City and County of Honolulu
Clean Water and Natural Lands Advisory Commission
CLEAN WATER AND NATURAL LANDS FUND
APPLICATION

CERTIFICATION: *The undersigned hereby certify that (1) the statements and information contained in this Clean Water and Natural Lands Fund Application, including all attachments, are true and accurate to the best of my/our knowledge and understand that if any statements are shown to be false or misrepresented, this application may be rejected; and that (2) applicant is aware of, and consents to, public disclosure of the application in accordance with the State Uniform Information Practices Act, H.R.S. Chapter 92F.*

Applicant: Hawaiian Islands Lands Trust
(Name of Entity)

Laura H. E. Kaakua	Chief Executive Officer
Name (type/print)	Title
	7.9.2020
Signature	Date

SECTION A. APPLICANT INFORMATION

Agency/Organization Name:	Hawaiian Islands Land Trust
Mailing Address (P.O. Box or Street, City, State, Zip):	126 Queen Street Suite #306 Honolulu HI 96813

Contact Person and Title:	Laura Kaakua, CEO
Phone Numbers (work, cellular):	808-791-0732
Email Address:	laura@hilt.org
Attach DCCA Business organization information and management structure for all entities in ownership	Certificate of Good Standing and General Information from DCCA website attached.
Agency/Organization Website (include URL to any specific pages regarding this project):	https://www.hilt.org
Attach a statement no longer than 3 paragraphs describing your organization's expertise and experience with similar land acquisitions:	Attached.

SECTION B. TYPE OF ACQUISITION

1. We are requesting funding for the City to purchase or otherwise acquire title to the following real property interest (City and County of Honolulu must hold a real property interest).

Fee Simple Interest:	
Perpetual Conservation Easement:	X
Other (Please Explain)	

2. Describe your proposal for the ownership and management of the property

In this application, the terms "Waikalua Fishponds Complex," "Waikalua Loko I‘a," and "Waikalua" are used interchangeably in reference to the entire 17-acre property.

Hawaiian Islands Land Trust (HILT), Hawai‘i's statewide nonprofit land trust, is seeking a perpetual Conservation Easement (CE) over the 17.11-acre Waikalua Loko I‘a (Waikalua Fishponds Complex) to permanently protect the land and ensure that stewardship of these fishponds, and community access and education, will continue in perpetuity. Fee ownership and stewardship will remain with Pacific American Foundation (PAF), the Hawai‘i nonprofit that has restored and cared for Waikalua Fishponds Complex for the last 24 years, and deeply benefitted the community by providing comprehensive ‘āina-based educational programs and projects in core competencies. In 2019, after two decades of landowner negotiations, fundraising, community engagement, and fishpond restoration work, PAF finally acquired fee ownership of Waikalua Fishponds Complex. PAF's final step in protecting Waikalua is to burden the property with a perpetual Conservation Easement. The Conservation Easement would prohibit

subdivision, limit development to one educational structure, and require managed access for education and cultural practice.

If the Clean Water and Natural Lands Commission recommends funding for the Conservation Easement and the City & County of Honolulu (City & County) is a willing Co-Holder of the Conservation Easement, Waikalua Fishponds Complex will be burdened with a Conservation Easement co-held by Hawaiian Islands Land Trust and the City & County. HILT would be the Administrative Holder of the CE with primary responsibility to annually monitor and enforce the terms of the CE in perpetuity. As part of HILT's annual monitoring responsibility as Administrative Holder, HILT would provide copies of its monitoring report to PAF and the City & County. The City & County would partner with HILT in this effort through CWNL funding, and serve as the Co-Holder of the CE.

Pacific American Foundation has been restoring Waikalua Fishponds Complex and educating O‘ahu's schoolchildren in nature for the past 24 years. Each year, they have educated thousands of children from all over O‘ahu at Waikalua, and developed Aloha Aina Curriculum and fishpond restoration practices which became the inspiration and foundation for the efforts of many other fishpond restoration groups elsewhere on O‘ahu and on the neighbor islands. Since PAF began its work at Waikalua, tons of invasive mangrove have been removed, thousands of students have been educated, thousands of families have reconnected to the ‘āina and kai, and the restoration efforts have brought back native, threatened, and endangered species such as ae‘o (Hawaiian stilt), and auku‘u (Black-crowned night heron).

HILT believes PAF is a reliable and model landowner and land steward partner for this proposed CE, as PAF has displayed a strong commitment to its conservation, cultural, and educational mission, maintained reputable leadership throughout the duration of its long-term stewardship and recent ownership, and proven its dedication to the community. Additionally, HILT sees this proposed CE as timely, considering PAF will be celebrating 25 years of Waikalua stewardship in 2021, and PAF leadership is currently focused on internal organizational succession planning. It is essential for PAF's current leadership to permanently protect Waikalua Loko I‘a through a Conservation Easement. The Conservation Easement will give PAF and the Kāne‘ohe community peace of mind that their last remaining fishponds are safeguarded and accessible in perpetuity. The Conservation Easement will also provide critical funds for PAF to reinvest in ‘āina-based education of O‘ahu's keiki, and the foundation for PAF's current leadership to pass down organizational operations to the next generation of fishpond caretakers.

SECTION C. RESOURCE PURPOSES

The applicant proposes that the property be acquired for the following purpose(s) identified in the Revised Ordinances of Honolulu 1990 § 6-62.2 and City Council Resolution 07-355, CD1 (check all that apply and provide more detailed information regarding the checked purpose(s) in the space provided below or attach additional sheets, maximum ten (10) pages per item):

1 X☐ **<u>Protection of watershed lands to preserve water quality and water supply.</u>**

Describe how the acquisition (of the conservation easement) will protect watershed lands to preserve water quality and water supply. Describe the watershed values of this property, such as rainfall, land cover type and condition, groundwater recharge, and waterbody types, characteristics, and management/regulatory status:

Historically, during the times of Oʻahu's pristine native environment, the two fishponds of Waikalua served as a catch basin of the excess nutrients provided by upstream loʻi kalo cultivation along Kāneʻohe Bay and Kawa Streams. These nutrients paired with catchment of brackish water provided the ideal environment for native limu growth and the raising of herbivorous fish such as mullet or ʻamaʻama. In 1950, a sewage outfall was constructed near Waikalua Loko which had a major negative impact on water quality. Since then, with urbanization and PAF's successful preservation of the two fishpond ecosystems, Waikalua Fishponds Complex now serves as a critical buffer and sediment retention area, effectively minimizing runoff into Kāneʻohe Bay.

Waikalua Fishponds Complex functions as the heart of Kāneʻohe's ahupuaʻa system which extends out into the ocean. As such, a protected and restored Waikalua is crucial for the health of Kāneʻohe Bay, where diverse endangered and native marine life exist. As rain (surface water) runs through the ahupuaʻa of Kāneʻohe via Kawa and Kāneʻohe Streams, it collects sediment and debris on its way to the ocean. Just before reaching the ocean, the water passes along and through the Waikalua Fishponds Complex. Thousands of volunteers and students who help PAF maintain and clean these fishponds are also providing ecosystem services to prevent excess debris, turbidity, and create a healthier estuary where the fresh water reaches Kāneʻohe Bay.

Because of the natural geography of the area, the property and fishponds are situated at the downslope of the watershed, causing upland surface and groundwater to run at increased speeds and leaving less time for soil filtration and groundwater recharge. This geographic understanding makes the Waikalua Fishponds Complex an extremely vulnerable and important area to protect for its ecological values and ability to prevent and promote a healthier Kāneʻohe Bay estuarine system. As discussed in more detail later in this application, after Waikalua is permanently protected by a Conservation Easement, PAF's longterm plans for Waikalua Fishponds Complex include restoring the natural path of Kawa stream to empty into Waikalua Loko, and working with the City to repurpose the now out of use Kāneʻohe Wastewater Treatment Facility for aquaculture. These actions would further improve the water quality of Kāneʻohe Bay, and will be built from the foundation of the perpetual Conservation Easement.

2 X☐ **Preservation of forests, beaches, coastal areas, and agriculture lands.**

Describe how the acquisition will preserve forests, beaches, coastal areas (including near-shore marine resources), or agricultural lands:

In addition to the ecosystem benefits mentioned above, the acquisition of this CE will allow for the continual clearing of invasive coastal plant species, such as the mangrove and seaweeds, allowing for the preservation of the native ecosystems along this coastal area of Kāneʻohe Bay. Before restoration efforts began in 1995, the ocean was inaccessible from the property. Without diligent management of the current stewards, mangrove and other invasive plants would return and block beach access. Similarly, a dirt path has to be maintained for the stewards to have access to all parts of the property, including the wall connecting Kāneʻohe Bay and Waikalua Loko.

PAF's leadership has established best practices in the restoration of ocean access, return of marsh land for native birds, function of Waikalua loko for native fish, and space to share this with their community. The acquisition of this CE provides a rare opportunity to protect in perpetuity, a highly threatened coastline and estuary, while supporting the restoration and stewardship work that provides direct benefits to improve the health of the ecosystem.

3 ☐ **Public outdoor recreation and education, including access to beaches and mountains.**

Describe how the acquisition will help preserve and enhance public outdoor recreation and educational opportunities, which may include parks, beaches, or interpretive trails, and/or access to such opportunities:

The acquisition would require the landowner to indefinitely provide managed access to the property for educational purposes and outdoor recreation indefinitely.

The beach on the corner where Kāneʻohe Stream meets Kāneʻohe Bay is frequented by fishermen. The nearby grassy area is perfect for groups to sit around and gather, similar to a small park. Canoe paddlers and swimmers occasionally launch from the beach at the end of the open space. A local canoe club has asked if it can use the space as its home base, where a few waʻa can be stored when they are not in use. PAF is considering the possibility of building a small hale waʻa, or canoe house, used to protect the canoes from the elements. Encouraging canoe paddling, one of the oldest Hawaiian recreational activities, is in alignment with everything Waikalua stands for and would like to perpetuate.

Another activity that people enjoy on the property is walking on the dirt path around the fishpond, which is a nice respite from the traffic and noise of nearby residential areas. The path is a circle around the perimeter and includes the stretch of fishpond wall dividing Kāneʻohe Bay and the fishpond. Walking the path is a good opportunity for observation and contemplation because each movement of the fishpond is dynamic yet peaceful. Watching the way wind and currents differ on either side of the wall is one example of a valuable fishpond exercise as well as

a metaphor for life. Understanding ‘ike kupuna, the knowledge of our ancestors, is to know that Native Hawaiians saw life through a lens of nature-related metaphors.

In 2000, PAF partnered with the Waikalua Loko Fishpond Preservation Society to explore how they could incorporate this special ‘ike into modern curriculum for children. The initiative created an opportunity for teachers to supplement their modern science classes with hands-on experience. The initiative proved to be very successful and by 2005, PAF received numerous awards and recognition by the Native Hawaiian Educational Council, the Hawaii Department of Education, and the Hawaii Historic Foundation for its work in developing a “new model” for culture-based education, preservation, and stewardship of the environment in Hawaii. Since then, various organizations have requested that PAF expand its curriculum development to Hawaii’s coral reef systems, other ahupua’a throughout the state, the Island of Kahoolawe, the science of Tsunamis, global climate change, and sea level rise.

PAF has developed integral relationships with educational establishments to ensure students have a “community classroom” experience outside of the traditional school campus. Elementary and high school classes from all over the state have benefitted from PAF’s educational resources. The classes teach the history of ancient fishponds’ roles in the ahupua‘a system and how that translates to modern day ecology, while at the same time instilling the Hawaiian values of working together. Given the uncertain times and the COVID-19 pandemic, classroom learning has become increasingly difficult. Accounting for the need of social distancing, schools are looking to alternative teaching spaces, from online platforms to open air spaces. Now more than ever, there is a necessity to maintain this space as an outdoor classroom.

To date, PAF has: (1) developed over 200 partners throughout the State of Hawaii, the Pacific and the U.S. continent in helping to support its success and mission to educate; (2) enrolled over 21,000 Students in its career planning system; (3) trained over 4,500 teachers statewide; (4) since 1995, over 100,000 students, parents, teachers and community members learn and steward the fishpond; and (5) provided fiscal sponsorship services for 15 community organizations.
PAF has prided itself in creating and building upon small successes that have firm foundations. These foundations of education and earning the trust and respect of the community have led to more expansive opportunities to share their model with students and educators from preschool to graduate school. PAF maintains relationships with Windward Community College, Hawaii Institute of Marine Biology, and MarineGEO, just to name a few. All of its partnerships revolve around the traditional uses of loko i‘a, the roles and functions of loko i‘a in supporting the restoration of a healthy watershed, and ways to address food sustainability in Hawai‘i. Ongoing research, community engagement, and stewardship is necessary to inform best management practices in restoring the intended function back to the fishponds of Waikalua—providing a healthy ecosystem for native fish and limu to thrive, in hopes of taking one step closer to food security in our state.

In addition to the various tangible educational opportunities, there is another unique component to Waikalua Fishponds Complex. There is an inherent sense of healing that is exemplified by the transformation of groups that have come through over the years. One noteworthy story is the time when prisoners from the Women’s Community Correctional Facility made weekly visits to the fishpond. After a few visits spent on simple cleanups, the group proposed that they collectively take on a project. The women committed to rebuilding a whole section of the wall on the mauka side of the fishpond. After many hours and visits, the section was completed.

Everyone involved was moved by the collaboration and dedication that went into the project. It was around the holidays which meant the women were allowed to spend monitored time with their families. PAF and the prison staff hosted a day for the prisoners to invite their families and show them what they accomplished together. The sense of pride was the perfect representation of how ʻāina can heal and impact people's lives. PAF recounts the event as one of the most rewarding moments in the history of their stewardship. The stewardship team still credits the women as the hardest working group that has come through the program.

4 ☐ **Preservation of historically or culturally important land areas and sites.**

Describe how the acquisition will preserve historic and/or important cultural sites and lands, including ancient Hawaiian archaeological sites:

In 2010, the Hawaiian Historic Society named the Waikalua Fishponds as one of the most endangered sites in Hawaiʻi. Archaeological research has dated the fishponds as being built around the year 1650. Acquisition of a CE over the Waikalua Fishponds Complex will provide complementary legal protections to ensure the preservation of these historical and ecologically important cultural lands in perpetuity. As mentioned above, a CE would also guarantee open access for cultural practitioners in support of the continuance of cultural gathering and other practices that have been passed down through generations.

Restoration of fishpond ecosystems requires intensive and committed time and resources, and is truly a community effort as upstream neighbors, businesses, and land uses eventually have impacts and positive or negative effects downstream. Additionally, the fishponds' wall systems and other features require consistent maintenance, especially in the event of environmental changes, hurricanes, large swells, king tides, projected sea level rise, etc. Preserving the historic and cultural site of the two fishponds while providing management and stewardship in a way that restores and maintains the function of the fishponds and wetlands will be possible through the legal protections and financial support provided by the proposed CE.

5 X ☐ **Protection of significant habitats or ecosystems, including buffer zones.**

Describe how the acquisition protects significant habitats or ecosystems, including buffer zones, and whether there is substantial, significant, or minimal presence of: native-dominated plant cover, endangered or threatened species, critical habitat, or species of greatest conservation need:

Over the past 20 years, Pacific American Foundation has managed these loko iʻa with a concerted effort to remove invasive and introduced species. Thousands of volunteers from the surrounding community and Hawaiʻi have removed tons of invasive limu, mangrove and worked to eradicate introduced fish. This effort to help restore native habitats for native species is a central goal of PAF at the Waikalua Fishponds Complex site. This is evident in the observation of octopuses and hammerhead shark pups between April to October, and the increased sightings of the endangered Hawaiian Green Sea Turtle. The black lipped pearl oyster, lingula reevii (endemic) and the pink sea cucumber (endemic) are species that were numerous in Kāneʻohe Bay and now, after the restoration of Waikalua Fishponds, their resurgence is possible.

The plan is to continue to propagate native limu such as manuea (has been in propagation since 2016), mullet, and awa. There is an abundance of barracudas, which although technically native, are predators of the herbivorous fish and must be managed to create a stable environment for the mullet. With the continual removal of mangrove by thousands of volunteers, the wetlands ecosystem was largely restored and effectively expanded, bringing back the native Aeʻo, the Hawaiian stilt, a federally listed endangered species. The Aukuʻu (night heron) have also returned, with occasional sightings of the Pueo, a state listed endangered species on the island of Oʻahu. Continued support of PAF's restoration and stewardship work through the proposed CE will provide a permanent buffer zone for these marine and terrestrial native species as the property and fishponds are surrounded by urban Kāneʻohe neighborhoods, as well as an extension of the open space provided by neighboring YWCA.

6 X☐ **<u>Conservation of land in order to reduce erosion, floods, landslides, or runoff.</u>**

Describe how the acquisition achieves conservation and reclamation of land that would reduce erosion, lower the risks of flooding and landsliding (such as providing buffer zones from rockfall hazards), and improve runoff management:

In the unlikely event that land ownership was to fall out from PAF, the proposed CE over the Waikalua Fishponds Complex would prohibit development activity, which is a common cause of landslides. Currently, the property is a buffer zone that completely fills up when there is heavy rain. Under a conservation easement, this land would not be converted into any use that minimizes the lands and fishponds' ability to serve as a flood mitigation area. At this time, when rain and storm water run through the streams and space of the Waikalua Fishponds Complex, the fishpond serves as a natural filter, providing an important ecosystem service to Kāneʻoheʻs watershed.

7 X ☐ **<u>Acquisition of public access to public land and open space.</u>**

Describe how the acquisition provides public access to public land and open space for public enjoyment, including whether the acquisition would secure important and critical access that has not previously existed:

This proposed acquisition of a CE would ensure managed public access to the ocean and coastline at Kāneʻohe Bay in perpetuity. The CE would ensure that the property could never be commercialized or urbanized in a way that would effectively restrict public access to the ocean. Given the design of the streets in this neighborhood and the surrounding neighbors, the ability for a CE to secure managed public access in this neighborhood for open space and public enjoyment is critical.

Public access is typically only provided through participation in PAF workdays and educational programs. PAF and HILT support providing managed public access to the coastline and ocean.

SECTION D. DESCRIPTION OF LAND

Describe the location of the property including ahupua'a (e.g., Waianae, in ahupuaʻa of Nanakuli, mauka of highway, Oahu):	Mokupuni- Oʻahu Moku- Koʻolau Poko Ahupuaʻa- Kāneʻohe Between Kawa and Kāneʻohe Streams

	Connects to Kāneʻohe Bay on the makai side and an Kāneʻohe Sewage Treatment Plant on the mauka side.
Tax Map Key(s) - use the following format: 1- 2-003:004:	4-5-030:001 (por)
City Council District: (1-9)	District 3
City Councilmember:	Ikaika Anderson
Size of property (indicate acreage or square footage):	17.11 acres
State Land Use District Designation (include conservation district subzone, if applicable, and state land use classification for public lands):	Urban & Conservation District (Resource subzone).
County Zoning:	Preservation
County General/Community Plan Designation:	Preservation
Flood Zone Designation:	AE
Is the property located in a Special Management Area? (If "Yes", provide explanation)	Yes, the property is in the SMA due to its coastal location.

1. Describe the terms and scope of the public access to the property:

   The property is located on the makai side of the Bayview Golf Course next to the Kāneʻohe Sewage Treatment Plant. Access is managed by the Pacific American Foundation (PAF) and is by appointment for scheduled use. Staff and volunteers are on site to greet and orientate groups that come to visit. Groups often consist of, although are not limited to, school groups of all ages and levels, canoe paddling groups and research teams.

2. Identify existing lessees, sub-lessees, tenants, sub-tenants, occupants and licensees of the property and provide a copy of their agreements (These leases shall be deemed proprietary and not subject to disclosure under the Uniform Information Practices Act, H.R.S. Chapter 92F):

   None.

3. List all adjacent landowners within 300 feet and indicate if they have been consulted about the project:

   Over the years PAF has developed relationships with most of the neighbors through its annual community workday flyers (since 2000) and more recently through its six Full Moon Concerts over the past 4 years. The first concert they walked door to door inviting all neighbors to attend the free concert. Main landowners within 300 feet are Bayview

Golf Park and YWCA, both of which are aware of the project and have provided letters in support (attached in appendix).

4. Describe all current and past uses of the property for the last 5 years (include neighboring properties, if relevant):

   The use of the Waikalua Fishponds Complex has been the same since 1995. There has been continuous restoration work based on a preservation plan approved by SHPD in 1995. PAF and Waikalua fishponds have served as training grounds for many of the fishponds being restored in Hawai‘i today and has developed a library of culture-based curricula for over 20 years including the training of over 6,000 teachers at the site. PAF holds 5 community workdays for the public annually since 2000 and averages about 3,000 students/‘ohana and community partners per year.

5. Provide copies of the following, if available, or indicate whether you intend to provide:

Attached	Intend to attach	
X	☐	Environmental Site Assessments and Remediation Plans
X	☐	Environmental Assessments
☐	☐	Cultural assessments
☐	☐	Environmental Impact Statements
X	☐	Biological Field Surveys
X	☐	Archaeological Inventory Surveys
☐	☐	Special Management Area Permit Application,
☐	☐	Conservation District Use Applications
☐	☐	Water Use Permit Application
☐	☐	Geological Hazard Assessment
☐	☐	Land Use and Zoning Permits

SECTION E. ENVIRONMENTAL HAZARDS

1. If there are suspected or potential environmental hazards associated on or related to this property, check all the following that apply and describe each. Provide copies of reports related to checked items:

There are no known hazards:	X
The property is a designated brownfield (former industrial use):	☐
There has been illegal dumping/hazardous materials:	☐

The property is prone to flooding or drainage from the property makes significant contributions to downstream flooding:	X (Property is in the AE flood zone and is a natural drainage basin, catching sediment and runoff from rains).
The property is prone to falling rocks or other geological hazards:	☐
The features of the property's surface are potentially hazardous (i.e., uneven, rocky, or fallow terrain, overgrowth of flora, etc.):	☐
Other suspected or potential hazards:	☐

SECTION F. PROJECT IMPORTANCE

Answer the questions below in the space provided or attach additional sheets, maximum ten (10) pages total, only if necessary.

1. Briefly describe the overall significance and importance of the property to the fund purposes.

   Waikalua Loko and Waikalua Fishponds are the last fishponds under active restoration and stewardship in the ahupuaʻa of Kāneʻohe. These fishponds and the open space surrounding them are a beautiful, ecologically, and culturally important feature of this urban coastline and are deserving and in need of permanent protection.

   These fishponds are historically significant for being recorded through archaeological processes as being built as early as 1650. They have served as critical role in the statewide movement for the restoration and preservation of fishponds throughout Hawaiʻi. Waikalua Loko is one of the first native Hawaiian fishponds to be stewarded for contemporary use and has been a pioneer in developing curriculum to teach and perpetuate Native Hawaiian fishpond practices.

   The fishpond complex is a crucial part of the preservation and promotion of a healthy coastal and ahupuaʻa system. PAF's capacity to continue the removal invasive species, monitor the quality of water, and propagate native wetlands species affects the ecosystem beyond the walls of the fishpond. The fishpond serves as an important filtration system for sediment flow, runoff, etc. which directly impacts the water quality of Kāneʻohe Bay.

   PAF and the stewards of Waikalua Fishponds Complex has demonstrated a long-term commitment to involving the community in its care of the fishpond. PAF's outreach is impressive by its sheer number of partnerships and volunteers, however, the management of all those relationships takes time and energy. For the stewardship and education model to be sustainable for generations to come, the property owner needs to construct basic facilities. The CE acquisition funding will give PAF the ability to erect a modest educational structure on the property including a small bathroom to replace the outhouse that is currently used. Once there is a stronger physical foundation on the property, the stewardship will have a comfortable space to operate out of, including a place to store their machinery and tools which have already been stolen a couple of times. Traditionally, fishponds had a loko iʻa kiaʻi (fishpond protector) who lives in a modest

structure on the premises and oversees all activity. Paepae ʻo Heʻeia uses this traditional approach and they have been successful in monitoring activity outside of normal working hours.

Lastly, a CE would guarantee managed public ocean and coastal access. Ensuring open space and recreational benefits for the community and general public in the urban neighborhood of Kāneʻohe would be a special value of the property to protect in perpetuity.

2. Identify any conditions that threaten the significance and importance of the subject site. This may include anticipated uses of neighboring lands, or environmental conditions (e.g., sedimentation, runoff, invasive species, conflicting activities, proposed development, etc.).

   Waikalua Fishponds Complex is located next to the Kāneʻohe Sewage Treatment Plant and the Bayview Golf course. The land use of both of these facilities could easily cause negative impacts on the ecosystem health of the fishponds, wetlands, streams, and ocean.

   Another concern is the possibility that future PAF leadership or possible community development plans could change the conservation course for the Waikalua Fishponds Complex. In order to prevent this problem, a CE needs to be put in place.

3. Describe the consistency of the acquisition with the other stated priorities of the City and County of Honolulu.

   The acquisition of the CE aligns with the City and County of Honolulu's goals of protecting watershed land to maintain and improve water quality. The Board of Water Supply's Koʻolau Poko Watershed Management Plan (Sept. 2012)—a long-range 20-year for the preservation, restoration, and balanced management of ground water, surface water, and related watershed resources in the Koʻolau Poko District—identified the management, stewardship, and restoration of the estuary area around Waikalua Loko fishpond as strategies for the watershed of Kāneʻohe.

   The acquisition of the CE also aligns with the City & County's Koʻolau Poko Sustainable Communities Plan (2016). The plan's guidelines for shoreline areas promotes increased opportunities for physical access to the shoreline areas of Kāneʻohe Bay by acquiring additional shorefront areas with the site of the Kāneʻohe Wastewater Pretreatment Facility, to be named Waikalua Bayside Park, with possible expansion into Kokokahi YWCA facility through either acquisition or joint use agreement. This proposed CE directly supports this intent and provides a great stepping stone for the City & County to potentially fulfill this.

4. Describe the public benefit of the project (public purpose, use, access).

   The work of PAF to restore, steward, and provide educational opportunities at the Waikalua Fishponds Complex has benefited the community of Kāneʻohe and all of Hawaiʻi. Ensuring the land and fishponds are protected in perpetuity ensures these benefits can multiply and continue in perpetuity. Public access to the ocean and coastline for canoe, snorkeling, educational, research and cultural purposes are invaluable.

5. Describe community outreach and general sentiment.

   See Appendix # for community support letters.

   The following is a quote from Rosalyn Dias Conception, PAF's Director: "For two decades, an intensive effort by students, community groups, public and private partners, and individual members of the greater community, breathed new life back into the 400 year old fishpond. As each stone was put back on the wall and each native plant took root, a foundation was laid for a healthier and sustainable future, honoring the rich cultural and natural heritage of the Kāneʻohe ahupuaʻa."

6. Describe any other issues related to the acquisition of which the Administration, Commission or Council should be made aware during their review process.

   None.

7. Provide an estimated timeline for the acquisition and indicate the urgency of your request (Loss of matching funds, imminent sale of property, etc.).

   The timeline for the Conservation Easement is dependent on the City & County's CWNL funding process. As there is a strong willingness by the current CEO of Pacific American Foundation to forever protect Waikalua with a conservation easement, HILT wants to seize this opportunity for Oʻahu's future and move quickly. A possible timeline is as follows:
   7.20: Submit CWNL Application through City Budget & Fiscal Services
   8.20: Presentation to CWNL Commission at August meeting (we welcome site visits before or after this meeting). Potential Commission recommendation for funding.
   9.20: Start work with City Council and City Department of Land Management regarding budgeted funds, due diligence, and conservation easement terms.
   12.20-6.21: Possible date range for closing.

SECTION G. STEWARDSHIP AND MANAGEMENT

Answer the questions below in the space provided; attach additional sheets (no longer than one single-spaced page for each item) only if necessary.

1. Briefly summarize the Resource Management Plan and describe the proposed use of the acquired property including any short and long term goals, sources of start-up funding, and operation and management/maintenance funding. Disclose any intended commercial uses. What entity (if not the applicant) will manage the property/easement (e.g. lessees, tenants, and others with rights to enter/use the property)? Describe the experience of the manager.

Waikalua Fishponds Complex has been efficiently managed by Pacific American Foundation for nearly 25 years. While the property has largely been stewarded by volunteer community members and groups, there is a tremendous amount of work that must be done regularly by qualified employees who understand the intricacies of the fishponds. Because of this, there are a few PAF members who are responsible for performing regular maintenance; educating others on fishpond caretaking; and directing the stewardship program.

Since its inception, Pacific American Foundation has relied on grants to sustain all major management and stewardship related costs. Everyday maintenance costs are just as vital to the overall health of the fishpond costly, however not included in grant funds. The primary use of this CE would be to secure adequate maintenance funds for the years to come through an endowment fund. An endowment would relieve PAF leadership of relying on annual grant monies, which are inherently variable and uncertain.

There are anticipated costs in the near future that are essential to the continued growth of Waikalua Fishponds Complex. There is still a relatively small portion of mangrove standing in the middle of the pond which needs to be removed. Mangroves are remarkably tough and must be handled by experienced workers which can be costly. Another large, yet necessary project is the extraction of sediment from the bottom layer of the fishpond. An enormous amount of sediment has settled at the bottom of the fishpond, making it very difficult for aquaculture productivity. Further research needs to be done to devise a plan that will remove the sediment buildup while preventing sediment from seeping into the bay.

HILT and PAF's vision to build an educational facility on site will provide, at minimal disturbance to the surrounding fishpond ecosystems, necessary infrastructure to increase PAF's capacity to run its outdoor education, research, and restoration programs. The security of a durable bathroom facility, a location to keep all of the tools, and educational center is long overdue considering the number of volunteers that have spent a significant amount of time on the property.

PAF intends to combine its experience as the steward of the Waikalua with the social and economic benefit of a modern aquaculture facility. The enterprise portion of the Aquaculture facility is economically self-sustaining, producing commercial quantities of fish for the greater community. Feed production ties in with the Luluku farm project that utilizes Aquaculture waste as fertilizer while mitigating operational costs of both facilities. Partnership with Windward Community College creates a specialized degree program that focuses on learning by doing, where undergraduates gain real world experience as an alternative to a theory-based curricula. Returning full circle tie-ins between research, development and education encourage innovation and enterprise further reinforcing the commercial sustainability of the project.

2. Describe the potential obligations of the City and County of Honolulu, if applicable (e.g. financial, staffing, monitoring of property interests, enforcement of conservation conditions).

Potential obligations of the City & County may include staff time to facilitate the acquisition through escrow and legal review of legal documents. In regards to post-acquisition, if the CE is co-held with HILT, HILT is committed to providing the capacity to steward, annually monitor, and enforce the conditions and terms of the CE. As part of HILT's Land Trust Accreditation requirements, each transaction requires HILT to allocate a percentage to its legal defense fund in the event of CE violations.

SECTION H. FUNDING REQUEST

1. Values:

	Fee Simple	Easement
Funding Amount Requested	N/A	$1,750,000.00
Total Purchase Price	N/A	$1,750,000.00
Appraised Value	N/A	$1,750,000.00
Other (please specify)	N/A	N/A

2. The total asking price should not exceed the appraisal value. If applicable, please justify why the asking price exceeds the appraisal price.

N/A.

3. Is the property currently listed for sale or has it been listed for sale within the past two years? If yes, provide the asking/listed sale price, dates of listing and days on market.

   No. There have been past development proposals for this property and surrounding lands, but within the past two years it has not been listed for sale. In 2019, PAF was finally able to purchase the property, and now wishes to permanently conserve it with a conservation easement.

4. What is the total estimated cost for the acquisition? (Use following chart)

Estimated Acquisition Cost Worksheet					
Expense Item	Estimated Cost	% of Costs to be Paid by:			
		Seller	Applicant	City	Other (specify)
Appraisal report	$13,089.00	50 %	50 %	%	%
Title report and Title Insurance	$4,000.00	%	100 %	%	%
Land survey & report (specify form)	$4,000.00	100 %	%	%	%
Subdivision of land, if required	$0 (Done)	%	%	%	%
Environmental investigation – Phase I & Phase II	$0 (Not Needed)	%	%	%	
Escrow Fees	$3,000.00	50 %	50 %	%	
Attorney Fees	$10,000.00	20 %	80 %	%	

Conservation Easement Baseline Survey	$5,000.00	0 %	100 %	0 %	
Subtotal:	$ 39,089.00				
Estimated Value of Property	$1,750,000				
Total Anticipated Cost of Acquisition	$1,789,089	0.8 %	1.4 %	97.8 %	

4. What are the anticipated matching funds, if any? (Use following chart)

Estimated Matching Funds Worksheet			
Type	$ Amount	Source of Funds or Basis of Valuation	Status (Secured/Pending)
Private funds	$14,045.00	HILT *	Secured
Private funds	$12,044.00	PAF	Secured
In-kind contributions	$13,000.00	HILT	Secured
Public/other funds			
Land value donation (can include bargain sale reduction in price from fair market value)			
TOTAL MATCHING FUNDS	$ 39,089 (2.2)%		
AMOUNT REQUESTED FROM CWNL FUND	$1,750,000 (97.8)%		
TOTAL ANTICIPATED COST OF ACQUISITION	$1,789,089 (100)%		

* HILT did not include in the acquisition costs or matching funds the cost of significant nonprofit staff time to complete this project, or the cost of monitoring and enforcing this conservation easement in perpetuity, which is the role of the Administrative Holder of the Conservation Easement. HILT may privately raise funds for a conservation easement stewardship endowment.

Appendix I: Waikalua Fishponds Complex Letter of Intent (July 2019)

PACIFIC AMERICAN FOUNDATION

BOARD OF DIRECTORS

Chairperson
Michael W. Beasley, Esq.

BOARD MEMBERS
Dr.Verlieann Malina Wright
Ethan Cooper
Alvin Pauole
Herb Lee, Jr.

ADMINISTRATION

President & CEO
Herb Lee Jr.
Chief Financial Officer
Louis F. Perez II
General Counsel
Ethan Cooper

Pacific American Foundation
C/O Bay View Golf Park
45-285 Kaneohe Bay Drive, #102
Kāne'ohe, HI 96744

Phone: (808) 664-3027
www.thepaf.org

July 19, 2019

Laura Kaakua
Chief Executive Officer
Hawaii Islands Land Trust

Re: Letter of Intent

Aloha Laura,

This letter of Intent is for the purposes of selling a conservation easement on the Waikalua Loko la property ("Property") in Kaneohe, Oahu. Based on our conversations, we propose this non-binding Letter of Intent ("LOI") to outline the basic terms of an Option Agreement ("Agreement") for HILT to purchase a conservation easement on the Property. The following is a summary of terms which would appear in an Option Agreement for the property:

Optionor/Seller: Pacific American Foundation Hawaii, Inc. ("PAFHI")

Optionee/Purchaser: Hawaiian Islands Land Trust

Property: PAFHI has acquired 17.113 acres including the Waikalua Loko la from the Bayview Kaneohe Golf Park Inc. The 17.113-acre property been subdivided out of the larger 62.433 property identified as TMK: 45030001.

Acres: 17.113 acres

Purchase Price: $1,300,000 subject to appraisal

Financing: The purchase is subject to HILT receiving sufficient funding for the purchase of the conservation easement, HILT's acquisition costs, and stewardship fund costs

Term: The term of the option agreement shall be thirty-six (36) months.

HILT and PAFHI each represent that they are not represented by any broker or agent in connection this this proposed transaction and that no commissions, finder's fees or the like are payable in connection with it.

Confidentiality: All negotiations and terms and conditions with respect to the transaction contemplated by this LOI shall remain strictly confidential and no press or other publicity release or communication to the general public in connection with the purchase and sale of the Property will be issued without the other party's prior written approval.

It is understood that this LOI is not a contract and only outlines the business terms that the parties are willing to consider in reaching agreement on the Option Agreement. With the exception of the provision with the heading "Confidentiality", the provisions of which shall be presently enforceable, only when the Option Agreement is mutually-approved, executed and delivered by HILT and PAFHI will there be an enforceable agreement between the parties as to the transactions contemplated herein.

The Option Agreement will be subject to approval by HILT's Board of Directors.

Thank you again for this opportunity. If you have any questions, please contact me at (808) 927-5646.

Sincerely,

The foregoing Letter of Intent is agreed to and accepted by the undersigned as the basis for the preparation of an Option Agreement for the Waikalua Loko la property on this **19th** day of July 2019.

Sincerely,

Herb Lee Jr.
President & CEO
Pacific American Foundation
Pacific American Foundation, Hawaii

Appendix II: About HILT & DCCA Information

ABOUT HILT:
PROTECT, STEWARD, CONNECT

WHO WE ARE

Hawaiian Islands Land Trust (HILT), 501(c)(3) nonprofit organization, is Hawai‘i’s only local, statewide, nationally accredited Land Trust. HILT formed in 2011 from a merger of four island land trusts on Maui, O‘ahu, Hawai‘i Island, and Kaua‘i. A dedicated Board of Directors representing all major islands guides HILT, supported by a lean and hard working staff. HILT has protected over 21,000 acres across Hawai‘i, through 7 public preserves owned and stewarded by HILT, 51 conservation easements protecting agricultural, ecological, and cultural resources on private lands, and 5 facilitated conservation transactions. We protect lands that are integral to Hawai‘i’s well-being and character, upholding our kuleana (responsibility) to these lands and the communities they are in through thoughtful stewardship that deepens community connection to, and builds reciprocal relationships with ‘āina (land and waters cultivated by people)—including and extending to Hawai‘i’s agricultural and ranch lands.

MISSION

The mission of the Hawaiian Island Land Trust (“HILT”) is to protect, steward and connect—protect and steward the lands that sustain Hawai‘i and to perpetuate Hawaiian cultural values by connecting people to the land.

HILT’s strategy for its land protection efforts sets a focus on coastal lands, Hawaiian cultural landscapes, and lands that grow healthy foods for the local market. HILT is committed to the active stewardship of its seven preserves and fourty-one (41) conservation easements across the State of Hawai‘i. HILT also prioritizes the integration of connecting people to the land through involving community in the land acquisitions process and stewardship of its land and easement holdings.

HILT CAPACITY FOR PROTECTION & STEWARDSHIP

Capacity for Protection: HILT’s Land Acquisition Team

HILT’s Land Acquisition Team is lead by its full time Director of ‘Āina Protection and In-House Counsel, who oversees and manages all land acquisition projects from intiial inquiry or outreach to closing and provides legal review and research on related legal issues. HILT’s Development Director largely assists in private fundrasing strategy and efforts for HILT’s land protection initiatives, while also providing assistance and oversight for HILT’s grant funding. HILT’s Chief Executive Officer (CEO) provides consultation and strategy capacity and assistance. HILT’s Land Stewardship Manager assists with the creation of project maps, ground-truthing easement stewardship cost estimates, upkeeping Landscape Software data, and managing the national Land Trust Alliance accredidation. HILT’s Chief Conservation Officer provides assistance in scoping restoration strategies. HILT’s Office Manager and Executive Assistant provides assistance in managing HILT’s social media and website, along with HILT’s Development Director.

HILT’s personnell capacity also extends beyonds its staff. HILT’s Board Members provide guidance and consultation for HILT’s Land Acquisition Team. The board’s Lands

Committee who focuses on HILT's land acquisition initiatives, including updating HILT's Strategeic Lands Protection Plan.

Another key component to HILT's Land Acquisition Team are its island councils comprised of local leadership from each island. HILT's Island Council members provide invaluable insight to honor the unique character and conservation priorities of each island.

Capacity for Stewardship: HILT's Stewardship Team

HILT's Stewardship Team is lead by its Chief Conservation Officer and Stewardship Manager. The focus of HILT's Stewardship Team is its seven fee-owned preserves and 51 conservation and agricultural easement holdings. HILT's Stewardship Manager oversees and is solely responsible for the monitoring, management, and enforcement of HILT's 51 conservation and agricultural easement holdings. HILT utilizes the Landscape Software for this work, providing for efficiancy to input data and produce reports for all of HILT's annual monitoring visits, site visits, and relevant enforcement actions. HILT's Stewardship Manager also trains and equips HILT's staff in the proper monitoring of its easements to provide additional easement monitoring support. There are currently five HILT staff who are trained in easement monitoring.

HILT's In-House Counsel also provides support and oversite for the enforcement of its easements. In the event HILT must retain outside legal counsel, HILT carries Terra-Firma insurance policies on all of its easement holdings to cover necessary legal fees. HILT also follows the Land Trust Alliance standards, ensuring each project HILT directs funding to its legal defense fund and stewardship endowment at closing to ensure HILT's stewardship in perpetuity.

E N A B L I N G S T A T U T E

Hawai‘i Revised Statute, §§ 198-1 to 198-6.

DCCA State of Hawaii

Downloaded on April 6, 2020.
The information provided below is not a certification of good standing and does not constitute any other certification by the State.
Website URL: http://hbe.ehawaii.gov/documents

Business Information

MASTER NAME	HAWAIIAN ISLANDS LAND TRUST
BUSINESS TYPE	Domestic Nonprofit Corporation
FILE NUMBER	121112 D2
STATUS	Active
PURPOSE	THE ACQUISITION, PRESERVATION AND PROTECTION OF CONSERVATION LANDS IN THE STATE OF HAWAII IN FURTHERANCE OF THE PRESERVATION OF THE INTEGRITY OF THE NATURAL ENVIRONMENT FOR THE ENJOYMENT OF CURRENT AND FUTURE GENERATIONS;
PLACE INCORPORATED	Hawaii UNITED STATES
INCORPORATION DATE	Feb 1, 2001
MAILING ADDRESS	126 QUEEN STREET STE 306 HONOLULU, Hawaii 96813 UNITED STATES
CONSENT NAME	DIVISION OF FINANCIAL INSTITUTIONS
TERM	PER
AGENT NAME	LAURA KAAKUA
AGENT ADDRESS	126 QUEEN ST STE 306 HONOLULU, Hawaii 96813 UNITED STATES

Annual Filings

FILING YEAR	DATE RECEIVED	STATUS
2020	Jan 3, 2020	Processed
2019	Jan 3, 2019	Processed
2018	Feb 7, 2018	Processed
2017	Feb 2, 2017	Processed
2016	Apr 10, 2016	Processed
2015	Jan 19, 2015	Processed
2014	Mar 31, 2014	Processed
2013	Jan 31, 2013	Processed
2012	Jan 27, 2012	Processed
2011	Jan 10, 2011	Processed
2010	Jan 7, 2010	Processed
2009	Jan 7, 2009	Processed
2008	Jan 11, 2008	Processed
2007	Jan 26, 2007	Processed
2006	Jun 26, 2006	Processed
2005	Jul 7, 2005	Processed
2004	Feb 19, 2004	Processed
2003	Apr 4, 2003	Processed

2002	Not Required
2001	Processed

Officers

NAME	OFFICE	DATE
CHARLES,MARY	VC/D	Aug 26, 2019
SCHEUER,JONATHAN	P/D	Aug 26, 2019
LUCK,JENNIFER	S	Aug 26, 2019
OGATA,KEITH	T/D	Jan 1, 2016
BEALL,MATT	PCH	Aug 26, 2019

Trade Names

NAME	TYPE	CATEGORY	REGISTRATION DATE	STATUS
MAUI COASTAL LAND TRUST	Trade Name	NO CATEGORY SELECTED	May 9, 2001	Expired
MAUI COASTAL LAND TRUST	Trade Name	NO CATEGORY SELECTED	May 9, 2001	Expired

Appendix III: Waikalua Fishponds Complex 2020 Resource Management Plan by Pacific American Foundation

Waikalua Fishponds Complex
2020 Resource Management Plan

By: Pacific American Foundation

Pacific American Foundation

ʻO ke kahua mamua, mahope ke kūkulu!
First the foundation, then the building!

In the days of old Hawaiʻi, the ahupuaʻa of Kāneʻohe flourished with productive loʻi kalo (taro patches) fed by the waters of Kawa and Kāneʻohe streams. The waters flowed from the streams through ʻauwai (ditches) into the loʻi and into the loko iʻa (fishponds). One of the loko iʻa benefitting from the downstream flow of water is Waikalua Loko Fishpond (the larger fishpond of the Waikalua Fishponds Complex) which is a loko kuapā—a type of fishpond that is unique to the Hawaiian Islands. The fishpond we see today is very different from the pond that was constructed by Hawaiians approximately 350 years ago. The original pond received fresh water from both Kāneʻohe and Kawa streams. Grates once controlled the flow of water from these streams into the pond so that pond managers could control the salinity of the water. The original locations of the mākāhā (sluice grates) on the makai side and the exact dimensions of the pond walls are not known, but more research could probably shed light on this information.

Over the last 24 years, Pacific American Foundation has managed Waikalu Fishponds Complex with the intention of restoring the property and fishponds to the state they were in hundreds of years ago, when traditional Hawaiian fishpond caretakers were managing the property. The stewardship team has put majority of their effort into removing invasive species and rebuilding the fishpond structure. In alignment with PAF's purpose of educating our community about traditional practices and culture, the team has involved thousands of volunteers from various communities all across Hawaiʻi. The volunteers have removed tons of invasive limu and mangrove, and worked to eradicate introduced fish. This effort to help restore native habitats for native species is a central goal of PAF at the Waikalua Fishponds Complex site. This is evident in the observation of octopuses and hammerhead shark pups between April to October, and the increased sightings of the Hawaiian Green Sea Turtle which is endangered. The black lipped pearl oyster, lingula reevii (endemic) and the pink sea cucumber (endemic) are species that were numerous in Kāneʻohe Bay and now, after the restoration of Waikalua Fishponds, their resurgence is possible.

TIMELINE OF WAIKALUA FISHPONDS COMPLEX

1650 Waikalua Loko constructed by Hawaiians. This approximate date is determined from a core sampling of the rock wall of the pond (Eugene Dashiell et al, 1995).

- An 1887 map of the area shows extensive loʻi kalo mauka of the pond. A photograph of the area also shows a small interior pond where mullet fry were probably grown.
- The pond was in commercial operation with an area of 13.4 acres (today it is approximately 11.6 acres).

1926 An aerial photograph of the pond from 1928 shows a large break in the makai pond wall.

1930 The pond walls were reconstructed with the three openings we see today. These mākāhā were constructed of reinforced concrete. The wall, which is 9 to 12 feet wide, may have been widened for access by equipment. The original walls had stone faces and were filled with cobbles and coral.

1940 Water quality and the marine environment were affected by human activities. More than 11 million cubic yards of coral was dredged in Kāneʻohe Bay, and sugar and pineapple cultivation led to extensive soil erosion and siltation of the bay.

1950 A sewage outfall that was constructed near Waikalua Loko had a major impact on water quality.

1967 An aerial photo shows a channelized Kawa Stream that flows directly into the bay. Today the mouth of this stream is covered in silt and mangrove. This same photo shows a ditch next to the pond and the sewage treatment plant that appears to connect both streams. Ongoing development in the uplands of the Kāneʻohe ahupuaʻa created serious soil erosion into the bay. Introduced mangrove plants became a major management challenge at the pond. Mr. Koyama, the pond operator in the 1960s, reported a mullet harvest of 100 pounds per month (not a commercially viable yield).

1970 Pond operation stopped. Flood control efforts led to channelization of Kāneʻohe Stream, which was dammed at Hoʻomaluhia Park. Portions of Kawa Stream were lined with concrete, and the stream was further channelized. Sewage discharge to Kāneʻohe Bay was stopped and diverted to Mōkapu Point.

1995 The Waikalua Loko Fishpond Preservation Society (WLFPS) was formed to help mālama the pond for use as an educational site.

1998 Castle High School Science Teacher, Sheila Cyboron, brings first group of students (Grade 11 and 12) to study science in the context of the fishpond. The transformation in student motivation and learning inspires a new level of culture-based curriculum development.

2000 WLFPS partners with the Pacific American Foundation (PAF), the Hawaii Department of Education and the University of Hawaii Sea Grant program and receives its first major curriculum development grant award from the U. S. Department of Education entitled "Kāhea Loko, the Call of the pond."

2003 Kāhea Loko program is welcomed by teachers; statewide workshops are scheduled and over 330 teachers sign up for training in the standards-based curriculum.

2004 Pacific American Foundation, the Society, the Hawaii DOE partner again and receive its second major grant award called "Aloha ʻĀina." It focuses on the Kāneʻohe ahupuaʻa (mountain to the sea).

2007 Aloha ʻĀina is also a very welcome addition to schools' curricula, and the project trains nearly 380 teachers; both Kāhea Loko and Aloha ʻĀina receive a "Partners in Education" award from the Hawaii Department of Education.

2009 In partnership with the University of Hawaii at Windward and the Hawaii Institute of Marine Biology, the Society and PAF, the U. S. Housing and Urban Development (HUD) awards WLFPS a grant to purchase the Waikalua Loko Fishpond and grant title to PAF.

2011 The Historic Hawaiʻi Foundation selects the Waikalua Loko Fishpond and the Society with its highest honor for exemplary preservation of a cultural resource; Honolulu Magazine determines that Waikalua Loko is one of the most endangered cultural sites in Hawaii.

2013 PAF acquires Waikalua Loko (17 plus acres) from current landowner utilizing HUD funds making it the first ancient Hawaiian fishpond to return to Hawaiian hands since the great mahele in 1848.

2014 White House recognizes the work of the community by honoring PAF Executive Director as one of 10 in country to be recognized as a Cezar Chavez, "Champion of Change." PAF invited to partner with the UH Manoa/HIMB and the Smithsonian Institute in the new Marine Global Earth Observatory (GEO) for Kāneʻohe Bay.

2015 Hawaii State Legislature awards $1.5 million to PAF Hawaii Inc. to develop much needed infrastructure to support educa-tional and stewardship of the Waikalua Loko Fishpond. PAF Hawaii Inc. succeeds the WLFPS as the new non-profit entity.

2016 PAF receives award from Hawaii Community Foundation for its Kahuliau Native Limu propagation project to pilot the growth and restoration of native limu in the pond and Kāneʻohe Bay. July 3, 2016 high tide overtops the wall by 6 inches for the first time in recorded history; invasive gracilaria salicornia (gorilla ogo) virtually vanishes from pond in the summer likely due to temperature rise; 2016 is hottest year in history. PAF begins discussions with the City & County of Honolulu for the acquisition of the decommissioned Kāneʻohe Sewage Treatment Facility adjacent to the Waikalua Loko to conduct an "adaptive reuse" of the site into Hawaii's largest fresh water aquaculture facility.

2017 Community participation exceeds the 100,000 mark since restoration began in 1995. Kuapa (wall) reconstruction begins on east end for a period of 3 years.

2019 City approves final subdivision approval of pond (now separate from golf course) and final deed is given to PAF Hawaii in July 2019.

2020 City CWNL Program recommends funding for a Conservation Easement

2021 Waikalua is hopefully be permanently protected by a Conservation Easement co-held by the C&C of Honolulu and HILT.

Today Since 2000, over 5,500 teachers have been trained in the various curricula developed by PAF (see Ulukau.org; Search: Hawaiian curriculum materials) Approximately 5,000 students, families and community members visit the pond every year to learn about this special place. Community members regularly come to care for the pond (Lā Hana) --to remove invasive mangrove, seaweed, pick up marine debris, and repair walls. The work of students, community groups, and the Waikalua Loko Fishpond Preservation Society has breathed new life back into Waikalua Loko. As each stone is put back on the wall and each native plant takes root, we build the foundation for a healthier future that honors the rich cultural and natural heritage of the Kāneʻohe ahupuaʻa.

The purpose and focus of Waikalua Fishponds Complex can be broken down into four categories – stewardship, propagation, education, and recreation. PAF will work with Hawaiian Islands Land Trust and the City & County to craft a conservation easement that protects Waikalua's natural and cultural resources, and balances PAF's need to generate revenue in order to steward those resources.
Within the scope of the aforementioned categories, short-term and long-term goals have been established. The short-term management plan includes objectives that PAF would like to complete in the next six years. The long-term management plan includes objectives envisioned for the next 6-25 years.

Short-term Plans:
1. Removal of existing structures on the property.
c2. Building a small educational structure.
3. Building a humble hale kiaʻi for a fishpond kiaʻi who would be responsible for overseeing the property, performing general maintenance on the property, and providing security and safety for all visitors.
4. Acquisition of the Kāneʻohe Waste Water Pre-Treatment Facility adjacent to Waikalua.

Long-term Plans:
1. Conversion of the Kāneʻohe Waste Water Pre-Treatment Facility adjacent to Waikalua
2. Restoration of small fishpond, often times referred to as Keana.
3. Return connection of Kawa Stream to Waikalua Fishpond.

Islands Land Trust is presently seeking funding for a conversation easement that would protect the integrity of Waikalua in perpetuity to continue its mission of caring for the Waikalua Fishponds Complex. Any funding acquired will be used to fulfill a part of this management plan.

Stewardship:

The lead stewards of Waikalua have been focused on clearing overgrowth, restoring the fishpond, researching and implementing ancient Hawaiian fishpond practices such as rebuilding the kuapā and mākāhā, and involving the community in all of its efforts. They are given a range of responsibilities such as fishpond maintenance, propagation efforts, educating other teachers and students, leading volunteer workdays, building partnerships, supporting research projects that involve the fishpond, and most importantly, observing and attending to all property needs as they arise.

PAF and stewardship managers of Waikalua are proud of the number of hands that have contributed to the restoration effort. Community stewardship will always be a part of our mission and something we prioritize. Stewardship and education go hand in hand because the things we teach are truly learned through doing them yourself. Humility and sharing of knowledge is a value amongst our leaders and should be practiced by all future stewards.

The peaceful atmosphere of Waikalua is largely in part to the surrounding scenery. When standing on the property facing Kāneʻohe Bay, there are no obstructions. To the left is Kāneʻohe stream. The opposite bank of the stream is lined by a few modest homes. To the right are the two fishponds, with a backdrop of trees that block the view of Kamehameha Highway. Finally, when you turn around, there is an unobstructed view of the Koʻolau mountain range and Keahiokahoe. It is essential that the scenic views be maintained for overall wealth. The trees and water surrounding the property are part of what makes the property a sanctuary. Native species are returning to this place because it is protected from the nearby residential areas. For these reasons, attention should be paid to the surrounding areas and any proposed development of those areas. Scenic views should be valued and maintained.

Kawa Stream once flowed through the fishpond. It is a long-term goal to return the flow to its natural state, assuming it does not harm the rest of the ecosystem in any way. More research must be done to see what this project will entail and if it is feasible.

The second, smaller fishpond cannot be forgotten, and restoration should begin when the resources are available.

Propagation:

Restoration of the larger fishpond continues as it gets closer to being healthy and stable enough to support the growth of selected species. In the meantime, mullet, awa, and native limu (such as limu manuea which has been in propagation since 2016) are being growing in separate controlled tanks. The use of aquaculture tanks gives us a chance to see how certain species grow in the environment without the potential threats that exist in the fishpond. The plan is to continue propagating various native plants in the aquaculture tanks to allow test them and support their

growth for eventual consumption, or to be a catalyst that is shared with other fishponds/growers interested in propagation.

Mullet and awa are being cultivated in a sectioned off area of the fishpond (paepae) to protect them from certain species in the fishpond. The mullet are more profitable than the awa and easier to propagate. Unfortunately, the majority of fish were stolen recently which prevented the mullet from going through their three-year maturation cycle. The ones that remain appear to be steadily growing although it is uncertain how or when they will be introduced to the fishpond without barriers. Raising oysters and possibly sea cucumber are on the horizon.

Before native plants and fish can be cultivated in the greater pond (our eventual goal), some threats need to be addressed and monitored. First, the remaining mangrove needs to be eradicated. The vast majority of it has already been removed, but what still remains makes it difficult for the ecosystem to return to its original balanced state. Another threat to the cultivation of species is the amount of barracuda that are present.

Although there is still a lot of work to be done and maintenance will be ongoing, there have been good signs. We have observed a steady return of the native Aeʻo, the Hawaiian stilt, a federally listed endangerd species. The Aukuʻu (night heron) have also returned, with occasional sightings of the Pueo, a state listed endangerd species on the island of Oʻahu.

Propagation activities include:

1. Introducing a larger variety of limu to the aquaculture tanks.
2. Growing enough mullet and awa to sell.
3. Continue elimination of invasive threats that prevent native species from thriving.
4. Sustain varieties of limu so they can be researched and shared with others
5. Continued research on the best candidates for the specific environment at Waikalua.

Recreation:

There should be continued managed public access to Kāneʻohe Bay for canoe paddling and swimming. The beach on the corner where Kāneʻohe Stream opens to Kāneʻohe Bay is frequented by fishermen. Canoe paddlers occasionally launch their canoes from the same beach. A local canoe club has asked if it can use the space as its home base, where a few waʻa can be stored when they are not in use. PAF is considering the possibility of building a small hale waʻa, or canoe house, used to protect the canoes from the elements. Encouraging canoe paddling, one of the oldest Hawaiian recreational activities, is in alignment with everything Waikalua encompasses and we would like to perpetuate. PAF does not have the resources to build a modest hale waʻa at this time, and it is not high priority at this time. While recreation is an important aspect of the value of Waikalua, it should not supersede any conservational or educational purposes.

Other activities that people enjoy on the property include walking on the dirt path around the fishpond, which provides people to escape the noise and traffic of nearby residential areas. We want to encourage the exploration of the premises, however fishpond management should be aware of the amount and type of activity that takes place around the fishponds. The recent return of native species is reassurance that we are on the right restoration path and we need to continue observing the natural cycles in the area. Excessive human activity and dog walking may deter birds from nesting nearby and should therefore be limited at certain times. All public access should be managed by PAF or the current owners/stewards due to the property's cultural and ecological vulnerability.

Education:

PAF prides itself on being a "community classroom" experience outside of the traditional school campus to learn, apply knowledge and help solve real world problems in their own communities. Elementary and high school classes from all over the state have benefitted from PAF's educational resources. The property offers an invaluable opportunity to participate in outdoor experiences where students learn the history of ancient fishponds' roles in the ahupuaʻa system and how that translates to modern day, all while exhibiting the core values of traditional Hawaiian culture.

It is essential that we continue to offer programs for outdoor, ʻāina based learning. Maintaining our relationships/partnerships is a huge part of sustaining our education program. To date, PAF has developed (1) over 200 partners throughout the State of Hawaii, the Pacific and the U.S. continent in helping to support its success and mission;(2) enrolled over 21,000 Students in its career planning system;(3) trained over 4,500 teachers statewide; (4) Since 1995, over 100,000 students, parents, teachers and community members learn and steward the fishpond (5) provided fiscal sponsorship services for 15 community organizations. PAF is proud of its foundation in education, earning the trust and respect of the community and we hope to expand our educational impact.

In an effort to provide students and teachers better resources, PAF intends to build a small educational center on the mauka side of the property, nearest Kawa stream. The center will house tangible educational resources and any operational materials. In addition to the educational structure, there is intent to build a small hale designed for a loko iʻa kiaʻi (fishpond caretaker) to reside. Having a loko iʻa kiaʻi was common for traditional Hawaiian fishponds. Having someone on site 24/7 would contribute to the overall safety of students and provide consistent maintenance of natural and cultural resources. This is particularly important considering how sensitive Waikalua is to the ever-changing surrounding environment. Furthermore, there have been a few instances of people entering the property at night and stealing thousands of dollars of materials such as fish and tools.

Along the lines of having a better centralized location to house materials and organize resources, there should be a small bathroom facility somewhere on the property. There has been an

outhouse on the property for 25 years, but it has not been ideal, especially considering the sheer number of volunteers that have contributed to the stewardship at Waikalua.

Financial Sustainability:

PAF's vision as a nonprofit is wide-reaching and long-lasting, and therefore necessitates some type of financial income. There is currently no part of the management model that directly contributes to financial sustainability. Although many steps need to be taken before sustainable revenue is generated, current management and researchers have come up with some plausible plans.

The ideal scenario would require the acquisition of the Kāneʻohe Waste Water Pre-Treatment Facility on the mauka side of the property. The plan involves lining the large tanks and bringing in freshwater, either from the ground and eventually, Kawa stream. The tanks would be used to raise tilapia and prawns. Extensive research has been done which analyzes the demand and supply on the market right now. The combination of tilapia and prawns is important because the prawns eat the algae (model attached) which stabilizes the environment for tilapia growth, which is the very profitable and in high demand. This plan, if successful, will support the fishpond and the community in various ways. First, the production of large quantities of fish would increase food security in our state because all of the tilapia sold in the stores today is imported. The profits would help the management and stewardship of the rest of the Waikalua Fishponds Complex. The acquisition of the Waste Water Pre-Treatment Facility would, most importantly, prevent the property from getting developed while eliminating any threats to water quality that other uses of that land might present.

In the last few years, moonlight concerts have been held in the open space on the premises. Those concerts are intended to continue after the COVID-19 pandemic halts. It is possible for us to charge attendees to help with stewardship costs.

There is some discussion about holding small events, such as weddings, on the property, although there is no plan drawn up for that. If implemented at any point, the events must be limited to a small number and should not compromise any of our conservation values or plans.

Finally, one idea for generating revenue focuses on the eco-cultural tourism. While there is some hesitation in this idea, there are many potential benefits aside from creating a sustainable source of revenue. First of all, it would give visitors a valuable opportunity to learn about our history and culture through ʻāina interaction. Furthermore, sharing our history and culture in an authentic way contributes to the greater restoration of our culture. It is incredibly important that each model proposed be closely analyzed from a conservation perspective. There is no situation where profit should be prioritized over conservation and preservation of Waikalua's intergrity. Additionally, any negative impact should be minimized by taking careful measures to protect the ecological health of the fishponds.

Conclusion:

By its nature, this Management Plan is meant to change and evolve over time, subject to mutual agreement by the landowner and the Hawaiian Islands Land Trust per the Conservation Easement, as new threats to the conservation values emerge, and best management practices evolve to address these issues. This Plan is not meant as a comprehensive strategy to address all real and potential threats. Rather, this Management Plan is designed to provide a guidepost for the protection of these resources.

Appendix IV: Environmental Assessment and Compliance Findings, US Dept. of Housing & Urban Development for Waikalua Loko Fishpond (Jan. 2010)

Environmental Assessment and Compliance Findings for the Related Laws

U.S. Department of Housing and Urban Development

1. Project Number: **AHIAC-09-HI-01**
   HUD Program: **Alaska Native/Native Hawaiian Institutions Assisting Communities**
2. Date Received: 01/06/10

RMS: HI-00487R

Findings and Recommendations are to be prepared **after** the environmental analysis is completed. Complete items 1 through 15 as appropriate for all projects. For projects requiring an environmental assessment, also complete Parts A and B. For projects categorically excluded under 24 CFR 50.20, complete Part A. Attach notes and source documentation that support the findings.

3. Project Name and Location: (Street, City, County, State)
Waikalua Loko Fishpond
Kane'ohe Bay
County of Oahu, HI 96720

4. Applicant Name and Address (Street, City, State, Zip Code), and Phone
University of Hawaii – Windward Community College
2530 Dole Street, Sakamaki D-200
Honolulu, HI 96822

5. ☐Multifamily ☐Elderly ☒Other
Public facility

6. Number of: **0** Dwelling Units **0** Building **0** Story **17** Acres

7. Displacement: ☒No ☐Yes
Site is vacant except for unoccupied, dilapidated structures.

8. ☐New Construction ☒Rehabilitation ☐Other
Acquisition and restoration of a 17-acre fishpond and shoreline, including the demolition and clearance of hazardous structures, for use as an educational and cultural facility.

9. Has an environmental report (federal, state, or local) been used in completing this form? ☒Yes ☐No
Various documents from 1989 Environmental Assessment prepared for golf course expansion.

10. Planning Findings: Is the project in compliance or conformance with the following plans?

Local Zoning:	☒Yes	☐No	☐Not Applicable
Coastal Zone:	☒Yes	☐No	☐Not Applicable
Air Quality (SIP):	☒Yes	☐No	☐Not Applicable

No construction activities are planned. No change in land use. Site will continue to be used as a fishpond.

Are there any unresolved conflicts concerning the use of the site? Explain "Yes" ☐Yes ☒No

11. Environmental Finding: (check one)

☒Categorical exclusion is made in accordance with § 50.20(a)(4) or

☐Environmental Assessment and a **Finding of No Significant Impact** (FONSI) is made in accordance with § 50.33 or

☐Environmental Assessment and a **Finding of Significant Impact** is made, and an Environmental Impact Statement is required in accordance with §§ 50.33(d) and 50.41.

☒ Project is recommended for approval (List any conditions and requirements): ☐ Project is recommended for rejection (State reasons):

Comply with the recommendations of the Waikalua Loko Pond Preservation Plan dated July 1995.

