APPENDIX B – BASELINE MARINE BIOLOGY AND WATER QUALITY (MARINE RESEARCH CONSULTANTS, LLC)

BASELINE ASSESSMENT OF
MARINE WATER CHEMISTRY
AND MARINE BIOTIC COMMUNITIES
KAANAPALI SAND RESTORATION PROJECT
WEST MAUI, HAWAII

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I. INTRODUCTION AND PURPOSE

Kaanapali Beach extends from Hanakaoo Beach Park at the southeast end of the beach to Puu Kekaa at the north end of the beach. This sandy coastline includes two beach sections, or littoral cells. The southern section, called Hanakaoo Littoral Cell, extends from Hanakaoo Beach Park to Hanakaoo Point, faces southwest, and sits inside a wide, shallow fringing reef. The northern section, called Kaanapali Littoral Cell, extends from Hanakaoo Point to Puu Kekaa, faces west, and is situated landward of a sloping reef and sand field. Both of these beaches have been exposed to erosion pressure. The Hanakaoo Littoral Cell has undergone long-term chronic erosion for approximately 30 years, and currently rests well landward of its location in the 1980's. The Kaanapali Littoral Cell has a slower chronic erosion rate; however, it is routinely exposed to dynamic seasonal shifts in sand volume that present severe, even if temporary, erosion impacts on the shoreline.

Both the State of Hawaii and the local Kaanapali land owners have partnered to investigate and pursue a beach restoration project for Kaanapali Beach. This project will include restoration of the Hanakaoo Littoral Cell beach to approximately its 1980's condition, and placement of additional dry beach volume on the Kaanapali Littoral Cell beach to help mitigate the dynamic seasonal variations. This entire project will require approximately 75,000 cubic yards of sand to be recovered from beneath the waters offshore of Puu Kekaa and delivered to the shoreline for placement on the beach. Recovery of the sand will be conducted from a barge anchored offshore, and delivery of the sand will be at two locations on the shoreline. Roughly 50,000 cubic yards and 25,000 cubic yards will be placed at the Hanakaoo Littoral Cell and Kaanapali Littoral Cell, respectively.

The purpose of this document is to provide the results of rapid ecological assessments (REAs) of two aspects of the marine ecosystem fronting the Kaanapali Sand Restoration Project area. Water chemistry was assessed by collecting a set of samples extending from the shoreline to the open coastal ocean directly fronting the project area. Marine community structure, primarily in terms of coral reef assemblages was also described based on in-water surveys. The purpose of these REAs is to provide a description of the existing condition of the marine environment. Evaluation of the existing condition of the water chemistry and marine communities provides an insight into the physical and chemical factors that influence the marine setting. As coral communities are both long-lived and attached to the bottom, they serve as the best indicators of the time-integrated forces that affect offshore reef areas. In addition, algal communities provide an insight into the existing physical/chemical conditions of the region. Understanding the existing physical, chemical and biological conditions of the marine environment that presently occur provides a basis for predicting potential affects that might occur as a result of the proposed shoreline sand restoration.

II. METHODS

A. Water Quality/Chemistry

Water chemistry field collection was conducted on July 9, 2017. Samples within 10 m of the shoreline were collected by swimmers, while samples farther offshore were collected from a personal watercraft. Water chemistry was assessed along three survey transects that extended approximately perpendicular to the shoreline originating at the sand-water interface of the beach and extended approximately 200 meters (m) offshore. Water samples were collected at up to nine locations along each transect at distances of approximately collected 0, 1, 2, 5, 10, 25, 50, 150 and 200 meters (m) from the shoreline) (Figure 2). Such a sampling scheme is designed to span the greatest range of salinity with respect to potential freshwater efflux at the shoreline. Sampling was more concentrated in the nearshore zone because this area receives the majority of groundwater discharge, and hence is most important with respect to identifying the effects of shoreline modification.

Owing to the shallow depth of the near-shore shelf, at stations from 0 to 2 m from shore, a single sample was collected within 20 cm of the sea surface by swimmers working from shore. At stations 5 to 200 m from the shoreline, samples were collected at two depths; a surface sample was collected within approximately 20 centimeters (cm) of the sea surface, and a bottom sample was collected within 50 cm of the sea floor.

Water quality parameters evaluated included the all specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) (Open Coastal waters) of the State of Hawaii Department of Health (DOH) Water Quality Standards. These criteria include: total dissolved nitrogen (TDN), nitrate + nitrite nitrogen (NO_3^- + NO_2^-, hereafter referred to as NO_3^-), ammonium nitrogen (NH_4^+), total dissolved phosphorus (TDP), Chlorophyll a (Chl *a*), turbidity, temperature, pH and salinity. In addition, silica (Si) and orthophosphate phosphorus (PO_4^{-3}) were also reported because these parameters are sensitive indicators of biological activity and the degree of groundwater mixing.

Surface water samples were collected by filling pre-rinsed 1-liter polyethylene bottles. Bottom samples were collected using a Niskin-type oceanographic sampling bottle. The bottle is lowered to the desired sampling depth with spring-loaded endcaps held open so water can pass freely through the bottle. At the desired sampling depth, a weighted messenger released from the surface triggers closure of the endcaps, isolating a volume of water.

Subsamples for nutrient analyses were immediately placed in 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice. Analyses for Si, NH_4^+, PO_4^{3-}, and NO_3^- were performed of filtered subsamples with a Technicon Autoanalyzer using standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TDN and TDP were analyzed in a similar fashion following digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between TDN and dissolved inorganic N and TDP and dissolved inorganic P, respectively.

Water for other analyses was sub-sampled from 1-liter polyethylene bottles and kept chilled until analysis. Chl *a* was measured by filtering 300 ml of water through glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -20° C for 12-24 hours. Fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001l (ppt). Turbidity was determined using a 90-degree nephelometer, and reported in nephelometric turbidity units (NTU) (precision of 0.01 NTU). Vertical profiles of salinity, temperature and depth were acquired using a RBR-Concerto CTD calibrated to factory standards.

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

NH_4^+: EPA 350.1, Rev. 2.0 or SM4500-NH3 G, detection limit 0.42 µg/L.
NO_3^- + NO_2^-: EPA 353.2, Rev. 2.0 or SM4500-NO3F, detection limit 0.28 µg/L
PO_4^{-3}: EPA 365.5 or SM4500-P F, detection limit 0.31 µg/L.
Total P: EPA 365.1, Rev. 2.0 or SM4500-P E J, detection limit 0.62 µg/L.
Total N: SM 4500-N C., detection limit 5.60 µg/L.
Si: EPA 370.1 or SM 4500 SiO2 E, detection limit 5.32 µg/L.
Chlorophyll *a*: SM 10200, detection limit 0.006 µg/L.
pH: EPA 150.1 or SM4500H+B, detection limit 0.002 pH units.
Turbidity: EPA 180.1, Rev. 2.0 or SM2130 B, detection limit 0.008 NTU.
Temperature: SM 2550 B, detection limit 0.01 degrees centigrade.
Salinity: SM 2520, detection limit 0.003 ppt.
Dissolved Oxygen: SM4500 O G, and detection limit 0.01% sat.

All fieldwork was conducted by Dr. Steven Dollar and Ms. Andrea Millan. All laboratory analyses were conducted by Marine Analytical Specialists located in Honolulu, HI (Labcode: HI 00009). This analytical laboratory possesses acceptable ratings from EPA-compliant proficiency and quality control testing.

B. Marine Biotic Community Structure

Biotic composition of the survey area was assessed by divers using SCUBA working from a personal watercraft. Dive surveys were conducted by swimming in a zigzag pattern in a belt along the transect lines fronting the Kaanapali Sand Restoration Project area (Figure 2). These surveys covered a corridor approximately 100 m wide centered on the transect line and extended water depths of approximately 10 m (30 feet). During these underwater investigations, notes on species composition were recorded, and numerous digital photographs recorded the existing conditions of the area. The baseline assessment was conducted by S. Dollar and A. Millan.

III. RESULTS

A. Water Quality/Chemistry

1. Distribution of Chemical Constituents

Table 1 shows results of all water chemistry analyses on samples collected off the Kaanapali Sand Restoration Project site on July 9, 2017. Concentrations of eight dissolved nutrient constituents in surface and bottom samples are plotted as functions of distance from the shoreline in Figure 3; values of salinity, Chl *a* and turbidity as functions of distance from shore are shown in Figure 4.

Several patterns of distribution are evident in Table1 and Figures 3 and 4. It can be seen in Figure 3 that the dissolved nutrients Si and NO_3^- display distinctly elevated concentrations in the samples collected within 50 m from the shoreline. Salinity displays the opposite trend, with sharply lower concentrations in the nearshore samples (Figure 4). Beyond 50 m from the shoreline, concentrations of Si, NO_3^- and salinity are essentially constant (Figures 3 and 4). Over the entire sampling range, the range in NO_3^- is about 13.86 µg/L (shoreline at Transect 3) to below the level of detection (250 m from shore bottom Transect 3), while salinity increased from 34.38 to 34.78 ppt (0.40 ppt) across Transect 3.

As there are were no streams discharging to the ocean in the vicinity of the Restoration site during the sampling, the horizontal gradients of Si, NO_3^- and salinity reflect input of groundwater to the ocean near the shoreline. Low salinity groundwater, which typically contains high concentrations of Si and NO_3^-, percolates to the ocean at the shoreline, resulting in a nearshore zone of mixing. In many areas of the Hawaiian Islands, such groundwater percolation results in steep horizontal gradients of increasing salinity and decreasing nutrients with increasing distance from shore, as is evident at the Kaanapali Sand Replenishment site in West Maui. PO_4^{3-} is also generally elevated in groundwater relative to ocean water. However, in the data set collected off Kaanapali, there is no consistent gradient in concentration of PO_4^{3-} with respect to distance from the shoreline (Figure 3). Horizontal gradients of TN and TP show relatively little change over the distance range of the transects.

As the sampling site off the Kaanapali Sand Restoration site is an open coastal area exposed to wind and wave, the zone of groundwater-ocean water mixing is small, extending only to distances of several meters from shore. These gradients are far less pronounced than at other areas of West Maui where either semi-enclosed embayments occur or physical mixing processes are less vigorous.

Water chemistry parameters that are not associated with groundwater input (NH_4^+, TON, TOP) do not show sharp gradients of decreasing concentration with respect to distance from the shoreline, although there are spikes in the concentration of NH_4+ at the sampling stations 10 m from the shoreline on Transects 1 and 2 (Tables 1, Figure 3). TON and TOP show no distinct gradients with respect to distance from the shoreline, and reflect the same patterns as TN and TP, respectively. Such patterns indicate that the concentrations of these organic chemical constituents are not a result of input of materials emanating from land.

Similar to the patterns of dissolved inorganic nutrients (Si and NO_3^-), the distributions of Chl *a* and turbidity also display peaks near the shoreline, with rapidly diminishing values seaward of the shoreline (Table 1, Figure 4). Overall, values of Chlorophyll *a* are considered low with all values below 0.3 µg/L (Figure 4). The progressive decrease in values of turbidity with distance from shore is likely a response to resuspension of fine-grained particulate material stirred by breaking waves in the nearshore zone. With decreasing wave energy and increasing water depth, turbidity in the water column decreases (Figure 4). Temperature also displays a similar pattern with peak values at the shoreline and progressively decreasing values with distance from shore (Figure 4).

In addition to horizontal gradients extending from the shoreline offshore, vertical gradients through the water column are often encountered. As groundwater has a salinity of essentially zero, it is more buoyant than seawater with a salinity of 35‰. Hence, in areas where mixing processes are not sufficient to homogenize the water column, surface layers of low-salinity, high-nutrient water are often found overlying layers of higher salinity, lower nutrient water. Inspection of Figure 3 and 4 indicates that there was distinct vertical stratification of nutrient concentrations on Transect 3 off the Kaanapali Sand Restoration site out to 50 m from shore. Beyond 50 m, the water column was well mixed. There was no similar vertical stratification of nutrients or salinity on Transects 1 and 2, indicating that the water column was more thoroughly mixed at these sites compared to Transect site 3. Temperature exhibited differences in surface and deep samples at Transects 2 and 3 with elevated surface values (Table 1, Figures 3 and 4).

2. Compliance with DOH Criteria

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

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

It can be seen in Table 1 that the only nutrient constituents to exceed State of Hawaii water quality standards for the “not to exceed more than 10% of the time” criteria under dry conditions are nitrate-nitrogen (NO_3^-) at the shoreline sampling stations of Transects 1 and 3, several values of ammonium nitrogen (NH_4^+) within 25 m from shore, and turbidity at the shoreline of Transect 1. As discussed above, the elevated concentration of NO_3^- near the shoreline is likely a result of mixing of groundwater with ocean water. The elevated concentrations of turbidity are likely a result of resuspension of fine-grained naturally occurring sediment by breaking waves in the nearshore zone. Beyond 50 m from shore, all values of turbidity were well below the standards.

B. Coral Reef Community Structure

1. Physical Structure

The Puu Kekaa Sand Borrow site consists of a broad plain of white-grey sand that extends from the base of the lava promontory known as Black Rock to depths beyond the limit of the present survey (Figure 5). The only prominent biotic colonizer of the sand plain are patches of the green calcareous alga *Halimeda* (Figure 6). No coral or hard bottom was observed during reconnaissance swims through the sand borrow area.

Physical composition of the survey area fronting the Kaanapali Sand Restoration Project site is relatively consistent throughout the area, although there are some differences between the transect sites. Overall, the physical structure of the nearshore marine habitat consists of a sand beach (at least during the present study) that extends through the intertidal area. The shallow nearshore region is composed of a limestone platform that can extend up to approximately 50 meters from shore. An important feature of the nearshore area fronting the Kaanapali Sand Restoration Project site is that the reef platform is essentially barren of biotic settlement owing to the normal conditions of direct wave impact from both northerly swells and southerly swells.
The baseline survey was conducted during a period of small south swell, and waves of 2-3 feet in face height were breaking at about the midpoint of the reef platform, off of Hanakaoo Point. Breaking waves resulted in substantial resuspension of naturally occurring calcium carbonate sand throughout the water column in the nearshore area. Beyond the area of wave break, resuspension of sand decreased markedly.

The nearshore reef platform extends seaward from between approximately 150 m (Transect 1) to 300 m (Transect 3). The seaward end of the limestone platform terminates as a vertical face 1-2 meters in height. The vertical face intersects with sand plains that extend seaward beyond the area coverage of the survey.

2. Biotic Community Structure

a. Berm Enhancement Area - Transect 1

Composition of the reef communities fronting the Kaanapali Sand Restoration Project Site are in direct response to several physical factors. As described above, breaking waves result in concussive forces that prevent settlement and growth of some species, or cause breakage and fragmentation of existing species (primarily corals). In addition, resuspension of sand from wave action also prevents settlement and causes destructive abrasion of corals.

The Berm Enhancement area is located closest to the sand borrow site, and as a result is more influenced by sand scour and coverage of the reef surface than the other two survey areas. The nearshore area of Transect 1 consists of a continuous sand bottom that is a state of near continuous resuspension (Figure 7). Seaward of the sand flat, bottom composition consists of irregularly spaced fossil limestone reef structure that contain only scattered coral colonies, primarily of the species Pocillopora meandrina (Figures 8 and 9). The relatively barren reef platform extends approximately 150 m from the shoreline, where it abuts a sand plain. Tufts of the green calcareous alga *Halimeda* sp. Occur in the sand plain in a similar distribution as found in the sand borrow area (Figure 9).

b. Hanakaoo Point – Transect 2

The junction between the Berm Enhancement area and the Beach Nourishment area occurs at Hanakaoo Point. As this area is more distant from the sand borrow area, there is less effect to reef community structure from sand scour and cover of the bottom. With less sand in the system, the nearshore area consists of a flat, pitted limestone bench that is covered with a thin veneer of turf algae. The nearshore reef bench is devoid of large sessile benthos (Figure 10). Within both the nearshore zone motile macrobenthos, particularly sea urchins, were extremely scarce, likely as a result of the force of breaking waves which is sufficient to prevent these unattached organisms to remain stable on the reef surface.

Moving seaward, the first corals to occur are scattered heads of *Pocillopora meandrina* (Figure 10). With increasing distance from shore and increasing water depth, other corals gradually appear, primarily encrusting or sturdy lobate forms of *Porites* and *Montipora* (Figure 11). At a water depth of approximately 8 meters, the outer reef zone consists of a mixed community of most of the common Hawaiian reef corals that cover most of the surface of the limestone reef platform.

The primary coral species occurring in the outer reef zone area *Porites lobata, which occur primarily as large encrustations or hemispherical dome-shaped colonies up to two meters in diameter (Figure 12).*). The large size, and healthy appearance of these colonies indicates that they are on the order of at least several decades old. *Porites compressa*, commonly called “finger coral” occurs as interconnected mats (Figure 12). The growth form of *Porites compressa* consists of elongated fingers, which are substantially more delicate and susceptible to breakage compared to the other corals. Hence, *P. compressa* is not found in areas that are routinely subjected to wave energy. The occurrence of large, intact colonies of *P. compressa* in the outer reef zone off of the Kaanapali Sand Restoration area indicates that the outer reef zone has not sustained wave stress substantial enough to destroy these coral colonies over at least a decadal time interval. While less abundant than species of *Porites*, other corals observed in the area were *Montipora patula, M. capitata, M. flabellata, Pavona varians, P. duedeni, Porites brighami, P. evermanni, P. brighami, Leptastrea* *purpurea,* and the solitary coral *Fungia scutaria.* No growth of dense stands of benthic algae were noted anywhere on the reef.

The outer reef zone terminates at a depth of approximately 10 m in a margin between the limestone platform and sand plain (Figure 13). Seaward of the outer reef margin bottom composition consisted of a flat, gently sloping sand plain. No pastures of *Halimeda* were observed during the present study at the junction of the reef platform and the sand plain in the area of Transect 2.

Other macro-invertebrates that were observed on the surface of the outer reef were several species of sea urchins (*Echinometra matheai*, *Echinothrix diadema, Tripneustes gratilla,* and *Heterocentrotus mammilatus*). None of these urchins were particularly abundant, but were found most commonly on the bare limestone reef platform rather than on living corals. It is well known that these urchins graze on benthic algae, and may be responsible for the absence of dense algae in the outer reef zones where wave energy is not sufficient to remove the urchins from the reef.

Reef fish were considered low in abundance throughout the study area. The most common, and conspicuous fish were mixed-species of Acanthurids (surgeonfish) occupying mid-water near the outer margin of the reef platform.

c. Beach Nourishment Area – Transect 3

The reef zonation pattern on Transect 3 is similar to Transect 2, with several exceptions. The innermost zone adjacent to the beach consists of a barren limestone platform (Figure 14). Somewhat different that Transect 2 is the occurrence of a zone of emergent fossil reef projections within a sand zone that lies between the inner reef bench and the outer reef (Figure 15). Seaward of the sand zone, the outer reef consists of a similar assemblage of lobate and encrusting corals as described for Transect 2. However, the outer region of the reef platform consists of a sub-zone dominated by widespread monospecific stands of *Porites compressa* (Figure 16). As at Transect 2, the reef platform terminates in a near vertical scarp that abuts sand plains (Figure 16). The monospecific stands of *P. compressa* indicate that this region has been extremely stable with respect to lack of impact from large storm waves for at least decades. In addition, throughout this study, there was no overall indication of bleaching of corals from the El Nino events of 2014-2015.

3. Incidental Sightings of Threatened and Endangered Species

Several species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly throughout the Hawaiian Islands, and are frequently observed throughout the west shore of Maui. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently from Hawaiian waters. Several green sea turtles were observed within the survey area over the course of the present study. No hawksbill turtles were observed during the course of underwater surveys.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) winter in the Hawaiian Islands from December to April. The present survey was conducted in July when whales are absent from Hawaiian waters. During the season when present, humpback whales, as well as other cetaceans are common off the coastline of West Maui. The Hawaiian monk seal, (*Monachus schauinslandi*) is an endangered earless seal that is endemic to the waters off the Hawaiian Islands. Monk seals commonly haul out of the water onto sandy beaches to rest. No seals were observed during survey work.

IV. DISCUSSION and CONCLUSIONS

The purpose of this assessment is to assemble the information to make valid evaluations of the potential for impact to the marine environment from the proposed beach restoration plan for the Kaanapali area of West Maui, Hawaii. Berm enhancement and beach nourishment is intended to minimize future erosion damage. The information collected in this study provides the basis to understand some of the important processes that are operating in the nearshore ocean, so as to be able to address any concerns that might be raised in the planning process for the beach stabilization.

Results of this baseline study reveal that the major factor shaping the composition of the marine communities off the project site is the concussive forces associated with breaking surf. Nearshore reef community structure is clearly in response to the degree of wave energy which controls community composition. The documented structure of the marine communities off of the Kaanapali area indicate that within the nearshore area where waves regularly break, the physical habitat is either sand (Transect 1) or a flat barren limestone bench with essentially no benthic community, with no corals present. At intermediate distances from shore, corals begin to colonize the hard surfaces. At deeper zones wave forces and sand resuspension are reduced to a level where coral communities can settle and grow, and the deep reefs are characterized by high densities of a variety of species of Hawaiian reef corals. Of importance is that nowhere in the survey area were large aggregations of benthic algae, including the invasive species that occur elsewhere in Maui, were noted. The reef communities off the Kaanapali Sand Restoration area can be considered in a normal condition relative to other similar Hawaiian ecosystems with typical coral abundance and diversity, and no outward appearance of significant stress. Such an observation suggests that these reefs were either not affected by the large-scale bleaching event from the 2014-2015 El Niño's, or have recovered from any such impacts that were associated with the periods of elevated temperature.

As corals are long-lived and fixed to the bottom, coral community structure provides an excellent integrator of physical conditions over time-scales of decades to centuries. Hence, the coral communities off Kaanapali have developed and grown throughout the large fluctuations of seasonal sand dynamics that have re-shaped the beach over the last several decades. As such, large fluctuations in beach structure occurring in the past have not had any apparent negative effects on offshore coral community structure. Thus, it is not likely that the proposed action to restore sand on the beach would not have any negative effect to existing communities. The only foreseeable change may be if beach stabilization results in a seaward extension of more sand into the intertidal and subtidal areas. As corals do not occur in this region, such a situation does not appear to present any potential for concern as the nearshore is already composed of sand and rubble.

Results of the water quality reconnaissance survey indicate a small component of groundwater entering the ocean near the shoreline. The groundwater input is rapidly mixed to background coastal oceanic values through wave action, and likely only affects the zone where macrobenthos do not occur. Turbidity of the water column is peak at the shoreline and decreases steadily with distance from shore as a result of wave resuspension of naturally occurring bottom sediments. None of these factors are likely to be affected to a noticeable extent beyond the range of natural variability by the proposed beach restoration.

All of these considerations indicate that the proposed sand restoration project at Kaanapali will not have any significant negative or likely even measurable, effect on water quality or marine biota in the coastal ocean offshore of the property.

REFERENCES CITED

Grasshoff, K. 1983. Methods of seawater analysis. Verlag Chemie, Weinheim, 419 pp.

Strickland J. D. H. and T. R. Parsons. 1968. A practical handbook of sea-water analysis. Fisheries Research Bd. of Canada, Bull. 167. 311 p.

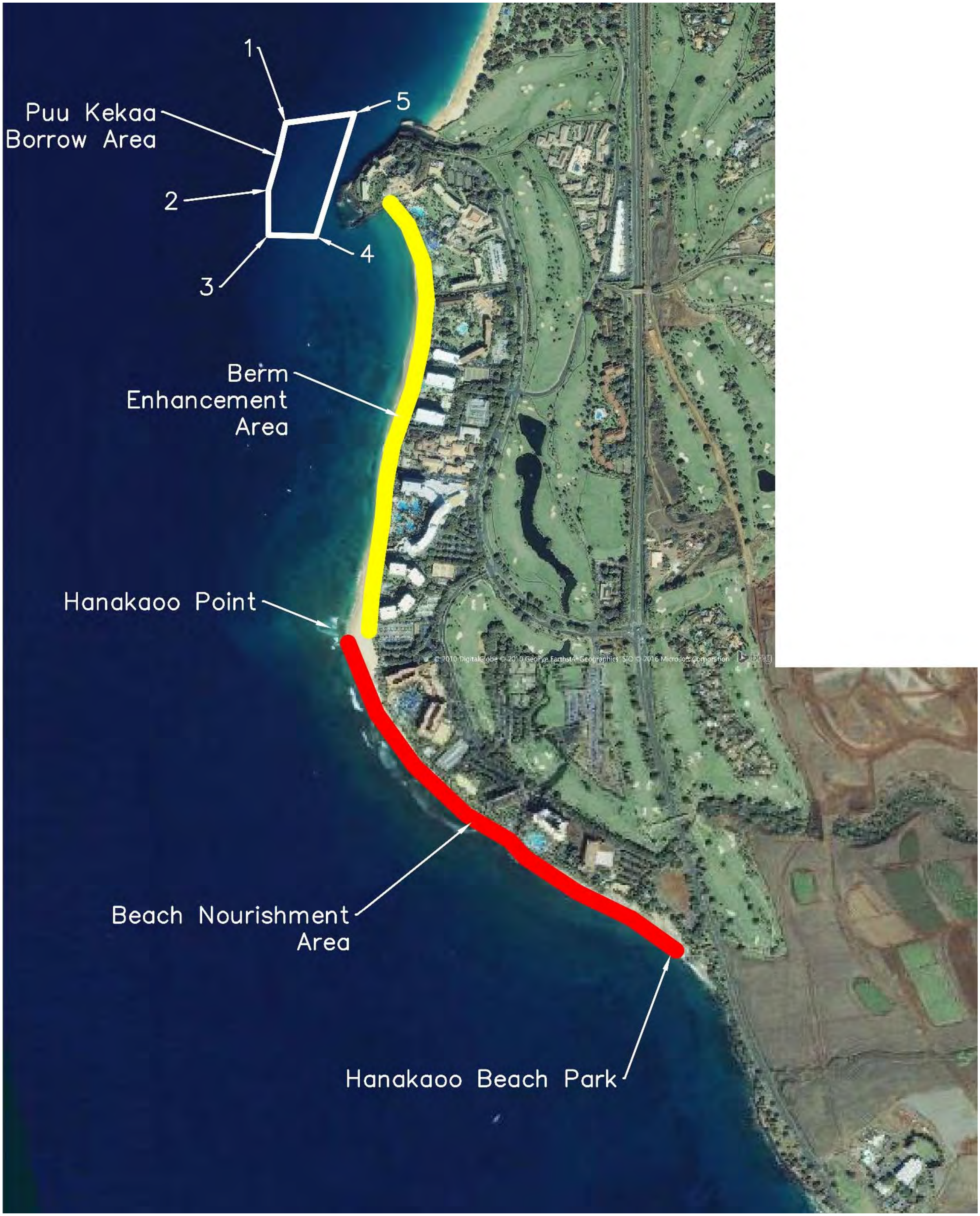


FIGURE 1. Aerial view of Kaanapali, West Maui Hawaii showing areas of proposed sand restoration, including the Puu Kekaa Sand Borrow Area, the berm enhancement area north of Hanakaoo Point, and the Beach Nourishment Area between Hanakaoo Point and Hanokaoa Beach Park.

