring for this project. Pre-approved water quality monitoring firms include: AECOS, Inc., Bow Engineering & Development, Inc., and Myounghee Noh & Associates, L.L.C., all of whom have previously provided AMAP water quality monitoring services for DLNR-DOBOR and are approved to do so by DOH-CWB.

3.3 Field Log

The selected water quality monitoring firm will store a single field log that will contain pertinent information noted at each sampling event including, but not limited to, date and time, weather (i.e., ambient temperature, approximate wind speed and direction, precipitation, etc.), condition of turbidity curtain, construction activities, if any, and other events such as vessel passage, data, time, and value of each parameter measured and log of each water sample taken.

3.4 Sampling Locations

Sampling will be performed using an iso-kinetic sampler. Sampling **for each decision unit** will be performed from surface to bottom within 1 meter directly outside of the BMP.

Impact Decision Units 1 and 2 will follow a one-meter wide path along the exterior of westernmost boundaries of both Garden Eel Cove and Kaukalaelae work areas. Both Impact Decision Units will be sampled in triplicate and percent relative standard deviation calculated (%RSD) for verification less than 20% RSD.

Control Decision Units 1 and 2 will cover a one-meter wide, 10-meter in length area centered 50 feet west of the BMPs of Impact Decision Units 1 and 2, respectively.

3.5 Sampling Frequency

3.5.1 Pre-construction Sampling

Prior to construction, a minimum of ten sampling events will be performed over at least a two-week period preceding commencement of construction activities. All decision units will be sampled during this period. Sampling will not be performed during storm events.

3.5.2 During-construction Sampling

All decision units will be sampled three times per week during drilling activities for the period of construction activities

3.5.3 Post-construction Sampling

Post-construction samples are taken after the BMPs are removed to verify there is no net increase in pollutants as a result of the project. Post construction sampling will be first performed in order to determine that the control area water quality is not distinguishable quantitatively from the water outside of the turbidity barrier after BMPs are removed. Post-construction sampling will include three sampling events after one week post-construction at impact and control DUs.

3.6 Sampling and Documentation Protocols

Multi-increment sampling will be performed using an iso-kinetic sampler (e.g., a US DH-81 sampler). Sampling for each decision unit will be performed of the entire water column from surface to bottom.

This section describes the procedures that will be followed during all sampling events. These protocols assume that the water sampled will not be hazardous and will not require personal protective equipment. If two personnel are used, “clean hands, dirty hands” protocol will be implemented. If one person is performing the sampling they will rinse and dry hands before and between sampling events. Sampling will be in a manner compliant with SM 1060B (Standards and Methods, 2011) and will be conducted according to the following requirements and constraints:

- Equipment Calibration will be performed at the beginning of each week at a minimum.
- Log book entry data will include date and time, weather, status of construction activities, and other pertinent observations made including, but not limited to, qualitative observations of water quality, and condition of turbidity barrier. A sample field data log sheet is shown in Appendix B. Logging of field activities will be consistent with the manner described in SM 1060 (Standards and Methods, 2011).
- Photo documentation will consist of digital, date/time-tagged photographs of the construction site and turbidity curtains. It is important that these be regular, with the same perspectives viewed each day, in addition to photographs taken of other pertinent situations. A photo-orientation map will be provided in each daily report.
- Multi-Increment™ samples will be taken for each decision unit (DU) in the following order: (1) Impact DU; (2) Work DU; (3) Control DU. This order will be applied to each of the 3 decision units and reversed 5 times during the pre-construction period in order to assess systematic errors as a result of the time between sampling events.
    - Chain-of-custody protocols will be observed.
    - Instruments will be calibrated weekly, and secondary checks will be conducted prior to and after each day's sampling.
    - Samples will be taken when work operations are in progress.
    - Raw data and photos shall be submitted to CWB by the end of the next business day (see section 3.7).Thus all monitoring parameters will be measured immediately after sampling. Cooler and refrigerator temperature will be monitored using field equipment or a different calibrated thermometer. Analytical methods will conform to those specified in HAR Section 11-54-10 and SM 1060B.

3.7 Reporting

Reports summarizing 1) previous data and 2) new data including all analytical data, logs, and photo documentation will be submitted to DOH on a bi-weekly basis.

The bi-weekly reports may be submitted via email with the approval of the Clean Water Branch to cleanwaterbranch@doh.hawaii.gov.

4 Data Quality Objectives

In this section we utilize the EPA's iterative Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA 2006) as a tool to establish performance and acceptance criteria to ensure that the data collected serve the purpose of the study. The Data Quality Objective (DQO) process has the following seven steps followed in the remainder of this section:

- State the Problem
- Identify the Goal of the Study
- Identify Information Inputs
- Define the Boundaries of the Study
- Develop the Analytic Approach
- Specify Performance or Acceptance Criteria
- Develop the Plan for Obtaining Data

4.1 State the Problem

The proposed project will involve the excavation of 400 cubic inches of powdered basalt over the course of 2 months of construction. Removal of material will be achieved by mechanical grinding with a hydraulic drill. Therefore, the project has the potential to release small particles into Class A waters of Makako Bay, Kaukalaelae Point, and Kuhio Bay. Although the release of fine sediments are not anticipated, they can be toxic to aquatic organisms and contribute to turbidity that can modify aquatic habitats by essentially compacting the photic zone near the surface.