12. Preparer: (signature) **Robert S. Kroll**
Robert S. Kroll
Date: *3/10/10*

13. Supervisor: (signature)
Date:

14. Comments by Environmental Clearance Officer (ECO): (required for projects over 200 lots/units)

ECO: (signature)
Date:

15. Comments (if any) by HUD Approving Official: Sherone Ivey, Director, Office of University Partnerships

HUD Approving Official: (signature) **Sherone Ivey, Deputy Assistant Secretary, Office of University Partnerships**
Sherone Ivey
Date: *3/11/10*

Part A. Compliance Findings for §50.4 Related Laws and Authorities

§50.4 Laws and Authorities	Project is in Compliance Yes	No	Source Documentation and Requirements for Approval
16. Coastal Barrier Resources	☒	☐	There are no Coastal Barrier Zones off the coast of Hawaii. **Ref**: www.fws.gov/habitatconservation/coastal_barrier.html
17. Floodplain Management (24 CFR Part 55)	☒	☐	The property is part of a wetland area and subject to coastal flooding. Project does not involve construction. Activities are limited to acquisition, restoration, and preservation of the fishpond as a cultural resource. **(Tab B – Preservation Plan)**
18. Historic Preservation (36 CFR Part 800)	☒	☐	Archeological survey of the golf course expansion dated 9/89 describes the poor condition of the fishpond and recommends restoration and preservation, which are the project objectives. The area is recognized as being culturally significant. SHPO approved the Fishpond Preservation Plan dated 7/95. Letter dated 1/22/10 from SHPO concurs in the determination that no historic properties will be affected by the project. **(Tab C – survey, SHPO letters; Tab B - Preservation Plan)**
19. Noise Abatement (24 CFR Part 51 Subpart B)	☒	☐	Kaneohe Bay Military Air Base is located a 2.4 miles across Kane'ohe Bay from fishpond; however, noise impacts are minimal since site is not under any flight path. Nearby streets are not major roadways. There are no railroads in the area. Project does not involve housing or construction activities; therefore, is not considered a noise sensitive use per 24 CFR 51.101(a)(3). **(Tab D – Noise Study)**
20. Hazardous Operations (24 CFR Part 51 Subpart C)	☒	☐	No above-ground storage tanks are located in the area per site visit by project coordinator Clyde Tamaru on 11/1/09. **(Tab E – site visit report)**
21. Airport Hazards (24 CFR Part 51 Subpart D)	☒	☐	The Kaneohe Bay Military Air Base is located 2.4 miles away. Take offs and landings occur northeast into the ocean and runways are parallel to the project. As a result, project is not within any Clear Zones or Accident Potential Zones. In addition, requirements of 24 CFR 51D do not apply since project is limited to acquisition and preservation activities. No construction or rehabilitation is proposed. **(Tab F - map)**
22. Protection of Wetlands (E.O. 11990)	☒	☐	Project site is a coastal wetland area. Activities are limited to acquisition, restoration, and preservation of the fishpond. No construction or rehabilitation activities are proposed. **(Tab B – Preservation Plan)**. **Ref: http://www.fws.gov/wetlands/Data/Mapper.html**
23. Toxic Chemicals & Radioactive Materials (§50.3(i))	☒	☐	Query of EPA database revealed no NPL Superfund sites in or near Kane'ohe Bay. **Ref:** http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm EPA's Enviromapper revealed no hazardous facilities or dump sites at or near the site. There are several facilities within a 5 mile radius that handle hazardous material; however, all are monitored by the EPA to ensure compliance with federal standards. **(Tab G – EPA maps)** **Ref:** www.epa.gov/emefdata/em4ef.home Study dated 4/6/89 determined no adverse environmental impact from fertilizers or pesticides used by the adjacent golf course, provided good management practices are followed. **(Tab H)** **Previous use of site:** Undeveloped fishpond. **Underground storage tank:** None identified during data search or prior studies.
24. Other §50.4 authorities (e.g., endangered species, sole source aquifers, farmlands protection, flood, insurance, environmental justice)	☒	☐	**Air Quality [Sections 176(c), (d), and 40 CFR 6,51,93]:** The entire state of Hawaii is an attainment area for all six federally regulated air pollutants, per Environmental Protection Agency website at www.epa.gov/air/data/repsst.html?st~HI~Hawaii. **Flood Insurance [§50.4(b)]:** Flood insurance not needed since there are no structures to insure. **Endangered Species [§50.4(c)]:** Botanical survey of the golf course expansion dated 3/89 determined that no rare or endangered plant species were present. Project will eradicate invasive species and preserve native plants. **(Tab I - survey)** Vertebrate animal survey of the golf course expansion dated 2/89 determined there were no threatened or endangered animal species in the project area. Planned activities are to restore and protect native species and habitat. **(Tab J - survey)** Marine survey of the golf course expansion dated 5/89 determined in section 3.2.3 that there were no threatened or endangered marine species. **(Tab K - survey)** USFWS is a partner with the Fishpond Preservation Society to eradicate invasive species, restore native plants, and maintain habitats for wetland birds. **(Tab L – progress report)** **Sole Source Aquifers [§50.4(d)]:** EPA website indicates the Oahu Sole Source Aquifer does not extend to the project area. In addition, project activities would have no impact on any aquifer. **(Tab M - aquifer map)** **Ref:** http://www.epa.gov/safewater/sourcewater/pubs/qrg_ssamap_reg9.pdf **Wild and Scenic Rivers [§50.4(f)]:** The National Park Service website confirms there are no designated Wild and Scenic Rivers in Hawaii. **Ref:** http://www.rivers.gov **Environmental Justice [§50.4(I)]:** The project site does not suffer from disproportionate adverse health and environmental effects

			on minority or low-income populations relative to the community-at-large. **Farmlands Protection [50.4(j)]:** The project site is not currently used for agricultural or aquaculture activities and has been designated for use as an educational and cultural resource. No agricultural lands will be withdrawn from production and project will enhance the aquaculture potential of the fishpond.

PROJECT DESCRIPTION

Project Name: Waikalua Loko Fishpond
Street Address: Kane'ohe Bay
City, State: Kane'ohe, County of Oahu, Hawaii

Program Name: **Alaska Native/Native Hawaiian Institutions Assisting Communities**
Grant Amount: **$799,318**

Project site is located on the southern shore of Kane'ohe Bay on the windward side of Oahu. The fishpond is approximately 11.5 acres, and the total site to be purchased is 17 acres. Historical records indicate the fishpond has existed for about 350 years. Grant funds will be used for the following activities:

1. Purchase of Waikalua Loko Fishpond.

2. Demolition and clearance of hazardous structures.

3. Educational and cultural programming to enhance stewardship and preservation of the fishpond.

4. Project management and coordination with project partners.

The University of Hawaii – Windward Community College will serve as fiscal sponsor and project manager, with close cooperation from and coordination with the Pacific American Foundation and Waikalua Loko Fishpond Preservation Society. Additional assistance in providing cultural and educational programs will come from the Hawaii Institute of Marine Biology.

Appendix V: Waikalua Fishpond Study

Waikalua (map #56)

SITE #: State 50-80-10-349; BPBM 50-Oa-G5-11

LOCATION
AHUPUA'A/DISTRICT/ISLAND: Kane'ohe/Ko'olaupoko/O'ahu
ADDRESS: 45-231 Kulauli St.
TMK: 4-5-30:1 (portion)
USGS QUAD: Kaneohe

TYPE: I

CLASS: IIA
INTEGRITY:
WALL CONDITION*: poor to good
AMOUNT OF SILTATION*: moderate
EXTENT OF VEGETATION ENCROACHMENT: minimal
NRHP CRITERIA: A--yes; B--no; C--yes; D--yes

SIZE: 4.7 hectares (11.6 acres)

WALL: 433 m (1420 ft) long; 3.5 m *(11.5 ft) wide; 1 m* (3 ft) high.

CONSTRUCTION*: seaward facing of angular and waterworn basalt, small boulders and cobble with cobble fill.

SLUICE(S)*: 3

OWNERSHIP: Pacific Atlas (Hawaii), Inc., Ala Moana Building Suite 1212, Honolulu, Hawaii 96814

HAWAII/NATIONAL REGISTER STATUS: no/no

REFERENCES:
Apple and Kikuchi, 1975
McAllister, 1933
MINARK, 1989

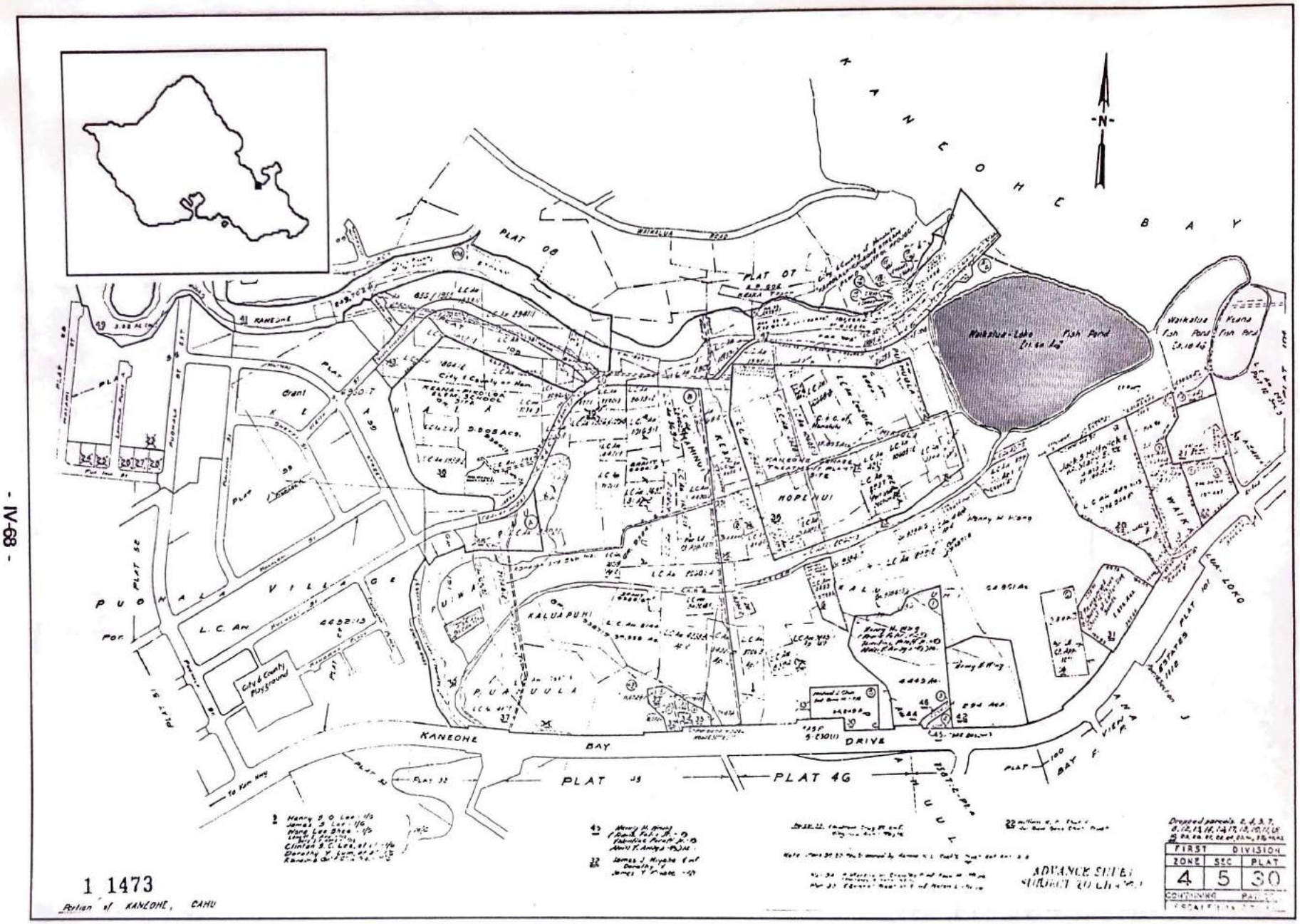
*FIELD CHECK: 28 June 1989

SURROUNDING LAND USES: P-2, P-1, R-10

SPECIAL ENVIRONMENTAL FACTORS: The Kaneohe Sewage Treatment Plant and an auto towing operation are located on the southwestern side of the fishpond.

WATER QUALITY: CLASS AA

GENERAL LAND CLASS: 6 (CONSERVATION)



Tax Map

HAWAIIAN FISHPOND STUDY

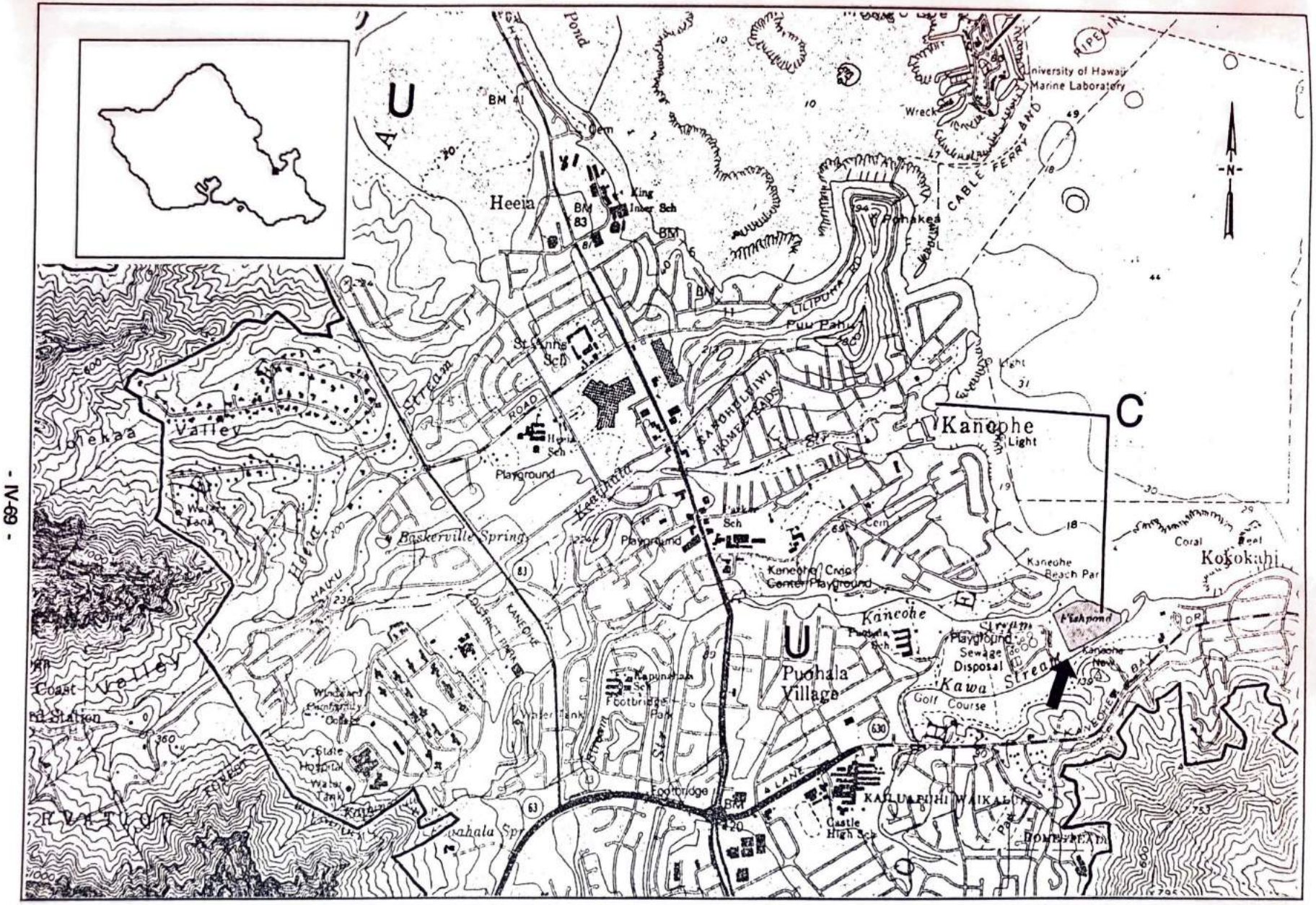
Islands of Hawai'i, Moloka'i and O'ahu

Waikalua Fishpond

Kane'ohe, O'ahu (Portion of TMK: 4-5-30:1)

DHM inc.

Land Use and Environmental Planning



State Land Use Districts

HAWAIIAN FISHPOND STUDY

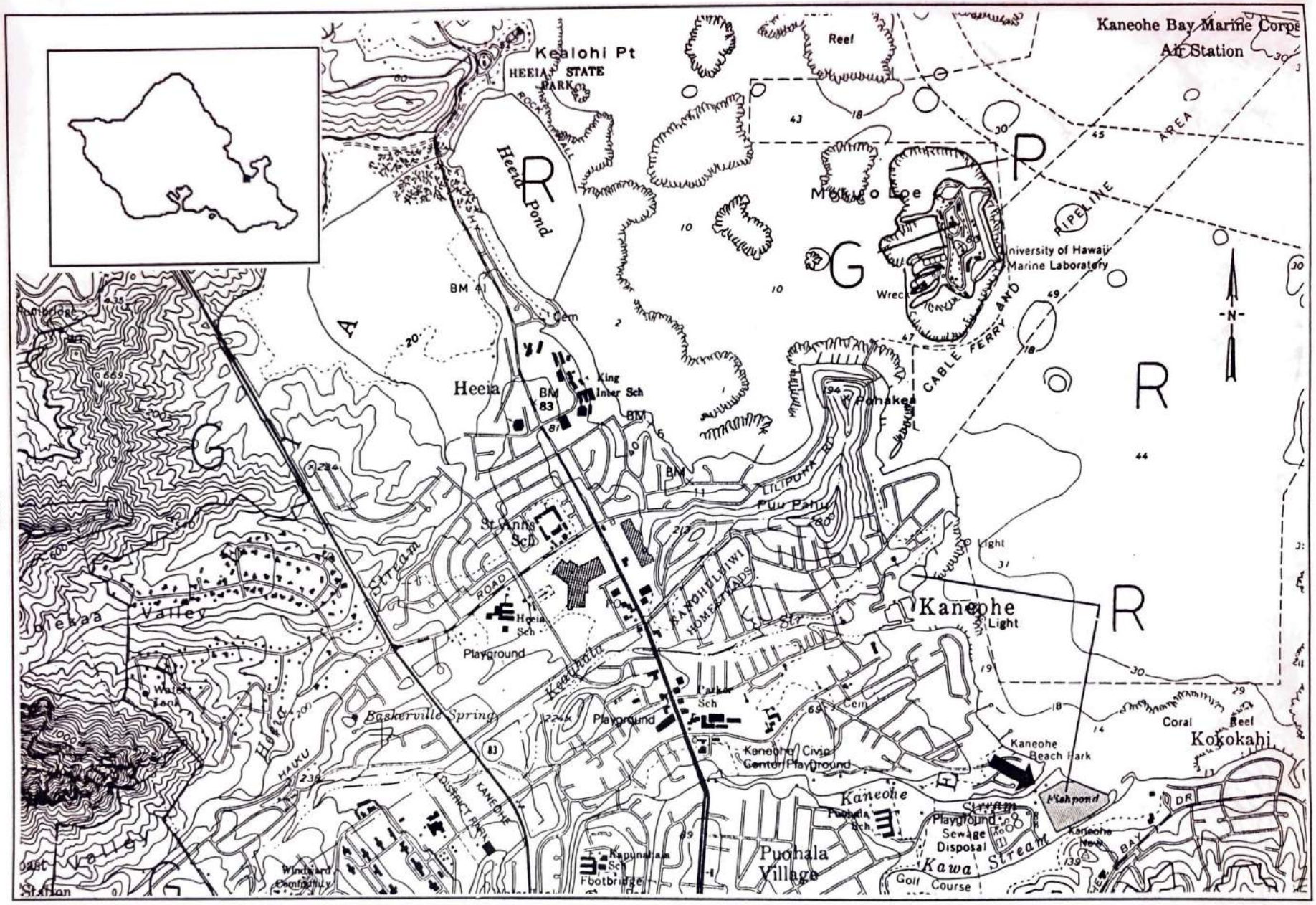
Islands of Hawai'i, Moloka'i and O'ahu

Waikalua Fishpond

Kane'ohe, O'ahu

DHM inc.

Land Use and Environmental Planning



State Conservation District Subzones

HAWAIIAN FISHPOND STUDY

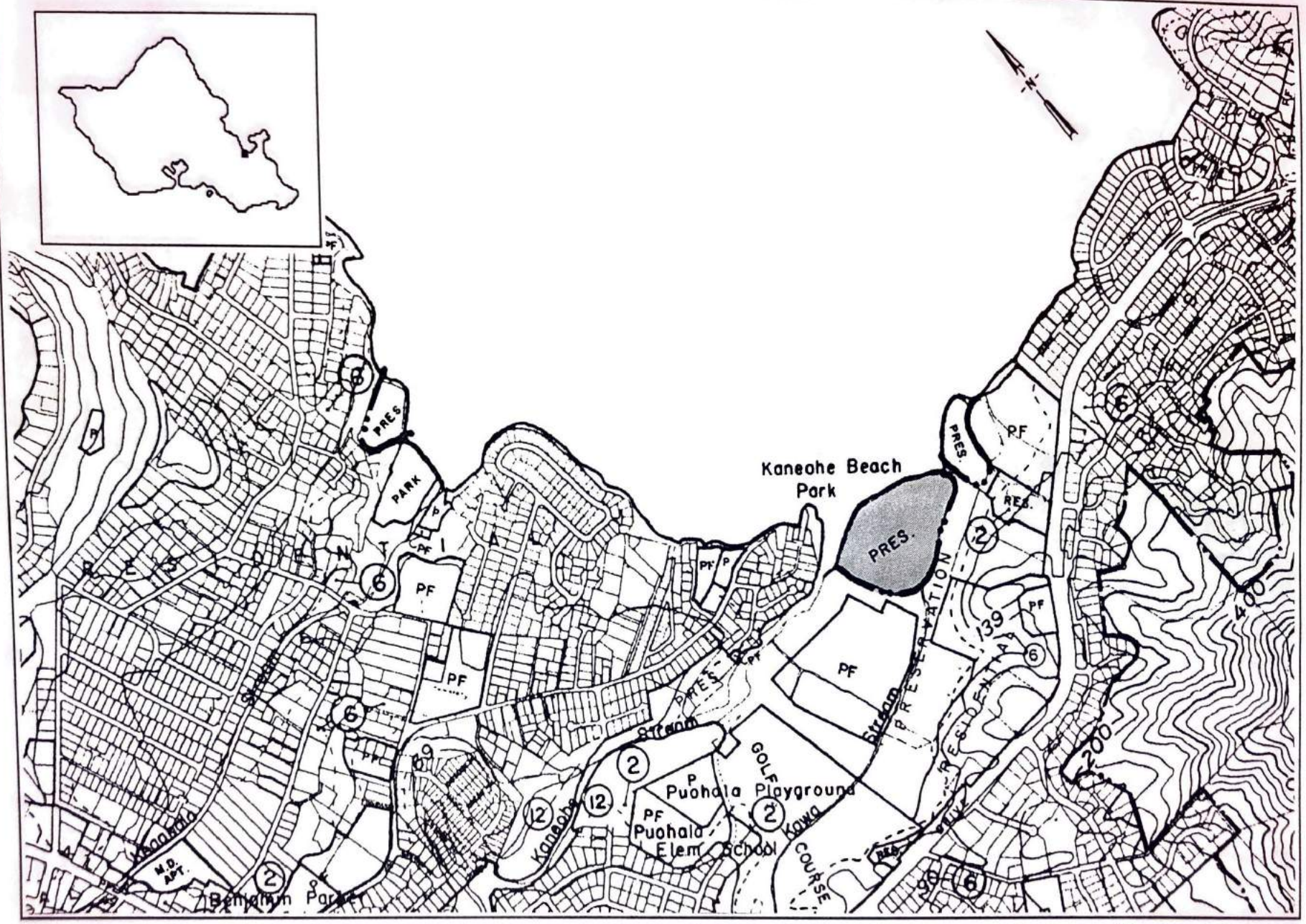
Islands of Hawai'i, Moloka'i and O'ahu

Waikalua Fishpond

Kane'ohe, O'ahu

DHM inc.

Land Use and Environmental Planning



Development Plan

HAWAIIAN FISHPOND STUDY

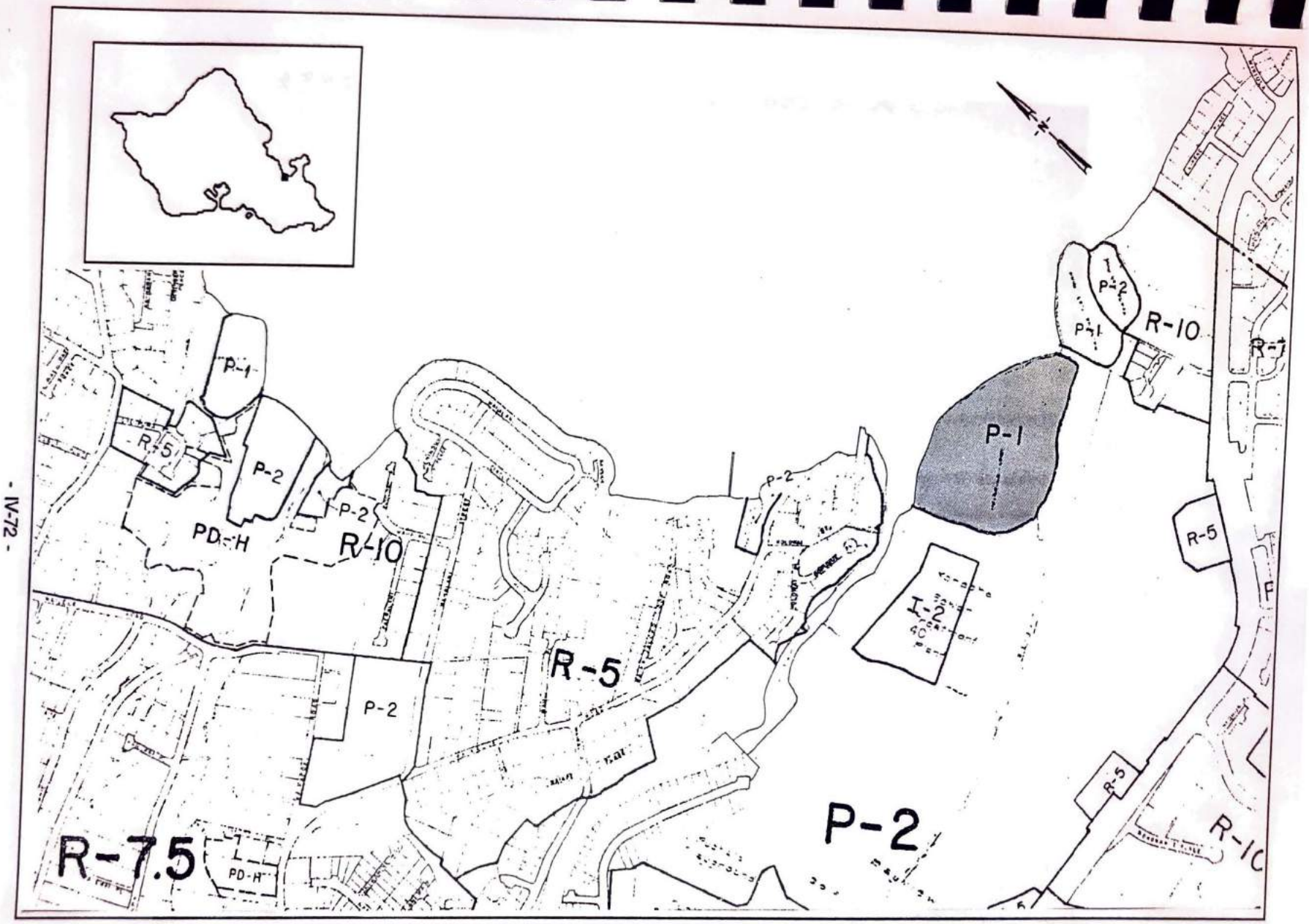
Islands of Hawai'i, Moloka'i and O'ahu

Waikalua Fishpond

Kane'ohe, O'ahu

DHM inc.

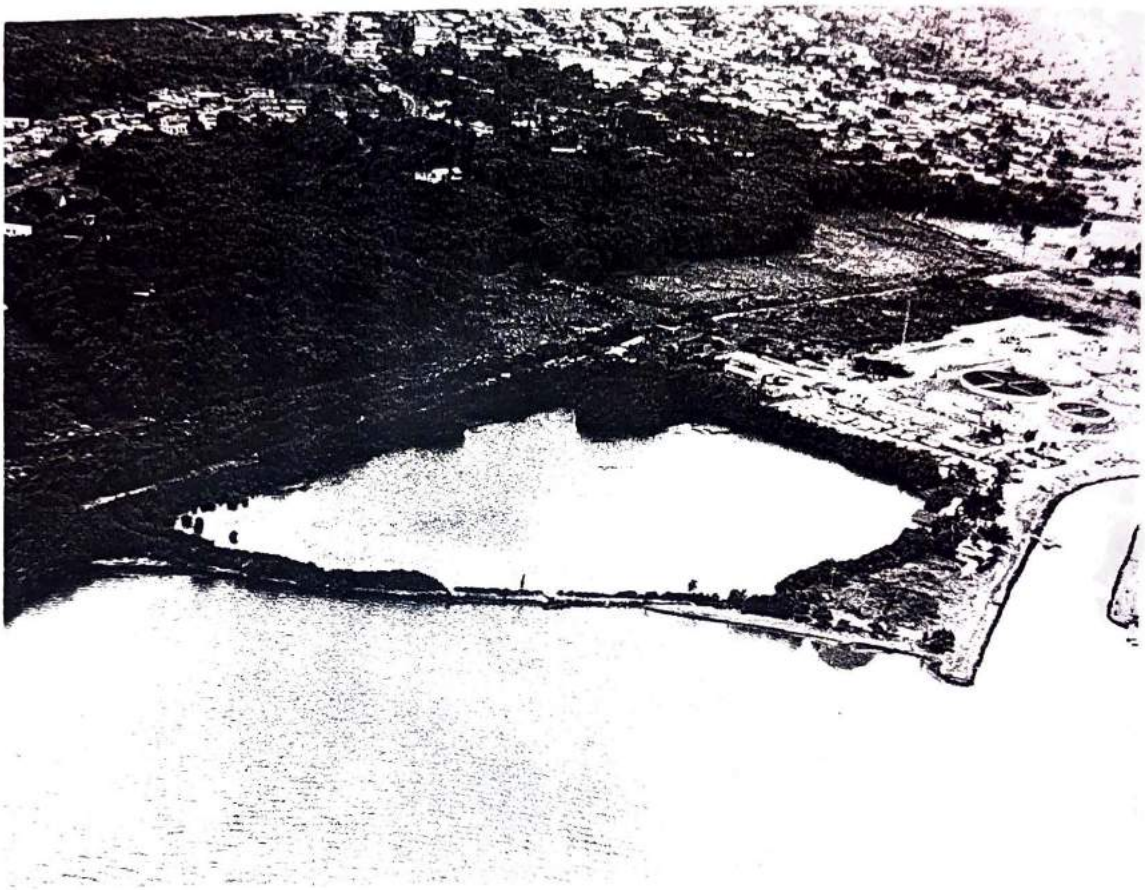
Land Use and Environmental Planning



Zoning Map
HAWAIIAN FISHPOND STUDY
Islands of Hawai'i, Moloka'i and O'ahu

Waikalua Fishpond
Kane'ohe, O'ahu

DHM inc.
Land Use and Environmental Planning



WAIKALUA FISHPOND, O'AHU. The aerial view of Waikalua Fishpond looking southwest, shows an overall view of the fishpond's relationship to the adjacent City and County of Honolulu Kane'ohe Sewage Treatment Plant and surrounding residential areas (May 25, 1989, DHM neg. no. Oa-43-24).

WAIKALUA FISHPOND, O'AHU. Aerial view to the southeast of Waikalua Fishpond with Kane'ohe stream in the foreground. (May 25, 1989, BPBM neg. no. Oa(a)-515-5).

Appendix VI: Resolving Water Quality and Permitting Issues for Native Hawaiian Fishponds, Project Loko I‘a Final Report by Pacific American Foundation (Sept. 1999 – Aug. 2003)

Resolving Water Quality and Permitting Issues for Native Hawaiian Fishponds

Project Loko I'a

FINAL REPORT

September 1999 – August 2003

Pacific American Foundation
33 South King Street
Honolulu, Hawai'i 96813

U.S. Environmental Protection Agency
Form SF424A

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APPENDIX A:	**Newspaper Articles, Awards and Citations**
APPENDIX B:	**Regulatory Permit Guide**
APPENDIX C:	**Template Permit Form - Army Corps 404 Permit** **Template Permit Form - State DLNR – MCDUA**
APPENDIX E:	**Approved Management Plan for Keawanui Fishpond**
APPENDIX F:	**Moloka'i Mangrove Forest and Reef Sediment Report**
APPENDIX G:	**Project Loko I'a Training Log** **Visitors Log**
APPENDIX H:	**Live Rock Plan**
APPENDIX I:	**FINAL REPORT**
APPENDIX J:	**Keawanui Strategic Plan**

Acknowledgments

Many people and organizations contributed to the success of Project Loko I'a. The Project staff extends a big mahalo! to: Senator Inouye, Mr. and Mrs. John Sabas, Susan Polanco de Couet, Dr. Roger Babcock, The Pacific American Foundation, Moloka'i Enterprise Community, The U.S. Environmental Protection Agency, Maui County Public Works Department, Hui O Kuapa, Paepae O He'eia, Kamehameha Schools, Alulike, Puuohoku Ranch, State of Hawai'i Department of Labor-Office of Community Services, The Oceanic Institute, The University of Hawai'i: Hawai'i Institute of Marine Biology, College of Tropical Agriculture, and Human Resources, Marine Options Program, Sea Grant and the College of Civil Engineering.

Introduction

This final report summarizes the project goals, activities and achievements of Project Loko I'a. Project Loko I'a is a grass roots initiated, community-based project committed to the restoration and reuse of traditional Hawaiian fishponds *loko i'a* for educational, cultural and commercial purposes.

Project Loko I'a is based on the island of Moloka'i, a rural community that views the rehabilitation of these fishponds as a centerpiece of future economic prosperity. With more than 70 fishponds and 15,000 acres of fringing reef, this small community of 7,000 sees these traditional resources and cultural treasures as one of their most important assets.

Project Loko I'a's primary support has come from $1.5 million in congressional funding via the U.S. Environmental Protection Agency. Pacific American Foundation has been the nonprofit management organization for Project Loko I'a. This three year EPA-Pacific American Foundation collaboration with Project Loko I'a ended in August 2003. It has been a very successful partnership—note, EPA's Region IX Environmental Award in 2001 and in 2003, The National Trust for Historic Preservation-Historic Hawai'i Foundation Preservation Award.

The goal of Project Loko I'a has been to create local on-island capacity building through training and education enabling the community of Moloka'i to reuse their ponds in the most productive and appropriate manner that suites this most traditional island. Also, integral to the project, was to disseminate and collaborate with other communities throughout the state who share similar goals and aspiration for their fishponds.

The outcomes of Project Loko I'a have been significant. We have trained Moloka'i youth in fishpond restoration techniques, aquaculture methods, water quality assessment, leadership and business training. We have simplified the permit process to access, rebuild and reuse the fishponds. Our trainees have restored Kahinapohaku fishpond, an immense and physically demanding achievement. We have hosted schools, community groups and tourists from throughout the State and the world to the fishponds. Once again we are successfully doing aquaculture in our fishponds. We have created awareness, pride and capacity in our Moloka'i youth through rebuilding fishpond walls and growing fish. We have created a base of operations at Keawanui Fishpond, a magnificent 72-acre fishpond. We have developed a long-

term master plan for Keawanui that builds upon the outcomes of Project Loko I'a; this will enable us to take our successes to the next level and the ultimate goal--making these ancient fishpond flourish once again and be economically viable, self-sustaining entities. We have also created State-wide interest in the proper reuse of the fishponds and have provided state-wide leadership in fishpond development.

Produced, as an outcome off these accomplishments, are the following documents that we feel are a useful resource for others who wish to reuse the fishponds:

> Regulatory Permit Guide (found in Appendix B).
> Application Template Form Army Corps 404 Permit (Appendix C).
> Application Template Form State DLNR - MCDUA (Appendix C).
> Approved Management Plan for Panahaha Fishpond (Appendix D).
> Approved Management Plan for Keawanui Fishpond (Appendix E).
> Permit Process Flow Chart and Guide. (Appendix B).
> Moloka'i Mangrove Forest and Reef Sediment Report (Appendix F).

The Goals and Outcomes Achieved of Project Loko I'a. The major deliverables components of the project work plan as outlined in the original proposal are as follows:

1. Community Engagement and Outreach

Conduct outreach activities to build a foundation of community understanding and support for the restoration and use of fishponds in communities throughout the state:

> Project Aquaculture Trainees are chosen by Moloka'i community leaders.
> Community Working Group established to develop rapport and input from community.
> Two project Loko I'a staff sit on the Moloka'i Federal Empowerment Community (EC) Board.
> Develop working relationships with Federal, State, County and other non-profit organization to advance the project goals.
> Project Loko I'a organize and hold Loko I'a Night, a public gathering on Moloka'i attended by over 600 people.
> Hosted hundreds of school children to the fishpond sites for orientation and education programs.

> Over 500 volunteers have participated in our demonstration project to rebuild the fishpond and do aquaculture. Some of these groups included The White House Fellows, The Nature Conservancy, State, County and Federal regulators, Kamehameha School Trustees and State Department of Education curriculum writers and a delegation of senior government officials and local community representatives from Thailand.

> The Channel 4 news team visited and aired a special on Moloka'i fishponds.

> Various printed media (magazines, newspapers) reported on the project.

> Project Loko I'a visited the islands of Oahu, Maui, Kaua'i and Hawai'i Island consulting and lending their expertise with various individuals and community groups interested in fishpond restoration.

2. Environmental Permit Process Streamlining

> In February 2001, held a one-day workshop and field visit to Moloka'i for all government regulators involved with fishpond permit regulatory issues.

> Developed a set of user-friendly application templates that meet the basic needs of the regulators;.

> Developed a streamlined permit process flow chart and guide.

> The first test of the "streamlined" regulatory process was implemented with the submittal of an application to restore and reuse Panahaha Fishpond for small-scale non-commercial aquaculture research purposes.

> On August 20, 2002 State of Hawai'i, Department of Land and Natural Resources (DLNR) gave authorization to Project Loko I'a to reuse Keawanui Fishpond for aquaculture, education and research purposes. This is the first fishpond to successfully utilize the streamlined Master Conservation District Use Permit Application (MCDUA) process to obtain permits.

3. Water Quality Research

> Three Project staff were trained and certified in water sample collection and analysis procedures.

> Established and maintained a water quality testing laboratory at Keawanui Fishpond.

> Conduct water quality data collection and analysis to document water quality issues under various fishpond use scenarios.

4. Fishpond Demonstration Models for Permits, Restoration and Production

> Kahinapohaku Fishpond restoration is completed January 2001.

> Panahaha Fishpond work site is cleared. Permits applied for—Contested Case Hearing ensued.

> 'Ualapu'e Fishpond site undergoes improvements and new facilities (meeting space, storage facility, fish nursery) and multi-crop aquaculture production is established.

> Keawanui Fishpond aquaculture production is established. Site improvements include native plant nursery, fish nursery and meeting space. Permits are obtained.

> Development of a long-range plan for Keawanui Fishpond that incorporates aquaculture production, economic sustainability, education and research.

5. Production and Marketing Strategies of Pond Reared Aquaculture Products

> Ramped up fish production in net pens at 'Ualapue and Keawanui Fishponds.

> Developed *limu* production at 'Ualapu'e.

> Developed Moloka'i Live Rock production and implementation of business plan.

6. Staff Development and Training

> Kia'i Loko Program in aquaculture training and development established.

> Trainees undergo an intensive two-week aquaculture program at Oceanic Institute, Oahu.

> Trainees submit plans and permit for reuse of Kahinapohaku and Panahaha Fishponds.

> Three trainees undergo training to conduct water quality sampling and lab analysis.

> Staff and Trainees conduct community outreach through school visits, hosting Loko I'a Night, writing news articles, visiting government officials and elected representatives and holding positions on local boards and commissions.

> Staff and Trainees take courses in business development, grant writing, first aid, aquaculture and computers.

> Leadership and cultural training. *Lomi lomi* message, *lauhala* cordage, tattoos, woodworking classes taught by experts brought to Moloka'i from throughout the State.

7. Neighbor Island Outreach

> Maui. Assist Ao ao o Na Loko I'a o Maui in their efforts to rebuild Ko'ie'ie Fishpond through sites assessment and water quality analysis. Consult with fishpond users in Hana.

> Hawai'i Island. Consult with Edith Kanakaole Foundation and survey fishponds in Hilo (Keokaha). Meet with community members in Ka'u interested in restoring their fishponds. Visited with the master wall builders and their on-going restoration project at Kaloko Fishpond (part of Kaloko-Honokohau National Historical Park).

> Kaua'i. Consult with the Waipa Foundation, the non-profit organization restoring the *ahupua'a* watershed of Waipa and their fishpond.

> Oahu. Collaborate with fishpond practitioners at He'eia, Moli'i and Waikalua Loko Fishponds.

> Co-sponsor the State-wide fishpond conference by and for fishpond operators at He'eia Fishpond, Oahu, Sept 2004.

A synopsis of significant activities, issues, and accomplishments for each objective are summarized in the following sections.

1. Community Engagement and Outreach

Community Engagement

It is well documented that the island of Moloka'i is very supportive of the reuse and restoration of their fishponds. From the 1993 *Report of the governor's Task force on Moloka'i Fishpond Restoration* and the 1994 *Moloka'i Aquaculture Strategic Plan* to the 1998 Empowerment Zone Application (and resultant Federal Enterprise Community designation in 1999) restoring these traditional Hawaiian Fishponds has been identified as a major goal for this island community.

The Empowerment Zone Application and Enterprise Community (EC) award was a watershed event for Moloka'i. This was the first time that every business, charitable organization, agency, church, school and family participated in creating a community strategic plan.

The guiding vision of the EC Plan is to develop a community-based economic development model that supports a strong healthy economy yet preserves the quality rural lifestyle that Moloka'i is known for. The EC Plan consisted of 25 community economic development projects that were created by and for the community. Fishpond production development, in conjunction with creating an economically viable diversified agriculture industry was one of the top five "benchmark" development projects in the EC community plan.

To unite diverse elements of the community for the common good was sited as an important means to achieve the EC goals. As such, Project Loko I'a continually worked to become a known and accepted partner within the community and seeks to be a key stimulus of the EC Project. We have done this through actively involving community members through on-site visits, employment opportunities, education and training programs.

Engagement with the community took many forms. Here are some of the highlights:

To involve the community in key decision-making processes three members of the community were invited to assist the Pacific American Foundation (PAF) in the hiring of our initial group of Kia'i Loko or Fishpond Trainees. The panel members were reputable community leaders and represented several organizations with distinct educational and vocational missions targeting

Native Hawaiians: Queen Liliuokalani Children's Center, Queen's Hospital, and the State Department of Education.

Figure 1. Trainees with Manu Kaiama, Native Hawaiian Leadership Program.

Twelve young men and women from the Moloka'i community were selected to join the Kia'i Loko (guardians of the fishpond) or Fishpond Trainees (Trainees) Program. Project Loko I'a staff and numerous partners organized and developed a program designed to teach skills related to the restoration and reuse of fishponds including aquaculture techniques, micro-enterprise training, environmental stewardship and leadership training (for details see Section Six – Staff Development and Training).

Figure 2. Trainees Building Dry Stack Stone Wall at Kulana O'iwi.

A Community Working Group was established whose role was to provide input on key issues as the project progressed. Members were recruited from the educational, social welfare, healthcare, and private sectors. The group met three times a year in addition to numerous individual discussions with group members as specific issues arose.

Project Loko I'a has two members that sit on the EC board. Another one of the EC board members is specifically assigned to our project to provide unbiased information back to the EC board. The Board has monthly meetings and quarterly island-wide community meetings for dissemination of information and collections of input. We also attend district community meetings to give out information about our project. We have written newspaper articles regarding our project in the local paper, The Moloka'i Dispatch (see Appendix A). We also work with the UH

agricultural extension agents (College of Tropical Agriculture and Human Resources - CTAHR), to help communicate with the community.

Figure 3. Trainees and Moloka'i youth work day at Kahinapohaku Fishpond.

As the project progressed it became clear that beyond just engaging the community, there was a need to coordinate and partner with other organizations and agencies that share an interest in revitalizing the fishponds and aquaculture. To this end, we established a number of partnerships:

Figure 4. Kahinapohaku Fishpond. Passing *'ili'ili,* small stones, to the fishpond wall using red plastic baskets.

Moloka'i Community Services Council (MCSC) provided vocational training in aquaculture to young adults and youths enrolled in a Federal Department of Labor (DOL) funded program to facilitate capacity building aimed at youth development through educational achievement, career development and leadership training. Project Loko I'a staff, after a year's experience with fishpond restoration, production and operation, served as trainers and mentors for youths and young adults enrolled in MCSC's DOL program, known as the Hoikaika Program. These youth, about 20 in total, consisting of in school 14-18 year olds and out-of-school 18-24 year olds, participated in various work experiences such as office work, forestry, native plant cultivation, taro and vegetable agriculture, *limu* culture, pond aquaculture and fishpond rebuilding. To us, they are seen as the next generation of fishpond operators. Joining our two Federal programs we coordinated and stretched resources to further community

Figure 5. Bill Kekahuna Tending to the Net Pens at 'Ualapu'e Fishpond.

goals of providing training, development and employment opportunities for youth that takes into consideration our rural lifestyle and desire for a sustainable aquaculture industry.

The University of Hawai'i–CTAHR helped Project Loko I'a establish a hatchery and grow-out facilities consisting three 150 by 50 foot pens for nurseries and three round net pens of 7,500 square feet each for fish grow out at 'Ualapu'e fishpond.

Senator Daniel Inoye's office brought together off-island organizations that have aquaculture, fishpond interests and expertise--Oceanic Institute, PAF, Kamehameha Schools, State Office of Community Services and the University of Hawai'i--with on-island agencies and the community. The purpose was to ensure the efficient and coordinated use of Federal resources flowing into Moloka'i to build a sustainable aquaculture industry.

Project Loko I'a, EPA, and Senator Inouye's Office coordinated a one-day Fishpond Permit Workshop in February 2001. The purpose was to bring regulators and fishpond practitioners together to find common ground and work towards creating a streamlined and user-friendly permit process. Attendees included community members and local business people, EPA, Army Corps of Engineers, United States Department of Agriculture (USDA), Department of Land and Natural Resources, University of Hawai'i, State Department of Health, State Department of Labor, Oceanic Institute, Kamehameha School, Office of Hawaiian Affairs and representatives from the Senator's office and the Honolulu and Maui county administrations (for details see Section Two–Permit Process Streamlining).

Figure 6. School Kids Visiting Keawanui Fishpond.

In March 2002 Project Loko I'a obtained a low-cost lease to Keawanui Fishpond, a magnificent 72-acre fishpond with approximately 5 acres of adjacent land that

Figure 7. Collecting *Pua* Fry in the Nursery Pond, Keawanui.

Figure 8. Walter Ritte Leading a School Group at the Visitors *Hale* at Keawanui Fishpond.

comprises our base of operation. We have created the Keawanui Learning Center a place of collaboration between community members, scientists, researchers, entrepreneurs and cultural practitioners. It is here we are developing a sustainable model of fishpond reuse and production that can be replicated statewide. We have many partners assisting us with this goal. Much of the help comes from donated in-kind services. For instance, the land cost, the land clearing and preparation costs and the conceptual plans have been donated from the landowner, Kamehameha Schools and the County of Maui. With assistance and collaboration from the Oceanic Institute, University of Hawai'i (Institute for Maine Biology, Marine options program, College of tropical Agriculture and Human Resources, College of Engineering), Kamehameha Schools and private planning consultants we have developed a long-range master plan for Keawanui Fishpond and are pursuing research and production activities at the site (for details see Section Four–Fishpond Demonstration Models).

Figure 9. Families Visiting Kahinapohaku Fishpond.

Community Outreach

To further our goals of fishpond rehabilitation and employ them as educational and cultural teaching tools, Project Loko I'a has worked with numerous community organizations, schools, church groups, Hawaiian programs, families, and individuals. Our extensive community outreach includes speaking

Figure 10. Kahinapohaku Fishpond. Having Collected the *'Ili'Ili*, Small Fill Stones, from the Fishpond Basin, Workers Move Towards the Fishpond Wall.

engagements at elementary, middle and high schools and at community meetings, community workdays and on-site orientations and at the fishponds.

Over 500 volunteers have participated in our demonstration projects to rebuild fishpond walls and do aquaculture production. We have developed and nurtured a network of people who love the ocean and believe in *malama 'aina* (care for the land). In welcoming groups and individuals working in the fishponds we spread the knowledge and wisdom which these cultural sites embody—care of our ocean and land resources, ocean sciences, fish behavior and propagation and a direct link to our past. Through these efforts we see a new generation of environmentally and culturally aware young people who will continue in the efforts to protect and revitalize the ancient fishponds and the lands that surround them and the seas and reefs that they embrace.

Figure 11. Trainees Visit With Students and Talk About Hawaiian Fishponds.

The primary means to educate the community about the ancient fishponds has

been through onsite orientations for school and community groups, educational presentations in the schools and participating in various community events. Outreach into the local Moloka'i primary, middle and high schools took place by project staff and the Aquaculture Trainees. Over 10 in-school presentations were made by project staff throughout the period reaching several hundred people. The Aquaculture Trainees also made presentations on fishpond activities to various community groups including the Manae Community(east-end Moloka'i), the Moloka'i Enterprise Community and the Moloka'i Planning Commission. These outreach efforts did much to inform the community on the project- many residents were not aware of the extent of fishpond work done by their own that involved not only restoration, but a full circle of services from production to job training to leadership development.

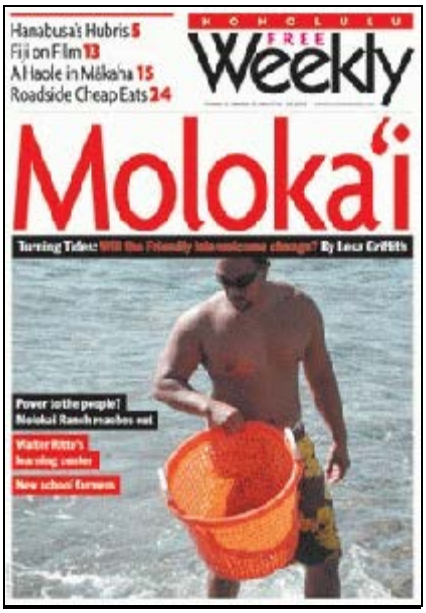

Figure 12. Josh Kalua on the cover of the March 24, 2004 issue of the Honolulu Weekly.

Over 1,000 youths and adults participated in onsite orientations and community workdays. Field visits took place primarily at 'Ualapu'e Fishpond and Keawanui Fishpond. Other visitors took part in workdays at these ponds and also at Kahinapohaku Fishpond. Workdays included an orientation session, rebuilding rock walls, fish feeding, net pen maintenance and/or site maintenance. Several high profile groups visited and worked in these fishponds including the White House Fellows, The Nature Conservancy, State, County and Federal regulators, Kamehameha School, Bishop Estate Trustees and Department of Education curriculum writers and school teachers (for a detailed list refer to Appendix G).

It should be noted that since 1964 The White House Fellowships are considered America's most prestigious program for leadership and public service. The White House Fellowships have offered outstanding young Americans the opportunity to participate in the business of governing the Nation. Each full time Fellow works as a special assistant to a Cabinet member or senior presidential advisor. They also participate in an education program designed to nurture their development as a leader. The Fellows sited their visit to Moloka'i and the fishponds as the highlight of their field trip to Hawai'i.

Another strategy employed to educate the community were a series of articles written by project staff that ran over the course of eight weeks in the local Moloka'i newspaper. These articles chronicled the personal experience and growth of staff as a result of their work with Project Loko I'a. It also gave the project staff practice in solidifying their computer literacy skills. The articles created a noticeable community enthusiasm for the project as evidenced by the numerous inquiries and comments that staff encountered whenever the articles appeared in the paper. Copies of these articles can be found in Appendix A– News, Articles and Citations.

Figure 13. Loko I'a Night. Buddy Keala Overseeing Live Fish Exhibit.

Various local newspaper and Magazines including the Honolulu Advertiser, the Honolulu Weekly, the Maui News and Hawaiian Airline's *Hana Hou Magazine* covered the story of Moloka'i Fishpond restoration. Copies of these articles can also be found in Appendix A.

Other Community outreach successes include:

> Produced Loko I'a Night, a public gathering at Mitchell Pauole Community Center in Kaunakakai featuring the Moloka'i fishponds

Figure 15. Loko I'a Night. Entertainment by Amy Hanaialii !

Figure 16. Loko I'a Nite. Various Educational Exhibits.

and attended by over 600 people. The Trainees and its major partners (PAF, EPA, State Office of Community Services, UH-CTAHR, EC, Ho'ikaika, Farber & Associates, Alu Like, Rural Development Program, Native Hawaiian Leadership Program, Kamehameha Schools, Ke Kua'aina Hanauna Hou, Oceanic Institute, Hui O Kuapa) did a "show and tell" that included poster boards, information tables, PowerPoint presentations; live fish tanks and water quality demonstrations. For attending, everyone was treated to a free Hawaiian dinner. To keep people there and the event going, dinner was followed by live entertainment and door prizes. The successful event lasted until after 10:00 p.m.

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> The Local ABC news anchor Gary Sprinkle (KITV-4) produced a documentary on Moloka'i Island and the communities practice and preservation of Hawaiian ways. Featured prominently in the program was the Kahinapohaku Fishpond restoration effort. The Program, *Pacific Adventures: Moloka'i* earned a number of awards in broadcast journalism and from the Hawaiian Visitors Bureau.

> Project Loko I'a visited the islands of Oahu, Maui and Hawai'i Island consulting and lending their expertise with various individuals and community groups interested in fishpond restoration (details of this can be found in Section Seven–Neighbor Island Outreach).

> EPA Award. In November 2001, Project Loko I'a received a national award for excellence from Region IX, Environmental Protection Agency. Recognizing the outstanding leadership and teamwork of the Moloka'i Hawaiian men and women and their contribution to the environment, EPA's Administrator praised the high quality and standards of the project and the support from the Pacific American Foundation.

Figure 17. Joshua Kalua, Greg Chun and Walter Ritte Receive EPA Award.

> National Trust for Historic Preservation Award. In April 2003 Project Loko I'a received The National Trust for Historic Preservation Award-Historic Hawai'i Foundation Preservation Award. The Trust

noted in their award the community organizing and leadership skills of Project Loko I'a and Project Coordinator Walter Ritte and the restoration of Kahinapohaku Fishpond.

> Keep it Hawai'i 2001 Award. The State of Hawai'i Visitors and Convention Bureau honored the Kahinapohaku Restoration Project for the efforts to preserve Hawaiian culture.

> Visit from Thai delegates. In August 2002 Moloka'i hosted a delegation of government officials from Thailand. In January 2002, EPA Administrator, Governor Christine Todd Whitman, had an audience with His Majesty King Bhumiphol of Thailand. During their discussion, King Bhumiphol raised his interest in engaging indigenous communities in Thailand to restore local fishponds that had suffered environmental and economic deterioration. Governor Whitman shared the example of the work being done by communities in Moloka'i to restore fishponds using indigenous methods. His Majesty was very interested in learning more. As a result a Thai delegation of senior government officials and local community representatives visited Moloka'i in August 2002 to learn more and prepare a report for His Majesty.

Figure 18. Exchange of Gifts.

Beyond the specific details regarding how the fishponds were restored, one of the primary purposes of this mission is for the delegates to learn how communities organized themselves and interacted with other groups, non-profit organizations and government agencies to accomplish their goals.

Figure 19. Moloka'i Community Welcomes the Delegation from Thailand.

Figures 20, Thai Delegates Help Repair Honouliwai Fishpond.

Figure 21, Thai Delegates Visit *Limu* Seaweed Farm.

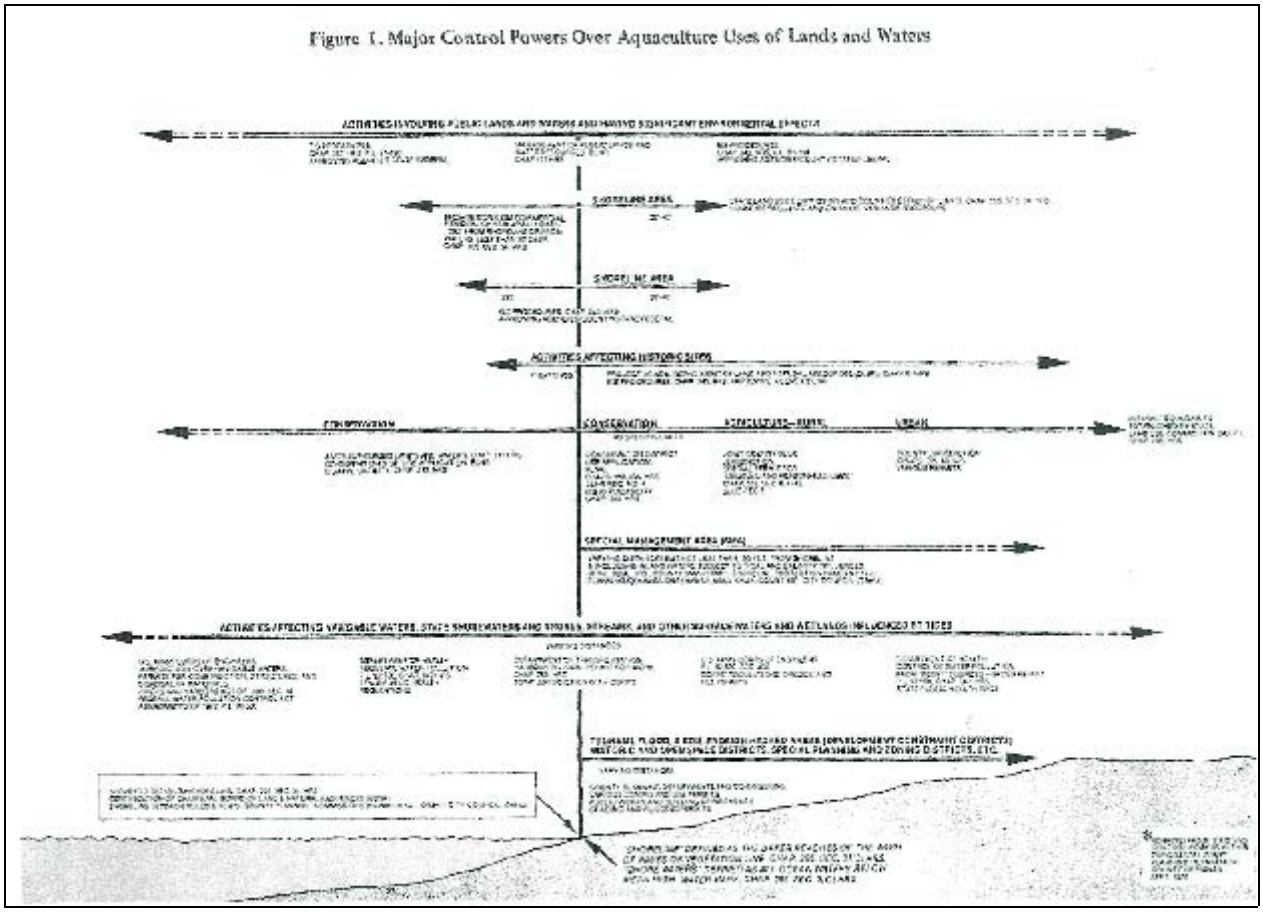
Figure 22, Children Perform Hula at Kahinapohaku Fishpond.

Figure 22, *Pau Hana,* Finished Working for the Day, Workers at Kahinapohaku Fishpond.

Figure 23, Lab Time at Keawanui Fishpond.

2. Environmental Permit Process Streamlining

Complex Federal, State, and County regulatory permits are necessary before any Hawaiian fishpond restoration, revitalization and reuse effort can be started. The jurisdiction of Hawaiian fishponds occurs at the shoreline, which interface between land and ocean and is heavily regulated (please note Figure 1, below, and figure 24 on the following page). It has been noted that to restore a fishpond there are potentially 17 permits and processing could easily cost $50-$80,000 and take several years to complete. The complexity lies in the fact that there are multiple regulatory agencies with often times overlapping regulatory purpose but no established guiding process nor lead agency to help navigate one through the labyrinth of permits. What a community is up against is a process that by default favors those with the resources necessary to hire experts to navigate through this regulatory process—leaving those who wish to restore fishponds for traditional purposes at a disadvantage.



In streamlining the permit process, our goal was to create a standardized process that the average person could navigate through in a timely manner and at minimal cost. To that end we accomplished the following:

> Untangled and simplified the current environmental regulatory framework;

> Sought collaboration with regulators and lawmakers for devising a mutually agreed upon streamlined process;

> Developed standardized user-friendly application templates that meet the basic needs of the regulators;

> Tested out the streamlined process by acquiring permits and leases for several State-owned fishponds. Reviewed the streamlined process, made changes as seen fit;

> Developed a streamlined permit process flow chart and guide.

While much work remains to make this permit process a "user-friendly" experience—Project Loko I'a has made substantial progress towards that goal. In doing so we have sown awareness among the regulatory community for the need to show flexibility when working with grass roots community projects. In addition, we have created a number of guides to help others move through the process. These products include:

> Regulatory Permit Guide (found in Appendix B)
> Permit Process Flow Chart and Guide (Appendix B)
> Application Template Form Army Corps 404 Permit (Appendix C)
> Application Template Form State DLNR - CDUA (Appendix C)
> Approved Management Plan for Panahaha Fishpond (Appendix D)
> Approved Management Plan for Keawanui Fishpond (Appendix E)
> Moloka'i Mangrove Forests and Reef Sedimentation Assessment Report (Appendix F).

Figure.24, South-East Coastline of Moloka'i. Note the Interface Between the Fishponds the Land and the Sea.

The following is the sequence of events, activities that took place and products produced in working towards permit simplification:

Streamlining the Permit Process

Methodology. A team of project staff, public agencies and private consultants was formed to develop a plan for streamlining the permit process[1]. After the initial analysis of the permit requirement issues, it was concluded that the development of the desired streamlined process would require three actions: 1) obtain regulator agreement on exempted issues and permit requirements; 2) development user friendly application templates that meet the basic needs of the regulators; and 3) standardize what is necessary to meet the requirements that remain. To accomplish this we have met with the regulators to identify both common and distinct needs and to assess where there might be room for gaining exemptions, standardizing requirements, and generally decreasing the amount of information, redundancy and data required.

Identify Existing Environmental Regulatory Framework. Work on streamlining the regulatory process began by educating ourselves about what permits could be required if someone wanted to restore a fishpond back to productive use. Below is list of those permits. A detailed summary of the Permits and their requirements can be found in Appendix B: Regulatory Permit Guide.

FEDERAL PERMITS:

> Department Of Army Permit (404)
> Dept. of Health 401 Water Quality Certification
> U.S. Fish & Wildlife Service (Review)
> Coastal Zone Management (CZM) Consistency Statement

STATE PERMITS:

Department of Land & Natural Resources:

> Conservation District Use Permit
> Environmental Impact Statement/Environmental Assessment (343 HRS)
> State Historic Preservation Office (Historic Site Review-Sec.106)
> Fishpond Operators Permit

[1] PAF contracted Jack Keppler, former Deputy Director of the Department of Land and Natural Resources. State Office of Community Services (OCS) and University of Hawai'i (UH) recommended two planners, Joe Farber of Farber & Associates, and Eugene Dashiell of Environmental Planning, both whom possess extensive experience with Hawaiian fishponds. In addition to the aforementioned consultants, Buddy Keala, UH Cooperative Extension Service; Jan Dill and Gregory Chun, Ph.D., PAF; Susan Polanco, Environmental Protection Agency (EPA); and Walter Ritte, Mark Forman and Keith Yabusaki, Ph.D., OCS, formed the nucleus of the permit team.

COUNTY (MAUI) PERMITS:

> Shoreline Management Area (SMA) Permit
> Shoreline Setback Variance
> Building Permit
> Grading, Grubbing & Stockpiling Permit

STATE-OWNED FISHPONDS:

DLNR-Land Management Division
State Lease mechanism:

> Non-Profit 501(c) 1 or 501(c) 3 Status
> Certified Shoreline Survey
> Land appraisal
> Lease Rent Negotiations
> Right-of-Entry permit
> Insurance Coverage

MASTER CONSERVATION DISTRICT USE PERMIT APPLICATION PERMIT (MASTER CDUA).