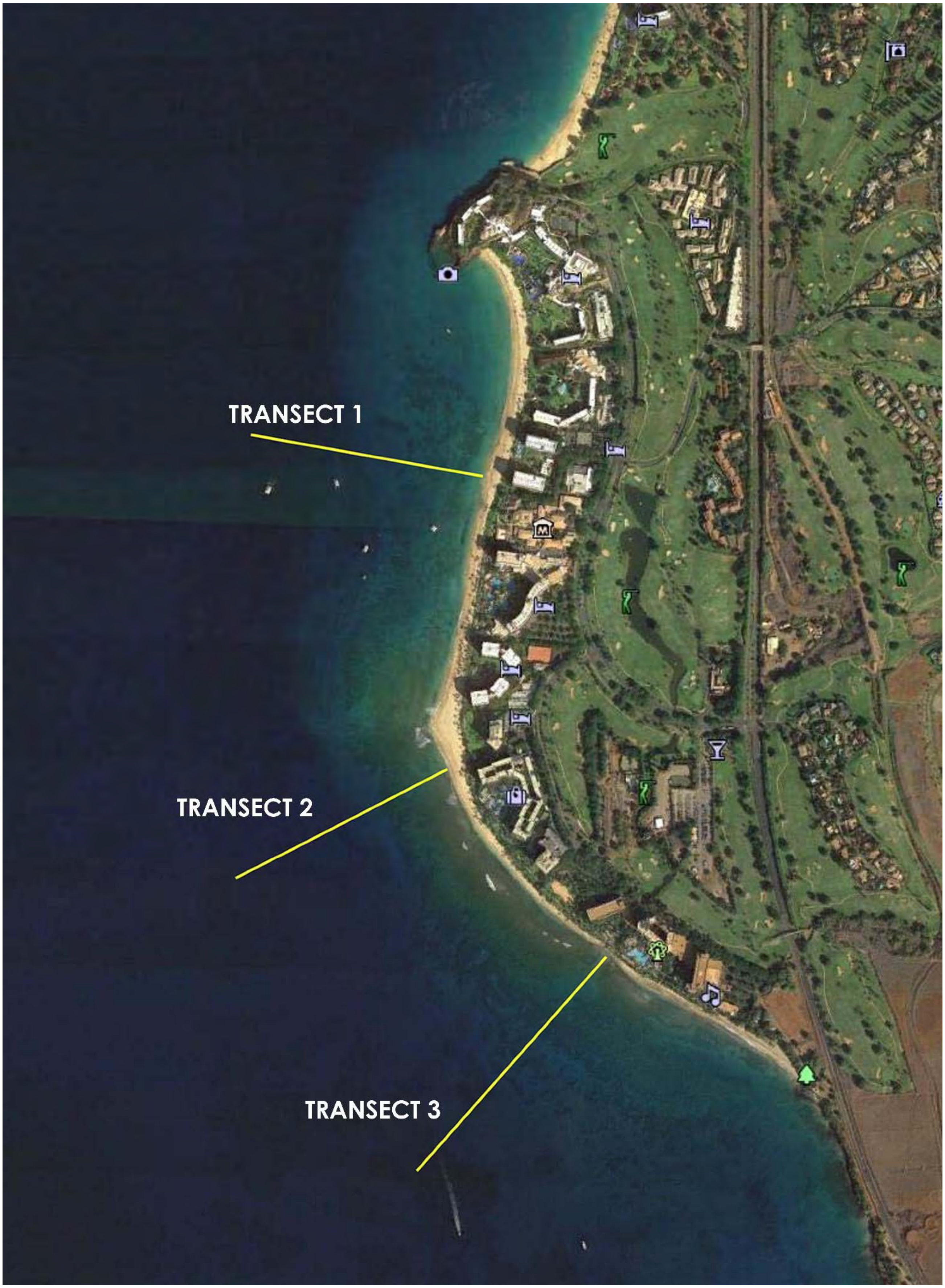


FIGURE 2. Aerial view of Kaanapali, West Maui Hawaii showing locations of water sampling transects off areas of proposed sand restoration. Transect 1 is off the center of the berm enhancement area north of Hanakaoo Point, Transect 2 is off of Honakaoo Point, and Transect 3 is off the center of the Beach Nourishment Area between Hanakaoo Point and Hanokaoa Beach Park.

TABLE 1. Results of water chemistry analyses from three ocean sampling transects in the vicinity of the Kaanapali Sand Replenishment Project. Samples were collected on July 9, 2017. See Figure 1 for locations of sampling stations. Also shown are DOH WQS for "open coastal waters" under "wet" and "dry" conditions, "not to exceed more than 10% and 2% of the time" criteria. Shaded values exceed the "not to exceed more than 10% of the time under dry conditions" standards.

	DFS (m)	DEPTH (mt)	PO_4^{3-} (µg/L)	$NO_3^-+NO_2^-$ (µg/L)	NH_4^+ (µg/L)	Si (µg/L)	TP (µg/L)	TN (µg/L)	TOP (µg/L)	TON (µg/L)	TURB (NTU)	SALT (o/oo)	pH (std. units)	Chl-a (µg/L)	TEMP deg. C	Diss. O_2 % sat.
TRANSECT 1	0	0.1	5.27	10.08	2.94	166.32	13.95	103.32	8.68	90.30	0.59	34.57	8.15	0.09	28.44	100.7
	1	0.2	6.20	8.96	3.92	156.24	13.95	83.16	7.75	70.28	0.54	34.53	8.15	0.10	28.61	100.9
	5-S	0.2	4.65	3.22	2.80	138.04	13.02	84.56	8.37	78.54	0.33	34.64	8.17	0.09	28.21	102.9
	5-B	1.5	3.41	0.84	3.36	133.00	11.78	77.98	8.37	73.78	0.24	34.68	8.17	0.11	28.16	103.7
	10-S	0.2	2.79	4.06	12.46	128.80	10.85	116.48	8.06	99.96	0.24	34.70	8.18	0.12	28.02	102.3
	10-B	2.2	4.03	4.48	7.70	126.56	14.26	115.08	10.23	102.90	0.23	34.72	8.18	0.09	27.97	103.8
	25-S	0.2	4.34	3.08	4.20	98.00	11.78	79.10	7.44	71.82	0.12	34.64	8.15	0.08	27.54	103.4
	25-B	3.6	5.27	2.52	3.64	109.48	14.26	90.44	8.99	84.28	0.15	34.68	8.16	0.09	27.38	102.8
	50-S	0.2	5.27	1.96	4.20	101.92	13.02	85.82	7.75	79.66	0.06	34.69	8.20	0.08	27.11	101.9
	50-B	3.9	4.65	1.54	4.06	104.72	13.64	98.42	8.99	92.82	0.16	34.72	8.20	0.09	27.14	102.9
	200-S	0.3	3.72	1.40	3.50	89.04	11.78	82.32	8.06	77.42	0.07	34.70	8.21	0.07	27.10	102.9
	200-B	5.6	4.34	1.96	3.64	98.00	12.71	83.86	8.37	78.26	0.10	34.72	8.22	0.07	27.06	106.2
TRANSECT 2	0	0.1	5.27	7.00	3.78	194.88	12.71	88.90	7.44	78.12	0.29	34.34	8.24	0.14	29.42	109.4
	1	0.3	5.89	6.72	5.88	195.44	13.33	95.62	7.44	83.02	0.28	34.42	8.24	0.32	29.37	111.3
	2	0.3	1.55	0.84	4.20	169.96	10.85	84.28	9.30	79.24	0.27	34.46	8.26	0.30	29.29	118.0
	5	0.3	4.34	1.68	3.22	178.64	12.40	88.34	8.06	83.44	0.21	34.46	8.26	0.19	29.19	122.6
	10-S	0.2	4.03	3.64	10.78	169.68	12.09	107.94	8.06	93.52	0.24	34.42	8.26	0.12	28.32	130.5
	10-B	2.6	3.72	2.24	3.36	168.56	13.33	91.14	9.61	85.54	0.20	34.46	8.26	0.21	27.95	123.8
	25-S	0.3	3.41	0.42	3.08	128.52	11.47	83.16	8.06	79.66	0.13	34.64	8.18	0.12	27.98	116.9
	25-B	2.1	4.34	3.22	2.66	141.40	11.78	87.50	7.44	81.62	0.25	34.57	8.20	0.12	27.69	114.2
	50-S	0.2	4.96	3.92	3.08	133.00	15.19	107.66	10.23	100.66	0.17	34.53	8.19	0.11	27.97	116.7
	50-B	4.8	4.96	1.54	3.92	130.76	14.57	112.42	9.61	106.96	0.12	34.53	8.18	0.10	27.30	109.0
	200-S	0.3	4.34	5.18	2.66	129.92	13.33	106.96	8.99	99.12	0.21	34.64	8.23	0.09	27.96	99.4
	200-B	6.1	4.96	5.04	3.36	135.24	16.12	128.94	11.16	120.54	0.08	34.65	8.23	0.08	27.26	100.3
TRANSECT 3	0	0.1	5.89	13.86	3.64	249.48	13.95	109.20	8.06	91.70	0.43	34.38	8.25	0.12	28.50	106.0
	1	0.4	4.34	5.88	1.82	243.04	15.81	122.08	11.47	114.38	0.32	34.42	8.25	0.20	28.30	112.2
	5	0.4	4.96	6.58	1.68	265.16	15.19	108.78	10.23	100.52	0.36	34.42	8.25	0.19	28.25	112.2
	5	0.8	5.89	7.28	4.48	265.16	13.64	106.54	7.75	94.78	0.37	34.46	8.24	0.17	28.24	113.9
	10-S	0.1	4.96	7.84	1.54	240.24	15.19	160.02	10.23	150.64	0.33	34.38	8.24	0.12	28.37	114.8
	10-B	0.3	4.96	7.42	2.66	226.24	13.64	99.68	8.68	89.60	0.34	34.50	8.23	0.14	28.38	115.4
	25-S	0.1	3.10	7.70	6.30	226.24	13.95	127.68	10.85	113.68	0.39	34.42	8.17	0.12	28.23	108.0
	25-B	1.1	4.03	5.74	1.12	157.36	13.64	87.36	9.61	80.50	0.13	34.62	8.23	0.17	27.79	110.8
	50-S	0.2	4.96	6.16	3.36	169.96	13.64	90.58	8.68	81.06	0.18	34.63	8.23	0.11	27.64	105.0
	50-B	3.5	3.41	0.70	0.28	129.08	13.64	76.72	10.23	75.74	0.11	34.64	8.24	0.12	27.37	106.5
	150-S	0.3	3.72	0.28	0.84	71.40	12.40	75.04	8.68	73.92	0.03	34.71	8.24	0.09	27.17	103.5
	150-B	5.7	2.79	bdl	0.28	63.28	12.71	85.40	9.92	85.12	0.15	34.73	8.24	0.25	27.13	106.3
	250-S	0.3	3.72	0.28	0.56	68.60	17.67	117.18	13.95	116.34	0.10	34.73	8.25	0.21	27.16	101.4
	250-B	6.3	3.41	0.14	0.42	78.96	17.98	108.78	14.57	108.22	0.07	34.74	8.25	0.09	27.12	100.3
	DRY	GEOMEAN		3.50	2.00		16.00	110.00			0.20	*	**	0.15	***	****
		10%		10.00	5.00	-	30.00	180.00			0.50	*	**	0.50	***	****
		2%		20.00	9.00	-	45.00	250.00			1.00	*	**	1.00	***	****
	WET	GEOMEAN		5.00	3.50		20.00	150.00			0.50	*	**	0.30	***	****
		10%		14.00	8.50	-	40.00	250.00			1.25	*	**	0.90	***	****
		2%		25.00	15.00	-	60.00	350.00			2.00	*	**	1.75	***	****

* = Salinity shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.
** = pH shall not deviate more than 0.5 units from a value of 8.1.
*** = Temperature shall not vary more than one degree C. from ambient conditions.
**** = Dissolved Oxygen not less than 75% saturation

DOH = Department of Health
BDL = below detection limit
NTU = nephelometric turbidity units
µg/L = micrograms per liter
WQS = water quality standards
ZOM = Zone of Mixing
"S" = surface sample
"B" = bottom sample

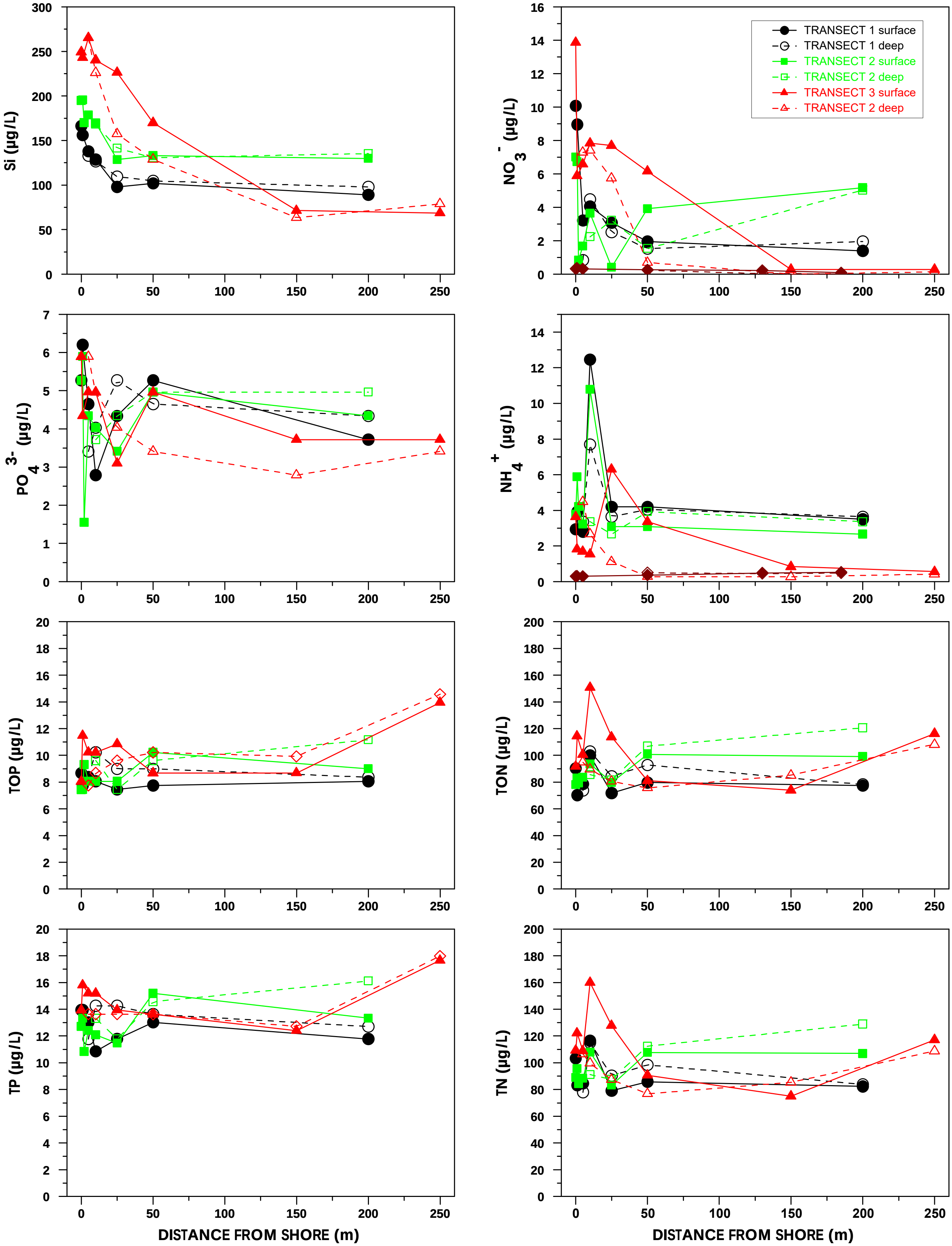


FIGURE 3. Plots of dissolved nutrients in surface and deep samples collected on July 9, 2017 as a function of distance from the shoreline along three transects in the vicinity of the Kaanapali Sand Restoration Project, West Maui, Hawaii. For transect locations, see Figure 2.

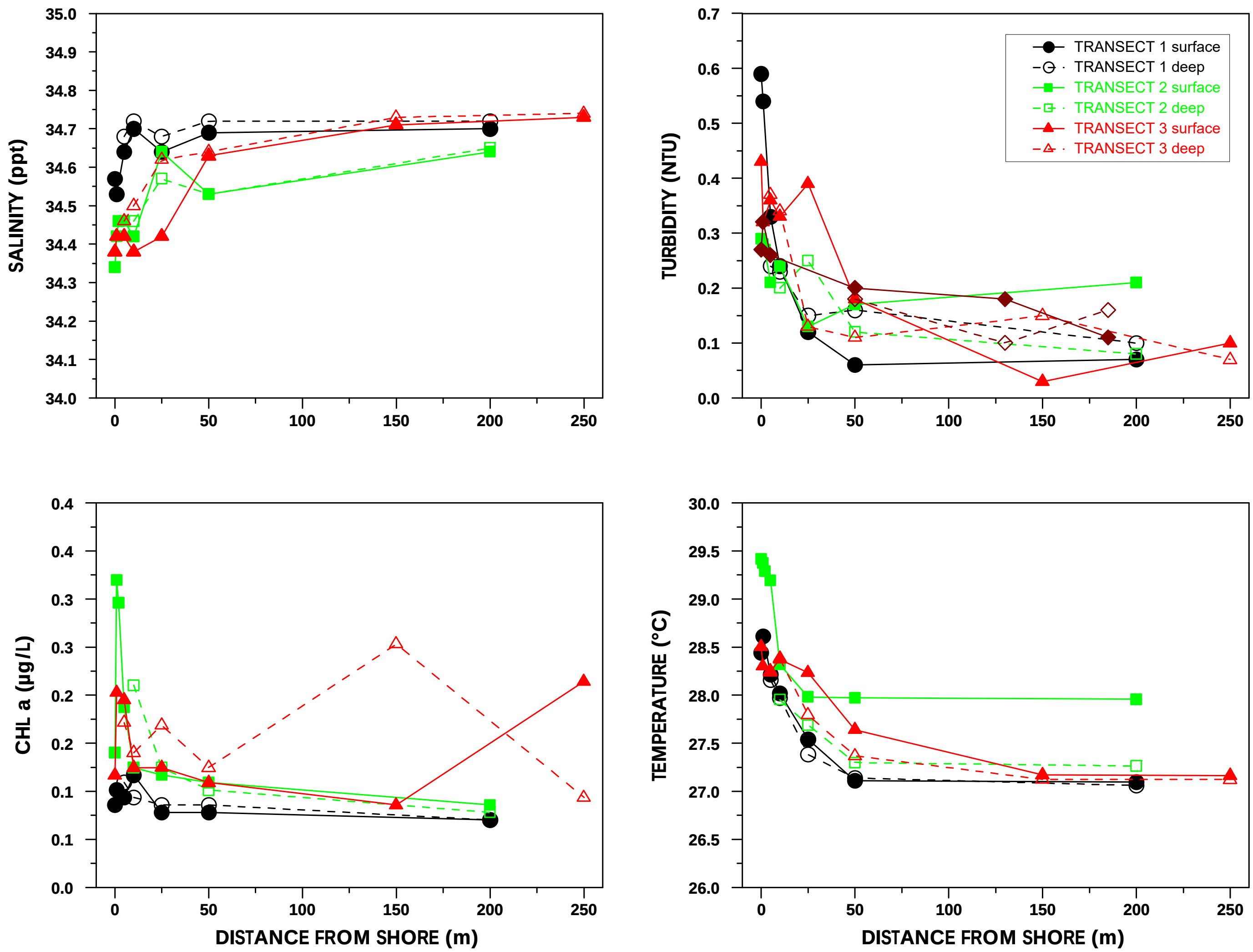


FIGURE 4. Plots of water chemistry constituents in surface and deep samples collected on July 9, 2017 along three transects fronting the Kaanapali Sand Restoration Project on West Maui, Hawaii as a function of distance from the shoreline. For transect locations, see Figure 2.

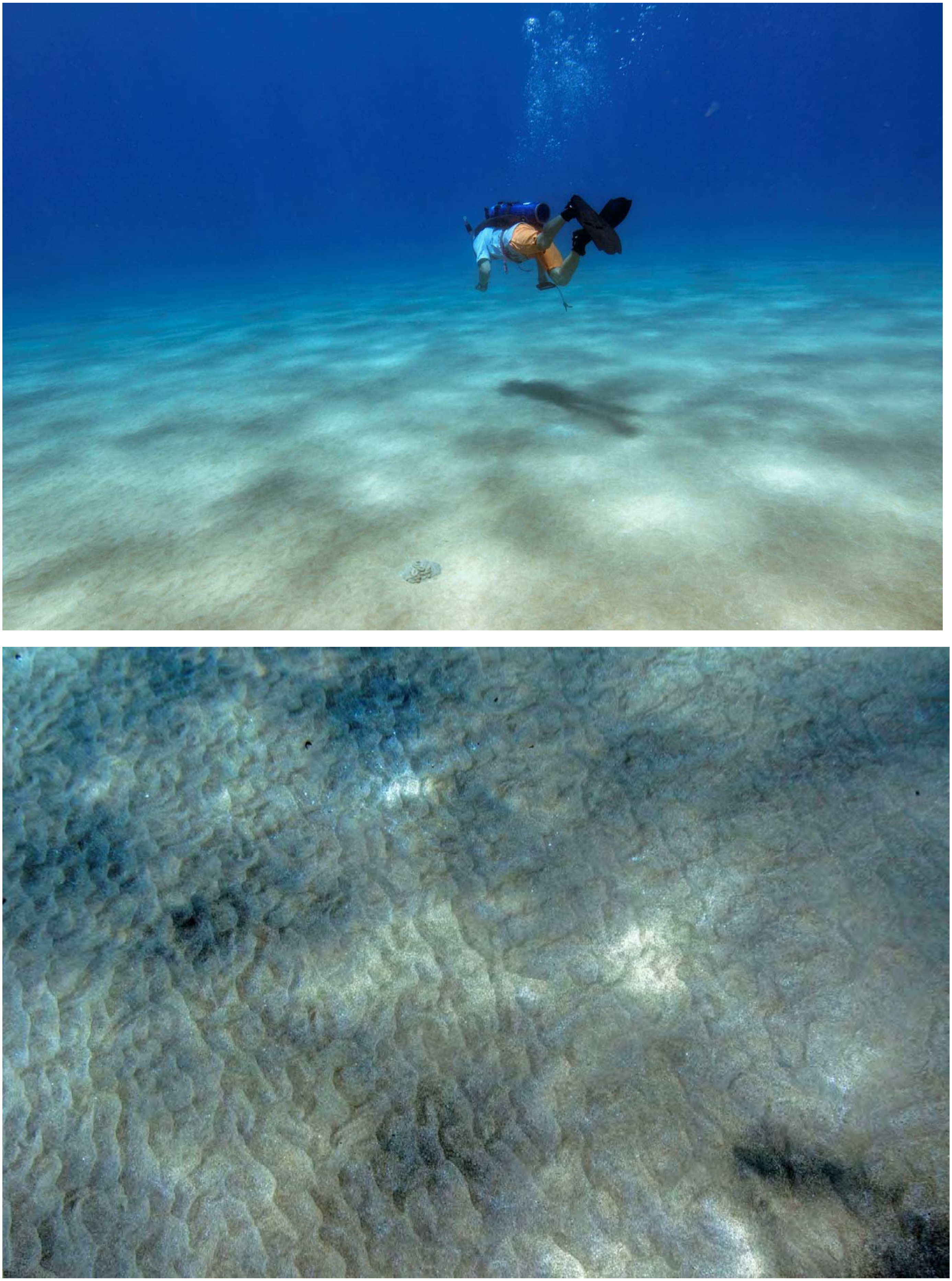


FIGURE 5. Two views of sand deposit at the Puu Kekaa borrow area. Water depth is approximately 5 meters. See Figure 1 for location of sand borrow area.

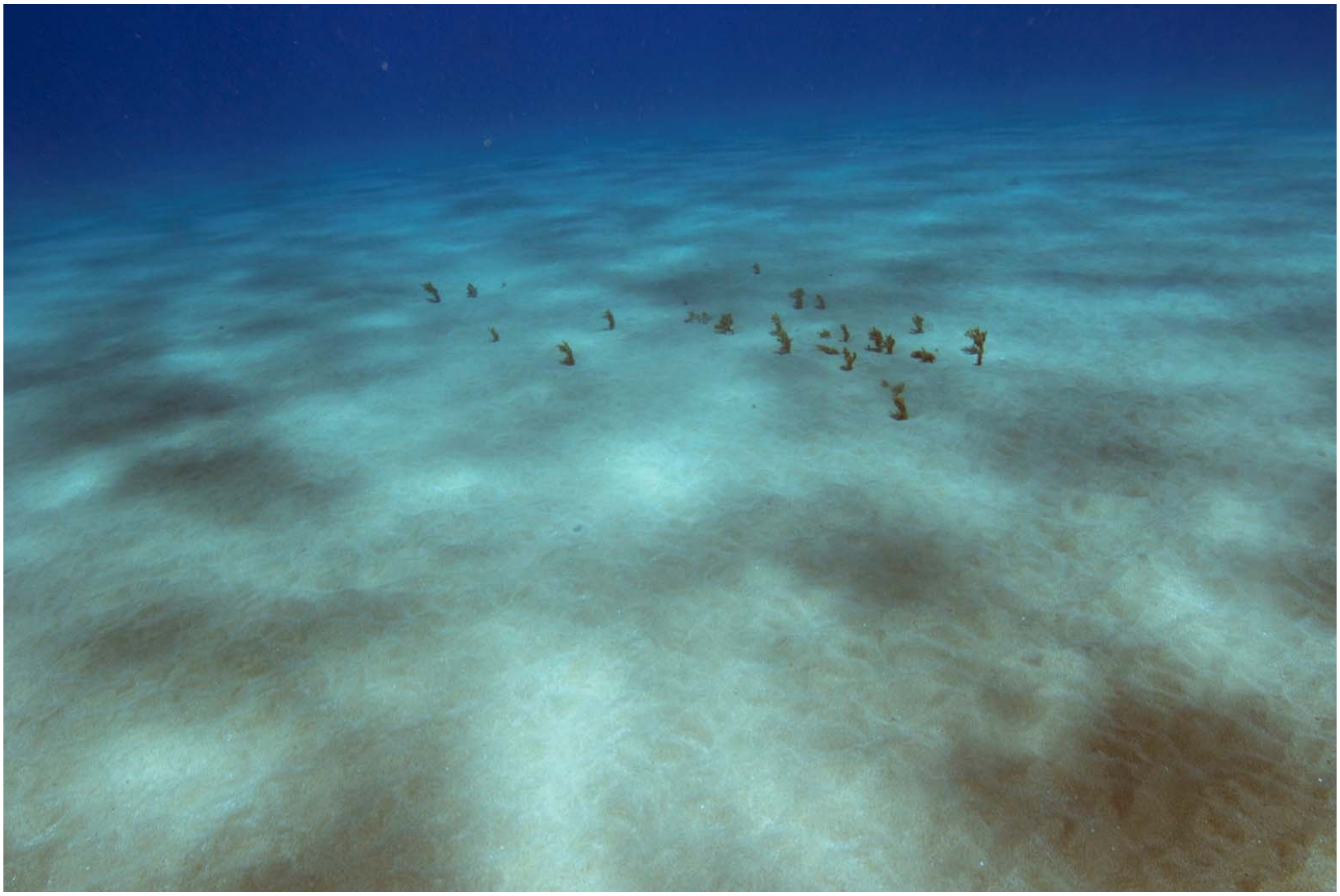


FIGURE 6. Two views of sand deposit at the Puu Kekaa borrow area showing patches of calcareous alga *Halimeda* sp. Clusters of the alga occur sporadically throughout the sand deposit. Water depth is approximately 7 meters. See Figure 1 for location of sand borrow area.

FIGURE 7. Two views of the nearshore sand zone off of Transect 1 within the Kaanapali Berm Enhancement area (See Figure 1 for location of Berm Enhancement area). Upper photo shows billows of resuspended sand resulting from wave action. Bottom photo shows mixture of sand and fossil reef rock in the nearshore zone. Water depthy is approximately 1 meter. See Figure 2 for location of Transect 1.

