# Draft Environmental Assessment

# Heinz Sea Wall Repair

*Prepared for:*

**Ursula Heinz, Heinz Trust**
Private Property Owner

*Prepared by:*

**oceanit**

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# General Information Summary

| | |
|---|---|
| Applicant:: | Ursula Heinz, MD<br>47-119 Kamehameha Highway<br>Kane`ohe, HI 96744 |
| Owner: | Ursula Heinz Trust |
| Consultant/Preparer: | Oceanit<br>Suite 600<br>828 Fort Street Mall<br>Honolulu, HI 96813 |
| Approving Agency: | City and County of Honolulu<br>Department of Planning and Permitting<br>650 South King Street<br>Honolulu, HI 96813 |
| Anticipated Determination: | Finding of No Significant Impact (FONSI) |
| Agencies Consulted: | Department of Land and Natural Resources/<br>Office of Conservation and Coastal Lands<br>City and County of Honolulu<br>Department of Planning and Permitting |
| Community Groups Consulted: | Neighborhood Board<br>Office of Councilman DelaCruz |
| Individuals Consulted: | Dr. Ursula Heinz |
| Tax Map Key: | 4-7-019:076, 080 |
| State Land Use: | Urban District |
| Zoning (LUO): | R-10 Residential District |
| Special Designations: | Special Management Area and Shoreline Setback |

# 1 Proposed Action

## 1.1 Environmental Assessment Requirements

The proposed action is to replace a damaged sea wall system located in the shoreline setback along the shoreline of Kane`ohe Bay. The property is owned by Dr. Ursula Heinz (Heinz Trust), Tax Map Key 4-7-019:076, 080. Analysis and terms presented herein are based on the National Environmental Policy Act (known as NEPA; 42 U.S.C. 4321 et seq.), its corresponding regulations (40 CFR §§1500-1508), and the Hawai`i Revised Statutes 343 (1974).

## 1.2 Technical Characteristics

The project is located on the windward side of the Island of Oahu, Hawai`i on the central western shoreline of Kane`ohe Bay (see Figure 1). Figure 2 shows the vicinity of the project site, Figure 3 shows an aerial photograph of this vicinity, and Figure 4 provides an up-close view of the project site.