In 1996, 29 Moloka'i fishponds (12 state-owned and 17 private) analyzed and selected by community members and the Governor's Task Force on Moloka'i Fishpond Restoration as having a high potential for restoration, were packaged under a single Master Permit Application. The advantage of the Master CDUA was that a single CDUA application and Environmental Assessment in support of the application was drafted for all 29 fishponds. This eliminated redundancy and the costs associated with individual CDUA/EA applications, which are required for any proposed activities within the State Conservation District. The motive behind creating the MCDUA was the belief that it would expedite the historically accurate restoration of Hawaiian fishponds by community groups for traditional '*Ohana*-based (family) management.

Reduce, Simplify Permit Requirements. Every permit granted by the regulatory agencies come complete with a number of requirements and conditions. For example, the Master CDUA comes with 19 conditions. Some of these conditions are costly and time consuming such as fishpond coring ($6,000), land appraisal ($2,000) and certified shoreline survey ($2,000-3,000). Working with regulators we negotiated to have a number of these conditions simplified and or eliminated. These include:

1. DLNR has agreed that a pre-project survey to assess impact of restoration activities on protected bird species would not be necessary, as their own Division of Fish and Wildlife has indicated that restoration of these ponds will likely *improve* bird habitat conditions.

2. Fishpond mapping and sediment coring (a requirement of DLNR's State Historic Preservation Division) can be met by having individuals who have received training by the State Historic Preservation Division in mapping and coring techniques, thereby averting the need to hire a professional to meet this requirement (see letter from State Historic Preservation Office, Appendix D).

3. Conditional exemption from the Army Corp of Engineers permit authorized under Section 404 of the Clean Water Act. A determination from the Corps is always required for every fishpond project. However, the Army Corps has stated that restoration of a fishpond wall does not pose a significant impact to ocean water quality *if* such a restoration plan adheres to Best Management Practices (BMPs)—restoring the wall along the existing footprint, no dredging and machinery kept to a minimum, etc. If such a project plan adheres to "restoration work under BMP's," a 404 Permit waiver will be granted.

4. If an ACE 404 exemption is granted, the State Department of Health administered 401 Water Quality Certification is not required. This permit is the most costly and time-consuming permit to obtain.

5. County requirements for a Special Management Area (SMA) permit have been waived. The County of Maui has concurred that since fishponds are located below the shoreline high-water mark, which is outside of the SMA, fishponds are exempted from this permit (see exemption letter in Appendix D).

6. Certified Shoreline Survey (CSS). Our position is that the expensive ($3,000 – 10,000) CSS is not necessary. In the case of restoration, we are following the historic imprint of the pond wall that is shown on a variety of maps, including tax key maps. This is a static boundary that will not be broached. As to possible impacts on adjacent shorelines and beaches from a restored fishpond wall, we suggest that beach profiles and photos documenting a series of transects be taken along the shoreline before, during and after restoration to monitor possible impacts to the shoreline. DLNR generally agrees with this argument and has somewhat backed off of the CSS requirement but still feels that a CSS exemption should be considered on a site-by-site basis. In the case of the Panahaha

Management Plan Application, we conducted beach transects in lieu of a CSS (These can be found in the Panahaha Management Plan, Appendix: D).

Fishpond Permit Workshop. A major meeting of regulatory agencies was held at Keawanui Fishpond to address specific concerns that hinder approval of permits. Held in February 2001, the one-day workshop and field visit to various Moloka'i fishponds was coordinated by Project Loko I'a, EPA, and Senator Inouye's office. Represented were EPA, Army Corps of Engineers, United States Department of Agriculture, Department of Land and Natural Resources, University of Hawai'i, State Department of Health, State Department of Labor , Oceanic Institute, Kamehameha Schools, Office of Hawaiian Affairs, and representatives from Senator Inouye's office and the Honolulu and Maui county administrations. Interested local community members and business people also attended.

The workshop focused on facilitating the development of the mutual understanding between agencies of their respective roles and regulatory interests in the permitting and access processes.

Figure 25. Fishpond Permit Workshop; Jenifer Goto Sabas; Regulators Visiting Kahinapohaku Fishpond.

Even through Project Loko I'a staff has developed a strong understanding of the regulatory process regarding fishpond reuse, there are clearly gaps in understanding between the regulators themselves.

The workshop and field visit provided the regulators critical face-to-face interaction with each other in a non-territorial environment. They got the opportunity to see first hand the fishponds they are charged with regulating. It also provided the regulators the opportunity to hear from the Moloka'i community its vision for fishpond reuse and an aquaculture industry on the island.

Develop Army Corps of Engineers and Pond Management Plan (State DLNR) Templates.
Two generic application templates that outline a management plan for restoring and operating a specific fishpond were developed to replace: 1) The Department of Army 404 Permit Application (administered by the Army Corps of Engineers); and 2) Management Plan as required by DLNR in its Master Conservation District Use Permit Application (See Appendix C).

These templates are basic forms that cover all the required information in these respect permits but are simplified to the point where applicants "fill in blanks" and "check appropriate box". This was seen as a way to standardize the requirements. It had been found that permit requirements were so open to ambiguity and individual regulator's interpretation that it often resulted in overly detailed or unnecessary documentation and even outright inaction by potential applicants due to this confusions and lack of clear guidance. The templates are intended as a simplified application form that anyone can prepare and submit themselves to acquire the necessary permits.

Testing the Streamlined Permit Process

Panahaha Fishpond. Our first test of the "streamlined" regulatory process came with the submittal of an application to restore and reuse the state-owned Panahaha Fishpond for small-scale non-commercial aquaculture research purposes. Four program participants, Kalaniua Ritte, Brandon Ikaika Lima, Marlin La Voie, and Scott Kauhane Adams, organized and formed a *hui* group, Four Brothers and a Fishpond. In January 2001 the *Hui* conducted site assessments and developed a plan.

In February 2001 the Hui filled out and submitted the draft templates to DLNR and the Army Corp of Engineers. Based on the submittal, The Corp did grant an exemption to the 404 requirements (see fill-out templates in the Final Panahaha Management Plan, Appendix D). The template for the MCDUA Permit met resistance at DLNR. Even though key DLNR regulators were involved in the crafting of the template, when the document was submitted to them for processing, they felt the form, as a stand-alone document, was not sufficient. They wanted a much more comprehensive management plan with a more detailed narrative of the project and the added requirements of an oral history report and further research on the archaeology of the fishpond (as to assure the restoration of the wall is as historically accurate as possible), and to restrict their production activities to subsistence use only. The additional requirements were completed and an expanded

and revised management plan was submitted to DLNR in December 2001 (see copy of letter from DLNR dated December 21 2000 and Final Panahaha Management Plan in Appendix D).

As required, DLNR held a public hearing about the Panahaha Fishpond restoration proposal. Over 100 people attended the meeting held at Moloka'i School on December 6, 2001. The overwhelming majority testified in favor of restoring this cultural treasure.

On January 30, 2002, the *Hui* held a Mana'e (East-end Moloka'i) community meeting at the Kilohana Elementary School to inform and answer questions about their proposed reuse of Panahaha Fishpond.

On December 26, 2001 one of the adjoining landowners to Panahaha Fishpond opposing our proposal filed a petition for a Contest Case hearing with DLNR. This in effect stopped dead the processing of the permits until the State Attorney General ruled if the opposing parties have "standing" to request the Contested Case. Twelve months later, December 2002, Contest Case standing was denied. Because of the contentious nature of this particular fishpond—while the State (DLNR) says they are again "moving ahead" with processing our permits—they are "reluctant" to grant us the permits to restore this fishpond. While Project Loko I'a seeks to one day have a permit to reuse this fishpond, our efforts and energies moved on and went into making Keawanui Fishpond the successful operation that it is.

Keawanui Fishpond. Keawanui Fishpond is a privately owned fishpond that is covered under the Master CDUA permit. In August 2002, the Department of Land and Natural Resources (DLNR) gave authorization to PAF to reuse Keawanui Fishpond for small-scale noncommercial aquaculture actives, research and educational purposes. Authorization was granted per the Keawanui Management Plan submitted to DLNR in March 2002 (Appendix E). Keawanui is the first fishpond to successfully utilize the streamlined MCDUA process to obtain its DLNR permits. Important to note that unlike Panahaha Fishpond, Keawanui is privately owned. Thus the permit process was significantly easier because it eliminated the State land lease disposition phase. The time from submittal of application to permit authorization was five months.

The templates were not used in the Keawanui application. Reasons cited were: 1) DLNR was not satisfied with the template as an application. They required a more narrative description of the proposal thus we based the application on the revised Final Panahaha Management Plan (see

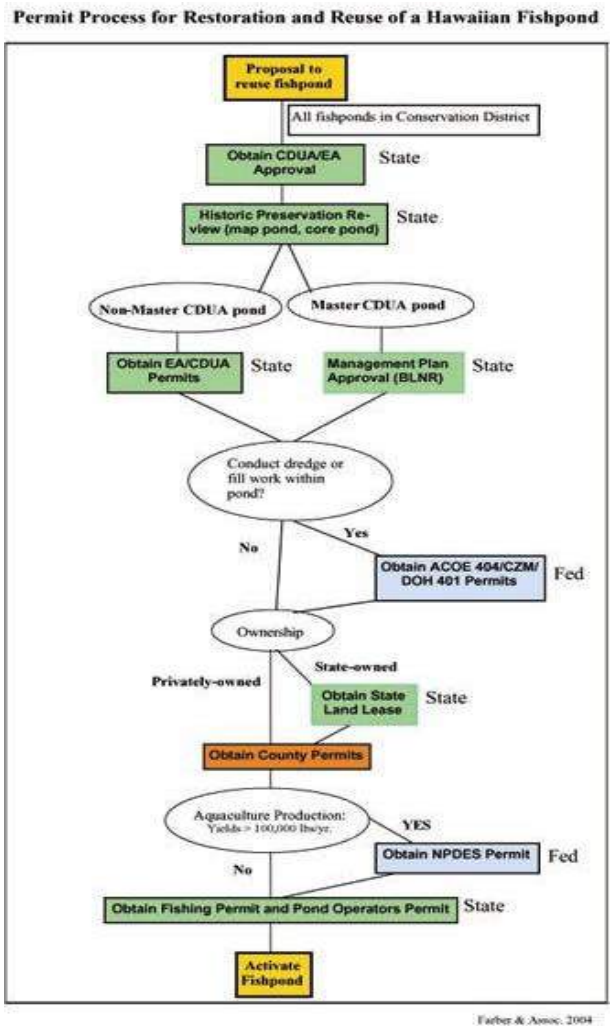
letter date December 21 2000 from DLNR in appendix D), 2) The applicant was PAF not a community group, they wanted the permit ASAP and as such hired a professional planner (Joseph Farber, Farber & Associated) to draft the entire Management Plan and Permit package, and 3) The information content of the templates are mostly on fishpond restoration and wall rebuilding. Keawanui Fishpond is in very good condition. No restoration work was needed. A copy of the approved Keawanui Management Plan can be found in Appendix E.

Leasing of Kahinapohaku Fishpond. Restoration of Kahinapohaku was completed in January 2001. A resident family from the community organized as the *Hui Ohana 'O Naki* to accept responsibility for the care of the fishpond and to begin the application process to obtain a long-term lease from the State for access and use of the fishpond. Project Loko I'a has consulted with the Naki Ohana to organize the group. As to date the Ohana has yet to submit plans and application to acquire a state lease.

Other groups have shown an interest in acquiring the fishpond to use and manage—but as of yet no one has moved forward to make the commitment.

Summary

While just a beginning, these efforts represent a significant step towards the goal of a streamlining the permitting process. We have gain awareness and some support from the regulatory community. We have standardized the permit process and have eliminated and simplified a number of permit conditions saving time and money. The current streamlined process is graphically represented in a flow chart (*right*) and accompanying table, found In Appendix B. Comparing this chart to the ambiguity, overlapping regulatory jurisdictions and complexity of Figure 1 on page 21, the preexisting process, we indeed have made great strides.



The templates have had mixed results. The template worked for the Army corps (they could form a decision based on it), but not for DLNR. It allowed the group Four Brothers and a Fishpond to begin forming their plans about how to reuse Panahaha. It was a start. The template for DLNR has morphed into what is now the latest draft of the Panahaha Management Plan and the Final Keawanui Management Plan.

We obtained all permits for the privately owned Keawanui Fishpond in five months, a record time. It is the first fishpond to demonstrate the benefits of the Master CDUA permit process. The documentation for this approval was a Keawanui Management Plan that contains 12 pages of text, four maps and two pages of photos. As comparison—Ko'ie'ie Fishpond is a state-owned fishpond on Maui that is currently moving through the permit process under restoration for cultural and interpretive purposes. This project has large support amongst the Maui community and permitting-wise is relatively very straightforward—no major glitches—one could argue this is a good example of best-case scenario for a stand-alone fishpond EA/CDUA permit. The EA/CDUA took five months to obtain permit approval. However, the document and its related studies took over a year to compile, it is 195 pages long and includes an underwater archeological survey and Cultural Impact Assessment study.

Though we have had success there remains a number of issues with permit requirements that we feel need to be resolved. These include the restriction on commercial use, leasing issues and "lead agency" government support for fishpond restoration efforts.

<u>Commercial Use</u>. Under the MCDUA permit, a fishpond cannot be used for commercial purposes. This condition will severely limit the development of fishpond-based aquaculture on Moloka'i. It is an issue that needs to be resolved if the community's vision is to be realized. As was the case with Panahaha Fishpond, the original application had to be amended and the applicants, against their wishes, agreed to restrict their production activities to subsistence use only. Yet fishponds will only be revitalized and reused on a larger scale if the investment to do such work can be recovered through commercial activities. Through discussion with DLNR they recommended that it would be better to address this issue separately, in another forum, outside of individual fishpond permits. This is because such changes will require significant resources to amend the hard won existing MCDUA permit (legal review, administrative amendments, Public Hearings, etc).

Lead Agency. One of the goals of fishpond streamlining was to find a "lead" permit agency—whereby those interested in reusing the a fishpond would know where within government they could go and find the help they need. We call this the one stop shop. Again, the goal here is to make the permit process accessible, legible and as inexpensive as possible—finding a way out of hiring professional to do the permit work

All roads in the regulatory process in fishpond reuse lead to DLNR as they constitute the central agency through which both environmental permitting and access and use rights are ultimately determined for a fishpond. Fishponds are unique in Hawaii in that they are considered submerged lands, yet they are real property that can be brought, sold and leased. Regardless of ownership, any proposed use within a fishpond requires DLNR approval as they administer all Conservation Lands, which fishponds are classified. As for the state-owned fishponds, DLNR has the added responsibility to take care of these resources. This responsibility includes the need to determine their highest and best use as a public owned asset and resource.

Figure 26: Walter Ritte, Project Loko I'a, speaking to Community in Ka'u, Hawai'i Island on their visions to restore local fishponds:

"How do you get government to help you?
Government is like a slimy slippery squid...
You got to grab and hemo 'em and not let go!
No one is going to come and give it to you on a silver platter. The Ka'u community is forced to come together, unify, and write a community plan before outside assistance will step in."

Unfortunately DLNR are understaffed, overwhelmed and have been unwilling to take on such a task. Maybe it's not even feasible to think they can interface with the community at the grass roots level. As it stands now—DLNR controls the state-owned fishponds—but this control is disbursed among different departments (land leases in the Land Division, permits in the Office of Conservation and Coastal Lands, historic site issues in Historic Preservation, fishing and aquaculture issues in Department of Aquatic Resources). Each division knows their role but the bigger picture is lost in bureaucratic rule making and job descriptions. Things will not change in the foreseeable future—in fact their budget is undergoing further cuts. It

is obvious to us that if we want to move forward we need to organize and network among ourselves to achieve our mission.

There is growing movement within the state to revitalize the ancient fishponds. It is exciting to us that Project Loko i'a has been apart of helping to nurture this movement through outreach and technical exchange, taking what we have learned on Moloka'i, out to the neighbor islands (for full details see Section 8: Neighbor Islands Outreach). Through these efforts we have networked with others who share our vision of community-based fishpond restoration and reuse: the non-profit (501c3) Moloka'i organization Hui o Kuapa, the Hawaiian Learning Center located at Keawanui Fishpond, the 501c3 Paepae o He'eia located at He'eia Fishpond, Oahu and Ao'ao Na Loko I'a o Maui at Ko'ie'ie Fishpond, Maui. These groups also see themselves as a resource on their respective islands to help others who are interested in restoring fishponds. In September 2004 a fishpond operator's conference was held at He'eia Fishpond to further these aims. It is through these groups, our shared experiences and resources and through modern means of communication (email, web communities and video conferencing, etc) we have grown to rely on and support each other in our quests to reuse the fishponds, rather than expect government to be there to help us.

Leasing. Obtaining a lease to a state owned fishpond poses many obstacles—both costly and time consuming. While we have yet to successful obtain a state lease to a fishpond, or know of any other group that has done so, we have managed to tackle some of the leasing issues. DLNR-Land Division, the agency that handles the state land leases, has agreed to relax the requirement for a Certified Shoreline Survey (CSS) on a case-by-case basis. For example, with the Ko'ie'ie Fishpond on Maui, they are asking for a simple metes and bounds survey, based on preexisting maps rather than a full CSS.

An appraisal (cost approx $2,000) is a requirement we still oppose and would like to see waived. The appraisal is used to establish the lease rent amount. We feel as long as the current restrictions of no commercial use apply, there is no realistic way to establish a value of a fishpond based on comparable properties alone. Furthermore, since a group reusing a fishpond is in effect improving the property through restoration and active use—the State should reward such actions by charging nominal rent, if any.

Yes, we eased some of the barriers to permitting and leasing of fishponds. However, consider a community prospective that questions the need to seek out authorization from State government to reuse a fishpond. Such a perspective is quite valid especially in view of the way fishponds were created, operated and used, and the current means to "legally" reuse them, who controls that process, and the informal use that continues to this day.

The fishponds are a legacy and a tangible, visible link to our ancestors. Many remain, despite their condition, a valuable resource that are informally used for gathering of seafood, fishing, throwing net and recreation.

If the desire for reuse of these fishpond is purely non-commercial (which under the MCDUA is the only allowable use) and the barriers to "reuse" and "access" are so steep, time consuming and costly—it really comes down to perceived need for permits. DLNR controls the State-owned fishponds—they have done an abysmal job being a steward to these resources and yet are also reluctant to let others take an active role in reusing them and improving their condition. Ownership? Control? Responsibility? The fishponds truly "belong" to the Community. They will continue to be reused despite the barriers at the official level. As the case with Kahinapohaku, the extended family that has ties to that pond looks after it, use it---informally. As they always have. Until there is perceived need for a lease, there is no motivation to seek that out.

Other Permit Streamlining Efforts

Mangrove and Reef Sedimentation Assessment. A major obstacle in the permitting process is the degree to which mangrove infestation and removal is significant and will need to be addressed in order to restore and operate a given fishpond. If the infestation is significant and requires heavy equipment to remove, a host of permitting conditions are triggered which make it cost- prohibitive to gain the permits that will allow restoration and operation of the fishpond. Off-shore reef sedimentation due to runoff is another concern, both as it relates to the spread of mangrove infestation along the coast (sedimentation serves as a carrier) as well as to water-quality issues, such as turbidity, that affect the health of the fishpond.

In 1988 a mangrove and sedimentation assessment of the southern shore of Moloka'i was conducted by Bigelow. This study was replicated during the first year of Project Loko I'a to document changes in mangrove growth, shoreline accretion and fishpond size reduction due to

mangrove infestation, and sedimentation along the southern shore reef flats of Moloka'i. A copy of the study found in Appendix F. Major findings of this study include:

1. Estimates of mangrove area calculated from aerial photographs taken in 1965, 1975, 1988, and 2000 indicate that infestation has increased approximately 85% along Moloka'i's southern shore, with the most substantial growth occurring along the western end of the island.

2. Due to sediment deposition and mangrove advancement, the shoreline in many areas on the western end of Moloka'i continues to advance seaward.

3. The impact of mangrove growth on fishponds has been most substantial on the western end of the island, where fishpond size has been reduced by as much as 50% in some cases due to mangrove infestation.

4. Overall, a decrease in sedimentation along the reef flats appears to have occurred, which is encouraging and suggestive of improved land management practices. However, there is a trend towards increased sedimentation as you move west along the shoreline that, along with the mangrove growth, paints a less optimistic view for restoration and revitalization of the fishponds on the western end of the island.

3. Water Quality Research

Background

There has been a running debate for years about the impacts to ocean water quality that fishpond restoration and its aftermath pose. Do raising these walls; enclosing bodies of water, doing aquaculture in the ponds degrade the quality of the water? There were many assumptions made about these questions—but no proof. The primary assumption, namely that restoring and reusing fishponds would degrade the existing quality of the water, made by the State Department of Health, ensured that the permit process (obtaining their costly and time consuming 401 Water Quality Certification) would prevent fishponds from being restored in any large number. Yet, Babcock's study of fishpond water quality in 1999 on six different Moloka'i fishponds show that many of the parameters (turbidity, nitrate and nitrite and total phosphorus) that are required to be monitored for DOH 401 certification do not meet their standards[2]. In other words, the ponds fail water quality standards *before* any work has even begun—making it virtually impossible to obtain the necessary permits for restoration and operation of a fishpond.

Figure 27, *right*, South East Moloka'i after a heavy rain. Note sediment runoff into the fishponds due to poor land management practices.

Figure 28, *above*, restoring Kahinapohaku Fishpond wall.

How much does manually moving rocks back onto a fishpond footprint pose to ocean water quality relative to a good rain?

[2] Babcock, W. Roger and Hisato Keith Oshiro (1999). Water Quality Evaluation and Analytical Method Equivalency Testing for Hawaiian Fishponds on Moloka'i. Water Resources Research Center. University of Hawai'i at Manoa.

Project Loko I'a along with its partners conducted an in-depth Water Quality Study of Moloka'i Fishponds in an effort to understand: 1) the water quality make-up of fishpond waters, the waters outside a fishpond, the effects of restoration and production activities on these waters and, 2) to determine the appropriateness of the existing water quality standards, and if need be, work with the permitting agencies to streamline the permit process through development of area-specific water quality criteria.

Project Description

The Environmental Protection Agency (EPA) approved Project Loko I'a's Quality Assurance Plan (QAP) in February 2001. Implementation of the QAP began in the fall of 2001 after Project staff had been trained and certified in sample collection and on-site analysis procedures.

Development of the QAP was headed by our UH partners at the College of Tropic Agriculture and Human Resources (CTAHR), with the guidance of EPA and DOH. The research hypotheses and appropriate data collection and analysis protocols were identified and subjected to several rounds of intense reviews to ensure the reliability and validity of the data being collected and analyzed.

To obtain representative samples of all areas and conditions that might be affected by restoration and aquaculture activities, water sampling was conducted every two months over a 12-month period (May 2001-2002) within five fishponds. The fishponds and the rational for their selection are:

> Niaupala – control pond – wall intact- no aquaculture activity, lower erosion, few cattle adjacent.
> Kahinapohaku – monitor water quality before, during after wall restoration.
> Panahaha- wall is down- no aquaculture activity.
> Keawanui and 'Ualapu'e- wall is intact-aquaculture production (using net pens).

The samples were analyzed for temperature, pH, conductivity, and turbidity, dissolved oxygen. Total dissolved phosphorus, total dissolved nitrogen, dissolved nitrate/nitrite, ammonia, total suspended solids and chlorophyll-a. These parameters were chosen because they are the criteria required for monitoring open coastal water per DOH Hawai'i Administrative rules (HAR) 11-54, Water Quality Standards, and the tested criteria required for Water Quality 401 Certification.

In addition to sampling within each pond at prescribed transects (generally about 7 to 9 set sampling locations within each fishpond), one transect at each pond extended from 1 meter to 1,000 meters offshore with sampling locations at 1m, 10m, 50m, 100m, 500m and 1,000m. This offshore transect was used to monitor the concentrations of nutrients from near shore to open ocean. Generally there are higher nutritional concentrations closer to shore, because of the groundwater flow into the shoreline area and then the gradual decrease of nutrient concentration further out into the open ocean due to mixing with seawater. The location of the transect generally ran from the shoreline through the gates of the fishpond wall--chosen because it is assumed that this would be path of the greatest flow of water from the shoreline out.

West Hawai'i Model. Under HAR 11-54 there is no consideration of water quality characteristics that naturally exist in a given area. The one exception is the West Hawai'i Model—DOH approved criteria tailored to the Kona Coat that better represented achievable water quality goals for the area than do the statewide criteria. Given that we know many of the fishponds do not meet the state criteria "as is" we adopted parts of the West Hawai'i model for our project. In addition to sampling within each pond at prescribed transects, one transect at each pond extended from 1 meter to 1,000 meters offshore with sampling locations at 1m, 10m, 50, 100, 500m and 1,000m. This offshore transect is used to monitor the concentrations of nutrients from near shore to open ocean. In the West Hawai'i model allowances have been made for higher nutritional concentrations closer to shore because of the groundwater flow into the ocean and then the gradual decrease of nutrient concentration further out into the open ocean due to mixing with seawater. Employing transects also help further our knowledge in understanding the water quality within a fishpond and how that differs (if at all) from its surrounding areas. For regulatory purposes using the West Hawai'i model was a start in finding a more reasonable criteria that the fishponds could possibly meet.

Figure 29, Water Quality Lab at Keawanui.

Figure 30, Guy Naehu at the Lab.

Water Quality Laboratory. Another critical component to conduct this research was the establishment of an on-island water quality analysis laboratory capable of processing the water samples. Most all of the analyses were conducted on-island by local Project Loko I'a staff. The exceptions being the more complex tests for dissolved nitrate/nitrite, total dissolved nitrogen and chlorophyll-a that were analyzed on Oahu at the University of Hawai'i at Manoa (CTAHR-Agricultural Diagnostic Service Center and College of Engineering-Water Resources Research Center). EPA and CTAHR purchased and set up the lab, stocked it with the necessary equipment, hired a water-quality technician to oversee sample processing and conducted on-island analyses. Dr. Roger Babcock, UH-Civil Engineering-Water Resources Research Center, trained our staff in all aspects of the QAP from sampling, analysis to running the lab. Another critical contribution by CTAHR was the purchase of a boat that allowed collection of the offshore transects samples.

Date Analysis, Findings and Recommendations

In summary, water quality within the Moloka'i fishponds sampled did not generally meet a significant proportion of the existing regulatory criteria (HAR 11-54). Most notably; compliance with turbidity, chlorophyll-a, nitrate-nitrogen, total nitrogen, total phosphorus, and dissolved oxygen was poor; compliance with ammonia-nitrogen and temperature was fairly good, and compliance with conductivity was very good.

It is particularly important to note that even the locations of best water quality given the parameters tested (generally the waters outside Kahinapohaku and Panahaha Fishpond—which many casual observers would agree has some of the best clarity and circulation along this stretch of coastline) did not meet the HAR criteria. This indicates that the criteria as established under HAR 11-54 is not achievable nor appropriate for Southern Moloka'i fishpond areas and needs to be changed.

The control pond generally did very poor in terms of overall compliance with HAR criteria. In formulating new criteria for these fishponds—the numbers within Niaupala should be considered as average and yet acceptable criteria and using the numbers found outside Panahaha and Kahinapohaku as best case. As such, suggested criteria for Southern Moloka'i fishpond areas are given in Table 1 below. For the full report, please refer to Appendix I).

Table 1. Suggested Water Quality Criteria for Southern Moloka'i Fishpond Areas

Parameter	Geometric mean not to exceed the given value
Total Nitrogen (ug N/L)	230.00
Ammonia Nitrogen (ug N/L)	3.50 (existing)
Nitrate + Nitrite Nitrogen (ug N/L)	30.00
Total Phosphorus (ug P/L)	70.00
Chlorophyll-a (ug/L)	6.0
Turbidity (NTU)	6.0
Conductivity (Salinity)	Shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors (existing)
Dissolved Oxygen (% Saturation)	Not less than 50% saturation, determined as a function of ambient water temperature and salinity
Temperature (Degrees Celsius)	Shall not vary more than one degree Celsius from ambient conditions (existing)
PH	Shall not deviate more than 0.5 units from a value of 8.1, except at coastal locations where and when freshwater from stream, storm drain or groundwater discharge may depress the pH to a minimum level of 7.0 (existing)

Figures 31, 32. No two fishponds are alike. Niaupala Fishpond (control pond) *above right*, and Panahaha Fishpond, *left*. Two fishponds with very different water circulation dynamics. Note Niaupala is actually an enclosed bay; Panahaha's wall was built out onto the reef resulting in better water circulation and water quality.

Other Findings and Observations:

Control Pond. Niaupala Fishpond is about 35 acres in size and has an intact wall, much of it is submerged at high tide. The wall encloses what was once a small inlet—thus circulation of these waters is fair. The pond is quite shallow in places and there is a fair amount of silt. No production. Water quality at this pond was very poor, yet it was the only pond that met the criteria for nitrogen.

Before and After Restoration of Kahinapohaku. In general there were no major changes to water quality within Kahinapohaku after the fishpond wall was restored. Levels of turbidity and nitrogen increased somewhat within the fishpond, but in general the water quality remained among the best of the six fishponds tested. This probably can be attributed to a number of factors including the style of fishpond, in that the fishpond basin was created by a wall arching out onto an open reef rather than enclosing a bay, thus it is naturally exposed to more water movement. Also, the water quality outside of the pond wall has some of the cleanest in the study. However, even though the water quality is some of the best in the study, it generally did not meet the criteria as established under HAR 11-54. This indicates that the criteria can't be achieved even under the best ambient conditions of Southern Moloka'i and needs to be changed.

To compare the water quality within and outside the fishpond before and after restoration we used Roger Babcock's study from 1999 that conducted water quality sampling 10 times from 11/26/1997 through 2/24/98.[3] The QAP sampling at this pond lasted from 5/22/2001 through 12/6/2003 and consisted of six different sampling events. The pond was restored in January 2001. There is no aquaculture activity at the fishpond.

The one notable change in parameters after restoration was in the nitrogen levels. The pond met the criteria (GeoMean not to exceed –> 150 ug/L)-- before restoration (150 ug/L inside the pond/110 ug/L outside)-- but not afterwards. Note that after restoration levels of nitrogen increased within the pond to 171 ug/L and outside they jumped to 166 ug/L.

Phosphorus levels were the same inside and outside the pond prior to restoration. After restoration phosphorus levels were actually higher outside the fishpond 73.8 than inside 66.7.

[3] Babcock, W. Roger and Hisato Keith Oshiro (1999). Water Quality Evaluation and Analytical Method Equivalency Testing for Hawaiian Fishponds on Moloka'i. Water Resources Research Center. University of Hawai'i at Manoa.

Turbidity. The allowable turbidity per HAR 11-54 is GeoMean not to exceed –> 0.50 NTU). Total of 16 sampling episodes; turbidity levels vary widely from each sampling event to the next and there seems to be no real trend over time. This is not unusual as turbidity along this coastline is mostly a result of high winds and upslope soil runoff due to heavy rain. However, if we take the average mean for all events before and all events after restoration we do see that inside the fishpond showed an increase in turbidity, 1.8NTU before vs. 4.01NTU after. Outside the fishpond little changed: before 1.14NTU vs. 1.17NTU after.

Figure 33, 'Ualapu'e Fishpond with Net Pens for Fish Production. Note Encroaching Development Around Fishpond.

Production Fishponds. 'Ualapu'e and Kahinapohaku were the two ponds that production was taking place, the latter on a larger scale. Relative to the other ponds, these two had poorer than average numbers in terms of meeting the HAR criteria. Keawanui Fishpond is over 70 acres. Given the relatively small scale of the aquaculture activities it would seem those impacts were quite minor, especially considering that the water quality numbers were very similar both inside and outside the fishpond. 'Ualapu'e is about 20 acres in size and has poor circulation. The numbers especially parameters related to aquaculture activities (Dissolved Oxygen, chlorophyll-a, total phosphorus) seem to indicate that aquaculture did to some degree impact the quality of the water—especially compared to the water quality outside of the fishpond—which was noticeable better. However, they're maybe other land-based factors in the case of 'Ualapu'e. During the course of testing, two homes were built in front of the pond, there are four other houses that front the fishpond and a small subdivision (new roads, sidewalks, grading, homes built) was constructed across the main highway from the fishpond.

Individual Ponds. A couple trends stand out in terms of the water quality in the five fishponds tested. The control pond, Niaupala generally had some of the lowest numbers in meeting the

various criteria. While Niaupala was the only pond to meet the criteria for total nitrogen, it had the lowest scores for turbidity, Chlorophyll-a, Nitrate Nitrogen. This is probably due to the poor circulation and its relatively shallow, silty waters. 'Ualapu'e also preformed poorly and is probably attributed to poor circulation, aquaculture activities taking place and encroaching development. While Keawanui Fishpond generally had low scores, what stood out with this pond was the fact that there was less differentiation between water quality inside the pond than outside the pond compared to the others. Panahaha generally had the best scores followed by Kahinapohaku. Both these ponds have good circulation patterns.

Observations on Selected Parameters Tested

Nitrogen. One of our hypotheses to test was if aquaculture production increases levels of nitrogen within the fishpond as that activity creates a higher level of nitrogen due to fish waste and input of fish feed. Excess nitrogen in the water can lead to low levels of dissolved oxygen, poor water clarity and harmful or toxic algal blooms.

Nitrogen levels outside the fishponds were lower than inside the ponds for Niaupala and Kahinapohaku. For the other 3 three ponds it was the opposite. Niaupala was the only pond to meet criteria for nitrogen (GeoMean not to exceed150 ug/L) (143 ug/L) followed closely by 'Ualapu'e (161). Keawanui had very high levels of nitrogen both inside and outside the pond (212/229).

Compared to inside the pond, 'Ualapu'e's nitrogen level outside the pond was very high (161 vs. 225). Given 'Ualapu'e's production activities it would seem the results would be the opposite. One explanation for the lower level of nitrogen inside 'Ualapu'e and Niaupala is that they are productive sites of naturally occurring and cultivated seaweed *gracilaria*, *limu* ogo. *Gracilaria* prefers calm waters and waters rich in nitrogen and phosphorus that they absorb and store in large amounts.

Panahaha has good circulation yet high levels of nitrogen inside and out the pond. This may suggest nitrogen entering these waters from the homes just adjacent.

Based on this mixed data for nitrogen it is hard to infer that the fishponds are of worse water quality than the natural ambient water quality outside the fishponds and instead it could infer that the existing water quality criteria is not realistic.

Ammonia nitrogen. Low-level ammonia nitrogen may be present in water naturally as a result of the biological decay of plant and animal matter. Higher concentrations may be found in raw sewage, industrial effluents and fertilizers.

All of fishponds except Keawanui met most of the criteria (GeoMean not to exceed –> 3.50 ug/L) for ammonia nitrogen. Keawanui, both inside and outside the fishpond, had abnormally high levels of ammonia nitrogen (6.28 inside/6.48outside). All the other ponds geometric mean levels varied between 0.63 and 1.88). Keawanui also has high levels of nitrogen inside and outside the pond. A possible explanation for these phenomena could be the results of outfall of wastes associated with the commercial aquaculture facilities on the land immediately east (and up current) from the fishpond. For 'Ualapu'e, ammonia nitrogen concentrations were more than double within the fishpond than outside of it (both still well within the criteria [1.64/.79]). Aquaculture production and surrounding development could possible explain these differences.

Nitrate Nitrogen. Nitrate is an inorganic form of nitrogen that occurs naturally. It is also a component of atmospheric and wastewater pollution and elevated concentrations may be associated with acidification or indicative of wastewater pollution. Excess nitrate in receiving waters can stimulate algae growth and, as a result, deplete the supply of oxygen necessary to fish and disrupt the aquatic food chain.

None of the ponds met the criteria geomean (5.0 ug/L). Four of the ponds exceeded the criteria by more than 300% (14.8 – 19.6). Kahinapohaku exceeded the criteria by more the 500% (27.5).

It can be observed that nitrate concentrations inside all of the ponds are higher than outside the ponds possibly indicating that processes and/or activities occurring inside the pond are causing increased nitrate levels. Yet, the nitrate concentrations in nearly all of the ponds have lower values than the "control" pond. This later finding is not expected and may just indicate the natural variability of nitrate concentrations within these types of fishponds. Also note that even the lowest reading of nitrate nitrogen (8.08), outside of Keawanui, still exceeds the allowable criteria.

Total Phosphorus. Phosphorus is an essential element for plant life. Rainfall can cause varying amounts of phosphates to wash from soils into nearby waterways. Phosphate will stimulate the growth of plankton and aquatic plants that provide food for fish. This increased growth may cause an increase in the fish population and improve the overall water quality. However, if an excess of

phosphate enters the water, algae and aquatic plants will grow wildly, choke up the waterway and use up large amounts of oxygen.

Only Panahaha met the geometric mean criteria (16.71 ug/L) for total phosphorus (GeoMean not to exceed –> 20 ug/L). Keawanui and Niaupala exceeded the criteria by more than 200% (41.08 and 47.51). Kahinapohaku and 'Ualapu'e exceeded the criteria by more than 300% (66.75 and 68.39). Interesting to note there were wide differences between levels inside and outside the ponds. None of the samples outside the ponds met the criteria. The levels of phosphorus were more than double outside of Panahaha than inside (16.71 vs. 30.21). It may be that the aquaculture facilities just east (up current) of Panahaha are impacting the waters outside the pond. 'Ualapu'e had the largest difference between inside the pond and outside (68.39 vs. 33.41). This may be due to the aquaculture activities within the pond and runoff from surrounding development.

Chlorophyll-a. Measuring the amount of chlorophyll in a water sample gives us an estimate of the quantity of phytoplankton (microscopic plants also know as 'algae') living in the water. Among other valuable functions, algae are important food for fish and shellfish. When nutrient loading increases and algae blooms result, many problems may occur including fish kills due to lower levels of dissolved oxygen and the decrease in the clarity of the water. For fishponds, reduced circulation and the availability of nutrients stimulate algae growth, thus raise the level of chlorophyll-a in the water.

None of the ponds meet the criteria for chlorophyll-a per HAR 11-54 (GeoMean not to exceed –> 0.30 ug/L) and in fact even the lowest counts within a fishpond at (Panahaha) exceeded the criteria by 300%. As expected the ponds that have good circulation (Panahaha, Kahinapohaku) and the areas outside all of the ponds had the lowest levels of chlorophyll-a. The production pond 'Ualapu'e had the highest levels of chlorophyll-a (5.57). Production might not totally explain 'Ualapu'e's high chlorophyll-a counts. This is a well-protected fishpond will relatively poor circulation and many homes around it. Note the control pond Niaupala has no production, is well-protected, low circulation and high chlorophyll-a counts as well (4.27). Interesting to note that unlike most ponds where the chlorophyll-a levels drop significantly as you more outside the pond (i.e., 'Ualapu'e 5.57 vs.1.05) Keawanui's counts did not (1.72 vs.1.30). Also note that even the lowest readings outside of Kahinapohaku (.52)—an area considered by most observers as some of the cleanest, clearest and well circulated water on this stretch of coastline did not meet the criteria.

Turbidity. Turbidity within Moloka'i fishponds is the result of stirred up sediment caused by upslope soil erosion particularly during heavy rains and prevailing trade wind patterns. High levels of turbidity can restrict light penetration and limit photosynthesis. Sedimentation of soil particles may also smother fish eggs and destroy beneficial communities of bottom organisms such as bacteria.

None of the ponds meet the numeric criteria for turbidity in open coastal waters per HAR 11-54 (GeoMean not to exceed –> 0.50 NTU). As expected, outside the fishponds and those ponds that have good circulation, had the lowest levels of turbidity. Yet, even the lowest turbidity levels, found outside of Kahinapohaku (1.17) were over 200% greater than the criteria. While four of the ponds had a relatively similar range of turbidity (3.45 to 6.51), Niaupala, the control pond, was far higher (12.38). Greater still was the difference of turbidity readings outside of Niaupala compared to outside the other four ponds (6.09 vs. 1.17 to1.84).

Dissolved Oxygen. Dissolved oxygen (DO) is by far the most important chemical parameter in aquaculture. Low-dissolved oxygen levels are responsible for more fish kills, either directly or indirectly, than all other problems combined. Fish are not the only consumers of oxygen in aquaculture systems; bacteria, phytoplankton and zooplankton consume large quantities of oxygen as well. Decomposition of organic materials (algae, bacteria, and fish wastes) is the single greatest consumer of oxygen in aquaculture systems. Oxygen enters the water primarily through direct diffusion at the air-water interface and through plant photosynthesis. Direct diffusion is relatively insignificant unless there is considerable wind and wave action.

The criteria for DO (not less than 75% saturation, determined as a function of ambient water temperature and salinity) was met for 35% (34 of 97) of the samples taken in the study. Of the samples that met the criteria 60% (19 of 34) of them were from outside the fishponds. Dissolved oxygen concentration is an indirect measure of biological activity in the ponds. When there is high activity and poor circulation, then DO concentrations will decrease. The DO data for 'Ualapu'e pond indicate that there is significant biological activity and poor circulation since none of the samples inside the pond (21) met the criteria. Keawanui pond also seems to have high activity and poor circulation since 71% (17 of 24) of the samples were less than 75% of saturation. For Panahaha pond 35% (7 of 20) of the samples did not meet the criteria-- that may be indicative of better circulation since all of the samples from outside the pond were in compliance with the criteria. The data also shows how seasonal or temporal variation can affect the DO. All the ponds

sampled showed certain sampling dates more in compliance than other times. The extreme example being at Kahinapohaku, where on one day all the samples met the criteria, and during another sampling event none of the samples met the criteria. It appears the increase in water temperature was responsible for those samples not meeting the criteria.

Temperature. After oxygen, water temperature may be the single most important factor affecting the welfare of fish. Fish are cold-blooded organisms and assume approximately the same temperature as their surroundings. The temperature of the water affects the activity, behavior, feeding, growth, and reproduction of all fishes. Temperature also determines the amount of dissolved gases (oxygen, carbon dioxide, nitrogen, etc.) in the water. The cooler the water the more soluble the gas.

The criteria for temperature (shall not vary more than one degree Celsius from ambient conditions) was met 96% of the time (out of a total of 56 samples taken). Of the 8 samples that failed to meet the criteria, 6 of them occurred at Kahinapohaku on a single day. It is not known why eight samples did not meet the criteria; it could be due to localized warming within the pond due to a lack of good circulation.

Figure 35, Kahinapohaku Fishpond About Midway Through Wall Restoration.

4. Fishpond Demonstration Models for Permitting, Restoration, Education and Production.

This section focuses on four fishponds and the various challenges and lessons learned to bring them back to productive use: Kahinapohaku Fishpond, restoration; 'Ualapu'e Fishpond, establish aquaculture production and educational experiences; Panahaha Fishpond; obtain permits, restoration, production and Keawanui Fishpond, aquaculture production and educational experiences.

Kahinapohaku Fishpond

The art of fishpond restoration requires all the engineering genius, craft and sheer strength of the ancient Hawaiians. Kahinapohaku Fishpond lies on the far southeastern end of Moloka'i. It is known as a *loko kuapa*, or pond whose solid walls extend out in an arc into the ocean with the two ends of the wall connecting to the shore at distant points. *Loko kuapa* are considered unique to Hawai'i and an advancement in aquaculture practice because they contained *makaha* gates in the wall constructed of wood in a grate-like fashion that allowed for the control and management of fish stocks.

Figure 36, Kahinapohaku Fishpond.

The Restoration of Kahinapohaku was completed in January 2001. The fishpond is about 5 acres in size, enclosed by a 1,200-foot long wall that is 15 feet wide at its base, 5 feet wide at the top and 5 feet high. Rebuilding the rock wall that had eroded away over the centuries took nearly 15 months to complete with over 300 people participating in the effort. To rebuild the wall, stones

were excavated from inside and outside the pond and stacked in the traditional dry-stack fashion following the footprint of the original wall. Larger stones were placed by hand and *o'o* spade and interlocked, forming an inner and outer wall. Smaller rock, known as *'ili'ili*, were used as fill between these walls.

All of the rock used in the restoration was from the original wall. These stones were disbursed throughout the pond after years of wave action had deteriorated the wall. Using a barge constructed of plywood and 55-gallon drums, stones were retrieved from the pond basin and hauled across the pond to rebuild the wall.

In site preparation, new facilities were built to accommodate the workers and visitors to the site. We built a new 12ft. x 16ft. traditional *hale* house using modern material along with traditional wood posts and grass roof. The hale contains a 6ft.x8ft storage shed and a kitchen with sink and counter and work bench.

The Moloka'i Fishpond Trainees were trained in ancient art of dry stack rock wall construction techniques, archeological mapping of the wall remains (footprint), underwater survey methods, water quality monitoring procedures and health and safety procedures. In addition training in modern and traditional aquaculture methods and procedures was obtained, a work plan was developed and the land site prepared before restoration of the wall began. The training program ensured the wall reconfiguration, location and alignment of the fishpond wall were as accurate and true to the existing fabric of the fishpond as possible.

The revitalized fishpond stands as a tribute to the determination and hard work of the Aquaculture Trainees and all the people throughout the community who participated in helping to move rocks and rebuild the wall. It is equally a tribute to our ancestors who created this wonder, and to the coming generations of Moloka'i peoples for whom fishponds represent a rich and proud past and a hopeful future.

Since restoration, a resident family from the community has begun to organize as the *Hui Ohana 'O Naki* to accept responsibility for the care of the fishpond. They have indicated they would like to apply for a long-term lease from the state. It is the intent of Project Loko I'a, as part of our philosophy to build the capacity of and empower communities, to assist the *Hui Ohana 'O Naki* in the planning and permit applications they will be required to submit for a lease. In the meantime

the pond continues to be used informally for gathering and fishing by the community as it always has.

Figures 37-42;
Kahinapohaku Fishpond Restoration Project.

'Ualapu'e Fishpond

'Ualapu'e is a 22 acre fishpond located on the southeast end of Moloka'i. The pond was restored in 1989. Since restoration the fishpond has been used for *limu* seaweed and fish research, community education, and subsistence use by the community. In recent years the pond has been somewhat inactive. After Kahinapohaku fishpond was restored, Project Loko I'a's demonstration efforts focused on developing aquaculture production activities for research and training purposes at this pond. Activities accomplished at the site include net pen installation and fish culturing, development of a new earthen nursery pond system, construction of an open-sided teaching *hale*, major site improvements, training and education programs and hosting visitors.

Site Improvements. In March 2001, the Moloka'i Aquaculture Trainees started site preparation and building of a traditional *hale* at the 'Ualapu'e fishpond site. The Trainees collaborated with Maui County to collect and store the necessary rock materials for the project and later in July, about thirty visiting Canadian Indians and church group members assisted in hauling cinders and covering the access road and floor of the traditional *hale*. In August, one hundred twenty five young women from Oahu volunteered to participate on a workday at the pond. Over 20 Hoikaika participants worked at the fishpond alongside their Aquaculture Trainees team leaders providing help with site clearing, maintenance, and improvements (classroom construction, installation of storage shed and composing toilet), mangrove eradication, pond aquaculture and fishpond rebuilding.

Figure 43, *Hale* at 'Ualapu'e Fishpond.

Aquaculture Activities. Under the direction of one of our project partners, the University of Hawai'i – College of Tropical Agriculture and Human Resources, Project Loko I'a established hatchery and grow-out facilities consisting three 150 by 50 foot pens for nurseries and three round net pens of 7,500 square feet each for fish grow out (aerial photo of fishpond can be found on page 64).

Figure 44, 'Ualapu'e Fishpond. Taking Feed Out to the Net Pens.

The old earthen nursery system was reconnected to the main 'Ualapu'e fishpond. The nursery pond wall and channel were rebuilt and lined with rocks. A double-gated *makaha* gate was created allowing the natural recruitment of seed stock into the nursery. Upon opening the nursery, an estimated 2,000 to 3,000 striped mullet migrated into the two earthen ponds. Recruitment of milkfish that "run" during summer to late fall, was also realized but at much lower numbers than the mullet. Fish caught from the wild in the earthen nursery exhibit growth rates comparable or even better than our net pen nursery in the main pond.

Figure 45; Nursery Ponds.

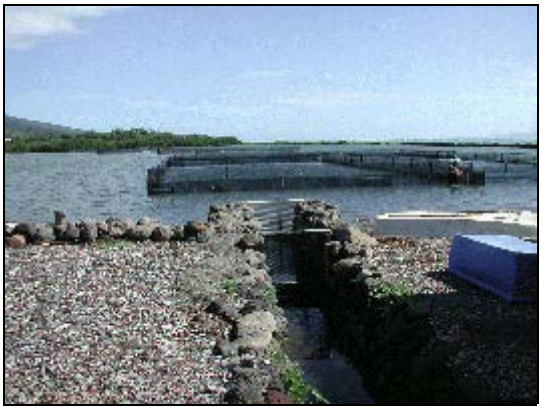


Figure 46, Nursery Ponds Connection to Main Pond.

In addition to the fish stock reared in the nurseries, *awa* milkfish and mullet fingerlings were purchased from the Oceanic Institute on Oahu. The Mullet and *awa* required daily care, feeding, net pen maintenance, weekly water quality and monthly sampling.

Figure 47, Feeding the Fish.

Typical of an extensive (more natural) fishpond system, growth data showed weight increase at a slower rate than contemporary land-based aquaculture systems. *Awa* growth reaching "market-size" rates occurred in about twelve months. *Mullet* growth has been characteristically slower with anticipated "market-size" rates at about 18 months.

Figure 48, Mullet in Feeding.

Polyculture *limu* ogo (*Gracilaria)* was transplanted into all net pens that contain fish stocks. *Limu* ogo is highly prized edible seaweed that grows well in the nitrogen-enriched conditions common in net-pen fish production settings.

Freshwater runoff from the mountains during the winter season has significantly reduced the quality and quantity of the *limu ogo* growth trends we were experiencing. This has lead us to experiment with the design and implementation of alternative models of growing the *limu* in an attempt to deal with the periodic influx of fresh water these fishponds are going to experience because of their location along the shoreline, which often is at the mouth of streams or rivers, or adjacent to fresh water springs. Project staff designed and constructed floating cages built of PVC tubing and wire mesh that can be moved and anchored in different locations in the fishpond. It is anticipated that the ability to move these production cages to areas in the pond where the effects of the freshwater runoff during the winter months is not as significant can serve to mitigate the negative impact of the freshwater on *limu* growth.

Education Programs. Project Loko I'a staff have hosted over 1,000 people to the fishpond sites over the past three years. Most of visitors are school-aged children. However, the fishponds have hosted many teachers, university students, community members, cultural practitioners, researchers and scientists as well. In addition we have hosted several high profile groups to our fishpond projects including The White House Fellows, Nature Conservancy, Elder Hostel groups, State, County and Federal regulators, Kamehameha School Trustees and Department of Education curriculum writers. 'Ualapu'e is a particularly valuable learning environment as we have a covered *hale* which can accommodate large groups and the nursery and net pens that provide hands on experiences in aquaculture production (for full list of visitors, see Appendix G) .

The Future at 'Ualapu'e. The Hoikaika Program (see page 7) has taken over the 'Ualapu'e site as a training base. They provide a capacity building program focused on youth development through educational achievement, career development and leadership training. The students are paid interns (generally 10 participants per class) that do field work at the fishpond twice a week in aquaculture production and fishpond site maintenance. Staff consists of two full-time employees. The participants are able to earn college and high school science credits for their work at the fishpond.

Panahaha Fishpond

Panahaha Fishpond, located along the southwest coast of Moloka'i is 22 acres in size (see photo on page 39). The pond wall at medium tide is almost completely submerged. The fishpond is owned by the State of Hawai'i.

Project Loko I'a sought to obtain the permits, rebuild the fishpond and do aquaculture. Panahaha Fishpond was chosen for its good water quality, ability to rebuild the rock wall given the existing amount of rocks in the pond, lack of siltation and mangrove inundation and most importantly, access. Access to Panahaha is through a county-owned and maintained public access right of way. The public uses the access to take advantage of the beach along the pond shoreline, launch boats, swim, fish, drive, etc.

As previously mentioned in Section 2-Permit Streamlining, we had the Trainees fill out the permits to rebuild the fishpond for commercial aquaculture purposes. We quickly met strong opposition from homeowners who live in front of the fishpond. These two, a brother and sister, object to the proposed reuse and restoration of the pond citing (incorrectly) that our proposal would limit access to the pond and the current activities taking place there, degrade water quality and destroy this archeological site. We countered these erroneous and negative accusations which the owner's were spreading through the community by holding informational meetings to share with the community our plans and applications, meet with surrounding land owners and touching base with our *kupuna* elders, and completing a preliminary oral history of the pond.

As required, DLNR held a public hearing about our proposed plan. Over 100 people attended the meeting held at Moloka'i School in Kaunakakai on December 6, 2001. The overwhelming majority testified in favor of restoring this cultural treasure.

Subsequently, the Trainees held a Mana'e (east-end Moloka'i) community meeting at the Kilohana Elementary School that is located right near the fishpond to inform and answer questions about their proposed reuse of Panahaha Fishpond.

On December 26, 2001 the neighbors opposing our proposal filed a petition for a Contest Case hearing with DLNR. This in effect stopped dead the processing of our permits until the State Attorney General ruled if the opposing parties have "standing" to request the contested case. Twelve months later, December 2002, the contest case hearing petition was denied. We won the

case and would like someday to revive this project. However, the delays forced us to move onto other projects. As such our focus and energies have gone into making Keawanui Fishpond a successful operation incorporating aquaculture, research and educational activities for the community and off-island visitors.

Figure 49, Keawanui Fishpond.

Keawanui Fishpond

The home of Project Loko I'a is Keawanui Fishpond, a magnificent 73-acre pond, the largest on the island. Besides the fishpond waters the site contains a classroom, offices, water quality lab and visitors center. In February 2002 Project Loko I'a obtained a lease from the landowner, Kamehameha Schools. Government permits to operate the fishpond were obtained at the same time based on the Keawanui Management Plan that is included in this report (see Exhibit E).

Keawanui has played a crucial role in the success Project Loko I'a. It has serve as a base for all that we have accomplished. The site contains our administrative offices and a double-wide trailer that serves as a meeting place and classroom. We have a fully functioning water quality lab and trained staff to operate and maintain it.

Figure 50, Keawanui Fishpond Grounds. From left to right, storage container, lab, offices and classroom.

The work we have done and valuable lessons learned in the other fishponds has taken us to this step--creating a world-class research, production and educational institution at Keawanui that will serve as a model and resource for other fishpond practitioners throughout the state.

Figure 51, Native Plan Nursery at Keawanui.

Figure 52, Constructing the *Hale* at Keawanui.

Figure 53, Mangrove Study with University of Hawaii.

Figure 54, Walter Ritte Teaching Class.

Figure 55, Kalaniua Ritte, Joshua Kalua and Guy Naehu Show off the Rock Wall they Constructed for the Native Plan Garden at Keawanui.

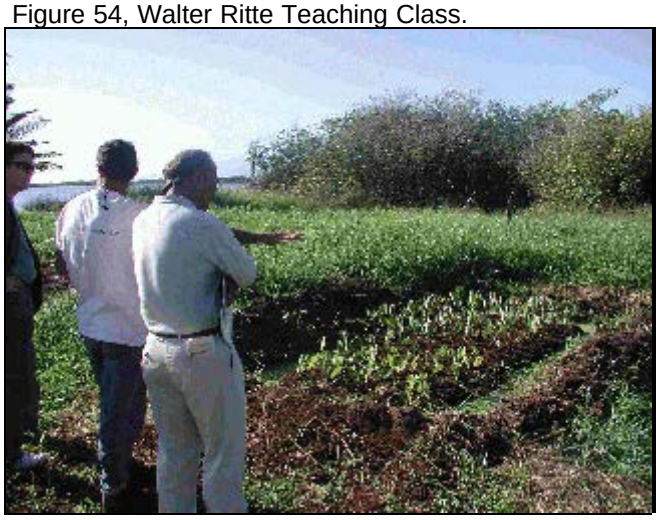


Figure 56, Taro Patch at Keawanui.

We have many partners assisting us with this goal. Much of the help comes from donated in-kind services. For instance, the land cost, the land clearing and preparation costs and the conceptual plans have all been donated from the landowner, Kamehameha Schools and the County of Maui. With the assistance and collaboration with the Oceanic Institute, University of Hawai'i (Institute for Maine Biology, Marine options program, College of tropical Agriculture and Human Resources, College of Engineering, Sea Grant), Kamehameha Schools and private planning consultants we have developed a long-range master plan for Keawanui Fishpond. The planning process was community led, culturally sensitive, with the goal of economic sustainability. The plan and listing of the partners involved can be found in Exhibit J.

The vision as stated in the Master Plan is to create the physical and organizational infrastructure necessary to support our goal of a world-class research, production and educational institution at Keawanui that is economically viable, environmentally sustainable and replicable.
To date, moving towards this vision, we have:

> Institutional Organization. Created The Hawaiian Learning Center and have re-energize the 501c3 non-for profit,. Moloka'i-based fishpond advocacy organization, Hui o Kuapa.

> Infrastructure. Repair and maintain Keawanui fishpond. With the assistance of the Country of Maui Department of Public Works we have cleared and landscaped a three acre site adjacent to the pond with a native plant garden, build a traditional *hale* open air house to accommodate visitors, build a walk through *ahupuaa* (watershed) park and a fish nursery.

> Production/Economic Development. Develop Diversified Aquaculture Products. We have net pens for growing fish and *limu.* We have also created a venture growing manmade "live rock" within the fishpond for the aquarium industry. Live Rock is manufactured from lightweight cinder and cement, placed in the ocean to obtain the necessary coverage of encrusted organisms, and then removed for sale. Hawaiian fishponds provide an exceptional culturing environment for live rock.

Figure 57, US Representative Ed Case visits Keawanui and inspects the Live Rock.

Figure 58, 59. Live Rock.

The ponds protect the rocks from human disruption while providing minimal turbidity and sedimentation, abundant sunlight, and moderate currents. While in the ocean, the rock acts as wild coral and helps to create a habitat for a myriad of sea life.

All forms of coral are illegal to sell, purchase, or possess in the state of Hawai'i. All forms of wild live rock (reef substrate) are also illegal. This manmade live rock is a perfect antidote to illegal coral mining that is happening all over the pacific to meet the demands of the saltwater aquarium market.

> Education. Project Loko I'a has hosted over 1,000 visitors to the Moloka'i fishponds over the past three years. We will continue to host day visitors to Keawanui Fishpond to teach them about the ancient fishpond and their connection to the cultural and land use patterns of past and their current role today. Project staff have completed the visitors infrastructure to allow visitors to experience hands on tank exhibits of fish, limu and coral that are in the fishpond, a walk through mini-ahupua'a (watershed) complete with native plan garden and visitors center.

Keawanui is the Moloka'i field site for teacher trainings and starting in 2005, hosting students using the Kahea Loko (Call of the Fishpond) Curriculum. Project Kahea Loko is funded by the U.S. Department of Education and managed by the Pacific American Foundation. The project focuses on the development of culturally relevant curricula using the fishponds to teach

science, social studies and language arts to students in the fourth to twelfth grade that meet current Hawai'i Department of Education content and performance standards. After three years of development, field testing, and training over 300 teachers, the final curricula is available and being actively used in Hawai'i schools. On Moloka'i four schools have signed up to use the curriculum. As such we expect to host 150 school children bi-monthly during the school year.

Summary. We have gone from rebuilding ancient fishponds, learning to work with government agencies and testing and analyzing water quality within fishponds to growing fish, *limu*, live rock, hosing visitor from throughout the world and providing a cultural sanctuary to teach our *opio* youth about their rich culture, their environment and the rewards that come from hard work.

There is saying in Hawai'i---in doing come knowledge. The demonstration projects proves that. We have amassed much knowledge and have become experts in fishpond restoration and reuse. We intend to share this with anyone interested. For instance, in the Spring 2005, we will be training the people on Maui how to rebuild their fishpond, Ko'ie'ie Fishpond in Kihei.

We continue to forge ahead with our work to develop Keawanui as the hub for new and diversified uses for Moloka'i fishponds. To be a base of education, training and research. To host school children, host conferences and workshops. To develop a diverse range of aquaculture products and be a place of collaboration between community members, scientists, researchers, entrepreneurs and cultural practitioners. Everyday the fishponds teach us something new. We are truly rediscovering a whole body of lost knowledge; and with that comes trial and error—finding a way in this modern world that the fishpond can once again thrive through active reuse. We're finding that fishponds are and need to be many things to "work" --a place, a focal point, where science, education, tradition and hard work all come together to create a community of learners, teachers, researchers and producers.

5. Production and Marketing Strategies of Pond Reared Aquaculture Products

Production within fishponds include the cultivation of fish, *limu* seaweed and live rock. Our goal was to use the various fishponds we had at our disposal to investigate and document the grow out and marketing potential of various pond-reared products.

Fish.

Production. Under the direction of our UH partner, CTAHR, three 150 by 50 foot pens for nurseries and three round net pens of 7,500 square feet for fish grow out were constructed and stocked in 'Ualapu'e Fishpond (see page 64 for aerial picture of fishpond with net pens).

Species stocked within the net pens were mullet, *'ama'ama* (Mugil cephalic), milkfish *awa* (Chanos chanos). Edible seaweed *limu ogo* (Gracilaria sp.) was incorporated into the fish culture as a multi-cropping fishpond product.

Stocking density followed the extensive to semi-intensive stocking practices (approximately 800-1,200 lbs./acre/year), as suggested by aquaculture technical experts at the Oceanic Institute and UH-Grant.

PVC netting started at 1/4" mesh for fry from 1" to 2" and takes 3-4 months to reach fingerling (4 inch) size. The animals were transferred to a ½" mesh net pen at 6-inch size and then into 3/4" for final grow-out.

Figure 60, Feeding the Fish at 'Ualapu'e.

Seedstock was acquired from the Oceanic Institute on Oahu. About 6,000 fry were stocked in the net pens. It is important to note that the fry need to be at

Figure 61, Measuring Awa Length.

minimal size @ 25 to 35 mm. OI has always experienced better transfer and survival rates with larger fish.

Feed. The high protein recommended fish food Rangen was used for feeding animals. Newly stocked fry are fed 2 times per day at 5-6% body weight. Grow-out fish are fed once to twice a day at 3% body weight. Feed conversion efficiency (FCE) or food conversion ratio (FCR) studies identify as 1:1 (Ako) or the equivalent of 1 pound of feed for 1 pound of fish growth. This is a very efficient conversion equivalency.

It is also important to note that the feeding rates above represent a closed system, without the benefits of supplemental foods. The culture of fish in fishpond net pens provides a large variety of supplemental food, such as micro/macro phytoplankton and zooplankton.

Data Records. Daily recording of activities include water quality, feeding, net pen cleaning, weather and animal observations. Daily water quality data includes: dissolved oxygen, tide, temperature and salinity. Animals are sampled monthly for growth and general health. Feed rates are adjusted based on size, weight and total standing biomass calculations.

Figure 62, Awa in Holding Bin.

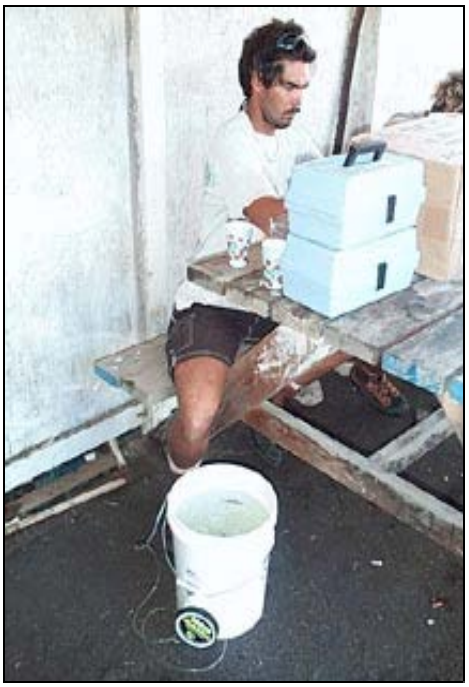


Figure 63, Mike Weeks Weighing Awa.

This type of net pen operation is intended to provide a yield not exceeding 1,500 pounds of fish per acre of water per year.[12] Typical of an extensive (more natural) fishpond system, growth data showed weight increase at a slower rate than contemporary land-based aquaculture systems. *Awa* growth reaching "market-size" rates occurred in about twelve months. *Mullet* growth has been characteristically slower with anticipated "market-size" rates at about 18 months. Survival rates varied widely between 20 and 60 percent of the original stock population. A typical stocking scenario per net pen enclosure would be an initial 3,000 *pua* fry that after 12 to 18 months would yield between 600 pounds of fish (low, 20 percent survival rate) to 1,800 pounds of fish (high, 60 percent survival rate).