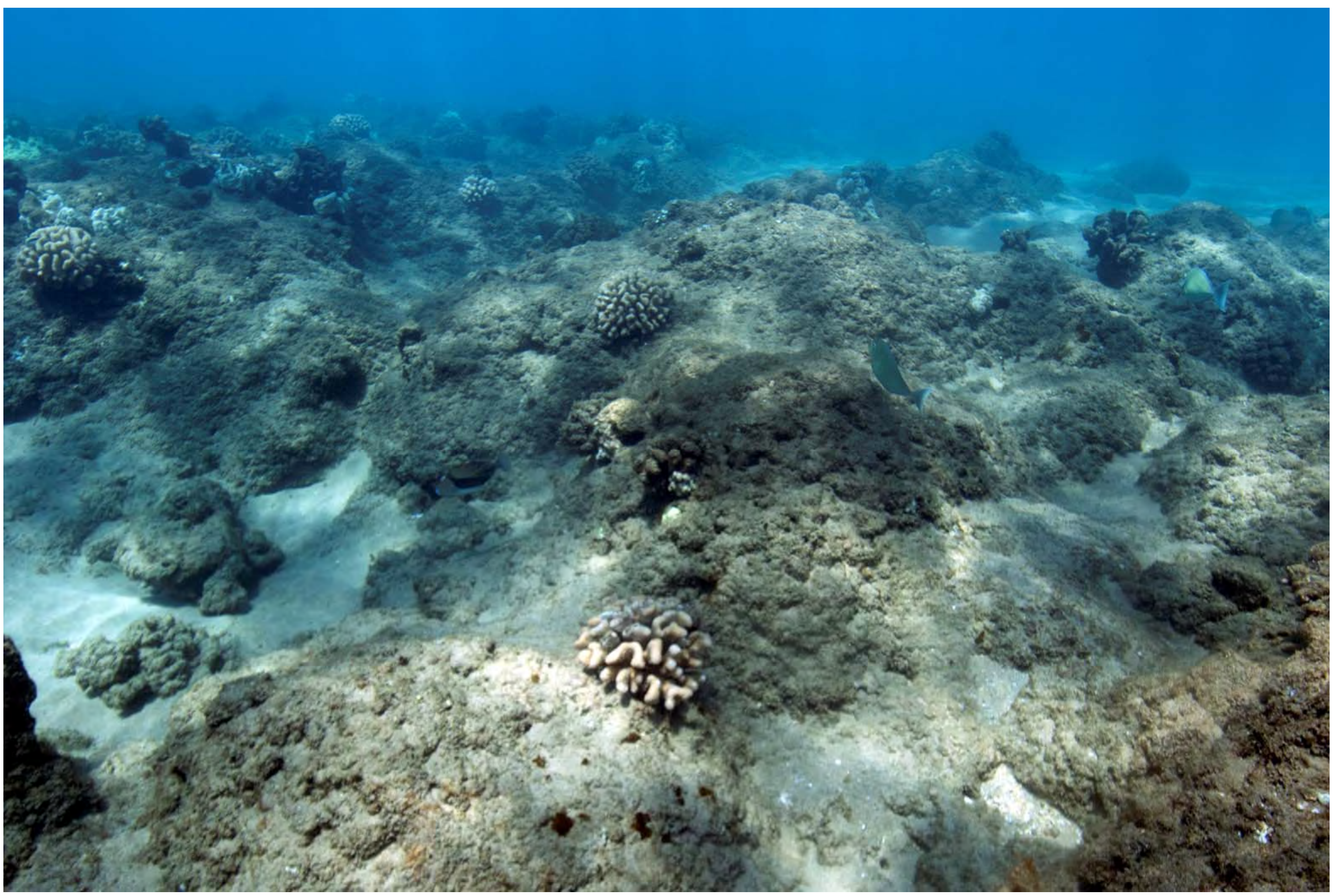


FIGURE 8. Two views of mid-reef zone off of Transect 1 (Kaanapali Berm Enhancement area). Upper photo shows clumps of the alga *Asparagopsis* sp. on exposed limestone surface. Bottom photo shows colonies of *Pocillopora meandrina* growing on fossil reef rock in the mid-reef zone. Water depth in both photos is approximately 2 meters. See Figure 2 for location of Transect 1.

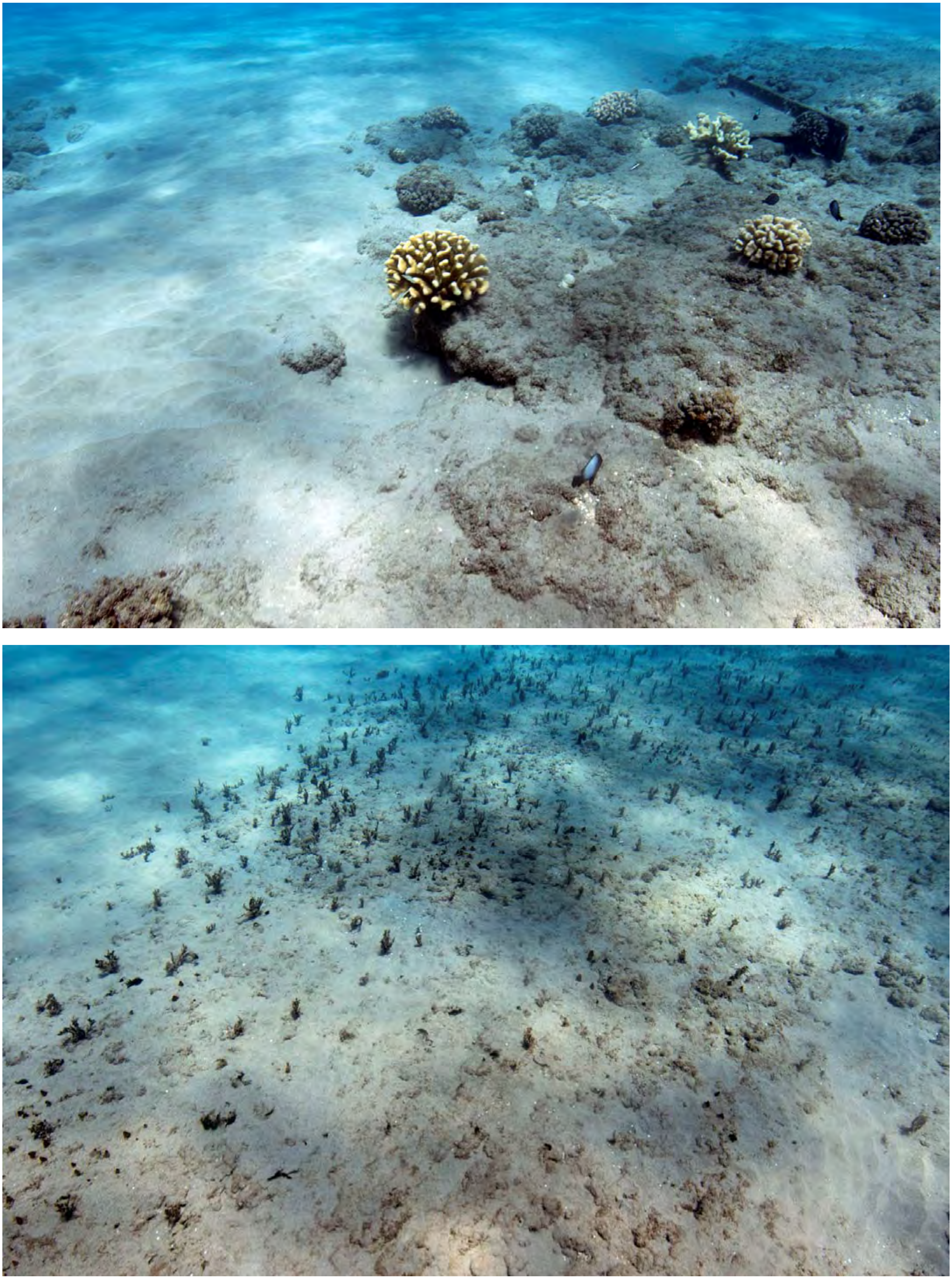


FIGURE 9. Two views of outer reef zone off of Transect 1 (Kaanapali Berm Enhancement area). Upper photo shows colonies of *Pocillopora meandrina* growing on the seaward edge of fossil reef rock platform. Bottom photo shows tufts of calcareous green alga *Halimeda* sp. growing on sand flat seaward of the fossil reef platform. Water depth is approximately 8 meters. See Figure 2 for location of Transect 1.

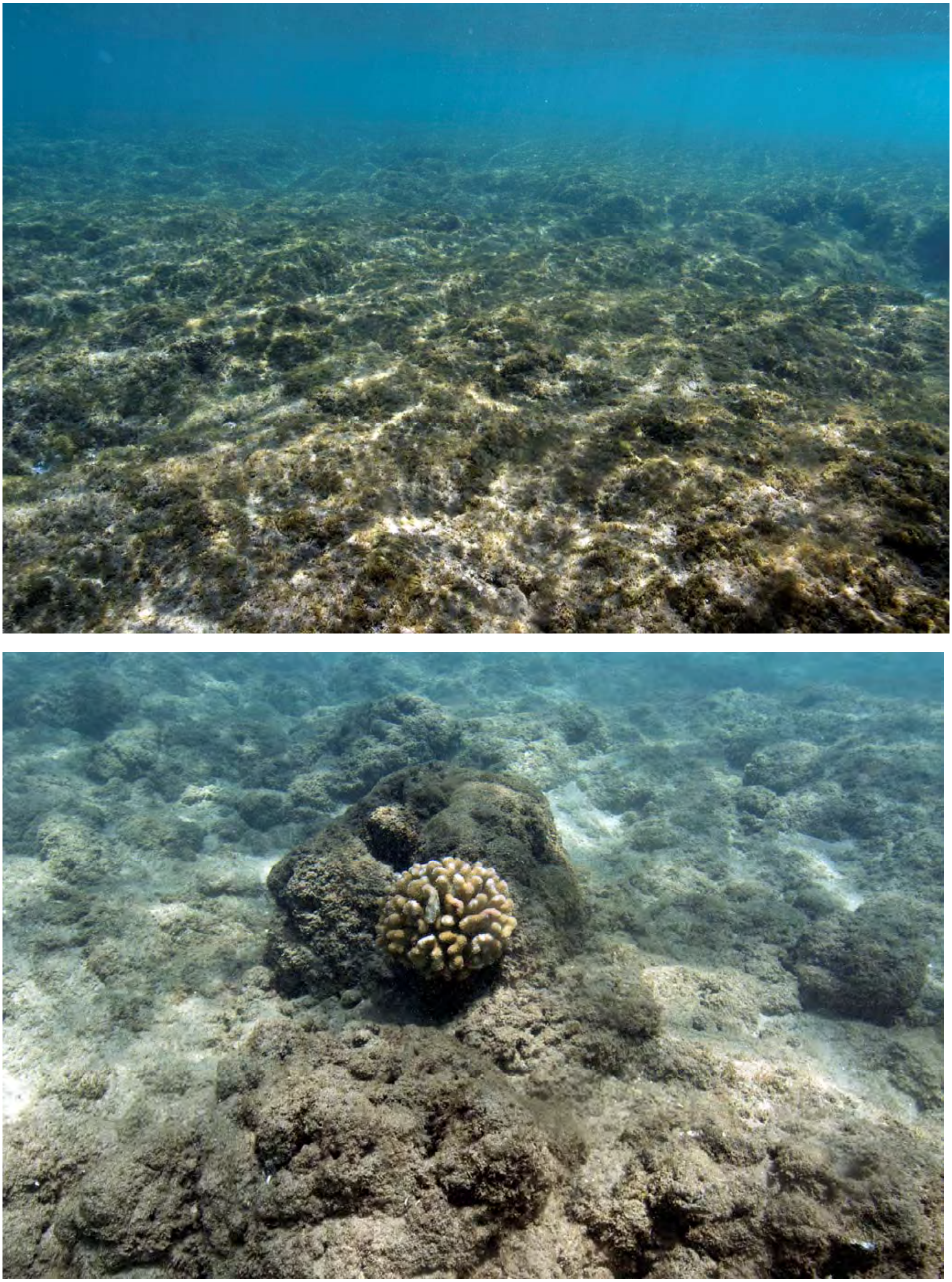


FIGURE 10. Two views of inner neashore reef zone at Transect 2 off of Honokaoo Point at the juncture of the Kaanapali Sand Berm Enhancement area and the Beach Nourishment area (See Figure 1). Upper photo shows flat bioeroded limestone pavement that forms the nearshore zone just seaward of the sand-water interface. Bottom photo shows isolated colony of *Pocillopora meandrina* growing on a projecting pinnacle of reef rock. Water depth in both photos is approximately 1 meter. See Figure 2 for location of Transect 2.

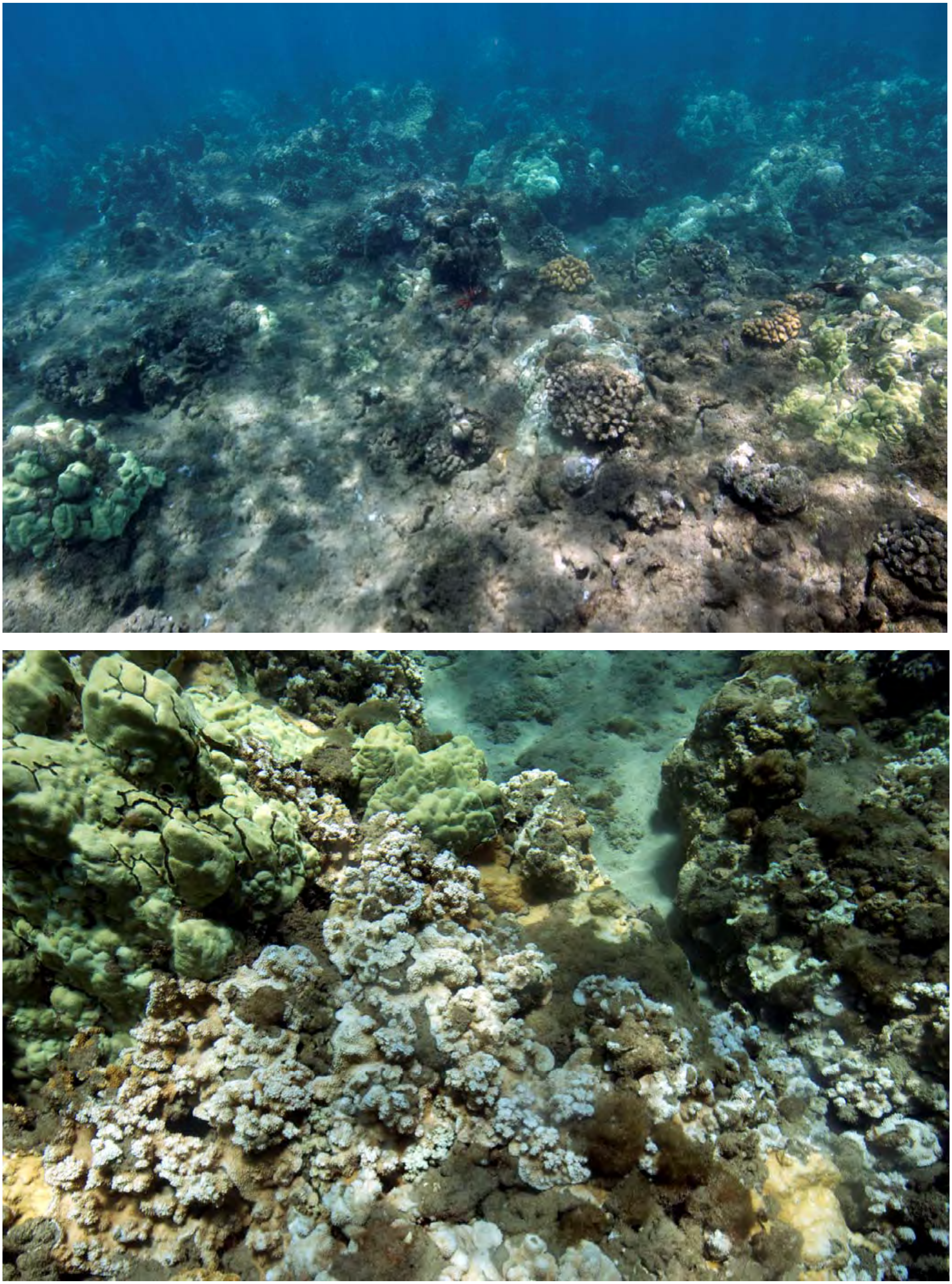
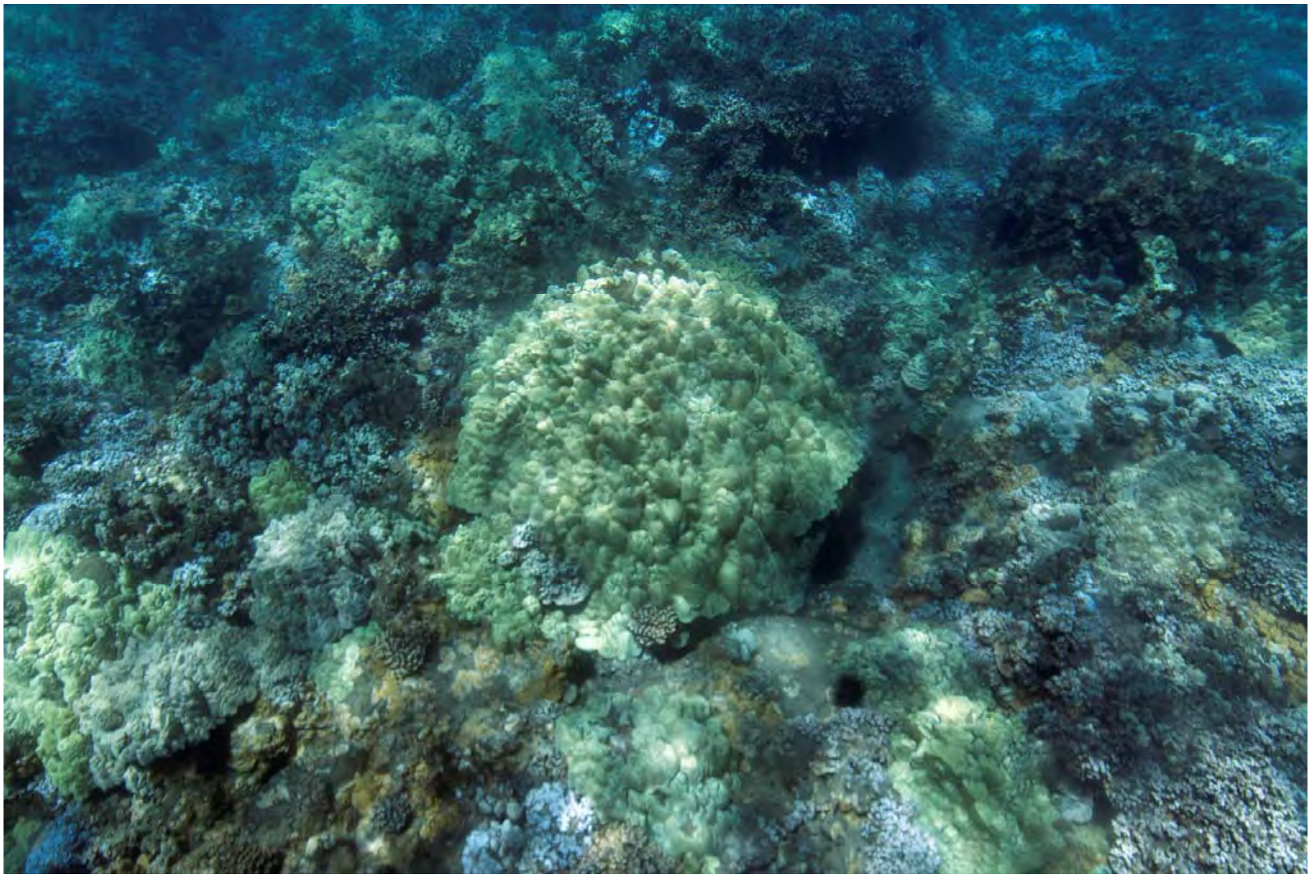


FIGURE 11. Two views of mid- reef zone on Transect 2 off of Honokaoo Point at the juncture of the Kaanapali Sand Berm Enhancement area and the Beach Nourishment area (See Figure 1). Both photos show typical coral assemblages that consist primarily of sturdy lobate forms (green-coloried *Porites lobata*) and encrusting growth forms (brown *Montipora* spp.) Water depth in both photos is approximately 3-4 meters. See Figure 2 for location of Transect 2.



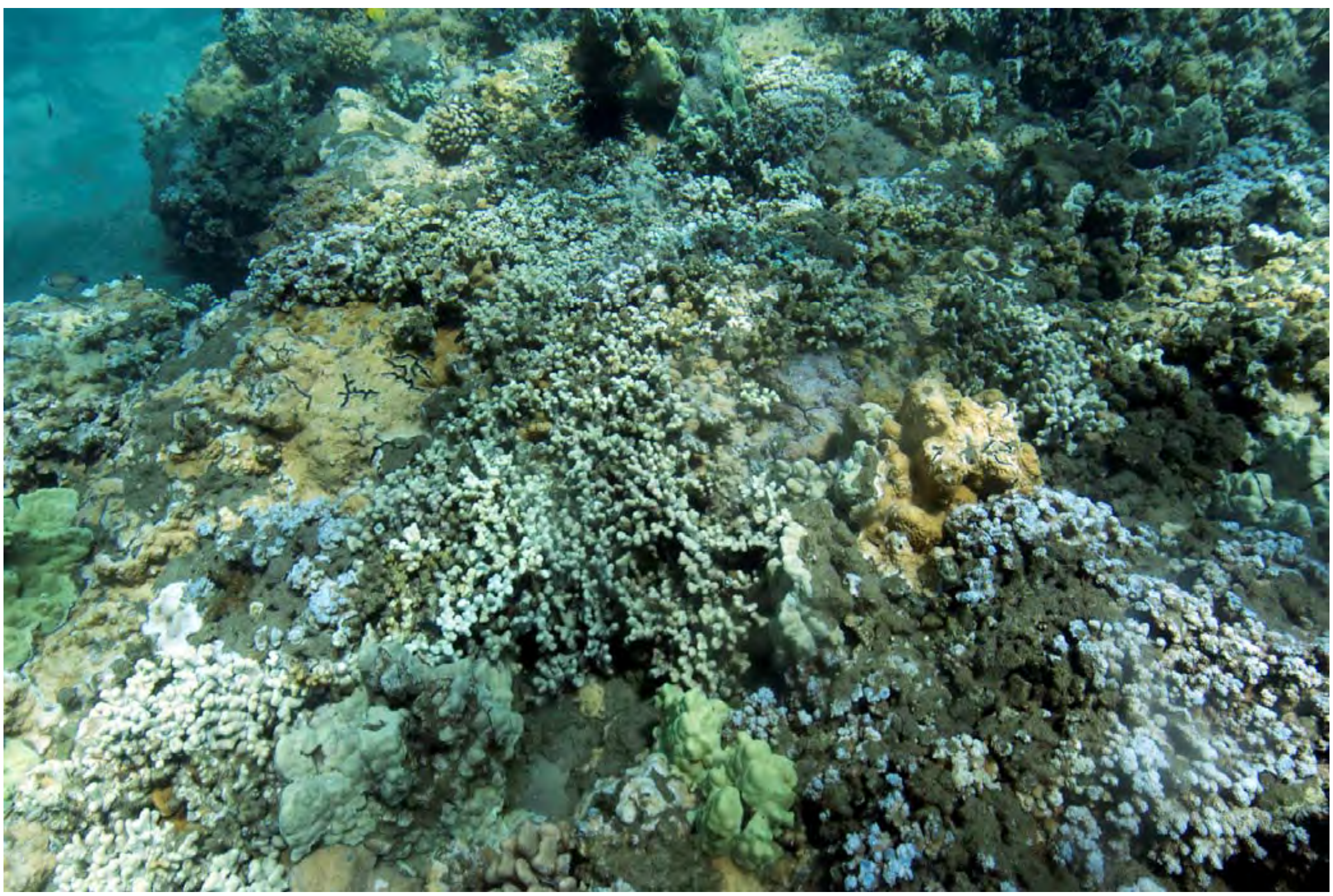


FIGURE 12. Two views of outer reef zone on Transect 2 off of Honokaoo Point at the juncture of the Kaanapali Sand Berm Enhancement area and the Beach Nourishment area (See Figure 1). Both photos show typical coral assemblages the consist primarily of large dome-shaped colonies of *Porites lobata* and interconnected mats of finger coral (*Porites compressa*). Live coral covers most of the hard substratum on the outer reef zone. Water depth in both photos is approximately 8 meters. See Figure 2 for location of Transect 2.

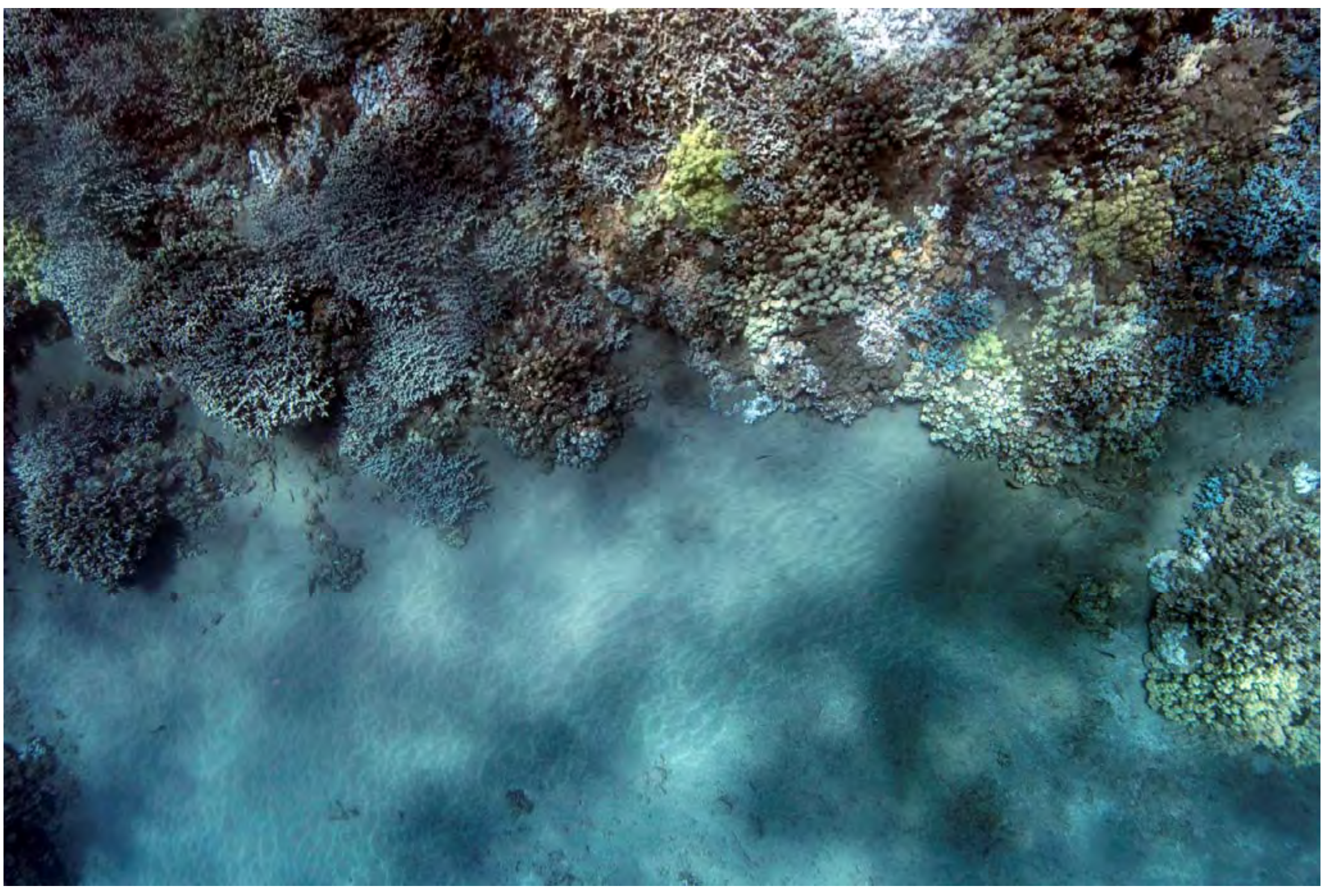


FIGURE 13. Two views of juncture of outer reef zone and sand plains at the outer terminus of Transect 2 off of Honokaoo Point at the juncture of the Kaanapali Sand Berm Enhancement area and the Beach Nourishment area (See Figure 1). Both photos show abrupt raised edge of solid limestone reef platform with sand flat. Water depth in both photos is approximately 10 meters. See Figure 2 for location of Transect 2.