The problem is to recognize changes in water quality due to the project, to distinguish changes in water quality from events, both natural and artificial, that are external to the project activities, and to monitor for water quality changes that may indicate failure of the primary project Best Management Practice (BMP), the turbidity curtain and silt pump.

4.2 Identify the Goals of the Study

The goals of the Applicable Monitoring and Assessment Plan (AMAP) is to conduct water sampling and analysis that will monitor the effects of the project on water quality, both within and without the turbidity curtain. More specifically, the goals are to (1) ensure that BMPs are functioning properly (2) to detect if BMPs are failing so that mitigation can be accomplished (3) demonstrate that water quality is not impaired before removal of BMPs (i.e., the turbidity curtain) and (4) establish thresholds.

4.3 Identify the Information Inputs

Information inputs are of two forms: 1. Visual observation and photo documentation; and 2. Analytical data. The first represent more qualitative data forms and the latter represent more quantitative data forms.

Pre-construction monitoring will be used to assess baseline conditions and the degree of natural and artificial variability in the monitoring parameters.

During-construction monitoring will be used to determine if the BMPs are properly functioning and if thresholds are not exceeded.

Post-construction monitoring will be conducted three times over the week after construction has been completed.

Pre-construction monitoring data will be submitted to HDOH CWB within two weeks of completion of all analyses and before the commencement of project work. During construction field monitoring data will be sent to HDOH-CWB by fax or email within 24 hours or by the next business day. TSS samples will be submitted for analysis on a weekly basis, but if on-site data exceed the thresholds established in Section 4.5, the TSS samples will be delivered for analysis the same day and results reported on rapid laboratory turnaround.

Within two weeks of completing all analyses, the selected water quality monitoring firm will submit a report of results to the HDOH-CWB via fax or email. These reports will have a running statistical summary for each phase of the project and will include field notes.

The selected water quality monitoring firm will prepare a final monitoring and assessment report that will be submitted to HDOH-CWB within 60 days of completion of post-construction monitoring and analysis. The final monitoring report will include a summary of all water quality monitoring results (pre-

construction, during construction, and post-construction) for the project. The final report will state if there was an increase in pollutants as a result of the project.

4.4 Define the Boundaries of the Study

The temporal boundaries of the study are 30 calendar days in total, to commence sometime after receipt of all required regulatory permits. Pre-construction monitoring will take place over a period of two weeks that much be completed two weeks prior to start of construction. Post-construction monitoring will take place for one subsequent week. Thus, as construction activities are expected to occupy 30 calendar days, this AMAP applies to this period plus 5 weeks, or 65 calendar days in all.

The construction activities are limited to two areas, both less than 700 feet in their longest dimension, the sampling locations (decision units) are in this general physical area. The use of turbidity curtains is pending review by Division of Aquatic Resources staff. Work Decision Units 1 & 2 represent conditions inside the work area and any BMPs in place. Impact Decision Units 1 & 2 represent conditions directly outside of the work area and installed BMPs. Control Decision Units 1 & 2 are expected to be representative of a randomly collected sample taken from throughout each decision unit collected using a Multi-increment sampling approach. Work Decision Units 1 & 2 span the length of the work area from the surface to the bottom. Impact Decision Units 1 & 2 span the exterior length of the work areas, from the surface to the bottom. Control Decision Units 1 & 2 are centered 50 feet southeast and southwest, respectively, of the corner of the work area covering a one-meter wide path, 110 meters in length, from the surface to the bottom.

Pre-construction sampling includes ten sampling events over a minimum two-week period to be completed two weeks prior to start of construction. Sampling during construction will be performed three times per week and post-construction will be performed over one week with one sampling event per week. Pre and post construction sampling will be performed during daytime work hours. Construction period sampling will be performed when work is being performed, which will be limited to daytime work hours.

4.5 Develop the Analytical Approach

Threshold for pH is considered exceeded if results at the Impact Decision Units:

- Fall outside of the range of 7.0 to 8.6.
- Deviate more than 0.5 units from the control units, or
- Deviate more than 0.5 units from the pre-construction range.

Additionally, if a turbidity plume is observed being discharged from the construction area, it will be sampled as a separate decision unit.

If any of these thresholds are exceeded then a determination must be made whether the cause is attributable to construction. If field personnel observe a problem that may be related to the results, they will notify the crew boss or designated point-of-contact. Field personnel and foreman will attempt to ascertain the cause of the exceeded threshold. Data collected from the control station and observations from the field personnel will be used in the investigation to aid in determining whether construction is impacting water quality. If it is determined that construction is causing the problem, then the construction will cease until the problem is corrected or BMPs are adjusted to contain the plume. HDOH-CWB will be notified by the next business day.