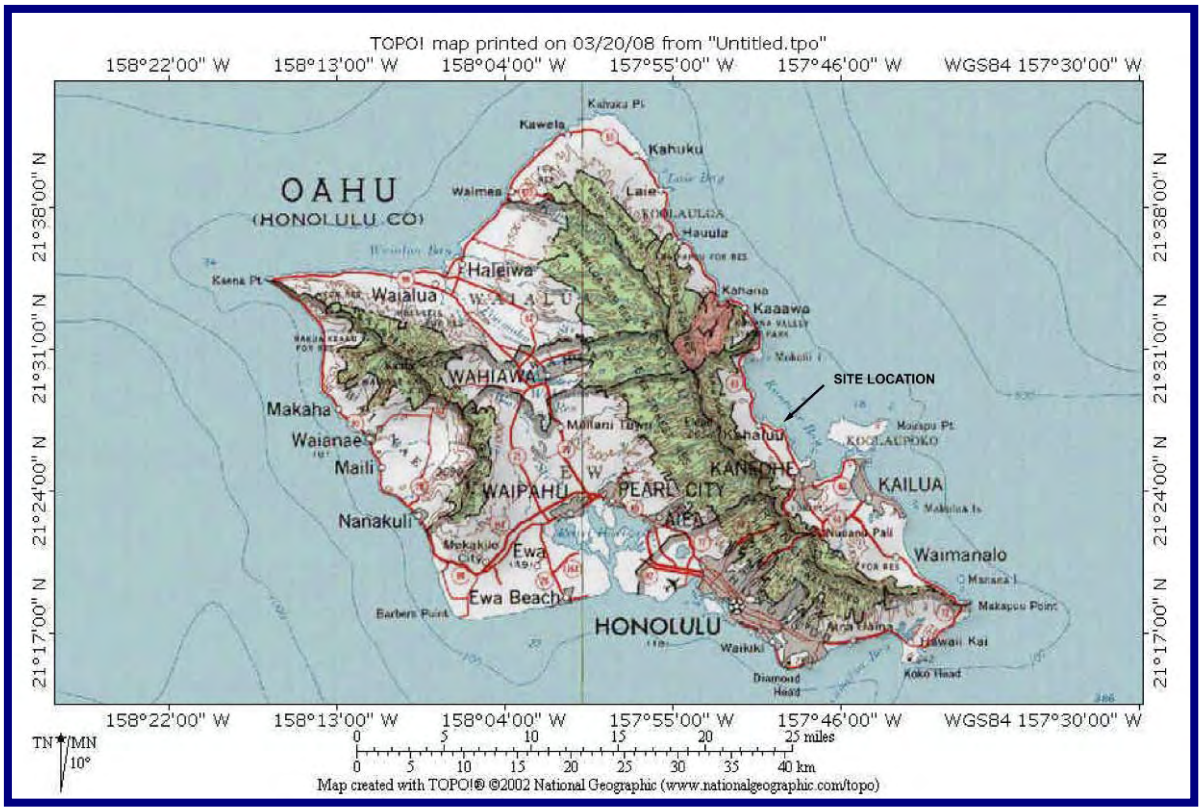


**Figure 1. Project Location Map**

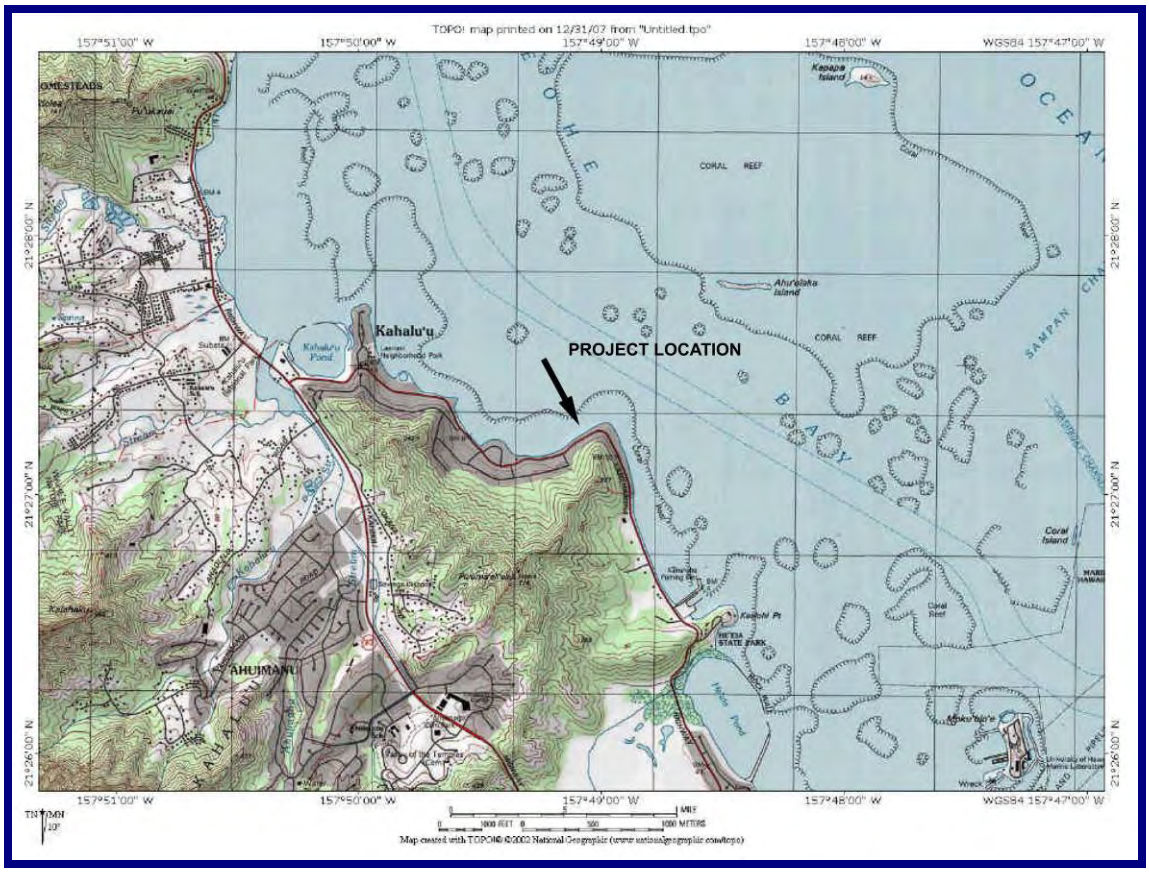


**Figure 2. Project Topographic Map**

**Figure 3. Aerial View of Project Vicinity**


**Figure 4. Aerial View of the Project Site (University of Hawaii Aerial Photo)**

Along a 68-foot section of shoreline, the center of the property is protected by a double wall system. The wall system consists of an outer concrete seawall and an inner concrete rubble masonry (CRM) retaining wall. The space between the walls is filled with rock and gravel. Portions of the outer seawall have collapsed, allowing water to reach the inner retaining wall. A boat channel fronting the property has eroded shoreward, and probably contributed to the collapse of the outer sea wall. The owner has seen evidence that soil from the property lawn is being washed out to the bay under the inner retaining wall. The wall foundation is shallow and the wall could collapse if the rocks were removed. Soil erodes into the boat channel. Concentrated rainwater drainage may damage particular areas of the inner wall, because rainwater often ponds in the yard, indicating that the soils do not drain well. The lot's eastern shoreline is protected by a CRM wall. The western shoreline is protected by a small concrete wall that is being undermined. Portions of the wall system are shown in Figures 5 through 8. Rocks placed along the walls are encroaching into state waters (see Figure 9).

A shoreline survey was conducted on July 28, 2009 and is shown in Figure 11. Oceanit conducted a seawall evaluation on January 25, 2007. The letter documenting this evaluation in included as Appendix B.

**Figure 5. West Side of Central Double Wall System (taken 1/25/07)**

**Figure 6. Concrete Wall on West Section of the Wall System (taken 1/25/07)**

**Figure 7. Eastern Portion of the Heinz Wall System (taken 1/25/07)**

**Figure 8. CRM Wall on Eastern Side of Lot (taken 1/25/07)**

**Figure 9. Rocks Encroaching in State Waters (taken 1/25/07)**

The proposed solution is to replace the existing CRM and concrete seawalls with a sheet pile wall that follows the shoreline/property line. Sheet piles are driven into the ground to a depth sufficient for stabilization and to prevent scour under the wall. Sheet piles have an advantage over other wall systems in that no toe excavation and therefore no dewatering are needed. So the environmental impact is less than for other wall systems. Sheet piles are made of steel, aluminum, concrete, vinyl, or fiber reinforced plastic. Non-metal sheets are preferred because they do not corrode; however, the material will be selected based on structural calculations and availability. If necessary, tiebacks will be attached to hold the sheets against soil pressure. A typical sheet pile design is shown in Figure 10.

## 1.3 Economic Characteristics

As the proposed action would occur on private property, the seawall replacement will be privately funded by the property owner, Dr. Ursula Heinz. The economic benefits of the seawall replacement are negligible to the local community.

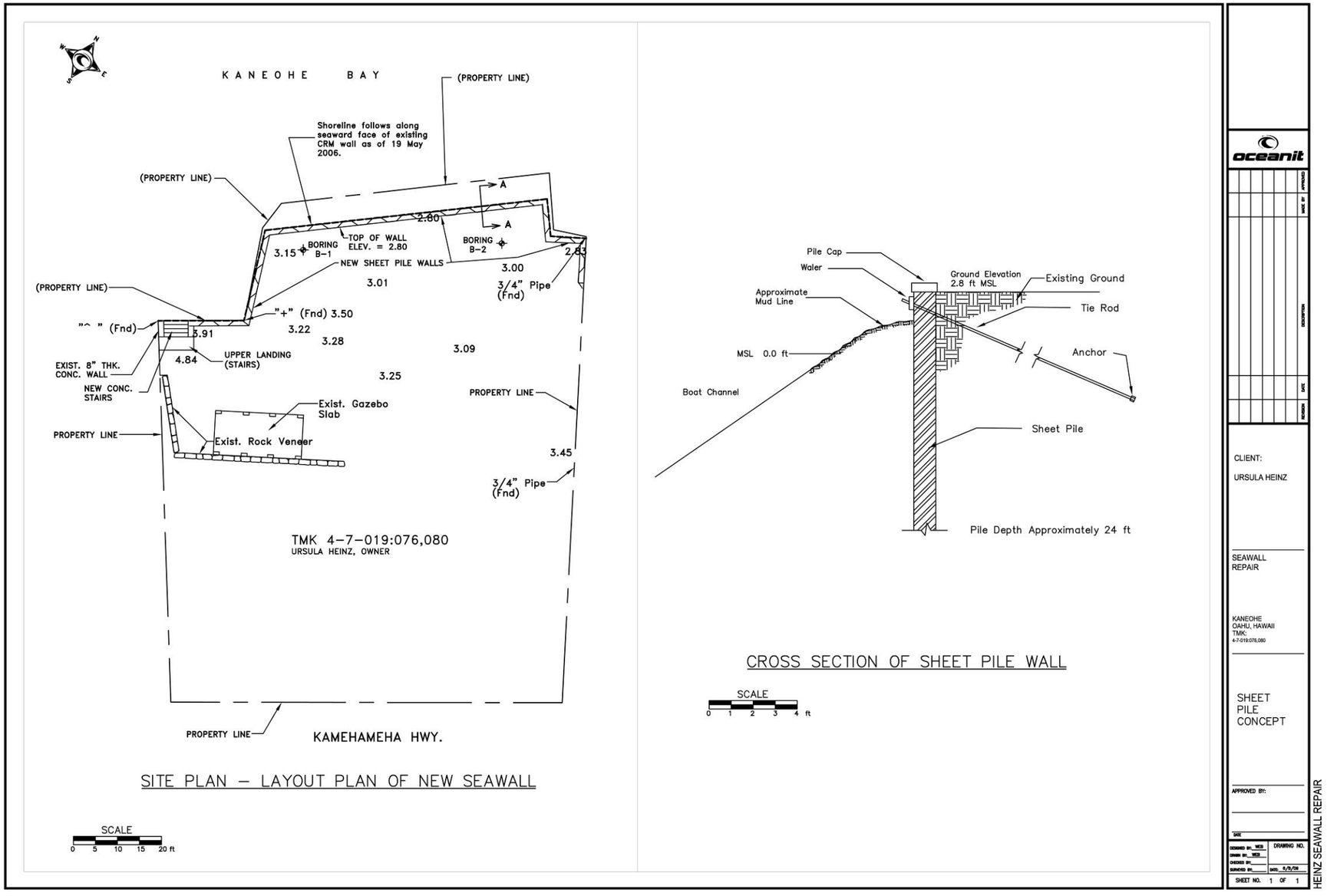


**Figure 10. Sheet Pile Concept Design**

## 1.4 Social Characteristics

The social characteristics of the proposed seawall replacement are negligible because the proposed action would occur on private property and have little effect in Kane`ohe Bay. Neighboring property owners may be affected by noise and water turbidity during seawall construction. These potential effects are discussed in Section 4. In general, Kane`ohe Bay is surrounded by residential and agricultural areas and by the Marine Corps Base, Hawai`i. It is an important area for recreational, commercial, and research uses and also for fishing. The current beneficial social uses of the environment include access by the landowner and neighbors to Kane`ohe Bay for kayaking or other water recreation. The Kane`ohe Bay vicinity is discussed more in depth in the proposed project area description in Section 2.1.

## 1.5 Environmental Characteristics

The Heinz wall system is located on the shoreline along the west side of Kane`ohe Bay (see Figure 2). The property's shoreline faces north-northwest, as shown in project vicinity map (see Figure 3). The Heinz property is partially filled with dredged material from Kane`ohe Bay, and the filled area has a grass lawn and several coconut trees (see Figure 10). The property is exposed to wind and small waves approaching from the north through the east. Incoming wave size is limited by shallow water directly in front of the Heinz property. As shown in aerial photos (see Figures 3 and 4), a shallow rock and sand fringing reef flat extends about 1000 feet to the north. Along the shoreline, a dredged boat channel runs past the property and out through the reef flat to a 40-foot-deep ship channel. These channels are shown in Figure 4.