Costs. The typical cost of materials for a 5,000 square foot net pen and *limu* production is about $2,500. Estimated labor to construct the pen is about 128 hours. The operation of the net pen for one year, including daily feeding and cleaning of the pen, monthly monitoring and annual harvests requires about 472 hours. Total labor for a one-year operation is about 600 hours. Feed costs are estimated to be about $1,300. Assuming a labor rate of $10.00 per hour, and a 10 percent contingency factor for miscellaneous operational expenses, the total capital, labor and operating cost for one net pen for Year One is approximately $9,680. As capital costs of net pen

[2]The historic Hawaiian pond has been estimated to have an average yield of about 300 pounds of fish per acre of water per year.

[3]Production rates of 1,500 pounds per year are low and are very unlikely to cause adverse impacts to surrounding water quality – avoidance of such impacts is one of the primary reasons for selecting a model of production which is sustainable under a variety of conditions and with low investment costs.

and limu growing equipment is not a factor, operating expenses for following years is about $7,000.

Assuming a sale price to the grower of $3.00 per pound, the annual gross income per net pen would be $1,800 for low yield (20 percent survival rate) and $5,400 for high yield (60 percent survival rate). Based on this, we estimate profit of about $900 is realized in year three.

Marketing. In typical Moloka'i style, most net pen reared fish have been shared among the workers, used as gifts, or if sold, done off the "back of the truck" at about $2.00 to $3.00 per pound.

Two on-island vendors have expressed interest in test marketing our mullet and milkfish catch. Friendly Market is interested in milkfish at $2.00 per pound wholesale, while Misak's Market is willing to purchase mullet at $3.00 per pound, wholesale. To do so, we require a aquaculture Facilities Permit (from DLNR-Department of Aquatic Resources) for the fishpond and a Aquaculture Dealers Permit as a vendor of fish products.

Limu.

Polyculture seaweed *limu* ogo (*Gracilaria)* production is grown in net pen systems by transplanting *limu* stock into net pens that contain fish stocks. *Limu* ogo is highly prized edible seaweed that grows well in the nitrogen-enriched conditions common in net pen fish production systems. Nitrogen, which is a by-product of fish cultures, is a critical nutrient to grow limu and thus as a side benefit, limu cultivation reduces the ambient nitrogen levels within the fishpond.

Limu seedstock was developed with the assistance of Ke Kua Aina Hanauna Hou at their hatchery in Puko'o. River rocks are collected and inoculated with spores that go through a nursery phase. Later, juvenile sporlings are be transported to each pen culture for grow-out.

We have found 'Ualapu'e is a perfect environment for the production of *limu*. *Gracilaria* favors low exposure to wind, wave action and water motion. Yields from this pond were competitive with tank-culture yields of *Gracilaria*.

The costs for *limu* production, including baskets, anchoring devises and sporlings is about $1,500. The *limu ogo* grow out rate has been about 50 lbs. per week. The cooperative Ke Kua Aina Hanauna Hou buys *limu* at a farm gate price ranging from $1.75-3.00 per pound.

Figure 64. Moloka'i raised limu ogo finds its way to The Tropical Fish and Vegetable Market on Oahu (Craig T. Kojima, Star-Bulletin).

Live Rock

Moloka`i Live Rock is manufactured from light-weight cinder and cement, placed in the ocean to obtain the necessary coverage of encrusted organisms, and then removed for sale. It is entirely man-made and can be shaped and designed to any shape or size. The rocks are grown in the fishponds which provide an exceptional culturing environment.

Live Rock is an integral part of a saltwater aquarium ecosystem. It is used in aquariums of all shapes and sizes to create mini-reefs. Live rock is used by individual hobbyists with small tanks to public aquariums, hotels, and restaurants who maintain very large capacity tanks.

In 2000, The World Resources Institute and Reef Check reported that the international aquarium hobbyists continue to increase at 10–30% annually; consequently trade in wild live rock has increased nearly 1700% since 1988[5]. In our marketing of live rock we have identified three customers: (1) Hotels and Restaurants, (2) Pet Retailers, and (3) Individual Consumers.

To date we have sold over one ton of live rock at the current wholesale price $3.00 per pound. We have about eight tons of rock in the water "growing." Incubation time is about 4-6 months. All of our permits are in place. We anticipate the Moloka`i Live Rock business should turn a steady profit of over $35,000 in Year 4. A copy of the business plan can be found in Appendix H.

[5] "Threats to Coral Reefs", EMS.org – Environmental Media Services. [Online]. Available:www.ems.org.

Although not impressive by for-profit business standards, culturing products in a Hawaiian fishpond can provide a modest profit over the long-term. This is only one aspect or component of the overall historic Hawaiian pond restoration and operation process. In this context, equally beneficial outcomes accrue to the community and to pond owners (both private and public) because of the improved stewardship that occur because of the commitment by fishpond operators to maintain (and in certain instances, restore) the ponds. For Project Loko I'a this is in keeping with the ultimate goal of our non-profit for which production activities help support its mission of research, education, conservation and cultural preservation.

Fig. 65. 'Ualapu'e Fishpond. Note 3 Rectangle 5,000sq Ft. Nursery Net Pens and 3 Round 7,500sq. Ft Grow Out Pens.

Fig. 66, Collecting *Pua* Baby Fish in the Nursery Pond at Keawanui.

6. Staff Development and Training

Moloka'i Aquaculture Training Program.

Twelve young men and women from the Moloka'i community were selected to join the Kia'i Loko (guardians of the fishpond) a.k.a., The Moloka'i Fishpond Aquaculture Training Program (Trainees). Project Loko I'a staff and numerous partners organized and developed a program designed to teach skills related to the restoration and reuse of the Moloka'i fishponds.

The list of training activities include:

- Basic Aquaculture understanding
- Traditional Hawaiian aquaculture systems
- Water quality assessment
- Instrumentation
- Math-metric/conversions/measurements
- Finfish aquaculture
- Fishpond economics
- Loko i'a restoration assessment/design/construction
- *Limu s*eaweed production
- Regulatory permits relating to fishpond restoration
- Environmental Stewardship
- Seedstock and transfer technology
- Marketing and product distribution
- Entrepreneurship micro-enterprise training
- Cultural training
- Leadership training

(For the detailed list of training activities, please refer to Appendix G).

Aquaculture Training Program highlights include:

Trainees at Oceanic Institute. Oceanic Institute (OI) is a not-for-profit research and development organization dedicated to marine aquaculture, biotechnology, and coastal resource management. The Trainees spend a month at OI gaining hands-on experience using OI's extensive laboratory, maturation, hatchery, and pond facilities. OI has a 25-year

Fig. 67, Loko I'a Trainees at The Oceanic Institute.

Fig 68, Dr. Babcock and Guy Naehu in the lab.

history of work force training projects conducting training sessions for students and farmers from all over the world. The Trainees learned milkfish and mullet fry production; shrimp maturation, hatchery management and intensive grow out, and feed production and evaluation. They raised milkfish *awa* from the hatching stage--ready to serve as stock for the fishponds. Upon completion of the training, the Moloka'i students took back a portion of the fish they helped rear.

Water Quality Assessment Training. As part the QAP study we have a trailer that contains a water quality laboratory located at Keawanui Fishpond. We also have a boat to take the off-shore water samples. Three trainees received instruction on how to conduct water quality sampling, lab analysis of the samples and maintenance and upkeep of the lab. Dr. Roger Babcock, Professor at the University of Hawai'i in Environmental Engineer and a water quality specialist provided the training.

University of Hawai'i Native Hawaiian Leadership Program. The Native Hawaiian Leadership Program (NHLTP) is funded by the U.S. Department of Education, Native Hawaiian Higher Education Act. The program advocates that leadership is essential for success and education represents one key to becoming a successful leader. Through counseling, mentoring and community service, NHLTP strives to develop leadership skills in program participants. Manu Kaiama, Principal Investigator, strongly supported the fishpond endeavor by flying in qualified trainers to Moloka'i monthly from March-September 2001 to teach our young adults leadership and community involvement skills.

Cultural Training. Experts from throughout the State came to Moloka'i to provided instruction in various aspects of Hawaiian cultural traditions. These include taro cultivation, *uala* sweet

potato cultivation, rock wall building, woodworking, *lomi lomi* massage, *lauhala* plaiting and cordage, tattooing.

Fig. 79, Traditional Hawaiian Implements Crafted by Project Loko I'a Trainees.

Business Training. Professor Wayne Tanna, Chaminade University, visited Moloka'i to provide business training that focused on starting a small business in Hawai'i. He has offered to help the Panahaha Fishpond group to set up their initial business structure. The Panahaha Hui also met with Barry Gay of Maui Economic Opportunity, Inc., to apply for micro loans and to establish a good credit history.

Oahu Field Trip. In February 2002 ten Trainees spent a week on Oahu for aquaculture and business training and general industry "networking" opportunities. Itinerary included State and County government officials and permit regulators, The Oceanic institute, Coconut Island (University of Hawai'i Institute of Maine Biology), Honolulu Aquarium, Anuenue Fisheries, He'eia Fishpond on Kaneohe Bay, Business training at HACBED (Hawai'i Alliance for Community-based Economic Development) and Native Hawaiian Legal Counsel Training.

Maui Ocean Center. In April 2002 the Trainees spent 5 days as interns at the Maui Ocean Center. The Trainees worked alongside staff at this stat-of-the-art aquarium facility learning about fish and reef ecology, aquarium tank maintenance, fish and sea life propagation, feeding and maintenance and water quality analysis.

Moloka'i Community Outreach. As detailed in Section 1, staff and Trainees conducted community outreach through school visits, hosting Loko I'a Night, writing news articles, visiting government officials and elected representatives and holding position on local boards and commissions. These activities gave the Project Loko I'a staff valuable experience in public speaking, writing skills and community leadership.

Other training highlights include attending the Coral Reef Ecosystems of the Northwestern Hawaiian Islands seminar at Kulana 'Oiwi, Moloka'i; attending the Hawai'i Aquaculture Conference, Honolulu; clam cultivation training with Lui Kwan on the Big Island; master

Fig. 80, 81; Hands-on Dry Stack Rock Wall Building Class at Kulala O'Iwi.

stone builder Billy Fields' three-day dry stack rock wall building class and scuba training and certification in Kihei, Maui.

Three of the Aquaculture Trainees, Josh Kalua, Hano Naehu and Kalaniua Ritte are currently enrolled at Maui Community College taking courses with the goal of obtaining a Certificate from the UH Oceanography Department's Marine Options Program.

Fig 82, Kalaniua Ritte, Guy Naeha, Josh Kalua at Moloka'i Education Center, Maui Community College.

Fig 83, Loko I'a Crew with Maui Mayor Kimo Apana.

Fig. 84, Bill Kekahuna, Josh Kalua, Guy Naehu, Kalaniua Ritte, Walter Ritte, Scott Adams and Jason Gamiao visiting with Senator Kalani English.

Fig 85, Hawaii Institute of Marine Biology at Coconut Island, Oahu. Outdoor Tanks.

Fig 86, Project Loko I'a Crew Investigates the *Makaha* at He'eia Fishpond, Oahu.

Fig. 87, Project Loko I'a Visits with Honolulu Mayor Jeremy Harris.

Fig 88, Loko I'a Crew on Coconut Island.

Fig 89, Guy Naehu and Joe Farber at Maui Ocean Center.

Fig 90, Teamwork Building Class at HACBED (Hawai`i Alliance for Community-Based Economic Development) Oahu.

Fig 91, Tour of Anuenue Fisheries Indoor Facilities, Oahu.

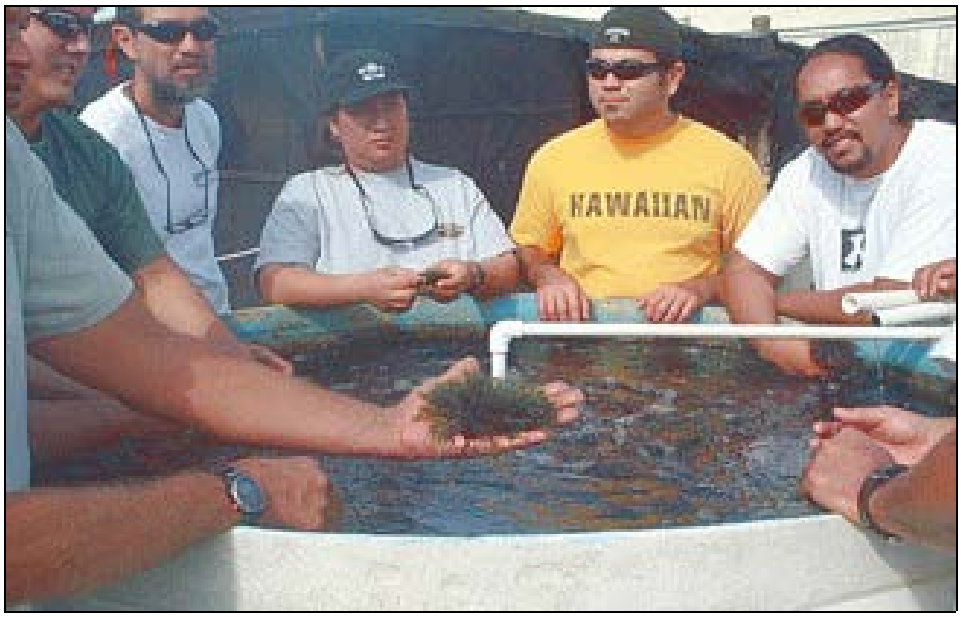


Fig 92, Tank Raised *Limu* - Anuenue Fisheries.

Fig. 93, Kalaniua Ritte, Brandon Lima, Josh Kalua, Bill Kekahuna, Scott Adams, Guy Naehu, Walter Ritte and Melody Kahinu visit with Representative Ronald Davis at the Hawai'i State Capitol.

Figure 94, Walter Ritte Meets with Dr. Gary Pruder (far left) and Jim Muratsuchi (far right) at the Oceanic Institute.

7. Neighbor Island Outreach

As Project Loko I'a has progressed we have gained the skills and knowledge to be a resource for others who wish to rehabilitate fishponds. We see it as our responsibility to collaborate with other communities throughout the state. Our goal is to share what we know and network with others to form a strong alliance of fishpond users and advocates. To that end, Project Loko I'a has done the following neighbor island outreach:

Maui. In October 2000 Project staff visited Ko'ie'ie and Hana Fishponds performing wall and water quality assessments, and at Hana, participating in a community workday to repair a section of the fishpond wall. In addition, the staff conducted presentations on Project Loko I'a for Lahainaluna High School's Alternative Learning Center and a community workshop in Hana. The staff also received training on native fish species at the Maui Ocean Center Aquarium (in 2002 the Trainees interned at the Maui Ocean Center for five days).

These visits were well received by the Maui community and were publicized in the local Maui newspaper (see Appendix A). More importantly, the trip served as an opportunity for the staff to share their knowledge and experience with other groups and communities who have an interest in fishpond restoration and operation. It was a growing experience for the Trainees to share their knowledge with others, enabling them to realize the depth and breadth of the knowledge they had gained.

A particular highlight of the Maui outreach has been networking with the Ko'ie'ie Fishpond

Fig. 95, Project Loko I'a at Ko'ie'ie Fishpond, Maui.

Fig. 96, Site Assessment and Water Quality Analysis.

Fig. 97 Site Assessment at Ko'ieie Fishpond.

Fig. 98, Mike Weeks Conducting Water Quality Analysis.

group. This non-profit 501c3, Ao ao Na Loko I'a o Maui, is in the process of obtaining their permits to restore Ko'ie'ie Fishpond for educational and cultural purposes. Project Loko I'a has formed a strong working relationship with this group. In 2004 Ao ao o Na Loko I'a o Maui hired the Trainees to conduct periodic water quality checks, perform beach profiles and do a fishpond wall assessment. In the spring of 2005 the Moloka'i Trainees will be instructing the core group of people who will be rebuilding the fishpond wall the art of dry-stack rock wall construction.

Hawai'i Island. Consulted with Edith Kanakaole Foundation and surveyed Keokaha (Hilo) fishponds. Meet with community members and help put together a strategic planning session in Ka'u with those interested in restoring one of their fishponds. Visited with the master wall builders and their on-going restoration project at Kaloko Fishpond (part of Kaloko-Honokohau National Historical Park). We also visited the ponds at Punaluu, Ninole and Honuapo.

Fig 99, Master Stone Workmanship at Koloko Fishpond, Hawai'i Island.

Kaua'i. Consulted with the Waipa Foundation, a community-based non-profit organization dedicated to stewardship and restoration of their *ahupuaa* watershed that contains a fishpond.

Oahu. In January 2001 we visited and collaborated with fishpond practitioners at Waikalua, He'eia and Moli'i Fishponds. We also made a presentation to a community working group that was formed as part of the revitalization of He'eia by the owner of the pond, Kamehameha Schools. As a result of this trip, Kamehameha Schools and Project Loko I'a agreed to explore opportunities for a partnership to develop He'eia Fishpond as an educational resource.

Fig. 100, The Fishpond as Outdoor Classroom. School Kids at Waikalua Loko Fishpond, Oahu.

Since that trip in 2001 we have established a strong working relationship with *Paepae 'o He'eia*, the non-profit organization that is restoring He'eia Fishpond, growing fish and limu and has established a curriculum program for students visiting the site. Currently, they have three Hawai'i public charter schools visiting He'eia Fishpond weekly in addition to hosting children from Kamehameha Schools.

Along with *Paepae 'o He'eia* we co-sponsored a statewide fishpond conference by and for fishpond operators at He'eia Fishpond in Sept 2004. Over 70 people representing fishpond operators, non-profit foundations, government officials, educators, scientists, entrepreneurs, and interested community members attended the two day event.

Fig 101, Under the Mango Tree at He'eia Fishpond.

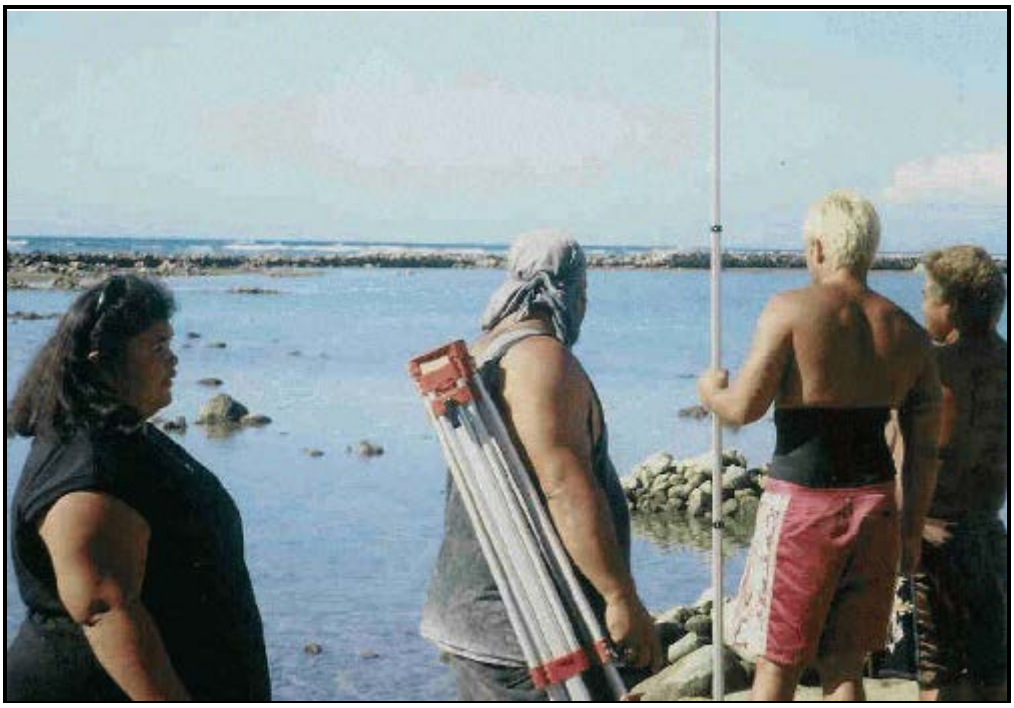


Figure 102, Ancient Fishpond, Modern Tools. Rebuilding Kahinapohaku Fishpond.

Conclusion

We envision a Moloka'i that leaves for its children a visible legacy: an island momona (abundant) with natural and cultural resources, people who kokua (help) and look after one another, and a community that strives to build an even better future on the pa 'a (firm) foundation left to us by those whose iwi (bones) guard our land.

The Moloka'i Vision Statement
Moloka'i Rural Enterprise Community

Through Project Loko I'a we have advanced the desires and vision of the People of Moloka'i. We have created the physical infrastructure and trained the human resources to:

> Focus on the capacity building of the Moloka'i Community.
> Provide educational benefits for all age groups.
> Contribute traditional and scientific knowledge to the already existing body of knowledge concerning Native Hawaiian fishponds.
> Provide a venue for economic and employment diversification on Moloka'i.
> Restor and reuse fishponds that serve as a model for other fishpond initiatives.

Most importantly we have changed the perception of fishponds and their value in today's world. We have turned around public and government perception that fishpond were a thing of the past. Through restoration we have created awareness: That culture is important. We have changed government and have changed the Community.

Planning studies sponsored by the State in 1987 recommended that a number of fishponds be zoning-reclassified from conservation to rural and redeveloped as recreational boat harbors, a public swimming lagoon and for rural development.[6] Today this could never happen. We now have a community that no longer views these ponds as rubble but as an important link the Hawaiians have to their elders and as valuable cultural treasures; much

[6] DHM Planners, Inc. and Public Archaeology Section, Applied Research Group, Bernice Pauahi Bishop Museum 1989. *Hawaiian Fishpond Study: Islands of Oahu, Moloka'i and Hawai'i*.

like taro cultivation, Hawaiian language, hula and navigation—Hawaiian things that are to be rediscover as they have resonance and meaning to our lives today.

All our efforts move forward the vision to create a fishpond industry on the island, provide jobs and contribute and strengthen the core values of a traditional subsistence lifestyle that is cherished by the Moloka'i community.

Figure 103, Keawanui Fishpond, Ka'amola.

Appendix VII: Archaeological Survey and Assessment for the Proposed Expansion of Bay View Golf Course by Cultural Surveys Hawaii (Sept. 1989)

ARCHAEOLOGICAL SURVEY
AND ASSESSMENT OF A 90-ACRE PARCEL
FOR THE PROPOSED EXPANSION OF
THE BAY VIEW GOLF COURSE
KĀNE'OHE, O'AHU

by

Hallett H. Hammatt, Ph.D.
Douglas Borthwick, B.A.

prepared for

Hida, Okamoto and Associates, Inc.

by
Cultural Surveys Hawaii
September, 1989

Abstract

An archaeological survey and assessment was conducted on a 90-acre parcel in Kāne'ohe for proposed expansion of the Bay View Golf Course. This area which lies along the lower floodplains of Kāne'ohe and Kawa Streams was traditionally used for taro planting and aquaculture. Over 40 Land Court Awards were granted here and the floodplain and fringing slopes must have supported a large Hawaiian community. Three fishponds were located along the Bay. In the late 19th and early 20th Centuries rice was intensively cultivated in old taro lands and taro continued to be planted up to the 1950s. Modern development of the area -- golf course, sewage treatment plant, surrounding residential subdivisions and flood control projects -- have caused extensive modifications of the land. Only 2 archaeological features remain as a visible part of the landscape. These are Waikalua-loko Pond which, although rebuilt in the 1930s, has been a continuously functioning pond since prehistoric times; and Waikalua Pond which is in poor condition due to mangrove intrusion, but still shows an intact seawall. Both ponds are recommended for preservation. In addition, because of the plentiful historic evidence of intensive Hawaiian occupation as well as the possibility that archaeological remains lie buried within the area, archaeological monitoring during initial clearing and grading is recommended.

Acknowledgements

The field work for this project was conducted by the authors as well as Mr. David Shideler. Ms. Kirsten Nakamura and Mr. Rodney Chiogioji. Backhoe work was done by Mr. Mike Masatani. Mr. Harvey Hida of Hida Okamoto and Associates and Mr. Tyrone Kusao both provided much useful information and support. Ms. Berna Cabacungan of Earth Plan provided coordination for the E.I.S. Mr. Kenneth Binkley of Bay View Golf Course was extremely helpful in arranging access and providing information. Mr. Charles Okino of the State Survey Office supplied many historical maps. Typing was provided by Dr. Vicki Creed of Windword Processing.

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I. Introduction

1. Scope of Work and Methods

This project includes the results of historic research, archaeological survey and limited subsurface testing on an approximately 90-acre parcel in the Waikalua area of Kāne'ohe ahupua'a (Figs 1-4). The parcel is designated TMK 4-5-30 parcels 1-3, 6- 20-22; 36, 37, 41, 42, 44-46, 48, 49.

Background Research

Historical and archaeological background research was conducted for the purpose of reconstructing past land use with specific reference to assessing potential for the presence of archaeological sites on the property and to guide the direction of the field survey. Much of the general background is contained in existing summaries as this area of Kāne'ohe has been the subject of much historical research. Original sources such as historic survey and LCA maps and records were consulted. The extensive use of the flood plains of Kawa and Kāne'ohe Streams for traditional taro planting in prehistoric and early historic periods and later for rice farming is well documented in the Land Court Records, early survey maps and extant photographs.

Field Survey

The field survey was conducted to assess present land conditions and to systematically cover areas which were relatively unmodified by modern development. The flood plain of the 2 streams presently contains the existing Bay View Golf Course at

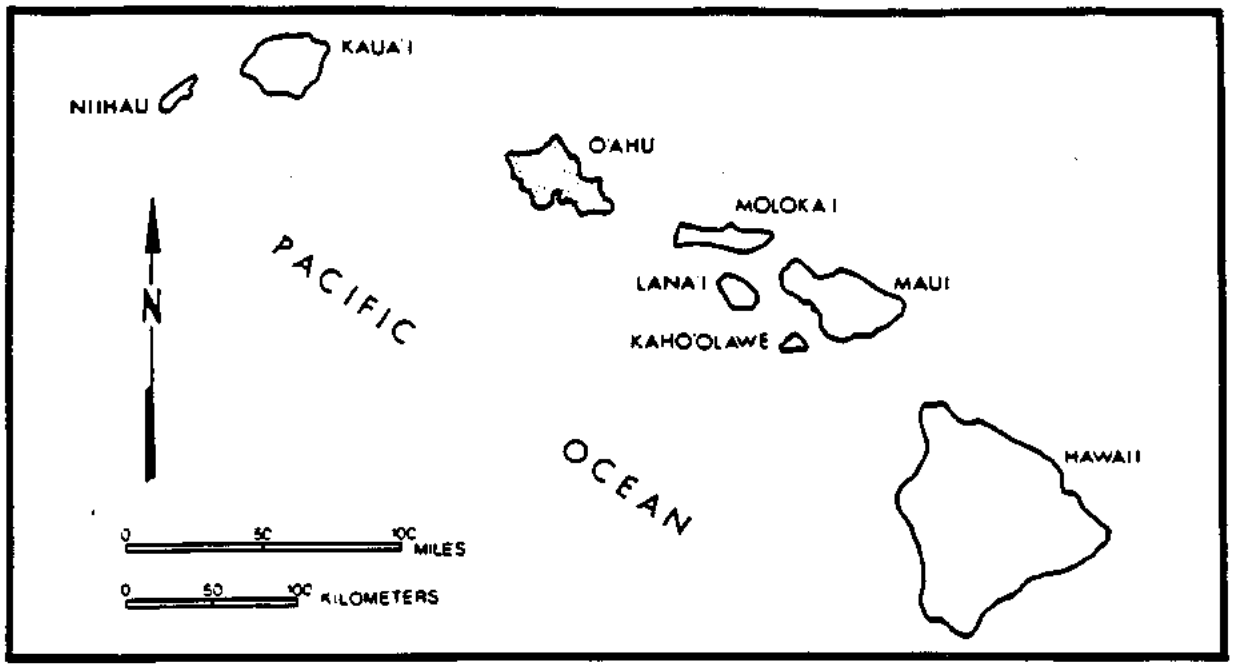


Fig. 1. State of Hawai'i

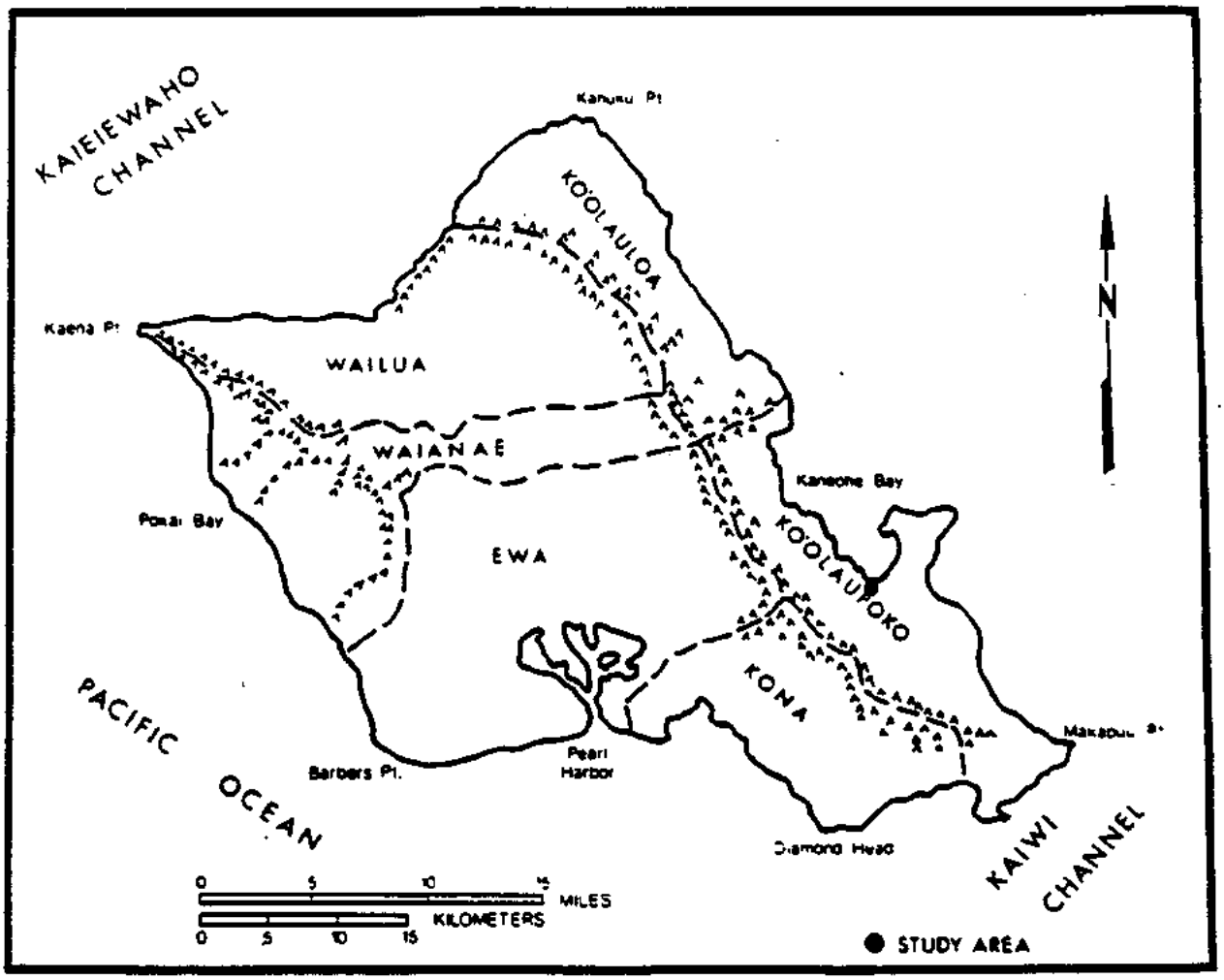


Fig. 2. General Location Map, O'ahu Island.

Figure 3 USGS Quad: Showing Project Area

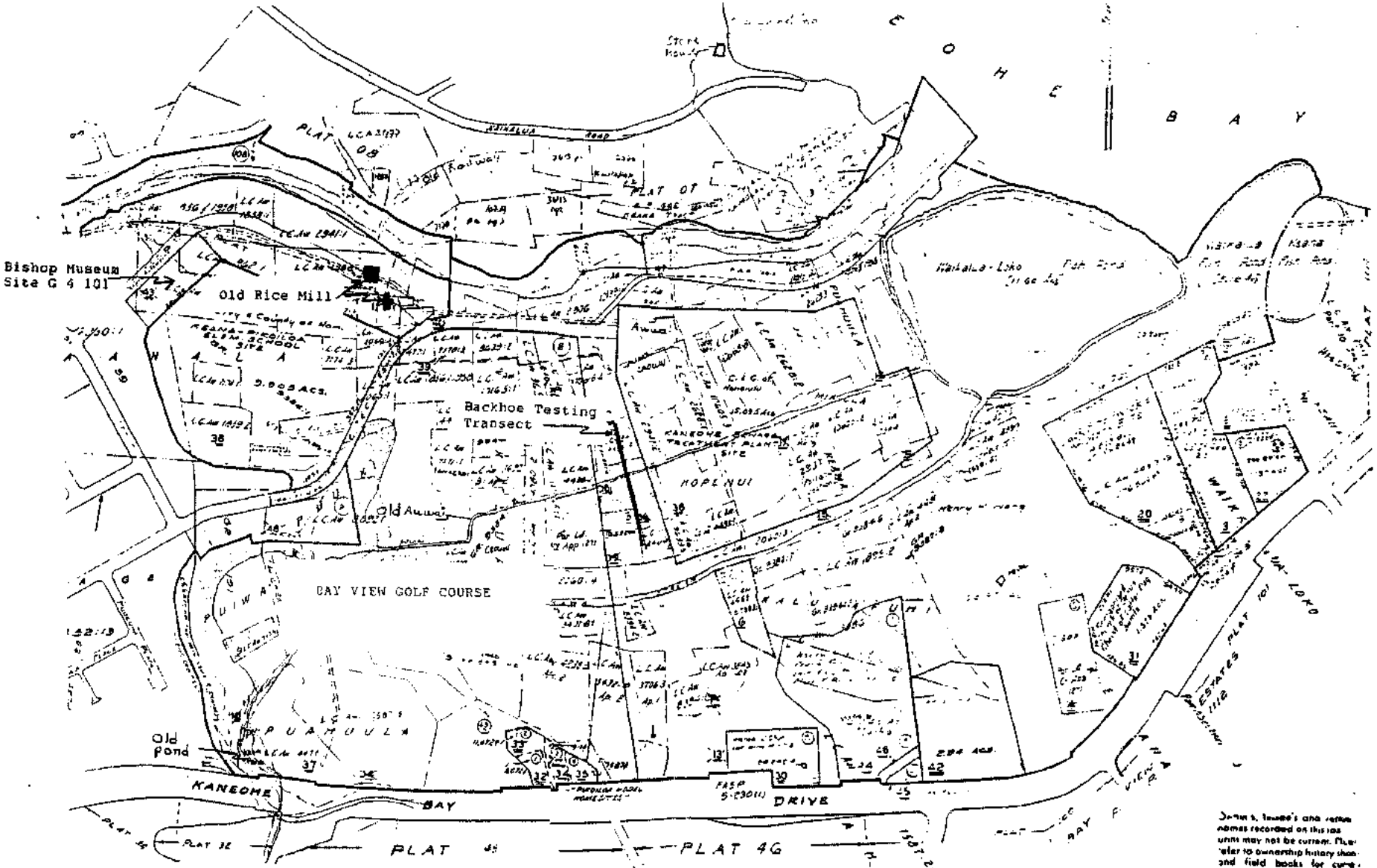


Fig. 4 Project Area, Showing Some Features and Places Mentioned in Text

the western end of the project area, as well as a sewer treatment plant, residential tenants and an auto wrecking company mauka of Waikalua Fishpond. Survey coverage concentrated on the unmodified pasture portion of the floodplain and the wooded slopes predominantly at the south end of the project area bordering Kāne'ohe Bay Drive. There is also floodplain and wooded slope within a small portion of the project area north of Kāne'ohe Stream.

Fishpond Assessment

An important aspect of the field survey was examination of Waikalua-loko, Waikalua and Keana Fishponds on the Kāne'ohe Bay side of the project area. The present conditions of the ponds, the state of preservation of their walls and mākāhā were assessed and the archaeological potential of their associated features and sediments were evaluated.

Subsurface Testing

Subsurface testing was conducted with use of a backhoe along what was judged to be the least disturbed section of the floodplain and virtually the only area that was readily accessible to mechanical equipment without inconvenient to the existing golf course users or present tenants. This area was located along the west boundary of the sewage treatment plant on the north side of Kawa Stream. A series of 8 20-25 foot- (6-7 meter-) long backhoe trenches were excavated along a 600-foot north/south transect perpendicular to Kawa Stream, from the stream bed towards the present entry road to the sewage treatment plant. Each trench

was excavated to a depth of 7-8 feet (210-240 cm.). Standard soil profile descriptions were made for each trench and all trench faces were inspected for changes in stratigraphic layering, buried cultural material, buried terraces, and organic deposits. In addition, samples of organic deposits were collected. In all, 160 linear feet of relatively undisturbed floodplain deposits were examined to the present water table of approximately 240 cm.

Interim Report

In May of 1989 an Interim Report on Historical Research and Preliminary Assessment of the Fishponds was submitted to Hida, Okamoto and Associates for submittal of the environmental assessment. The present report incorporates elements of the Preliminary Report within the Previous Archaeology and Historical Background Sections. The survey was completed and the testing accomplished since the submittal of the Interim Report.

2. Description of Project Area: Present Conditions

The 90-acre parcel comprising the project incorporates the estuaries and lower floodplains of Kāne'ohe and Kawa Streams as they enter the eastern shoreline of Kāne'ohe Bay. The majority of the project area is relatively flat alluvial land, but includes the sloping lands dropping from Kāne'ohe Bay Drive at the south end, as well as a small parcel of sloping land and floodplain on the north side of Kāne'ohe Stream. The study area is bounded by Kāne'ohe Bay Drive at the south end except for 3

excluded lots fronting the north side of the road. The west end is bounded by existing residential subdivisions (Puohala Village and Nani Pua and Puohala School). The north boundary follows the south side of Kāne'ohe Stream except for an extension of the study area north of the stream which incorporates a slope and a meander of the floodplain and is surrounded by existing residences. This area is accessible from the eastern end of Waiape Place. At the eastern boundary is the shoreline of Kāne'ohe Bay where the estuary of Kawa and Kāne'ohe Streams were modified in Prehistoric times into 3 fishponds extending from the mouth of Kāne'ohe Stream to the present Kokokahi YWCA.

Present Land Use and Conditions:

The Floodplain

The western portions of the floodplain has been extensively graded for the existing Bay View Golf Course. The undulating contour of the course shows that the original level topography of the floodplain has been highly modified. At the eastern portion of the floodplain, north of Kawa Stream and mauka of Waikalualoko Pond is the City and County of Honolulu Sewage Treatment Plan which presently occupies nearly 16 acres of the floodplain. The plant area has been extensively graded and landscaped. Open excavations for sewer plant improvement were observed adjacent to Kawa Stream during the archaeological subsurface testing. The sediments within these trenches appeared to be gravelly mechanical fill.

On the south side of Kawa Stream across from the sewer plant

the floodplain area is presently used for pasture land. Even here there is evidence of modern dumping of landfill and bulldozing for pasture improvement.

Fishponds

Of the three fishponds recorded on the historic maps - Waikalua-loko, Waikalua and Keana Ponds - Waikalua was the largest, enclosing over 11 acres of water. Although this pond was modified in the 1930s with addition of mortared makāhā (gates) it still shows its original configuration. Much of the northwest and south portions of the pond boundary have been modified in modern times with adjacent coral and earthen fill for flood control. Kawa Stream has been channelized by an artificial bank to flow seaward on the southeastern side of the pond. In spite of these adjacent modifications the sea wall is still intact and the pond itself is clear of vegetation, except for a growth of mangrove at the southeastern end.

Waikalua Pond shows portion of an intact but mangrove covered kuapā (seawall) and the pond outline is still visible, but the interior is filled with dense mangrove.

Kaena Pond, which on the historic maps is shown as a walled-off segment of Waikalua Pond, was filled in the 1950s and all traces of it have been obliterated.

Kāne'ohe and Kawa Streams and Other Drainages

The banks of both of these streams have been bermed with artificial fill for flood control, most visibly at or near the entrance to Kāne'ohe Bay. There is a long earthen berm separating Kawa Stream at its mouth from Waikalua-loko Fishpond. The

south bank of Kāne'ohe Stream has been straightened with the addition of large quantities of fill adjacent to the northwestern side of Waikalua-loko. The tax map of the project area (4-5-30) shows 2 major auwai (irrigation ditches) between the 2 streambeds, one of which emptied into Waikalua-loko. These auwai(s) were for flooding of wetland crops on the floodplain. The course of these former ditches have been destroyed by golf course and sewer plant construction.

Slopes Surrounding the Floodplain

Long-term residential development with attendant grading and filling has resulted in the modification of much of the slope land on the north side of Kāne'ohe Bay Drive, as well as along the western and northwestern boundaries of the study area. However, most of the area at the top of the slope on the south side of Kawa Stream appears to be original topography. Here were found occasional large boulders of dense basalt which rolled downslope. Some of this material is of fine-grained quality and would have been suitable for ancient adz manufacturing but no evidence of human flaking was observed.

II. Previous Archaeological Research

There have been a number of in-depth studies concerning the ahupua'a of Kāne'ohe. These studies include, Rosendahl (ed.) (1976), Devaney et al. (1976), and Allen et al. (1987), which were done in association with major "urban" projects effecting Kāne'ohe. Rosendahl's report was in response to the Kāne'ohe-Kailua Flood Control Project, Devaney et al. was "part of The Comprehensive Kāne'ohe Bay Urban Water Resources Study," and Allen et al. was in conjunction with "the Proposed Kāne'ohe Interchange, Interstate Highway H-3." These reports include sections on history and historic land use from which much of this report's historical background section is based, and credit must be given to those authors, especially Marion Kelly.

The first archaeological research done within the project area was by J. Gilbert McAllister (1930). McAllister identified three sites within the project area (349, 350, and 353) (Fig. 5) site 349 is Waikalua Pond or Waikalua-loko, with McAllister's description indicating recent (1920s-1930s) rebuilding. "The rebuilding of the pond has been completed. The wall was 1420 feet long, of waterworn basalt 3 to 4 feet high but somewhat wider. The pond covers 11 acres" (McAllister 1933:178). There is also a photo of the fish pond wall (Ibid. Plat 12B). Site 350 is the two ponds adjacent (Kailua side) of Waikalua-loko. "The pond in use is said to be Keana with an area of 3.5 acres ... The name of the other is Kalokohanahou. Its wall is broken. Both were built of waterworn basalt. The dirt filled wall of Keana is wide enough for trees to grow on it...." (Ibid.:179). The "Kaloko-

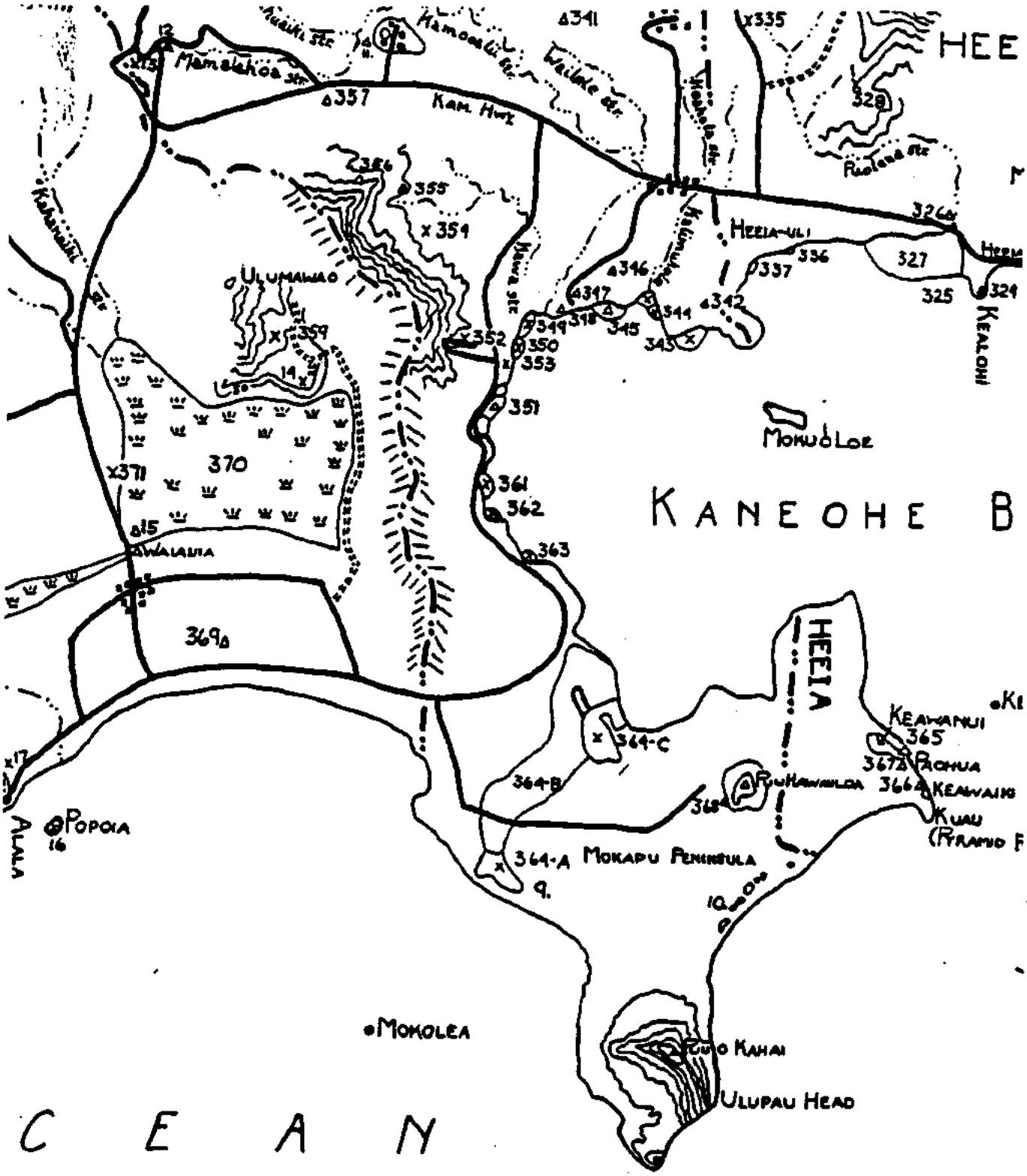


Fig. 5 McAllister Sites, Kāne'ohe: (Sterling and Summers 1978 Ko'olaupoko District).

hanahou" Pond appears on some maps as Waikaluawaho Pond with Waikalaa being an "older variant" (Devaney et al. 1976:147). Keana (Lokokeana) which once included Waikaluawaho, was "artificially filled in 1950s" (Ibid.:147). Waikaluawaho is in a poor state of preservation, with just the seaward wall remaining and the former pond area being filled with mangrove. Site 353 was a spring in the Kokokahi YWCA area. Traditional accounts called this spring "Kini Kailua-Mano Kāne'ohe" for the "hundreds of Kailua and thousands of Kāne'ohe people who died from drinking the poisoned waters of the spring (Ibid.:179). The YWCA property in the area of the former Keana pond and Kini Kailua-Mano Kāne'ohe spring is perpetually muddy and a flow of brackish water enters Kāne'ohe Bay in the vicinity. The area is presently used as open space, sail boat storage and launching area.

The next major archaeological research was associated with the Kailua-Kāne'ohe Flood Control Project, with a reconnaissance level survey of the banks of Kāne'ohe Stream within the project area. "Below the confluence of the Kuou and Kamo'oali'i Streams, it covers only the immediate banks of Kāne'ohe Stream; this entire stretch has been developed and no sites remain" (Rosendahl (ed.) 1976:3-8). Though no sites were recorded this report details upland agriculture of Kāne'ohe and how it relates to overall ahupua'a occupation.

The research associated with the U.S. Army corps of Engineers, Kāne'ohe Bay Urban Water Resource Study resulted in the book Kāne'ohe: A History of Change (Devaney, Kelly, Lee, Motteler 1976). The book (ca. 220 pps) includes sections on popula-

tion, history, agriculture, water and forest marine resources (including section on fishponds) and numerous photos and maps. Ross Cordy also wrote an 82 page report dealing with Cultural Resource Planning of the Kāne'ohe Bay Area as part of U.S. Army Corps study. Of particular interest is Cordy's documentation and figure (F-2) on kuleana(s) within the project area (Cordy 1977:49-50).

The 1987 Bishop Museum Report "Five Upland 'Ili" (Allen (ed) 1987) concerns the Kāne'ohe interchange for H-3. The report discusses the intensive survey and excavations conducted in upland agricultural systems.

In 1986 staff of the Bishop Museum conducted archaeological investigations at the site of the "Proposed Nani Pua Gardens II Subdivision" (Clark and Riford 1986) (See Fig.4). This property is just mauka (NW) of the present project area. The report details stratigraphy of backhoe trenches, controlled excavations and burial removal. There were some 12,200 portable artifacts, evidence of large pole/thatched houses, and in situ burials below habitation floors.

The recent (1970s - 1980s) archaeological research concerning Kāne'ohe has supported traditional and early historical accounts of the high productivity of the ahupua'a of Kāne'ohe. The research has also produced a range of dates from the uplands to the coast. Rosendahl (1970) suggests a time span of 325 years for the upland site, 50-OA-G5-37. "The site was occupied, most likely in a pattern of recurrent occupation, abandonment, and reoccupation, during an estimated maximum time span of approxi-

mately 325 years A.d. 1425-1750" (Rosendahl 1976:6-96). Allen (1987) suggests a time span for ponded fields in Luluku (50-OA-G5-85 Features 30 to 38) "The 5th through 16th or 17th Centuries at a minimum" and dry land agriculture starting around the 11th to 13th Centuries (Allen 1987:179: 244). Clark and Riford (1986) in their work on the Nani Pua Gardens indicate that "apparently site 50-OA-G5-101, was settled sometime between A.D. 1070 and 1405 ... and that ... sometime prior to A.D. 1510 - 1680, a major flooding event occurred that buried a major portion of this small settlement. The eroded sediments may have come from the de--stabilized landscapes where upland forest had been cleared for agricultural purposes' (Clark, Riford 1986:109-110).

Fishpond dating has been attempted in a few locations, notably Nu'upia Ponds Mōkapu Peninsula (Hammatt et al. 1985). Though there was a very small organic sample involved, a date of around 12-1300 A.D. was postulated for the development of the ponds (Hammatt et al. 1985:41-42).

In general Kāne'ohe has been one of the most intensively studied ahupua'a(s). Studies from the uplands to the coast, including fishponds have been conducted. However the project area which includes former ponded taro fields (lo'i) and fish-ponds appear to have the potential for additional substantial data. The dating of both fishponds and lo'i are feasible and rewarding in terms of adding significantly to Hawaiian prehistory and settlement patterns.

III. Historical Background

1. Introduction

The project area is located within the Windward O'ahu district of Ko'olaupoko and is situated within the traditional Hawaiian land unit (ahupua'a) of Kāne'ohe (Fig. 6) Kāne'ohe is a large ahupua'a (ca 11,000 acres) extending from the Windward base of the Ko'olau to include most of the Mōkapu Peninsula. Traditionally Kāne'ohe has been viewed as a "valuable" ahupua'a both in terms of agricultural and fishery productivity. S. Kamakau referred to 1830s Kāne'ohe as the "most valuable part" of Ko'olaupoko (Kamakau 1961:303). Specifically, the project area encompasses what has been called Waikawa Swamp and Waikawa (loko) fishpond (Fig. 7). Formerly these were some of the most productive taro lands of Kāne'ohe.

2. Traditional Accounts

There are a number of traditional (legendary) references, dealing with this general area of Kāne'ohe, which indicate its high productivity and hence, its highly "valuable" status. The legend of La'amaikahiki "so named for his coming from Kahiki" (Tahiti)(Kamakau: in Sterling and Summers 1978:209-210) relates the landing of La'a on the north side of the mouth of Kāne'ohe Stream where he "threw out some sand as a resting place for the canoes" (Ibid.). The sandy canoe landing has become known as "Na-one-a-La'a" which were "tapu to the commoner when ali'i lived there" (McAllister (Site 348) 1933:178). La'a had traveled to Hawai'i and specifically to O'ahu because "He heard ... Hawai'i

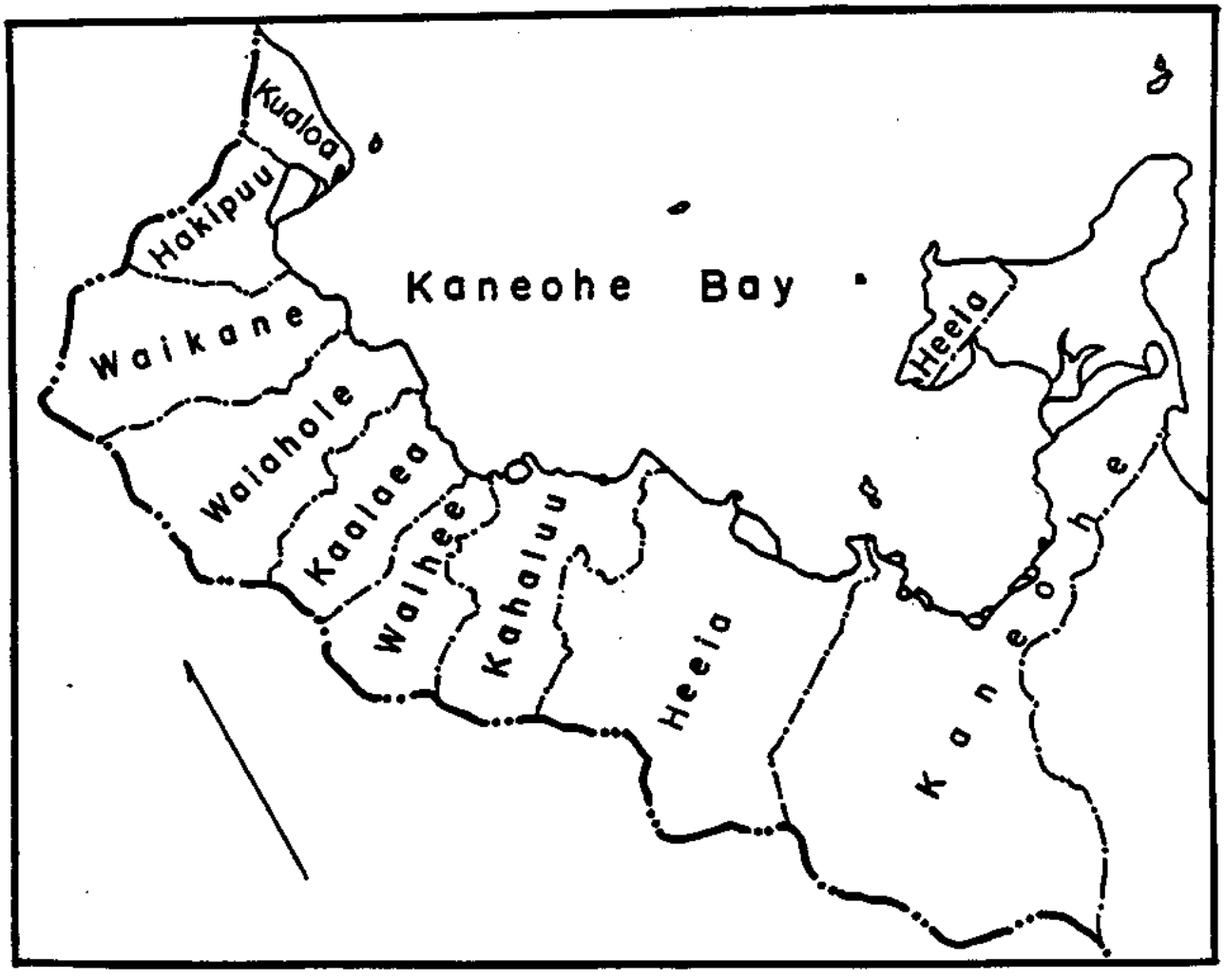


Fig. 6 Ko'olaupoko District: Showing Kāne'ohe <u>Ahupua'a</u> (From Devaney et al. Fig. 1).

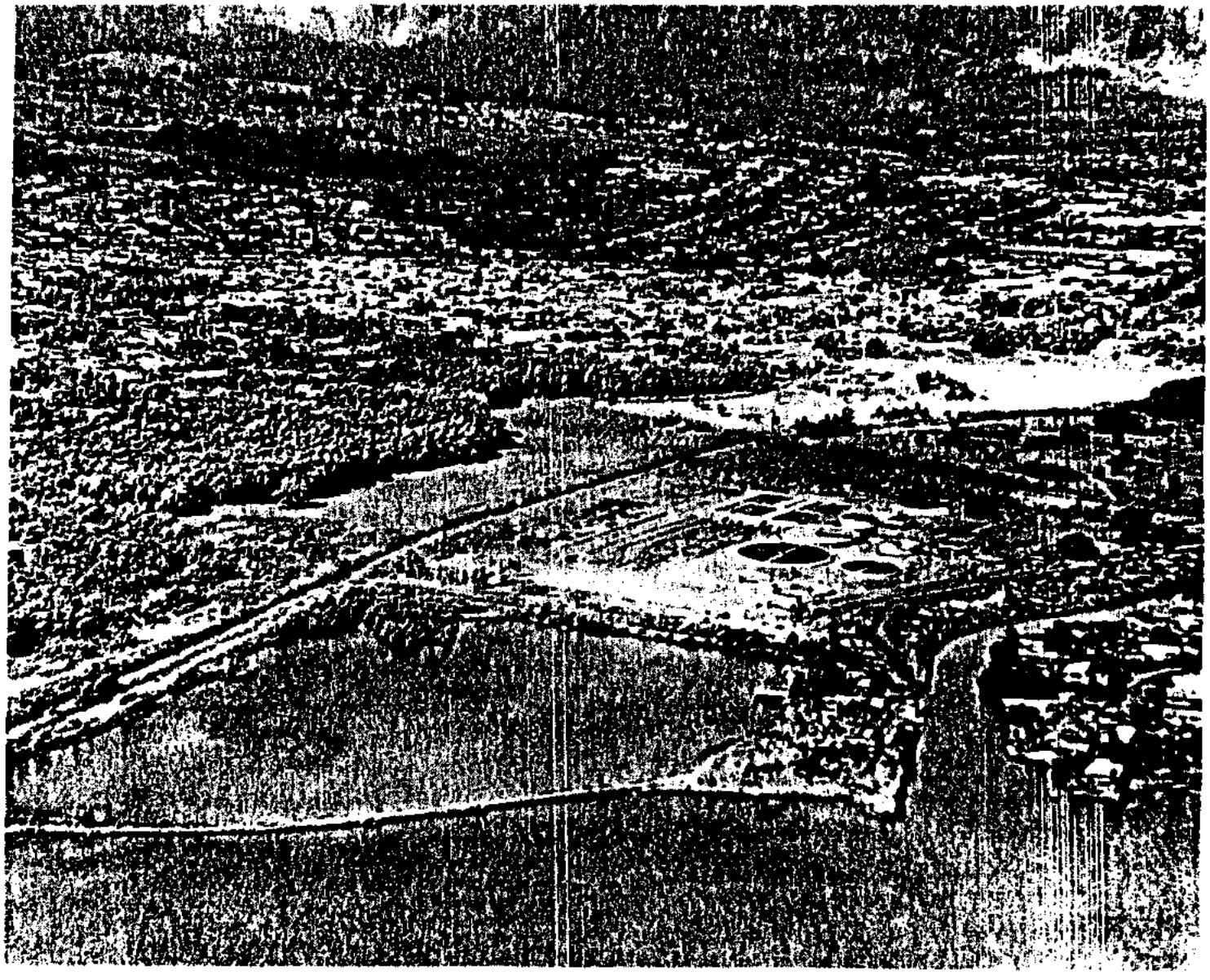


Fig. 7 Aerial photo dated 1974, Showing Waikalua loko Pond, Sewage Treatment Plant and Golf course (Waikalua Swamp)

was a fertile land ... with ... O'ahu the richest of all" (Kamakau: in Sterling and Summers 1978:209). Kamakau referred to the general area as Wai-hau-palua. The place name apparently was shortened to Waikalua over time. T. Thrum reports in 1916 "At Waikalua near the beach, once stood the Naoneala'a Heiau" (Thrum 1916:90).

Kamakau also specifically refers to this area (Waihaupawa/-Naonealaa) in his discussion of the invasion of O'ahu (ca 1737) by the Hawai'i Island chief Alapai and his warriors. Kamakau relates that Alapai and his warriors' encampment was at Kailua and Kāne'ohe, to insure abundant food supplies. This war was settled at Naonealaa with the meeting of Kauai chief Peleioholani and Alapai, who was encamped at Waihaupalua. "It was January 1737, that the two hosts met, splendidly dressed in cloaks of bird feathers and in helmet shaped head coverings beautifully decorated with feathers of birds ... both chiefs were attired in a way to inspire admiration and awe, and the day was one of rejoicing as that of the ending of a dreadful conflict. So it was that Peleioholani and Alapai met at Naonealaa Kāne'ohe" (Kamakau 1961:72).

3. Early Historic Period, 1778 - 1840

These traditional accounts did not mention the large fish pond at Waikalua, but they do indicate the high productivity and desirability of the area. Subsequent early historic accounts echo these earlier traditions.

"In early historic times, when Kahahana ruled O'ahu, he

sometimes lived in Kāne'ohe. After defeating Kahahana in 1983, Kahekili and most of his famous warriors lived in Ko'olaupoko at Kailua, Kāne'ohe, and He'eia (Fornander 1969:225; Kamakau 1961:138). When Kamehameha I apportioned the conquered O'ahu lands in 1715 to his warrior chiefs and counsellors (Ii 1959:69-70), he retained as his personal property the Ahupua'a of Kāne'ohe. One of his personal gods, the Akuapoko, collected tribute from Kāne'ohe during the makahiki (Ii 1959:75-76). Much of Kāne'ohe and all of Kahalu'u and Kualoa were inherited as personal lands by Kamehameha's sons Liholiho and Kauikeaouli, (Kamehameha II and III) (Indices 1920:27-28). It was Kamehameha III (Kauikeaouli) who in 1848 presided over the division of lands known as the Great Mahele.

4. Mid 1800s

Kamehameha III retained the bulk of the ahupua'a during the Mahele (1848). After his death his wife, Queen Kalama inherited portion of the ahupua'a. Her award (L.C.A. 4452, 9,500 acres) included Waikalua (loko) and Keana fishponds but not the majority of the project area. The project area was, for the most part, small plots of irrigated taro or lo'i. The Kuleana Act of 1850 allowed for "small tenants ... to acquire a full title to the lands which they had been improving for their own use ... for it was the labor of these people and their ancestors that made the land what it was" (Lyons 1875:127: in Devaney et al. 1976:22). There were a total of 150 Land Commission Awards (LCA's) issued for the ahupua'a of Kāne'ohe of which 117 were for less than 10

acres, with the average kuleana award being 2.39 acres (Kelly 1976:22-33). There were approximately 45 LCAs or portions thereof within the project area (Fig. 8). The majority of these LCAs were for less than an acre. However, all these claims were not for "commoners" as chiefs and/or konohiki(s) were also awarded lots within the project parcel. These include:

	Awardee	Acres
LCA 7587	Kealoha, L.	275
6400	Kapu	266
2937	Harbottle	141
10605	Piikoi, I	43
3986/8146	Hueu	12

These chiefs/konohiki(s) received relatively large pieces of land of which only small lots (lo'i) were within the project area. Also the crown retained parcels, in addition to Queen Kalama's holdings.