4.6 Specify Performance/Acceptance Criteria

The impact decision unit will be sampled in triplicate. The percent relative standard deviation (%RSD) will be calculated for the triplicate samples. If 20% RSD is exceeded the sampling protocol will be reevaluated to determine the cause of the deviation.

All field meters will be calibrated prior to use and calibration procedures will be recorded in the field book or a special notebook used only for recording meter calibrations and maintenance procedures.

Secondary checks will be performed prior to and after each day's sampling activities. If secondary checks fail then calibration will be performed. If calibration is successful re-sampling will be performed and water quality parameters compared to the pre-calibration values. If there is no change the two sets of parameters will be recorded as valid data. If calibration is unsuccessful the data for that day's field activities will be considered invalid and backup instruments will be procured from a certified laboratory, such as GeoTek Hawaii, via overnight delivery, or rented from an on-island environmental consultant, and sampling will be performed again as soon as possible.

4.7 Develop the Plan for Obtaining Data

The sampling locations and sampling frequency were developed in accordance with water quality regulations promulgated in Hawaii Administrative Rules (HAR) Chapter 11-54 (HDOH 2014) and the General Monitoring Guideline for Section 401 Water Quality Certification Projects (HDOH 2000). Modifications to optimize the sampling design may be necessary if variance in triplicate samples is excessive. Representative samples will be collected in each decisions unit by randomly moving a multi-increment sampler throughout each decision unit.

4.7.1 Chain of Custody Procedures

Once water samples have been obtained and site conditions and field measurements have been properly documented in the field notebook, a written record of the chain of custody of the samples must be made for the laboratory analyses. A chain-of-custody (COC) form serves the purpose of accompanying the samples to the laboratory and directing laboratory analysts on the analyses to be performed. The form also identifies the samples, so the laboratory can report the analytical results by sample ID. When transferring possession of samples, the sampler should sign and record the date and time on the COC record. Each person who subsequently takes custody will complete the appropriate section of the COC record. The COC will be filed with the laboratory data and become a part of the permanent record.

4.7.2 Field Analysis Quality Control

All instrument calibration procedures will be undertaken prior to field measurements and documented in the field notes. The pH meter and turbidity meter will be maintained and calibrated according to manufacturer instructions (YSI 2009, Hach 2008 or approved equal) and standard operating procedures.

Personnel who have been properly trained will calibrate and operate equipment and instruments. Documentation of calibration and any maintenance information will be maintained in appropriate field or logbooks including data on calibration failures. All calibrations will be made prior to analyzing the samples. Measurements of pH and temperature will be made immediately following collections of samples. Turbidity values will be measured with the turbidimeter. Measurement must be made with the instrument on a level, still surface with the sampled aliquot at ambient temperature. Measurements will be made in triplicate for each sample and the arithmetic mean reported. All measurements will be logged

with date and time on the standard field log. Prior to and after turbidity analysis in each monitoring event, the nephelometer will be checked with turbidity calibration standards and noted in the project field notes to verify the meter is operating within the range of designed specifications as per the manufacturer or the SOP. The time of collection and time of measurement shall be recorded.

Any item of field equipment that has shown by calibration or otherwise to be defective is to be taken out of service until it has been repaired. The equipment is placed back in service only after verifying by calibration that the equipment performs satisfactorily. If at any time calibration and maintenance is beyond the capability of the trained personnel, the selected water quality monitoring firm will be notified. An attempt will be made to solve the problem. If the equipment or instrument still cannot be repaired, the equipment will be taken out of service and sent for repair and replacement equipment will be obtained at the laboratory.

4.7.3 Reports/Assessment

The results and field notes for daily monitoring will be faxed (808-586-4352) or emailed (cleanwaterbranch@doh.hawaii.gov) to HDOH-CWB. A final report for submittal to HDOH-CWB will be prepared within two weeks of completion of analysis. In addition to analytical results, the report will include time and date of sampling, name of the person who collected the samples, date each analysis was conducted, and identification of the laboratory and analyst(s) that conducted the work. The reports will contain a running statistical summary for each phase of the project AMAP.

A final report and water quality assessment will be prepared upon completion of the monitoring plan. This report will be submitted to HDOH within 60 days following completion of post- construction monitoring and analysis. The final report will identify the methods and procedures for analytical measurements and include all data collected as well as statistical summaries of results by station and activity phase (preconstruction, during construction, and post-construction). This report will also assess whether water quality was affected by the construction activity. Upon completion of the monitoring plan, the contract laboratory will retain the original data and field notebook for a minimum of five years.

5 Quality Assurance

AMAP Quality Assurance will be achieved through implementation of the Data Quality Assessment (DQA) process as described in EPA (2000) which establishes the following steps:

1. Review the project's objectives and sampling design
2. Conduct a preliminary data review
3. Select the statistical method
4. Verify the assumptions of the statistical method

5.1 Draw conclusions from the data

The DQA will be done after completion of the project, the conclusions of which will be included in the final report.

6 References

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