## 1.6 Time Frame

Seawall construction will probably start in Spring of 2010 and would require about one to two months. This environmental assessment is the first step in the planning process. No public funds, such as those of the State of Hawai`i or City and County of Honolulu, would be used for the proposed project.

## 1.7 Funding and Source

The Heinz seawall proposed project will be privately funded by the property owner.

**Figure 11. Property Yard along Shoreline**

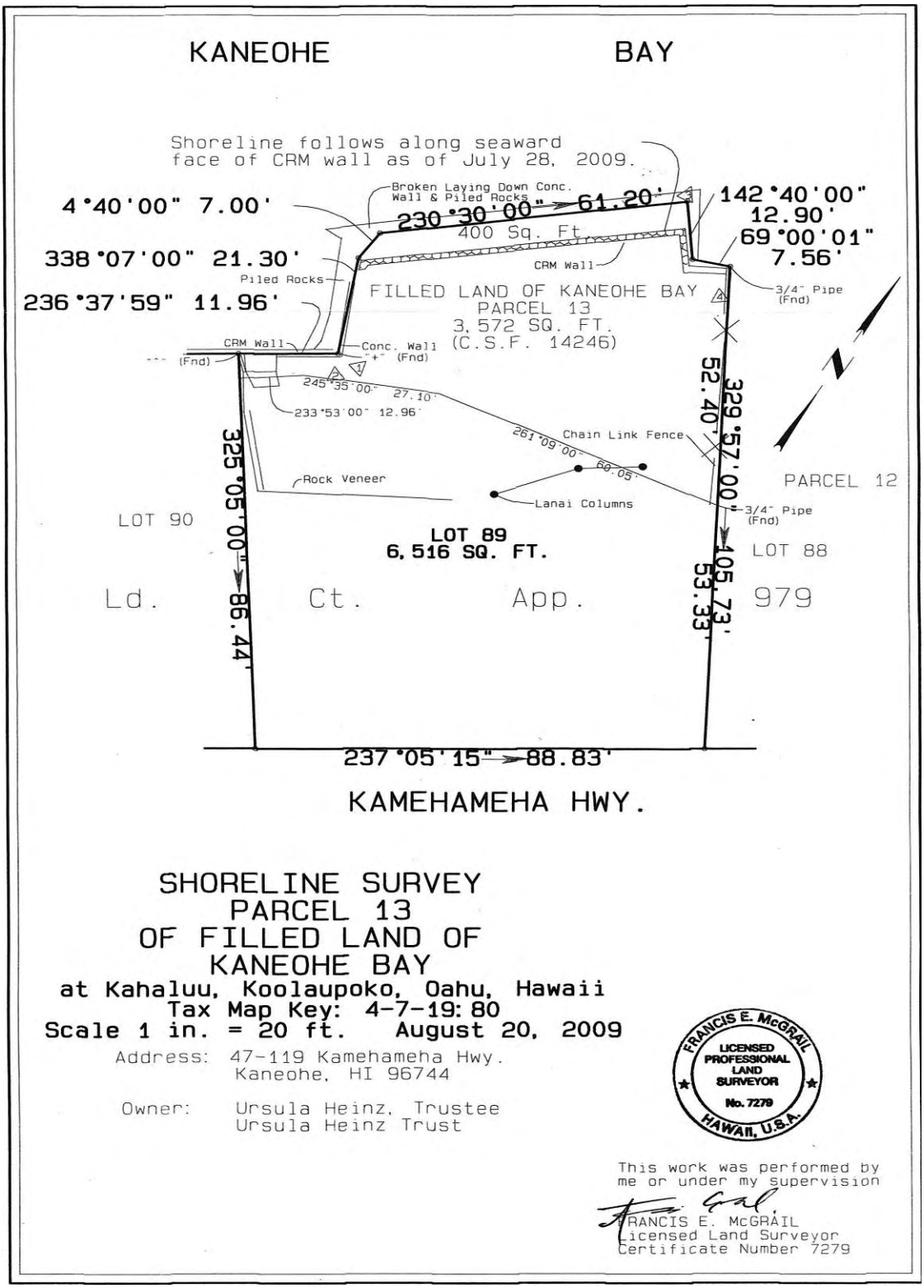


**Figure 12. 2009 Shoreline Survey of Heinz Lot**

# 2 Description of Affected Environment

## 2.1 Kane`ohe Bay

The project is on the shoreline of the central portion of Kane`ohe Bay on the windward side of the island of O`ahu. The project site is located on the north side of Kamehameha Highway about one mile north of He`eia Kea Boat Harbor and abuts the Kane`ohe Bay shoreline. The property is fronted by a partially damaged seawall and retaining wall. Prior to a project site visit, Oceanit gathered general information on the Kane`ohe Bay vicinity. On December 12, 2007, biologists made an underwater visual survey of the near shore bottom during the early morning at low tide (about 0.0 feet MLLW).

Kane`ohe Bay is a large embayment protected by a fringing reef with numerous emergent patch reefs within the inner lagoon area. In most areas, the inner shoreline of the bay consists of a shallow reef flat that changes from fine sand and mud at the shore to coarse sand at the reef edge in 2 to 6 feet of water. The edge of the reef varies from 100 feet to well over 1000 feet off shore with the shallow back reef supporting sand-dwelling communities and very limited coral or algae growth. Kane`ohe Bay is separated by a barrier reef from deeper ocean waters. Encompassing about 11,000 acres, the bay contains a number of islands, a barrier reef, fringing reefs, patch reefs, sand bars, mud flats, mangrove areas, small boat harbors, and two boat channels.

The Hawaiian Stilt, an endangered species, is found in Kane`ohe Bay. The best stilt habitat is at Nu`upia Ponds Wildlife Management Area near the Marine Corps Base Hawai`i. A species of concern in Kane`ohe Bay is the inarticulated brachiopod (*Lingula reevii)*, which is only known to occur in the shallow, sandy reef flats in the bay. Another species of concern found in Kane`ohe Bay is the Hawaiian reef coral, *Montipora dilitata*. None of these species were observed during the December 2007 site survey, and the habitat near the wall is different from these species' natural habitats.

## 2.2 Project Site Shoreline

Some of the land inside the Heinz wall system is filled by dredged sediments from the bay, and coconut trees and a grass lawn grow here. The bottom seaward from the outer seawall slopes quickly into a small boat channel that runs parallel to the shoreline (Figures 4 and 7). Deep water waves and tsunami do not typically reach the project site, and there is no sand beach at the site. The seawall location is not part of a scenic vista or plane of view and cannot be seen from the Kamehameha Highway side of the property.

The reef fronting the subject property varies from 650 to 1200 feet wide and averaged 1 to 4 feet deep on the morning of the survey. The small boat channel is roughly 30 to 40 feet wide along approximately 1200 feet of shoreline and fronts a dozen shoreline homes. This shoreline channel is connected to the open bay through a 650 foot-long, 20- to 30-foot-wide channel across the shallow back reef flat. Each of the homes fronting the shoreline channel has constructed a seawall at the shoreline.

The sea bottom near the project site contains up to 33% terrestrial sediments (University of Hawai`i CISNet Kane`ohe Bay 2008), suggesting that eroded sediment from the wall probably drops into the boat channel. Although trade wind waves and north swell must pass the outer Kane`ohe Bay barrier reef and traverse more than 6,000 feet of reef flat and the Ship Channel to reach the project site, there is sufficient water motion to slowly erode exposed shoreline soil and sediments.

## 2.3 Shoreline Use and Zoning

The proposed project site for the Heinz property is within the special management area and the shoreline setback. The special management area is the land extending inland from the shoreline as defined in Hawai'i Revised Statues 205A, and subject to the Coastal Zone Management Act of 1972 (as amended through public law 104-150, The Coastal Zone Protection Act of 1996). The setback is 40 feet from the certified shoreline.

The bay has numerous channels dredged through the shallow reef flat to allow boat access for Kane`ohe Bay's residential, agricultural, military, and recreational uses. Recreational boating is common around Kualoa Regional Park and Mokoli`i Island, which are located at the north end of the bay. The south end of the bay is enclosed on three sides by the town of Kane`ohe and the Marine Base. A number of shoreline communities dredged channels through the shallow back reef flat up until the 1960s, providing secure mooring areas close to shore.