According to the testimonies given at the time of the kuleana awards (ca 1850) virtually the entire project area was under intensive wet land taro (lo'i) cultivation. Two of the LCAs, 2628 to Paele and 1958 to Mahu, refer to owning a fishpond on one of their lots (apana), but though both are within close proximity to Waikalua Pond they do not appear to be referring to this large (11 acre) pond. The testimonies also mention the auwai system (water ditch system) as it related to the location of the particular kuleana. House and kula (dryland agriculture) lots were located on the north side of Kāne'ohe Stream and south

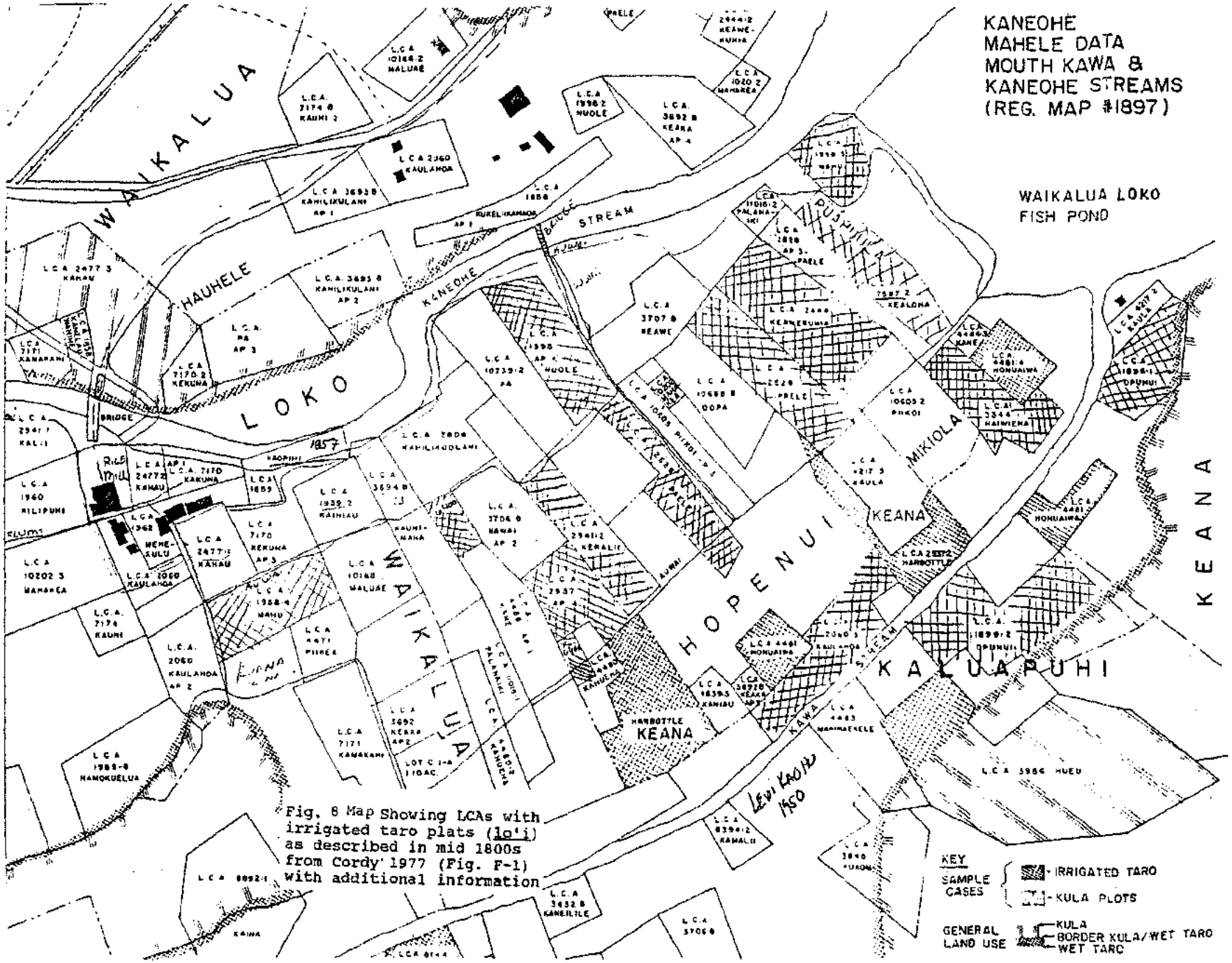


Fig. 8 Map Showing LCAs with irrigated taro plats (lo'i) as described in mid 1800s from Cordy 1977 (Fig. F-1) with additional information

of Kawa Stream along present day Kāne'ohe Bay Drive. The record left by the Mahele - large numbers of small plots, Testimonies and the status of those who received the larger tracts of land - again attests to the valuable nature of the project parcel.

5. 1860-1920

In the 1860s both commercial sugar cane and rice cultivation began in Kāne'ohe. The Kāne'ohe Sugar Plantation which started around 1865 was on Queen Kalama's land with Charles Coffin Harris (C.C.Harris) as partner and manager. Sugar cultivation did not directly affect the project area, but the land ownership changes brought about by the sugar operation did. In 1871 C.C. Harris bought Queen Kalama's Ko'olaupoko properties from her heir Charles Kanaina, as well as some land in Honolulu for $22,448. The sale included "livestock, tools, fishponds, and fishing rights" (Bur. of Conv. Book 34: 53; in Devaney et al. 1976:29), the fishponds of Waikalualoko and Keana were part of this sale.

Rice cultivation was to eventually dominate the project area. Rice was cultivated mainly by Chinese who rented/leased the lo'i lands from the Hawaiian landowners. By the late 1880s virtually the entire project area is under rice cultivation (Fig. 9). In 1890-92 the Kāne'ohe Rice Mill was erected and put into production on property adjoining (mauka of) the present golf course (Fig. 10). The mill had a long flume coming to it form further up Kāne'ohe Stream, and a short railway leading to a small landing in Kāne'ohe Bay, north of Kāne'ohe Stream. During the height of rice cultivation (ca 1890-1920) Chinese dominated

Fig. 9 Project Area Under Rice Cultivation ca. 1910 (Devaney et al. 1976:Fig. 17)

Fig. 10 Kāne'ohe Rice Mill ca. 1913 (Devaney et al. 1976:Fig. 25)

the business. "To a great extent the rice business, growing and milling was controlled by Chinese hui, (firms), which recruited laborers from China, handled investment capital from rich absentee landlords, and tallied profits (Montgomery MS.)" (Devaney et al. 1978:49). The Kāne'ohe Rice Mill of the 1890s was owned by "a man named Lee, Ahlo" and "ground rice of anyone who brought it to them ... The manager of the mill ... leased land from the Hawaiians. He could have had the land in his name." but at that time everyone wanted to earn as much money as possible and then go back to China." These quotes are from a Personal Interview by M. Kelly of Polly Ching who was born at the site of the Kāne'ohe Rice Mill (Devaney et al. 1976). The City Directory(s) of 1894/96 (Bowser, ed.) listed L. Ahlo, General Merchandize of Honolulu as agent for Kāne'ohe Rice Mill with a Mr. An Yuck as Manager.

In 1917 Harold K. Castle buys the Kāne'ohe Ranch Company, formerly Queen Kalama's land, from Nannie R. Rice who had inherited property from her father C.C. Harris. Kāne'ohe Ranch both under the Harris/Rice ownership and Castle's bought, whenever available, the smaller kuleana lots. As leases and mortgages came due the lots were usually purchased at nominal fees. "Tracing the means by which kuleana lands were alienated from their original awardees or heirs reveals that they were most often sold or mortgaged and then auctioned ... as commercial venture(s) ... sugar, rice and pineapple ... extended their boundaries to increase acreage under cultivation, the process of consolidation of land ownership continued" (Devaney et al.

1978:31). By this means the Castle Estate came to eventually own the entire property.

By the 1920s rice had gradually declined in importance. There was competition from California and "Japanese farmers began to displace Chinese farmers in many places in Windward O'ahu" (M. Kelly in Allen et al. 1987:245). However, limited rice and some taro cultivation continued within the project area.

6. Urbanization

Rice and taro planting continued into the middle or late 1950s and the flume system which took water to Kāne'ohe Rice Mill was still in operation. According to local informants taro outlasted rice. "Around 1950 water was carried to the fields near the bay through a concrete culvert and then along a 30 foot high wooden flume that crossed the main stream near Kamehameha Hwy and Honda Store and dropped into the stream (I: It watered the rice fields? [Respondent:] No, it watered the taro patches ... the rice fields were gone already" (Ed. Haitsuka in Allen et al. 1987:282). Referring to the taro, Mr. Henry Wong (longtime Kāne'ohe Ranch Manager) indicated that "The last taro patches ... were abandoned 20 to 25 years ago" (ca 1955 Wong: in Rosendahl et al. 1976:3-8).

7. Recent History

During the 1950s and 1960s the Castle Estate divested itself, through sales and/or leases, of control over most of the project area. These land transactions included sale of Kokokahi

YWCA (1940s) City and County of Honolulu (sewage plants), Bay View Golf Course, and lands to Kāne'ohe Ranch Manager Henry Wong. Henry Wong obtained Waikalua-loko fishpond, as the two other ponds were non-operational by this time. Waikalua Pond was overgrown with mangrove and Keana Pond was artificially filled in the 1950s. These two ponds were also impacted by sewer line excavations.

8. Historical Summary

Historically, the ahupua'a of Kāne'ohe was one of the more productive areas, in terms of agriculture and fisheries in pre-Contact times (pre A.D. 1778). Kamehameha I after conquering O'ahu retained the ahupua'a of Kāne'ohe as his personal property, which was inherited by his sons (Kamehameha II and III). The Mahele of the mid 1800s (1840s - 1850s) changed land tenure to private ownership and the majority of the project area was divided into small lots, kuleana. The kuleana were, for the most part, wet land taro lo'i. There were a number of high status individuals, as well as crown land awarded lo'i within the project area, again indicating the land's value. In the late 1800s and early 1900s (ca 1880 - 1920) commercial rice growing replaced the taro lo'i. The rice operation was a Chinese concern, with land leased from the Hawaiian (kuleana) owners. However. land consolidation by major land owners, first by the Harris/Rice Estate (ca 1870 - 1917), then the Castle Estate (ca 1917 - 1950s) swallowed most of the kuleana by the 1920s. The fishponds stayed with the major land holder for the ahupua'a of

Kāne'ohe; first to Queen Kalama (1848 - 1871), then to K.K.L. Castle Estate (1917 - 1960s). Taro made a short-lived recovery, as rice declined between the 1920s and 1950s. Urban pressure on the project area is evidenced by sales/leases of small parcels (former kuleana) for house lots along present day Kāne'ohe Bay Drive, starting in the 1940s. The advent of Statehood (1959) was further impetus for urban expansion and in the 1960s Kāne'ohe Bay Golf Course and the sewage treatment plant permanently took over the former taro lands of Waikalua. Keana Pond was filled and Waikalua Pond was choked by mangrove by the 1950s to 1960s. Only the larger fishpond, Waikalua-loko, was able to sustain some type of productivity (raising oysters) (Devaney et al. 1976:145). Archaeological data from Kāne'ohe shows dates for ponded taro (lo'i), possibly as early as the 5th Century A.D. (Allen 1987:179, 244). Coring within Nu'upia Pond(s), on Mōkapu Peninsula has yielded an estimate of of A.D. 1200-1300 for the fishpond development (Hammatt et al. 1985).

IV. Survey Results

1. Ground Survey - Fishponds

The entire subject area was covered in the ground survey and the only two archaeological sites located were Waikalua-loko and Waikalua Ponds. No cultural remains were located on the floodplain which has been heavily modified by construction of recent features such as Bay View Golf Course, the sewage treatment plant and wide-spread dumping of soil over former irrigated fields. No trace of the former auwai system recorded on historic maps was located. These ditches which served the 20th Century Kāne'ohe Rice Mill as well as extensive rice and taro fields were presumably filled by post-1950 grading and dumping of soil fill.

Slope areas occur along he south fringes of the floodplain adjacent to Kāne'ohe Bay Drive. Much of this land has been modified by recent residential development. No sites were located here. It is worthy of mention that some large boulders of fine grained quality basalt were observed. These appeared to have rolled down the slope from above. They are of a quality of raw material which would be suitable for stone tool manufacturing. However, no evidence of ancient quarrying was found.

A small portion of the project area extends onto the floodplain and slope of the north side of Kāne'ohe Stream. On the slope above the floodplain was located a burned and abandoned modern house with cement steps, roofing iron and rusted cars. No evidence of earlier occupation was observed here.

The mauka edge of the project area has been heavily modified and graded for adjacent residential subdivisions. As far as the

potential for archaeological sites in the makai section (except for the fishponds and their immediate periphery there is little or none. Both Kāne'ohe and Kawa Stream beds near the coast have been bermed for flood control with imported gravel fill and the outlets of these streams contain only recent alluvial deposits.

The two extant fishponds on the property are Waikalua-loko and Waikalua Ponds. The third pond shown on the historic maps adjoining Waikalua Pond to the east - Keana Pond - was filled in during the 1950s (Devaney et al. 1976:147) and not a trace of its former outline survives. Each of the 2 surviving ponds are described as follows:

Waikalua-loko Pond

This pond which stands between the outlets of Kāne'ohe and Kawa Streams is in some sources referred to as simply Waikalua Pond, but the name shown on the modern tax map is used in this report. The pond has a 2-4 foot high seawall which separates the interior from the reef. The wall is 2-4 feet high and 10-15 feet wide and the center is in sections, filled with sand and coral. The gates of the pond are mortared lava rock with wooden frame works and bridges (Figs 11-12).

The seawall is relatively clear of vegetation except at the east and towards Kawa Stream and is in portions somewhat jumbled by wave action on the seaward side. The wall was measured to be 1520 feet long (McAllister 1933:178) but appears to have been shortened somewhat by berming of the Kāne'ohe Stream mouth at the northwestern end of the pond.

The waters of the pond are generally clear of vegetation

Fig. 11 Waikalua-loko Fishpond, View to West from Seawall

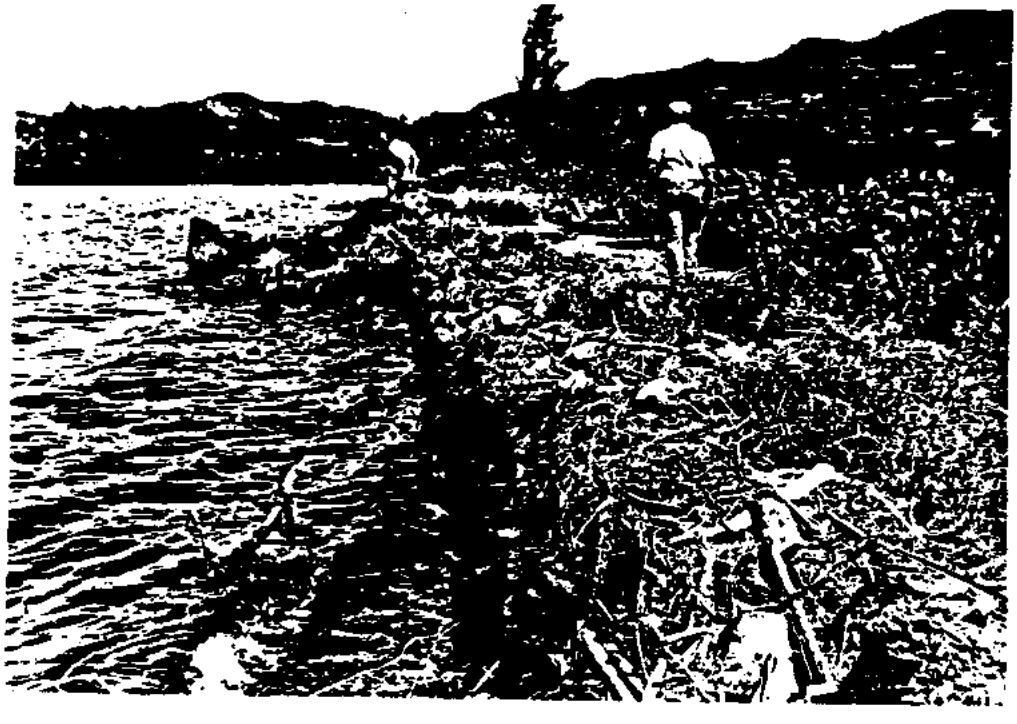


Fig. 12 Waikalua-loko Fishpond, Makai side of Seawall Showing Gate, View to Southeast

except at the southeast end. The size estimates of the pond in various sources vary from 11 acres to 13 acres (Devaney 1976:139, 146) but this variation may be simple differences in calculation rather than actual changes in the pond through time. Review of the various historic maps showing the pond indicate that its size and placement of its seawall has remained the same in the last 100 years. Apparently the pond went through rebuilding in the early 1930s and McAllister reports that this work had just been completed (Ibid. 1933:178).

Besides fish rearing the pond has been used for raising oysters (Devaney 1976:145). Cobb in his 1901 survey of fishponds for the U.S. Fish Commission listed Waikalua (loko Waikalua) Pond as one of 16 ponds in Kāne'ohe Bay which were still in commercial production (Cobb 1902:748).

The historic maps show Kawa Stream entering the mauka side of Waikalua Pond. This stream in recent times has been diverted to its own channel which outlets at the eastern side of the pond.

Waikalua Pond

This pond borders Waikalua-loko on its eastern side. It has been referred to by other names such as Waikalua-waho or Waikalaa. A 1-2 foot high and 3-4 foot wide seawall survives on the east side of the present channel of Kawa Stream. The pond wall and interior are overgrown with mangrove and at present, there is no open water (Figs 13-14). The east and south sides are not clearly defined but a sewer line lies buried close to the periphery.

It appears from the historic maps that Waikalua Pond never

Fig. 13 Waikalua Pond Seawall, View Southwest

Fig. 14 Mangrove Intrusion Into Waikalua Fishpond

had an established source of fresh water as did Waikalua-loko although there was probably fresh water seepage. The pond in its original extent covered 3.5 acres and at one time connected to the now destroyed Keana Pond (Devaney 1976:147).

2. Subsurface Testing

Subsurface backhoe testing was conduced on the floodplain between Kāne'ohe and Kawa Streams in a strip of undeveloped pasture between the sewage treatment plant and the Bay View Golf Course. This area was chosen because it appeared as possibly the only undisturbed portion of the floodplain within the project area. The purpose of the testing was to gain information on the stratigraphic sequence within the floodplain, determine the existence of former pondfield soils and to evaluate the potential of the strata for containing remnants of former terrace walls, and other possible prehistoric features. In addition, on the historic map here an auwai is shown which traversed mauka-makai emptying into Waikalua-loko Pond. It was thought that the auwai, although it has been filled in, could be traced in the subsurface layers.

A 600-foot north-south sample line was chosen beginning 200 feet north of Kawa Stream at a point designated as 0. Eight trenches were excavated at 50-100 foot intervals with each trench averaging 25 feet long (7.5 meters) and averaging 7-8 feet (230-240 cm.) in depth (to water table). Both sides of the trenches were examined for cultural materials and features as well as changes in stratification. A typical section of each trench was

selected and a soil profile description was made. Samples of all subsurface deposits were collected. Elevation rise from trench 1 of point 0 to Trench 8 at point Plus 586 was approximately 3 feet.

The stratigraphic succession was uniform throughout all eight trenches with variation in depth and thickness of each strata. A generalized soil profile description is presented below:

Stratum	Horizon and Origin	Average Depth (Range in Thickness)	Description
I	Modern mechanical fill	0-80 cm (60-120 cm.)	Dark greyish brown silt loam to sandy clay contains basalt and coral gravel with modern trash, plastic, golf balls, bottle glass, abrupt wavy boundary
IIA	A-1 horizon Natural Deposit buried agricultural soil	80-120 cm. (20-60 cm.)	Reddish brown, clay loam with fine strong angular blocky structure with clay and iron coatings between peds and pronounced iron stained root casts. Clear wavy boundary. Top 10 cm. typically has platy structure from compaction.
IIB	A-3 horizon natural deposit buried agricultural soil	120-240+ cm. (100-130+ cm.)	Grayish blue, clay moderate medium angular blocky with pronounced iron coatings on root casts. Gleyed soil with weak organic and iron staining. Bottom portion waterlogged.

Throughout the 200-linear feet of floodplain exposed by the backhoe there has been modern dumping of imported top soil mixed with construction fill. This was probably done to reclaim the

lowland areas for pasture land. This practice appears to have been widespread in the project area. Underlying this fill and partly compacted by it is the former wetland taro/rice agricultural soil (Figs 15-16). Very typical of these soils is partial gleying in the lower portions (due to poor drainage) and iron staining in the upper portion (from the water flow along crop roots). Strata IIA and IIB are considered to have the same depositional origin (alluvium) and their differences are explained in terms of past depositional alteration, differential weathering and variation in moisture regime and drainage. The A-1 horizon is better drained and has been more exposed to weathering. Samples were collected of Stratum IIA and IIB in most trenches but these samples are estimated to be too low in organic content for dating.

Within none of the backhoe trenches were cultural materials or features such as rock alignments, charcoal lenses, shell midden, etc, observed. The former auwai shown on the early maps was not discerned in the profiles of any of the trenches, nor was there any indication of earthen field boundaries. It is possible and even likely however, that if large sections of floodplain and adjacent deposits were exposed during construction that archaeological materials, including datable samples would be recovered.

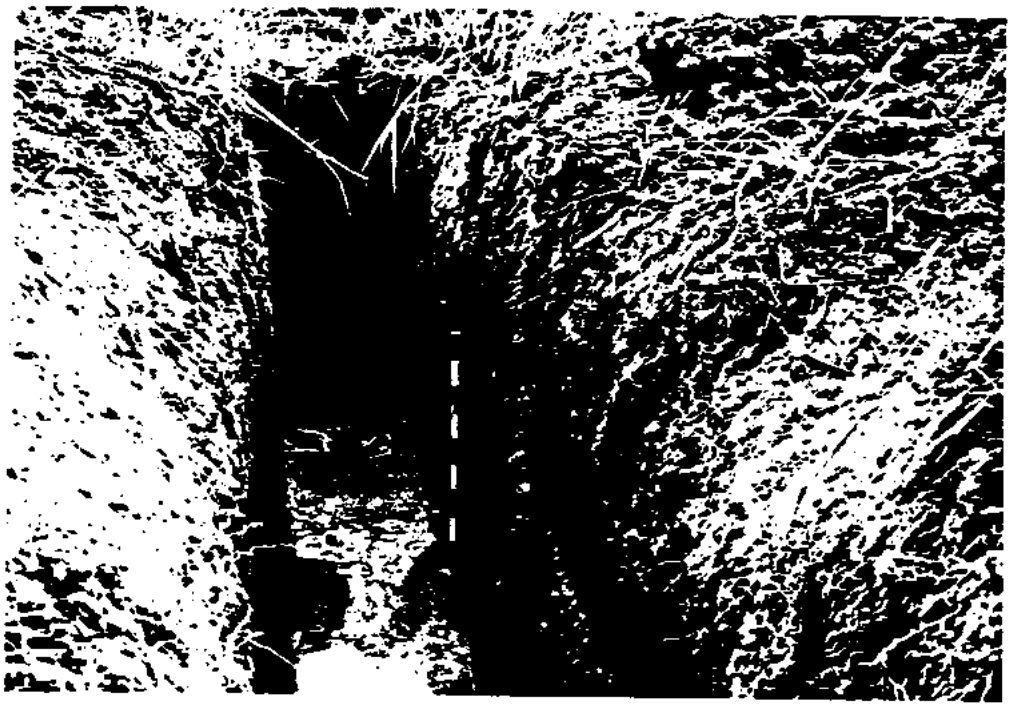


Fig. 15 Backhoe Trench 6, Showing Modern Fill (Stratum I) and Buried Pond Soils (Stratum IIA, IIB)

Fig. 16 Backhoe Trench 7. North face Showing Modern Fill (Stratum I) and Buried Pond Soils (Stratum IIA, IIB)

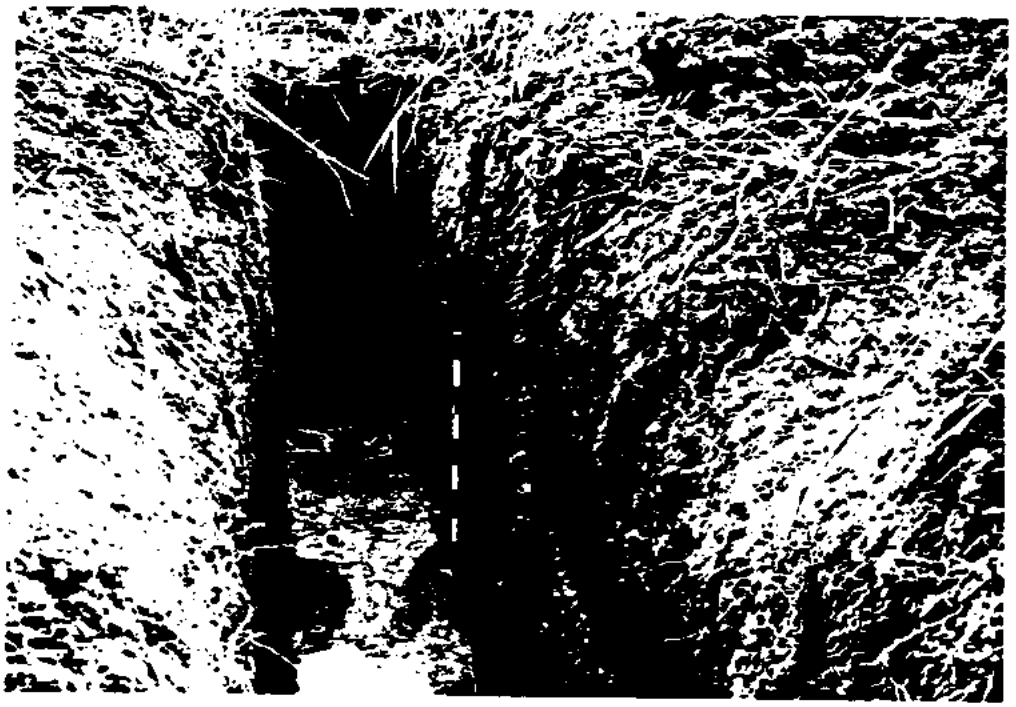
V. Summary: Archaeological Potential and Significance

1. Historical Summary

The historical research on the subject parcel, including examination of the number and kind of Land Court Awards, indicate that the lower floodplain of Kāne'ohe and Kawa Streams was densely used in prehistoric and historic times for taro cultivation. There were once 3 fishponds along the shoreline and even the slopes above the plain, near present Kāne'ohe Bay Drive were used for habitation and dryland planting. The study area may have been one of the most heavily used and most agriculturally productive on O'ahu. Approximately 45 separate Land Court Awards were granted within the study area in the mid 19th Century. Most of these were lo'i, wetland taro plots, of less than one acre which were irrigated by a permanent auwai system. Because the land was so valuable here, Chiefs and Konohiki(s) received plots of land (generally much larger than those received by commoners). Kamehameha I had in 1795 retained Kāne'ohe as his personal property on his conquest of O'ahu in 1795. Not only was it a residence of Chiefs before the conquest, but it was traditionally known as a place of plenty.

Following the Mahele and by the 1880s almost the entire floodplain was given over to rice cultivation. The Kāne'ohe Rice Mill was built mauka of the project area and rice was mostly cultivated by Chinese farmers. Following the fall in rice prices due to external production, taro once gain flourished and was planted on the floodplain into the 1950s.

With increased urbanization and associated improvements such



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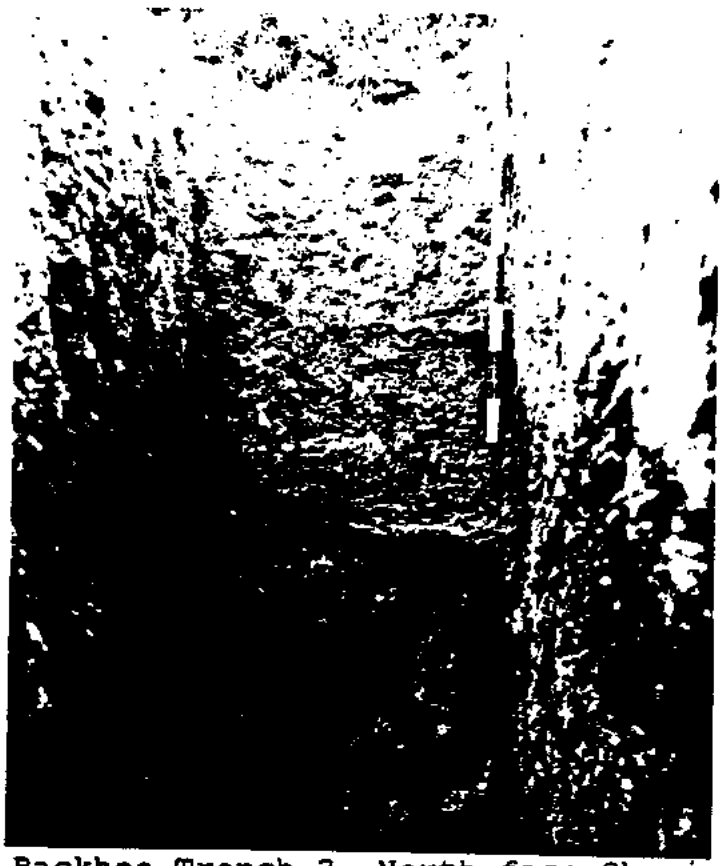

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V. Summary: Archaeological Potential and Significance

1. Historical Summary

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Following the Mahele and by the 1880s almost the entire floodplain was given over to rice cultivation. The Kāne'ohe Rice Mill was built mauka of the project area and rice was mostly cultivated by Chinese farmers. Following the fall in rice prices due to external production, taro once gain flourished and was planted on the floodplain into the 1950s.

With increased urbanization and associated improvements such

as flood control, road building, sewer plant, etc., the project area was extensively modified from the 1950s onwards.

2. Survey Results and Fishpond Significance

Partly as a result of these dramatic modifications of the study area, and in spite of historic evidence for intensive prehistoric and early historic use, only two archaeological sites were found on the property. These are Waikalua-loko and Waikalua Fishponds. Both of these ponds and their immediate fringes (banks and walls) are important archaeological sites. In spite of modern modifications to Waikalua-loko and disturbance by mangrove and a sewer line to Waikalua Pond they both represent significant examples of prehistoric Hawaiian fishponds.

Waikalua-loko Pond

Waikalua-loko Pond has been in continuous productive use to the present time. The pond itself is in good condition and the water of good quality. There has been only a small encroachment by mangrove. Apple and Kikuchi (1975) list Waikalua (loko) Pond as one of 56 fishponds in the State of Hawaii worthy of preservation. It appears today essentially the same as it did in the 1974 aerial photograph (Ibid 1975:129). They evaluate the pond as significant according all 4 of the National Register of Historic Places Criteria summarized as follows:

Criterion A: Site reflects major trends or events in the history of the state or nation.

Criterion B: Site is associated with the lives of persons

significant in our past. Apple and Kikuchi state that all Hawaiian fishponds were associated with Ali'i and were objects of conspicuous ownership, contributing products which were offered to the golds or eaten by the elite (Ibid., 1975:67).

Criterion C: Site is an excellent example of a site type. Apple and Kikuchi state that each pond had a unique method of construction and design utilizing a unique shoreline feature and a unique ecological habitat (Ibid., 1975:67).

Criterion D: Site may be likely to yield information important to prehistory or history. This criterion is clearly valid in view of recent stratigraphic and chronological research on Hawaiian Ponds and associated cultural deposits incorporated in banks and walls (Hammatt et al, 1985).

Criterion E: Site has cultural significance. This criterion is not mentioned by Apple and Kikuchi, but a fishpond certainly qualifies when the products of the ponds were offered to the gods or eaten by the elite (the earthly representatives of the gods).

Waikalua Pond

Although the walls of this smaller pond are intact, they, as well as the entire interior of the pond, are heavily overgrown

with mangrove and to a lesser extent hau. The original configuration of this pond may be slightly changed with partial filling on the east side. A sewer line passes on the east and south side. However, because of the intact kuapā (seawall) the pond is judged to meet all the criteria mentioned for Waikalua-loko above. On the western side banked reef deposits contain plentiful marine shells and some possible basalt flakes which may represent early occupation associated with the pond. It is therefore particularly likely that the pond could yield information important to prehistory or history.

Keana Pond

This pond which once joined to the east side of Waikalua Pond has been entirely filled and no trace of any former features of the pond could be located.

3. Subsurface Testing and Potential for Finding Subsurface Cultural Deposits

A 600-foot long transect of what was judged to be the most intact portion of the Kāne'ohe/Kawa Stream floodplain was backhoe tested with a total of nearly 200 linear feet of trenching. The original ponded, gleyed sediments associated with former taro/-rice planting were encountered at depths varying from 60 to 120 cm. No terracing or buried ancient feature or material was found. These paddy soils have been covered with an extensive layer of imported fill containing broken glass, road tar and other historic trash. If these are representative profiles as

they are believed to be then large areas of the floodplain have been filled in modern times, probably in efforts to reclaim marshlands. This filling would have covered much of the original taro/rice lands and buried associated terraces and other features which survived from long-term use. Many of the slopes and level uplands above the streams have been graded and covered as well.

There is an obvious disparity between the abundant historic evidence for intensive prehistoric land use in the project area and the lack of discovery of archaeological features and layers. Given the size of the project area and the variety of potential site "habitats" (many of which cannot be feasibly tested), as well as the plentiful documentary evidence of prehistoric habitation, there is still potential for uncovering archaeological materials during the construction phase of the proposed project. This potential is particularly relevant considering the massive grading which will be required along the slope areas of the south and west end of the project.

The primary example in illustrating this potential is provided in the discovery of a cultural rich archaeological site to the west of the project area on a high terrace buried beneath 20 cm. to one meter of bulldozed fill (alluvium). This site located to the northwest of Puohala School by Wena Road, eventually yielded over 12,000 portable artifacts, including stone and bone tools, tattooing combs and adzes, as well as human burials. The cultural materials were dated to as early as 1,000 A.D. (Clark and Riford, 1986). The possibility of the discovery of buried sites of comparable importance during construction within the present project area cannot be eliminated.

VI. Impacts and Recommendations for Mitigation

1. Impacts

Present plans for expansion of the Bay View Golf Course will include massive grading of the floodplain slopes and higher elevation level lands, particularly at the southern periphery. There is a potential for exposing significant archaeological sites which may now lie buried under fill and alluvium. In addition, there are 2 intact and archaeologically important prehistoric Hawaiian fishponds in the project area which are judge to be significant according to all 5 National Register Criteria. The following measures are proposed to mitigate impact of the project construction.

2. Archaeological Monitoring During Grubbing and Initial Grading

A. An archaeologist should be on site to monitor initial grubbing and grading for the purpose of identifying and evaluating buried cultural materials which may be uncovered. If significant material is uncovered the State Historic Preservation Office should be consulted to evaluate the findings before construction resumes in that area.

Preservation and Restoration of Two Fishponds

B. Both Waikalua-loko and Waikalua Fishponds, the only 2 sites presently identified on the property, should be preserved in place. No construction or other modifi-

cations should take place on their banks or walls except that which serves to preserve or improve the condition of the sites as functioning Hawaiian fishponds.

C. Both ponds should be cleared by hand or other feasible means of existing mangrove, hau and other destructive vegetation.

D. Before any dredging or cleaning of the pond takes place, the deposits within the pond should be core-sampled for purposes of stratigraphic study and recovery and dating of organic samples.

E. The mākāhā (gates) and kuapā (seawalls) of the ponds should be restored as much as possible to their earlier functioning condition.

F. The ponds should be maintained, free of vegetation and with sufficient water quality to allow flourishing of vertebrate and invertebrate marine life.

G. A modest interpretive program is recommended which would include explanatory signs giving the history and function of the ponds as well as present operation.

VII. References Cited

Allen J., ed.
1987 "Five Upland 'Ili: Archaeological Investigations in the Kaneohe Interchange, Interstate Highway H-3, Island of Oahu." Departmental report series 87-1, Bishop Museum Press, Honolulu.

Apple, R. A. and W. K. Kikuchi
1975 Ancient Hawaii Shore Zone Fishponds, National Park Service, Honolulu.

Clark, J. T.
1986 Archaeological Salvage Excavations at Site 50-OA-G5-101, Waikalua-Loko, Kāne'ohe, Ko'olaupoko, O'ahu Island, Hawai'i, B.P. Bishop Museum, Honolulu.

Cobb, John N.
1902 Commercial Fisheries in the Hawaiian Islands, Report U.S. Fish and Fisheries Commission for 1901, P381-499, U.S. Gov. Printing Office, Washington.

Cordy, Ross
1977 "Kāne'ohe Bay Urban Water Resources Study: Cultural Resources Planning," U.S. Corps of Engineers, Pacific Division, Honolulu.

Devaney, D., M. Kelly, P.J. Lee, and L. Motteler
1976 Kāne'ohe: A History of Change (1778-1950), B.P. Bishop Museum, The Bess Press, Honolulu.

Hammatt, H.H., D. Shideler and D. Borthwick
1985 "Archaeological Coring and Testing at Nu'upia Ponds: Kāne'ohe Marine Corps Air Station, Mōkapu, O'ahu, Cultural Surveys Hawaii, Kailua, O'ahu.

Ii, John Papa
1983 Fragments of Hawaiian History. Bishop Museum Press, Honolulu.

Kamakau, Samuel M.
1961 Ruling Chiefs of Hawaii, Kamehameha Schools Press, Honolulu.

McAllister, J.G.
1933 Archaeology of O'ahu. Bishop Museum, Bulletin 104, Honolulu.

Rosendahl, Paul H.
1976 "Archaeological Investigations in Upland Kāne'ohe, Survey and Salvage Excavations in the Upper Kamo'-oali'i Stream Drainage Area, Kāne'ohe, Ko'olaupoko, O'ahu, Hawai'i. Bishop Museum, Honolulu.

Sterling, Elspith P. and C. C. Summers
1978 Sites of O'ahu. Dept. of Anthropology, B.P. Bishop Museum, Honolulu.

Appendix VIII: Phase I Environmental Site Assessment for Bay View Golf Course by Tetra Tech EM Inc. (Feb. 2006)

PHASE I ENVIRONMENTAL SITE ASSESSMENT

BAY VIEW GOLF COURSE
45-285 KANEOHE BAY DRIVE

KANEOHE, OAHU, HAWAII 96744

Prepared for

KBAY LLC

February 15, 2006

Prepared by

Tetra Tech EM Inc.
2828 Paa Street, Suite 3080
Honolulu, Hawaii 96819

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EXECUTIVE SUMMARY

KBAY, LLC contracted Tetra Tech EM Inc. (Tetra Tech) to perform a Phase I environmental site assessment (ESA) for the Bay View Golf Course comprised of parcels of land identified with the following Tax Map Keys (TMK): 450080380000, two portions of 450300010000, 450300060000, 450300090000, 450300200000, 450300320000, 450300330000, 450300370000, 450300490000, 4505900330000, 4505900340000, 4505900350000, 4505900360000, hereinafter referred to as the "subject property," located in the vicinity of 45-285 Kaneohe Bay Drive in Kaneohe on Oahu, Hawaii (see Figure 1). The parcels are contiguous except for TMK 450300490000, which is located approximately 1,500 feet west of the larger portion of land, north of Waiwi Street, Lanipola Place, and Puohala Street, and south of Halemuku Street. A 15.895-acre exclusion area exists within the golf course where the Kaneohe Wastewater Treatment Plant (WWTP) is located between Kawa Stream and Kaneohe Stream. The Phase I ESA was conducted in accordance with the American Society for Testing and Materials (ASTM) Practice E 1527-00, "ESAs: Phase I ESA Process."

Any exception to, or deviation from, the standard practice or the master services agreement is described in Section 7 of this report.

The subject property is located in the vicinity of 45-285 Kaneohe Bay Drive (see Figure 2). Bay View Investment Company, LLC is the current property owner. Tetra Tech was tasked to complete a Phase I ESA of the subject property supporting due diligence efforts related to a possible property transaction.

The Phase I ESA addresses potential environmental conditions such as, but not limited to, the presence of aboveground storage tanks (AST), underground storage tanks (UST), and leaking underground storage tanks (LUST); hazardous materials or hazardous wastes; operational contamination; landfills; potable water; wastewater; asbestos; lead-based paint; polychlorinated biphenyls (PCB); radon; and other on-site and off-site environmental concerns. The Phase I ESA involves a field reconnaissance and visual inspection of the subject property. No sampling was conducted as part of this Phase I ESA.

Tetra Tech obtained from Environmental Data Resources, Inc. (EDR) the Radius Map with Geocheck® report. EDR reports draw on various environmental databases and list sites within the ASTM-recommended search distances that are considered to be recognized environmental conditions (REC) in connection with the subject property. The EDR reports are presented in Appendix B and Appendix C.

Based on the review of environmental reports and historic records, site reconnaissance, and interviews, no RECs to the subject property were identified.

RECORDS REVIEW

No EDR sites were identified as RECs to the subject property based on Tetra Tech's review of the information presented in the database; however; four facilities require further examination based on their proximity to the subject property. A request to examine government records was submitted to the State of Hawaii, Department of Health (DOH) to obtain information concerning Castle High School, Windward Nazarene Academy, Kaneohe WWTP, and Scott's Plating. A response had not been received upon the submittal of this report. An addendum to the report will be submitted if any RECs are identified following a review of the information.

SITE RECONNAISSANCE

No RECs were identified at the subject property during the site reconnaissance.

INTERVIEWS

No RECs were identified in relation to the subject property following the interview with the general manager of the Bay View Golf Course.

1.0 INTRODUCTION

KBAY, LLC contracted Tetra Tech EM Inc. (Tetra Tech) to perform a Phase I environmental site assessment (ESA) for the Bay View Golf Course comprised of parcels of land identified with the following Tax Map Keys (TMK): 450080380000, two portions of 450300010000, 450300060000, 450300090000, 450300200000, 450300320000, 450300330000, 450300370000, 450300490000, 4505900330000, 4505900340000, 4505900350000, 4505900360000, hereinafter referred to as the "subject property," located in the vicinity of 45-285 Kaneohe Bay Drive in Kaneohe on Oahu, Hawaii (see Figure 1). The parcels are contiguous except for TMK 450300490000, which is located approximately 1,500 feet west of the larger portion of land, north of Waiwi Street, Lanipola Place, and Puohala Street, and south of Halemuku Street. A 15.895-acre exclusion area exists within the golf course where the Kaneohe WWTP is located between Kawa Stream and Kaneohe Stream. The Phase I ESA was conducted in accordance with the American Society for Testing and Materials (ASTM) Practice E 1527-00, "ESAs: Phase I ESA Process."

Tetra Tech was asked to complete a Phase I ESA of the subject property. Bay View Investment Company, LLC currently owns the subject property, which is located on a total of 118.924 acres of land (see Figure 2).

1.1 PURPOSE

The purpose of this Phase I ESA is to identify whether recognized environmental conditions (REC) are present on the subject property and surrounding properties. RECs are defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or material threat of release of any hazardous substances or petroleum products into structures on the property, or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products, even under conditions in compliance with laws. The term does not include *de minimis* conditions that do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

1.2 INVOLVED PARTIES

Tetra Tech performed the Phase I ESA for KBAY, LLC, the prospective buyer of the subject property.

1.3 SCOPE OF WORK

The scope of work for this ESA includes the following:

- Identify whether RECs are present on the subject property using ASTM Practice E 1527-00.
- Reviewing literature and agency records to document incidents or operations that may have impacted the environmental condition of the property.
- Interviewing individuals who might have knowledge of current or past operations that could have impacted the environmental condition of the property.
- Completing a visual site reconnaissance.

This Phase I ESA report documents findings and provides an assessment of the environmental condition of the property. No sampling was conducted as part of this Phase I ESA. KBAY, LLC understands that hazardous materials or coatings may be masked by building materials, buried in the ground, or otherwise concealed in a manner undetectable to the consultant, even through the exercise of due diligence.

2.0 SITE DESCRIPTION AND PHYSICAL SETTING

The following sections describe the subject property and adjacent properties, as observed by Tetra Tech personnel during a site reconnaissance conducted on January 31, 2006. For the purpose of this assessment, the subject property is assumed to be the project area described in the paragraphs below, which may differ from the actual legal boundaries of the property. Figure 2 illustrates the subject property and surrounding properties. Photographs of the subject property and adjacent properties are presented as Appendix A.

2.1 LOCATION

The subject property is located on a total of 118.924 acres of land in the vicinity of 45-285 Kaneohe Bay Drive in Kaneohe, Hawaii. The area surrounding the land is used primarily for residential purposes (see Figure 2).

The subject property exists as a nearly contiguous piece of land that is bound on the north by residential homes south of Waikalua Road and Kaneohe Stream and Kaneohe Bay, to the east by the Waikalua Loko Fish Pond and a smaller unmaintained fish pond, the Kaneohe YWCA facility, and residential homes within the Koki Cluster development, to the south by Kaneohe Bay Drive, and to the west by residential homes and Puohala Elementary School and Puohala Park which are situated on land owned by the City and County of Honolulu. The uniform southern boundary along Kaneohe Bay Drive is interrupted by two exclusion areas. These two areas include The Reorganized Church of Jesus Christ of Latter Day Saints, which is located near the southeast corner of the property across from Moakaka Way and the construction area for the Bay View Estates residential community that is in the process of development by Royal Clark Development Company located on the south-central portion of the property across from Namoku Street. A non-contiguous portion of the subject property is located approximately 1,500 feet to the west of the larger portion of land, north of Waiwi Street, Lanipola Place, and Puohala Street, and south of Halemuku Street. A 15.895-acre exclusion area also exists within the golf course where the Kaneohe WWTP is located between the Kawa Stream and the Kaneohe Stream.

A 3.975-acre, non-contiguous portion of the subject property is located approximately 1,500 feet west of the golf course, north of Waiwi Street, Lanipola Place, and Puohala Street, and south of Halemuku Street.

2.2 SITE CHARACTERISTICS AND CURRENT USES

The subject property currently operates a miniature golf course, driving range, and 18-hole public golf course. According to an online golf magazine golf course guide, the Bay View Golf Park was originally

built in 1963 and was expanded in 1997 (Golf Magazine 2006). The miniature golf course area and driving range are located on the southwest corner of the property just north of Kaneohe Bay Drive. An auxiliary club house with a snack bar, game room area, and restroom facilities is associated with the miniature golf area. A two-story driving range is located immediately east of the auxiliary clubhouse. The Bay View Clubhouse is located east of and adjacent to the driving range and contains a banquet room, offices, an elevator, an elevator room, a mechanical room, and a golf cart parking, charging, and maintenance area. The golf course maintains approximately 50 to 60 golf carts, which are battery powered. Auto Lite, a subcontractor to the golf course, services the operational batteries and removes old batteries from the property for disposal.

The southern boundary of the subject property grades steeply to the north from Kaneohe Bay Drive down to the main golf course. With the exception of several golf course holes along the southeast portion of the property the remainder of the property is relatively flat and open with a slight grade to the north toward Kaneohe Stream and Kaneohe Bay. The Kawa Stream extends across the property from the southwest to the east and wooden bridges allow for golf carts and golfers to cross the waterway. The northwest corner of the subject property crosses the Kaneohe Stream and extends north to the terminus of Waipe Place on the west and Holowai Place on the east. A wooden bridge allows for access across the stream. One large fishpond (Waikalua Loko Fish Pond), which is maintained by the Rotary Club of Kaneohe and the Waikalua Loko Fish Pond Preservation Society, is located on the eastern portion of the property. A smaller unmaintained fish pond is located adjacent to the larger pond. A concrete-lined pond is located on the southeastern portion of the property and is reported to be used for surface water drainage control.

An unregistered, degraded wetland is located on the southern portion of the golf course south of Kawa Stream. Signs demark the boundary of the land feature and request that golfers not enter the area. The wetland is topographically lower than the surrounding golf course and is characterized with thick, unmaintained grasses, shrubs, and trees.

The Kaneohe WWTP is located in the central portion of the golf course between Kawa Stream and Kaneohe Stream. The facility is accessed from the western boundary at the terminus of Kulauli Street where an asphalt road leads across the golf course property. The plant property is a 15.895-acre exclusion area that previously was used to collect and treat municipal sewage. Treatment operations ceased approximately 10 years ago and the facility is currently used as a collection point for the sewage, which is pumped to the Aikahi WWTP. The property also contains a restroom facility that is reported to be unused and an electrical transformer with the vault ID V4899. No identifying features were observed on the transformer to verify if PCB-containing material was present. Hawaii Electric Company (HECO) was contacted to discuss the status of the transformer and in a response letter HECO stated that the equipment

observed was a vault (Vault #4899) that contains a switchgear with "no oil-filled equipment inside." Therefore, the presence of PCBs at the facility is unlikely. The response from HECO also identified a second transformer on the treatment plant property that was not observed during the site reconnaissance (Vault #8473, Transformer #49717). HECO stated that the equipment contains a PCB-free transformer.

A partially covered maintenance / storage area and residence are located along the north boundary of the property immediately south of Kaneohe Stream and north of the Kaneohe WWTP. This area is used for maintaining and repairing the landscaping equipment as well as a storage area for fertilizers and herbicides used on the golf course.

A gravel covered area is located east of the treatment plant and west of the Waikalua Loko Fish Pond. This area has historically been used by local car dealerships, including Windward Honda and Servco, as a storage space to park new vehicles. At the time of the site reconnaissance no vehicles were located on the gravel strip; however, numerous old golf carts, used tires, and small piles of construction material including hosing, wood scarp, and metal scrap were observed. Two portable above ground petroleum storage tanks were also observed in the area. The tanks are reported to be used to fill the golf course maintenance vehicles and landscaping equipment and are serviced by B&E Petroleum. No staining was observed in the vicinity of the tanks and a rectangular metal box was observed beneath the dispenser nozzle of one of the tanks to contain fuel drips. The second tank did not have a dispenser nozzle.

A 3.975-acre, non-contiguous portion of the subject property is located approximately 1,500 feet west of the golf course, north of Waiwi Street, Lanipola Place, and Puohala Street, and south of Halemuku Street. The land is the former path of Kaneohe Stream, which is currently overgrown with tall grass, shrubs, and trees.

2.3 VICINITY CHARACTERISTICS AND CURRENT USES

Residential homes and Kaneohe Stream are located north of the subject property. Kaneohe Bay and property maintained by the Young Women's Christian Association (YWCA) are located to the east. From the YWCA west along the southern boundary of the property are residential homes within the Koki Cluster Residential Development, the Reorganized Church of Jesus Christ of Latter Day Saints, a construction site for the development of Bay View Estates residential homes, and a single residential home. Residential homes are located across Kaneohe Bay Drive to the south. Residential homes, Puohala Elementary School, and Puohala Park are located beyond the western boundary. Residential homes are located north and south of the non-contiguous portion of the property and the land to the east and west is undeveloped.

2.4 TOPOGRAPHY

The subject property is depicted on the 1998 U.S. Geological Survey (USGS) 7.5-minute topographic series maps of the Kaneohe Quadrangle, presented in Appendix C (EDR 2006c). According to the topographic map, the elevation of the subject property ranges from approximately 140 feet above mean sea level (msl) on the southeast corner of the property to sea level. The topographic gradient of the subject property is generally west-northwest.

2.5 SOIL GEOLOGY

The subject property is situated in a coastal plain. The southern portion of the property along Kaneohe Bay Drive consists of several land-types. Kaena clay at 2 to 6 percent slopes (KaB) underlies the southeastern portion of the property from approximately the Kawa Stream to the golf course clubhouse. The clubhouse and associated parking lot are located on Kaena clay at 6 to 12 percent slopes (KaC) and from the parking lot east to the property boundary is Alaeloa silty clay at 15 to 35 percent slopes (AeE). The remainder of the property to Kaneohe Stream is Hanalei silty clay at 0 to 2 percent slope (HnA). Kaena clay is very dark gray at the surface becoming dark gray and dark grayish-brown at depth. It is underlain by highly weathered gravel, has slow permeability and slow to medium runoff characteristics, and exhibits slight erosion hazards. Alaeloa silty clay is dark reddish-brown at the surface becoming dark-red and red at depth. It has moderately rapid permeability and medium runoff characteristics, and exhibits moderate erosion hazards. Hanalei silty clay is located on stream bottoms and flood plains and is dark-gray to very dark-gray with dark brown and reddish mottles at the surface becoming mottled, dark-gray and dark grayish-brown at depth. It has moderately permeable and slow runoff characteristics, and exhibits no more than slight erosion hazards. In addition, the subject property contains soils from the Kaena-Wailua and Lolekaa-Waikane Associations (Foote and others 1972). The soil-type association is described in more detail in the table below.

Soil-Type Association	Soil-Type Association Description
Kaena-Wailua Association (southeastern portion of subject property)	The association is deep, nearly level and gently sloping, with poorly-drained to excessively drained soils that have a fine-textured to coarse-textured subsoil or underlying material, and is located on coastal plains and talus slopes and in drainageways. The association makes up about 10 percent of the island and is found in elevations ranging from sea level to 200 feet.
Lolekaa-Waikane Association	The association is deep, nearly level to very steep, with well drained soils that have a dominantly fine-textured subsoil and is located on fans, terraces, and uplands. The association makes up about 15 percent of the island and is found in elevations ranging from near sea level to 1,500 feet.

Source: Foote and others 1972

2.6 HYDROGEOLOGY AND HYDROLOGY

According to "Aquifer Identification and Classification for Oahu" (Mink and Lau 1990), the subject property is located within the Koolaupoko System of the Windward Aquifer Sector. Two aquifer types exist within this portion of the Koolaupoko Aquifer System. One aquifer type contains groundwater that is basal and unconfined and found in sedimentary–type (non-volcanic lithology) geology. It is currently used, is ecologically important, has a low salinity of 250 to 1,000 milligrams per liter (mg/l) of chloride, is irreplaceable, and has a high vulnerability to contamination. The second aquifer type contains groundwater that is basal and confined and found in dike geology where the aquifer is located within dike compartments. It is currently used for drinking water, is considered fresh water with a salinity of less than 250 mg/l of chloride, is replaceable, and has a moderate vulnerability to contamination.

According to the topographic map, groundwater is anticipated to flow in a northern direction, toward the Pacific Ocean (EDR 2006c). It should be noted that surface topography does not always reflect the actual hydraulic gradient and that fluctuations are sometimes encountered. Groundwater flow direction measurements would be necessary in order to determine the actual on-site direction and gradient.

Based on Tetra Tech's review of the referenced floodplain map, the southern portion of the subject property, south of Kawa Stream, is located in a 500-year floodplain. The property from Kawa Stream north to Kaneohe Stream is located within a 100-year floodplain (EDR 2006a).

3.0 RECORDS REVIEW

The purpose of the records review is to obtain and review records that will help identify RECs in connection with the subject property.

3.1 REGULATORY AGENCY DATABASE REVIEW

Environmental Data Resources (EDR), Tetra Tech's subcontractor, searched available environmental databases that list businesses or properties that have handled hazardous materials or contaminated wastes. The EDR report meets the government database search requirements for ASTM Practice E 1527-00. A list and description of the databases along with distances searched are presented in Table 1. These databases were investigated with due diligence based on the minimum search distances recommended by the ASTM guidelines for conducting Phase I ESAs.

The database search results that Tetra Tech relied upon in the preparation of this Phase I ESA were compiled by EDR and represent current listings. Tetra Tech did not verify the locations and distances of every property listed by EDR; however, Tetra Tech did verify locations and distances of properties that were identified as having the potential to pose an environmental impact to the subject property. It should be noted that regulatory listings are limited and include only those sites that are known to the regulatory agencies at the time of publication to be contaminated or that are being evaluated for potential contamination. A copy of the regulatory data obtained and reviewed for this project and a plotted site map of the regulated facilities, prepared by EDR, are provided in Appendix B (EDR 2006a). A summary of the sites identified in the EDR database search is presented in Tables 1 and 2.

In addition, EDR also provided a list of "orphan" sites currently listed in federal or state databases. Orphan sites are sites that have inadequate address information. If partial street addresses were available, Tetra Tech checked the site locations against the known location of the subject property to determine their proximity with respect to the selected ASTM search distance from the subject property. The EDR orphan summary identified 32 orphan sites with poor or unconfirmed addresses or business listings which, based on their limited address information, could be in proximity to the subject property. Based on our knowledge of the region and by reviewing local street maps, Tetra Tech was able to determine that one orphan site is in proximity to the subject property. The orphan site is discussed in further detail in Section 3.2 (Table 4) of this report.

Table 1: Summary of Databases Searched by EDR

Environmental Database	Description of Database	Subject Property Search Distance (miles)
Federal ASTM Standard Databases		
Federal NPL Site List/ Proposed NPL sites	A U.S. Environmental Protection Agency (EPA) listing of uncontrolled or abandoned hazardous waste sites. The list, also known as the Superfund List, is primarily based on a score that the site receives from the U.S. EPA's Hazard Ranking System. These sites are targeted for possible long-term remedial action under Superfund (CERCLA).	1.25
CERCLIS	A compilation of known and suspected uncontrolled or abandoned hazardous waste sites. These sites have been or are being investigated by the EPA for the release or threatened release of hazardous substances. Once a site is placed on CERCLIS, it may be subjected to several levels of review and evaluation and ultimately placed on the NPL.	0.75
CERCLIS – NFRAP	A database of CERCLIS sites designated "No Further Response Action Planned (NFRAP)." NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or contamination was not serious enough to require federal Superfund action or NPL consideration.	0.75
CORRACTS	A database of RCRA facilities undergoing "corrective action." A "corrective action order" is issued pursuant to RCRA Section 3008(h) when there has been a release of hazardous waste or constituents into the environment from a RCRA facility. Corrective actions may be required beyond the facility's boundary and can be required regardless of when the release occurred, even if it predates RCRA.	1.25
RCRIS-TSD	A database containing information pertaining to those facilities that treat, store, or dispose of hazardous waste.	0.75
RCRIS-LQG	A database of information pertaining to those facilities that either generate more than 1,000 kilograms of hazardous waste per month or meet other applicable requirements of RCRA.	0.5
RCRIS-SQG	A database of information pertaining to those facilities that generate between 100 and 1,000 kilograms of hazardous waste per month or meet other applicable requirements of RCRA.	0.5
ERNS	A database used to collect information on reported releases of oil and hazardous substances. The database contains information from spill reports made to federal authorities including the EPA, the U.S. Coast Guard, the National Response Center, and the Department of Transportation.	0.25
State ASTM Standard Databases		
SHWS	SHWS records are the state equivalent of CERCLIS. These sites may or may not also be listed on the federal CERCLIS list. This database identifies sites planned for cleanup using state funds and sites where potentially responsible parties will pay for cleanup.	1.25
Solid Waste Facilities/Landfill Sites	An inventory of solid waste disposal facilities or landfills. These sites may be active or inactive facilities.	0.75
UST Database	A database of information on USTs containing petroleum products registered with the Hawaii Department of Health.	0.5
LUST Database	A database of information on those USTs for which a leak has been reported to the Hawaii Department of Health.	0.75

Table 1: Summary of Databases Searched by EDR (Continued)

Environmental Database	Description of Database	Subject Property Search Distance (miles)
Federal and State ASTM Supplemental Databases		
CONSENT	Superfund (CERCLA) Consent Decrees – a database of NPL sites that have had major legal settlements that establish responsibility and standards for cleanup.	1.25
ROD	A database of NPL (Superfund) sites that have had records of decision mandating a permanent remedy at the site and containing technical and health information to aid in the cleanup.	1.25
Delisted NPL	A database of sites that have been deleted from the NPL. In accordance with 40 CFR 300.425(e), sites may be deleted from the NPL where no further response is appropriate.	1.25
FINDS	An EPA database containing both facility information and pointers to other sources of information that contain more detail.	0.25
HMIRS	A database of hazardous material spill incidents reported to DOT.	0.25
MLTS	A database of over 8,000 sites that possess or use radioactive materials and are subject to NRC licensing requirements.	0.25
MINES Master Index File	Mine related information reported by the Department of Labor, Mine Safety and Health Administration.	0.5
NPL Liens	A listing of filed notices by the EPA against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability.	0.25
PADS	PADS identify generators, transporters, commercial stores, and/or brokers and disposers of PCBs who are required to notify the EPA of such activities.	0.25
DOD	Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.	1.25
RAATS	A database that contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative actions brought by the EPA.	0.25
TRIS	The TRIS database contains information on the individual release and/or transfer of toxic chemicals.	0.25
TSCA	The TSCA database identifies manufacturers and importers of chemical substances and includes production volume of these substances by plant site.	0.25
SSTS	The SSTS database identifies all registered pesticide-producing establishments and reports the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.	0.25
FTTS	The FTTS database tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years.	0.25

Table 1: Summary of Databases Searched by EDR (Continued)

Environmental Database	Description of Database	Subject Property Search Distance (miles)
SPILLS	The SPILLS database identifies releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.	Subject property
Brownfields Databases		
U.S. Brownfields	The U.S. Brownfields database includes properties addressed by EPA's Targeted Brownfields Assessments (TBA) Program and the Brownfields Cleanup Revolving Loan Fund (BCRLF) program.	0.75
State Brownfields	State Brownfield Inventories are databases of sites identified by state authorities as Brownfield properties that are typically candidates for cleanup and liability control.	0.25
VCP	State VCPs are state-sponsored programs that encourage private parties to conduct cleanups of contaminated properties in the absence of state enforcement measures. Many states use their VCP database in lieu of a Brownfields Inventory.	0.75

Notes:

CERCLIS	CERCLA Information System
CORRACTS	Corrective Action Report
DOD	Department of Defense Sites
ERNS	Emergency Response Notification System
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FINDS	Facility Index System/Facility Identification Initiative
FTTS	FIFRA/TSCA Tracking Systems
HMIRS	Hazardous Material Information Reporting System
LQG	Large Quantity Generator
LUST	Leaking Underground Storage Tank
MINES	Mines Master Index File
MLTS	Material Licensing Tracking System
NFRAP	No Further Response Action Planned
NPL	Federal National Priorities List
PADS	PCB Activity Database System
PCB	Polychlorinated Biphenyls
RAATS	RCRA Administrative Action Tracking System
RCRIS	Resource Conservation and Recovery Information System
ROD	Record of Decision
SHWS	State Hazardous Waste Sites
SPILLS	Release Notifications
SQG	Small Quantity Generator
SSTS	Section Seven Tracking System
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
TSD	Treatment Storage and Disposal
UST	Underground Storage Tank
VCP	Voluntary Cleanup Programs

The following table summarizes the results of the federal and state regulatory data review. Only those databases that contained information on a particular facility located within the search distance are included in the table below.

Table 2: Summary of EDR Database Findings

Site Name	Site Address	Database[a]	Approximate Distance from the Subject Property	Potential for Environmental Impact to the Subject Property
Bayview Golf Course	45-285 Kaneohe Bay Drive	FINDS	Subject Property	No; facility on FINDS list for NPDES permit pertaining to water system improvements.
44-309 Kaneohe Bay Drive	44-309 Kaneohe Bay Drive	FINDS	> 1 mile NE	No; distance and direction from subject property. Facility misplotted on subject property and actually located > 1 mile away.
Kaneohe Sewage Spill	44-417 Kaneohe Bay Drive	FINDS	> 1 mile NE	No; distance and direction from subject property. Facility misplotted on subject property and actually located > 1 mile away.
Kaneohe Stream Bridge	44-417 Kaneohe Bay Drive	FINDS	> 1 mile NE	No; distance and direction from subject property. Facility misplotted on subject property and actually located > 1 mile away.
Kaneohe Pretreatment Facility	44-417 Kaneohe Bay Drive	FINDS	> 1 mile NE	No; distance and direction from subject property. Facility misplotted on subject property and actually located > 1 mile away.
Scott's Plating	45-212 Kaneohe Bay Drive	CERCLIS; SHWS; FINDS	< 1/8 mile SSE	Yes; due to the close proximity of the facility to the subject property. A request was placed with the DOH HEER office to examine records pertaining to the site.
Coconut Island	Kaneohe Bay	LUST; UST	1/8-1/4 mile N	No; distance and direction from subject property. Facility misplotted and actually located in the middle of the bay.
Kaneohe Wastewater Station No. 2	44-029 Kaimalu Place	UST	1/2 mile NE	No; distance and direction from subject property. Facility misplotted and actually located 1/2 mile away.
AT&T – AWS Kaneohe	45-232 Kaneohe Bay Drive	FINDS	1/8-1/4 mile SW	No; ground checked in field and no RECs observed.