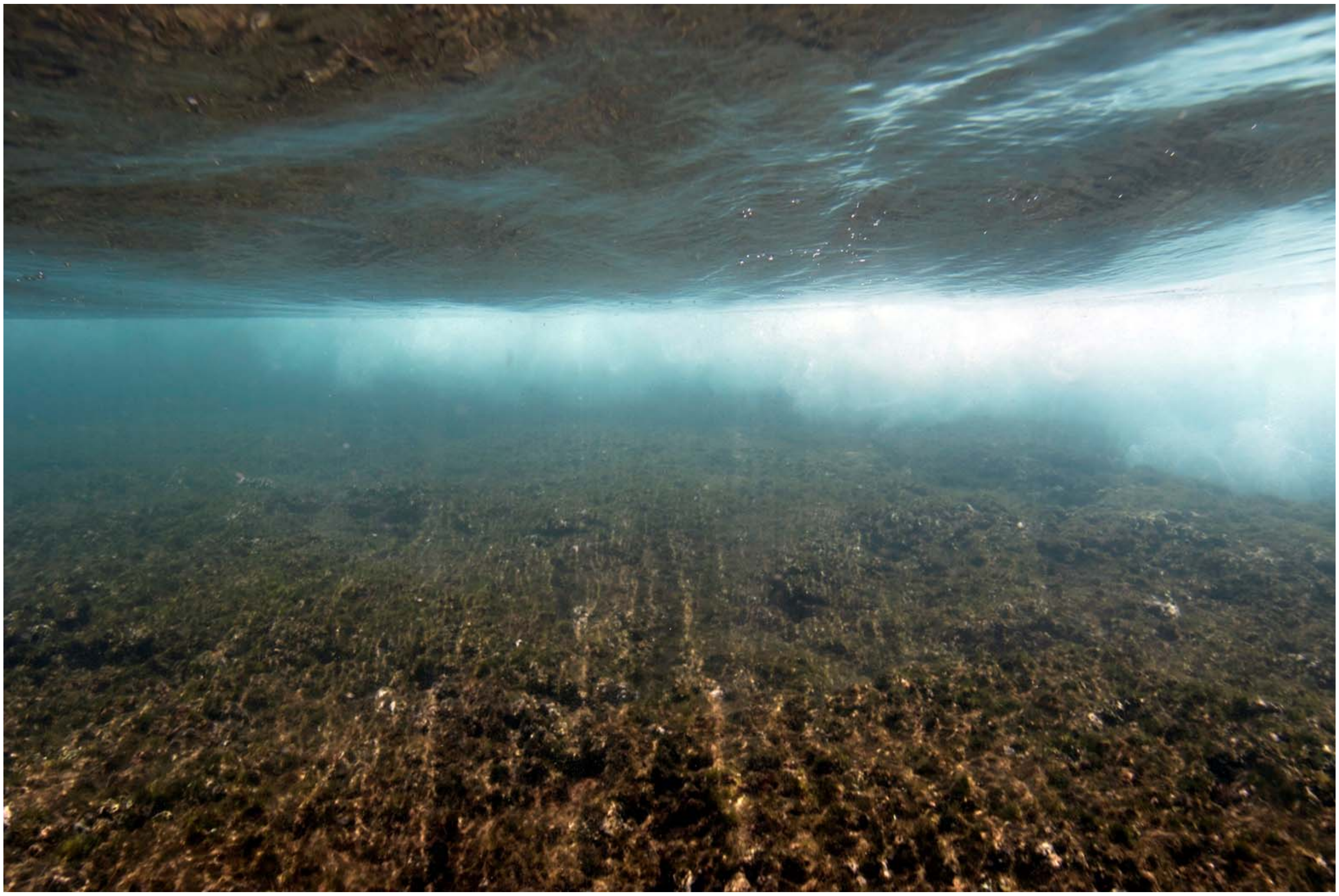
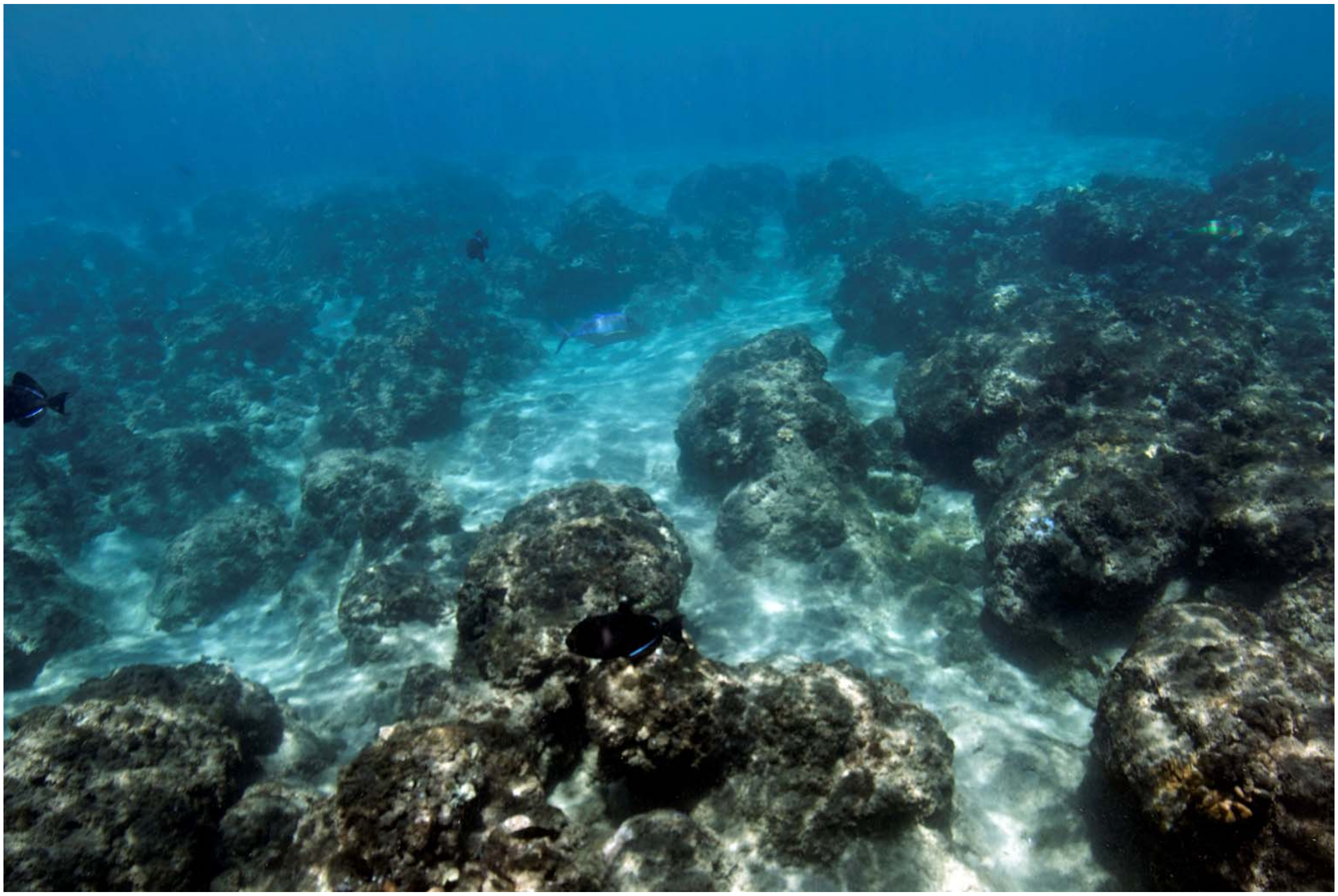


FIGURE 14. Two views of nearshore reef surface on Transect 3 within the Kaanapali Beach Nourishment area (See Figure 1). Upper photo shows wave breaking on shallow flat pitted limestone platform that merges with the shoreline sand. Bottom photo shows limestone platform offshore of upper photo. Water depth in both photos is approximately 1 meter. See Figure 2 for location of Transect 3.



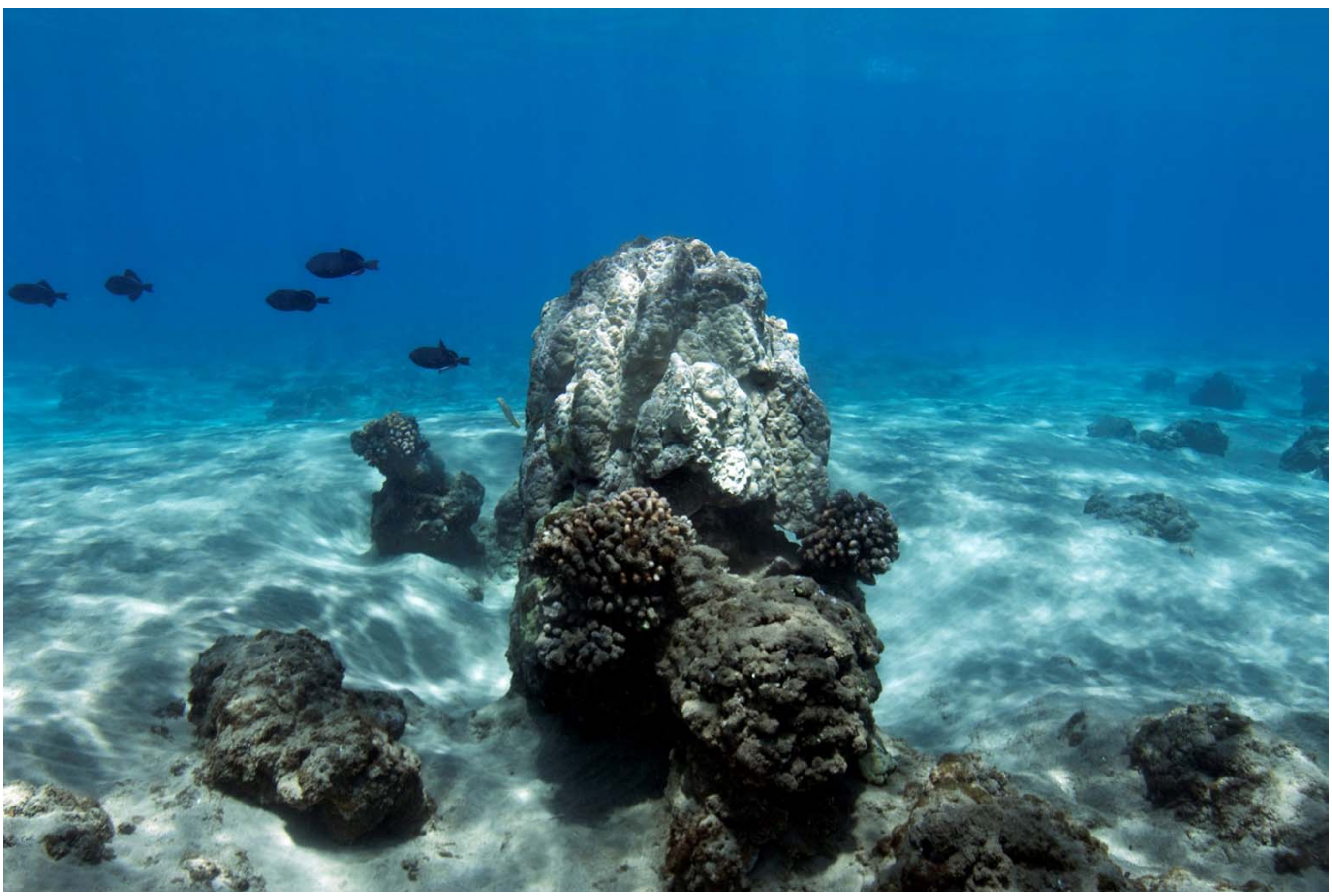


FIGURE 15. Two views of mid-reef zone on Transect 3 within the Kaanapali Beach Nourishment area (See Figure 1). Bottom structure consists of raised sections of fossil limestone reef rock protruding through sand plains. Water depth in both photos is approximately 3 meter. See Figure 2 for location of Transect 3.

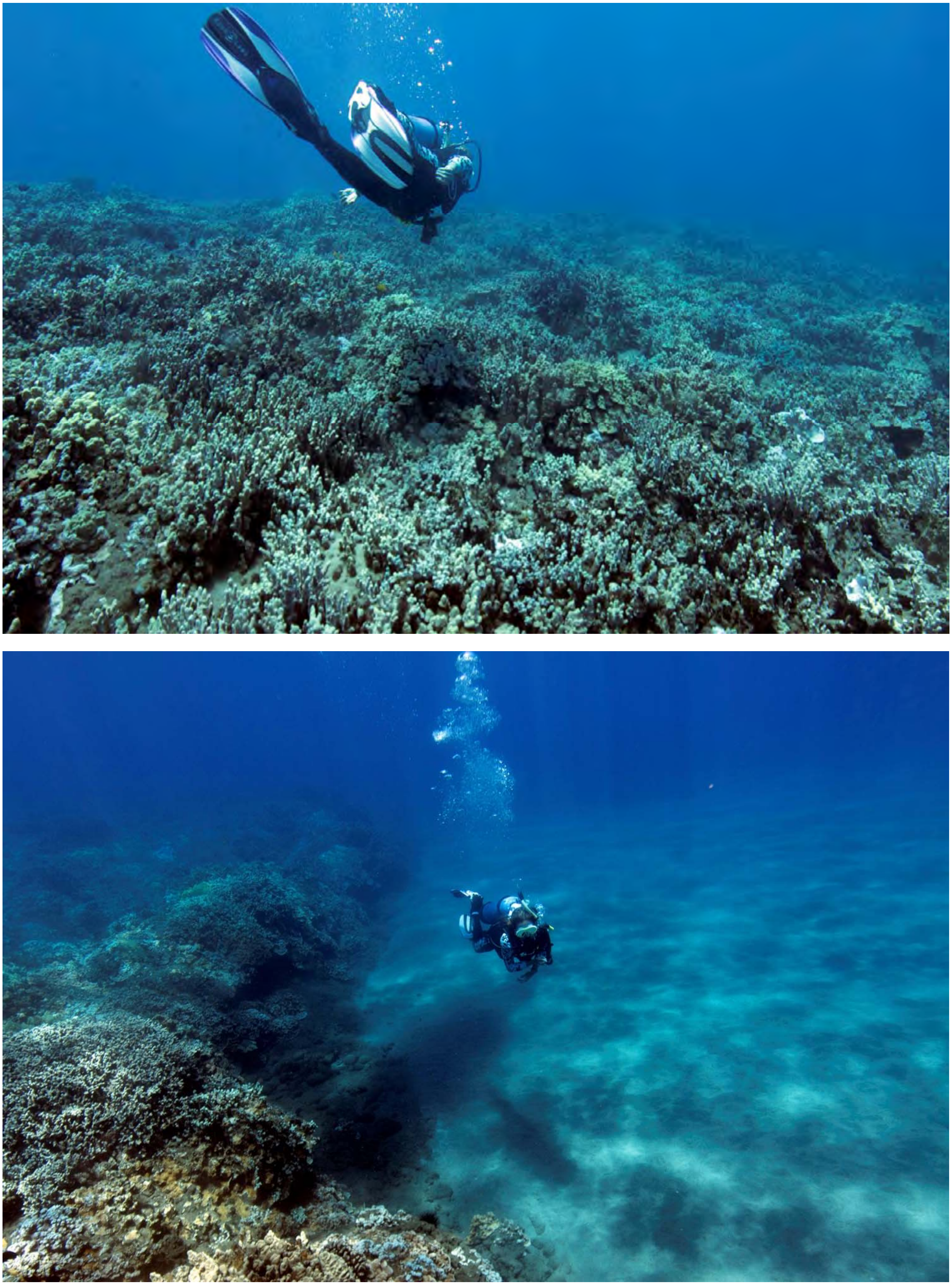


FIGURE 16. Two views of outer reef zone on Transect 3 within the Kaanapali Beach Nourishment area (See Figure 1). Bottom structure consists primarily of interconnected mats of finger coral (*Porites compressa*) (upper photo) that extend to the abrupt edge of the reef platform. Seaward of the reef platform bottom structure consists of sand plains (bottom). Water depth in both photos is approximately 10-12 meters. See Figure 2 for location of Transect 3.

APPENDIX C – MARINE BIOLOGY AND WATER QUALITY (MARINE RESEARCH CONSULTANTS, LLC)

MARINE BIOTIC COMMUNITIES
KĀʻAANAPALI SAND RESTORATION PROJECT
WEST MAUI, HAWAII
ADDENDUM 1

Prepared for:

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By:

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December 2020

I. INTRODUCTION AND PURPOSE

Kāʻanapali Beach extends from Hanakaʻōʻō Beach Park at the southeast end of the beach to Pu'u Keka'a at the north end of the beach (Figure 1). This sandy coastline includes two beach sections, or littoral cells. The southern section, called Hanakaʻōʻō Littoral Cell, extends from Hanakaʻōʻō Beach Park to Hanakaʻōʻō Point, faces southwest, and sits inside a narrow, shallow fringing reef. The northern section, called the Kāʻanapali Littoral Cell, extends from Hanakaʻōʻō Point to Pu'u Keka'a, faces west, and is situated landward of a sloping reef and sand field (Figure 1).

Both of these beaches have been exposed to erosion pressure. The Hanakaʻōʻō Littoral Cell has undergone long-term chronic erosion for approximately 30 years, and currently rests well landward of its location in the 1980's. The Kāʻanapali Littoral Cell has a slower chronic erosion rate; however, it is routinely exposed to dynamic seasonal shifts in sand volume that present severe, even if temporary, erosion impacts on the shoreline.

The State of Hawaii and the local Kāʻanapali landowners have partnered to investigate and pursue a beach restoration project for Kāʻanapali Beach. This project will restore the Hanakaʻōʻō Littoral Cell beach to its approximate 1980's condition. The project will also place additional dry beach sand on the Kāʻanapali Littoral Cell beach to help mitigate the dynamic seasonal variations. This entire project will require approximately 75,000 cubic yards of sand to be recovered from marine sources offshore of Pu'u Keka'a and be delivered to the shoreline for placement on the beach. Recovery of the sand will be conducted from a barge anchored offshore, and delivery of the sand will be at two locations on the shoreline. Roughly 50,000 cubic yards and 25,000 cubic yards will be placed at the Hanakaʻōʻō and Kāʻanapali Littoral Cells, respectively.

A previous document prepared by Marine Research Consultants, Inc., (MRCI) provided the results of a rapid ecological assessment (REA) of two aspects of the marine ecosystem fronting the Kāʻanapali Sand Restoration Project area (MRCI 2017). Water chemistry was assessed by collecting a set of samples extending from the shoreline to the open coastal ocean directly fronting the project area. Marine community structure, primarily in terms of coral reef assemblages, was also described based on in situ surveys. The purpose of the REA was to provide a general description of the existing condition of the marine environment. Evaluation of the existing condition of the water chemistry and marine communities provides insight into the physical and chemical factors that influence the marine setting. Such baseline information is important for evaluating potential impacts that may be associated with the proposed project.

Comments on the MRCI report recommended the inclusion of existing map products produced by various agencies that provide depictions of the overall composition of the nearshore marine environments fronting the project site. Examination of these maps indicates that they provide only a very coarse representation of coral community structure and contain a degree of inconsistency. To provide an accurate response to comments, follow-up field action was conducted by MRCI personnel in October 2020. One purpose of the field investigations was to acquire ground-truth data to verify existing habitat maps to ensure that they provide a valid representation of the area offshore of the proposed sand replenishment actions.

A second objective of the fieldwork was to initiate a monitoring program to evaluate change to the coral community over time. As coral communities are both long-lived and attached to the bottom, they serve as the best indicators of the time-integrated forces that affect offshore reef areas from both natural and anthropogenic stresses. Thus, time-course monitoring of coral community structure before, during, and after the Kāʻanapali sand restoration project will provide an important insight into the effects of the project to offshore communities. The second objective of the present study was to establish permanent monitoring stations that can be used as a baseline reference to quantitatively evaluate changes that may occur during the time period when beach restoration occurs.

II. METHODS

Biotic composition of the survey area was assessed by divers using SCUBA working from a small boat. All fieldwork was conducted by Dr. Steven Dollar and Ms. Andrea Millan on October 28, 2020.

Two types of benthic reef evaluations were conducted during the field surveys. Seven "verification" sites were surveyed to provide a set of quantitative ground-truth data to compare to existing mapping products. In addition, three "monitoring" sites were established and surveyed in order to establish baseline conditions for time-course monitoring designed to quantify impacts to coral community from sand restoration activities (Figure 1).

Both types of sites were evaluated with a photographic "orthomosaic" technique that uses several software programs to merge multiple digital photographs into a single undistorted image. These images provide a permanent record of the reef habitat at a point in time and can be analyzed to provide quantification of various components of benthic community structure.

Prior to fieldwork, the locations of each monitoring and verification site were chosen based on a composite benthic habitat map prepared by Sea Engineering, Inc. These maps overlaid data from four mapping sources (PIFSC [2017], NOAA [2016], USGS [2014] and NCCOS [2007]). In the field, each site was identified from the surface using a handheld GPS. The exact survey locations were refined by divers to ensure representative bottom cover in each area. For the three monitoring sites, divers marked square areas 5 x 5 meters (m) (25 m^2) using measuring tapes. Cable ties 24-inches long were affixed to the reef at the corners of the square areas in order to relocate the exact sites in future monitoring surveys.

For the seven verification sites, survey areas were approximately 3 m x 3 m (9 m^2). Prior to data acquisition 30-centimeter (cm) long metal pipes were placed at the four corners of the survey square, while a fifth pipe was placed at the center. The pipes were marked at 10 cm intervals to serve as scale indicators. Following completion of dive operations at the survey site, the coordinates of the center pipe were recorded by GPS on the boat to ensure exact positioning.

The reef surface within the boundaries of each of the sites was photographed by divers using cameras fitted with 24-millimeter lenses in underwater housings. Photographs were acquired by divers swimming horizontal overlapping “lawnmower” lines at a constant depth of approximately 2 m above the reef surface while continually taking overlapping photographs. Approximately 400 individual images were collected for the three monitoring orthomosaics, and a range of 200-300 individual images were collected for the seven verification orthomosaics.

To build orthomosaic images, individual photographs were initially processed using Adobe® Bridge® and Adobe® Photoshop® software. Agisoft® Metashape® software was then used to produce a seamless high-resolution orthomosaic scaled image of each site. The orthomosaics were then color-corrected and adjusted in Adobe® Photoshop®. All orthomosaics are included in Appendix A.

A MatLab® program developed for large images (up to 400 megabytes) was used to grid 200 points on each of the monitoring orthomosaics, and 100 points on each of the verification orthomosaics. Corals underlying the gridded points were identified to the species level while other benthic cover types were identified to a more general level (e.g., crustose coralline algae, turf algae, dead coral, limestone fossil reef, and sand). Data from MatLab® was exported to Microsoft® Excel® where the resulting data set provides percent cover of all bottom types.

III. RESULTS

A. Verification of Map Products

Several entities have produced benthic habitat maps of the west Maui area from Pu’u Keka’a to Hanakaʻōʻō Beach. These include PIFSC (2017), NOAA (2016), USGS (2014) and NCCOS (2007). The various methodologies for development of each of these map products can be found in the original documents. However, all provide a spatial estimate of the percentage of bottom covered by coral in varying increments. Figure 2 provides a composite overlay of the four mapping products (constructed by Sea Engineering, Inc.). By overlaying the map products, it is possible to evaluate the consistency of the estimates of coral cover. Three of the four maps classify coral cover in one of two classes (10% $\leq$ 50% and 50% $\leq$ 90%), while the fourth (PIFSC) classifies coral in 20% increments. For consistency the PIFSC mapping divisions are collapsed into the same two categories as the other three maps.

Examination of the composite map indicates a general consistency in terms of overall reef occurrence, with coral cover essentially absent from just north of Hanakaʻōʻō Point to Pu’u Keka’a. A narrow fringing reef extends from near the shoreline out to a depth of approximately 7-8 m and extends from Hanakaʻōʻō Point to Hanakaʻōʻō Beach (Figure 2).

Comparison of the four map products shows a general consistency of high coral occurrence (~50-90%) from north of Hanakaʻōʻō Point to Hanakaʻōʻō Beach. As the area coverage and cover symbols are not consistent for the various methods, it is difficult to draw conclusions on the detailed consistency between the maps. However, it does appear that the NOAA and NCCOS maps show the greatest area coverage of high coral class, while the PIFSC map shows the lowest (Figure 2).

As the resolution of all the maps is very coarse, it was deemed important to provide a more quantitative and comprehensive data set that describes the coral community of the area. Data was acquired by analysis of verification orthomosaic images from seven locations across the reef tract. Orthomosaic images are labeled as V1-V7 on Figures 1 and 2, and are shown in Appendix A.

Results of point count analyses of these images are shown in Table 1. In total seven species of reef building corals were identified in point counts of the seven verification sites. Total coral cover ranged from 38% to 82%, with an average of 68%. In terms of the mapping classification only one site (V6) had coral cover less than 50%. This site occurred in the shallow boulder zone adjacent to the proposed sand offloading location (Figure 2). It is of interest to note that this site with 38% coral cover occurs in the area showing 50-90% coral in the NOAA and NCCOS maps.

Three coral species occurred on all seven orthomosaics (*Montipora capitata, M. patula,* and *Porites lobata). Porites compressa occurred at six of the seven sites.* These four species accounted for 98.3% of coral cover. The remaining three species (*Montipora flabellata, Pavona varians, and Porites evermanni*), were encountered in point counts on only one or two orthomosaics (Table 1). While the coral community is dominated by four species, the distribution among these species is relatively equitable, with average bottom cover ranging from 13.4% to 20.6%. Thus, the community can be considered in somewhat of an intermediate stage of succession. At late stages of succession, coral communities in Hawaii are generally dominated by a single species, which is typically *P. lobata*.

To show the variability in reef structure, two sets of orthomosaics were situated within 10 m of each other (V1-V3 and V4-V5). For both pairs, total coral cover differs by about 5% (V1=82%-V3=77.0% and V4=69-V5=74%). The similarity within and between pairs suggests that the composition of the reef is relatively similar throughout the region, and that the analytical method captures a good representation of reef structure.

B. Time-Course Monitoring

It is evident that while the existing habitat maps provide a broad overview of coral community structure, they are not of sufficient resolution to serve as effective tools for monitoring changes to reef composition resulting from the proposed sand restoration project. Such monitoring has been successfully carried out at other locations using orthomosaics. These locations include the Hulopoe Marine Life Conservation District on Lanai and Kaupulehu on the West Coast of the Island of Hawaii. A major advantage of the method is that it provides a permanent photographic representation that can be replicated exactly over repeated monitoring events. The high resolution of the images is sufficient to be able to assess the condition of individual corals over time.

To initiate a monitoring program for the Kāʻanapali Sand Restoration Project, three monitoring sites were established and investigated. Two of the sites (M1 and M2) were positioned at the same locations as monitoring sites Maui Ridge to Reef monitoring sites (Figure 3). One of these sites was identified by the presence of a sediment trap fixed to the reef, which was positioned at the center of the orthomosaic. The third monitoring site (M3) was located in the approximate center of the reef tract between Hanaka'ō'ō Point and Hanaka'ō'ō Beach (Figure 2). This monitoring site was located in the area closest to the shoreline where coral community structure was deemed to be fully developed. The selection of a site close to the shoreline was intended to provide a measure of maximum effect from sand movement off the beach.

When another increment of monitoring is conducted prior to the initiation of the sand restoration project at least one more monitoring location will be chosen to serve as a control site(s). Control sites will be located in another littoral cell removed from the Kāʻanapali area such that they will not be affected by the sand restoration activities. By definition the control site will be subjected to the same natural stresses as the Kāʻanapali monitoring sites and will contain similar coral community structure. It is projected that control sites will be located off the Kahekili area located to the north of Pu'u Keka'a. Results of previous surveys of this area by the investigators have revealed similar physical structure and coral community structure as the sand restoration area. As such, the Kahekili control site will serve to indicate whether any documented changes to coral communities at Kaanapali can be attributed to the sand restoration activities.

Table 1 shows the results of point count analyses of the three monitoring orthomosaics. Total coral cover ranged from 45.5% to 69.5%. The lowest cover occurred at M1, which is the site of the Ridge to Reef Monitoring station. The highest coral cover occurred at M3, located in the approximate center of reef of the Hanaka'ō'ō littoral cell where sand restoration will occur. Seven coral species were encountered in the monitoring orthomosaics. M1 and M2 included four species, the most abundant of which was *Porites lobata* (29% and 30.5% of bottom cover, respectively). M3 included seven species of coral, the most abundant of which was *Montipora patula* (33.5% of bottom cover). As the number of coral species and the dominant coral differs between orthomosaic M1-M2 and M3, it is evident that these two locations represent somewhat different coral assemblages. These subtle differences will provide an important component during time-course monitoring in evaluating the difference in effect to different species.

C. Non-coral Bottom Composition

In addition to living corals, several other categories are classified in the point count analyses. These categories include crustose coralline algae and turf algae. Had any macroalgae been encountered, these species would be included at the lowest recognizable taxonomic level. Abiotic bottom composition is classed as sand, limestone fossil reef, and dead coral. Dead coral is differentiated from limestone fossil reef by the presence of distinct skeletal colony morphology. Conversely, limestone fossil reef is bare substrate that clearly consists of limestone deposition without any identifiable colonial structure.

III. SUMMARY

A follow-up survey of the reef off the proposed site of the Kāʻanapali Sand Restoration Project site was conducted for two purposes: ground-truthing existing coral reef habitat maps, and establishing a baseline protocol for quantitative time-course monitoring to evaluate the magnitude of impacts associated with the project.
Four maps of the Kāʻanapali reef created by four federal agencies divide bottom cover of living corals into two classifications (10≤50% and 50≤90%). An overlay of the four map products indicates that overall, the maps created by NOAA, USGS, and NCOOS provide a consistent representation of the reef structure. The PIFSC map provides somewhat lower values than the other three.