## 2.4 Flora, Fauna, and Habitat Survey

On December 12, 2007, an underwater visual survey of the near shore bottom was conducted during the early morning when the tide was low (about 0.0 feet MLLW). Data was recorded and digital photographs were taken. The path of the underwater survey (Figure 12) clearly shows the wide, shallow, fringing reef flat seaward of the project site. The near shore intertidal and channel areas fronting the Heinz property and properties on either side were inspected. The access channel through the back reef area was examined, including the shallow reef front in Kane`ohe Bay. The survey included inspection of the following areas inspected based upon physical conditions and populations of fish, invertebrate, and algae communities supported. All these areas are mapped in Figure 14.

- Shoreline channel bottom
- Shoreline channel slopes
- Bay access channel bottom
- East slope of bay access channel
- Mouth of bay access channel
- West slope of bay access channel
- Shallow reef flats between the boat channel in from of the Heinz property and the main body of Kane`ohe Bay

In general, sea bottom cover and water quality at the project site are typical of near shore areas in Kane`ohe Bay. Research prior to the site survey found that throughout the bay the narrow reef face typically supports almost 100% coral cover and drops nearly vertically to the talus slope (broken rock at the bottom) and mud bottom at depths varying from 10 to 30 feet. Water quality varies considerably over the shallow near shore reefs of Kane`ohe Bay and is dependent upon tide, proximity to stream mouths, wind and wave energy, and recent rainfall. At the time of the site survey, underwater visibility was less than 2 feet close to shore, gradually improving to 15 feet at the mouth of the access channel (see Figure 13). Generally, water quality is affected by several factors. Rainfall washes sediment and nutrients into the bay through about a dozen streams. Tides and waves drive water into the bay which flows out through the two main channels. Before 1977–1978, sewage was dumped into the bay, but since then sewage has been diverted to deep ocean outfalls and near shore water quality has improved. Water quality and bottom cover details are included in the flora, fauna, and habitat descriptions for the aforementioned inspection areas (shoreline channel bottom and slopes; bay access channel bottom, slopes, and mouth; and shallow reef flats).

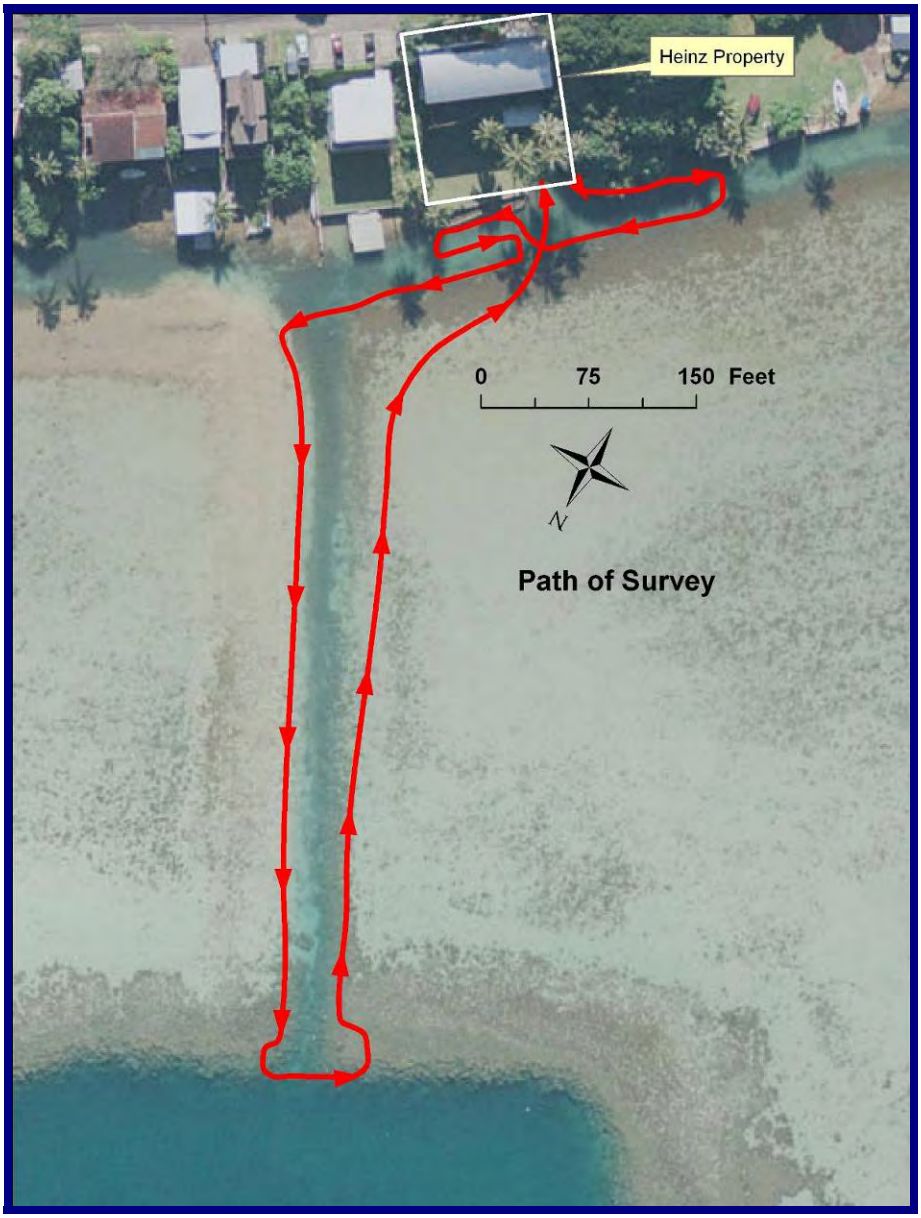


**Figure 13. Path of the Underwater Site Survey Conducted December 12, 2007**


**Figure 14. Inspection Areas of Underwater Site Survey**

### 2.4.1 Shoreline Channel Bottom

Fine silt and decomposing plant material line the bottom of the boat channel fronting the subject and adjacent properties. The channel bottom is devoid of coral, but clumps of the introduced macro algae *Gracilaria salicornia* are numerous accumulating in a mat up to 6 inches thick in some areas. The water depth varies from four to eight feet. A classical representative of lagoon-like habitats, the up-side-down jellyfish (*Cassiopea medusa*) was seen in the channel as well as schools of small baitfish, likely nehu or Marquesian sardines.

### 2.4.2 Shoreline Channel Slopes

The slopes of the channel parallel to the shoreline have occasional young colonies of coral, primarily lace coral (*Pocillopora damicornis)* and finger coral (*Porites compressa*) attached to solid substrate and larger colonies of rice coral (*Montipora capitata)* that may have been transplanted as they do not appear firmly affixed to the bottom. The slope on the seaward side of the channel consists of a sand and rubble substrate with occasional rocks, whereas the landward slope (of each property) consists mainly of rocks, likely placed there as an early

shoreline stabilization effort. *Gracilaria* covers much of the substrate on either side of the channel. The pink sea cucumber (*Opheodesoma spectabilis)* is common on the *Gracilaria* beds.

### 2.4.3 Bay Access Channel Bottom

The bottom of the access channel grades from fine sand and mud with accumulations of algae nearest shore, to coarse and fine sand with occasional large colonies of corals, out near the reef edge. The bottom of the channel appears to have silted in over the years and occasional large clumps of coral and reef debris liter the bottom and support coral growth. The east (northeast) and west (southwest) side slopes of the access channel provide significantly different communities.

### 2.4.4 East Slopes of Access Channel

The eastern slopes support numerous well developed coral colonies, primarily finger coral (*Porites compressa*) up to several feet in diameter with associated fish and invertebrate communities. Large colonies of rice coral (*Montipora capitata)* were also common showing both the plate and fingered formations. At the upper edges of the slope occasional colonies of rose coral (*Pollilopora meandrina*) and lace coral could be found on stable reef rubble. Sand patches and rubble found on the western slopes (see Section 2.3.5) are absent, and the vertical structure created by the coral supports diverse vertebrate and invertebrate populations. The green alga *Dictyosphaeria cavernosa* was also observed.

### 2.4.5 Mouth of Access Channel

The mouth of the access channel, the furthest point examined during this survey, is home to numerous coral heads and reef fish. The size of the coral heads suggest that this reef has not been disturbed for a long period of time as it was at one point in the channels. Improved water quality may also play a role in the health of the reef at the mouth of the channel where the full range of reef fish typical of Kane`ohe Bay can be seen. On the day of the study, visibility was over 15 ft, compared to 10 feet or less in the channels and less than 5 feet in the near shore channel.