Table 2: Summary of EDR Database Findings (Continued)

Site Name	Site Address	Database[a]	Approximate Distance from the Subject Property	Potential for Environmental Impact to the Subject Property
Kaneohe WWPTF	45-230 Kulauli Street	FINDS; SPILLS	Subject property	Yes; due to the close proximity of the facility to the subject property. A request was placed with the DOH HEER office to examine records pertaining to the site.
Windward Nazarene Academy	45-232 Puaae Road	FTTS; FINDS	1/8-1/4 mile SW	Yes; due to the close proximity of the facility to the subject property. A request was placed with the DOH HEER office to examine records pertaining to the site.
Omega Station	Haiku Road	LUST; UST	1/4-1/2 mile NNE	No; site cleanup completed and UST permanently out of use.
Waikalua Wastewater Pump Station	45-044 Holowai Place	UST	1/4-1/2 mile NNE	No; located on north side of Kaneohe Stream, which acts as a hydraulic barrier between the facility and the subject property.
Windward Battery Exchange	45-216 Pahikaua Street	RCRA-SQG; FINDS	1/4-1/2 mile SSW	No; no violations found in relation to this facility.
State of Hawaii Castle High School	45-386 Kaneohe Bay Drive	RCRA-LQG; FINDS	1/4-1/2 mile WSW	Yes; due to the close proximity of the facility to the subject property. A request was placed with the DOH HEER office to examine records pertaining to the site.
Pohai Nani Care Center	45-090 Namoku Street	LUST; UST	1/2-1 mile SSE	No; distance and three USTs permanently out of use and a site cleanup was completed.
Koolau Chevron Foodmart	45-462 Kaneohe Bay Drive	LUST; UST	1/2-1 mile WSW	No; distance.
ARCO 82106	45-467 Kaneohe Bay Drive	LUST; UST	1/2-1 mile WSW	No; distance, four USTs permanently out of use, and site cleanup completed.
Windward Shell	45-685 Kamehameha Highway	LUST; UST	1/2-1 mile W	No; distance, five USTs permanently out of use, and site cleanup completed.
Kaneohe Chevron Service	45-1002 Kamehameha Highway	SHWS; FINDS; LUST; SPILLS	1/2-1 mile WNW	No; distance.

Table 2: Summary of EDR Database Findings (Continued)

Site Name	Site Address	Database[(a)]	Approximate Distance from the Subject Property	Potential for Environmental Impact to the Subject Property
Former Unocal Station No. 4393	44-740 Kaneohe Bay Drive	SHWS; SPILLS	> 1 mile E	No; distance and direction.

Notes for Table 2:

(a)	Refer to Table 1 for list of databases searched to identify type of site.
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
DOH	Department of Health
FINDS	Facility Index System/Facility Identification Initiative
FTTS	Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) Toxic Substance Control Act (TSCA) Tracking System
HEER	Hawaii Department of Health, Hazard Evaluation and Emergency Response Office
LUST	Leaking Underground Storage Tank
RCRA-LQG	Resource Conservation and Recovery Act – Large Quantity Generator
RCRA-SQG	Resource Conservation and Recovery Act – Small Quantity Generator
SHWS	State Hazardous Waste Sites
SPILLS	Release Notifications
UST	Underground Storage Tank

No EDR sites were identified as RECs to the subject property based on Tetra Tech's review of the information presented in the database; however; four facilities require further examination based on their proximity to the subject property. A request to examine government records was submitted to the State of Hawaii, Department of Health office to obtain information concerning Castle High School, Windward Nazarene Academy, Kaneohe WWTP, and Scott's Plating. A response had not been received upon the submittal of this report. An addendum to the report will be submitted if any RECs are identified following a review of the information.

In addition, five water wells were also identified by EDR on the subject property (EDR 2006a). Table 3 summarizes well information for each of the water wells located on the subject property.

Table 3: Summary of EDR Well Information on the Subject Property

EDR Well Map No.	Well Identification	Year Drilled	Well Name	Use	Well Depth (feet below ground surface)	Owner
A1	3-2447-006	1996	Bay View Irr 5	Unused	38 feet	Pacific Atlas
A2	3-2447-005	1996	Bay View Irr 4	Unused	39 feet	Pacific Atlas
B3	3-2447-004	1995	Bay View Irr 3	Unused	35 feet	Pacific Atlas
B4	3-2447-003	1995	Bay View Irr 2	Unused	36 feet	Pacific Atlas
5	3-2447-002	1995	Bay View Irr 1	Unused	37 feet	Pacific Atlas

According to Mr. Bruce Doorly, the general manager for the Bay View Golf Course and a representative of Bay View Investment Company, LLC, there are five water wells located on the subject property. Although the EDR report describes the wells as unused, two of the wells (Bay View Irr 4 and Bay View Irr 5) are currently utilized for irrigation purposes and the remaining three are inoperable due to mechanical problems. Mr. Doorly stated that the water from the operational wells is tested for pH and the results are consistently neutral. No public water supply wells are located within one mile of the property. The five water wells are not considered RECs to the subject property.

3.2 ORPHAN SITE LIST

The EDR orphan summary identified 32 orphan sites with poor or unconfirmed addresses or business listings which, based on their limited address information, could be in proximity to the subject property. Based on our knowledge of the region and by reviewing local street maps, Tetra Tech was able to determine that one orphan site is in proximity to the subject property. Information regarding this site is presented below in Table 4.

Table 4: Summary of EDR Orphan Sites

Site Name	Site Address	Database[(a)]	Approximate Distance from the Subject Property	Potential for Environmental Impact to the Subject Property
HECO Transformer 28851	45-420 Aumoku Street	SHWS	3/4 mile SW	No; distance from the subject property.

Notes:
(a) Refer to Table 1 for more information on the databases.
SHWS State Hazardous Waste Site

No orphan sites were identified as RECs to the subject property based on Tetra Tech's review of the information presented in the database.

3.3 LOCAL AGENCY INFORMATION

The DOH UST and LUST databases and DOH Hazard Evaluation and Emergency Response (HEER) database were reviewed to assess whether the subject property or properties in its immediate vicinity were the site of significant unauthorized releases of hazardous substances or other events with potentially adverse environmental effects (DOH 2000, 2005).

A request for information concerning the subject property and adjacent properties was submitted to the DOH HEER office in Honolulu, Hawaii. A response had not been received upon the submittal of this

report. An addendum to the report will be submitted if any RECs are identified following a review of the information.

The DOH's Solid and Hazardous Waste Branch handles response actions related to leaking USTs. In the table below, LUSTs that have a "Cleanup Initiated" status currently are undergoing a response action. LUSTs that have a "Site Cleanup Completed" status from the DOH have been delineated to the State of Hawaii Tier 1 Action Level. Sites in the latter category are not anticipated to pose an adverse impact to the subject property, based on review of the DOH database findings.

Tables 5, 6, and 7 present information obtained from the State of Hawaii DOH LUST, UST, and HEER databases, respectively.

Table 5: Summary of State of Hawaii, Department of Health, LUST Database Sites

Site Name	Approximate Distance	Facility Identification Number	Status
Coconut Island	1/8-1/4 mile N offshore	9-102977	LUST Site Cleanup Completed
Omega Station	1/4-1/2 mile NNE	9-200353	LUST Site Cleanup Completed
Pohai Nani Care Center	1/2-1 mile SSE	9-202196	LUST Site Cleanup Completed
Koolau Chevron Foodmart	1/2-1 mile WSW	9-201102	LUST Cleanup Initiated
ARCO 82106	1/2-1 mile WSW	9-200333	LUST Site Cleanup Completed
Windward Shell	1/2-1 mile W	9-201018	LUST Site Cleanup Completed
Kaneohe Chevron Service	1/2-1mile WNW	9-201109	LUST Site Cleanup Completed

Source: http://www.state.hi.us/health/environmental/waste/ust/data.html. 2005
Note:
LUST Leaking Underground Storage Tank

Table 6: Summary of State of Hawaii, Department of Health, UST Database Sites

Site Name	Approximate Distance	Facility ID No.	Status	Owner	Date Closed	Capacity (gal)	Fuel Type
Kaneohe Wastewater Station No. 2	1/2 mile NE; misplotted by EDR	9-201940	Currently in Use	City and County of Honolulu	--	550	Diesel
Omega Station	1/4-1/2 mile NNE	9-200353	Permanently Out of Use	U. S. 14th Coast Guard District	9/13/94	25,000	Gasoline
Waikalua Wastewater Pump Station	1/4-1/2 mile NNE	9-201939	Currently in Use	City and County of Honolulu	--	550	Diesel
Pohai Nani Care Center – Tank R-2	1/2-1 mile SSE	9-202196	Permanently Out of Use	Pohai Nani Good Samaritan Kauhale	12/30/67	2,000	Gasoline
Pohai Nani Care Center – Tank R-1	1/2-1 mile SSE	9-202196	Permanently Out of Use	Pohai Nani Good Samaritan Kauhale	12/30/67	2,000	Diesel
Pohai Nani Care Center – Tank R-M-3	1/2-1 mile SSE	9-202196	Permanently Out of Use	Pohai Nani Good Samaritan Kauhale	12/30/67	1,000	Diesel
Koolau Chevron Foodmart – Tank 92	1/2-1 mile WSW	9-201102	Currently in Use	Chevron Products Company	--	10,000	Gasoline
Koolau Chevron Foodmart – Tank 87	1/2-1 mile WSW	9-201102	Currently in Use	Chevron Products Company	--	10,000	Gasoline
Koolau Chevron Foodmart – Tank 89	1/2-1 mile WSW	9-201102	Currently in Use	Chevron Products Company	--	10,000	Gasoline
ARCO 82106 – Tank R-4	1/2-1 mile WSW	9-200333	Permanently Out of Use	U.S. Restaurant Properties, Inc.	1/1/84	550	Used Oil
ARCO 82106 – Tank R-92	1/2-1 mile WSW	9-200333	Permanently Out of Use	U.S. Restaurant Properties, Inc.	3/17/03	10,000	Gasoline
ARCO 82106 – Tank R-89	1/2-1 mile WSW	9-200333	Permanently Out of Use	U.S. Restaurant Properties, Inc.	3/17/03	10,000	Gasoline
ARCO 82106 – Tank R-87	1/2-1 mile WSW	9-200333	Permanently Out of Use	U.S. Restaurant Properties, Inc.	3/17/03	12,000	Gasoline
Windward Shell – Tank R-3	1/2-1 mile W	9-201018	Permanently Out of Use	Shell Oil Co.	7/31/97	8,000	Gasoline
Windward Shell – Tank R-4	1/2-1 mile W	9-201018	Permanently Out of Use	Shell Oil Co.	Not Reported	550	Used Oil
Windward Shell – Tank R-1	1/2-1 mile W	9-201018	Permanently Out of Use	Shell Oil Co.	7/31/97	8,000	Gasoline
Windward Shell – Tank R-5	1/2-1 mile W	9-201018	Permanently Out of Use	Shell Oil Co.	7/31/97	550	Used Oil
Windward Shell – Tank R-2	1/2-1 mile W	9-201018	Permanently Out of Use	Shell Oil Co.	7/31/97	8,000	Gasoline

Source: http://www.state.hi.us/health/environmental/waste/ust/data.html. 2005
Notes:
UST Underground Storage Tank

Table 7: Summary of State of Hawaii, Department of Health, HEER Database Release Sites

Site Name	Approximate Distance	Case No.	Status
Kaneohe WWPTF	Subject Property	19921126-3	NFA
Kaneohe WWPTF	Subject Property	19921216-3	NFA
Kaneohe WWPTF	Subject Property	20041031-1315	NFA
Kaneohe Chevron Service	1/2-1 mile WNW	20010205-1018	Site Cleanup Completed
Puohala Elementary School	< 1/8 mile W	19951024	NFA
Former UNOCAL Station No. 4393	> 1 mile E	20000916-1218	NFA

Sources: http://www.state.hi.us/health/environmental/hazard/records.html. 2005 and previous database from 2000
Notes:
HEER Hazard Evaluation and Emergency Response
NFA No Further Action

The Kaneohe WWPTF is listed on the HEER Release Sites Database. The facility is located in the central portion of the subject property. Sewage spills have historically occurred at the facility when the input of rainwater and stormwater exceeds the plant capacity. Mr. Bruce Doorly stated that to his knowledge the overflow material predominantly flows southeast into Kawa Stream and is directed east into Kaneohe Bay. When a spill occurs, DOH posts notices along the banks of Kawa Stream and Kaneohe Bay warning of the potential human health dangers associated with untreated waste. Mr. Doorly stated that the sewage and associated dangers dissipate relatively rapidly at which time the DOH removes the posted warnings. According to regulatory records that were reviewed, each time a sewage overflow occurs the material is treated and disinfected with chlorine during a response action and a "No Further Action" is issued by DOH. Based on the historical frequency of overflow sewage spills at the facility, it can be assumed that future spills are anticipated. The potential for future spills; however, is not considered a REC to the subject property since the incidents appear to be easily manageable with treatment during response actions and rapid natural migration and degradation of the material. The facility may be considered as a developmental concern.

No UST sites adjoin the subject property. The USTs that are listed as both currently in use and permanently out of service and the LUST and HEER Release sites (excluding the Kaneohe WWPTF facility) are not considered RECs based on distance and direction from the subject property or because the status of the facilities are listed as "No Further Action." No RECs were identified based on Tetra Tech's review of the State of Hawaii databases.

The City and County of Honolulu, Department of Permitting and Planning ([DPP] 2005) database files were also reviewed online to search for any past or current environmental concerns associated with the

subject property and adjacent properties. The following land controls were reported for the parcels of land that comprise the subject property:

TMK 45008038 (5.461 acres)

- Flood Zone = Firm X
- Height Limit = 25 feet
- Historic Site Register = None
- Lot Restrictions = None
- SMA/Shoreline = SMA
- Special District = Not in special district
- State Land Use = Urban District
- Street Setback = Yes
- Zoning = P-2 General Preservation and R-5 Residential District

TMK 45030001 2 portions (60.716 acres and 1.717 acres) and TMK 4030037 (39.558 acres)

- Flood Zone = Firm zone AE, X, and X (Shaded)
- Height Limit = 25 feet
- Historic Site Register = None
- Lot Restrictions = None
- SMA/Shoreline = SMA
- Special District = Not in special district
- State Land Use = Urban District
- Street Setback = None
- Zoning = P-2 General Preservation and R-5 Residential District

TMK 45030006 (0.788 acres)

- Flood Zone = Firm zone AE, X, and X (Shaded)
- Height Limit = 25 feet
- Historic Site Register = None
- Lot Restrictions = None

- SMA/Shoreline = SMA
- Special District = Not in special district
- State Land Use = Urban District
- Street Setback = None
- Zoning = P-2 General Preservation

TMKs: 45030009 (0.350 acres), 45030020 (4.513 acres), 45030032 (0.185 acres), 45030033 (0.268 acres), 45030049 (3.975 acres), 45059033 (0.322 acres), 45059034 (0.321 acres), 45059035 (0.321 acres), 45059036 (0.429 acres),

- Flood Zone = Firm zone X
- Height Limit = 25 feet
- Historic Site Register = None
- Lot Restrictions = None
- SMA/Shoreline = Not in SMA
- Special District = Not in special district
- State Land Use = Urban District
- Street Setback = None
- Zoning = P-2 General Preservation

The City and County database did not identify information that indicates RECs to the subject property.

3.4 HISTORICAL USE INFORMATION

The following sections provide information regarding the historical use of the subject property that could be ascertained from readily available sources.

3.4.1 Aerial Photographs

Aerial photographs were reviewed for the subject and surrounding properties. Table 8 presents a summary of the aerial photographs reviewed.

Table 8: Aerial Photograph Summary

Photograph Number	Photograph Date	Photograph Scale and Quality	Description
001	1939-1941	Unknown Scale Good Quality	The southern portion of the subject property is heavily vegetated along Kaneohe Bay Drive until the slope grades steeply to the north. The area north of the slope is flat and appears to be used for agriculture. The Kawa and Kaneohe Streams are visible. One large and one small pond are located on the eastern portion of the property. Approximately four structures are visible in the vicinity of the southern boundary near the road. The land to the east, south, and west is predominantly undeveloped.
002	December 11, 1952	1:6750 Good Quality	The southern boundary of the subject property is heavily vegetated and similar to the previous photograph. Approximately six structures are visible in the vicinity of Kaneohe Bay Drive. Across the street, to the south, residential homes are visible. One large pond is located on the eastern portion of the property and the smaller pond appears degraded and open to the ocean. The remainder of the property appears to be used for agriculture. The area where Bay View Golf Course presently extends over Kaneohe Stream appears as an open, undeveloped field.
003	February 16, 1965	Unknown Scale Good Quality	The southern portion of the property is similar to the previous photograph. Residential homes are visible across the street to the south and Castle High School is located southwest of the property. The two ponds appear similar to the previous photograph. A golf course is located on the western portion of the property and the Kaneohe WWTP is centrally located. Four circular ponds, one rectangular pond, and several small structures are located in the vicinity of the Plant. Kulauli Street extends from the western boundary, across the northern boundary, and into the Plant area. Large, open, undeveloped fields are located between the Plant and the golf course to the west and the steep slope near Kaneohe Bay Drive to the south. As in the previous photograph, the area where Bay View Golf Course presently extends over Kaneohe Stream appears as an open, undeveloped field.
004	February 6, 1968	Unknown Scale Good Quality	Eight structures are visible along the southern boundary of the property. The western portion of the property is a golf course. Six circular ponds, ten rectangular ponds, and several small structures are visible at the treatment plant. The remainder of the property appears similar to the previous photograph.
005	December 18, 1969	Unknown Scale Good Quality	The southern boundary of the property appears similar to the previous photograph. Eight round ponds, twelve rectangular ponds in two parallel rows of six, and seven small structures are visible at the treatment plant. Residential structures are visible north of the subject property across Kaneohe Stream. Puohala School and Park are located west of the property.

Source: U.S. Army Air Corps 1939-1941; U.S. Department of the Navy 1952; U.S. Department of Agriculture, Soil Conservation Service 1965; R.M. Towill 1968, 1969.

A review of the aerial photographs did not identify any RECs to the subject property.

3.4.2 Sanborn® Fire Insurance Maps

Sanborn® Fire Insurance Maps were requested from EDR during this Phase I ESA; however, there was "no coverage" for the subject property (EDR 2005b).

3.4.3 Historical Topographic Maps

Historical topographic maps were reviewed to assess whether the subject property or properties in its immediate vicinity were the site of significant unauthorized releases of hazardous substances or other events with potentially adverse environmental effects. The maps reviewed were 1959, 1968, 1983, and 1998 USGS 7.5-minute Kaneohe quadrangle maps as presented in Appendix C (EDR 2006c). The following was identified:

- The 1959 map shows the southern and western portions of the subject property along Kaneohe Bay Drive to be predominantly vegetated. From Kaneohe Bay Drive the land grades steeply to the north where the remainder of the property is flat and undeveloped. Seven structures are visible on the subject property side of the roadway. Two structures are visible in the area of the current Bay View Estates Development construction zone along the southern boundary and a church is visible in the present day location of the Reorganized Church of Jesus Christ of Latter Day Saints. Kawa Stream extends west to east across the property from the southwest corner and empties into one of two large fishponds on the eastern portion of the property. Kaneohe Stream is located on the northern boundary of the property. Residential neighborhoods are located to the south, west, and north of the subject property.

- The 1968 map shows the subject property as a golf course. Structures along the southern boundary of the property are oriented in a similar manner to the 1959 map with the exception of a larger structure, assumed to be the golf course clubhouse, which is located on the present day location of the Bay View Golf Course clubhouse. A sewage disposal plant is centrally located within the subject property north of Kawa Stream and south of Kaneohe Stream. Six circular ponds, two rectangular ponds, and six smaller structures appear to be associated with the sewage plant. A roadway extends east onto the property from Kulauli Street on the western boundary and encircles the plant. Nine new, small structures are visible on the property in the vicinity of the plant. The surrounding areas appear similar to the 1959 map; however, Puohala School is now visible to the west.

- The 1983 and 1998 maps are similar to the 1968 map. The 1998 map shows the Puohala Park in the vicinity of the Puohala School, west of the subject property.

A review of the historical topographic maps did not identify any RECs to the subject property.

3.4.4 Previous Environmental Reports

No previous environmental reports were available for review.

4.0 SITE RECONNAISSANCE

Alex Globerson of Tetra Tech conducted an initial site reconnaissance of the subject property on January 31, 2006. The site reconnaissance consisted of visually inspecting the subject property and all surrounding properties. The periphery of the subject property was observed from all accessible, adjacent public thoroughfares. Visual reconnaissance of adjoining properties was limited to areas and facilities that were readily observable from the subject property or from public access areas.

Photographic documentation of the site reconnaissance is presented as Appendix A. Figure 2 illustrates the subject property and surrounding properties.

Mr. Greg Hong, a co-owner of KBAY LLC and the real estate agent representing KBAY LLC for the property transaction, and Bruce Doorly, the general manager of the Bay View Golf Course and a representative of Bay View Investment Company LLC, accompanied Mr. Globerson during the site reconnaissance. Mr. Doorly provided information regarding the subject and adjacent properties. Details of the interviews are discussed in Section 5, Interviews.

Table 8 summarizes conditions encountered during the site reconnaissance of the subject property. Refer to the figures and color photographs (Appendix A) for the locations of items discussed in the table and the following subsections.

Table 9: Summary of Site Reconnaissance Findings

Feature	Observed	Section Number
Structures (existing)	Yes	4.1
Roads	Yes	4.2
Potable water supply	Yes	4.3
Sewage disposal system	Yes	4.4
Current uses of the property	Yes	4.5
Evidence of past uses	Yes	4.6
Hazardous substances and/or petroleum products	No	4.7
Aboveground storage tanks (AST)	Yes	4.8
Underground storage tanks (UST) or evidence of USTs	No	4.9
Drums and/or containers	No	4.10
Unidentified substance containers	No	4.11
Hazardous materials and wastes	No	4.12
Solid waste	No	4.13
Wells	Yes	4.14
Odors or air emissions (strong, pungent, or noxious odors)	No	4.15
Pits, ponds, or lagoons and other surface waters	Yes	4.16
Pools of liquid	No	4.17
Staining or corrosion on floors, walls, or ceiling	No	4.18
Drains and sumps	No	4.19
Stained soil and/or pavement	No	4.20
Dumping, burning, stressed vegetation	No	4.21
Possible fill or grading	No	4.22
Potential polychlorinated biphenyl (PCB) containing equipment	No	4.23
Subsurface hydraulic equipment/vehicle lifts	No	4.24
Waste or wastewater discharges to surface or surface waters on property (including stormwater)	No	4.25
Septic systems	No	4.26
Asbestos-containing material (ACM)	No	4.27
Lead-based paint (LBP)	No	4.28
Heating, ventilation, and cooling systems (air conditioners)	Yes	4.29
Other off-site environmental concerns	No	4.30

4.1 STRUCTURES

Structures related to the golf course and miniature golf course are present on the subject property. A one-story auxiliary clubhouse is located on the southwest corner of the property adjacent to the miniature golf course. The structure consists of a pro shop, storage areas, two private multifunction rooms, a game room, bathrooms, a snack bar, a ticket room, and an office. A two-story, open air driving range is located to the northeast. Twenty-four tee stations are located on each story and a machine room that contains the electrical equipment for the facility is on the west side of the structure. East of the driving range is the Bay View clubhouse that consists of a dining/banquet/bar area, kitchen, meeting rooms, pro shop, restrooms, storage rooms, an office, cart and bag storage areas, snack rooms, elevator rooms, and mechanical rooms. A maintenance facility, consisting of covered, open air work areas and enclosed storage areas is located along the northern boundary of the property between the Kaneohe WWTP and Kaneohe Stream. According to Doorly, this area is used to maintain the landscaping equipment used on the golf course. Equipment, which predominantly included lawn mowers with some golf carts, was observed in the vicinity of the structures. Mr. Doorly stated that the structures were also used to store fertilizers and herbicides that are used for maintaining the golf course. A small residential home was also observed in this area.

The Kaneohe WWTP is centrally located within the subject property. The Plant was observed from the fence line that surrounds the facility. The structures visible included concrete holding ponds and small auxiliary structures. The facility appeared to be well maintained. A bathroom facility was visible immediately within the fence line.

A cell tower and associated equipment panel were observed on the southeast portion of the property adjacent to the church property along Kaneohe Bay Drive. The land for the cell tower is subleased to Sprintcom, Inc. and that the equipment is electrically powered.

4.2 ROADS

Asphalt golf cart paths are located across the subject property and provide access for golfers and maintenance crews. Kulauli Street also enters the property from the western boundary and provides access to the Kaneohe WWTP for City and County of Honolulu employees. The roads are not considered RECs to the subject property.

4.3 POTABLE WATER SUPPLY

Mr. Doorly stated that potable water is provided to the subject property by the Honolulu Board of Water Supply (BWS). The water supply system is not regarded as a REC to the subject property.

4.4 SEWAGE DISPOSAL SYSTEM

Sewage from the subject property is maintained by the City and County of Honolulu. No RECs were identified concerning the handling of sewage at the subject property.

The Kaneohe WWTP is centrally located within the subject property. The facility is maintained by the City and County of Honolulu and has been operational since the early 1960's. The facility originally collected municipal sewage, treated the waste, and discharged the treated material into Kaneohe Bay. Approximately 10 years ago; however, the plant operations were changed and the sewage was only collected at the facility and then transferred via a pumping system to the Aikahi WWTP. Water is no longer discharged into the Bay. According to Mr. Doorly, sewage at the Plant has historically overflowed the containment ponds and spilled outside of the facility property boundaries during heavy storm events. To his knowledge, the sewage flows southeast from the property and into the Kawa Stream, which directs the waste east and into the Bay. Mr. Doorly stated that the sewage and associated dangers dissipate relatively rapidly at which time the DOH removes the posted warnings. According to regulatory records that were reviewed, each time a sewage overflow occurs the material is treated and disinfected with chlorine during a response action and a "No Further Action" is issued by DOH. Based on the historical frequency of overflow sewage spills at the facility, it can be assumed that future spills are anticipated. The potential for future spills; however, is not considered a REC to the subject property since the incidents appear to be easily manageable with treatment during response actions and rapid natural migration and degradation of the material. The facility may be considered as a developmental concern.

4.5 CURRENT USES OF THE PROPERTY

The property is currently used as an 18-hole public golf course, 36-hole miniature golf course, and driving range. Mr. Doorly stated that herbicides and fertilizers are applied to the golf course grounds on a regular schedule. Roundup Pro® herbicide is applied to large weeds and Revolver® herbicide is used on the golf course greens. Water soluble fertilizer is applied to the greens on a monthly rotation with granular fertilizer. The herbicides and fertilizers are assumed to be distributed according to the manufactures indications and directions. A large pond, located on the eastern portion of the property, is a project run by the Waikalua Loko Fishpond Preservation Society that is supported by the Rotary Club of Kaneohe. The Preservation Society uses the pond to demonstrate traditional Hawaiian fish pond techniques.

4.6 EVIDENCE OF PAST USES

According to Mr. Doorly, much of the subject property has been a golf course since the 1960's. Mr. Doorly stated that all of the structures located on the property during the expansion of the golf course in the mid-1990's were demolished and the structures currently present on the site were constructed in their place. No visible evidence of prior uses that would be regarded as a REC was identified during the site reconnaissance.

4.7 HAZARDOUS SUBSTANCES AND PETROLEUM PRODUCTS

No hazardous substances or petroleum products that would be considered a REC to the subject property were observed during the site reconnaissance.

4.8 ABOVEGROUND STORAGE TANKS

Three ground-mounted aboveground storage tanks (AST) and two portable petroleum ASTs were observed on the subject property. Information concerning the tanks was provided by Mr. Doorly. One propane AST is located in the parking lot on the east side of the entrance to the subject property and is used in the kitchen located in the Bay View Golf Course clubhouse. One propane AST is located on the west side of the entrance to the property between the auxiliary clubhouse and the clubhouse. The tank is used to fuel the decorative tiki torches that are used within the miniature golf course. One propane AST is located on the western boundary of the property on the east side of Kulauli Street across from Puohala Park and Elementary School. The tank is utilized by the elementary school. Two portable ASTs were observed on the gravel area between the Kaneohe WWTP and the Waikalua Loko Fish Pond. The tanks are used to fill the golf course maintenance vehicles and landscaping equipment and are serviced by B&E Petroleum. No staining was observed in the vicinity of the tanks and a rectangular metal box was observed beneath the dispenser nozzle of one of the tanks to contain fuel drips. The second tank did not have a dispenser nozzle.

None of the ASTs located on the subject property are considered RECs.

4.9 UNDERGROUND STORAGE TANKS OR EVIDENCE OF USTS

No underground storage tanks are located on the subject property.

4.10 DRUMS AND OTHER CONTAINERS

No visible evidence of drums or other containers or associated staining that would be regarded as a REC were identified during the site reconnaissance.

4.11 UNIDENTIFIED SUBSTANCE CONTAINERS

No visible evidence of unidentified substance containers or associated staining that would be regarded as a REC was identified during the site reconnaissance.

4.12 HAZARDOUS MATERIALS AND WASTES

No visible evidence of hazardous materials or wastes that would be regarded as a REC was identified during the site reconnaissance.

4.13 SOLID WASTE

No visible evidence of solid waste that would be regarded as a REC was identified during the site reconnaissance.

4.14 WELLS

Five wells were identified by EDR as previously discussed in Section 3.1 of this report. The EDR report states that all of the wells are inoperable. According to Mr. Doorly, five wells are located on the property with two of the wells operating and used for irrigation purposes and three of the wells inoperable due to mechanical problems. Mr. Doorly stated that the two operational wells are routinely tested for pH levels only and that the pH is consistently neutral. The wells are not considered RECs to the subject property.

4.15 ODORS OR AIR EMISSIONS (STRONG, PUNGENT, OR NOXIOUS)

No strong, pungent, or noxious odors were observed during the site reconnaissance.

4.16 PITS, PONDS, LAGOONS, AND OTHER SURFACE WATERS

The Waikalua Loko Fishpond and a smaller deteriorated fishpond are located on the eastern portion of the property adjacent to Kaneohe Bay. The fish ponds are maintained by the Rotary Club of Kaneohe and the Waikalua Loko Fish Pond Preservation Society.

Kawa Stream flows from the southwest corner of the subject property, north around the miniature golf course, and east toward the Waikalua Loko Fishpond and Kaneohe Bay. Kaneohe Stream flows east across the northern boundary of the property and into Kaneohe Bay.

A concrete-lined drainage retention pond is located on the southeastern portion of the property. Mr. Doorly stated that to his knowledge this pond is consistently filled with water and is used to contain stormwater runoff and irrigation runoff from the golf course.

None of the surface water features that were observed during the site reconnaissance are considered RECs to the subject property.

4.17 POOLS OF LIQUID

No pools of liquids were observed on the subject property.

4.18 STAINING OR CORROSION ON FLOORS, WALLS, OR CEILING

No staining or corrosion on floors, walls, or ceilings was observed during the site reconnaissance.

4.19 DRAINS AND SUMPS

Storm drains are located within the asphalt parking lot associated with the golf course. According to Mr. Doorly the drains direct surface water runoff from the parking lot to the Kawa Stream. No RECs were identified in relation to the drain system. No sumps are located on the subject property.

4.20 STAINED SOIL OR PAVEMENT

Stained pavement was observed on the asphalt in the vicinity of the maintenance facility located on the northern portion of the property and the asphalt of the parking lot adjacent to the golf course clubhouse. The instances of staining are assumed to be from oil drips originating from equipment or parked cars. The staining is considered *de minimis* and does not appear to present a REC to the subject property.

4.21 DUMPING, BURNING, STRESSED VEGETATION

No dumping, staining, or stressed vegetation was observed during the site reconnaissance.

4.22 POSSIBLE FILL OR GRADING

No fill material or grading was observed during the site reconnaissance. Mr. Doorly explained that fill material had been brought to the site during the construction activities associated with the golf course

expansion in the mid-1990's. No environmental problems were reported in relation to the fill material; however, it was reported that the soil used was not appropriate to support the structures that were erected. Subsequent compression and settling of the fill soil has caused stress on the existing structures and created cracks in portions of the buildings. Mr. Hong provided Tetra Tech with a report entitled, "Bay View Golf Park, Auxiliary Clubhouse, 45-285 Kaneohe Bay Drive, TMK 4-5-30:37, Site Assessment Report," dated December 29, 2005, which was prepared by Lyon Associates. The report discusses the issues associated with the fill and provides conclusions based on a review of a foundation settlement investigation and architectural plans and a site visit. The conclusion of the report states that "soil consolidation has occurred and additional movement is not expected." The fill is not considered a REC to the subject property.

4.23 POTENTIAL PCB-CONTAINING EQUIPMENT

One transformer was observed in the clubhouse parking lot. A "No-PCB" sticker was located on the side panel of the equipment and no staining was noted in the vicinity. The transformer is not considered a REC to the subject property. A transformer was also observed on the property maintained by the Kaneohe WWTP. The equipment is located adjacent to a restroom facility and no distinguishing marks were observed to identify if PCBs were present. Hawaii Electric Company (HECO) was contacted to discuss the status of the transformer and in a response letter HECO stated that the equipment observed was a vault (Vault #4899) that contains a switchgear with "no oil-filled equipment inside." Therefore, the presence of PCBs at the facility is unlikely. The response from HECO also identified a second transformer on the treatment plant property that was not observed during the site reconnaissance (Vault #8473, Transformer #49717). HECO stated that the equipment contains a PCB-free transformer. The transformers do not present a REC to the subject property.

4.24 SUBSURFACE HYDRAULIC EQUIPMENT/VEHICLE LIFTS

No subsurface hydraulic equipment is located on the subject property.

4.25 WASTEWATER/STORMWATER DISCHARGES TO SURFACE OR SURFACE WATERS ON SUBJECT PROPERTY

No wastewater discharges to surface or surface water occur at the subject property. No stormwater was observed during the site reconnaissance; however, Mr. Doorly stated that during storm events, excess water from the golf course drains into the concrete drainage retention pond located on the southeastern portion of the property. No RECs were identified based on the drainage information provided.

4.26 SEPTIC SYSTEMS

No septic systems were observed on the subject property during the site reconnaissance. Mr. Dooly stated that municipal sewage generated by the activities at the golf course is directed into sewer utilities maintained by the City and County of Honolulu. No RECs were identified in relation to the septic system.

The Kaneohe WWTP is centrally located within the subject property. Information regarding this facility is presented in Section 4.4 of this report and no RECs were identified in relation to the system.

4.27 ASBESTOS-CONTAINING MATERIALS

Surveying and testing for asbestos-containing materials (ACM) is beyond the scope of this Phase I ESA and is not required by E-1527-00; however, the environmental professional preparing this report has reviewed the site history and performed a site reconnaissance such that an educated opinion can be rendered. The structures related to the current golf course operations including the clubhouse, auxiliary clubhouse, and driving range were constructed in the late 1990's and therefore the presence of ACM is unlikely. Mr. Doorly was unsure of the age of the structures used as a maintenance shop and storage area located on the north portion of the property, but assumed that they were constructed in the late 1960's. Construction prior to 1978 indicates that the presence of ACM is possible. For confirmation, a comprehensive survey with sampling and analysis would need to be performed.

4.28 LEAD-BASED PAINT

Surveying and testing for lead-based paint (LBP) is beyond the scope of this Phase I ESA and is not required by E-1527-00; however, the environmental professional preparing this report has reviewed the site history and performed a site reconnaissance such that an educated opinion can be rendered. The structures related to the current golf course operations including the clubhouse, auxiliary clubhouse, and driving range were constructed in the late 1990's and therefore the presence of LBP is unlikely. Mr. Doorly was unsure of the age of the structures used as a maintenance shop and storage area located on the north portion of the property, but assumed that they were constructed in the late 1960's. Construction prior to 1978 indicates that the presence of LBP is possible. For confirmation, a comprehensive survey with sampling and analysis would need to be performed.

4.29 HEATING, VENTILATION, AND AIR CONDITIONING SYSTEM

According to Mr. Doorly, four split-unit air conditioning units and one 8-ton air conditioning unit are located at the auxiliary clubhouse and one air conditioning unit services the Bay View Golf Course clubhouse. The units are electrically operated and no evidence of a petroleum-based fuel source was observed at the site. The air conditioning system is not considered a REC to the subject property.

4.30 OTHER OFF-SITE ENVIRONMENTAL CONCERNS

There were no other site-specific environmental conditions noted during the site visit.

4.31 SUMMARY OF SITE RECONNAISSANCE

Based on the site reconnaissance Tetra Tech has not identified any RECs to the subject property.

5.0 INTERVIEWS

Tetra Tech conducted interviews with individuals who might have knowledge of operations and environmental conditions at the subject property and surrounding properties. The objective of the interviews was to obtain information indicating RECs in connection with the subject property.

5.1 INTERVIEW WITH OWNER

The owner of the subject property was not interviewed for this assessment. The general manager of the golf course, who is knowledgeable about the daily operations at the facility, was interviewed as discussed in Section 5.2.

5.2 INTERVIEW WITH SITE MANAGER/TENANT

Mr. Bruce Doorly, the general manager of the Bay View Golf Course and a representative of Bay View Investment Company LLC, was interviewed regarding his knowledge of the subject property. Applicable information recorded during the interview is referenced throughout this report.

5.3 INTERVIEW WITH LOCAL GOVERNMENT OFFICIAL

A letter was faxed to Fire Chief Kenneth G. Silva on January 31, 2006 requesting documentation regarding response to hazardous materials incidents at the subject property. A letter was also faxed to the DOH HEER office on February 1, 2006 requesting access to government records pertaining to facilities located in the vicinity of the subject property that were identified in the EDR report. As of the submittal of this report Tetra Tech has not received a response to either request. An addendum to the report will be submitted if any RECs are identified following a review of the information provided.

6.0 FINDINGS AND CONCLUSIONS

Tetra Tech has performed this Phase I ESA in accordance with the scope and limitations of ASTM Practice E 1527-00, to identify RECs in connection with the subject property. RECs address the presence, or likely presence, of hazardous substances or petroleum products on the subject property, under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the subject property or into the ground, groundwater, or surface water. This assessment included an evaluation, to the extent practicable, of past and present land uses at the subject property and on adjacent properties.

Based on the review of environmental reports and historic records, site reconnaissance, and interviews, no RECs to the subject property were identified.

RECORDS REVIEW

No EDR sites were identified as RECs to the subject property based on Tetra Tech's review of the information presented in the database; however; four facilities require further examination based on their proximity to the subject property. A request to examine government records was submitted to the DOH office to obtain information concerning Castle High School, Windward Nazarene Academy, Kaneohe WWTP, and Scott's Plating. A response had not been received upon the submittal of this report. An addendum to the report will be submitted if any RECs are identified following a review of the information.

SITE RECONNAISSANCE

No RECs were identified at the subject property during the site reconnaissance.

INTERVIEWS

No RECs were identified in relation to the subject property following the interview with the general manager of the Bay View Golf Course.

7.0 DEVIATIONS

No deletions or deviations from ASTM guidance, general practices or procedures, or the Tetra Tech proposal or the general services agreement were noted during the completion of this Phase I ESA.

8.0 LIMITATIONS

This report was compiled based partially on information supplied to Tetra Tech from outside sources and other information in the public domain. The findings and conclusions herein are based on the information made available to Tetra Tech. The information selected for review by Tetra Tech is on file at Tetra Tech's Honolulu, Hawaii office. Tetra Tech makes no warranty as to the accuracy of statements made by others, which may be contained in the report, nor are any other warranties or guarantees, expressed or implied, included or intended by the report except that it has been prepared in accordance with the current generally accepted practices and standards, consistent with the level of care and skill exercised under similar circumstances by other professional consultants or firms performing the same or similar services. Because the facts forming the basis for the report are subject to professional interpretation, differing conclusions could be reached. Tetra Tech does not assume responsibility for the discovery and elimination of hazards that could possibly cause accidents, injuries, or damage. Compliance with the submitted recommendations or suggestions does not ensure the elimination of hazards or the fulfillment of our client's obligations under local, state, or federal laws or any modifications or changes to such laws. None of the work performed hereunder shall constitute or be represented as a legal opinion of any kind or nature, but shall be a representation of findings of fact from records examined.

If you have any questions concerning the findings and conclusions contained in this report, please call Mr. Jason Brodersen at (808) 441-6602.

Prepared by:

Alex Globerson
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Tetra Tech EM Inc.

Reviewed by:

Jason Brodersen
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Tetra Tech EM Inc.

9.0 REFERENCES

American Society for Testing and Materials.(ASTM) 2000. Practice E1527-00: "Standard Practice for Environmental Site Assessments (ESA): Phase I ESA Process."

City and County of Honolulu, Department of Permitting and Planning (DPP). 2005. http://gis.hicentral.com/website/parcelzoning/viewer.htm.

Department of Health (DOH). 2005. Office of Hazard Evaluation and Emergency Response. http://www.state.hi.us/health/environmental/hazard/records.html. August 25.

———. 2005. Solid and Hazardous Waste Branch. http://www.state.hi.us/health/environmental/waste/ust/data.html. February.

Environmental Data Resources, Incorporated (EDR). 2006a. EDR Radius Map with GeoCheck®. Inquiry No. 1602246.1s. January 30.

———. 2006b. EDR Sanborn® Map Report. Inquiry No. 1602246.3. January 30.

———. 2006c. EDR-Historical Topographic Map Report. Inquiry No. 1602246.2. January 30.

Foote, D. E.; Hill, E. L.; Nakamura, S.; and Stephens, F. 1972. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service. August.

Golf Magazine. 2006. www.golfcourse.com.

Lyon Associates. 2005. "Bay View Golf Park, Auxiliary Clubhouse, 45-285 Kaneohe Bay Drive, TMK 4-5-30:37, Site Assessment Report." December 29.

Mink, J.F., and L.S. Lau. 1990. "Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii." Technical Report No. 179. Honolulu: University of Hawaii, Manoa.

R.M. Towill. 1968. Aerial Photograph GS-VXJ-S-4-11. February 6.

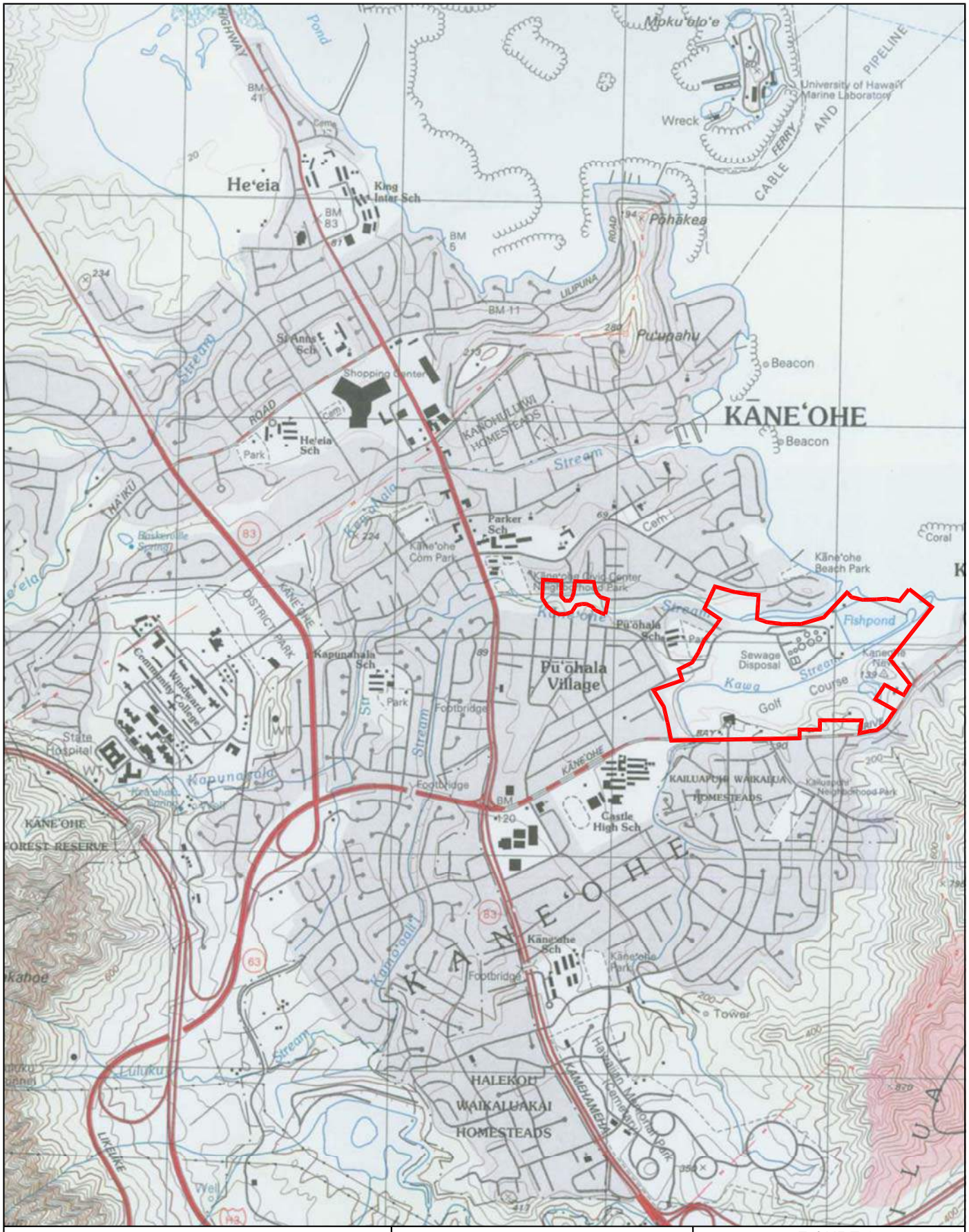
———. 1969. Aerial Photograph 5225-15. December 18

U.S. Army Air Corps. 1939-1941. Aerial Photograph M46-68.

U.S. Department of Agriculture. 1965. Agricultural Stabilization and Conservation Service, Aerial Photograph EKM-3CC-65. February 16.

U.S. Department of Navy. 1952. Aerial Photograph 3-58. December 11.

FIGURES



LEGEND

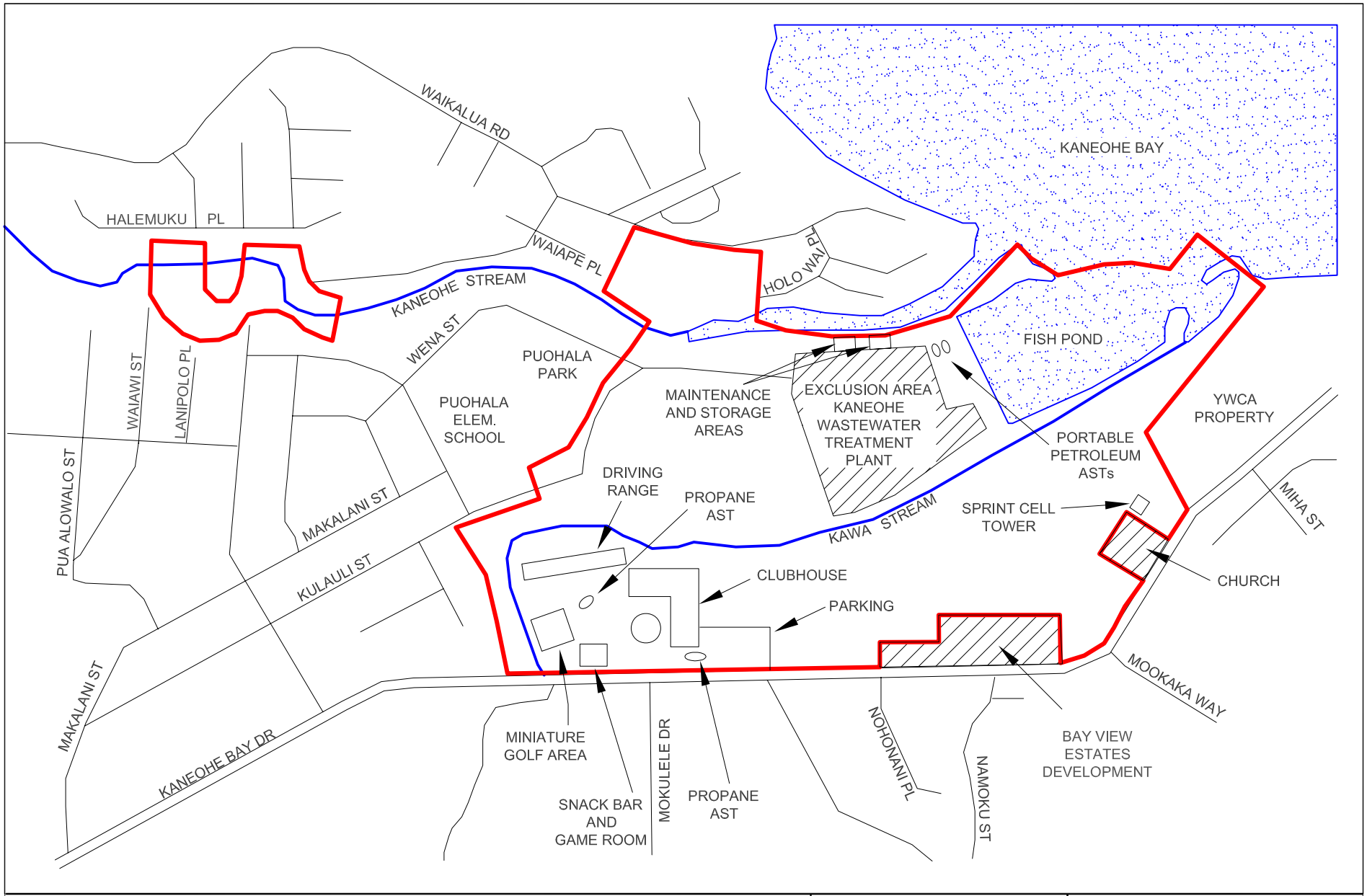
Target Property Boundary

Tetra Tech EM Inc.

0 1000' 2000'

APPROX. SCALE IN FEET

FIGURE 1
SITE VICINITY MAP
BAY VIEW GOLF COURSE
45-285 KANEOHE BAY DRIVE
KANEOHE, HAWAII 96744



LEGEND

Subject Property Boundary

SOURCE: TETRA TECH EM INC., 2006

Tetra Tech EM Inc.

0 375' 750'

APPROX. SCALE IN FEET

FIGURE 2
SITE PLAN
BAY VIEW GOLF COURSE
45-285 KANEOHE BAY DRIVE
KANEOHE, HAWAII 96744

APPENDIX A
SUBJECT PROPERTY PHOTOGRAPHS

Photograph 1

Orientation: North

View looking north towards the Bay View Golf Course clubhouse from entrance driveway.

Photograph 2

Orientation: Southwest

View looking southwest from the golf course towards the clubhouse.

Photograph 3

Orientation: West

View looking west toward the golf cart parking and battery recharge area.

Photograph 4

Orientation: Northwest

View looking northwest towards the auxiliary clubhouse.

Photograph 5

Orientation: West

View looking west towards miniature golf course.

Photograph 6

Orientation: West

View looking west towards the driving range.

Photograph 7

Orientation: Northeast

View looking northeast across the golf course.

Photograph 8

Orientation: East

View looking east across the golf course.

Photograph 9

Orientation: East

View looking east towards the access road to Kaneohe WWTP from Kulauli Street.

Photograph 10

Orientation: Southeast

View looking southeast towards the Kaneohe WWTP,

Photograph 11

Orientation: North

View looking north across the golf course towards the Kaneohe WWTP.

Photograph 12

Orientation: North

View looking north across the golf course towards the Kaneohe WWTP.

Photograph 13

Orientation: East

View looking east towards the maintenance / storage area located on the north portion of the subject property along Kaneohe Stream.

Photograph 14

Orientation: South

View looking south towards the maintenance / storage area located on the north portion of the subject property along Kaneohe Stream.

Photograph 15

Orientation: South

View looking south toward two portable, petroleum ASTs located on the gravel portion of the property between Kaneohe WWTP and the Waikalua Loko Fish Pond.

Photograph 16

Orientation: East

View looking east towards various solid wastes located on the gravel portion of the property between Kaneohe WWTP and the Waikalua Loko Fishpond. The materials included old golf carts, hosing, metal scrap, and wooden scrap.

Photograph 17

Orientation: Southeast

View looking southeast towards various solid wastes located on the gravel portion of the property between Kaneohe WWTP and the Waikalua Loko Fishpond. The materials included old golf carts, hosing, metal scrap, and wooden scrap.

Photograph 18

Orientation: Southeast

View looking southeast toward the concrete pond.

Photograph 19

Orientation: East

View looking east toward Kawa Stream.

Photograph 20

Orientation: West

View looking west toward Kaneohe stream from the northwest portion of the subject property.

Photograph 21

Orientation: Northwest

View looking northwest towards Kaneohe Stream from the northeast corner of the subject property.

Photograph 22

Orientation: Southeast

View looking southeast toward the Waikalua Loko Fishpond.

Photograph 23

Orientation: East

View looking east toward the YWCA property located adjacent to the southeastern boundary of the subject property.

Photograph 24

Orientation: Northeast

View looking northeast from Kaneohe Bay Drive towards construction activities associated with the development of Bay View Estates along the southern boundary of the subject property.

Photograph 25

Orientation: Southeast

View looking southeast from the entrance to the Bay View Golf Course along Kaneohe Bay Drive.

Photograph 26

Orientation: Southwest

View looking southwest from the entrance to the Bay View Golf Course along Kaneohe Bay Drive.

Photograph 27

Orientation: West

View looking west from the western boundary of the subject property towards Puohala Park and Puohala Elementary School.

APPENDIX B
ENVIRONMENTAL DATA RESOURCES, INC.
RADIUS MAP WITH GEOCHECK®

The EDR Radius Map
with GeoCheck®

Bay View Golf Course
45-285 Kaneohe Bay Drive
Kaneohe, HI 96744

Inquiry Number: 1602246.1s

January 30, 2006

EDR® Environmental Data Resources Inc

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

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Detail Map	3
Map Findings Summary	4
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Orphan Summary	18
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting Source Map	A-7
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Physical Setting Source Records Searched	A-13

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

45-285 KANEOHE BAY DRIVE
KANEOHE, HI 96744

COORDINATES

Latitude (North):	21.407400 - 21˚ 24' 26.6''
Longitude (West):	157.787600 - 157˚ 47' 15.4''
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	625667.1
UTM Y (Meters):	2367582.8
Elevation:	7 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	21157-D7 KANEOHE, HI
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following government records. For more information on this property see page 6 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
BAYVIEW GOLF COURSE SUBDIV 45-285 KANEOHE BAY DRIVE KANEOHE, HI 96744	FINDS	110020739637

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

FEDERAL RECORDS

NPL..... National Priority List
Proposed NPL..... Proposed National Priority List Sites
Delisted NPL..... National Priority List Deletions

EXECUTIVE SUMMARY

NPL Liens ..... Federal Superfund Liens
CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned
CORRACTS ..... Corrective Action Report
RCRA-TSDF ..... Resource Conservation and Recovery Act Information
ERNS ..... Emergency Response Notification System
HMIRS ..... Hazardous Materials Information Reporting System
US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls
DOD ..... Department of Defense Sites
FUDS ..... Formerly Used Defense Sites
US BROWNFIELDS ..... A Listing of Brownfields Sites
CONSENT ..... Superfund (CERCLA) Consent Decrees
ROD ..... Records Of Decision
UMTRA ..... Uranium Mill Tailings Sites
ODI ..... Open Dump Inventory
TRIS ..... Toxic Chemical Release Inventory System
TSCA ..... Toxic Substances Control Act
SSTS ..... Section 7 Tracking Systems
PADS ..... PCB Activity Database System
MLTS ..... Material Licensing Tracking System
MINES ..... Mines Master Index File
RAATS ..... RCRA Administrative Action Tracking System

STATE AND LOCAL RECORDS

SWF/LF ..... Permitted Landfills in the State of Hawaii
INST CONTROL ..... Sites with Institutional Controls
VCP ..... Voluntary Response Program Sites
BROWNFIELDS ..... Brownfields Sites

TRIBAL RECORDS

INDIAN RESERV ..... Indian Reservations

EDR PROPRIETARY RECORDS

Manufactured Gas Plants ... EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

FEDERAL RECORDS

CERCLIS: The Comprehensive Environmental Response, Compensation and Liability Information System contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

A review of the CERCLIS list, as provided by EDR, and dated 09/19/2005 has revealed that there is 1 CERCLIS site within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SCOTT'S PLATING	***45-212 KANEOHE BAY DRIV***	***0 - 1/8 SSE***	***6***	***7***

RCRAInfo:RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System(RCRIS). The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month Large quantity generators generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-LQG list, as provided by EDR, and dated 10/14/2005 has revealed that there is 1 RCRA-LQG site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
STATE OF HAWAII CASTLE HIGH SC	***45-386 KANEOHE BAY DR***	***1/4 - 1/2 WSW***	***16***	***12***

RCRAInfo:RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System(RCRIS). The database includes selective information on sites which generate, transport, store , treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month Large quantity generators generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

A review of the RCRA-SQG list, as provided by EDR, and dated 10/14/2005 has revealed that there is 1 RCRA-SQG site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
WINDWARD BATTERY EXCHANGE	***45216 PAHIKAUA ST***	***1/4 - 1/2 SSW***	***15***	***11***

EXECUTIVE SUMMARY

FTTS:FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, and dated 10/12/2005 has revealed that there are 2 FTTS sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
WINDWARD NAZARENE ACADEMY	45-232 PUAAE RD	1/8 - 1/4 SW	C11	10
WINDWARD NAZERENE ACADEMY	***45-232 PUAAE RD***	***1/8 - 1/4 SW***	***C12***	***10***

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 09/29/2005 has revealed that there are 8 FINDS sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
44-309 KANEOHE BAY DRIVE	44-309 KANEOHE BAY DR	0 - 1/8	A2	6
KANEOHE SEWAGE SPILL	44-417 KANEOHE BAY DRIV	0 - 1/8	A3	6
KANEOHE STREAM BRIDGE	44-417 KANEOHE BAY DRIV	0 - 1/8	A4	6
KANEOHE PRETREATMENT FACILITY	44-417 KANEOHE BAY DRIV	0 - 1/8	A5	6
SCOTT'S PLATING	***45-212 KANEOHE BAY DRIV***	***0 - 1/8 SSE***	***6***	***7***
AT&T - AWS KANEOHE	45-232 KANEOHE BAY DR	1/8 - 1/4 SW	9	8
WINDWARD NAZERENE ACADEMY	***45-232 PUAAE RD***	***1/8 - 1/4 SW***	***C12***	***10***

Lower Elevation	Address	Dist / Dir	Map ID	Page
KANEOHE WWPTF	***45-230 KULAULI ST***	***1/8 - 1/4 NNW***	***10***	***8***

STATE AND LOCAL RECORDS

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

A review of the SHWS list, as provided by EDR, and dated 08/24/2005 has revealed that there are 3 SHWS sites within approximately 1.25 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
SCOTT'S PLATING	***45-212 KANEOHE BAY DRIV***	***0 - 1/8 SSE***	***6***	***7***
KANEOHE CHEVRON SERVICE	***45-1002 KAMEHAMEHA HWY***	***1/2 - 1 WNW***	***21***	***16***
FORMER UNOCAL STATION NO. 4393	***44-740 KANEOHE BAY DR***	***1 - 2 E***	***22***	***17***

EXECUTIVE SUMMARY

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Health's Active Leaking Underground Storage Tank Log Listing.

A review of the LUST list, as provided by EDR, and dated 08/01/2005 has revealed that there are 6 LUST sites within approximately 0.75 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
OMEGA STATION	***HAIKU RD / P.O. BOX H***	***1/4 - 1/2 NNE***	***D13***	***11***
POHAI NANI CARE CENTER	***45-090 NAMOKU ST***	***1/2 - 1 SSE***	***17***	***13***
KOOLAU CHEVRON FOODMART	***45-462 KANEOHE BAY DR***	***1/2 - 1 WSW***	***E18***	***13***
ARCO 82106	***45-467 KANEOHE BAY DR***	***1/2 - 1 WSW***	***E19***	***14***
WINDWARD SHELL	***45-685 KAMEHAMEHA HWY***	***1/2 - 1 W***	***20***	***15***

Lower Elevation	Address	Dist / Dir	Map ID	Page
COCONUT ISLAND	***KANEOHE BAY***	***1/8 - 1/4 N***	***B7***	***7***

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Health's Listing of Underground Storage Tanks.

A review of the UST list, as provided by EDR, and dated 08/01/2005 has revealed that there are 4 UST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Dist / Dir	Map ID	Page
OMEGA STATION	***HAIKU RD / P.O. BOX H***	***1/4 - 1/2 NNE***	***D13***	***11***
WAIKALUA WASTEWATER PUMP STATI	45-044 HOLOWAI PL	1/4 - 1/2 NNE	D14	11

Lower Elevation	Address	Dist / Dir	Map ID	Page
COCONUT ISLAND	***KANEOHE BAY***	***1/8 - 1/4 N***	***B7***	***7***
KANEOHE WASTEWATER STATION NO.	44-029 KAIMALU PL	1/8 - 1/4 N	B8	8

SPILLS: Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

A review of the SPILLS list, as provided by EDR, and dated 08/24/2005 has revealed that there is 1 SPILLS site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
KANEOHE WWPTF	***45-230 KULAULI ST***	***1/8 - 1/4 NNW***	***10***	***8***

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
HAWAII WHOLESALE FUMIGATORS	FTTS
KAILUA CORPORATION YARD	SHWS, FINDS, SPILLS
KAWAINUI MARSH	SHWS, FINDS, SPILLS
KAPAA LANDFILL - KAPAA QUARRY ROAD	SHWS
HECO TRANSFORMER 28851	SHWS, SPILLS
KMCAS LANDFILL	SWF/LF
AHUIMANU WASTEWATER PRELIMINARY TREATMENT FACILITY	UST
J & M AUTOMOTIVE	RCRA-SQG, FINDS
WINDWARD TOYOTA SERVICE	RCRA-SQG
EE BLACK SCI JV H3 PRECAST YARD	RCRA-SQG, FINDS
CHEVRON 98242	RCRA-SQG
KANEOHE BAY NEAR HEEIA BOAT HARBOR	ERNS
KANEOHE MARINE BASE KANEOHE BAY SIDE	ERNS
KANEOHE BAY / VESSEL ANCHORED AT THE SAND BANK	ERNS
KANEOHE YACHT CLUB, ON KANEOHE BAY DRIVE	ERNS
KANEOHE BAY DRIVE	ERNS
KANEOHE BAY DRIVE	FINDS
PALI GOLF COURSE REPAIR CART	FINDS
JP-5 SPILL AT MCBH KANEOHE BAY	FINDS
MARINE CORP BASE HAWAII KANEOHE BAY BUILDING 374	FINDS
OCEAN VIEW TERRACE	FINDS
MCBH KANEOHE BAY RANGE FACILITY	FINDS
KANEOHE BAY SHOPPING CENTER	SPILLS
LONGS DRUGS-KANEOHE BAY	SPILLS
KANEOHE BAY DRIVE, PESTICIDE SMELL	SPILLS
KANEOHE BAY MUDDY/OILY WATER	SPILLS
KAHALUU BAY WATERWAY, TRASH DUMPERS	SPILLS
KANEOHE BAY, FLOAT DEVICE STACKED WITH PAINT RELAT	SPILLS
KANEOHE BAY MARINE OIL SPILL REPORTED	SPILLS
KANEOHE BAY SHEEN #633084	SPILLS
MCBH KANEOHE BAY HYDRAULIC FLUID SPILL	SPILLS
KANEOHE BAY SHEEN	SPILLS

OVERVIEW MAP - 1602246.1s

0 1/2 1 2 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Federal Wetlands

SITE NAME: Bay View Golf Course ADDRESS: 45-285 Kaneohe Bay Drive Kaneohe HI 96744 LAT/LONG: 21.4074 / 157.7876	CLIENT: Tetra Tech EM Inc. CONTACT: Alex Globerson INQUIRY #: 1602246.1s DATE: January 30, 2006

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DETAIL MAP - 1602246.1s

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Federal Wetlands

N

SITE NAME: Bay View Golf Course ADDRESS: 45-285 Kaneohe Bay Drive Kaneohe HI 96744 LAT/LONG: 21.4074 / 157.7876	CLIENT: Tetra Tech EM Inc. CONTACT: Alex Globerson INQUIRY #: 1602246.1s DATE: January 30, 2006

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MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL RECORDS								
NPL		1.250	0	0	0	0	0	0
Proposed NPL		1.250	0	0	0	0	0	0
Delisted NPL		1.250	0	0	0	0	0	0
NPL Liens		0.250	0	0	NR	NR	NR	0
CERCLIS		0.750	1	0	0	0	NR	1
CERC-NFRAP		0.750	0	0	0	0	NR	0
CORRACTS		1.250	0	0	0	0	0	0
RCRA TSD		0.750	0	0	0	0	NR	0
RCRA Lg. Quan. Gen.		0.500	0	0	1	NR	NR	1
RCRA Sm. Quan. Gen.		0.500	0	0	1	NR	NR	1
ERNS		0.250	0	0	NR	NR	NR	0
HMIRS		0.250	0	0	NR	NR	NR	0
US ENG CONTROLS		0.750	0	0	0	0	NR	0
US INST CONTROL		0.750	0	0	0	0	NR	0
DOD		1.250	0	0	0	0	0	0
FUDS		1.250	0	0	0	0	0	0
US BROWNFIELDS		0.750	0	0	0	0	NR	0
CONSENT		1.250	0	0	0	0	0	0
ROD		1.250	0	0	0	0	0	0
UMTRA		0.750	0	0	0	0	NR	0
ODI		0.750	0	0	0	0	NR	0
TRIS		0.250	0	0	NR	NR	NR	0
TSCA		0.250	0	0	NR	NR	NR	0
FTTS		0.250	0	2	NR	NR	NR	2
SSTS		0.250	0	0	NR	NR	NR	0
PADS		0.250	0	0	NR	NR	NR	0
MLTS		0.250	0	0	NR	NR	NR	0
MINES		0.500	0	0	0	NR	NR	0
FINDS	X	0.250	5	3	NR	NR	NR	8
RAATS		0.250	0	0	NR	NR	NR	0
STATE AND LOCAL RECORDS								
SHWS		1.250	1	0	0	1	1	3
State Landfill		0.750	0	0	0	0	NR	0
LUST		0.750	0	1	1	4	NR	6
UST		0.500	0	2	2	NR	NR	4
SPILLS		0.250	0	1	NR	NR	NR	1
INST CONTROL		0.750	0	0	0	0	NR	0
VCP		0.750	0	0	0	0	NR	0
BROWNFIELDS		0.750	0	0	0	0	NR	0
TRIBAL RECORDS								
INDIAN RESERV		1.250	0	0	0	0	0	0
EDR PROPRIETARY RECORDS								
Manufactured Gas Plants		1.250	0	0	0	0	0	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID Direction Distance Distance (ft.) Elevation	Site	Database(s)	EDR ID Number EPA ID Number
A1 **Target** **Property** **Actual:** **7 ft.**	**BAYVIEW GOLF COURSE SUBDIV** **45-285 KANEOHE BAY DRIVE** **KANEOHE, HI 96744** **Site 1 of 5 in cluster A** FINDS: Other Pertinent Environmental Activity Identified at Site: PERMIT COMPLIANCE SYSTEM	**FINDS**	**1008169826** **110020739637**
A2 **< 1/8** **1 ft.** **Relative:** **Equal** **Actual:** **7 ft.**	**44-309 KANEOHE BAY DRIVE** **44-309 KANEOHE BAY DR** **KANEOHE, HI 96744** **Site 2 of 5 in cluster A** FINDS: Other Pertinent Environmental Activity Identified at Site: PERMIT COMPLIANCE SYSTEM	**FINDS**	**1008003220** **110020729229**
A3 **< 1/8** **1 ft.** **Relative:** **Equal** **Actual:** **7 ft.**	**KANEOHE SEWAGE SPILL** **44-417 KANEOHE BAY DRIVE** **KANEOHE, HI 96744** **Site 3 of 5 in cluster A** FINDS: Other Pertinent Environmental Activity Identified at Site: PERMIT COMPLIANCE SYSTEM	**FINDS**	**1008001946** **110020719748**
A4 **< 1/8** **1 ft.** **Relative:** **Equal** **Actual:** **7 ft.**	**KANEOHE STREAM BRIDGE** **44-417 KANEOHE BAY DRIVE** **KANEOHE, HI 96744** **Site 4 of 5 in cluster A** FINDS: Other Pertinent Environmental Activity Identified at Site: PERMIT COMPLIANCE SYSTEM	**FINDS**	**1008001947** **110020719766**
A5 **< 1/8** **1 ft.** **Relative:** **Equal** **Actual:** **7 ft.**	**KANEOHE PRETREATMENT FACILITY** **44-417 KANEOHE BAY DRIVE** **KANEOHE, HI 96744** **Site 5 of 5 in cluster A** FINDS: Other Pertinent Environmental Activity Identified at Site: NATIONAL EMISSIONS INVENTORY	**FINDS**	**1006833198** **110013938301**

6 SSE < 1/8 594 ft. | **SCOTT'S PLATING** | **CERCLIS SHWS FINDS** | **1000816950 HID984470047**
45-212 KANEOHE BAY DRIVE
KANEOHE, HI 96744

Relative: Higher

Actual: 76 ft.