Seven locations on the reef were selected as ground-truth sites to provide verification of the mapping products. Orthomosaic images of 9 m^2 areas of the reef surface were constructed using a series of computer products that assemble a multitude of overlapping photographs into a single seamless undistorted orthomosaic image. Orthomosaic images were analyzed using point count methods to generate quantitative representations of reef community structure. While the resolution of the existing maps is very coarse, they are generally consistent with quantitative ground-truth data. One region where the ground-truth diverges from the maps is the area adjacent to the sand channel that is proposed as the site of the sand offloading platform. In this area ground-truth data indicates lower coral cover than occurs in several of the maps.

A requisite of the proposed sand restoration will be the inclusion of a monitoring program that can effectively detect any impacts to the reef communities that may result from the project. The resolution of the existing maps is too coarse to serve as effective tools for such monitoring. To initiate such a monitoring program, three sites were selected that can be re-visited over time to determine quantifiable changes to reef composition. Two of the monitoring sites were at the same locations as existing Ridge to Reef Monitoring stations. The third was located in the approximate center of the reef tract off the area where sand will be relocated. The sites consist of 25 m^2 areas that were marked on the reef in a manner that they can be precisely relocated during future increments of monitoring. During the next increment of monitoring, additional monitoring sites can be added. In particular, additional sites will be established to serve controls. The control sites, likely located off of Kahekili Beach, will consist of a similar biotic assemblages as the Kāʻanapali sites and will be subjected to similar environmental conditions, but will not be influenced by the sand restoration activities.

IV. REFERENCES CITED

PIFSC. 2017. Baseline assessments for coral reef community structure and demographics on west Maui. Data Report. NOAA Fisheries Pacific Science Center, PIFSC Special Publication, SP-17-001, 44p.https://doi.org/10.7289/V5/SP-PIFSC-17-001.

NOAA. 2016. Institutional Repository. 2016. West Maui Wahikuli & Honokōwai priority watershed area : reef condition report.

USGS. 2014. Benthic Habitat Map of the U.S. Coral Reef Task Force Watershed Partnership Initiative Kāʻanapali Priority Study Area and the State of Hawaiʻi Kahekili Herbivore Fisheries Management Area, West-Central Maui, Hawaiʻi. Open-file Report 2014-1129.

NCCOS 2007.Mapping of Benthic Habitats for The Main Eight Hawaiian Islands Task Order I Project Completion Report. Prepared by BAE Systems Sensor Solutions Identification & Surveillance (S2 IS). Prepared for: U.S. Department of Commerce National Oceanic & Atmospheric Administration National Ocean Service National Centers for Coastal Ocean Science Center for Coastal Monitoring and Assessment NOAA Contract No.: DG133C-02CN-007

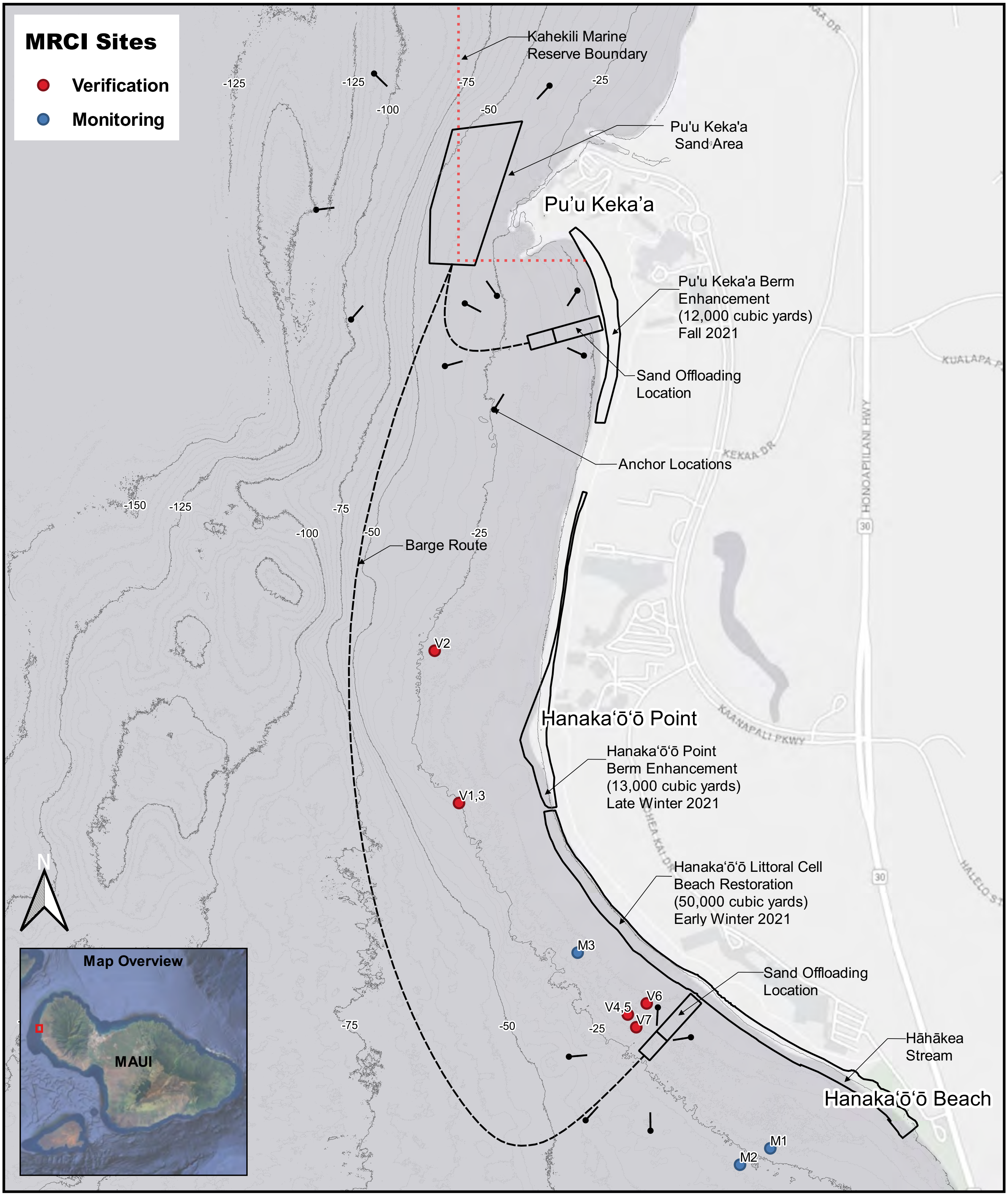

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FIGURE 1.

Kaanapali Beach
MRCI Monitoring Locations

Projection:
SPCS HI-2, NAD83, Feet

0 500 1,000 ft

Graphical Scale

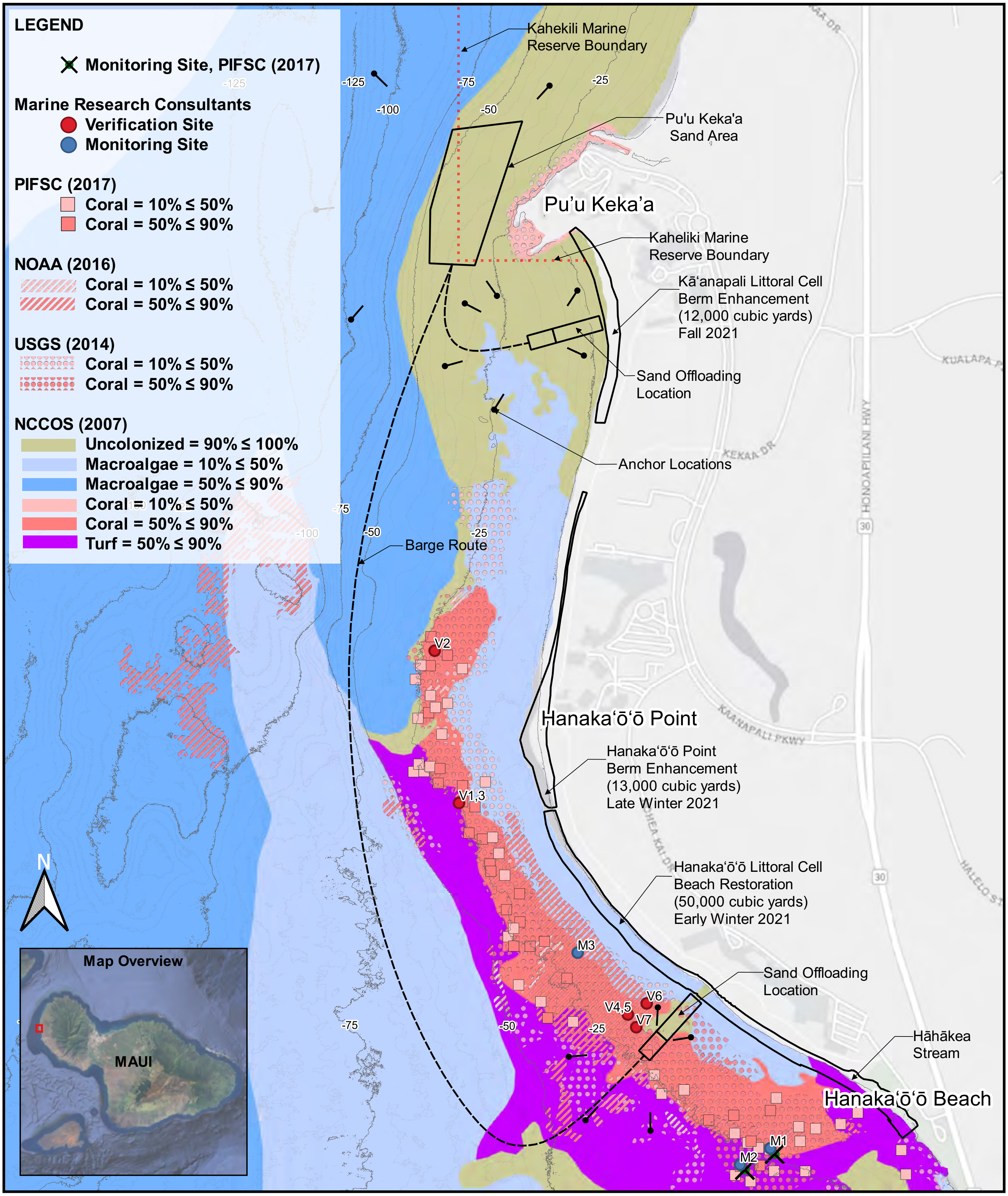

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FIGURE 2.
Kāʻanapali Beach Benthic Habitat Composite Mapping Product

Projection:
SPCS HI-2, NAD83, Feet

0 500 1,000 ft
Graphical Scale

TABLE 1. Percent bottom cover of corals and other non-coral substratum from orthomosaics at reef locations offshore of the Kaanapali Beach Nourishment and Berm Restoration project area. Orthomosaics labeled "Mx" are prospective monitoring sites; orthomosaics labeled "Vx" are veirification sites. Also shown are water depths for each orthomoraic. See Figure 1 for locations of orthomosaics.

	ORTHOMOSAIC									
CORAL SPECIES	**M1**	**M2**	**M3**	**V1**	**V2**	**V3**	**V4**	**V5**	**V6**	**V7**
Depth	**22'**	**24'**	**12'**	**17'**	**12'**	**19'**	**12'**	**13'**	**12'**	**14'**
Montipora capitata	8.5	10.0	8.0	6.0	2.0	43.0	12.0	12.0	2.0	25.0
Montipora flabellata	-	-	2.0	-	-	4.0	-	-	2.0	-
Montipora patula	-	-	33.5	18.0	2.0	15.0	11.0	19.0	9.0	20.0
Pavona duerdeni	-	-	2.0	-	-	-	-	-	-	-
Pavona varians	-	-	-	0.5	-	-	-	-	-	-
Pocillopora meandrina	-	0.5	2.0	-	-	-	-	-	-	-
Porites compressa	7.5	21.5	7.5	42.0	44.0	10.0	12.0	9.0	-	12.0
Porites evermanni	-	-	-	-	1.0	-	-	-	-	0.5
Porites lobata	29.0	30.5	14.5	16.0	19.0	5.0	34.0	34.0	25.0	11.0
Palythoa tuberculosa	0.5	-	-	-	-	-	-	-	-	-
TOTAL CORAL	**45.5**	**62.5**	**69.5**	**82.5**	**68.0**	**77.0**	**69.0**	**74.0**	**38.0**	**68.5**
Crustose Coralline Algae	2.5	11.0	0.5	2.0	4.0	1.0	-	2.0	2.0	-
Turf Algae	0.5	0.5	0.5	1.0	-	-	-	-	-	-
Dead Coral	0.5	-	0.5	-	-	-	-	1.0	4.0	1.0
Limestone Fossil Reef	30.5	25.5	29.0	14.5	27.0	22.0	31.0	17.0	55.0	30.5
Sand	20.5	0.5	-	-	1.0	-	-	6.0	1.0	-
TOTAL NON CORAL	54.5	37.5	30.5	17.5	32.0	23.0	31.0	26.0	62.0	31.5

APPENDIX A

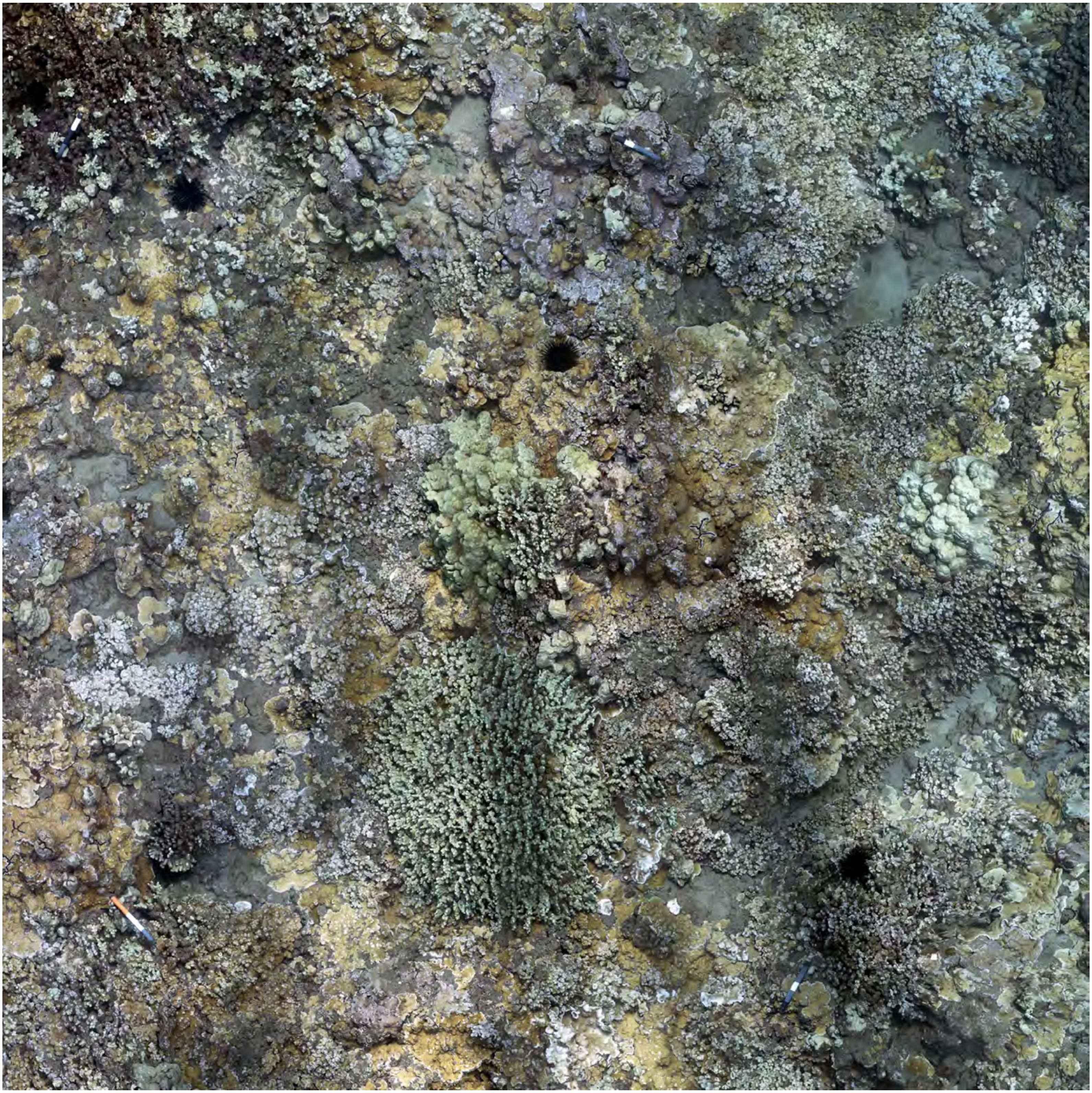
KĀ‘ANAPALI SAND RESTORATION PROJECT

VERIFICATION AND MONITORING ORTHOMOSAICS

NOVEMBER 2020

KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **V-1**

KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **V-2**



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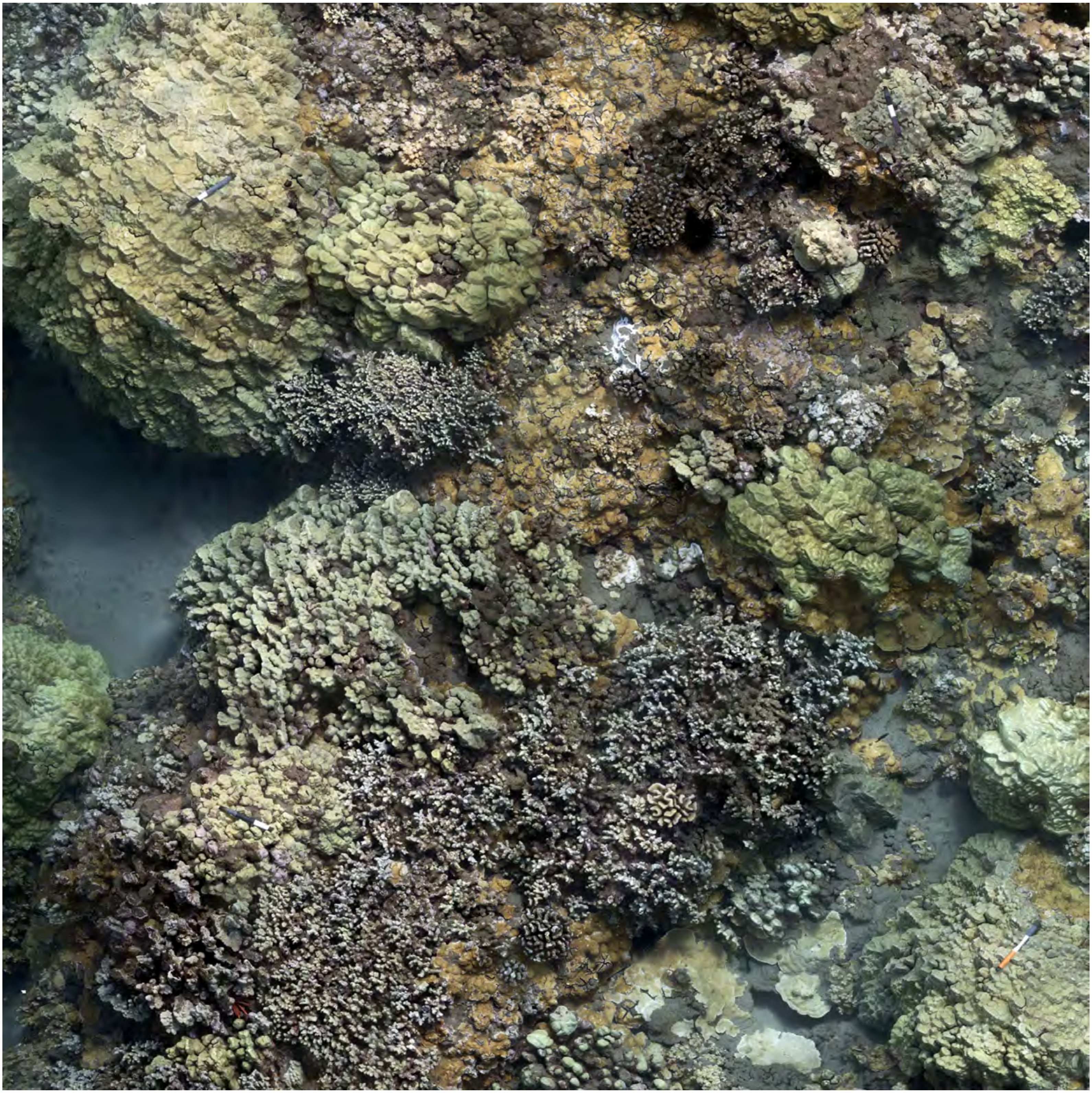
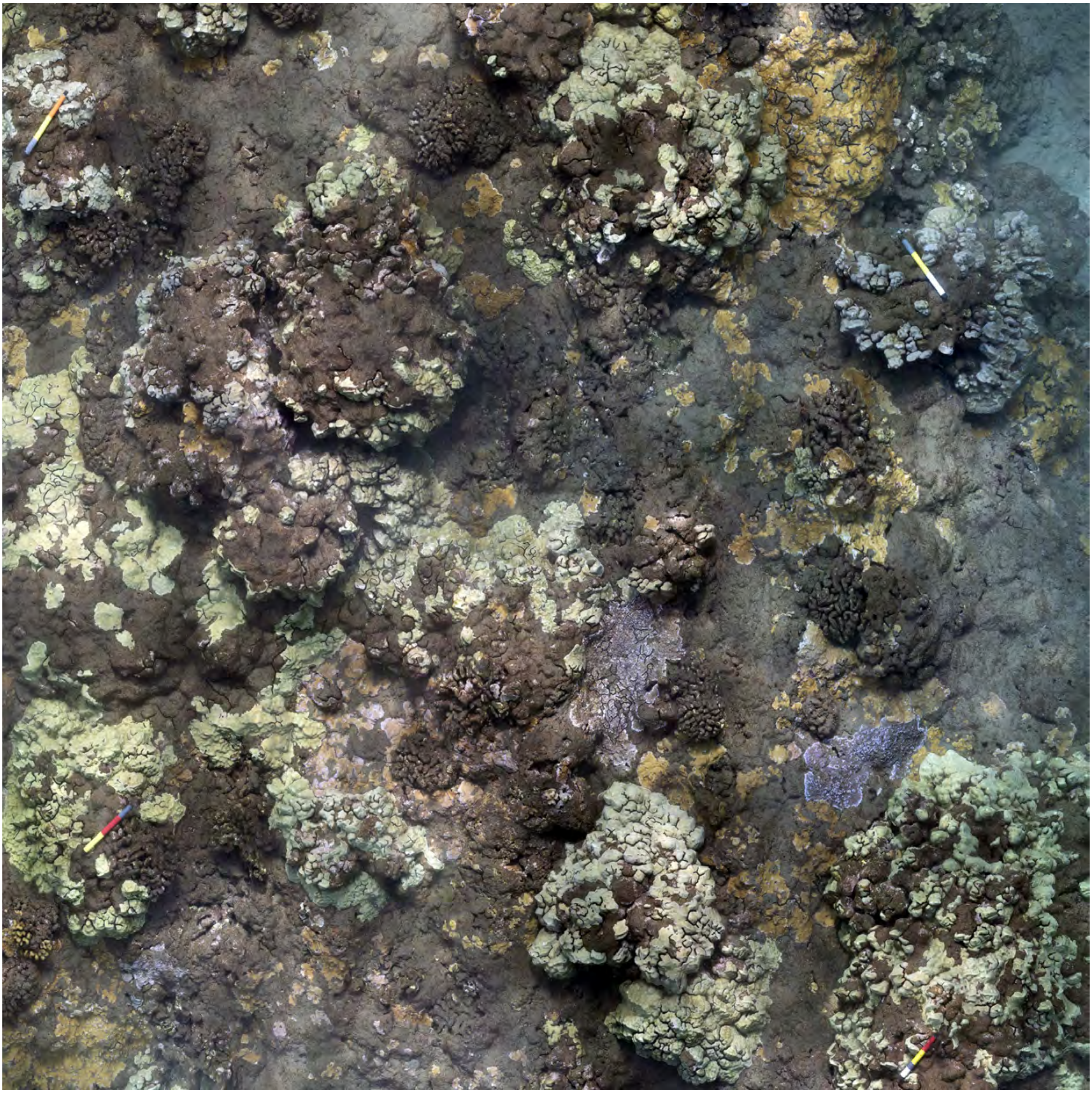


KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **V-5**



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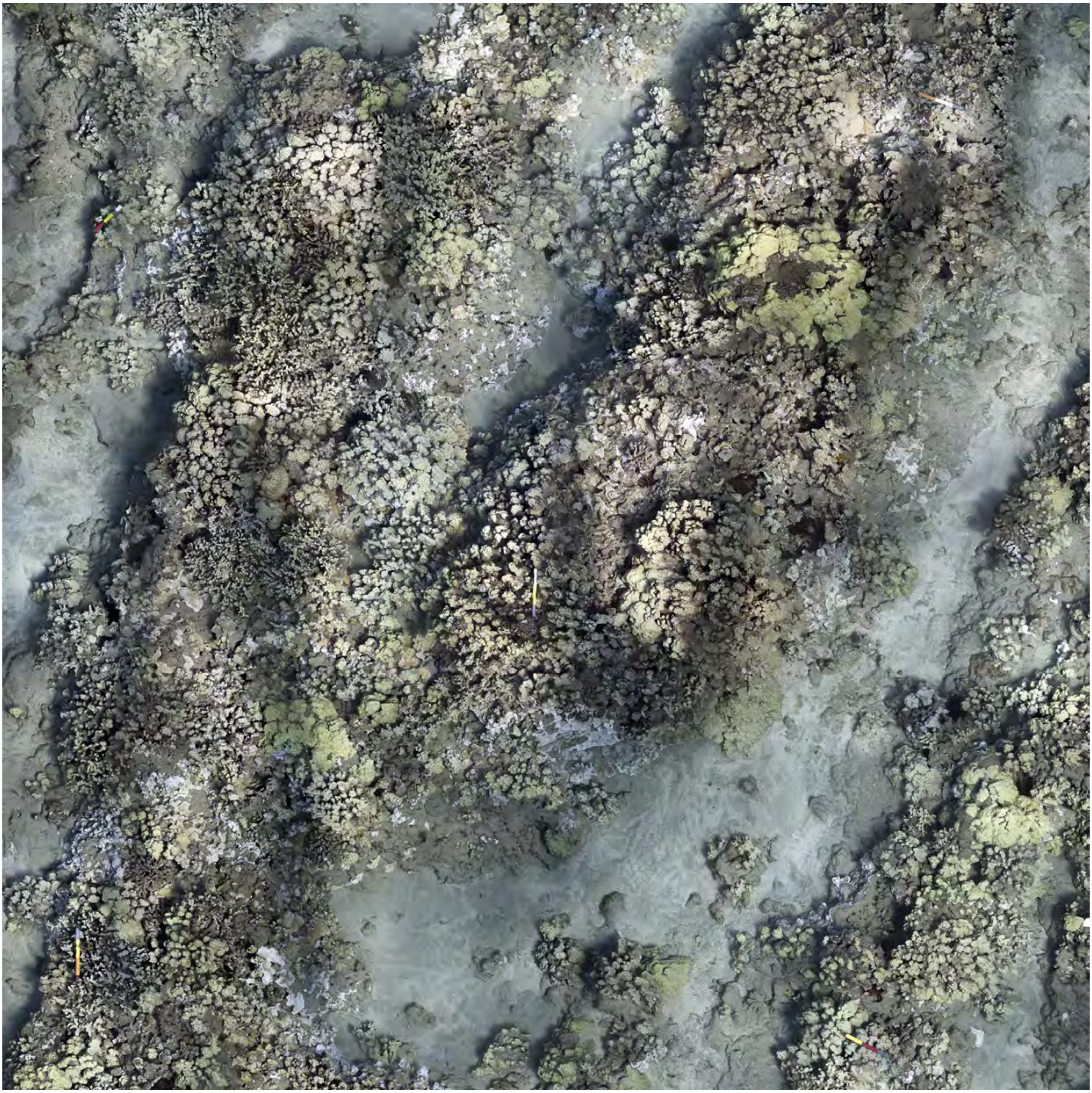
KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **V-7**



KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **M-1**

KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **M-2**

KAANAPALI SAND RESTORATION PROJECT – ORTHOMOSAIC **M-3**

APPENDIX D – COASTAL AND MARINE USES REPORT (JOHN CLARK)

Coastal and Marine Uses Report

for the

Kaanapali Beach Restoration and Berm Enhancement Project

at

Kaanapali, Maui, Hawaii

Prepared for:

Sea Engineering, Inc.
Makai Research Pier
Waimanalo, Hawaii 96795
[Job No. 25457]

Prepared by:
John Clark
Planning Consultant
P. O. Box 25277
Honolulu, Hawaii 96825

June 1, 2018

1.0 COASTAL AND MARINE USES REPORT

1.1 Purpose

This coastal and marine uses report is intended to provide information to Sea Engineering, Inc. [SEI], in regard to the Kaanapali Beach Restoration and Berm Enhancement Project. SEI completed a concept design report in July 2017 and submitted it to the Department of Land and Natural Resources, Office of Conservation and Coastal Lands. This report is part of the permit process for the project.