### 2.4.6 West Slopes of Access Channel

In contrast to the east slopes of the access channel, substrate on the west slopes of the access channel represent a transition between the sandy silt found in the channels and the sandy rubble found on the reef flats. The abundance of rubble and distinct coloration makes it appears that during the creation of the channel the dredged material was sidecast here. This slope was largely void of any coral. An occasional patch of macro algae was encountered, including *Acanthophora specifera*, *Padina* sp. and the invasive red alga *Kappaphycus alvarezii*. Holes in the sandy areas suggest the presence of healthy populations of clams, worms and other invertebrates below ground.

### 2.4.7 Shallow Reef Flats

The shallow reef flats are a mosaic of coral patches, rubble patches and sand patches. The coral are less developed and sparse in relation to coral on the fringes of the access channel opening to the bay and along the western slopes of the access channel. Water depth ranges from 0.5 feet to 3 feet depending on the tide and wave action

### 2.4.8 Species Observed

The following marine plants and animals were identified during the field survey.

| Species Observed during Underwater Site Survey | | |
|---|---|---|
| **Common Name** | **Scientific Name** | **Origin** |
| Macro algae | *Gracilaria salicornia* | introduced |
| Red alga | *Kappaphycus alvarezii* | introduced |
| Green alga | *Dictyosphaeria cavernosa* | indigenous |
| Spiny seaweed | *Acanthophora spicifera* | introduced |
| Brown alga | *Padina sp.* | introduced |
| Nehu | *Encrasicholina purpurea* | endemic |
| Marquesian sardines | *Sardinella marquesensis* | introduced |
| Pink sea cucumber | *Opheodesoma spectabilis* | |
| Lace coral | *Pocillopora damicornis* | |
| Finger coral | *Porites compressa* | |
| Rose coral | *Pollilopora meandrina* | |
| Rice coral | *Montipora capitata* | |
| Jelly Fish | *Cassiopea medusa* | |
| Tube worm | | |
| Nudibranch | | |

**Table 1. Species Observed during Underwater Site Survey on December 12, 2007**

## 2.5 Historical, Archaeological, and Cultural Resources

### 2.5.1 Cultural Impact Assessment

The project is located on the shoreline near the eastern border of the Kahalu`u ahupua`a, one of nine on Kane`ohe Bay. Kane`ohe Bay is culturally important for fishing and was historically divided among ahupua`a. There were many fish ponds around the bay. The inland area was also very productive (Hawaiian Voyaging Society website). After conquering O`ahu, Kamehameha I took ownership of the Ahupua`a and distributed other lands to his warrior chiefs. Kahalu`u was inherited by Kamehameha's sons Kamehameha II and III.

There are several historic sites in the project area that are on the national and state register of historical places including He`eia Fishpond and Kahalu`u Fishpond. He`eia Fishpond is over 500 years old. Owned by Kamehameha Schools, the pond was formerly leased for growing fish and limu. It is now used for cultural education and training as well as production. Volunteers are heavily involved in restoring the pond and in conducting educational programs. A number of books and research papers have been written about He`eia Fishpond, and the history is relatively well known. Kahalu`u Fishpond (Kahouna Fishpond), west of Wailau Point, is privately owned. It may have been in use for fish harvesting until about 1960. Adjacent land area is used for weddings and other gatherings. The fishpond wall was modified in the 1960s (Kahalu`u Community Master Plan Background Report, 2005). Other sites of interest include the Haluakaiomaoana Heiau, which was formerly located adjacent to Kahalu`u Fishpond on Wailau Point. The heiau was destroyed in 1911 to build a cannery, and a church now occupies the site. There is another small, unnamed, privately owned fishpond called "Senator Fong's Fishpond" located east of Wailau Point.

# 3 Alternatives

## 3.1 Alternative 1: No Action

"No Action" would be an unacceptable alternative because erosion and further wall destruction would continue, and the property owner must remove damaged pieces of the sea wall that are encroaching on State of Hawai`i waters. If the property owner does not take action, the State of Hawai'i may issue a violation. Further wall degradation would result in loss of Heinz property. Also, eroded material would continue to fall into the shoreline boat channel and potentially pollute water in the near shore area.

## 3.2 Alternative 2: Remove Existing Wall System without Replacement

Removal of the existing sea wall system without replacement would expose the Heinz property to severe erosion. Severe soil erosion would result in loss of property. Soil and rock erosion would pollute the near shore area and increase water turbidity, suspended materials, and sediments. Eventually, erosion could threaten the structural integrity of the house on the property site. Removal of the existing wall system without replacement is not an economically viable or environmentally sound alternative.

## 3.3 Alternative 3: Reinforced Concrete Seawall

Under Alternative 3, the entire existing double wall system would be replaced with a reinforced concrete seawall. Replacement of the Heinz wall system would require (1) removal of damaged sections of the inner retaining wall; (2) soil excavation for a new wall footing; and (3) construction of the reinforced concrete wall. The construction of a reinforced concrete wall would be difficult without heavy construction equipment. The project site lacks access for the heavy construction equipment, as shown in Figure 14. Excavation for a wall footing might require dewatering and could increase water pollution. A reinforced concrete wall is also expensive.

## 3.4 Alternative 4: Concrete Rubble Masonry (CRM) Seawall

Under Alternative 4, the entire existing double wall system would be replaced with a CRM seawall in a process similar to that required for a concrete wall. However, the soil at the site will not support the weight of a rock wall without a special foundation such as micro piles. Pile installation is typically expensive. And dewatering would likely be required for the footing excavation. A CRM wall does not appear to be economically a good choice.

## 3.5 Alternative 5: Sheet Pile Seawall

Sheet piles have advantages over other wall systems because no footing excavation is needed, and therefore no dewatering would be required. However, sheet piles do require pile driving equipment that can handle the sheet lengths required. Access for the equipment is restricted but appears to be possible. Sheets can be tied back to buried anchors on the property, which would allow shorter sheets to be used and possibly smaller installation equipment. Sheet piles are the alternative that is the most environmentally friendly. They are also technically straight forward to design and place. Sheet piles are the recommended shore protection system for the Heinz property. A conceptual design for a sheet pile system is shown in Figure 10.

**Figure 15. Construction Equipment Access Area**

*Top left:* Only available access area available for construction equipment through neighboring property. View is from backyard of property, facing southwest. *Top right:* View going down access to backyard of property, viewed facing northwest. *Bottom:* Seaward view of access from area from west of house.

# 4 Potential Impacts and Mitigation

## 4.1 Flora, Fauna, and Habitat Impacts

Even though removal and replacement of the existing seawall will likely cause turbid water around the work area, long-term impacts to local floral, fauna, or habitat are not expected. Removal of material from the collapsed wall and removal of encroaching rocks will suspend sediment in nearshore waters. The construction area will be surrounded by a silt curtain or other BMPs to minimize any spread of turbid water. Excavated material would be temporarily stored outside the setback or removed from the property. The positive effects of a sheet pile wall are that it will prevent soil and vegetation from the property from being eroded into Kane`ohe Bay and polluting the water. The lot is less than 100 feet wide at the shoreline and any turbidity will be temporary.

There do not appear to be any critical habitats or species that would be adversely impacted by typical construction methods used to replace the subject seawall. The marine environment near the project site was modified during the 1960s by dredging a channel through the reef flat to the open bay. This change led to an increase in coral reef habitat along the western side of the access channel and a transition of the close near shore environment to a lagoon-like habitat. Additional small corals grow naturally on the side slopes of the shoreline channel. Other than these changes, the marine flora and fauna near the subject property are typical of those expected in this area of Kane`ohe Bay.

## 4.2 Historical, Archaeological, and Cultural Resource Impacts

None of the historic sites mentioned in Section 2 are in immediate proximity to the property. Part of the property is filled land where no buried artifacts are likely. The landowner is not aware of any cultural activities that are/were practiced on or near the property or would be affected by the proposed plans.

No impacts on the neighboring community are expected under Alternatives 3, 4, or 5. However, if no action is done (Alternative 1) or the sea wall is removed without replacement (Alternative 2), soil erosion could eventually damage neighboring properties. Replacement of the damaged seawall will not change access to or uses of Kane`ohe Bay.