CERCLIS Classification Data:

Federal Facility:	Not a Federal Facility		
Non NPL Status:	SI Start Needed		
NPL Status:	Not on the NPL		
Contact:	Eugenia Chow	Contact Tel:	(415) 972-3160
Contact Title:	Not reported		
Contact:	Betsy Curnow	Contact Tel:	(415) 972-3093
Contact Title:	Not reported		

CERCLIS Assessment History:

Assessment:	DISCOVERY	Completed:	07/20/1993
Assessment:	PRELIMINARY ASSESSMENT	Completed:	05/10/1995

CERCLIS Site Status:
High

FINDS:
Other Pertinent Environmental Activity Identified at Site:
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND INFORMATION SYSTEM
HAWAII ENGINE CONTROL SYSTEM

SHWS:

Supplement :	Not reported
Restricted Use :	Not reported
Fed Id :	HID984470047
Funding :	Not reported
Agreement/program :	State Site
Activity Type :	SI1
Assignment Date :	2003-03-18 00:00:00
Activity Lead :	Melody Calisay
Assignment End Date :	Not reported
End fill :	2005-08-24 00:00:00
Result fill :	Ongoing
Overall Status :	Ongoing
File Under :	Scott's Plating
Restricted Use Comm :	Not reported
Ic Relied On In Remedy :	Not reported
Unit :	Scott's Plating
Sitelist Name :	Scott's Plating

B7 North 1/8-1/4 669 ft. | **COCONUT ISLAND** | **LUST UST** | **U001235660 N/A**
KANEOHE BAY
KANEOHE, HI 96744

Site 1 of 2 in cluster B

Relative: Lower

Actual: 3 ft.

LUST:

Facility ID:	9-102977
Release ID:	950122
Facility Status Date:	2002-05-10
Facility Status:	Site Cleanup Completed
Project Officer:	Fu

UST:

Facility ID:	9-102977	Tank ID:	R-USTA
Tank Status:	Permanently Out of Use		
Tank Capacity:	250	Installed:	Not reported
Date Closed:	1995-08-04 00:00:00	Substance:	Diesel
Owner:	U.S. ARMY CORPS OF ENGINEERS		

COCONUT ISLAND (Continued) **U001235660**

PACIFIC OCEAN DIVISION / CE-POD-ED-EH
Kaneohe, HI 96744

Facility ID:	9-102977	Tank ID:	R-USTB
Tank Status:	Permanently Out of Use		
Tank Capacity:	1000	Installed:	Not reported
Date Closed:	1995-08-01 00:00:00	Substance:	Diesel
Owner:	U.S. ARMY CORPS OF ENGINEERS PACIFIC OCEAN DIVISION / CE-POD-ED-EH Kaneohe, HI 96744		

B8
North
1/8-1/4
669 ft.

Relative:
Lower

Actual:
3 ft.

KANEOHE WASTEWATER STATION NO. 2 **UST** **U001236439**
44-029 KAIMALU PL **N/A**
KANEOHE, HI 96744

Site 2 of 2 in cluster B

UST:

Facility ID:	9-201940	Tank ID:	M-1
Tank Status:	Currently In Use		
Tank Capacity:	550	Installed:	1990-03-06 00:00:00
Date Closed:	Not reported	Substance:	Diesel
Owner:	C&C HNL - DEPT OF ENVIRONMENTAL SERVICES 1000 ULU'OHIA STREET, SUITE 308 Kaneohe, HI 96744		

9
SW
1/8-1/4
702 ft.

Relative:
Higher

Actual:
47 ft.

AT&T - AWS KANEOHE **FINDS** **1006820515**
45-232 KANEOHE BAY DR **110013784994**
KANEOHE, HI 96744

FINDS:
Other Pertinent Environmental Activity Identified at Site:
HAWAII ENGINE CONTROL SYSTEM

10
NNW
1/8-1/4
1153 ft.

Relative:
Lower

Actual:
3 ft.

KANEOHE WWPTF **FINDS** **1006820737**
45-230 KULAULI ST **SPILLS** **110013787456**
KANEOHE, HI 96744

FINDS:
Other Pertinent Environmental Activity Identified at Site:
HAWAII ENGINE CONTROL SYSTEM

HI SPILLS:

Case Number:	19940216-1
Island:	Oahu
Numerical Quantity:	Not reported
Less Or Greater Than :	Not reported
Units :	Not reported
Activity Type :	Response
Assignment Date :	Not reported
Activity Lead :	Not reported
Assignment End Date :	Not reported
Result :	8

KANEOHE WWPTF (Continued) **1006820737**

Supplemental Loc. Text: Not reported
Unit: Kaneohe Wastewater treatment station
Substances: wastewater
Incident : system overloaded
Rainwater Overflow in excess of Plant s Capacity.
sewage spill
Initial : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time
Report : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time

Case Number: 19921126-3
Island: Oahu
Numerical Quantity: 178500
Less Or Greater Than : Not reported
Units : Gallons
Activity Type : Response
Assignment Date : Not reported
Activity Lead : Not reported
Assignment End Date : Not reported
Result : 8
Supplemental Loc. Text: Not reported
Unit: Kaneohe Wastewater Treatment Plant, Kaneohe, Oahu, Hi
Substances: Sewage Spill
Incident : system overloaded
Rainwater Overflow in excess of Plant s Capacity.
sewage spill
Initial : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time
Report : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time

Case Number: 20041031-1315
Island: Oahu
Numerical Quantity: 900
Less Or Greater Than : Not reported
Units : Gallons
Activity Type : Response
Assignment Date : 2004-10-31 00:00:00
Activity Lead : Liz Galvez
Assignment End Date : 2004-10-31 00:00:00

KANEOHE WWPTF (Continued) **1006820737**

Result : 8
Supplemental Loc. Text: Not reported
Unit: Sewage Spill for Kailua
Substances: Sewage
Incident : system overloaded
Rainwater Overflow in excess of Plant s Capacity.
sewage spill
Initial : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time
Report : chlorinated
By Pass effluent prior to secondary treatment to the Makapuu Outfall. Chlorinate ? Will notify Deputy Director, Bruce Anderson. Also note that there was an internal spill of approx. 750 Gals which was disinfected & contolled. No Beach C
No further action at this time

C11 **WINDWARD NAZARENE ACADEMY** **FTTS** **1007300171**
SW **45-232 PUAAE RD** **N/A**
1/8-1/4 **KANEOHE, HI 96744**
1232 ft.

Site 1 of 2 in cluster C

Relative: Higher

Actual: 80 ft.

FTTS Insp:
Region: 04
Inspected Date: Not reported
Insp Number: 19990316MS005 1
Violation occurred: No
Inspector: YOUNG, PAMELA
Investigation Type: AHERA, Enforcement, State Conducted
Facility Function: User
Investig Reason: Not reported
Legislation Code: TSCA

Region: 09
Inspected Date: Not reported
Insp Number: 199204209HI06 1
Violation occurred: Yes
Inspector: TLILEIKIS
Investigation Type: AHERA, Enforcement, State Conducted
Facility Function: User
Investig Reason: Not reported
Legislation Code: TSCA

C12 **WINDWARD NAZERENE ACADEMY** **FINDS** **1004465018**
SW **45-232 PUAAE RD** **FTTS** **110011647931**
1/8-1/4 **KANEOHE, HI 96744**
1309 ft.

Site 2 of 2 in cluster C

Relative: Higher

Actual: 80 ft.

FTTS Insp:
Region: 09
Inspected Date: Not reported
Insp Number: 19940628HI905 1
Violation occurred: Yes

WINDWARD NAZERENE ACADEMY (Continued) **1004465018**

Inspector: RLOPES
Investigation Type: AHERA, Enforcement, State Conducted
Facility Function: User
Investig Reason: Not reported
Legislation Code: TSCA

FINDS:
Other Pertinent Environmental Activity Identified at Site:
NATIONAL COMPLIANCE DATABASE SYSTEM

D13
NNE
1/4-1/2
1536 ft.

Relative:
Higher

Actual:
10 ft.

OMEGA STATION **LUST** **U001236137**
HAIKU RD / P.O. BOX H **UST** **N/A**
KANEOHE, HI 96744

Site 1 of 2 in cluster D

LUST:
Facility ID: 9-200353
Release ID: 940195
Facility Status Date: 1995-12-18
Facility Status: Site Cleanup Completed
Project Officer: Brewer

UST:
Facility ID: 9-200353 Tank ID: M-1
Tank Status: Permanently Out of Use
Tank Capacity: 25000 Installed: 1946-09-04 00:00:00
Date Closed: 1994-09-13 00:00:00 Substance: Gasoline
Owner: U.S. FOURTEENTH COAST GUARD DIST
300 ALA MOANA BOULEVARD
Kaneohe, HI 96744

D14
NNE
1/4-1/2
1597 ft.

Relative:
Higher

Actual:
11 ft.

WAIKALUA WASTEWATER PUMP STATION **UST** **U001236438**
45-044 HOLOWAI PL **N/A**
KANEOHE, HI 96744

Site 2 of 2 in cluster D

UST:
Facility ID: 9-201939 Tank ID: M-1
Tank Status: Currently In Use
Tank Capacity: 550 Installed: 1990-03-06 00:00:00
Date Closed: Not reported Substance: Diesel
Owner: C&C HNL - DEPT OF ENVIRONMENTAL SERVICES
1000 ULU'OHIA STREET, SUITE 308
Kaneohe, HI 96744

15
SSW
1/4-1/2
2185 ft.

Relative:
Higher

Actual:
87 ft.

WINDWARD BATTERY EXCHANGE **RCRA-SQG** **1000193228**
45216 PAHIKAUA ST **FINDS** **HID981687106**
KANEOHE, HI 96744

WINDWARD BATTERY EXCHANGE (Continued) **1000193228**

RCRAInfo:
Owner: NOEL BREN
(415) 555-1212
EPA ID: HID981687106

Contact: ENVIRONMENTAL MANAGER
(808) 247-0334

Classification: Small Quantity Generator
TSDF Activities: Not reported

Violation Status: No violations found

FINDS:
Other Pertinent Environmental Activity Identified at Site:
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM

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16 WSW 1/4-1/2 2359 ft.

STATE OF HAWAII CASTLE HIGH SCHOOL
45-386 KANEOHE BAY DR
KANEOHE, HI 96744

FINDS **1000397505**
RCRA-LQG **HID982040776**

Relative: Higher

Actual: 74 ft.

RCRAInfo:
Owner: STATE OF HAWAII
(415) 555-1212
EPA ID: HID982040776

Contact: ENVIRONMENTAL MANAGER
(808) 235-4591

Classification: Large Quantity Generator
TSDF Activities: Not reported

Violation Status: Violations exist

Regulation Violated: 262.10-12.A
Area of Violation: GENERATOR-ALL REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 03/25/2002
Actual Date Achieved Compliance: 09/25/2002

Regulation Violated: 261.5
Area of Violation: GENERATOR-ALL REQUIREMENTS (OVERSIGHT)
Date Violation Determined: 02/05/2002
Actual Date Achieved Compliance: Not reported

There are 2 violation record(s) reported at this site:

Evaluation	Area of Violation	Date of Compliance
Compliance Evaluation Inspection	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)	
	GENERATOR-ALL REQUIREMENTS (OVERSIGHT)	20020925

FINDS:
Other Pertinent Environmental Activity Identified at Site:
HAWAII OFFICE OF SOLID WASTE
NATIONAL COMPLIANCE DATABASE SYSTEM
NATIONAL CENTER FOR EDUCATION STATISTICS
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM

17 SSE 1/2-1 3272 ft. | **POHAI NANI CARE CENTER** | **LUST** | **U001237415**
45-090 NAMOKU ST | **UST** | **N/A**
KANEOHE, HI 96744

Relative: Higher

Actual: 157 ft.

LUST:

Facility ID:	9-202196
Release ID:	900099
Facility Status Date:	1993-08-23
Facility Status:	Site Cleanup Completed
Project Officer:	Goyke

UST:

Facility ID:	9-202196	Tank ID:	R-2
Tank Status:	Permanently Out of Use		
Tank Capacity:	2000	Installed:	1967-12-30 00:00:00
Date Closed:	1991-12-16 00:00:00	Substance:	Gasoline
Owner:	POHAI NANI GOOD SAMARITAN KAUHALE 45-090 NAMOKU ST Kaneohe, HI 96744		

Facility ID:	9-202196	Tank ID:	R-1
Tank Status:	Permanently Out of Use		
Tank Capacity:	2000	Installed:	1967-12-30 00:00:00
Date Closed:	1991-12-06 00:00:00	Substance:	Diesel
Owner:	POHAI NANI GOOD SAMARITAN KAUHALE 45-090 NAMOKU ST Kaneohe, HI 96744		

Facility ID:	9-202196	Tank ID:	R-M-3
Tank Status:	Permanently Out of Use		
Tank Capacity:	1000	Installed:	1967-12-30 00:00:00
Date Closed:	1990-08-17 00:00:00	Substance:	Diesel
Owner:	POHAI NANI GOOD SAMARITAN KAUHALE 45-090 NAMOKU ST Kaneohe, HI 96744		

E18 WSW 1/2-1 3524 ft. | **KOOLAU CHEVRON FOODMART** | **LUST** | **U003222012**
45-462 KANEOHE BAY DR | **UST** | **N/A**
KANEOHE, HI 96744

Site 1 of 2 in cluster E

Relative: Higher

Actual: 101 ft.

LUST:

Facility ID:	9-201102
Release ID:	970040
Facility Status Date:	1997-07-11
Facility Status:	LUST Cleanup Initiated: Petroleum
Project Officer:	Pritchard

UST:

Facility ID:	9-201102	Tank ID:	92
Tank Status:	Currently In Use		
Tank Capacity:	10000	Installed:	1982-05-05 00:00:00
Date Closed:	Not reported	Substance:	Gasoline
Owner:	CHEVRON PRODUCTS COMPANY 91-480 MALAKOLE ST. Kaneohe, HI 96744		

Facility ID:	9-201102	Tank ID:	87
Tank Status:	Currently In Use		
Tank Capacity:	10000	Installed:	1977-05-05 00:00:00

KOOLAU CHEVRON FOODMART (Continued) **U003222012**

Date Closed:	Not reported	Substance:	Gasoline
Owner:	CHEVRON PRODUCTS COMPANY 91-480 MALAKOLE ST. Kaneohe, HI 96744		
Facility ID:	9-201102	Tank ID:	89
Tank Status:	Currently In Use		
Tank Capacity:	10000	Installed:	1982-05-05 00:00:00
Date Closed:	Not reported	Substance:	Gasoline
Owner:	CHEVRON PRODUCTS COMPANY 91-480 MALAKOLE ST. Kaneohe, HI 96744		

E19
WSW
1/2-1
3588 ft.

Relative:
Higher

Actual:
103 ft.

ARCO 82106 **LUST** **U001236133**
45-467 KANEOHE BAY DR **UST** **N/A**
KANEOHE, HI 96744

Site 2 of 2 in cluster E

LUST:

Facility ID:	9-200333
Release ID:	980137
Facility Status Date:	2000-04-03
Facility Status:	Site Cleanup Completed
Project Officer:	Li

UST:

Facility ID:	9-200333	Tank ID:	R-4
Tank Status:	Permanently Out of Use		
Tank Capacity:	550	Installed:	Not reported
Date Closed:	1984-01-01 00:00:00	Substance:	Used Oil
Owner:	U.S. RESTAURANT PROPERTIES, INC 12240 INWOOD RD #200 Kaneohe, HI 96744		
Facility ID:	9-200333	Tank ID:	R-92
Tank Status:	Permanently Out of Use		
Tank Capacity:	10000	Installed:	1984-02-07 00:00:00
Date Closed:	2003-03-17 00:00:00	Substance:	Gasoline
Owner:	U.S. RESTAURANT PROPERTIES, INC 12240 INWOOD RD #200 Kaneohe, HI 96744		
Facility ID:	9-200333	Tank ID:	R-89
Tank Status:	Permanently Out of Use		
Tank Capacity:	10000	Installed:	1984-02-07 00:00:00
Date Closed:	2003-03-17 00:00:00	Substance:	Gasoline
Owner:	U.S. RESTAURANT PROPERTIES, INC 12240 INWOOD RD #200 Kaneohe, HI 96744		
Facility ID:	9-200333	Tank ID:	R-87
Tank Status:	Permanently Out of Use		
Tank Capacity:	12000	Installed:	1984-02-07 00:00:00
Date Closed:	2003-03-17 00:00:00	Substance:	Gasoline
Owner:	U.S. RESTAURANT PROPERTIES, INC 12240 INWOOD RD #200 Kaneohe, HI 96744		

20 West 1/2-1 3956 ft. | **WINDWARD SHELL**
45-685 KAMEHAMEHA HWY
KANEOHE, HI 96744 | **LUST** **UST** | **U003154914** **N/A**

Relative: Higher

Actual: 82 ft.

LUST:

Facility ID:	9-201018
Release ID:	970116
Facility Status Date:	1997-09-30
Facility Status:	Site Cleanup Completed
Project Officer:	Sherrer

UST:

Facility ID:	9-201018	Tank ID:	R-3
Tank Status:	Permanently Out of Use		
Tank Capacity:	8000	Installed:	1982-04-18 00:00:00
Date Closed:	1997-07-31 00:00:00	Substance:	Gasoline
Owner:	SHELL OIL COMPANY 789 NIMITZ HWY Kaneohe, HI 96744		

Facility ID:	9-201018	Tank ID:	R-4
Tank Status:	Permanently Out of Use		
Tank Capacity:	550	Installed:	1963-04-19 00:00:00
Date Closed:	Not reported	Substance:	Used Oil
Owner:	SHELL OIL COMPANY 789 NIMITZ HWY Kaneohe, HI 96744		

Facility ID:	9-201018	Tank ID:	R-1
Tank Status:	Permanently Out of Use		
Tank Capacity:	8000	Installed:	1982-04-18 00:00:00
Date Closed:	1997-07-31 00:00:00	Substance:	Gasoline
Owner:	SHELL OIL COMPANY 789 NIMITZ HWY Kaneohe, HI 96744		

Facility ID:	9-201018	Tank ID:	R-5
Tank Status:	Permanently Out of Use		
Tank Capacity:	550	Installed:	1990-08-18 00:00:00
Date Closed:	1997-07-31 00:00:00	Substance:	Used Oil
Owner:	SHELL OIL COMPANY 789 NIMITZ HWY Kaneohe, HI 96744		

Facility ID:	9-201018	Tank ID:	R-2
Tank Status:	Permanently Out of Use		
Tank Capacity:	8000	Installed:	1982-04-18 00:00:00
Date Closed:	1997-07-31 00:00:00	Substance:	Gasoline
Owner:	SHELL OIL COMPANY 789 NIMITZ HWY Kaneohe, HI 96744		

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
21 WNW 1/2-1 5254 ft.	**KANEOHE CHEVRON SERVICE 45-1002 KAMEHAMEHA HWY KANEOHE, HI 96744**	**SHWS FINDS LUST SPILLS**	**1006820744 110013787535**

Relative: Higher

Actual: 79 ft.

FINDS:

Other Pertinent Environmental Activity Identified at Site:

HAWAII ENGINE CONTROL SYSTEM

HAWAII-UNDERGROUND STORAGE TANK

SHWS:

Supplement :	Not reported
Restricted Use :	Not reported
Fed Id :	Not reported
Funding :	Not reported
Agreement/program :	State Site
Activity Type :	Screening
Assignment Date :	2004-05-20 00:00:00
Activity Lead :	John Peard
Assignment End Date :	Not reported
End fill :	2005-08-24 00:00:00
Result fill :	Ongoing
Overall Status :	Ongoing
File Under :	Chevron Products Company
Restricted Use Comm :	Not reported
Ic Relied On In Remedy :	Not reported
Unit :	Kaneohe Chevron Service
Sitelist Name :	Kaneohe Chevron Service

LUST:

Facility ID:	9-201109
Release ID:	040015
Facility Status Date:	2004-11-04
Facility Status:	Site Cleanup Completed
Project Officer:	Fu

HI SPILLS:

Case Number:	20040205-1018
Island:	Oahu
Numerical Quantity:	Not reported
Less Or Greater Than :	Not reported
Units :	Not reported
Activity Type :	Response
Assignment Date :	2004-02-05 00:00:00
Activity Lead :	Terry Corpus
Assignment End Date :	2004-02-05 00:00:00
Result :	8
Supplemental Loc. Text:	Not reported
Unit:	Chevron Gasoline Station
Substances:	Petroleum Hydrocarbon
Incident :	While chasing metal piping, found petroleum contamination at the old tank farm area. (Between 1 foot to 12 foot)
Initial :	None.
Report :	None.

Map ID Direction Distance Distance (ft.) Elevation	Site	Database(s)	EDR ID Number EPA ID Number
22 East > 1 5503 ft.	**FORMER UNOCAL STATION NO. 4393 44-740 KANEOHE BAY DR KANEOHE, HI 96744**	**SHWS SPILLS**	**S106815556 N/A**

Relative:
Higher

Actual:
21 ft.

SHWS:

Supplement :	Not reported
Restricted Use :	Not reported
Fed Id :	Not reported
Funding :	ERRF
Agreement/program :	State Site
Activity Type :	Site Assessment
Assignment Date :	2005-05-05 00:00:00
Activity Lead :	Diane England
Assignment End Date :	2005-06-06 00:00:00
End fill :	2005-06-06 00:00:00
Result fill :	Site under SHWB oversight
Overall Status :	SDAR NFA
File Under :	Unocal Union Oil Company of California
Restricted Use Comm :	Not reported
Ic Relied On In Remedy :	Not reported
Unit :	Former Unocal Station No. 4393
Sitelist Name :	Former Unocal Station No. 4393

HI SPILLS:

Case Number:	20000916-1218
Island:	Oahu
Numerical Quantity:	Not reported
Less Or Greater Than :	Not reported
Units :	Each
Activity Type :	Response
Assignment Date :	2000-09-16 00:00:00
Activity Lead :	Bill Perry
Assignment End Date :	Not reported
Result :	8
Supplemental Loc. Text:	Not reported
Unit:	44-740 Kaneohe Bay Dr, market dumpster odor
Substances:	hydrogen sulfide/decaying fish pieces

Incident : Afterhours SOSC received notification regarding a persistant foul odor originating from a roll-off dumpster owned by Baydrive Market, Kaneohe.

Initial : SOSC requested Baydrive Market manager arrange for immediate refuse company pickup of the dumpster.

Report : Decaying fish located within a roll-off

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU COUNTY	S103763651	KMCAS LANDFILL	KANEOHE BAY		SWF/LF
KAHALUU	U003402870	AHUIMANU WASTEWATER PRELIMINARY TREATMEN FACILITY	47-305 KAHEKILI HWY	96744	UST
KAILUA	1006820819	KAILUA CORPORATION YARD	42-377 KALANIANAOLE HWY	96734	SHWS, FINDS, SPILLS
KAILUA	1006819296	KAWAINUI MARSH	KAPAA QUARRY RD	96734	SHWS, FINDS, SPILLS
KAILUA	S106818199	KAPAA LANDFILL - KAPAA QUARRY ROAD	OLD KAPAA QUARRY RD	96734	SHWS
KANEOHE	1008002840	KANEOHE BAY DRIVE	75-5961 ALI I DR	96744	FINDS
KANEOHE	S106817469	HECO TRANSFORMER 28851	45-420 AUMOKU ST	96744	SHWS, SPILLS
KANEOHE	1000122673	J & M AUTOMOTIVE	45 620 C KAM HWY	96744	RCRA-SQG, FINDS
KANEOHE	1008171056	PALI GOLF COURSE REPAIR CART	EXTENSION OF QUEEN ST	96744	FINDS
KANEOHE	1004688794	WINDWARD TOYOTA SERVICE	45-655 KAM HWY	96744	RCRA-SQG
KANEOHE	S107026355	KANEOHE BAY SHOPPING CENTER	46-047 KAMEHAMEHA HWY.	96744	SPILLS
KANEOHE	S106818798	LONGS DRUGS-KANEOHE BAY	46-047 KAMEHAMEHA HWY	96744	SPILLS
KANEOHE	1008181632	HAWAII WHOLESALE FUMIGATORS	45-1048 KAMEHAMEHA HWY RM 203	96744	FTTS
KANEOHE	8718968	KANEOHE BAY NEAR HEEIA BOAT HARBOR	KANEOHE BAY NEAR HEEIA BOAT HARBOR		ERNS
KANEOHE	94393006	KANEOHE MARINE BASE KANEOHE BAY SIDE	KANEOHE MARINE BASE KANEOHE BAY SIDE		ERNS
KANEOHE	98440502	KANEOHE BAY / VESSEL ANCHORED AT THE SAND BANK	KANEOHE BAY / VESSEL ANCHORED AT THE SAND BANK		ERNS
KANEOHE	91233010	KANEOHE YACHT CLUB, ON KANEOHE BAY DRIVE	KANEOHE YACHT CLUB, ON KANEOHE BAY DRIVE		ERNS
KANEOHE	2000528386	KANEOHE BAY DRIVE	KANEOHE BAY DRIVE		ERNS
KANEOHE	S107025349	KANEOHE BAY DRIVE, PESTICIDE SMELL	KANEOHE BAY DR	96744	SPILLS
KANEOHE	S106818164	KANEOHE BAY MUDDY/OILY WATER	KANEOHE CIR	96744	SPILLS
KANEOHE	1000860448	EE BLACK SCI JV H3 PRECAST YARD	H3 KANEOHE INTERCHANGE	96744	RCRA-SQG, FINDS
KANEOHE	1008880425	CHEVRON 98242	45 462 KANEOHE BAY DR	96744	RCRA-SQG
KANEOHE	S106818027	KAHALUU BAY WATERWAY, TRASH DUMPERS	47-028 LAENANI DR	96744	SPILLS
KANEOHE	S106818172	KANEOHE BAY, FLOAT DEVICE STACKED WITH PAINT RELAT	46-133 LILIPUNA RD	96744	SPILLS
KANEOHE	S106818161	KANEOHE BAY MARINE OIL SPILL REPORTED	46-133 LILIPUNA ST	96744	SPILLS
KANEOHE	1006820777	JP-5 SPILL AT MCBH KANEOHE BAY	MARINE CORP BASE	96744	FINDS
KANEOHE	1006818908	MARINE CORP BASE HAWAII KANEOHE BAY BUILDING 374	MARINE CORP BASE	96744	FINDS
KANEOHE	S106818168	KANEOHE BAY SHEEN #633084	44-275 MIKIOLA DR	96744	SPILLS
KANEOHE	1008171048	OCEAN VIEW TERRACE	NEAR AIRCRAFT PARKING	96744	FINDS
KANEOHE	1006819009	MCBH KANEOHE BAY RANGE FACILITY	RANGE FACILITY	96744	FINDS
KANEOHE	S107025214	MCBH KANEOHE BAY HYDRAULIC FLUID SPILL	1ST ST	96744	SPILLS
KANEOHE	S106818167	KANEOHE BAY SHEEN	45-995 WAILELE RD	96744	SPILLS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

FEDERAL RECORDS

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/14/05
Date Data Arrived at EDR: 11/02/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 35

Source: EPA
Telephone: N/A
Last EDR Contact: 11/02/05
Next Scheduled EDR Contact: 01/30/06
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 8
Telephone: 303-312-6774

EPA Region 4
Telephone 404-562-8033

Proposed NPL: Proposed National Priority List Sites

Date of Government Version: 10/14/05
Date Data Arrived at EDR: 11/02/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 35

Source: EPA
Telephone: N/A
Last EDR Contact: 11/02/05
Next Scheduled EDR Contact: 01/30/06
Data Release Frequency: Quarterly

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/14/05
Date Data Arrived at EDR: 11/02/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 35

Source: EPA
Telephone: N/A
Last EDR Contact: 11/02/05
Next Scheduled EDR Contact: 01/30/06
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Date Data Arrived at EDR: 02/02/94
Date Made Active in Reports: 03/30/94
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 11/21/05
Next Scheduled EDR Contact: 02/20/06
Data Release Frequency: No Update Planned

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 09/19/05
Date Data Arrived at EDR: 10/21/05
Date Made Active in Reports: 10/27/05
Number of Days to Update: 6

Source: EPA
Telephone: 703-413-0223
Last EDR Contact: 12/21/05
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Quarterly

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 08/22/05
Date Data Arrived at EDR: 09/20/05
Date Made Active in Reports: 10/27/05
Number of Days to Update: 37

Source: EPA
Telephone: 703-413-0223
Last EDR Contact: 12/21/05
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Quarterly

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 10/13/05
Date Data Arrived at EDR: 10/27/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 41

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/06/05
Next Scheduled EDR Contact: 03/06/06
Data Release Frequency: Quarterly

RCRA: Resource Conservation and Recovery Act Information

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS). The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 10/14/05
Date Data Arrived at EDR: 10/27/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 41

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/28/05
Next Scheduled EDR Contact: 02/27/06
Data Release Frequency: Quarterly

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/04
Date Data Arrived at EDR: 01/27/05
Date Made Active in Reports: 03/24/05
Number of Days to Update: 56

Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Last EDR Contact: 01/12/06
Next Scheduled EDR Contact: 04/24/06
Data Release Frequency: Annually

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 08/17/05
Date Data Arrived at EDR: 10/18/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 50

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/16/06
Next Scheduled EDR Contact: 04/17/06
Data Release Frequency: Annually

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 08/02/05
Date Data Arrived at EDR: 08/12/05
Date Made Active in Reports: 10/06/05
Number of Days to Update: 55

Source: Environmental Protection Agency
Telephone: 703-603-8867
Last EDR Contact: 01/24/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 01/10/05
Date Data Arrived at EDR: 02/11/05
Date Made Active in Reports: 04/06/05
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 703-603-8867
Last EDR Contact: 01/20/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/04
Date Data Arrived at EDR: 02/08/05
Date Made Active in Reports: 08/04/05
Number of Days to Update: 177

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 11/11/05
Next Scheduled EDR Contact: 02/06/06
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/04
Date Data Arrived at EDR: 06/29/05
Date Made Active in Reports: 08/08/05
Number of Days to Update: 40

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 01/19/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Varies

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 08/18/05
Date Data Arrived at EDR: 08/18/05
Date Made Active in Reports: 10/06/05
Number of Days to Update: 49

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 11/30/05
Next Scheduled EDR Contact: 03/13/06
Data Release Frequency: Semi-Annually

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/14/04
Date Data Arrived at EDR: 02/15/05
Date Made Active in Reports: 04/25/05
Number of Days to Update: 69

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 04/24/06
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 10/07/05
Date Data Arrived at EDR: 10/20/05
Date Made Active in Reports: 12/07/05
Number of Days to Update: 48

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 01/04/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 12/29/04
Date Data Arrived at EDR: 01/07/05
Date Made Active in Reports: 03/14/05
Number of Days to Update: 66

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 10/28/05
Next Scheduled EDR Contact: 12/19/05
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/85
Date Data Arrived at EDR: 08/09/04
Date Made Active in Reports: 09/17/04
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/04
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/03
Date Data Arrived at EDR: 07/13/05
Date Made Active in Reports: 08/17/05
Number of Days to Update: 35

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 12/21/05
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/02
Date Data Arrived at EDR: 04/27/04
Date Made Active in Reports: 05/21/04
Number of Days to Update: 24

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 01/16/06
Next Scheduled EDR Contact: 04/17/06
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/12/05
Date Data Arrived at EDR: 10/31/05
Date Made Active in Reports: 12/20/05
Number of Days to Update: 50

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 12/20/05
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Date of Government Version: 10/12/05
Date Data Arrived at EDR: 10/31/05
Date Made Active in Reports: 12/20/05
Number of Days to Update: 50

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 12/20/05
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Quarterly

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/03
Date Data Arrived at EDR: 01/03/05
Date Made Active in Reports: 01/25/05
Number of Days to Update: 22

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/16/06
Next Scheduled EDR Contact: 04/17/06
Data Release Frequency: Annually

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 08/30/05
Date Data Arrived at EDR: 09/13/05
Date Made Active in Reports: 10/27/05
Number of Days to Update: 44

Source: EPA
Telephone: 202-564-3887
Last EDR Contact: 12/29/05
Next Scheduled EDR Contact: 02/06/06
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/18/05
Date Data Arrived at EDR: 10/31/05
Date Made Active in Reports: 12/20/05
Number of Days to Update: 50

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/03/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Quarterly

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/12/05
Date Data Arrived at EDR: 09/27/05
Date Made Active in Reports: 11/14/05
Number of Days to Update: 48

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 12/27/05
Next Scheduled EDR Contact: 03/27/06
Data Release Frequency: Semi-Annually

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 09/29/05
Date Data Arrived at EDR: 10/04/05
Date Made Active in Reports: 11/14/05
Number of Days to Update: 41

Source: EPA
Telephone: N/A
Last EDR Contact: 01/03/06
Next Scheduled EDR Contact: 04/03/06
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Date Data Arrived at EDR: 07/03/95
Date Made Active in Reports: 08/07/95
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 12/05/05
Next Scheduled EDR Contact: 03/06/06
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/03
Date Data Arrived at EDR: 06/17/05
Date Made Active in Reports: 08/04/05
Number of Days to Update: 48

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/12/05
Next Scheduled EDR Contact: 12/12/05
Data Release Frequency: Biennially

STATE AND LOCAL RECORDS

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 08/24/05
Date Data Arrived at EDR: 08/29/05
Date Made Active in Reports: 09/28/05
Number of Days to Update: 30

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Semi-Annually

SWF/LF: Permitted Landfills in the State of Hawaii

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/19/04
Date Data Arrived at EDR: 05/20/04
Date Made Active in Reports: 06/22/04
Number of Days to Update: 33

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 04/24/06
Data Release Frequency: Varies

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/05
Date Data Arrived at EDR: 08/19/05
Date Made Active in Reports: 09/20/05
Number of Days to Update: 32

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 01/27/06
Next Scheduled EDR Contact: 03/27/06
Data Release Frequency: Semi-Annually

UST: Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/05
Date Data Arrived at EDR: 08/19/05
Date Made Active in Reports: 09/20/05
Number of Days to Update: 32

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 01/27/06
Next Scheduled EDR Contact: 03/27/06
Data Release Frequency: Semi-Annually

SPILLS: Release Notifications
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 08/24/05
Date Data Arrived at EDR: 08/29/05
Date Made Active in Reports: 09/28/05
Number of Days to Update: 30

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls
Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 08/24/05
Date Data Arrived at EDR: 10/12/05
Date Made Active in Reports: 10/26/05
Number of Days to Update: 14

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites

Date of Government Version: 08/24/05
Date Data Arrived at EDR: 10/31/05
Date Made Active in Reports: 12/14/05
Number of Days to Update: 44

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Varies

BROWNFIELDS: Brownfields Sites

Date of Government Version: 08/24/05
Date Data Arrived at EDR: 10/12/05
Date Made Active in Reports: 10/26/05
Number of Days to Update: 14

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 01/26/06
Next Scheduled EDR Contact: 03/20/06
Data Release Frequency: Varies

TRIBAL RECORDS

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/04
Date Data Arrived at EDR: 02/08/05
Date Made Active in Reports: 08/04/05
Number of Days to Update: 177

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 11/11/05
Next Scheduled EDR Contact: 02/06/06
Data Release Frequency: Semi-Annually

EDR PROPRIETARY RECORDS

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: 11/15/05
Date Data Arrived at EDR: 12/05/05
Date Made Active in Reports: 12/28/05
Number of Days to Update: 23

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: 01/25/06
Next Scheduled EDR Contact: 04/24/06
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

BAY VIEW GOLF COURSE
45-285 KANEOHE BAY DRIVE
KANEOHE, HI 96744

TARGET PROPERTY COORDINATES

Latitude (North):	21.407400 - 21˚ 24' 26.6''
Longitude (West):	157.787598 - 157˚ 47' 15.4''
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	625667.1
UTM Y (Meters):	2367582.8
Elevation:	7 ft. above sea level

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

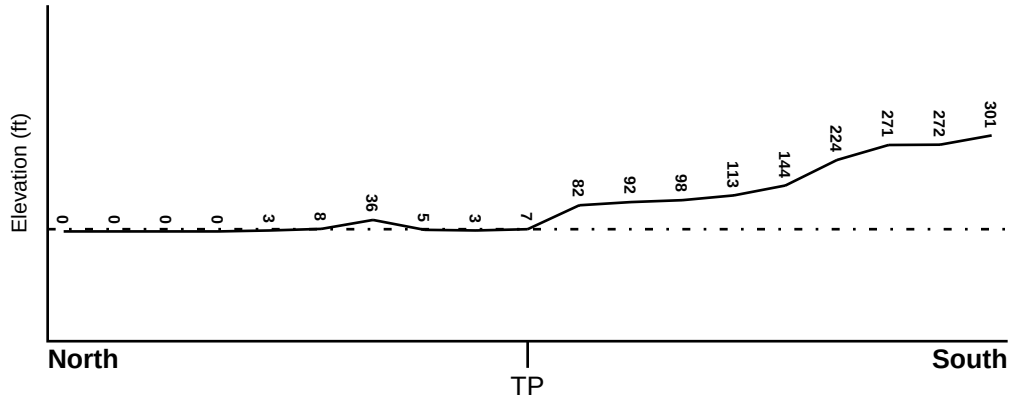
TOPOGRAPHIC INFORMATION

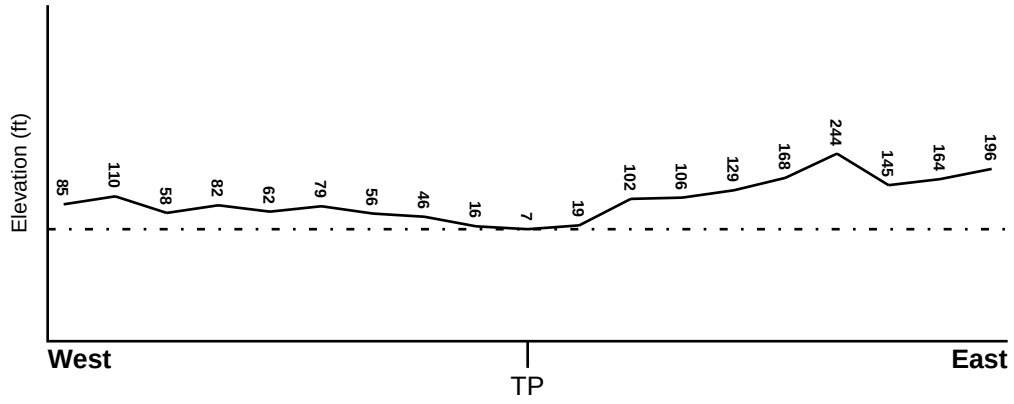
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

USGS Topographic Map:	21157-D7 KANEOHE, HI
General Topographic Gradient:	General NNW
Source:	USGS 7.5 min quad index

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 7 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
HONOLULU, HI	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 1500010060B

Additional Panels in search area: 1500010090C

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
KANEOHE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era: -
System: -
Series: -
Code: N/A *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name: LOLEKAA

Soil Surface Texture: silty clay

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	10 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Kaolinitic suffix for MH	Max: 6.00 Min: 2.00	Max: 5.50 Min: 4.50
2	10 inches	42 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Kaolinitic suffix for MH	Max: 6.00 Min: 2.00	Max: 5.50 Min: 3.60
3	42 inches	65 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Kaolinitic suffix for ML.	Max: 6.00 Min: 2.00	Max: 5.00 Min: 3.60

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: silty clay loam
clay

Surficial Soil Types: silty clay loam
clay

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: silty clay
gravelly - silty clay
silty clay loam

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	3-2447-006	0 - 1/8 Mile SSW
A2	3-2447-005	0 - 1/8 Mile SSE
B3	3-2447-004	1/8 - 1/4 Mile WSW
B4	3-2447-003	1/8 - 1/4 Mile WSW
5	3-2447-002	1/8 - 1/4 Mile West
6	3-2447-001	1/4 - 1/2 Mile NW

PHYSICAL SETTING SOURCE MAP - 1602246.1s

County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location

N

SITE NAME: Bay View Golf Course ADDRESS: 45-285 Kaneohe Bay Drive Kaneohe HI 96744 LAT/LONG: 21.4074 / 157.7876	CLIENT: Tetra Tech EM Inc. CONTACT: Alex Globerson INQUIRY #: 1602246.1s DATE: January 30, 2006

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Map ID Direction Distance Elevation	Database	EDR ID Number
A1 **SSW** **0 - 1/8 Mile** **Higher**	**HI WELLS**	**3-2447-006**

Wid:	3-2447-006	Island Code:	3
Island Name:	Oahu	Well no:	2447-06
Well name:	Bay View Irr 5	Old name:	Not Reported
Yr drilled:	1996	Driller:	MELS WTR WORK
Quad_map:	12	Latitude:	212434
Longitude:	1574727	UTM:	Y
Gps:	N	Owner/user:	Pacific Atlas
Old number:	Not Reported	Well_type:	ROT
Type:	Rotary Drill	Casing dia:	6
Ground Elev:	22	Well depth:	60
Solid casing Depth:	20	Perf casing Depth:	60
Use:	UNU	Use Desc:	Unused
Use year:	96	Water Top Elev:	5.33
Chloride value:	44	Test date:	02/21/1996 00:00:00
Pumping Test rate:	100	Drop in water Lvl:	8.6
Chloride Test:	41	Temperature:	25.2
Units:	C	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	0
Min chlorides:	Not Reported	Min Cl year:	0
Bot_hole depth:	-38	bot_solid depth:	2
Bot_perf depth:	-38	Well Capacity:	12
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-5-030:037	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	02/23/1996 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

A2 **SSE** **0 - 1/8 Mile** **Higher**	**HI WELLS**	**3-2447-005**

Wid:	3-2447-005	Island Code:	3
Island Name:	Oahu	Well no:	2447-05
Well name:	Bay View Irr 4	Old name:	Not Reported
Yr drilled:	1996	Driller:	MELS WTR WORK
Quad_map:	12	Latitude:	212433
Longitude:	1574724	UTM:	Y
Gps:	N	Owner/user:	Pacific Atlas
Old number:	Not Reported	Well_type:	ROT
Type:	Rotary Drill	Casing dia:	6
Ground Elev:	11	Well depth:	50

Solid casing Depth:	10	Perf casing Depth:	50
Use:	UNU	Use Desc:	Unused
Use year:	96	Water Top Elev:	8.37
Chloride value:	45	Test date:	02/17/1996 00:00:00
Pumping Test rate:	100	Drop in water Lvl:	7.4
Chloride Test:	43	Temperature:	24.8
Units:	C	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	0
Min chlorides:	Not Reported	Min Cl year:	0
Bot_hole depth:	-39	bot_solid depth:	1
Bot_perf depth:	-39	Well Capacity:	14
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-5-030:037	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	02/19/1996 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

B3
WSW
1/8 - 1/4 Mile
Higher

HI WELLS **3-2447-004**

Wid:	3-2447-004	Island Code:	3
Island Name:	Oahu	Well no:	2447-04
Well name:	Bay View Irr 3	Old name:	Not Reported
Yr drilled:	1995	Driller:	MELS WTR WKS
Quad_map:	12	Latitude:	212434
Longitude:	1574735	UTM:	Y
Gps:	N	Owner/user:	Pacific Atlas
Old number:	Not Reported	Well_type:	ROT
Type:	Rotary Drill	Casing dia:	6
Ground Elev:	15	Well depth:	50
Solid casing Depth:	10	Perf casing Depth:	50
Use:	UNU	Use Desc:	Unused
Use year:	95	Water Top Elev:	8.48
Chloride value:	25	Test date:	12/12/1995 00:00:00
Pumping Test rate:	60	Drop in water Lvl:	12.0
Chloride Test:	27	Temperature:	25.5
Units:	C	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	Not Reported
Min chlorides:	Not Reported	Min Cl year:	Not Reported
Bot_hole depth:	-35	bot_solid depth:	5
Bot_perf depth:	-35	Well Capacity:	5
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-5-030:037	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	12/14/1995 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

Map ID Direction Distance Elevation	Database	EDR ID Number
B4 **WSW** **1/8 - 1/4 Mile** **Higher**	**HI WELLS**	**3-2447-003**

Wid:	3-2447-003	Island Code:	3
Island Name:	Oahu	Well no:	2447-03
Well name:	Bay View Irr 2	Old name:	Not Reported
Yr drilled:	1995	Driller:	MELS WTR WKS
Quad_map:	12	Latitude:	212436
Longitude:	1574736	UTM:	Y
Gps:	N	Owner/user:	Pacific Atlas
Old number:	Not Reported	Well_type:	ROT
Type:	Rotary Drill	Casing dia:	6
Ground Elev:	14	Well depth:	50
Solid casing Depth:	10	Perf casing Depth:	50
Use:	UNU	Use Desc:	Unused
Use year:	95	Water Top Elev:	5.11
Chloride value:	29	Test date:	11/20/1995 00:00:00
Pumping Test rate:	100	Drop in water Lvl:	5.8
Chloride Test:	28	Temperature:	25.0
Units:	C	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	Not Reported
Min chlorides:	Not Reported	Min Cl year:	Not Reported
Bot_hole depth:	-36	bot_solid depth:	4
Bot_perf depth:	-36	Well Capacity:	86
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-5-030:037	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	11/22/1995 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

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5 **West** **1/8 - 1/4 Mile** **Higher**	**HI WELLS**	**3-2447-002**

Wid:	3-2447-002	Island Code:	3
Island Name:	Oahu	Well no:	2447-02
Well name:	Bay View Irr 1	Old name:	Not Reported
Yr drilled:	1995	Driller:	MELS WTR WKS
Quad_map:	12	Latitude:	212439
Longitude:	1574737	UTM:	Y
Gps:	N	Owner/user:	Pacific Atlas
Old number:	Not Reported	Well_type:	ROT
Type:	Rotary Drill	Casing dia:	6
Ground Elev:	13	Well depth:	50

Solid casing Depth:	10	Perf casing Depth:	50
Use:	UNU	Use Desc:	Unused
Use year:	95	Water Top Elev:	4.43
Chloride value:	29	Test date:	11/17/1995 00:00:00
Pumping Test rate:	50	Drop in water Lvl:	7.5
Chloride Test:	31	Temperature:	25.1
Units:	C	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	0
Min chlorides:	Not Reported	Min Cl year:	0
Bot_hole depth:	-37	bot_solid depth:	3
Bot_perf depth:	-37	Well Capacity:	7
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-5-030:037	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	11/19/1995 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

6
NW **HI WELLS** **3-2447-001**
1/4 - 1/2 Mile
Higher

Wid:	3-2447-001	Island Code:	3
Island Name:	Oahu	Well no:	2447-01
Well name:	Kaneohe	Old name:	Not Reported
Yr drilled:	1946	Driller:	U S ARMY
Quad_map:	12	Latitude:	212454
Longitude:	1574738	UTM:	Y
Gps:	N	Owner/user:	U S Army
Old number:	410-	Well_type:	Not Reported
Type:	Not Reported	Casing dia:	10
Ground Elev:	40	Well depth:	240
Solid casing Depth:	Not Reported	Perf casing Depth:	Not Reported
Use:	SLD	Use Desc:	Sealed
Use year:	46	Water Top Elev:	0
Chloride value:	35	Test date:	Not Reported
Pumping Test rate:	Not Reported	Drop in water Lvl:	Not Reported
Chloride Test:	Not Reported	Temperature:	Not Reported
Units:	Not Reported	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	0
Min chlorides:	Not Reported	Min Cl year:	0
Bot_hole depth:	-200	bot_solid depth:	Not Reported
Bot_perf depth:	Not Reported	Well Capacity:	Not Reported
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	Not Reported	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	01/01/1946 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for HONOLULU County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 96744

Number of sites tested: 22

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.091 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002. 7.5-Minute DEMs correspond to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STATE RECORDS

Ground Water Wells
Source: Department of Land and Natural Resources
Telephone: 808-587-0242

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

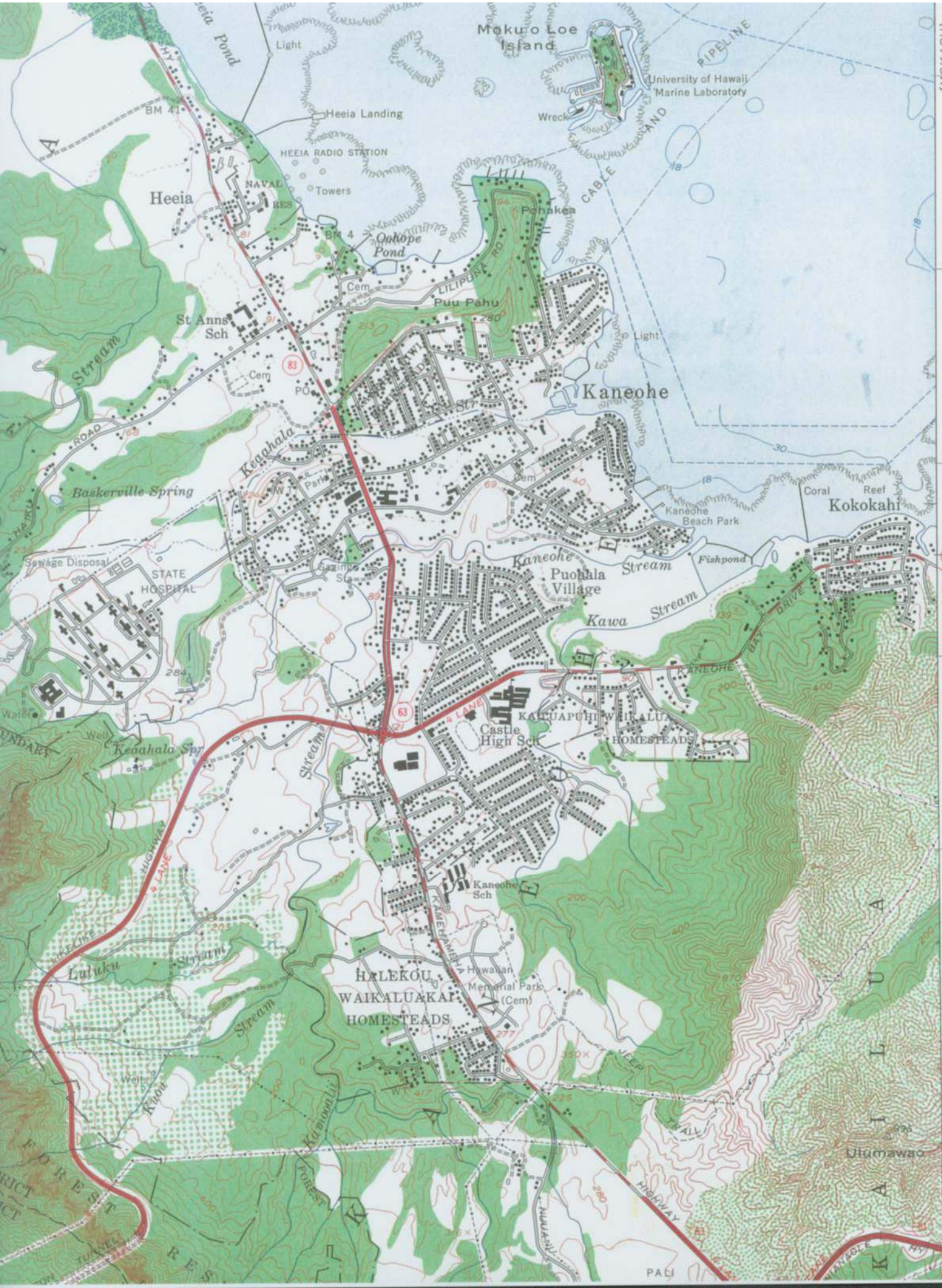
EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

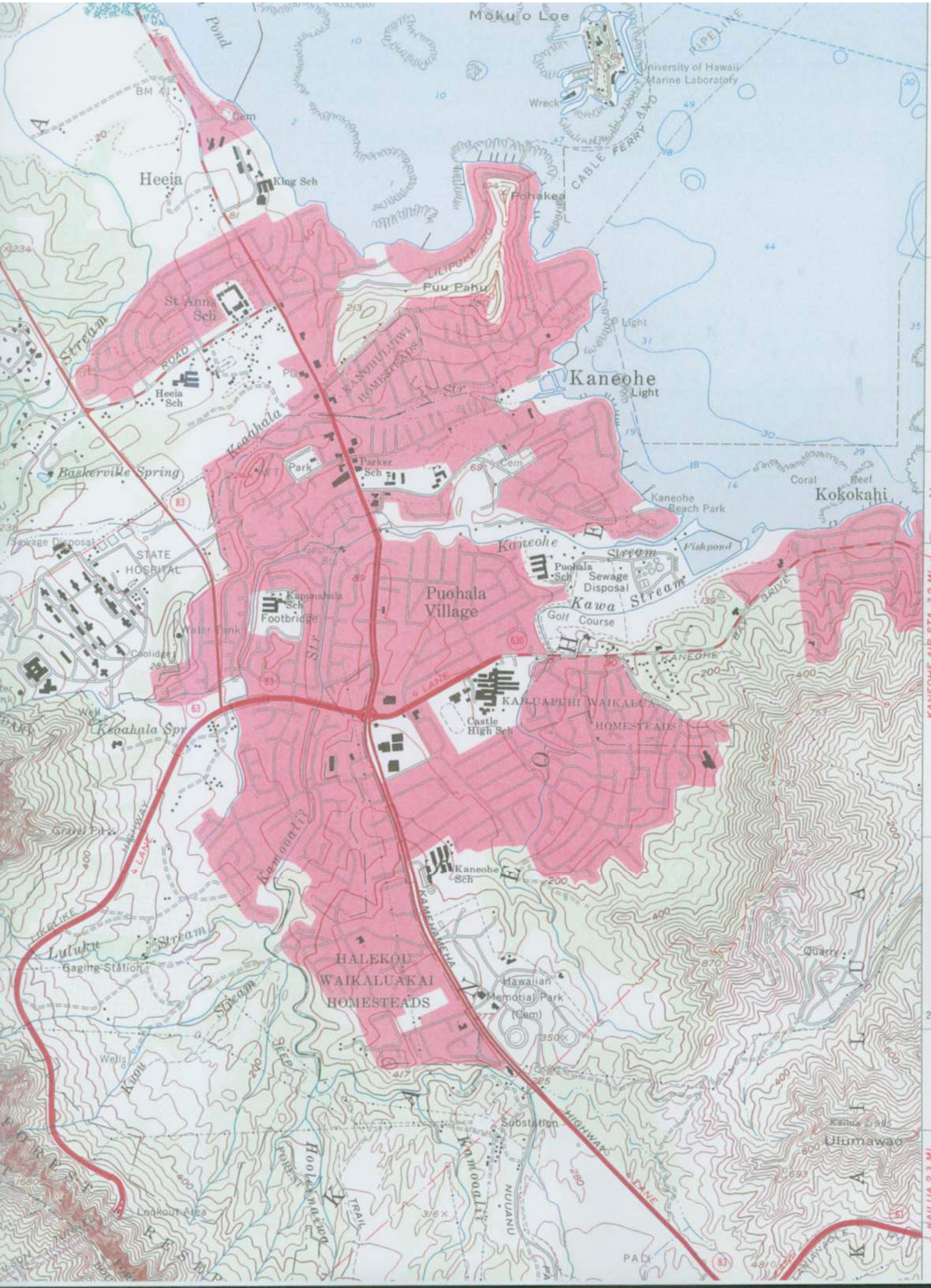
OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

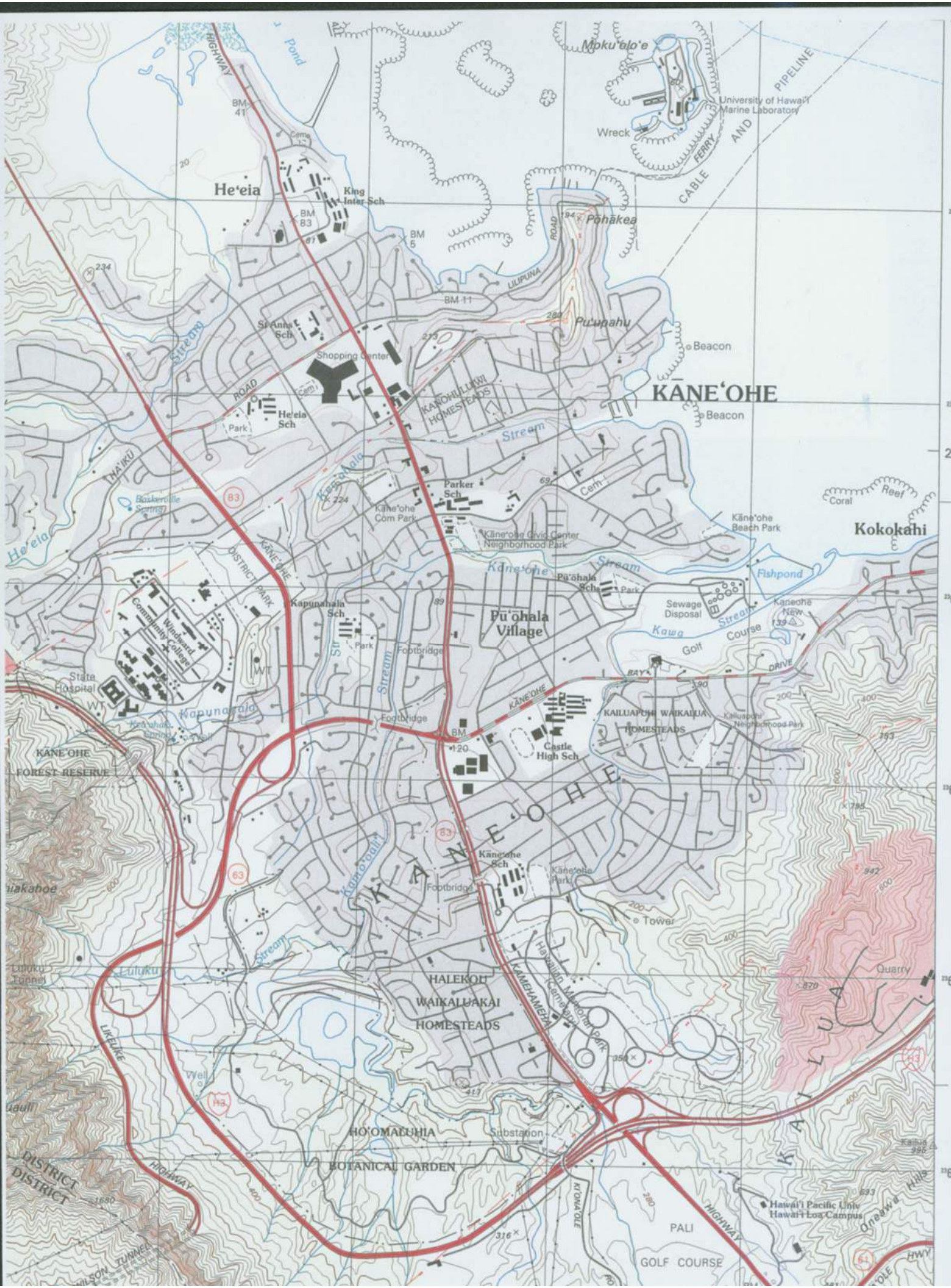
Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

APPENDIX C
ENVIRONMENTAL DATABASE RESOURCES, INC.
HISTORICAL TOPOGRAPHIC MAPS


Moku o Loe Island
University of Hawaii Marine Laboratory
Wreck
PIPELINE
CABLE
Light
Heeia Pond
Heeia Landing
BM 41
HEEIA RADIO STATION
Towers
NAVAL RES
Heeia
BM 4
Oohope Pond
Pohakea
LILIPUNA RD
Puu Pahu
Cem
St Anns Sch
Stream
Keaahala
Kaneohe
Baskerville Spring
Sewage Disposal
STATE HOSPITAL
Kaneohe Beach Park
Coral Reef
Kokokahi
Fishpond
Kaneohe Stream
Puohala Village
Kawa Stream
KANEOHE BAY DRIVE
KANEOHE
KAILUAPUHI WAIKALUA HOMESTEADS
Castle High Sch
Keaahala Spr
Kaneohe Sch
KAMEHAMEHA
Hawaiian Memorial Park (Cem)
HALEKOU WAIKALUAKAI HOMESTEADS
Luluku
Ulumawao
JEEP TRAIL
HIGHWAY
PALI
KANEOHE AIR STA. 3.2 MI.
KAILUA 2.3 MI.
(MOKAPU)
25'
2366000


Mokuo Loe
University of Hawaii Marine Laboratory
Wreck
CABLE FERRY AND PIPELINE
(MOKAPU)
Pond
BM 41
Cem
Heeia
King Sch
Pohakea
LILIPOHA RD
Puu Pahu
St Anns Sch
Stream
ROAD
Heeia Sch
KANOHULUIWI HOMESTEADS
Str
Kaneohe
Light
Keaahala
Baskerville Spring
Park
Parker Sch
Cem
Coral
Beef
Kokokahi
Kaneohe Beach Park
Sewage Disposal
STATE HOSPITAL
Kaneohe
Stream
Fishpond
Puohala Sch
Sewage Disposal
Kawa
Stream
Puohala Village
Kapunahala Sch
Footbridge
Golf Course
BAY DRIVE
Water Tank
Coolidge
KANEOHE
KANEOHE AIR STA. 3.2 MI.
KALUAPILIHI WAIKALUA
HOMESTEADS
Castle High Sch
Well
Keaahala Spr
Gravel Pit
Kamooalii
Kaneohe Sch
KAMEHAMEHA
Lulukii
Stream
Gaging Station
HALEKOU
WAIKALUAKAI
HOMESTEADS
Hawaiian Memorial Park (Cem)
Quarry
Wells
Kuau
Substation
Hoolamanawa
TRAIL
Kamooalii
NUUANU
Kailua
Ulumawao
KAILUA 2.3 MI.
Lookout Area
PALI
25'
2366000

Mokuo Loe
University of Hawaii Marine Laboratory
Wreck
CABLE FERRY AND PIPELINE
(MOKAPU)
Pond
BM 41
Cem
Heeia
King Inter Sch
BM 83
BM 5
Pohakea
BM 11
LILIPUNA RD
Puu Pahu
St Anns Sch
Stream
ROAD
Heeia Sch
Playground
KANOHULUHULU HOMESTEADS
Kaneohe
Light
Keaahala
Baskerville Spring
Parker Sch
Playground
Cem
Kaneohe Civic Center Playground
Coral Reef
Kokokahi
Kaneohe Beach Park
Fishpond
Kaneohe Sch
Playground
Sewage Disposal
Kawa Stream
Kaneohe New
Golf Course
KANEOHE BAY DR
Puohala Village
Kapunahala Sch
Footbridge
Park
Water Tank
KANEOHE DISTRICT PARK
Windward Community College
State Capital
Kapunahala Well
Keaahala Spr
Footbridge
BM 20
KAILUA-PUHI WAIKALUA HOMESTEADS
Castle High Sch
Park
Grand Pier
Kaneohe Sch
Park
Footbridge
Tower
Kamooalii
Likelike
Lulukii
Stream
HALEKOU WAIKALUAKAI HOMESTEADS
Quarry
Hawaiian Memorial Park (Cem)
Well
BM 229
HOOMALUHIA PARK
Substation
FOREST RESERVE
Lookout Area
Ulumawao
Hills
Hawaii Loa College
Oneawa
KIONAOLE
PADI
BM 321
BM 201
KANEOHE AIR STA. 3.2 MI.
KAILUA 2.3 MI.
25'
2366000


Mokuʻoloʻe
University of Hawaiʻi Marine Laboratory
Wreck
CABLE AND PIPELINE
FERRY
Pond
HIGHWAY
He'eia
King Inter Sch
Pōhākea
ROAD
LIUPUNA
Puʻunahu
Beacon
KĀNEʻOHE
Beacon
St Anna Sch
Shopping Center
He'eia Sch
Park
KAHOHULUWI HOMESTEADS
Stream
Kaneʻohe
Parker Sch
Kāneʻohe Com Park
Kāneʻohe Civic Center Neighborhood Park
Kāneʻohe Beach Park
Coral
Reef
Kokokahi
Fishpond
He'ela
Basketville Spring
DISTRICT PARK
KANE'OHE
Kapunahala Sch
Pūʻohala Sch
Pūʻohala Village
Sewage Disposal
Kaneohe New Golf Course
Kawa
Windward Community College
State Hospital
WT
Kapunahala
Footbridge
BAYS
DRIVE
KANE'OHE
KAILUAPUHI WAIKALUA HOMESTEADS
Kailuapuhi Neighborhood Park
Castle High Sch
KANE'OHE FOREST RESERVE
Kāneʻohe Sch
Kāneʻohe Park
Tower
Quarry
HALEKOU WAIKALUAKAI HOMESTEADS
Hawaiian Memorial Park Cemetery
KAMEHAMEHA
KAILUA
Luluku Tunnel
LIKELIKE
Well
HO'OMALUHIA
Substation
BOTANICAL GARDEN
DISTRICT
DISTRICT
HIGHWAY
KI'IONA'OLE
Hawai'i Pacific Univ Hawai'i Loa Campus
PALI
GOLF COURSE
Onewa Hills
WILSON TUNNEL

APPENDIX D
ENVIRONMENTAL SITE ASSESSMENT QUESTIONNAIRE

ENVIRONMENTAL SITE ASSESSMENT QUESTIONNAIRE

This Environmental Site Assessment Questionnaire is designed to assist in determining in whether a proposed project location may have been environmentally impacted from historic or current uses of the site. The Checklist consists of 25 questions, which are completed through verbal or written inquiry to the owner or occupant and a visual site visit. The information presented on the Checklist is intended to be a factual determination about the project site and adjacent areas.