1.2 Project Location

Kaanapali Beach is located on the west shore of the island of Maui. It extends south from Puu Kekaa, or Black Rock, to Hanakaoo Beach Park, or Canoe Beach. The project includes this beach.

North Kaanapali Beach extends north from Puu Kekaa to Kahekili Beach Park. The project does not include this beach.

Puu Kekaa, a cinder-and-spatter cone of the Lahaina Volcanic Series, is located on the Kaanapali shore, where it divides Kaanapali Beach and North Kaanapali Beach. In Hawaiian lore it is known as a leina ka'uhane, a "leaping place of the spirits." A historic marker on the Kaanapali Boardwalk includes the following information, "To this day, it [Puu Kekaa] is revered as a sacred spot known as "ka leina a ka 'uhane"- the place where a soul leaps into eternity."

1.3 Project Description

The purpose of the project is to initiate beach restoration and berm enhancement to mitigate the shoreline erosion and beach narrowing problem on Kaanapali Beach between Puu Kekaa and Hanakaoo Beach Park. This problem has threatened nearshore infrastructure and has undermined the Kaanapali Beachwalk, a concrete walkway that runs the length of the backshore of Kaanapali Beach.

The beach restoration and berm enhancement project will include removing sand from a sand deposit designated as the Puu Kekaa Sand Area, which contains an estimated 358, 000 cubic yards of beach quality sand and is part of the region's larger sand system. The sand will then be transported and delivered to the beach, where it will be placed in the backshore and graded.

One of the specific goals of the project is to restore the 1988 shoreline of the beach from Hanakaoo Point, which is in the middle of the beach, to Hanakaoo Beach Park at the southern end of the beach.

1.4 Construction Methodology.

Sand will be recovered from a 9.2-acre sand deposit located approximately 140 feet offshore Puu Kekaa in 28 to 56 feet water depth. The proposed sand recovery plan limits dredging depths to about six feet below the existing sand surface. This upper section of the sand deposit is the portion that was tested for sand quality, including grain size, distribution, sediment character, and color.

The dredging equipment will consist of a crane barge and several 1,500 cubic yard deck barges. The crane barge will be anchored at the offshore sand deposit site. Dredging and offloading operations will be performed simultaneously, using two deck barges to transport the sand. The deck barges will be equipped with concrete wear decks and containment fences. An environmental clamshell bucket will be used to dredge the sand and place it on the deck barges.

Once a deck barge is filled, it will be towed by a tugboat to the offloading location, where it will be docked to an elevated floating bridge in approximately 15 feet of water. The sand will be transported to shore along the bridge system. Trucks and other equipment onshore will transfer the sand along the shoreline to the placement area, where bulldozers and crews will spread it according to the concept design plan.

Construction is expected to take place during the fall and winter months. Work is expected to proceed seven days per week and 12 hours per day. The estimated time to complete the project is approximately two months.

1.5 Scope

The scope of work for this report included:

a. Identifying coastal and marine uses in the project area, including traditional fishing and gathering activities.
b. Identifying beach and ocean conditions in the project area.
c. Interviewing shoreline users.
d. Identifying possible short term and long-term impacts of the project.
e. Identifying possible beach and ocean hazards at the project site.

1.6 Survey Methodology

Information for this report was gathered from site visits to Kaanapali Beach, from interviews with individuals familiar with the project site, from interviews with staff members of beach concessions on Kaanapali Beach, from email surveys that were sent to commercial ocean recreation companies that conduct business at the project site, and from email surveys that were sent to other organizations.

Coastal and marine use surveys along with the executive summary of the Kaanapali Beach Restoration and Berm Enhancement Concept Design Report prepared by Sea Engineering, Inc., and a graphic prepared by Sea Engineering, Inc. showing the essential components of the project were sent to the following companies and organizations who have a coastal or marine use interest at Kaanapali Beach.

1.6.1 Aqualani
1.6.2 Black Rock Water Sports
1.6.3 Blue Maui Ocean Adventures
1.6.4 Five Star Scuba
1.6.5 Gemini Sailing Charters
1.6.6 Hale Huakaʻi Ocean Activity Center
1.6.7 Hawaiian Sailing Canoe Association
1.6.8 Hawaiian Paddle Sports
1.6.9 Hula Girl Sailing Charters
1.6.10 I.S.A. Surf School
1.6.11 Island Style Adventures
1.6.12 Kaanapali Ocean Adventures

1.6.13 Kaanapali Operations Association
1.6.14 Kaanapali Surf Club
1.6.15 Kahana Canoe Club
1.6.16 Lahaina Canoe Club
1.6.17 Maui County Canoe Racing Association
1.6.18 Maui County District Office, DLNR, Boating Division
1.6.19 Maui Department of Fire and Public Safety
1.6.20 Maui Department of Fire and Public Safety, Ocean Safety Bureau
1.6.21 Maui Kayaks
1.6.22 Napili Canoe Club
1.6.23 Pacific Jet Sports
1.6.24 Save Our Surf
1.6.25 Sea Maui
1.6.26 Surfrider Foundation
1.6.27 Teralani
1.6.28 Trilogy Corporation
1.6.29 UFO Parasail
1.6.30 Wake Maui
1.6.31 Water Works Sports
1.6.32 West Maui Community Association
1.6.33 West Maui Preservation Association
1.6.34 West Maui Parasail

2.0 Physical Conditions

For purposes of describing the project the Kaanapali Beach Restoration and Berm Enhancement Concept and Design Report divided Kaanapali Beach into three areas.

The first area is the Hanakaoo Littoral Cell at the south end of the beach, which extends 3,600 feet from Hanakaoo Beach Park to Hanakaoo Point. The foreshore along this reach is lined by a shallow fringing reef, except for a small sand channel through the reef near the Hyatt Regency Maui Resort & Spa, which is the remnant of an ancient stream that existed at the location of the Hyatt.

The second area is Hanakaoo Point in the center of Kaanapali Beach near the Kaanapali Alii Hotel. The shallow fringing reef in the Hanakaoo Littoral Cell ends at the point, which is fronted by a deeper fringing reef.

The third area is the Kaanapali Littoral Cell at the north end of the beach, which extends 3,850 feet from Hanakaoo Point to Puu Kekaa. The deeper fringing reef at the point transitions to a sandy seafloor that extends to Puu Kekaa.

2.1 The following is a brief summary of the dynamic seasonal beach sand movement at the project site. Summer swells at Kaanapali Beach come from the south and create longshore currents that run north toward Puu Kekaa. These currents erode sand from Hanakaoo Point in the center of the beach and transport it north, where it accretes and widens the beach. Winter surf reverses this pattern, coming from the north and creating longshore currents that run south toward Hanakaoo Point. These currents erode sand from the Puu Kekaa area and transport it south, where it accretes and widens the beach at Hanakaoo Point. In summary, the seasonal variations in wave activity at Kaanapali Beach result in dynamic shifts of sand, resulting in dramatic differences between summer and winter beach widths.

2.2 Offshore currents tend to reverse like the nearshore currents, but they are influenced by movement of the tides. Ebb tide currents flow to the north, while flood tide currents are inconsistent and may flow to the north and south.

2.3 The island of Molokai shelters Kaanapali Beach from northwest swells but swells from a more northerly direction reach the beach, creating large shorebreak waves, rip currents, and strong longshore currents.

3.0 Coastal and Marine Uses

Coastal and marine uses of Kaanapali Beach and its nearshore waters are regulated by the State of Hawaii's Department of Land and Natural Resources (DLNR) administrative rules. Uncertified copies of the rules are found online. Certified copies may be obtained from DLNR. Paragraphs cited in this report refer to the administrative rules identified in sections a, b, and c that follow.

a. Commercial activities. Hawaii Administrative Rules Title 13, Department of Land and Natural Resources Subtitle 11, Ocean Recreation and Coastal Areas Part III, Ocean Waters, Navigable Streams and Beaches, Chapter 251, Commercial Activities On State Ocean Waters, Navigable Streams, and Beaches, Subchapters 1- 8.
b. Mooring areas. Hawaii Administrative Rules Title 13, Department of Land and Natural Resources Subtitle 11, Ocean Recreation and Coastal Areas Part I, Small Boat Harbors, Chapter 235, Offshore Mooring Rules and Areas. Subchapter 3, Paragraph 13-235-65 Kaanapali mooring zones.
c. Ocean recreation and management areas. Hawaii Administrative Rules Title 13, Department of Land and Natural Resources Subtitle 11, Ocean Recreation and Coastal Areas Part III, Ocean Waters, Navigable Streams and Beaches, Chapter 256 Ocean Recreation Management Rules and Areas. Subchapter 7 West Maui Ocean Recreation Management Areas.
    a. Designated Ocean Recreation Management Areas (ORMA's) are established to (1) provide for increased public access; (2) reduce user conflicts; (3) promote overall public safety; and (4) avoid possible adverse impacts on humpback whales or other protected marine life (13-256-16). The designated areas also are established to control certain commercial activities to specifically designated locations and time periods as well as place limits on equipment types. Both recreational and commercial vessels may use designated areas when the permitted activity is not taking place and may cross the area at all times with caution. There are specifically designated zones assigned to qualified permittees within each ORMA. For example, commercial thrill craft may only operate in a specifically assigned location with not more than six craft in an area measuring 400 feet in diameter.
    b. Non-designated Ocean Recreation Management Areas prohibit the commercial use of controlled ocean sports. In these areas off the islands of Kauai, Oahu, Maui, and Hawaii, recreational (i.e. non-commercial) thrill craft may operate in State waters only from 500 feet from the shore line (or outer

edge of a fringing reef) to two miles off shore. There are no ingress/egress corridors established in non-designated Ocean Recreation Management Areas. Thus, motorized commercial vessels may not land and/or pick up passengers in these locations.

3.1 Swimming and sunbathing.

While sunbathing takes place along the entire length of Kaanapali Beach, swimming tends to be concentrated from Hanakaoo Point to Puu Kekaa. The shore south of the point is bordered by a shallow reef shelf, while the shore north of the point is bordered by a mostly sandy seafloor. The sand bottom north of the point is more attractive to swimmers who wade in and out of the water with bare feet.

These activities are addressed in Paragraph 13-251-76 as follows: Kaanapali Beach shall mean the area within Kaanapali ocean waters that is situated between the shoreline and the mean high tide mark along the shores. Kaanapali Beach is designated for public use for sunbathing, foot traffic, swimming, and other activities which, when engaged in, shall not unduly disrupt others from enjoying the beach.

3.2 Snorkeling and scuba diving. The ocean surrounding Puu Kekaa, or Black Rock, is one of the most popular snorkeling destinations on Maui. With excellent visibility and depths to 25 feet, there is a wide variety of sea life, including fish, turtles, and crustaceans. This location is always rated as one of the top ten snorkeling sites on Maui.

Taking advantage of this site, almost every hotel on Kaanapali Beach has one or more beach concessions that offer snorkeling equipment rentals and sales, introductory snorkeling lessons, and introductory scuba lessons.

3.3 In addition to the beach concessions, a number of commercial catamarans and monohull boats that operate from the Kaanapali mooring zone off Hanakaoo Point offer snorkeling and scuba lessons, but not at Kaanapali Beach or Puu Kekaa. They use other destinations for their tours, such as Honolua Bay and Olowalu. However, they pick up their passengers from Kaanapali Beach.

Catamarans land directly on the beach in ingress/egress lanes designated by DLNR, while the monohull vessels use smaller boats, such as motorized inflatable crafts, to pick up and return their passengers in the designated lanes. This activity is addressed in Paragraph 13-251-76 as follows: The maximum number of Kaanapali commercial permits that may be issued for monohull vessels to embark and disembark passengers at Kaanapali Beach shall not be greater than five, but small craft used to shuttle passengers to and from a monohull vessel in the Kaanapali ocean waters may be included under that vessel's commercial activity permit.

3.4 Cliff diving/jumping. This activity takes place on the low sea cliff on the south side of Puu Kekaa, or Black Rock. The dive/jump site is approximately 30 feet above sea level. Most divers swim to the base of the cliff from Kaanapali Beach and then climb to the top of the jump site.

The Sheraton Maui Resort and Spa offers a nightly torch lighting ceremony on Puu Kekaa, which concludes with a cliff dive by a single diver.

3.5 Surfing. The most popular surf spot on Kaanapali Beach is located on the reef offshore Hanakaoo Point. It is the most consistent spot and offers the longest rides, which are preferable conditions for beginners and other surfers. Although surf may be found at the point throughout the year, it breaks best during the summer months. This surf spot is in the project area.

Several other less used surf spots are located between Hanakaoo Point and Hanakaoo Beach Park near the small sand channel through the reef off the Hyatt Regency Maui Resort & Spa. These spots are in the project area.

During the summer months sand normally erodes at Hanakaoo Point and accretes at the north end of Kaanapali Beach, where it may form a sand bar extending seaward along Puu Kekaa. With the arrival of the first winter swells, a surf spot may form along the outer edge of the sand bar with waves extending as far south as the Kaanapali Beach Hotel. The surf spot is short-lived, disappearing as the winter waves erode the sandbar. This spot is in the project area.

The north end of Kaanapali Beach is also used as a bodysurfing, bodyboarding, and skimming site when waves, beach, and bottom conditions are favorable. This spot is in the project area.

3.6 Standup paddling and kayaking. Several beach concessions along the Kaanapali boardwalk rent standup paddle boards (SUPs) and offer lessons. Several concessions also rent ocean kayaks and offer kayak tours along the beach and around Puu Kekaa. Paddlers in both activities transit the nearshore waters of the project area.

3.7 Outrigger canoe paddling

Outrigger canoe paddling in the project site is concentrated at Hanakaoo Beach Park, which is also known as Canoe Beach. Three canoe clubs are based at the park: Kahana Canoe Club, Lahaina Canoe Club, and Napili Canoe Club. They are members of the Maui County Hawaiian Canoe Association and participate in MCHCA regattas every year in June and July. They also participate in the long-distance racing season, which follows the Hawaiian Canoe Racing Association championships in August.

Outrigger canoe regattas on Maui take place at various locations around the island, including at Hanakaoo Beach Park. The regatta race course at the beach park is situated offshore the park, which places it outside of the project area. However, outrigger canoe paddling training takes place year around, including through the project area.

This activity, outrigger canoe paddling training, is addressed in Paragraph 13-251-58, which identifies restrictions in the Kaanapali Beach waters as follows: This section shall not apply in the event of any emergency, to law enforcement or rescue craft, to vessels participating under a valid ocean waters permit issued by the department, or to Hawaiian design canoes engaged in crew training.

3.8 Outrigger canoe tours. One company offers narrated outrigger canoe tours at Kaanapali Beach. It operates from the beach concession at the Royal Lahaina Hotel on the north side of Puu Kekaa, where the canoes are launched and landed. The tour route circles Puu Kekaa to Kaanapali Beach and then returns to its point of origin.

This activity, outrigger canoe tours, is addressed in Paragraph 13-251-66 as follows: No person shall operate nor shall any owner authorize or permit a canoe to transport passengers for hire unless the canoe meets all the requirements of these rules and a canoe captain or second captain, each having a valid permit issued by the department, is on board. In these instances the senior crew member aboard shall not permit the vessel to be utilized for canoe surfing unless a minimum crew as provided in subsection (a) is on board.

3.9 Fishing. Shore casting and spear fishing, including night diving, by individual free divers and scuba divers occurs primarily at the south end of Kaanapali Beach and outside of the project area. Divers access the area either from shore or by boat.

Commercial net fishing is an infrequent activity that occurs in or near the project area in the vicinity of Puu Kekaa. The exact location depends on the movements of the target school of fish. This activity may include surround net operations on the surface for pelagic fish such as akule (big-eyed scad) or underwater surround net operations for bottom fish such as weke (goatfish).

Fishing from boats is addressed in Paragraph 13-251-58, which identifies restrictions in the Kaanapali Beach waters as follows: (2) No person shall navigate a motorboat within 200 feet of the shoreline, or designated swimming area, or within one hundred feet of a diver's flag, nor shall any person navigate a commercial motorized vessel within 500 feet of the shoreline except within a designated ingress/egress corridor. Notwithstanding this paragraph, vessels engaged in fishing outside the designated ingress/egress corridors are exempt from the 200-foot shoreline restriction, provided that designated swimming areas are approached with caution and due care.

(3) No person shall navigate a motorized vessel within 300 feet of a vessel engaged in fishing.

(4) A vessel engaged in fishing shall not impede the passage of any vessel passing through a designated ingress/egress corridor.

3.10 Gathering. No gathering activities, such as picking opihi (edible limpets) or harvesting limu (edible seaweed), take place in the project area.

3.11 Parasailing. This activity takes place in a designated area seaward of the project area, but is not permitted during the whale season, the time of year when whales are wintering in Hawaii. It is addressed in Paragraph 13-256-108 Lahaina-Kaanapali Offshore Restricted Area as follows: (b) Restrictions. The Lahaina-Kaanapali Offshore Restricted Area is designated as a parasailing area. Parasailing activity shall remain seaward of the described boundary when within three miles of the coastline, except when transiting to or from Lahaina Harbor, Mala ramp or a designated mooring area. No more than five commercial operating area use permits shall be issued for this zone. Persons operating vessels shall exercise due care when transiting this area. This area shall be closed to parasail operations from December 15 to May 15 of the following year.

Parasailing does not take place in the project area.

3.12 Thrill craft. This activity, which includes using craft such as jet skis, takes place in two designated areas south of the project area, but is not permitted during the winter and spring, the season when whales are wintering in Hawaii. It is addressed in Paragraph 13-256-109 Kaanapali Commercial Thrill Craft Areas as follows: (b) A maximum of three commercial thrill craft operating area permits may be issued for Kaanapali ocean waters. Notwithstanding the contrary provisions of sections 13-256-18, a person owning one or more business entities holding valid commercial thrill craft permits may consolidate all commercial thrill craft operations within Kaanapali Commercial Thrill Craft Area 1; provided that no more than eighteen rental units and three safety units shall be operated at any one time. Kaanapali Thrill Craft Area 2 is reserved for use by a single permittee. All supporting rafts or platforms shall be located within the operating area and shall display an anchor light at night. (c) These areas shall be closed to all thrill craft operations during the whale season, from December 15 to May 15 of the following year.

The use of thrill craft does not take place in the project area.

3.13 Water sledding. This activity, which includes using a motorized vessel to tow one or more persons on a water sled, such as an inflatable raft or tube, takes place in one designated area south of the project area, but is not permitted during the winter and spring, the season when whales are wintering in Hawaii. It is addressed in Paragraph 13-256-111 Kaanapali Commercial Water Sledding Zone as follows: (1) This area is designated for commercial water sledding. No more than two commercial operating area use permits for water sledding shall be issued for this zone. (2) This area shall be closed to all commercial water sledding operations during the whale season from December 15 to May 15 of the following year.

Water sledding does not take place in the project area.

3.14 Kite flying and kite surfing. These activities are addressed in Paragraph 13-251-76 as follows: The following activities shall be prohibited on Kaanapali Beach: 1. Kite flying; and 2. Kite surfing equipment.

Kite flying and kite surfing do not take place in the project area.

3.15 Athletic Events. Several ocean sports events take place on Kaanapali Beach, such as the Maui Jim Ocean Shootout, the Hawaiian Sailing Canoe Association's events, and the Maui Channel Swim.

Maui Jim Ocean Shootout. This event is one of several in the Maui Jim Ocean Racing Series. It includes competitive events for prize money in standup paddling (SUP), outrigger canoe paddling (OC-1), ocean swimming, surfski paddling, and paddleboard paddling. The event sponsor provides all racing craft free-of-charge. The race courses are close to shore and front the Kaanapali Beach Hotel, the event hotel. This annual event is held in June and includes international television coverage. The race courses are in the project area.

Maui Channel Swim. This event is a 10-mile channel crossing relay that starts on Lanai at the Club Lanai Pier and ends at Kaanapali Beach at the Kaanapali Beach Hotel, the event hotel. Relay teams consist of six persons who swim alternate legs of the race course. Each swimmer swims 30 minutes once, then rotates through 10-minute swims until complete or six hours have passed. Each team is supported by an escort motor boat, which must stop 200 yards off the finish line on Kaanapali Beach. The race is held every year in September on the Saturday of Labor Day Weekend. The 47th annual swim is scheduled for September 1, 2018. The finish line for this event is in the project area.

Hawaiian Sailing Canoe Association's events. The 2018 race schedule for the HSCA includes the following: June 1, Kahului to Kaanapali (Waa Kiakahi); June 2, Community Service (Waa Kiakahi) rides at Kaanapali; June 3, Kaanapali short races (Maui Jim Ocean Shootout); June 23, Kaanapali to Kaunakakai, Molokai. The HSCA events take place on Kaanapali Beach fronting the Kaanapali Beach Hotel, which is in the project area.

4.0 Impacts on Coastal and Marine Uses.

The Kaanapali Beach Restoration and Berm Enhancement Concept Design Report, prepared by Sea Engineering, Inc. in July 2017, is a detailed document, which includes possible short and long term impacts of the project. Several of these impacts were also identified by individuals, companies, and organizations who have a coastal or marine use interest at Kaanapali Beach that were contacted for this report. The companies and organizations are listed in Section 1.5 Survey Methodology.

The concept design report notes that all of the project's operational activities that take place either in the ocean or on the beach are expected to directly, but temporarily impact ocean recreation and access in both areas.

4.1 Short term impacts in the ocean.

4.1.1 Turbidity. During sand recovery operations, minor turbidity is expected from the clamshell dredging operation as sand is brought from the seafloor to the barge. Depending on ocean conditions, such as wind and currents, the turbidity plume may extend inshore and impact water clarity in the snorkeling and scuba diving areas around Puu Kekaa, including its north side, which is outside of the project area.

Sand from the sand recovery site, though compatible with the dry beach sand, will still have fine sand grains that will separate out of the beach system and move offshore during the initial seaward merging of the introduced sand to the existing beach sand. The fine sand grains may create nearshore turbidity plumes and impact the water clarity in the nearshore waters of Kaanapali Beach.

However, while sand placement operations are occurring, silt curtains and containment barriers will be deployed along the shoreline to help reduce turbidity.

Results of turbidity analysis by SEI of the sand in the Puu Kekaa Sand Area indicate that following the placement of recovered sand, turbidity in the nearshore waters at the project site are expected to be elevated, but are also expected to approach natural levels as the placed sand is washed, and as waves and currents carry away find sand grains. Additional episodes of increased turbidity may occur over time as more placed sand is exposed and washed by waves.

4.1.2 Sand color and scent. When sand is recovered from anoxic environments, such as portions of the sand recovery site, it may have a grey color and scent. These characteristics may be temporarily evident on Kaanapali Beach.

4.1.3 Boating. Sand from the sand recovery area will be placed on a barge and towed by a tugboat to the floating bridge anchored first at the North Offloading Location and second at the South Offloading Location. There will be two barges alternating between the sand recovery area and the offloading location, but for the majority of the day they will be moored at these locations. They will typically transit between the sand recovery area and the offloading location four times per day with a transit time expected to be less than 30 minutes. While the barges are in transit, other marine vessels and marine activities will need to adjust to their movements. Barge routes may change according to weather conditions, but they are expected to be approximately 2,000 feet offshore in 100 feet of water, well offshore of swimming, snorkeling, scuba, and surfing sites.

4.2 Short term impacts on the beach.

4.2.1 Beach activities. Three locations on Kaanapali Beach have been identified for placement of offloaded sand: (a) the Puu Kekaa Berm Enhancement Area at the north end of the beach, (b) the Hanakaoo Point Berm Enhancement Area in the center of the beach, and (c) the Hanakaoo Littoral Cell Beach Restoration Area at the south end of the beach. Sand placement operations on the beach in each of these areas will require them to be cordoned off to all beach activities during trucking, placement, and grading operations. Onshore and nearshore hazards will be marked with signage and/or marker floats. Security personnel on the beach will advise the public when and where they can safely cross the beach to enter and exit the ocean.

4.2.2 Beach loading for commercial marine tours. During the first phase of the project (the Puu Kekaa Berm Restoration), the beach from the Aston to the Westin will be open for vessels to pick up and drop off passengers. Once the berm enhancement is completed at Puu Kekaa, the North Offloading Location will be demobilized and all in-water work between Puu Kekaa and Hanakaoo Point will be over. The next phase will be the Hanakaoo Point Berm Enhancement, which only extends as far north as Whaler's Village. Placement of sand on the berm fronting the Westin and Whaler's Village should not take more than two or three days. During that time, the beach fronting the Aston, Kaanapali Beach Hotel, and Sheraton will be open for dropping off and picking up passengers. In summary, there will always be an open stretch of beach for beach loading and unloading of passengers for commercial marine tours.

4.2.3 Shore transfer stations. The northern transfer station will be located south of Puu Kekaa, near the Kaanapali Beach Hotel. The floating bridge structure will be approximately 240 feet long to reach shore from a depth of 15 feet. The southern transfer station will be located at the ancient stream channel near the Hyatt Regency Maui Resort & Spa. The floating bridge structure will be approximately 450 long to reach shore from a depth of 15 feet. An estimated 100-foot wide no-entry safety zone on either side of the bridge will be in place while it is in operation at both the northern and southern transfer stations, precluding ocean recreation activities.

4.3 Long term impacts in the ocean.

4.3.1 Sedimentation on live corals. Sedimentation occurs when fine sediment particles suspended in turbid water dissipate and settle on the ocean floor, so sedimentation is a normal process that follows turbidity. Turbidity generated from dredging operations at the Puu Kekaa Sand Area is expected to have a net transport to the south by currents moving parallel to shore. The nearest live corals down-current from the dredge site are located approximately 3,000 feet to the south off Hanakaoo Point. Sand sized particles will fall out of the water column rapidly and return to the sand field. While some turbidity will remain in the water column long enough to be transported to the coral reef's northern end, this material is expected to be widely distributed and to be quickly dispersed by nearshore wave action and longshore currents, eliminating sedimentation on live coral reefs. The same expectation of eliminating sedimentation on live corals reefs is anticipated for turbid waters that will be generated following the sand placement, distribution, and grading operations onshore.

4.4 Long term impacts on the beach.

4.4.1 Extreme weather events, such as strong Kona (southerly) storms, hurricanes, tsunami, and extreme water level changes may result in the loss of some or all of the placed sand. In summary, a beach restoration project should be viewed as a maintenance activity that will require ongoing work and future restoration projects.

4.4.2 Sand grain size. Sand will be recovered from the Puu Kekaa Sand Area, a 9.2-acre sand deposit located approximately 140 feet offshore Puu Kekaa in 28 to 56 feet water depth. The proposed sand recovery plan limits dredging depths to about six feet below the existing sand surface. This upper section of the sand deposit is the portion that SEI tested for sand quality, including grain size, distribution, sediment character, and color. In summary, the samples tested consistently met DLNR's sand source requirements for grain size.

4.4.3 Coral rubble. Coral rubble is defined as coral fragments up to 1 inch in diameter. SEI's tests of potential sand recovery sites for the project determined that the Puu Kekaa Sand Area, while not completely free of coral rubble, has a comparatively low volume of it. One of the disadvantages of clamshell dredging is that there is no method to screen coral rubble from the recovered sand at the dredge site. The contractor, therefore, will monitor the sand as it is dumped on the barge. If excessive coral rubble appears, sand recovery operations will be moved to another location within the sand recovery area. While screening sand as it is offloaded on the floating bridge is possible, it would substantially extend the duration of the project. Careful inspection of the sand as it being recovered is, therefore, considered the most effective way to minimize cobble content. In summary, some coral rubble may be found in the sand placed onshore.