## 4.3 Mitigation

Under Alternatives 3, 4, and 5, best management practices will be used to minimize water pollution during construction. These practices include using silt curtains or other barriers during construction and placement of stockpiled materials inland as far as possible to minimize potential runoff. Unused construction materials and any debris will be removed from the shoreline area. No other mitigation is planned.

# 5 Significance Criteria

The expected determination is a Finding of No Significant Impact (FONSI), and significance analysis is provided below.

(1) **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource:** The project does not substantially change the existing property configuration or use. The existing seawall is broken and will be removed. An interior CRM retaining wall will be replaced with a sheet pile seawall. There are no known cultural resources at the site primarily because the location of the seawall is on land filled from dredging Kane`ohe Bay. There is no irrevocable commitment to loss or destruction of any natural or cultural resource.

(2) **Curtails the range of beneficial uses of the environment:** The current beneficial uses of the environment include access by the landowner and neighbors to Kane`ohe Bay for kayaking or other recreation. This access will not change. Another beneficial use of the environment is the use of property for recreation and relaxing near the water. Without the proposed seawall, the property along the water will be lost.

(3) **Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders:** The purpose of Chapter 344, HRS is to "establish a state policy which will encourage productive and enjoyable harmony between people and their environment, promote efforts which will prevent or eliminate damage to the environment…" Repairing or replacing the damaged seawall prevents fill sediments and vegetation from being washed into Kane`ohe Bay, thereby polluting the water and possibly damaging marine life on the nearby fringe reefs.

(4) **Substantially affects the economic or social welfare of the community or state:** The proposed repairs will have no major affect on the economic or social welfare of the community or state other than providing income for consultants and contractors. However, the repairs will be a large financial burden to the property owner, and without repairs, erosion could eventually damage the home on the property.

(5) **Substantially affects public health:** The only public health issue for a seawall repair project is water pollution. The project is small, short term, and best management practices such as silt curtains can be used during construction to minimize turbid water escaping the work area.

(6) **Involves substantial secondary impacts, such as population changes or effects on public facilities:** The proposed project is for a private lot with a single family home. There are no public facilities at the site other than an old, little used, boat channel that serves a few private residences. If the seawall is not repaired, eroded soil would wash into the channel. Population is completely unaffected by the project.

(7) **Involves a substantial degradation of environmental quality:** If the wall is not repaired as proposed, there will be some local degradation to water quality. During repair, the nearby water may become turbid temporarily, but BMPs will be used.

(8) **Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions:** The proposed repair is small in scope and affects only the immediate property. It is not part of a larger plan that could cause considerable impact to the environment.

(9) **Substantially affects a rare, threatened, or endangered species, or its habitat:** The Hawaiian Stilt, an endangered species, is found in Kane`ohe Bay. The

best Stilt habitat is at Nu'upia Ponds Wildlife Management Area near the Marine Corps Base Hawai'i. A "species of concern" in Kane`ohe Bay is the inarticulated brachiopod (*Lingula reevii)*, which is only known to occur in the shallow, sandy reef flats in the Bay. Another species of concern found in Kane`ohe Bay is the Hawaiian reef coral, *Montipora dilitata*. None of these species were observed at the site and none should be substantially affected by repairing or replacing a seawall along the eroding shoreline, since the habitat near the wall is different from the natural habitat.

(10) **Detrimentally affects air or water quality or ambient noise levels:** Nearby water will likely become turbid during seawall construction. Best management practices, such a silt curtains, will minimize release of turbid water from the work site. Since soil is wet or underwater at the work site, release of air pollutants such as dust is highly unlikely. Use of small construction equipment will cause a temporary increase in noise but not to detrimental levels. Large construction equipment cannot access the site.

(11) **Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters:** The project is to repair/replace a damaged seawall that has been in place on the shoreline of Kane`ohe Bay for many years. The existing wall was damaged by slow erosion from locally generated wind waves. A wide, shallow fringing reef is located mauka from the property, and deep water waves and tsunami do not typically reach the project site. There is no sand beach at the site.

(12) **Substantially affects scenic vistas and viewplanes identified in county or state plans or studies:** The seawall location is not part of a scenic vista or viewplane. Its low height means that the wall would not be very noticeable unless an observer was in a boat nearby. Homes and vegetation at higher elevation essentially block any view of the wall from Kamehameha Highway.

(13) **Requires substantial energy consumption:** Other than fuel to run equipment during construction, the new seawall will require no energy consumption.

# 6 Permits, Variances, and Approvals

A. Shoreline Setback Variance, City and County of Honolulu, Department of Planning and Permitting. Status: in preparation
B. Building Permit, City and County of Honolulu, Department of Planning and Permitting. Status: Will be prepared after designs are complete
C. Certified Shoreline Approval, Department of Land and Natural Resources Office of Conservation and Coastal Lands

# 7 Contacts with Community Groups and Agencies

A. Letter to Councilman Dela Cruz's office with project description. No response.

B. Letter to Kahalu`u Neighborhood Board #2 with project description. No response.

C. Discussion and site visit with the Department of Land and Natural Resources Office of Conservation and Coastal Lands on shoreline location.

D. Discussion with planner at the City and County of Honolulu Department of Planning and Permitting.

# 8 References

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NOAA National Marine Fisheries Service, "Species of Concern, Inarticulated brachiopod *Lingula reevii,*

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University of Hawai'i CISNet Kane`ohe Bay 2008

# Appendix A: Marine Biological Evaluation, December 2007

MARINE BIOLOGICAL EVALUATION

Kaneohe Bay at the Heinz Property

47-119 Kamehameha Highway

December 12, 2007

## Background

The project site is on the shore of the central portion of Kaneohe Bay on the windward side of the island of Oahu. Kaneohe Bay is a large embayment protected by a fringing reef with numerous emergent patch reefs within the inner lagoon area. In most areas, the inner shoreline of the bay consists of a shallow reef flat grading from fine sand or mud at the shore to coarse sand at the reef edge in 2 to 6 feet of water. The edge of the reef varies from 100 feet to well over 1000 feet off shore with the shallow back reef area supporting sand dwelling communities and very limited coral or algae growth. Up until about the 1960s a number of shoreline communities dredged channels through this shallow back reef flat to allow boat access to the open bay and to provide secure mooring areas close to shore. One such channel exists fronting the Heinz property providing access to the reef face about 650 offshore. Throughout the bay the narrow reef face typically supports almost 100% coral cover and drops nearly vertically to the talus slope and mud floor of the bay at depths varying from 10 to 30 feet. Water quality varies considerably over the shallow nearshore reefs of Kaneohe Bay and is dependent upon tide, proximity to stream mouths, wind and wave chop energy, and recent rainfall. Underwater visibility at the time of the visit was less than 2 feet close to shore, gradually improving to 15 feet at the mouth of the access channel.

## Methods

On December 12, 2007, two Oceanit biologists conducted an underwater visual survey of the nearshore bottom during the early morning when the tide was low (about 0.0 feet MLLW). Data was recorded and digital photographs were taken. The nearshore intertidal and channel areas fronting the Heinz property and properties on either side were inspected. The access channel through the back reef area was examined out to and including the shallow reef front in Kaneohe Bay. The survey included inspection of the channel and its slopes fronting the property, inspection of the access channel that connects to the main body of Kaneohe Bay and its slopes, and inspection of the shallow reef flats between the channel in front of the property and the main body of Kaneohe Bay.

## Results

The reef fronting the subject property varies from 650 to 1200 feet in width and averaged 1 to 4 feet deep on the morning of the survey. A shoreline channel has been dredged parallel to the shoreline roughly 30 to 40 feet wide along approximately 1200 feet of shoreline fronting a dozen shoreline homes. This shoreline channel is connected to the open bay through a 650 foot-long, 20 to 30 foot-wide channel across the shallow back reef flat. Each of the homes fronting the shoreline channel has constructed a seawall at the shoreline.

The areas inspected can be broken down into assemblages based upon physical conditions and populations of fish, invertebrate, and algae communities supported:

1) Shoreline Boat Channel Bottom

Fine silt and decomposing plant material lines the bottom of the boat channel fronting the subject and adjacent properties. The channel bottom is devoid of coral, but clumps of the introduced macro algae *Gracilaria salicornia* are numerous accumulating in a mat up to 6-inches thick in some areas. The water depth varies from four to eight feet. A classical representative of lagoonal habitats, the up-side-down jellyfish (Cassiopea medusa) was seen in the channel as well as schools of small baitfish, likely nehu or marquesian sardines.