4.4.4 Beach slope. Beach slope, the angle of the beach, is measured by using a gradient of height to length, such as one foot of height for six feet of length, 1:6. SEI determined beach slopes for the entire length of the Kaanapali Beach and will ensure that the contractor matches them as closely as possible during the sand placement and grading operations. SEI noted in its concept design report that based on previous projects in Hawaii, there is evidence that the introduced slopes match the existing slopes in a short period of exposure to the natural elements. In summary, the slope of the placed sand will follow the natural slope of the beach.

4.5 In summary, the beach restoration and berm enhancement project is expected to have short term impacts on coastal and marine uses, but no long term effects on them.

5.0 Existing Beach and Ocean Hazards in the Project Area.

5.1 An Emergency Action Plan (EAP) should be developed for the Kaanapali Beach Restoration and Berm Enhancement Project. The EAP should address risk assessment concerns in the project area and determine risk management recommendations to address them. The EAP, which should include a project notification list with contact information, should be distributed to everyone involved in the project, including the contractors conducting the onsite operations and their personnel.

5.2 Hurricanes and tsunami. The Central Pacific Hurricane Center in Honolulu defines the annual Central Pacific hurricane season in Hawaii as June 1 to November 30. Tsunami may occur at any time of year. In the event that either a hurricane or tsunami warning should occur, provisions should be made to relocate the dredge barge and the floating bridge offshore to deeper water.

In the event that the dredge barge or the floating bridge should be dislodged, resulting in either one becoming a hazard to navigation or washing ashore and becoming a hazard to beach users, provisions should be made for recovery operations.

5.3 The dredge barge and the floating bridge are both anchored platforms. Paragraph 13-256-109 Kaanapali Commercial Thrill Craft Areas addresses anchored platforms as follows: All supporting rafts or platforms shall display an anchor light at night.

Many of the catamarans and monohulls that conduct commercial tours at Kaanapali Beach offer sunset cruises. Although most of them return to the beach before the sun sets, sometimes they return after dark, such as during the winter months. Anchor lights are for their safety and for the safety of other vessels operating at night.

Anchor lines for the dredge barge will be in place for the duration of the sand recovery operation. Anchor lines for the floating bridge will be in place for duration of the sand offloading, first at the north site and second at the south site. Floating anchor lines at all of these sites should also be marked with floats.

5.4 When the dredge barge and floating bridge are not in use and unoccupied, swimmers and other individuals on various personal watercraft may attempt to board them, especially at night. Some type of security watch should be considered, perhaps by alerting security staff members at the various hotels when operations have ceased. The 100-foot wide no-entry safety zone on either side of the bridge should be marked by buoys.

5.5 Weather conditions at the project site that would preclude operations at the dredge barge and/or the floating bridge should be identified. These conditions would include high surf and high winds. Many of the catamarans and monohulls that conduct commercial tours at Kaanapali Beach have established their own tour cancellation guidelines, such as when a high surf warning is in effect for the Kaanapali coast, which would preclude beach landings, or when trade winds are in excess of 28 knots.

5.6 Medical emergencies may occur anywhere in the project area at any time. The EAP should address how they would be reported and who would be notified. For emergencies that occur offshore, the EAP should designate a shoreline location with good access for emergency response vehicles to receive the victim being brought ashore. In the event that high surf precludes a beach landing, an alternate site, such as Hanakaoo Beach Park, should be designated. The beach park is the nearest site to the project area that has a county lifeguard on duty during the day and can accommodate emergency response vehicles. The lifeguard is also equipped with a jetski and could assist with an ocean emergency or extrication. For emergencies that occur onshore, the EAP should identify the nearest sites for emergency vehicle access to the north and south offloading and sand placement locations.

APPENDIX E– COMMENTS AND RESPONSES TO EISPN

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

February 25, 2019

Mr. Rocco Tramontano
Oahu Resident
Email: rmkt@Hawaiʻi.edu
Ph: (808)-292-9128

Aloha Mr. Tramontano,

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kāʻanapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kāʻanapali , Maui, Hawaiʻi.

Thank you for taking the time to consider the proposed project and to provide us with your letter containing comments on the EISPN for the Kāʻanapali Beach Restoration and Berm Enhancement project on Maui. We appreciate your thorough review of the proposed project. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

How will construction effect outrigger canoe practices? Would the outrigger canoe clubs still be able to conduct practices and would outrigger canoe races still be held at Hanakao'o Beach Park during the estimated 63 days of construction? If not, how do you propose to mitigate conflict so that the outrigger canoe clubs that use the beach do not have to suspend outrigger canoe paddling during this time period?

We understand that Hanakaʻōʻō Beach Park is the home to three canoe clubs whose season runs from April into October. At this site is a ¼ mile sprint race course that is used daily during the canoe season. We are also aware that from November to February two of the clubs host high school paddle teams where that course is again utilized. We understand your concerns on the impact of the proposed project on outrigger canoe practices and we would like to reassure you that the fears you have expressed are forefront in our mind. We are concerned about impacts to the beach and beach users and have made efforts through the early design process to mitigate those impacts as much as possible. The current design, which may be modified through the environmental review and permit processes, does not shut down the beach park for the full 2 months. Rather, it was developed to move through the regions as quickly as possible, with minimized impacts in terms of time to Hanakaʻōʻō Beach Park, especially. The proposed work plan includes 12-hour days, seven days a week, in an effort to minimize actual work days on any section of beach.

What studies will be or have been conducted to see how beach restoration along with sea level *rise will affect currents? How will the beach restoration and sea level rise affect beach currents? If there is any significant change, how will it impact nearby ecosystems and environments? What studies have been conducted to show that these natural coastal processes are not going to be magnified and sand washed away from the beaches soon after restoration?*

How do you plan to mitigate negative community feedback regarding this issue? (Cultural)

We are planning to conduct a series of public meetings as part of the outreach work in the EIS process. During the public meetings and EIS process, if negative community feedback is received, our team will work with the appropriate agencies and engineers to assess the project design and modify as needed to address issues identified by the public.

It was stated in the Construction Methodology (section 1.5 pg. 21) that clamshell bucket and barge will be used to dredge and transport fill material. Have other dredging methods been considered such as using hydraulic methods (suction) rather than the proposed mechanical (clamshell) method? Additionally, has any other transportation methods been considered such as pipelining material vs. barge? Other dredging methods (pipeline) may reduce traffic and turbidity at the dredge site which were potential impacts of the project.

We understand that the construction methodology presented in the EISPN did not discuss all possible options for recovery and delivery of sand from the offshore site to the beach. Additional methods that are possible to conduct this work are considered in the Draft Environmental Impact Statement (DEIS). These alternatives in methodology are presented in the DEIS (Section 1.5). We hope that continued collaboration with the community will provide critical feedback on the most beneficial construction practices that will support a successful project design, which also minimizes impacts where possible. Ideally, this will also leave room for individual contractors to bid their unique means and methods to complete the proposed project.

What is significant about the 1988 condition that the proposing agency and consultant decided to restore the beach to this condition? What makes the 1988 condition significant from other years such as 1987, 1989, etc.? An explanation as to what is significant to the 1988 condition of the beach would help inform the community as to why this is important.

The 1988 shoreline position was chosen for the beach restoration because the beach was stable and healthy for several years in that location. 1988 is chosen, in particular, because a clear aerial photograph exists of the project area showing beach width, toe, and nearshore sands.

Thank you again for your input on this project and we welcome additional comments on the project design during the publication of the DEIS. Should you have any questions or desire additional information please contact me at 808-259-7966, ext. 26 or cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Geologist & Project Manager

CC: DLNR-OCCL

Accepting Authority:
Governor, State of Hawaiʻi
The Honorable David Y. Ige, Governor, (808) 586-0034,
Executive Chambers, State Capitol, 415 South Beretania St., Honolulu, HI 96813

Proposing Agency
Department of Land and Natural Resources, State of Hawaiʻi Samuel Lemmo, Administrator, Office of Conservation and Coastal Lands, (808) 587-0377, sam.j.lemmo@hawaii.gov 1151 Punchbowl St., Room 131, Honolulu, HI 96813

Consultant
Sea Engineering, Inc. Christopher Conger, Coastal Scientist, (808) 259-7966 ext. 26, cconger@seaengineering.com 41-305 Kalanianaʻole Hwy, Waimānalo, HI 96795

To Whom It May Concern:

I am a resident of Oahu commenting on the environmental impact statement preparation notice (EISPN) of the Ka'anapali Beach Restoration and Berm Enhancement. I am not a resident of Lahaina or a frequent user of Ka'anapali Beach, however I do have a personal interest in the matter as I have been blessed with the opportunity to paddle at the Hawaii Canoe Racing Association State Championships (HCRA) in 2017 located at Hanakao'o Beach. My experience in Ka'anapali and Hanakao'o Beach was nothing but positive and is an excellent location for outrigger canoe paddling and the HCRA State Championships. I hope that the proposed project is in the best interest of the local residents of Lahaina and the most frequent users of Ka'anapali Beaches.

As stated in Section 2.2.3 Coastal and Nearshore Recreation on pg. 55 of the EISPN, "Hanakaʻōʻō Beach Park is sometimes called Canoe Beach, as Lāhainā Canoe Club, Kahana Canoe Club, and Napili Canoe Club all hold practices there. The three canoe clubs store their canoes in a single canoe hale and along a grassy area behind the beach." The potential impacts and proposed mitigation measures did state that there would be disruption to nearshore recreation, however it did not specifically address whether the affected area would still be accessible to the outrigger canoe clubs that use the area. Typically outrigger canoe practices occur after work between 5-8 depending on the amount of daylight left in the day. With "Equipment operation on the shoreline will be limited to the hours between 7:00 a.m. and 6:30 p.m", how will construction hours affect outrigger canoe practices? Would the outrigger canoe clubs still be able to conduct practices and would outrigger canoe races still be held at Hanakao'o Beach Park during the estimated 63 days of construction? If not, how do you propose to mitigate conflict so that the outrigger canoe clubs that use the beach do not have to suspend outrigger canoe paddling during this time period?

In section 2.1.13 Coastal Processes (pg. 49-50), it states that "Sand bars, waves, and ripples are currently present in the natural beach system, and would continue to develop in both the beach and restoration area and berm enhancement area." It goes on to say that "Any and all of these can affect a large-scale change in the beach, as the project site is located on an open ocean coastline that is exposed to a wide range of events and hazards. As a result of one or more of these events, all placed sand and some or all of the existing sand could be lost from the beaches." With higher sea levels and more water nearshore, changing the shoreline can affect the nearshore currents that are generated by ground and wind swells as well as daily tidal shifts. By displacing this water with sand, tt cannot be assumed that currents would be the same as it was in 1988 since sea level has since changed and is continuing to change. What studies will be or have been conducted to see how beach restoration along with sea level rise will affect currents? How will the beach restoration and sea level rise affect beach currents? If there is any significant change, how will it impact nearby ecosystems and environments? What studies have been conducted to show that these natural coastal processes are not going to be magnified and sand washed away from the beaches soon after restoration?

Section 2.1.15 (pg. 53) Cultural Impact Assessment states "Hundreds, if not thousands, of iwi kupuna (ancestral remains) have been disturbed or displaced by resort construction on and around Puʻu Kekaʻa over the last 55 years. The general disrespect accorded to these burials during the modern era is considered an act of profound desecration by many members of the Hawaiian community. The prospect of disturbing additional burials during further ground disturbing construction activities may raise concerns among community members. Public meetings will be held and the local community will be regularly consulted during EIS development to solicit community feedback concerning the potential cultural impacts of construction activity." How do you plan to mitigate negative community feedback regarding this issue?

It was stated in the Construction Methodology (section 1.5 pg. 21) that clamshell bucket and barge will be used to dredge and transport fill material. Have other dredging methods been considered such as using hydraulic methods (suction) rather than the proposed mechanical (clamshell) method? Additionally, has any other transportation methods been considered such as pipelining material vs. barge? Other dredging methods (pipeline) may reduce traffic and turbidity at the dredge site which were potential impacts of the project.

From the project description the beach is to be restored to the approximate 1988 condition. What is significant about the 1988 condition that the proposing agency and consultant decided to restore the beach to this condition? What makes the 1988 condition significant from other years such as 1987, 1989, etc.? An explanation as to what is significant to the 1988 condition of the beach would help inform the community as to why this is important.

Thank you for taking the time to address my comments and concerns and I look forward to your response.

Aloha,
Rocco Tramontano
Email: rmkt@hawaii.edu
Ph: (808)-292-9128

Sea Engineering, Inc.
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February 25, 2019

Mr. Tom La Basco
Condominium Owner, The Whaler
Email: tomlabasco@yahoo.com

Dear Mr. La Basco:

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kā‘anapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kā‘anapali , Maui, Hawai‘i.

Thank you for your email dated August 4, 2018, containing comments on the EISPN for the Kā‘anapali Beach Restoration and Berm Enhancement project on Maui. Thank you for taking the time to consider the proposed project and to provide us with a comment letter. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

We understand that Kā‘anapali Beach is in a deflated condition with unhealthy slopes in front of many properties including The Whaler. We assure you that we will be conducting additional surveys as the process moves forward to design a healthy beach slope for the entire Kā‘anapali shoreline, as well as pre-, during-, and post-placement surveys for the nourishment project.

Should you have any questions or desire additional information please contact me at 808-259-7966, ext. 26 or cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Geologist & Project Manager

CC: DLNR-OCCL

Email from Tom LaBasco, 8/4/2018

On Sat, Aug 4, 2018 at 9:07 AM Tom <tomlabasco@yahoo.com> wrote:

To: Mr. Lemmo and Mr. Conger

My name is Tom LaBasco. I am an owner of a condominium at The Whaler. I arrived to stay at The Whaler on July 30. My first day down on the beach was July 31. I was extremely surprised to see the major change to the slope and width of the beach along the beach in front of The Whaler. The next couple of days visiting got me very concerned as to what was happening to the condition of the beach. So, yesterday, I decided to do a google search to find out if others had similar concerns. I was pleased to find out that not only did others have similar concerns, but also, an EIS existed to have a project performed to restore Kaanapali Beach. That is the reason for my email to the both of you.

I'm not sure when the design work initiated for the beach restoration project, but please be advised the condition of the beach in front of The Whaler has drastically changed since this time last year. I reviewed the preliminary plans on your web site and found that the southerly beach improvements from Hanaka'o'o Beach north, ended between Whalers Village and Tower 2 of The Whaler. In addition, the beach restoration work on the north end of the project began at Black Rock, proceeded south, and ended between The Kaanapali Beach Hotel and Tower 1 of The Whaler. If this scope continues and does not include the area in front of The Whaler, the project has a major gap.

Please assure me that before the project goes out to bid a final survey of the condition of the beach will be performed so that the scope of the project contains all failing areas.

Thank you.

Tom LaBasco

Sent from Mail for Windows 10

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

February 25, 2019

Ms. Louise Rockett
Email: louiserockett@aol.com
808- 283-5486

Dear Ms. Rockett:

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kāʻanapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kāʻanapali , Maui, Hawaiʻi.

Thank you for taking the time to consider the proposed project and to provide us with a comment letter dated August 28, 2018, containing comments on the EISPN for the Kāʻanapali Beach Restoration and Berm Enhancement project on Maui. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

We understand that the rules for public beach parking and beach access are not clear in Kāʻanapali. Thank you for letting us know that this would be helpful information for the public.

Thank you also for letting us know that you would like to see Hanakaʻōʻō Beach Park commercial free. We would like to assure you that the proposed project does not include any introductions of commercial activities to the Beach Park. The restored beach would remain a public resource. During the proposed project, as sand is brought to the shoreline and moved along the shoreline, we assure you that public safety is very important to us. The proposed project includes precautions to protect the public.

In addition, the contractor who gets awarded the contract for the work will be required to follow a Best Management Practices Plan that would include requirements for the protection of public health and safety. The proposed work plan includes 12-hour days, seven days a week, in an effort to minimize actual work days and interruptions to public use.

Should you have any questions or desire additional information please contact me at 808-259-7966, ext. 26 or cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Geologist & Project Manager

CC: DLNR-OCCL

Email from Louise Rockett, 8/8/2018

I am adding my comments to the EISPN of the Kaanapali Beach Restoration and Berm Enhancement Project.

The rules for Beach Parking and Beach Access should be included in the final EIS and the approval of this work.

As a member of the community and as a taxpaying member of the public, since we are participating dollar-wise, I would like to see the rules for beach parking SPELLED OUT at each property. I would like to see the enforcement of these rules with stiff fines and a process where it is monitored daily.

It is time to recognize the public and give them their due.

Also, I would like to see Hanakao'o Beach Park commercial free. I do not want to see propelled boats anywhere near our swimming / paddling / snorkeling area. Propelled launch boats should be situated well out of the way of our keiki, paddlers and snorkelers. It should be placed as close to Whalers Village as possible not on the South Side of the Hyatt.

Thank you for addressing this in the EISPN.

Louise Rockett

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February 25, 2019

Ms. Heidi Sherman
Ailana Surveying and Geomatics
P.O. Box 1240
Kula, HI 96790

Dear Ms. Sherman:

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kāʻanapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kāʻanapali , Maui, Hawaiʻi.

Thank you for taking the time to consider the proposed project and to provide us with a comment letter dated August 29, 2018. The letter discussed the EISPN for the Kāʻanapali Beach Restoration and Berm Enhancement project on Maui. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

You are correct about the berm design fill and calculations. The design berm uses the September 2015 grade at Pu'u Keka'a and the February 2016 grade at Hanakaʻōʻō Point. The proposed project would add sand to the Pu'u Keka'a berm segment of the shoreline first during the fall. Next, sand would be delivered to the Hanakaʻōʻō Littoral Cell beach restoration segment. While sand is being delivered to the Hanakaʻōʻō Littoral Cell during the early winter, a portion of the sand that was placed at Pu'u Keka'a is anticipated to get redistributed under wave action. The third phase of the project would place the remaining berm enhancement sand at Hanakaʻōʻō Point later in winter, which is why we reference the February 2016 grade. The time delay between phase one and three is intended to help mitigate the oversaturation of the beach with sand and to allow the point to begin its winter growth season before placement operations.

We agree with your suggestion to implement a sand distribution when conditions are similar to September 2015, thereby allowing nature to redistribute some of the sand. This is similar to the proposed first phase of the project. In addition, we will be placing sand on the beach berm at Hanakaʻōʻō Point later during winter, to provide additional sediment to the system, which will be redistributed during the summer months.

At the time of beach nourishment project, we agree that observing and responding to current conditions will be a critical step in the sand placement process. We have reviewed your suggestion to vary the height of the fill so that it thickens moving mauka across the placement plan. Even thickness across the footprint has multiple benefits, including minimizing impacts to public access and scenic viewplanes. In an effort to balance to benefits with the potential impacts, while still delivering a sufficient volume of sand, even elevation across the placement surface was chosen.

You note that the winter and summer wave climates impose an energy flux on the beach at an angle. Based on this, you suggest that the seasonal erosion on the ends of the Kāʻanapali littoral cell would eventually exhaust the backshore sediment supply even if it were placed as a dune profile. The gradual incorporation of the sediment into the active littoral system is actually desirable for the project. Though small, the KLC has been subjected to long-term erosion and sediment loss. In the end, the project is intended to return 25,000 cy of sand back to the littoral cell.

Thank you for suggesting that some gap [sandy substrate] between the toe and fossil reef may be desirable in the Hanakaʻōʻō Littoral Cell. The littoral cell has been perched atop the fossil reef since prior to the topographic sheets collected early in the 20th century. During all aerial photographs, a narrow nearshore sand field has been attached to the face of the beach. This is a function of the wave environment atop the fossil reef, mauka of the reef crest. The physical conditions creating and maintaining the narrow nearshore sand field will remain the same and are expected to build and maintain that same feature in response to the beach restoration project. Currently the width and volume of this attached sandy feature vary with water levels and wave events, and this is anticipated to continue after the beach restoration project.

Should you have any questions or desire additional information please contact me at 808-259-7966, ext. 26 or cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Geologist & Project Manager

CC: DLNR-OCCL

Berm Fill Design and Calculations

Do berm fill design and volume calculations use September 2015 grade for Puu Kekaa profiles and February 2016 grade for Hanakaoo Point profiles?

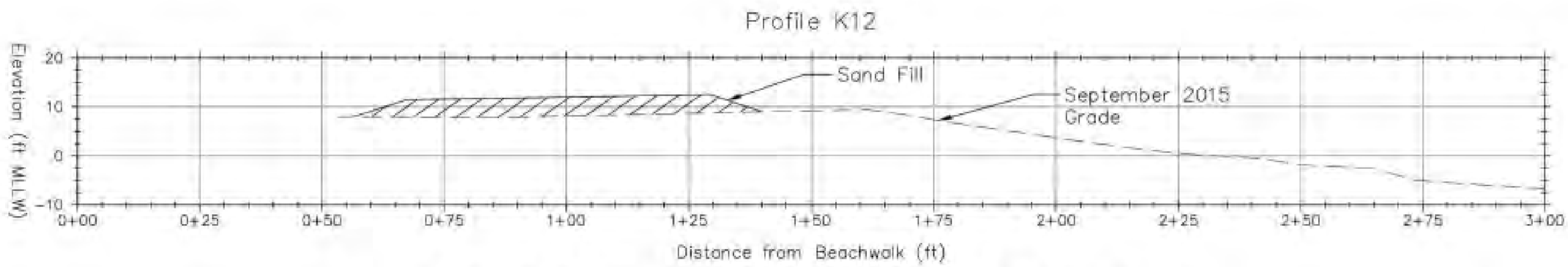
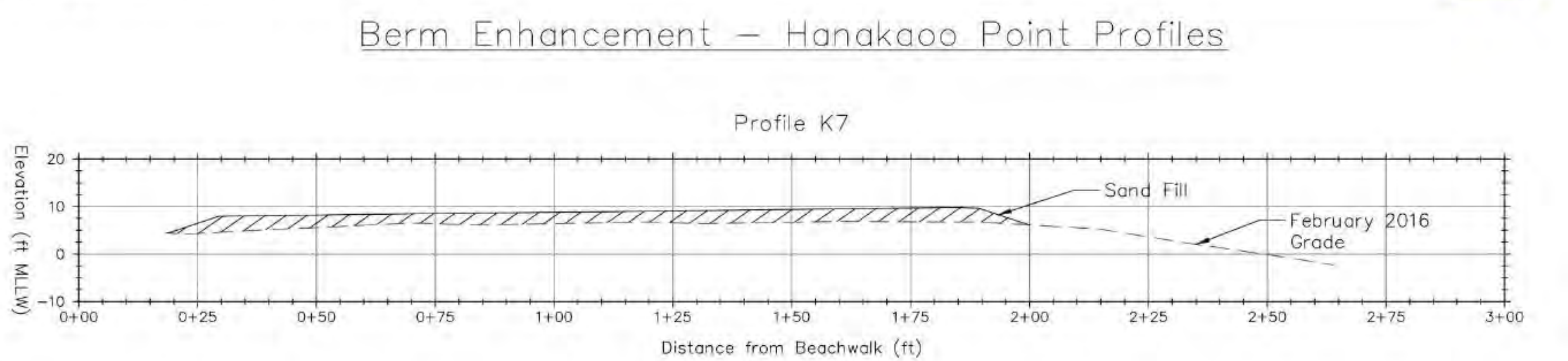
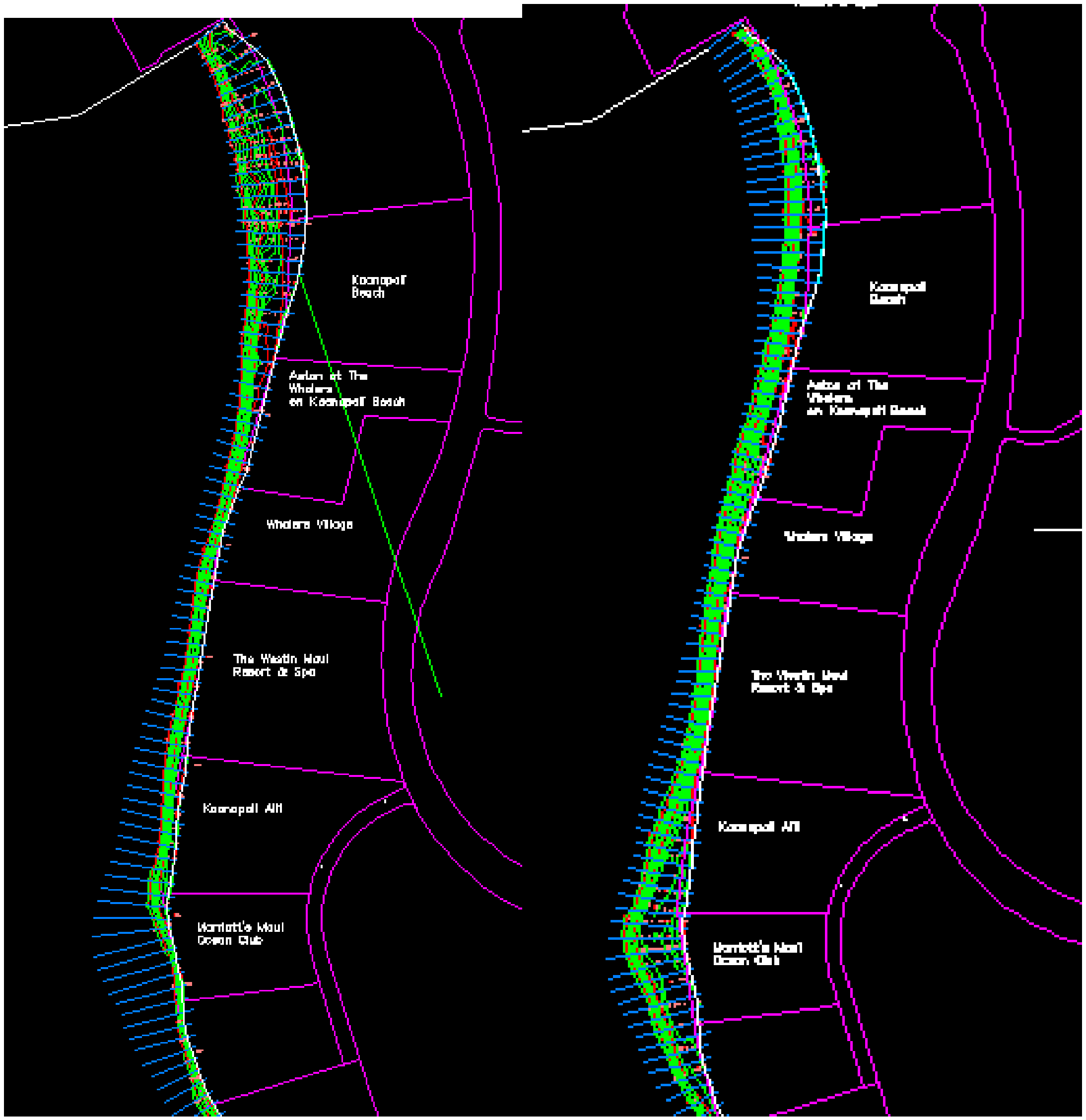


Figure 1-10. Puʻu Kekaʻa Berm Enhancement – Profile Views

Environmental Impact Statement Preparation Notice
Kāʻanapali Beach Restoration and Berm Enhancement



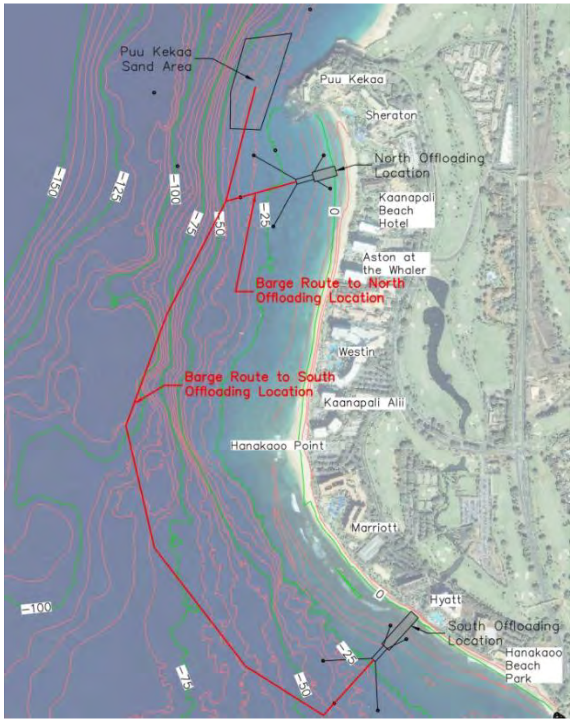
The beach is constantly changing, but in general the beach isn't that wide at the north end near Black Rock and at Hanakaoo point at the same time, but rather the sand moves back and forth, e.g., Sept 5 2015 (left) and Feb 14 2016 (right) topography below.