2) Shoreline Channel Slopes

The slopes of the channel parallel to the shoreline have occasional young colonies of coral, primarily lace coral (*Pocillopora damicornis)*and finger coral (*Porites compressa*) attached to solid substrate and larger colonies of rice coral (*Montipora capitata)* that may have been transplanted as they do not appear firmly affixed to the bottom. The slope on the seaward side of the channel consists of a sand and rubble substrate with occasional rocks, whereas the landward slope (of each property) consists mainly of rocks, likely placed there as an early shoreline stabilization effort. *Gracilaria* covers much of the substrate on either side of the channel. The pink sea cucumber *Opheodesoma spectabilis* is common on the *Gracilaria* beds.

3) Kaneohe Bay Access Channel Bottom

The bottom of the access channel grades from fine sand and mud with accumulations of algae nearest shore, to coarse and fine sand with occasional large colonies of corals, out near the reef edge. The bottom of the channel appears to have silted in over the years and occasional large clumps of coral and reef debris liter the bottom and support coral growth. The east (north-east) and west (south-west) side slopes of the access channel provide significantly different communities.

4) West slopes of Access Channel

Substrate on the west slopes of the access channel represent a transition between the sandy silt found in the channels and the sandy rubble found on the reef flats. The abundance of rubble and distinct coloration makes it appears that during the creation of the channel the dredged material was sidecast here. This slope was largely void of any coral. An occasional patch of macro algae was encountered, including *Acanthophora specifera*, *Padina* sp. and the invasive red alga *Kappaphycus alvarezii.* Holes in the sandy areas suggest the presence of healthy populations of clams, worms and other invertebrates below ground.

5) East Slopes of Access Channel

In contrast to the western slopes of the access channel, the eastern slopes support numerous well developed coral colonies, primarily finger coral (*Porites compressa*) up to several feet in diameter with associated fish and invertebrate communities. Large colonies of rice coral (*Montipora capitata)* were also common showing both the plate and fingered formations. At the upper edges of the slope occasional colonies of rose coral (*Pollilopora meandrina*) and lace coral could be found on stable reef rubble. Sand patches and rubble are absent, and the vertical structure created by the coral supports diverse vertebrate and invertebrate populations. The green alga *Dictyosphaeria cavernosa* was also observed.

6) Shallow Reef Flats

The shallow reef flats are made up of a mosaic of coral patches, rubble patches and sand patches. The coral are less developed and sparse in relation to coral on the fringes of access channel opening to the Bay and along the western slopes of the access channel. Water depth ranges from 0.5 feet to 3 feet depending on the tide and wave action.

7) Mouth of Access Channel

The mouth of the access channel, the furthest point examined during this survey, is home to numerous coral heads and reef fish. The size of the coral heads suggest that this reef has not been disturbed for a long period of time as it was at one point in the channels. Improved water quality may also play a role in the health of the reef at the mouth of the channel. At the mouth of the channel the full range of reef fish typical of Kaneohe Bay can be seen. On the day of the study, visibility was over 15 ft, compared to 10 feet or less in the channels and less than 5 feet in the nearshore channel.

Interpretation

The marine environment near the project site was modified approximately a half century ago by the dredging of a channel through the reef flat to the open bay. This change has led to an increase in coral reef habitat along the western side of the access channel and a change in the very near shore habitat making it more like a lagoon. Additional small corals grow naturally on the side slopes of the shoreline channel, but it appears that some larger colonies may have been transplanted to these areas. Other than this change, the marine flora and fauna off from the subject property is typical of that expected from this area of Kaneohe Bay. There do not appear to be any critical habitats or species that would be adversely impacted by any reasonable construction methods used to restore the subject seawall.

The following marine plants and animals were identified during the field survey:

*Gracilaria salicornia* (introduced)

*Kappaphycus alvarezii* red alga (introduced)

*Dictyosphaeria cavernosa* green alga (indigenous)

*Acanthophora spicifera*

*Padina*

Pink sea cucumber: *Opheodesoma spectabilis*

Coral: *Montipora capitata*

Jelly Fish

Tube worm

Nudibranch

# Appendix B: Seawall Evaluation, January 2007

oceanit
innovation through engineering & scientific excellence

February 26, 2007

Dr. Ursula Heinz
47-119 Kamehameha Highway
Kaneohe, HI 96744

Subject: Seawall Evaluation Report for 47-119 Kamehameha Highway

Dear Dr. Heinz:

The following is Oceanit's evaluation of the seawall at 47-119 Kamehameha Highway with recommendations.

SITE VISIT

I inspected the seawall on January 25, 2007. From the inspection and from discussion with you, I learned the following:

1. There are two parallel walls along the shoreline. The outer wall is concrete and the inner wall is concrete rubble masonry (CRM). The space between the walls is filled with rock and gravel. Sections of the outer wall have fallen. The CRM wall may also be damaged.
2. There have been sinkholes in the yard indicating that soil is being washed out to the bay under the CRM wall. Sinkholes are evidence that the wall foundation is shallow and probably not stable.
3. There is a boat channel dredged just outside and parallel to the outer wall. The bottom slopes down from the wall into the channel. This channel may have contributed to the loss of foundation material from under the outer wall.
4. Rainwater apparently ponds in the yard indicating that the soils do not drain well. If the drainage concentrates in a few locations, that could also aggravate flow and loss of soil from under the inner wall.
5. Some rocks were placed outside the existing walls, and the Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) determined that these were encroachments into state waters.
6. The survey produced by Francis McGrail shows that the shoreline follows along the seaward face of the inner CRM wall.
7. Part of the retaining wall along the border of your property was demolished to allow equipment access. You received a violation from the City and County for rebuilding the wall without a permit.

Oceanit Center 828 Fort Street Mall, Suite 600 Honolulu, Hawaii 96813 Phone: 808.531.3017 Fax: 808.531.3177

EVALUATION

The rocks placed between the two walls have damaged the outer wall and have not helped with stabilizing the inner wall. The City and County Department of Planning and Permitting (DPP) typically requires a Shoreline Setback Variance (SV) to place rocks along the shoreline. They will likely request that these rocks be removed or that you apply for an after-the-fact SV. You will need a certified shoreline to get the variance; however, DLNR will not certify the shoreline if there are encroachments such as the rocks inside and outside the outer wall. You will also need an environmental assessment (EA).

***Existing Conditions***

I discussed the location of the certified shoreline with DLNR/OCCL. Since the outer wall is no longer intact and the new rocks are not permitted, the shoreline would likely be certified along the seaward face of the inner wall. This would mean that any new wall would have to replace the existing inner wall, and the outer wall could not be repaired or replaced. They would also request that the new rocks be removed.

However, we obtained a copy of the certified shoreline map from 1993-94 that shows the shoreline around the outer wall (copy attached). The wall has apparently been in place since 1963, which is prior to the state's conservation laws in 1964 and the county's grandfather date of July 1970.

***Outer Wall***

There is a chance that DPP might allow the outer wall to be replaced or restored. If they did, then the shoreline could again be placed at the outer wall. DPP would probably require an SV or a Building Permit or both. However, DPP might not grant a permit now that the wall is more than 50 percent damaged.

If DPP will not grant permission to restore the outer wall, then the inner wall is the only remaining barrier to more property loss.

***Inner Wall***

Since the sinkholes show that the inner wall foundation is not deep enough to prevent flow under the wall, the foundation will probably have to be made deeper. This can be done by digging down behind the wall and placing rock and cement grout. This type of repair is difficult and does not always work. However, DPP might grant a repair permit if the wall is considered less than

50 percent damaged. With a repair permit, no environmental assessment (EA) would be required. A building permit would be required.

A second alternative to the rock and grout repair is to place sheet piles along the seaward face of the inner wall if the certified shoreline allows. Sheet piles are driven into the mud by special equipment and might be difficult because site access is restricted. Sheet piles could also be placed along the inner face of the inner wall. The wall could then be removed since it would no longer have any function.

A third alternative is to replace the existing inner wall with a concrete or rock retaining wall with a deep foundation.

The second and third alternatives require an SV and an EA plus design plans.

RECOMMENDATIONS

1. Meet with DPP to discuss the possibility of repairing/replacing the existing outer wall with a City and County permit but without a new certified shoreline. Stress that the inner wall is not designed as a seawall and that if the outer wall is removed, you will lose property to erosion very quickly. If needed, Oceanit could write a letter on your behalf that states that fact. Emphasize that the boat channel dredged along your property has contributed to the erosion and loss of foundation for your wall. (It would be good to know when that channel was dredged.) The idea is to ask DPP to accept the old certified shoreline until repairs/replacement is done and to convince them that the outer wall was slowly being undermined.
2. If DPP agrees, obtain an engineered design for the work and apply for a building permit.
3. Remove the new rocks located between the walls and in state waters outside the existing wall. Stockpile them toward your house as far as possible so that they are not in the 40-foot setback.
4. Repair the outer wall to the extent allowed by DPP. Preferably, replace the wall with a new design. If that isn't allowed, restore the wall to its former condition.
5. Make a new shoreline survey so that the shoreline is along the seaward side of the outer wall. You will need preliminary agreement with DLNR/OCCL to do this. You might also need agreement from the City and County DPP.
6. If DPP and DLNR do not agree to the repair or replacement scheme given in steps 1-6 above, then you will probably have to replace the inner wall as described in the Evaluation section above and remove the outer wall.

There are a number of unknowns in the recommended process. These will have to be handled as they arise. You may have better luck negotiating with DPP than

Oceanit would, since you could potentially lose property. There is no beach outside your seawall and no harm to the shoreline or your neighbors if you repair or replace the wall. A new wall will not damage the environment. Any turbidity during construction would be temporary. The county gains nothing by denying you the right to make the repairs.

We understand that the process of design and permits can be complex and confusing. We can prepare a proposal to assist you with the recommended tasks if you want. Design tasks will have to be done by a professional, but you can process permit applications yourself to keep costs down. You will need a competent construction contractor if you receive permission to replace the old structures with new ones.

Please let us know if you have questions on the evaluation or recommendations.

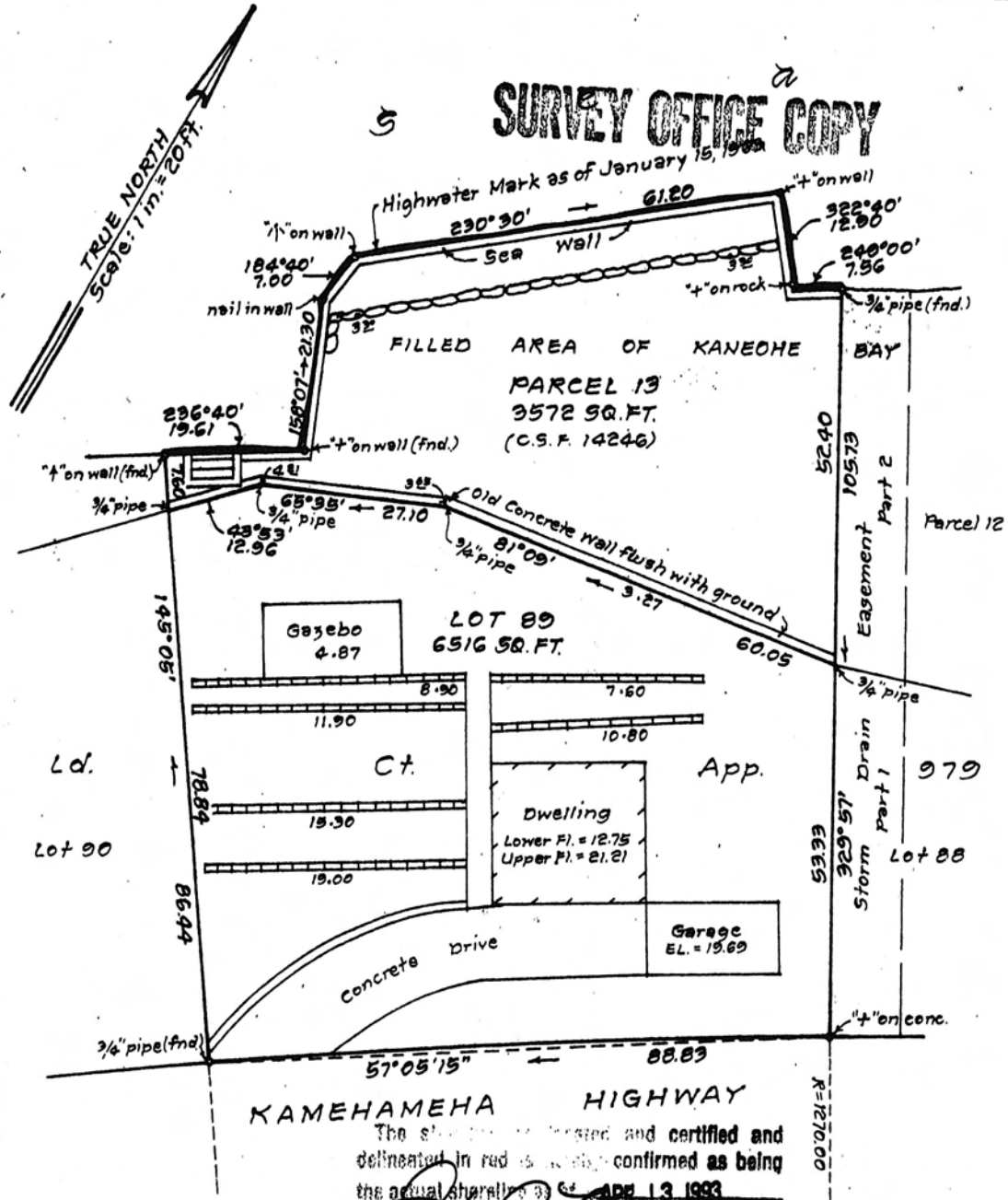
Sincerely,

Warren E. Bucher

Warren E. Bucher, Ph.D., P.E.
Senior Ocean Engineer

Attachment - Certified Shoreline Map 1993-94
Cost Estimate

SURVEY OFFICE COPY




The s[illegible] and certified and delineated in red [illegible] confirmed as being the annual shoreline as of APR 13 1993

Chairman, Board of Land and Natural Resources

This work was performed by me or under my direct supervision.

Francis E. McGrail
LS 7279

FRANCIS E. McGRAIL
LICENSED PROFESSIONAL LAND SURVEYOR
No. 7279
HAWAII, U.S.A.

# SHORELINE SURVEY
# PARCEL 13
# OF THE FILLED AREA OF KANEOHE BAY

At Kahaluu, Koolaupoko, Oahu, Hawaii

Tax Map Key: 4-7-19:80

The shoreline as located and certified on APR 13 1993 is hereby re-confirmed as being the shoreline as of MAY 31, 1994

Chairperson, Board of Land and Natural Resources

February 23, 1993

SEAWALL REPAIR COST ESTIMATE
HEINZ PROPERTY
2/16/2007

| TASK | COST EST | COMMENTS |
|---|---|---|
| **OUTER WALL RESTORATION** | | Do this task first to re-establish the prior shoreline. |
| DESIGN FOR WALL RESTORATION | $7,500 | |
| PERMITS (depends on City reqmts) | ? | Need to consult with City DPP. |
| SHORELINE SURVEY | $4,000 | This has to be done by a Licensed Land Surveyor |
| CONSTRUCTION | $8,000+ | |
| **OUTER WALL REBUILD** | | Do this if shoreline approved at outer wall and replacement permitted. |
| DESIGN | $10,000 | |
| PERMITS | | |
| Shoreline Setback Variance | $8,000 | |
| Building Permit | $4,000 | |
| EA | $12,000 | Required with SV. |
| CONSTRUCTION QUALITY CONTROL | $6,000 | Inspection required if design stamped by Professional Engineer. |
| CONSTRUCTION | $63,000 | Get quotes for a better estimate. |
| **INNER WALL REBUILD** | | Do this if not allowed to rebuild outer wall. |
| SHORELINE SURVEY | $4,000 | Shoreline would follow outer face of inner wall if outer wall not allowed. |
| DESIGN | $10,000 | |
| PERMITS | | |
| Shoreline Setback Variance | $8,000 | |
| Building Permit | $4,000 | |
| EA | $12,000 | Required with SV. |
| CONSTRUCTION QUALITY CONTROL | $6,000 | Inspection required if design stamped by Professional Engineer. |
| CONSTRUCTION | $63,000 | Get quotes for a better estimate. |