September 2015 had a relatively large northward shift in sand (even compared to September 2016, and 2017) and there was relatively little dry berm surface area at Hanakaoo point. If existing grades from different surveys are used to design the Black Rock berm fill and point berm fill then calculations might not give an accurate total berm surface area. In the example above calculations might over estimate available berm surface area (even over the construction period there isn't likely to be that much of a seasonal shift).

Sand Distribution Similar to September 2015 Scenario

For a sand distribution similar to September 2015 it might be possible to do the berm fill near Black Rock and skip the 13,000 cu yds at Hanakaoo Point. Also since there isn't an offloading station at the point this would significantly reduce the need to transport sand on the beach. It would also reduce concern over the point surf break and corals off the point. If the sand is placed in the fall the point would be in the process of natural seasonal recovery anyway. Alternatively, it may be considered desirable to add the full 25,000 cu yds to the beach, in which case more sand might need to be added to the north end.



Sand Distribution and Berm Surface Area at Time of Fill

It might be helpful to try to predict the likely sand distribution at the time of fill. If construction is scheduled for the fall this might depend significantly on the preceding summer swell season. Recognizing year-to-year trends could also be helpful as the beach can vary from year to year, e.g., early summer 2018 had an increase in beach volumes north and south of the point and a decrease near Whalers Village. You could also consider whether the sand distribution would affect the total berm surface area, e.g., when the sand shifts to the shallower water at the point does the total beach surface area increase?

Volume of Seasonal Sand Shift

Adding sand to the Kaanapali littoral cell would likely increase the volume of seasonal sand movement. The beach near Black Rock has been eroding mauka into the naupaka so adding a readily moveable sand supply would likely increase the volume of sand moved south during the winter. Also if sand is added to the northern shoulder of Hanakaoo point during the fall this may shift south during the winter. This would likely result in widening of Hanakaoo point (for better or worse) and/or a pass through of sand to the Hanakaoo littoral cell, or loss into deeper water.

Pass Through Inflection Point

Near Whalers Village sand appears to pass through along the beach without the large volume fluctuations seen in other parts of the littoral cell.

Height of Fill

If fill were designed to be thicker farther back on the beach - maybe even in a “dune” shape – the sand might stay in place longer and not be as susceptible to seasonal transport. Thinner fill toward the water might help avoid having too high an erosion scarp at the point during the first summer season.

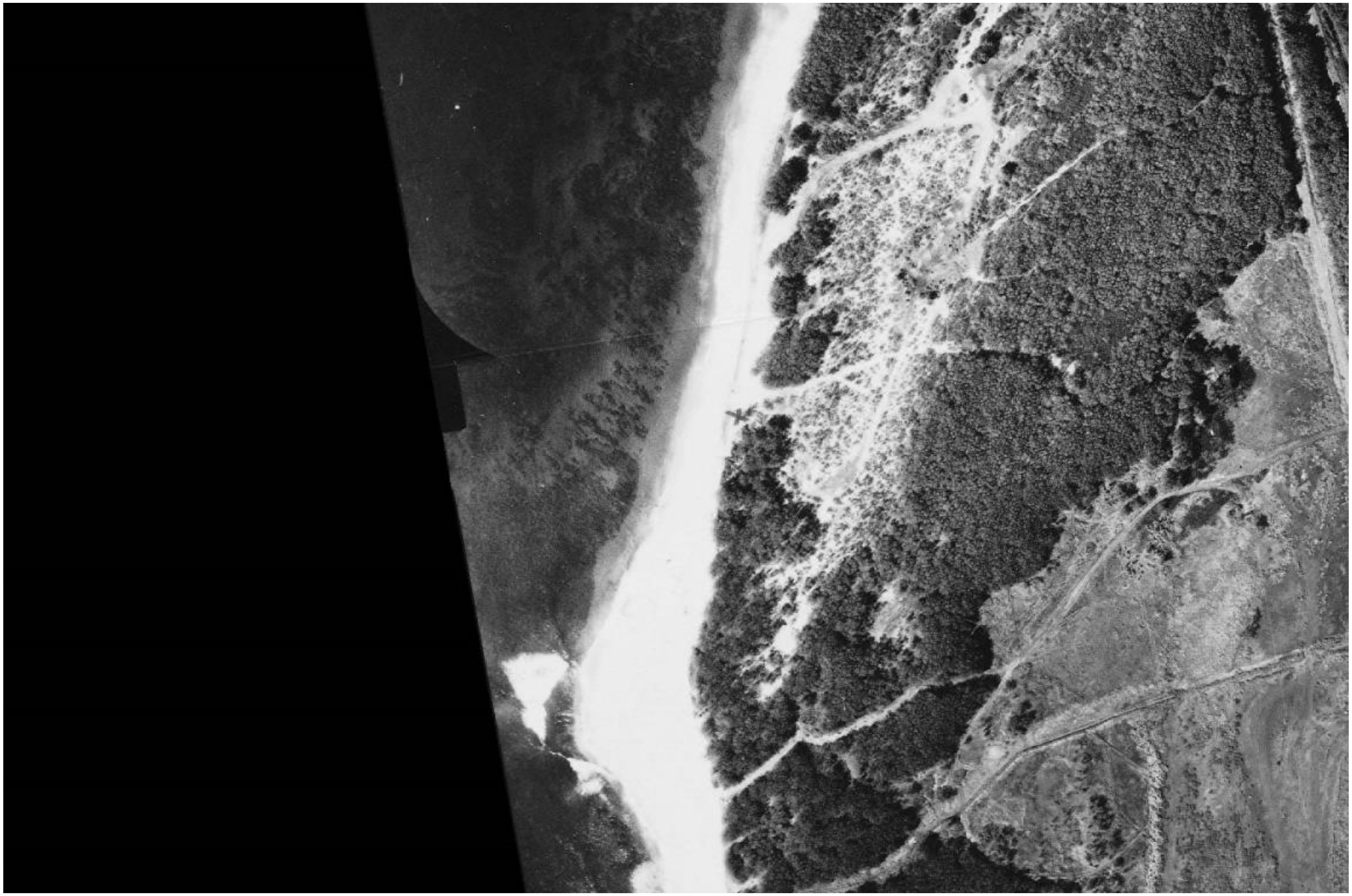
Hanakaoo Littoral Cell

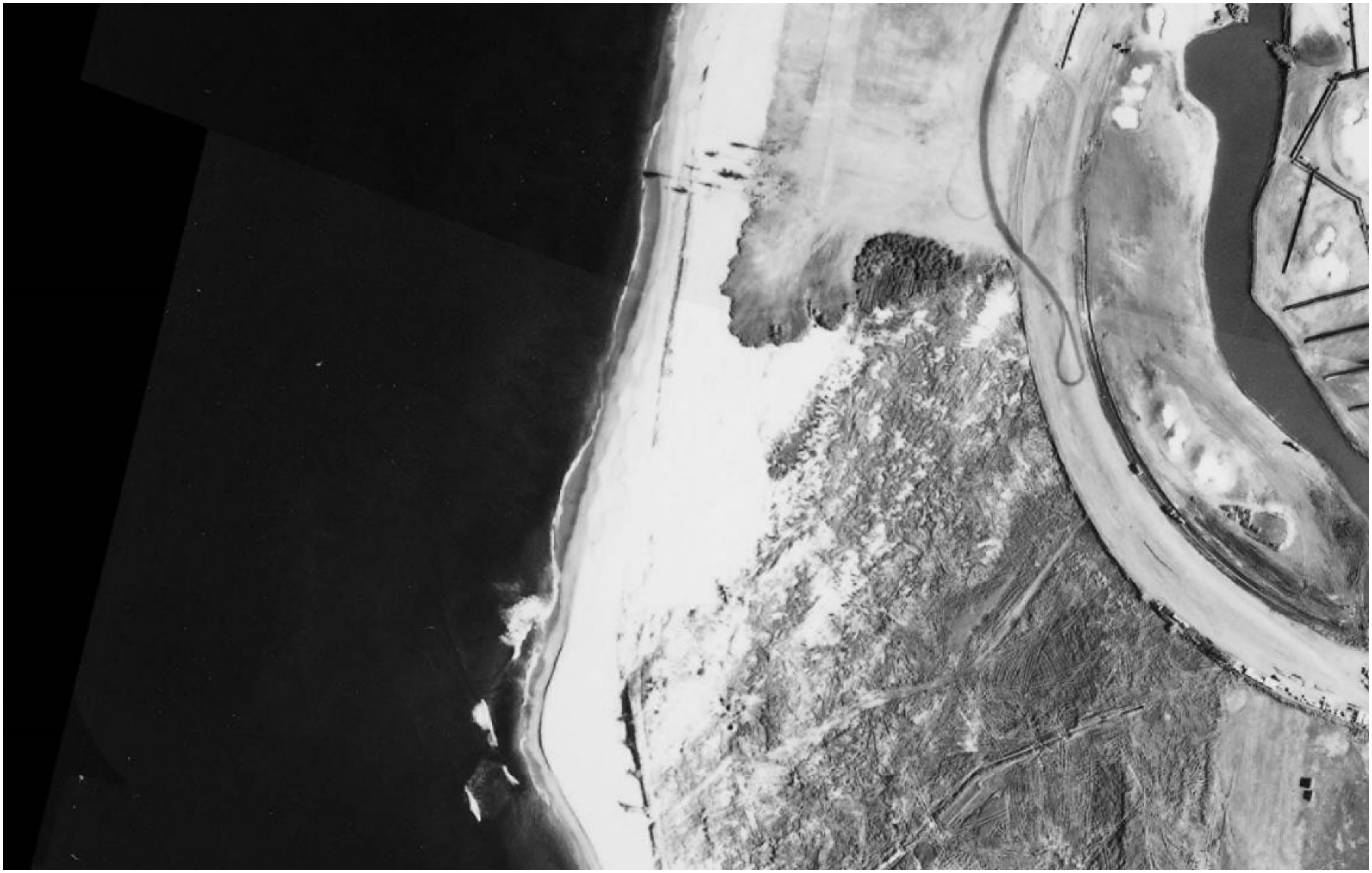
Some gap between the toe and fringing reef/beach rock may be desirable for keeping people off of and away from the rocks there and also keeping people on the protected side of the rocks during rougher conditions.

The erosion hotspot near the Hyatt pool may be partially from waves breaking over the fringing reef/beach rock and washing out at the channel?

Beach Narrowing and Community Outreach

The Kaanapali resorts were built and landscaped prior to adequate shoreline setback requirements. In hind sight they were developed too close to the beach. That doesn't mean that it is in our community's best interest to let the resorts slowly erode into the ocean.   However, I think it might be good to acknowledge and address this in an objective way because it is part of the problem of beach narrowing and will inevitably come up in community discussion. Community outreach and addressing public concerns seems critical.   UH mosaics.





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February 25, 2019

Richard C. Roshon
Lecturer, Author, Kayak Entrepreneur
Hawaiʻi-Whales-R-US
P.O. Box 10502
Lahaina, HI 96761
richard.roshon@gmail.com

Dear Mr. Roshon:

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kāʻanapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kāʻanapali , Maui, Hawaiʻi.

Thank you for taking the time to consider the proposed project and to provide us with your letter received on September 19, 2018, containing comments on the EISPN for the Kāʻanapali Beach Restoration and Berm Enhancement project on Maui. We appreciate your lifetime of practical experience and local expertise. We respect the work you do as a vigorous advocate for the protection of the sea and its species. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

1. We understand that each year West Maui loses portions of its beach and each year the sea brings some of it back again. Our team has made considerable effort to understand this process and to monitor the sand volume over long time periods. The northern half of Kāʻanapali Beach (from Hanakaoo Point to Black Rock) experiences a seasonal redistribution of sand primarily driven by seasonal shifts in the wave patterns. Unfortunately, the sand volume is not quite enough in this region to maintain a buffer between the highest wash of the waves and the infrastructure mauka of the beach under extreme wave conditions causing damage to both public and private interests. The proposed berm enhancement in this area would augment the littoral cell with more sand for nature to continue to naturally redistribute seasonally. On the southern end of Kāʻanapali, between Hanakaoo Beach Park and Hanakaoo Point, the sediment transport is less seasonally driven due to a more consistent incoming wave direction. The energy flux imposed by the waves on the shoreline continues to erode the beach landward into public and private infrastructure. The proposed effort is to add sand volume to this segment to restore the shoreline to its 1988 position. While this will not fix the erosion problem, it will preserve the beach resource for some time and allow more time for interested parties to consider options for management of this portion of the shoreline.

2. We appreciate your observations of the crabs, plants, and polyps living in the sand environment. All species are important and we understand that there will be impacts to some biology living in the project area. During the permitting process for the proposed project, we are fortunate to have consultations and input from both state and federal agencies. These agencies specialize in marine and coastal ecology and will impose restrictions and conditions through the permit process. These restrictions and conditions are intended to assist the design and construction teams by identification of methods to minimize impacts to native species.

3. We understand that any sand dredging will have an impact on the turbidity, biology, and scenic resource. We do care very much about these impacts and intend to work with permitting agencies to design a well-reviewed Best Management Practices Plan to reduce these impacts to the greatest possible extent. For example, throughout operations water quality specialists would be contracted to monitor the water quality. In the event that water quality standards are exceeded, the Department of Health would be notified and the appropriate action to correct the issue.

4. We appreciate your recommendation to let the beach go, allowing nature to claim the land mauka of the shoreline. We agree that this is a valid approach to managing the coastal environment. This option was reviewed as a potential alternative to beach nourishment. In this instance, there are numerous factors that support beach nourishment as the preferred option.

These suggestions are noted and will be considered during the continued development of the proposed project. We are grateful for your comments and for your work in the community. Should you have any questions or desire additional information please contact me by telephone at 808-259-7966, ext. 26, or by email at cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Geologist & Project Manager

CC: DLNR-OCCL

HAWAII-WHALES-R-US

DEDICATED TO LIVING IN BALANCE WITH OUR MARINE ENVIRONMENT

G. Richard Craig Roshon - *Lecturer, author, Kayak Entrepreneur*

Established 1975

Aloha Mr. Chris Conger,

As and eye-to-eye contact individual and of course that communicates through the written letter, (foundations that once made us human beings), I have enclosed my thoughts as to several topics including Beach Restoration in the Kaanapali area.

I must always stay optimistic for there is no other way. However in the past 5-6 decades of environmental issues that I have been involved in here in Hawaii, my words seem to go into the wind. However I keep trying, as that is my way, and our natural planetit is my passion.

I'm sure what I have to say in reference to Beach Restoration will be laughed at and not considered at all, but I keep trying.

Me Ke Aloha Pumehana
With Warm Aloha

Richard Roshon

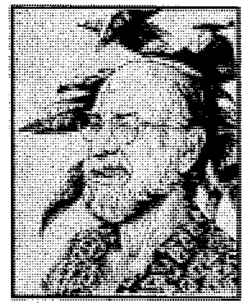
G. Richard C. Roshon

CC: Mr. Sam Lemmo, DLNR

IT'S ALL ABOUT THE JOURNEY (PART 11)
Part I can be found on my website www.hawaiiwhalesrus.com
under articles entitled "The Journey"

Hawaii-Isolation, The Oceans, Plastics, Beach Restoration
OUT OF SIGHT – OUT OF MIND

By Richard, Craig Roshon



HAWAII: Living here in the Hawaiian Islands since the early 1960's it is my opinion that where-ever the economy (such as here in Hawaii) is dependent upon the visitor industry, natural eco-systems, both Aina (land) and Kai (the sea) are under daily assault.

Geographically Hawaii, the most isolated chain of islands on the planet, due to its isolation is EXTREMELY fragile. It is nothing less than a miracle that life exists at all on these islands. And we and we alone are playing Russian roulette with it's very existence, all for the love of man's main attribute GREED.

IT IS A FACT "LESS IS MORE". The more you take away from the beauty of open space (NATURE) the more you take from the value of life from within.

Due to Hawaii's isolation I believe we only have around 300 species of reef fish and around 50 different species of reef, compared to places along continental shelves as the Great Barrier Reef of Australia, which contain thousands of species of fish and reefs.

How did life arrive to the Hawaiian Islands? Perhaps indigenous plants arrived from the seeds within the stomachs of sea birds, following the clockwise rotation of trade winds in the Northern Hemisphere. However that seed had to change it characteristic to adapt to the environment here in Hawaii.

Sea life, perhaps in the same manner by following the clock wise manner of our currents in the Northern Hemisphere, and miraculously arrived in the middle of the Pacific Ocean.

On many sailing ventures to and from the mainland, flotsam 1000's of miles from land are abundant with life, from barnacles, crabs, etc. hitching a ride. Beneath lie large schools of fish, perhaps protecting themselves from the sun, along with being in the shade giving protection from large predators. I always wonder when I see sand crabs on the beach, "How did you little guys arrive? Miraculously they did arrive in these isolated beautiful islands of Hawaii, and multiplied.

The isolation of the Hawaiian Archipelago is an extremely fragile existence, and that fragile existence which gives us life is vanishing. We cannot live alone.

THE OCEANS: Cover more than 70% of Planet Earth

The Pacific Ocean covers more than 64 million square miles, or 25% more area than the entire land-mass on Planet Earth with an average depth of 2 miles.

Due to our oceans ability to absorb heat, the planet is warming and has been since the industrial age. Anyone that disbelieves this is a ???????. Our planet is on a move of growing warmer, and no matter what steps we take, you just do not change temperatures over night.

Warming seas estimated by the end of this century to rise more than 3 feet. Ice caps are melting creating weight to the sinking of the ocean floor.

Warmer seas=less oxygen=less food=less life. Fish extract oxygen from the sea, as do plant life such as coral, sea kelp etc. However less oxygen increases acidity, and plant life are becoming toxic, and then digested by fish, in turn humans.

Our oceans regulate the temperature of our planet, due to their ability of absorbing heat. Warmer seas, warmer planet, warmer planet more frequent storms at higher volume – keep in mind Nature has no boundaries.

REEFS:

The world has lost roughly ½ of it's coral reefs in the past 30 years
Support ¼ of all marine species, and ½ billion people
Estimated 90% lose by 2050 due to global warming
Produce some of the oxygen we breathe
Form barriers protecting coastlines from storms
Used in medical research for cures to diseases such as cancer, viral infections, arthritis
Reefs are plants; don't even think about walking on reefs

Light penetrates down to approximately 300 feet. Our last El Nino around 2011, the oceans warmed to a depth of 1000 feet.

WHAT WE DO TO NATURE, WE DO TO OURSELVES.

PLASTIC: Sailing ventures I have made from my home here on Maui to the Pacific NW, 1000 miles from land we sail through the North Pacific Convergence Zone, now twice the size of Texas. For 14 hours we sailed through nothing but plastic. PRODUCED BY AN INTELLIGENT SPECIES.

Every year, 8 million metric tons of plastic end up in our oceans, and that figure could increase by ten-fold over the next 10 years if actions are not taken. 8 million metric tons is equivalent to 5 grocery bags of plastic for every foot of coastline in the world. Annual cumulative output of plastic by 2025 will be around 155 million metric tons.

In 2010, the 192 countries situated along an ocean coast altogether generated 275 million metric tons of plastic waste.

It is estimated that by 2050 there could be more plastic in our oceans than marine life. Even if that estimate is decades off, isn't it past time to think. It was not that long ago when it was said that it would be impossible to deplete the oceans from marine life.

In 1989 I sailed from the Philippine islands along the East Coast of Japan towards the Bering Sea. It was estimated that there were 40,000 miles of net being laid each and every day across the Pacific. Enough net to stretch from San Francisco to Tokyo 6-8 times. We sailed over these nets viewing buoys every mile, and fish of every species dead including one Female Sperm whale DEAD, with her calf swimming around lost.

Personal encounters:

Along the beaches of West Maui, I swim after another plastic inter-tube, as the individual watches it float away. I retrieve it, and my comment is "You didn't have to go after it, they only cost $4.00.

A man finishes his bottle of water, puts the cap back on and throws it out into the ocean. I stood there telling myself "Richard calm down, do not lower yourself to that level". I call to him, he turns around and I say to him, "What did you just do?" "What" was his response"? trying to maintain a calm manner I said "You just threw that plastic bottle into the sea", "Yes – so, it will float away and you'll never see it again". I once again left with heartfelt tears, and said to myself, I cannot take this anymore.

Two young ladies in the same area of which I do my daily swim are hitting golf balls out from the shoreline. Once again I went home shaking my head wondering when-- when will people think. The following morning on my swim, and about 50 yards from shore I swim into a Green Sea Turtle, DEAD. A golf ball stuck in it's throat. Green Sea Turtles frequently rest on the beach at Pohaku or S-turn way side park in Kahana. People sit on their backs for that ALL IMPORTANT PICTURE. What do you say? How would like to lie on the beach and have someone sit on your back for a picture.

A small group of people leave their beer cans, and I politely say, "Excuse me but you left your empty beer cans" Their reply, "if it bother you, you pick it up", and I do.

Very few people pick up trash along the shoreline – WHY? It's our trash. Perhaps everyone has bad backs. Our footprints are sen from the top of the world to the abyss of the sea.

The trash, both land and sea is beyond words, and in the end "We will pay the price". Now in my 70's I feel there was a time when people cared, we took the time to care, respect for our Aina & Kai. Not any more, as the bumper sticker reads "It's all about me".

I wonder, does the Visitor Industry advertise any environmental films on board air flights or advertise not to do this or that in their brochures. I haven't seen any, if so IT'S NOT ENOUGH.

WHAT OTHER SPECIES ON THIS PLANET KNOWING POLLUTES THEIR OWN HOME? NONE—WE HAVE SUCCESSFULLY LEFT OUR FOOTPRINTS FROM THE TOP OF THE WORLD TO THE ABYSS OF THE SEAS.

AND WE, THE HUMAN SPECIES PAT OURSELVES ON THE BACK AND CALL OURSELVES INTELLIGENT?

BEACH RESTORATION: Maui, Hawaii, Another assault on our natural ecosystems, and assault which has been proven unworthy in several different parts of the world such as Australia, as it doesn't last. The State of Hawaii, and the Kaanapali operators

Association have developed a (long term) viability of this sandy coastal resource that includes both beach restoration and berm enhancement.

A proposal of dredging 75,000 cubic yards of sand or approximately 8.5 acres of sand from the ocean floor 150 feet offshore from Pu'u Keka'a (or Black Rock) in 28 to 56 feet of water depth is ????? Beyond sanity.

Each year Napili Bay, which lies on the North West Shore of Maui, looses much of its beach, and each year the sea brings it back again. (Perhaps at times not as much, but it does eventually bring back the beach) The same thing happens at Pohaku or S-turns way side park in Kahana where at times the drain pipe is completely covered with sand at times covering the coast road, and eventually with another surge of surf, the sea takes it away. Back and forth, that's nature's way.

My long distance daily swims take me ½ mile offshore into the channel, and back - swimming over the sand bottom adjacent to the Maui Kaanapali Villas north of Black Rock.

It is not a dessert of sand, there is life. There are highways of tracks made by sand crabs making their way and burying themselves, and also plant life or polyps which are food for sea life.

If the bottom is dredged, sand that is disturbed and not picked up will drift with the current, which moves north against the trade winds and could possibly settle and not only cover the reefs at Kahekilli - or North Beach Park but also eliminating food and shelter for those reef fish that depend on the reef. Is there anyone that cares?

Let the beach go, for the most part it always comes back. The sand will eventually wash away with storms, and will come back. You cannot hold back the seas. And yes the beaches are receding, but shoring them up for short term???? Again I think we are playing Russian Roulette.

With sea level predicted to rise more than 3 feet by the end of this century, I would be more concerned when water, and sand floods into the pools & hotels.

As a author/writer/lecture I have often been introduce as the "Jane Goodall" of the sea. A compliment of which I am humbled. I've also been introduced as and Expert. I'm not an expert far from it. I barely made it through High School; I've sailed around the Southern Hemisphere of this planet in search of perfect waves after my tenure from Viet Nam—have made many crossing from my home here in Hawaii to the U.S. mainland and have logged more than 30,000 miles of kayaking around the Hawaiian Archipelago over the past 4 decades.

My life with North Pacific Humpback whales from my Sea Kayak, has created a very unique, blessed life, and I am humbled. My education has come from living, breathing, and observing nature. My classroom has been the Sea. It is my home; it is the only place where I find peace of mind.

As I write in my self-published book: "*Earth and sky, woods and fields, lakes and rivers, the mountain and the sea, are excellent schoolmasters, and teach some of us more than we can ever learn from books*". Sir John Lubbock 1834-1913

What we have created in this world, we have to live with and hopefully will begin to THINK, by living peacefully within ourselves -- as a community and in balance with our natural surrounding environment. We have no CHOICE.

Perhaps out of context as to this writing, however something to think about: Daniel Boone, 1734-1820 Frontiersman writes in his journal, *"A squirrel could climb a tree in Maine, and go all the way to the Mississippi without touching the ground".*

We depend on the environment. The forest and oceans give us clean water and air. Our window of time for us is vanishing. We must get together to save this natural world. Jane Goodall

In closing: We and we alone pat ourselves on the back and label ourselves as INTELLIGENT. We have altered this natural planet for our own use only, without very little if any thought of our Natural Environment. This manner of non thinking will come back to haunt us.

On a personal view: My mile long swims that take me from the shoreline and into the depths is the only place where I feel peace from within, I am not alone in a weightless environment. Turquoise rays from the sun surround me, and I feel in this weightless environment that I'm not alone.

Each and every moment of each and every day, the assault that we place upon this natural planet continues. With my passion for nature I feel I'm loosing a portion of my soul, and TRULY ashamed of be a human being.

All things - Earth and the heavens - are connected - we cannot live alone.

Me Ke Aloha Pumehana
With Warm Aloha
Richard Roshon
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February 25, 2019

Mr. Chris Carafino
Email: carafinocarafino@gmail.com

Dear Mr. Carafino:

Subject: Response to Environmental Impact Statement Preparation Notice (EISPN) Comment Letter on the Kāʻanapali Beach Restoration and Berm Enhancement project. Seaward of TMKs (2) 4-4-013:007, (2) 4-4-013:006, (2) 4-4-013:008, (2) 4-4-013:013, (2) 4-4-013:002, (2) 4-4-013:001, (2) 4-4-008:022, (2) 4-4-008:019, (2) 4-4-008:001, (2) 4-4-008:002, (2) 4-4-008:003, (2) 4-4-008:005, Kāʻanapali, Maui, Hawaiʻi.

Thank you for sending your comment letter by email for the Kāʻanapali Beach Restoration and Berm Enhancement project EISPN. In your letter you summarized your consideration of and comments for the proposed project. As the agent for the Applicant, the Department of Land and Natural Resources, we are pleased to provide the following response to your comments.

We understand that the construction methodology presented in the EISPN did not discuss all possible options for recovery and delivery of sand from the offshore sand recovery area to the beach. Your comment letter summarized your research on methods that are currently available to conduct this work, and your assessment of their respective impacts to different recreational and biological communities. In your correspondence you also provide points of contact for practitioners with relevant experience in these methodologies.

Our team, in discussion with the Applicant, has provided an alternate construction methodology in the DEIS, which utilizes some of the suggestions you have provided. This alternate methodology is presented and discussed in Section 1.5 of the Draft Environmental Impact Statement (DEIS).

We acknowledge that there are many parties interested in the Kāʻanapali Beach project area that represent many different interest groups. We hope that continued collaboration with the community will sift out the most beneficial construction practices that will support a successful project design. The final design, means, and methods should be the alternative that minimizes impacts where possible and leaves some options for contractors with different capabilities to bring their unique talents to the project.

Thank you again for your input on this project and we welcome additional comments on the project design during the publication of the DEIS. Should you have any questions or desire additional information please contact me at 808-259-7966, ext. 26 or cconger@seaengineering.com.

Sincerely,

Chris Conger
Coastal Scientist, Permit Agent

Cc: DLNR-OCCL

Email from Chris Carafino to the Office of Conservation and Coastal Lands, Department of Land and Natural Resources, 12/19/2018

I have conducted extensive research online with Hawaii SSBN permits granted and most recently reviewed the attached file delivered to your office with response letter by Mr. Scott Glenn directing all questions to your attention on the subject matter of the Kaanapali Beach Restoration and Berm Enhancement Project.

The report is the second one I have reviewed in recent weeks prepared by Sea Engineering Incorporated, of which I disagree with in part. In particular, section 1.5, Construction Methodology, page 21 of the report. **T**he industrial method suggested and described to replenish the beach area is complex, dangerous, over priced, an outdated technique approach, time consuming and poses an extreme risk to the sensitive marine environment, by way of moving maritime vessels, land based trucks, etc.