For the purposes of this Checklist, the property is assumed to be the area of the project and not the actual legal boundaries of the parcels involved. This assumption was used to minimize the size of some areas of focus, because legal parcel boundaries can often include areas that do not affect the project.

All questions are answered to the best knowledge of the interviewee.

ENVIRONMENTAL SITE ASSESSMENT QUESTIONNAIRE

Name of Site: **Bay View Golf Course**	Type of Structure: **golf course, clubhouse, auxiliary clubhouse, driving range structure.**
Description of Project: **Phase I ESA**	Location of Project: **Kaneohe, Oahu, Hawaii**

Question	Property Owner (or Representative)	Occupants (if applicable)	Observations During Site Visit
1. How long have you owned/occupied the *property*?		September 2003	NA
2. What is the approximate age of the building (if applicable)?		Approximately 9 years old.	NA
3. Has the *property* had any extensive remodeling? (*If yes, what was done and when did it occur)*		Property has been a golf course since the 1960's. Previous golf course structures demolished and current structures built approximately 1997.	NA
4. What was the past use of the property and any adjacent properties?		Golf course and residential.	NA

Question	Owner	Occupants (if applicable)	Observations During Site Visit
5. What is the nature of the other tenants in the building (if applicable)?		No other tenants.	NA
6. Do you have any documentation of any past environmental work that was conducted at the property? *(if yes, please attach a copy to this questionnaire upon return)*		None to knowledge.	NA
7. Is the *property*, or *any adjoining property*, used for an industrial use, and has it been used for industrial use in the past? *(if yes, please provide brief explanation)*		No.	No.
8. Is the *property,* or *any adjoining property*, currently used for any of the following activities: Gas station; motor repair; commercial printing; dry cleaners; photo-developing; junkyard or landfill; waste treatment, storage, disposal, processing, or recycling? *(if yes, please provide brief explanation)*		The Kaneohe WWTP is located within the subject property.	Kaneohe WWTP.
9. Has the *property* or *any adjoining property* been used for any of the listed activities in the past? *(if yes, please provide brief explanation)*		No.	NA
10. Are there currently, or have there been previously, any of the following in individual containers stored on or used at the *property* or *facility*? Damaged or discarded automotive or industrial batteries, pesticides, paints, or other chemicals *(if yes, please provide quantities, storage or use locations, length of use or storage, etc.)*		Batteries used to power the golf carts are stored in the golf cart farm on the lower level of the clubhouse. Old batteries are removed by an outside subcontractor. Paint, pesticides, and fertilizers are stored in a maintenance/storage area north of the WWTP.	Batteries in golf cart farm. Fertilizer in the maintenance/storage area.

Question	Owner	Occupants (if applicable)	Observations During Site Visit
11. Are there currently, or have there been previously, any industrial drums or sacks of chemicals located on the *property*? *(if yes, please provide brief explanation)*		One 55-gallon drum was left on the property by an outside party. The drum was ½ full with an unknown substance and was removed by a recycling firm.	No.
12. Has fill dirt been brought onto the *property* that originated from a contaminated site or that is of an unknown origin? *(if yes, please provide origin of fill, type of contaminant, when it was brought on the property, etc.)*		No.	NA
13. Are there currently, or have there been previously, any pits, ponds, or lagoons located on the *property* in connection with waste treatment or waste disposal? *(if yes, please provide when and where pits, lagoons, or ponds were located on property)*		No.	No.
14. Is there currently, or has there been previously, any stained soil on the *property*? *(if yes, please provide location and source of staining)*		Occasional hydraulic spills in maintenance area. Spills are on the asphalt and absorbent materials are used to clean the spills.	Minor staining on asphalt of golf course parking lot and asphalt at maintenance/storage area.
15. Are there currently, or have there been previously, any registered or unregistered storage tanks (aboveground or underground) located on the *property*? *(if yes, please provide when and where tanks were on property, and indicate the contents of the tank)*		Three propane ASTs and 2 portable petroleum ASTs.	Three propane ASTs and 2 portable petroleum ASTs.
16. Are there currently, or have there been previously, any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the *property* or *adjacent* to any *structure* located on the *property*? *(if yes, please provide brief explanation)*		No.	No.
17. Are there currently, or have there been previously, any flooring, drains, or walls on the *property* or within the *facility* that are stained by substances other than water or that are emitting foul odors? *(if yes, please provide location and source of staining)*		No.	No.

Question	Owner	Occupants (if applicable)	Observations During Site Visit
18a. Is the property served by a private well or non-public water system? *(if yes, go to 18b)*		Five wells on property. Two are operational and three are inoperable due to mechanical problems.	Five wells observed.
18b. If yes to 18a: Have contaminants been identified in the well or system that exceed guidelines, or has the well been designated as contaminated? *(if yes, please provide type of contaminants)*		The water from the wells is used for irrigation purposes and is tested regularly for pH, which consistently is neutral.	NA
19. Do you know of any environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property? *(if yes, please provide brief explanation)*		No.	NA
20. Have you been informed of the past or current existence of hazardous substances, petroleum products, or environmental violations with respect to the *property* or any *facility* located on the *property*? *(if yes, please provide brief explanation)*		None with respect to the subject property.	NA
21. Do you know of any environmental site assessment of the property or facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the *property* or that recommended further assessment of the *property*? *(if yes, please provide brief explanation)*		No.	NA
22. Do you know of any past, threatened, or pending lawsuits or administrative proceedings concerning release or threatened release of any hazardous substances or petroleum products involving the *property*? *(if yes, please provide brief explanation)*		No.	NA
23. Does the *property* discharge wastewater on or adjacent to the *property*, other than storm water, into a sanitary sewer system? *(if yes, please indicate what is discharged and where it is discharged)*		Wastewater is directed to the Kaneohe WWTP, which transfers the material to the Aikahi WWTP for treatment.	NA

Question	Owner	Occupants (if applicable)	Observations During Site Visit
24. Have any of the following been dumped above grade, buried, or burned on the *property*? Hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries or any other waste materials *(if yes, please indicate what was dumped, where it was dumped, when it was dumped, and how much was dumped)*		Materials are constantly dumped on the periphery of the property by outside parties. All materials observed are disposed of by the golf course personnel.	No.
25a. Is there a transformer, capacitor, or any hydraulic equipment on the *property*?		Two transformers on the property.	One transformer in golf course parking lot and one transformer at Kaneohe WWTP.
25b. If yes, are there records indicating the presence of polychlorinated biphenyls (PCBs)		No.	Parking lot transformer has No-PCB sticker.

Notes for Questions 1 through 25:
Unk = Unknown or no response
NA = Not applicable to site visit

Please use the space provided below to provide a brief explanation of any "yes" responses. Be sure to indicate the appropriate question number next to each explanation. Attach additional sheets if necessary.

The Owner questionnaire was completed by:

Name of Owner (or Representative) _____ **Address** _____

Company _____

Date Reviewed _____ **Phone Number** _____

The Adjacent Property Owner questionnaire was completed by:

Name of Occupant Bruce Doorly

Company Bay View Investment Co., LLC **Address** 45-285 Kaneohe Bay Drive, Kaneohe, HI 96744

Date Reviewed 1/31/06 **Phone Number** 386-4726

The Occupant questionnaire was completed by:

Name of Occupant _____

Company _____ **Address** _____

Date Reviewed _____ **Phone Number** _____

APPENDIX E
QUALIFICATIONS OF PROJECT PERSONNEL

coordination and planning of thirteen ongoing sampling and remediation projects conducted out of the Tetra Tech Honolulu office. Mr. Brodersen oversees activities within eight technical disciplines including innovative technologies, geosciences, engineering, chemistry, data management, ecological and human health risk assessment, BRAC, and regulatory/policy support. Mr. Brodersen provides technical and contract quality assurance and quality control.

- **Project Manager, State of Hawaii Department of Health, Hawaii –** Mr. Brodersen serves as the project manager for the development of total maximum daily loads for Pearl Harbor, Oahu, and Nawiliwili Bay, Kauai, Hawaii DOH, Environmental Planning Office. Mr. Brodersen manages a team of water quality modelers, watershed experts, GIS staff, and community involvement experts in preparing TMDLs, integrating watershed data analysis and modeling, and developing viable solutions for improvement of water quality of the Pearl Harbor and Nawiliwili watersheds.

- **Technical Support, Kailua Bay Advisory Council (KBAC), Hawaii** – Mr. Brodersen assisted KBAC in developing and adopting a water quality improvement plan to improve water quality in the Kailua waterways system. Mr. Brodersen formed and facilitated meetings of an advisory-stakeholders group, made up of stakeholders and community members, to provide input on and prioritize water quality issues and proposed implementation actions. Mr. Brodersen led watershed tours and presentations to educate the group on watershed properties, characteristics of and interactions between the various waterways segments, and the associated water quality problems. He also provided technical input to the KWIP, which described and prioritized the water quality issues, identified appropriate remedial measures, and outlined a strategy for implementing the most feasible measures that would result in the greatest improvement in water quality in the watershed.

- **Technical Support, U.S. EPA, Hawaii –**Under contract to EPA Region 9, Mr. Brodersen is assisting with the development of the "Hawaii Strategic Action Plan for Preventing Land-Based Pollution Impacts to Coral Reefs." Working with a steering committee consisting of EPA Region 9, U.S. Department of Agriculture, Hawaii Department of Health, Hawaii Department of Land and Natural Resources, and Hawaii Coastal Zone Management, Mr. Brodersen is helping to plan and develop a Pacific Regional Conference and various workshops on coral reefs and land-based pollution prevention. Mr. Brodersen will compile and assess information obtained from these conferences and workshops to help develop the Hawaii Strategic Action Plan, with input from the steering committee and other coastal zone stakeholders.

- **Project Manager, CERCLA Remedial Investigation/Feasibility Study, U.S. Navy, Hunters Point Shipyard, California** — Mr. Brodersen was responsible for the overall management and execution for the remedial investigations/feasibility studies (RI/FS) for the U.S. Navy at the Hunters Point Shipyard, California. Mr. Brodersen was responsible for the work of the Tetra Tech EM Inc. team of 30 employees and over 20 subcontractors, as conducted under 12 active projects valued at over $25 million. Activities at Hunters Point involve the characterization and remediation of petroleum wastes, industrial process sites such as steel-working and electroplating at a naval shipyard, solvent wastes in the form of DNAPLs, a landfill on the bay, and radiological wastes. Mr. Brodersen was responsible for overall contract administration, scheduling, cost estimating, technical oversight, and document review.

- **Program Manager, U.S. Navy, California** — Mr. Brodersen served as the technical and subcontracting program manager under the CLEAN contracts. Mr. Brodersen was responsible for the identification of program issues and resolution of technical approaches at 18 major installations. Specific responsibilities included preparing position papers, conducting technical presentations and workshops for installation teams, and providing technical and contract quality assurance and quality

control. Mr. Brodersen was involved with the biannual technical performance reviews for each installation, including designing and implementing program improvement plans.

Mr. Brodersen oversaw management issues and technical quality involving team firm and other subcontractors under the CLEAN contracts. Specific duties included monitoring procurements, coordinating, attending, and participating in seminars, procurement conferences, and other business opportunity functions, preparing small business utilization reports, supervising and assisting procurement and technical staff in counseling and assisting small business referrals, advising qualifying firms on how to improve their bid and proposal practices and assisting them in developing company procedures, and reviewing firm capabilities and advising the firms of methods to increase their capabilities.

- **Project Manager, UST Removal and Remedial Actions, U.S. Navy, Port Hueneme, California** — Mr. Brodersen was the project manager for the UST Removal Action and Remedial Investigations being conducted at NCBC Port Hueneme, California. The investigation encompasses more than 90 abandoned USTs. The investigation consists of multiple projects and phases being conducted at different stages. Mr. Brodersen was the project manager for the UST Naval Exchange Gasoline Station Interim Remediation Project being conducted at NCBC Port Hueneme, California. The project consists of characterizing and remediating a spreading floating product plume at the facility. The project included technical approaches including soil gas surveys, monitoring well installation, free product extraction systems, dissolved product removal systems, and a soil trenching remediation system.

- **Project Manager, CERCLA Remedial Investigation, U.S. Navy, Port Hueneme, California** — Mr. Brodersen was the project manager for the CERCLA Remedial Investigation/Feasibility Study (RI/FS) conducted at NCBC Port Hueneme. The RI/FS encompassed sites with pesticide, paint, solvent, metals, radioactivity, and petroleum hydrocarbon contamination.

- **Project Manager, CERCLA Site Inspection, U.S. Navy, Port Hueneme, California** — Mr. Brodersen was the project manager for the CERCLA Site Inspection (SI) conducted at NCBC Port Hueneme, California. The SI encompassed seven separate sites with potential radioactive, pesticide, solvent, metals, petroleum hydrocarbon, and mixed waste contamination.

- **Project Manager, UST Retrofit Study, U.S. Navy, Port Hueneme, California** — Mr. Brodersen was the project manager for the UST Retrofit Study conducted at NCBC Port Hueneme, California. The Retrofit Study encompassed more than 30 active USTs. The project consisted of regulatory agency meetings, file reviews, site reconnaissance, UST verification studies, and regulatory compliance evaluations for each UST.

- **Field Team Leader, Geophysical Survey, U.S. Navy, California** — Mr. Brodersen was the field team leader for the geophysical survey performed at over 60 abandoned UST sites at NAWS Point Mugu, California. The project consisted of underground utility reviews and site reconnaissance, field investigation activities, and data interpretation. Field techniques used included ground penetrating radar, electromagnetic induction, and electromagnetic resistance. Mr. Brodersen has managed geophysical surveys and contributed to UST removal activities at NAS Moffett Field, NCS Stockton, Mare Island Naval Shipyard, NSC Oakland, and Hunters Point Shipyard.

- **Project Manager, RCRA Enforcement Oversight, U.S. EPA, John Smith Landfill, California** — Mr. Brodersen was the project manager for the EPA Technical Enforcement Support of the RCRA Facility Investigation and Corrective Measures Study at John Smith Landfill, California. Mr.

Brodersen provided technical expertise to the EPA regarding the geologic and hydrogeologic characterization of the site. Mr. Brodersen oversaw groundwater-modeling methods and participated in perfecting the appropriate model. Mr. Brodersen is responsible for the preparation of the work plans, technical approach and rationale, cost estimates, negotiations, budget tracking, client/team firm communications, and deliverable submittals.

- **Technical Support, CERCLA Enforcement Oversight, HRS Program, U.S. EPA, Region 9** — Mr. Brodersen was the technical advisor for the EPA Technical Enforcement Support of the CERCLA Preliminary Assessment/Site Investigation Hazardous Ranking Scoring (PA/SI HRS). Mr. Brodersen helped developed the work plan for the technical approach and contributed to initial computer assessments of multiple sites. Mr. Brodersen was the technical advisor for the PA/SI HRS expert system computer model.

- **Project Manager, UST Remediation Project, Federal Courthouse Site, GSA, Las Vegas, Nevada** — Mr. Brodersen was the project manager for a UST remediation oversight project in Las Vegas, Nevada. Mr. Brodersen continues to serve as the technical consultant to the property development group at General Services Administration. The project includes technical review of existing remedial and groundwater monitoring activities, and the preparation of a preferred remedial approach.

- **Geologist, Technical Assistance, Various Projects** — Mr. Brodersen was responsible for environmental proposal writing, implementation and management of field sampling programs at numerous hazardous waste sites and landfills, data analysis, and gas chromatograph operation. Mr. Brodersen was responsible for the Report of Disposal Site Information and contributed to the SWAT at China Grade Landfill. Additional projects included the Caltrans Cross-town Freeway in Santa Barbara, California, Santa Maria Town Center in California, Texaco Oil Refinery in Bakersfield, California, and BP Petroleum in New Orleans, Louisiana.

- **Technical Support, CERCLA Compliance, Tracor Aviation, Santa Barbara, California** — Mr. Brodersen assisted in CERCLA SARA Title III Compliance reporting while at Tracor Aviation, Inc. His responsibilities included hazardous waste inventory and documentation.

- **Research Assistant, Satellite Optical Development, Thomson C.S.F, Paris, France** — Mr. Brodersen assisted with the research and development of optical properties while at Thomson C.S.F. as measured through liquid-phase epitaxial growth of yitrium-iron-garnet. His responsibilities included quality assurance and quality control, in addition to technical writing and language translations.

PROFESSIONAL ORGANIZATIONS/ASSOCIATIONS

American Geophysical Union
National Contract Management Association
State of California Board of Geologists and Geophysicists

EMPLOYMENT HISTORY

1990 - Present	Tetra Tech EM Inc.
1989 - 1990	Metcalf & Eddy
1988 - 1989	Tracor Aviation
1986	Thomson C.S.F.

JASON BRODERSEN, R.G.

Geologist **Tetra Tech EM Inc. – Honolulu**

EDUCATION/SPECIAL TRAINING

B. S. Geophysics, University of California, Santa Barbara, 1987
TPG Leadership Challenge, TPG Learning Systems, 1992
Health and Safety Site Supervisor Training, PRC EMI, 1990
Toxicity Characteristic Training, EPA, 1990
Land Disposal Restrictions Training, EPA, 1990
CERCLA Guidance Training, PRC EMI, 1990
Geophysical Methods for Environmental Assessments, EPA, 1990
Hydrogen Sulfide Training, Safety Technical Protectors, 1989
Health and Safety Training, OSHA, 1989

REGISTRATION/CERTIFICATION

Registered Geologist, California, No. 6262

QUALIFICATIONS

Mr. Brodersen has a wide range of experience in project and program management and technical oversight. He has worked in the environmental field as a project manager and geologist for 15 years. His experience includes managing multiple projects covering all facets of environmental investigations. Mr. Brodersen has been responsible for project execution and negotiations, client and regulatory agency interface, and project communications for over 40 projects with an approximate value of $35 million.

Mr. Brodersen has been responsible for coordinating and overseeing the application of water resource projects, hazardous waste investigations, innovative technologies, conducting compliance inspections, site prioritization, risk assessment, and engineering oversight. Mr. Brodersen has been responsible for subcontractor program management including negotiating hundreds of large and small business contracts, valued at $80 million; monitoring subcontractor performance; and integrating small and disadvantaged businesses into ongoing technical work. Under a $260-million comprehensive cleanup contract with the U.S. Navy, Mr. Brodersen was responsible for coordinating with all subcontractors, managing project and program resources, managing the Department of Defense mentor protégé program, and ensuring high technical quality of work.

RELEVANT EXPERIENCE

- **Project Manager, Phase I Site Assessments, Hawaiian Electric Company (HECO), Verizon Wireless** — Mr. Brodersen served as project manager on multiple Phase I environmental site assessments throughout various locations on Oahu, Kauai, Maui, and Hawaii for HECO and Verizon Wireless. His responsibilities included collecting background and historical information on the various sites, conducting field assessments of the locations and surrounding areas, and preparing reports documenting the findings of the investigations.

- **Program Manager, U.S. Navy, Hawaii** — Mr. Brodersen serves as the Tetra Tech EM Inc. program manager for the U.S. Navy PACDIV CLEAN program. Mr. Brodersen is responsible for the

ALEX J. GLOBERSON

Geologist **Tetra Tech EM Inc. - Honolulu**

EDUCATION

B.A., Geological Sciences, State University of New York at Geneseo, 1999

QUALIFICATIONS

Mr. Globerson has more than 5 years of experience in the environmental field. His experience includes technical and field support to hazardous waste site investigations, compliance monitoring for chemical and industrial facilities, and Phase I and Phase II environmental site assessments (ESA). Currently Mr. Globerson supports various projects for Pacific Division (PACDIV), Naval Facilities Engineering Command, through field sampling. He also has conducted background research and field sampling in support of a total maximum daily load (TMDL) survey of the Pearl Harbor watershed.

RELEVANT EXPERIENCE

- **Phase I and Phase II ESAs, Hawaiian Electric Company, Inc. (HECO), Honolulu, Oahu, Hawaii.** Mr. Globerson prepared multiple Phase I ESAs for various sites on Oahu and Maui for HECO. The Phase I ESAs were conducted in accordance with ASTM standards. His responsibilities included collecting background and historical information on the sites, conducting field assessments of the locations and surrounding areas, and preparing reports documenting the assessment findings. In addition, Mr. Globerson also served as the field manager for several Phase II sampling investigations to identify potential sources of contamination based on information obtained through previous Phase I ESAs. For Phase II sampling activities, Mr. Globerson's responsibilities included conducting field assessments of the locations, working in partnership with the client to obtain necessary access to the site location prior to sampling activities, coordinating utility clearance of the sampling area (if necessary), conducting soil and/or groundwater sampling, and preparing a written report of the investigation findings and recommendations.

- **Phase I ESAs, Maui Electric Company, Ltd. (MECO), Maui, Hawaii.** Mr. Globerson has conducted Phase I ESAs for MECO in accordance with ASTM standards. His responsibilities included collecting background and historical information on the sites, conducting file reviews at local and state agencies, reviewing aerial photographs, conducting visual site assessments of the locations and surrounding areas, and preparing reports documenting the assessment findings.

- **Phase I ESAs, D.R. Horton, Inc. (Schuler Homes), Various Locations on Oahu and Hawaii.** Mr. Globerson conducted Phase I and Phase II ESAs for D.R. Horton (Schuler Homes), a national homebuilder, and its subsidiaries in connection with properties owned or considered for acquisition for various housing development parcels located on the islands of Oahu and Hawaii. The Phase I ESAs were conducted in accordance with ASTM standards. His responsibilities included a visual inspection of each site and the accessible exteriors of surrounding properties; interviews with company and public officials; and reviews of appropriate federal, state, local, historical, and environmental records. Mr. Globerson prepared detailed and thorough reports that were well received by the client and conducted the ESAs on an expedited basis, exceeding the tight schedule and budget requirements of the client.

- **Phase II ESAs, Actus Lend Lease, LLC., Honolulu, Oahu, Hawaii.** Mr. Globerson served as field manager and technician for Phase II sampling activities conducted on Hickam Air Force Base (Hickam AFB), on Oahu, Hawaii for Actus Lend Lease, LLC. Phase II sampling was conducted concurrently with the Phase I assessments due to an expedited schedule. Mr. Globerson's responsibilities included preparing a site health and safety plan, conducting visual site assessments of the sampling locations identified during the Phase I ESA to ensure that access was attainable, working in partnership with the client to obtain necessary passes to perform the direct-push sampling on a military facility, coordinating utility clearance of the sampling area with the Air Force, and other utility providers, scheduling clearance and sampling activities, and conducting soil and/or groundwater sampling.

- **Field Sampling to Support PCB Removal Action at Former Naval Air Station Barbers Point, U.S. Navy, Pacific Division, Oahu, Hawaii.** Mr. Globerson supported field sampling investigations to help delineate polychlorinated biphenyl (PCB) contaminated soil adjacent to transformer sites. Mr. Globerson performed site measurements to determine sampling locations and collected hand samples. He also oversaw subcontracted subsurface drilling activity. Responsibilities included contacting on-site personnel, coordinating subcontractors, and conducting proper field sampling in accordance with sampling and analysis plans.

- **Field Sampling to Support PCB Removal Actions, Numerous Navy Bases Across Oahu, U.S. Navy, Pacific Division, Hawaii.** Mr. Globerson currently is the field team leader on the PCB removal action at over 60 transformer sites at various Navy Bases on Oahu. Responsibilities include utility clearance oversight, identifying proposed sampling locations, coordinating and maintaining subcontractor schedules, subsurface drilling oversight, collection of hand and Geoprobe direct push samples, boring log identification and recording, and technical support for contaminated soil delineation design.

- **Research and Field Sampling for Total Maximum Daily Load (TMDL) Survey of Nawiliwili Watershed, State of Hawaii Department of Health, Kauai, Hawaii**. Mr. Globerson provided technical support to describe the physical characteristics and historical data of the watershed. Soil type, stream flow, precipitation, well location, and potential point source contributing data was researched, collected, and compiled for use in the preparation of a TMDL report that identified relations between water quality and potential sources of pollution.

- **Research and Field Sampling for Total Maximum Daily Load (TMDL) Survey of Pearl Harbor Watershed, State of Hawaii Department of Health, Oahu, Hawaii.** Mr. Globerson supports activities performed to describe the physical characteristics and potential pollution sources contributing to the watershed. Responsibilities include research and field sampling. Various data including stream flow, precipitation, monitoring locations and a list of NPDES point source permit holders was collected to evaluate historical stream trends. Field sampling, including the collection of water samples and measurement of field parameters, is currently conducted on a monthly basis to evaluate the baseline flow of various streams within the watershed. Future activities will include the installation of automated sampling equipment, downloading data collected from the automated samplers, and the collection of samples during storm events.

- **Technical Research and Community Outreach Support for Watershed Improvement Plan, Kailua Bay Advisory Council, Oahu, Hawaii.** Mr. Globerson researched and reviewed secondary data from reports, studies, and published literature on water quality and nonpoint sources of pollution in the Kailua watershed. He identified and contacted state and local offices to obtain relevant information and data. He compiled and maintained a database of data and information sources that

was used to identify best management practices and remedial options to improve water quality in the Kailua waterways system.

- **Search and Recovery of Space Shuttle Columbia Wreckage, U.S. Environmental Protection Agency, Region 6, Corsicana, Texas.** Mr. Globerson supported field activities for the purpose of locating, identifying, collecting, and the safe handling of wreckage from the February 1, 2003 Space Shuttle Columbia disaster. As a member of the Superfund Technical Assistance and Response Team (START) Mr. Globerson helped to collect and identify shuttle debris, document all items using GPS, iPAC PDA's, and digital cameras, and deliver materials to NASA representatives for use in the disaster investigation.

- **National Pollutant Discharge Elimination System (NPDES) Compliance Monitoring, Stockpiled Transformer Oil Testing, and Regulatory Report Filing, Southern States Phosphate and Fertilizer Company, Savannah, Georgia.** Mr. Globerson was responsible for filing various facility wide regulatory reports and conducting various field efforts at the sulfuric acid transfer and mixing station. Facility wide wastewater outflow pH meters were calibrated, surface water samples were collected and stream field measurements were recorded from wastewater outflow sources. Data from the sampling events was included in yearly NPDES reports. Mr. Globerson also assisted with the filing of regulatory reports for air emissions groundwater use. Mr. Globerson also conducted field tests to determine if transformers stockpiled on site, contained PCB contaminated oil.

- **Unexploded Ordnance (UXO) Cleanup, United States Army, Fort Ord, California.** Mr. Globerson assisted with geophysical data collection for the purpose of the detection and removal of unexploded ordinance (UXO) at the former military installation. The field effort included the use of Geonics EM-61 conductivity meters and Geometrics 858 magnetometers for geophysical evaluation and Trimble GPS equipment to locate potential hazards to be evaluated for removal or detonation.

EMPLOYMENT HISTORY

Tetra Tech EM Inc., Geologist, 2002-present
ADVENT Environmental Inc., Geologist, 2000 - 2002

TRAININGS AND CERTIFICATIONS

OSHA 40-Hour Hazardous Waste Operations & Emergency Response Initial Training, 2000
8 Hour Refresher Training, September 2003
Certified First Aid/ CPR, September 2003

Appendix IV: Baseline Marine, Estuarine, and Stream Surveys for Bayview Golf Course Expansion by Hida, Okamoto and Associates, Inc. (May 1989)

Baseline Marine, Estuarine and Stream Surveys Bayview Golf Course Expansion South Kaneohe Bay, Oahu, Hawaii

Prepared for

Hida, Okamoto and Associates, Inc.
2600 South King Street - Suite 207
Honolulu, Hawaii 96822

May 1989

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SECTION 1.0

INTRODUCTION

The scope of services was to provide baseline marine, estuarine and freshwater biological and water quality support for an environmental assessment of the proposed expansion of the Bayview Golf Course, Kaneohe, Hawaii (Figure 1).

Specific services included the following:

1. Qualitative underwater biological surveys encompassing nearshore coastal water habitats (identification and assessment of corals, algae, fishes and invertebrates);

2. Qualitative surveys of intertidal flora and fauna (high and low tide periods);

3. Physical-chemical characterization of coastal and nearshore marine environments (temperature, salinity, dissolved oxygen, and turbidity) at various tidal periods;

4. Qualitative underwater (or as applicable) biological surveys of existing ancient Hawaiian fishponds, stream channels (including estuarine reaches), and existing wetlands (fish and invertebrates); and,

5. Physical-chemical characterization of ancient Hawaiian fishponds, existing stream channels (including estuarine reaches), and existing wetlands at various tidal periods (temperature, salinity, dissolved oxygen, turbidity).

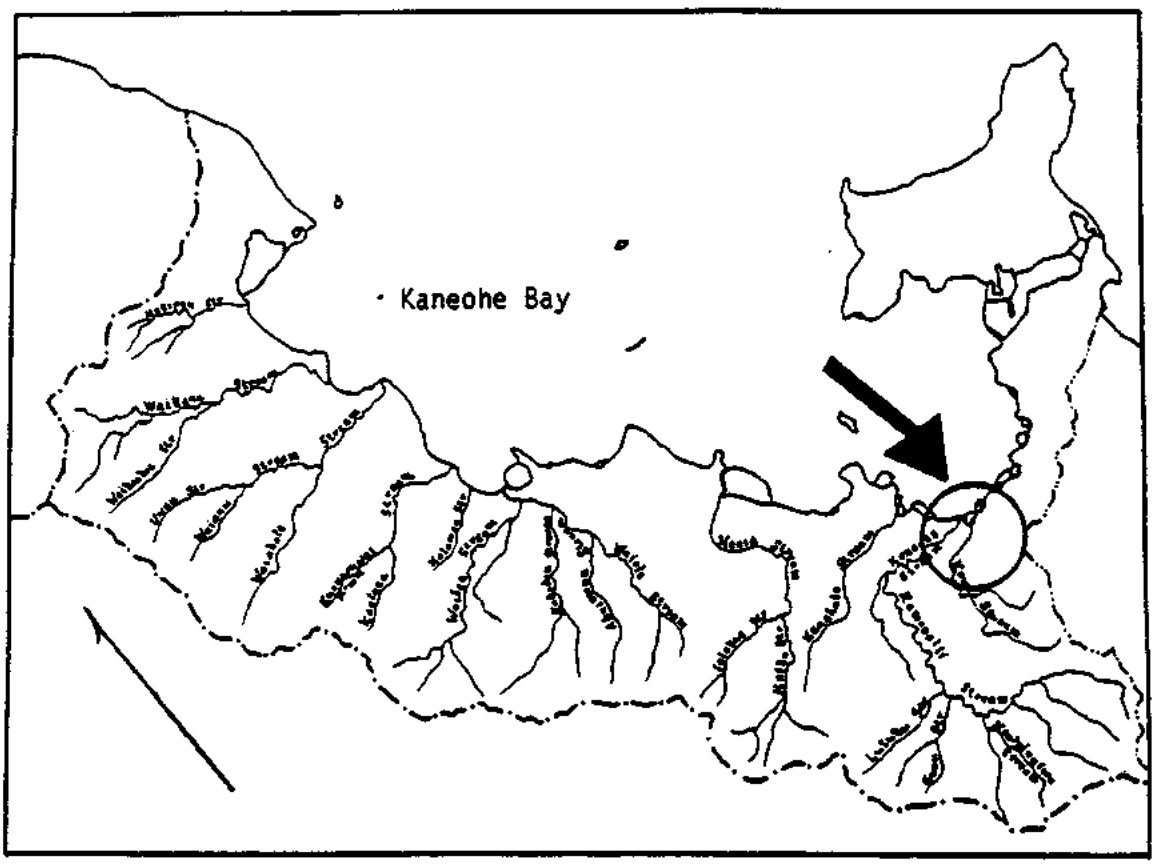


Figure 1. Location Map, Kaneohe Bay.

SECTION 2.0

METHODS

2.1 Physical-Chemical Measurements

Salinity and temperature measurements were made with a Yellow Springs Instrument Company (YSI) S-C-T meter equipped with a YSI Model 3300 nickel-platinum conductivity and temperature probe. All measurements were based on *in situ* readings from the shoreline or from an inflatable boat. Based on manufacturer-supplied data, worst case instrument and probe (combined) error for temperature and salinity are ±0.7 degrees Centigrade (°C) and ±0.2 parts per thousand (ppt), respectively. Some reading were made by *averaging* meter oscillations because of the efflux of brackish groundwater in the nearshore and estuarine reaches of both Kawa and Kaneohe Streams.

Dissolved oxygen measurements were obtained using a YSI Model 51B dissolved oxygen meter equipped with a YSI Model 5739 pressure-compensated, polarographic probe. The instrument was calibrated according to factory guidelines in a water vapor saturated chamber. Measurements were based on *in situ* readings from the shoreline or from an inflatable boat. Manufacturer's data indicate a probable error accumulation (maximum worst-case) of ±0.52 parts per million (ppm).

Turbidity measurements were made with a Turner Nephelometer. Field samples were collected and returned to the laboratory for analysis within two hours of collection. Water quality sampling station locations are depicted in Figures 2 and 3.

2.2 Biological Surveys

2.2.1 Nearshore Marine and Fishpond Environments

Biological surveys were conducted with mask and snorkle apparatus to assess qualitatively the major physiographic features, biological zonation patterns, and benthic assemblages occurring throughout the study area. Underwater surveys were limited to a depth of about 3 m, which was the maximum depth recorded near mouths of Kaneohe and Kawa Streams. No effort was made to identify or enumerate cryptic species dwelling within the reef flats or mudflats. All observations were recorded on water-proof Polypaper sheets and supplemented by underwater photographs using a Nikonos II underwater camera.

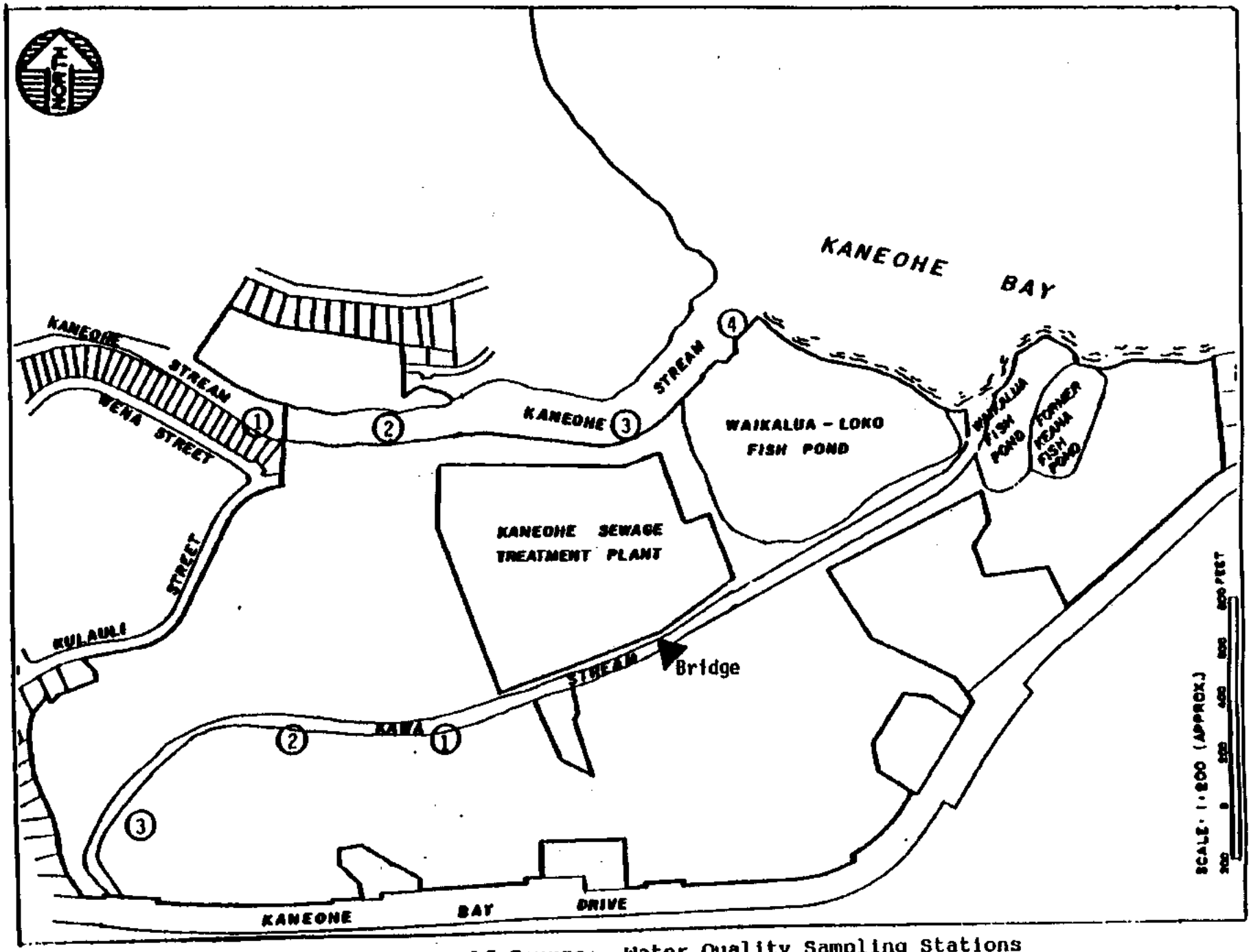


Figure 2. Bayview Golf Course: Water Quality Sampling Stations and Present Alignment of Kawa Stream.

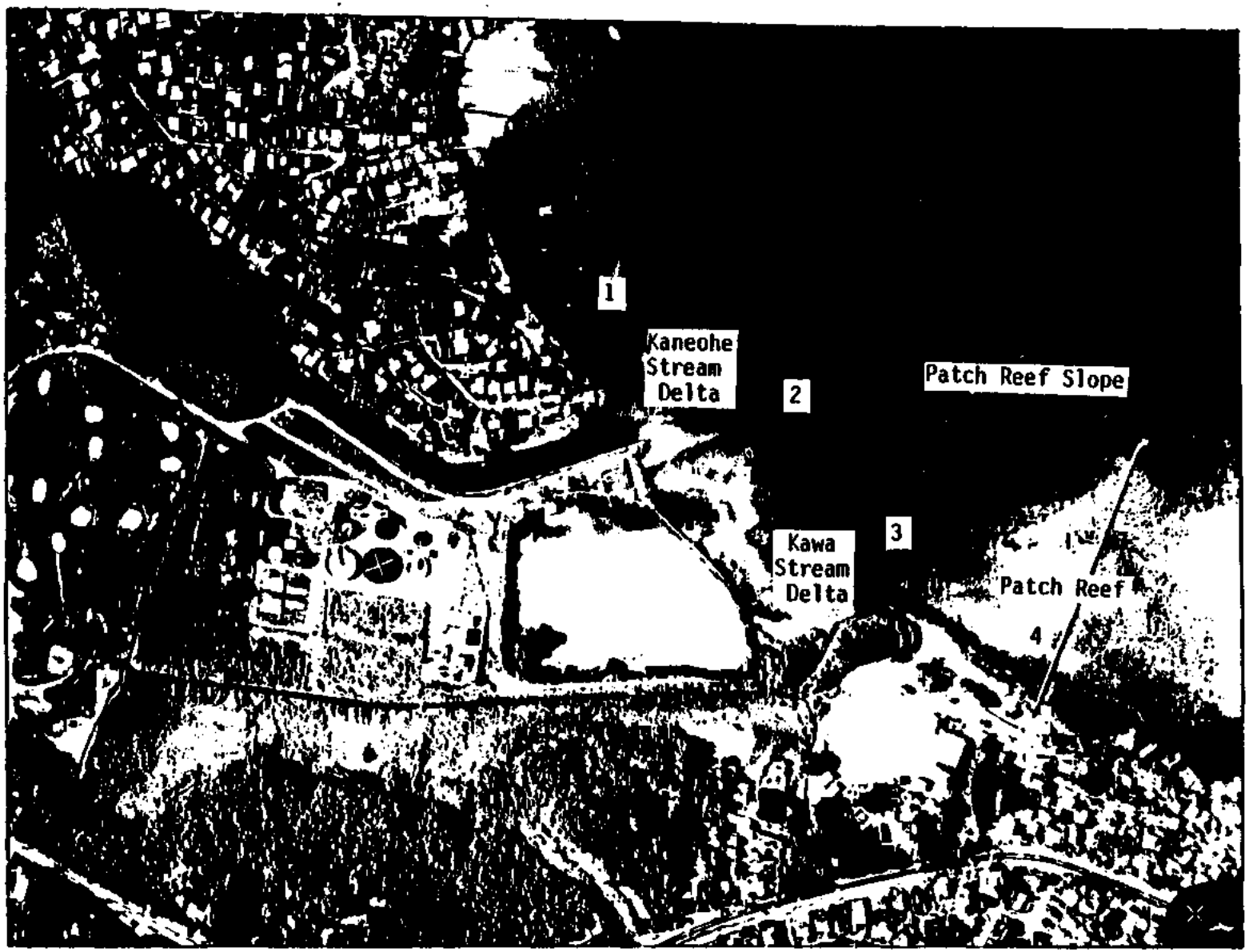


Figure 3. Water Quality Sampling Stations and Major Biological Zones, Kaneohe Bay.

Roughly 7 hours were spent, over a period of several weeks (made necessary by prevailing high nearshore water turbidities), conducting underwater surveys. Underwater visibility was poor in all areas surveyed during all survey periods. Prevailing high nearshore turbidity levels were likely responsible for certain species being omitted from the data record.

Tides ranged from -0.5 to 2.4 feet (ft) during diurnal surveys, which occurred between March 31 and May 11, 1989. Surveys conducted at night would have accounted probably for additional species.

Macrothallic algae and coral coverage was determined by visual estimates of abundance or percent coverage.

Benthic invertebrate identification and enumeration was limited to individuals exceeding 2 centimeters (cm) along the longest body axis, though certain especially numerous, albeit smaller, invertebrates were recorded occasionally. Where appropriate, counts or population density estimates of certain benthic invertebrates were made with either a 0.10 square meter (m^2) stainless steel grid, or with an aluminum meter stick, which was used to lay out crude 0.25 or 1 m^2 quadrants. Rocks and debris were turned over occasionally in an effort to identify cryptic species. Because of the preponderance of soft, unconsolidated bottom sediments, efforts at quantifying benthic invertebrates were hampered by limited underwater visibility.

Fish identification and abundance estimates were made by the diver recording all species sighted during the underwater surveys. Rough counts of represented fishes were tabulated on Polypaper sheets upon which a listing of the more common nearshore reef or estuarine fishes expected to occur in the area had been typed previously. This permitted more time for observations and less time for data recordation.

Semi-quantitative estimates of fish and macroinvertebrate abundance used the following numerical criteria for numbers of individuals sighted in a 30-minute period:

- Abundant = more than 50 individuals;
- Common = 10 to 20 individuals;
- Few = 2 to 9 individuals; and,
- Rare = only 1 individual.

This census method is based upon the premise that more abundant species will be encountered first over a specified time.

The intertidal zone on all headlands and beach areas was censused on foot during low-tide periods on March 31 and May 6, 1989. The latter period tides corresponded from -.0.5 to -0.2 ft. Macroscopic organisms were identified in the field and rough estimates of population size and distribution were noted.

Zero visibility conditions (and the presence of several exceptionally large barracuda) did not permit underwater surveys within Waikalua-Loko fishpond. High turbidities were the synergy of unconsolidated bottom sediments, shallow water, prevailing tradewinds, and the presence of large fishes. Survey data were based on visual estimates from the existing fishpond wall and a meeting with Mr. Gordon Wong, whose home is on the shoreline of Waikalua-Loko Fishpond.

2.2.2 Kawa and Kaneohe Streams

The lower riverine and estuarine reaches of Kawa and Kaneohe Streams were censused using mask and snorkel apparatus. All biological surveys were conducted during periods of low runoff when water turbidities were lowest. During conditions of low runoff, underwater visibility in the estuarine reaches of Kawa Stream ranged between 0.7 to 2.5 m and averaged about 6 m in the upstream, non-tidal, segment adjacent to the golf course. Segments, too shallow to permit underwater observations, were censused by wading. Visibilities within the estuarine reaches of Kaneohe Stream averaged about 2 m or less during periods of low runoff. Because the lower segments of both Kawa and Kaneohe Streams had been dredged and channelized previously, no effort was made to relate species distribution or population density to habitat.

Kawa Stream can be divided into four habitat zones: the estuarine zone, from the mouth to the eastern edge of the golf course; the lower stream, from the golf course to Kaneohe Bay Drive; the middle stream, from Kaneohe Bay Drive to Mokulele Drive; and the upper stream, from Mokulele Drive to the Hawaiian Park Cemetery (VTN Pacific, 1977). For the purposes of this survey only the estuarine and lower stream reaches were surveyed. Kaneohe Stream can be divided similarly into different habitat zones. This study encompassed only the lower and estuarine reaches of the stream (roughly abutting the northern limit of the proposed golf course expansion).

SECTION 3.0

RESULTS

3.1 Water Quality Analyses

3.1.1 Kawa Stream and Estuary

Water quality sampling showed that the lower, estuarine, reaches of Kawa Stream (from the easterly boundary of the golf course to its mouth) is a salinity-stratified environment (Table 3.1), except during heavy runoff conditions. Surface salinities ranged from 0 to 3.8 ppt; bottom water (about 1 to 1.5 m, as a function of tidal period) salinities from 16.25 to 23.5 ppt. Water temperatures in the estuarine segment of the stream were variable. Surface temperatures ranged from 23.8 to 24.8 °C,

Table 3.1 Water Quality Parameters, Kawa Stream & Estuary.

Location/Station	Date	Time (hr)	Temp. (°C)	Salinity (ppt)	D.O. (ppm)	Turbidity (NTU)
WWTP bridge, sur.	3/31/89	0930	24.8	3.8	7.44	6.54
bot.	"	0931	27.8	23.5	4.15	
Golf Course, 1	"	1015	27.2	0.01	12.48	3.15
Golf Course, 2	"	1027	26.9	0.00	10.55	
Golf Course, 3	"	1038	26.8	0.00	9.54	3.14
Golf Course, 1	4/1/89	1041	26.2	0.01	9.23	
Golf Course, 2	"	1049	25.8	0.00	8.34	
Golf Course, 3	"	1055	25.0	0.00	8.19	
WWTP bridge, sur.	4/5/89	1530	23.8	0.00	7.80	13.50
bot.	"	1530	24.2	16.25	6.42	
Golf Course 1	"	1550	23.4	0.00	7.43	11.00
Golf Course 2	"	1554	23.4	0.00	7.31	
Golf Course 3	"	1559	23.2	0.00	7.67	4.28
WWTP bridge	4/8/89	0950	(heavy, sustained rain)			66.10

with cooler temperatures being associated with overcast skies or heavy runoff. Bottom waters ranged from 24.2 to 27.8 °C., and usually reflected the influence of warmer bay waters. Dissolved oxygen values ranged from 4.15 to 7.8 ppm, with surface waters showing levels about 90% saturation. Dissolved oxygen values in bottom waters were low; roughly 58 to 82% saturation.

Water quality conditions in the mauka (golf course) segment of the stream were a function of runoff conditions. Temperatures ranged from 23.2 to 27.2 °C. Dissolved oxygen values were similarly variable and ranged from 7.31 to 12.48 ppm. The highest dissolved oxygen reading (12.48 ppm, about 190% saturation) corresponded to a period of clear, stagnant (no detectable flow) conditions. This value was likely the result of high photosynthetic rates associated with benthic filamentous algae. The highest temperature, recorded in the mauka reaches of the stream (27.2 °C), was reported during this same period.

Turbidity values were variable as a direct function of runoff conditions. These ranged from 3.14 NTU, during low flow conditions, to 66.1 NTU, which corresponded to near flash-flood conditions.

3.1.2 Kaneohe Stream and Estuary

Water quality parameters associated with the boulder riprap mouth of Kaneohe Stream were similar to those reported for Kawa Stream (Table 3.2). Temperatures ranged from 22.7 to 26.7 °C. The lower value is about 0.5 °C less than the coolest temperature recorded at Kawa Stream. This difference may reflect the higher average discharge volume, larger watershed, and higher elevation, which encompass Kaneohe Stream and its major tributaries.

Salinity stratification was not evident in Kaneohe Stream. The prevailing winds at the exposed stream mouth provide a high degree of vertical mixing. Poor water visibilities, and an assortment of subsurface hazards (broken glass, protruding metal pipes, steel cable, tree limbs and assorted debris), prevented access into more mauka regions of the stream. Salinity values were a function of tidal period and ranged from 0.02 to 29.4 ppt. The lowest values corresponded to low tide periods, when fresh-water dominates the mouth of the stream; the higher values were associated with high tide conditions, when the stream mouth is dominated by Kaneohe Bay waters.

Dissolved oxygen values ranged from 6.9 to 8.29 ppm, which suggests that water quality conditions are more stable in Kaneohe Stream than Kawa Stream. These values correspond to roughly 98 to 106% saturation.

Table 3.2 Water Quality Parameters, Kaneohe Stream & Estuary.

Location/Station	Date	Time (hr)	Temp. (°C)	Salinity (ppt)	D.O. (ppm)	Turbidity (NTU)
Stream Mouth, 1	3/31/89	1044	24.2	0.02	7.37	4.12
Stream Mouth, 2	"	1058	25.4	2.30	7.15	
Stream Mouth, 3	"	1107	26.7	20.45	6.95	
Stream Mouth, 4	"	1118	26.6	25.75	7.05	
Stream Mouth, 1	4/1/89	0955	24.4	0.05	7.95	
Stream Mouth, 2	"	1000	24.9	1.50	6.45	
Stream Mouth, 3	"	1011	25.4	26.60	7.14	
Stream Mouth, 4	"	1020	26.6	29.40	6.90	
Stream Mouth, 1	4/5/89	1610	22.7	0.52	8.29	49.9
Stream Mouth, 2	"	1613	22.7	0.60	8.05	
Stream Mouth, 3	"	1618	23.1	1.05	8.16	
Stream Mouth, 4	"	1624	23.3	2.56	8.23	
Stream Mouth, 1	4/8/89	0945 (heavy, sustained rain)				86.3

3.1.3 Kaneohe Bay Waters

Water quality parameters associated with the nearshore waters fronting the mouths of Kaneohe and Kawa Stream are influenced heavily by tidal period, surface runoff, and subtidal and intertidal groundwater discharges (Table 3.3). As a result, these waters vary in salinity from near full strength seawater (during high tide periods associated with little surface water runoff) to freshwater (during low tide and periods of heavy surface runoff). Water temperatures also vary widely, with cooler temperatures from periods of heavy runoff. Warmer temperatures coincide with high tide periods. Distinct temperature and density gradients were apparent in many, but not all, stations sampled. The range in water quality values is likely to strongly influence the distribution and abundance of nearshore organisms and probably, accounts for the prevailing paucity of marine and intertidal organisms that was observed.

Water temperatures ranged from 22.5 to 26.5 °C and coincided with tidal periods. Salinity values ranged from a low of 0.9 to

31.1 ppt and corresponded to the tidal period. Dissolved oxygen values were high and ranged from 7.04 to 9.90 ppm. The less saline surface waters demonstrated higher concentrations of dissolved oxygen than subsurface or bottom water samples. Table 3.3 provides evidence of the great range of water quality values associated with a rather small inshore area of Kaneohe Bay during a period of about 3 hours.

Table 3.3 Water Quality Parameters, Kaneohe Bay Delta & Reef Flat.

Location/Station		Date	Depth (m)	Time (hr)	Temp. (°C)	Salinity (ppt)	D.O. (ppm)
Low Tide (-0.5 to -0.2 ft.)							
Bay	1	4/6/89	0.5	1030	22.5	1.1	8.00
Bay	1	"	1.0	1031	22.8	2.2	7.45
Bay	2	"	0.1	1037	23.0	3.4	7.67
Bay	2	"	0.5	1038	23.1	3.8	7.38
Bay	3	"	0.5	1043	22.7	0.9	8.14
Bay	3	"	1.0	1044	24.3	5.9	7.21
Bay	4	"	0.5	1056	23.3	4.9	7.22
Bay	4	"	1.1	1057	24.4	8.8	7.04
High Tide (+1.7 to +1.8 ft.)							
Bay	1	4/6/89	0.5	1310	25.8	23.1	8.90
Bay	1	"	1.9	1311	25.9	30.2	7.80
Bay	2	"	0.5	1315	26.1	26.4	8.85
Bay	2	"	1.8	1315	26.5	30.3	7.24
Bay	3	"	0.5	1322	25.8	20.1	8.32
Bay	3	"	1.5	1323	24.9	29.4	8.00
Bay	4	"	0.5	1333	23.9	19.0	8.13
Bay	4	"	1.4	1334	26.1	31.1	7.59

3.2 Biological Surveys

3.2.1 Kawa Stream and Estuary

The estuarine segment of Kawa Stream extends from its mouth in Kaneohe Bay about 700 m inland to the eastern boundary of the existing golf course (Figure 3). The channel is straight and varies in width from about 7 to 9 m. Water depths range from about 1 to 1.5 m. It was dredged to its present width around 1958, when the wetlands at the mouth were reclaimed for building the Kaneohe wastewater treatment plant. It was subsequently dredged in 1965 to remove accumulated sediment (VTN, Pacific, 1977). The lower portions of the stream are bordered by occasional small stands of the mangrove, *Rhizophora*.

The estuarine reaches of Kawa Stream support a greater diversity of species than the lower stream, opposite the golf course. Represented fishes included juvenile barracuda (*Spyhraena barracuda*) and jacks (*Caranx melampygus*); the kuhliid, *Kuhlia sandwicensis* (*aholehole*); tilapia (*Oreochromis mossambicus*); and juvenile *manini* (*Acanthurus triostegus*) and *ama'ama* (*Mugil cephalus*). The goby, *Psilogobius mainlandi*, was noted in the extreme lower reaches of the estuary, as was a single blenny (*Istiblennius* sp).

The macroinvertebrate fauna was dominated by large numbers of both living and dead specimens of rock oyster, *Ostrea sandvichensis* (oyster) and barnacles (*Balanus* sp.). Crustaceans were represented by the crabs *Grapsus tenuicrustatus*, *Metopograpsus messor*, and *Thalamita integra*. The former two species were generally associated with rocky intertidal shorelines, mangrove proproots, and the exposed roots of shoreline trees.

Algae were not well represented and included various unidentified turf-building cyanophytes (blue-green algae). These algae form dense mats in more protected reaches of the estuary and appear to assist in stabilizing the benthic sediments. Mats of these diverse microalgal communities are observed occasionally along the upper reaches of exposed roots, having been deposited during heavy runoff conditions. Although undoubtedly important in stabilizing benthic sediments, they appear to experience a rather fugitive existence.

The lower stream zone, opposite the golf course, is characterized by generally sluggish flow, except during periods of heavy runoff. On March 31, 1989, there was virtually no detectable flow. Numerous springs discharge into the stream from the bank on the south (mauka) side of the golf course. Although not measured, this produces a significantly larger flow than is observed where the stream crosses under Kaneohe Bay Drive.

The biota of the lower stream zone is one of low diversity. The largest species observed were tilapia (*O. mossambicus*). They were extremely abundant along the lower (non-tidal) third of the stream, but were less common and smaller in size in the estuarine

reaches. Numerically, the poecilids *Poecilia reticulatus* (guppy) and *Gambusia affinis* (mosquito fish) dominated the stream fauna along all reaches of Kawa Stream below Kaneohe Bay Drive. No native fishes were observed.

Invertebrates were limited to the Louisiana crayfish (*Procambarus clarkii*) and, rarely, the freshwater prawn, *Macrobrachium lar*.

Large numbers of the Wrinkled frog, *Rana rugosa*, and a few toads (*Bufo marinus*) occur in or adjacent to stream waters between Kaneohe Bay Drive and the tidally-influenced segment of the stream.

3.2.2 Kaneohe Stream and Estuary

The invertebrate fauna of the rock riprap segment of the Kaneohe Stream mouth was limited to a few grapsid crabs, sponges, and few alive, though abundant shells of oysters (*O. sandvichensis*).

3.2.3 Waikalua-Loko Fishpond

Waikalua-Loko Fishpond encompasses about 12 acres (A) underwater. Various reports have indicated the surface acreage as between 11.9 and 13.4 A. It has rock and mortar wall about 1,420 ft long that was rebuilt in the 1930's. In 1976 the pond was used for experimental oyster culture (Devaney, *et al.*, 1976).

Waikalua-Loko fishpond is inhabited by sizeable but unquantified populations of barracuda (*S. barracuda*) jacks (*Caranx* sp.), mullet (*Mugil cephalus*), milkfish (*Chanos chanos*), and tilapia (*Oreochromis* sp.) (Wong, 1989; personal communication) (Table 3.4). Although once managed for its fishery resource and as an experimental oyster culture operation, it is no longer in commercial production. Three *makahas* provide the principal means of water exchange with Kaneohe Bay waters. Freshwater enters the pond through numerous subtidal springs and during periods of high runoff from Kaneohe Stream, which influences most of the northern section of the pond wall. The only discernible invertebrates associated with the interior of the pond wall and mangrove proproots were rock oysters (*Ostrea*).

3.2.4 Nearshore Reef Flat

The nearshore reef flat, to about 900 m seaward (roughly north) of the mouth of Kaneohe Stream, is a zone of extremely low biological diversity. This zone is largely a sedimentation basin for Kaneohe Stream. Aerial photographs (Figure 3) show a rather distinct delta created by sediment deposition from both Kawa and Kaneohe Streams. The substratum is composed of consolidated and unconsolidated brown terrigenous sediments. As a result, there is little discernible permanent habitat for marine or estuarine

species. This zone is influenced by subtidal freshwater springs, resulting in cool water temperatures and appear to be independent of local surface runoff from either Kaneohe or Kawa Streams. Vertical relief is provided by occasional palm fronds, tree trunks and branches, broken bottles, metal scrap and, immediately outside the mouth of Kaneohe Stream, hundreds of golf balls.

Represented species in this biologically impoverished zone included heavily-silted orange sponges; the red alga, *Polysiphonia* sp.; the bivalves *Ostrea* and *Chama* (mostly dead); and, a very modest assortment of fish. Represented fishes included the eagle ray (*Aetobatus narinari*), juvenile mullet and, in shoreline and walled areas dominated by mangrove proproots, small schools of *aholehole* (*K. sandwicensis*). Surveys done during both low (minus tide) and high tide periods yielded no discernible differences in the diversity or density of represented fishes.

Reef flat *walking* surveys conducted during a minus tide on May 6, 1989, failed to reveal the presence of *normal* mudflat crustaceans and mollusks across several acres of exposed mudflats between Kaneohe Bay Beach Park and the mouth of Kawa Stream. Shells of *Nerita picea*, *Patella sandwichensis*, *Crepidula* sp., and *Heliachus* sp. were observed, but live specimens were not seen. These observations suggest that the zone is one of continual sediment deposition, a process that inhibits the development of benthic communities.

3.2.5 Slope Zone

The slope zone, seaward of the Kaneohe Stream delta, demonstrated a low diversity of both benthic and pelagic marine organisms. This zone was dominated by a veneer of silty detrital deposits which collectively represent a limiting factor for most benthic organisms. Biological diversity and density were comparable to the impoverished inshore delta community. This area appears to be a zone of secondary settlement for materials not deposited on the inshore delta.

3.2.6 Patch Reef Zone

A roughly 20-acre shallow (about -3 ft MSL) patch reef abuts the northeast side of the mouth of Kawa Stream (Figure 3). Biological surveys showed only moderate amounts of silt and sediment, suggesting that the majority of the reef is outside the influence of sediment-laden runoff waters from Kaneohe and Kawa Streams. Inshore areas, to about 100 m seaward of the shoreline, were turbid during all surveys conducted over the March to May, 1989 period. The prevailing high turbidity appears to result from the effects of tradewinds which continually re-work deposited silt and sediment, particularly deposits that accumulate within dense stands of mangrove proproots. The patch reef is roughly bisected by a dilapidated pier. Portions of the reef are also used for mooring of small craft and an ultra-light

seaplane.

Macroalgae were poorly represented and extant species were often cropped down to the holdfast, making accurate identification impossible. Represented species included *Acanthophora spicifera*, *Polysiphonia* sp., *Dictyosphaeria cavernosa*, and *Gracilaria* sp.

Live corals were not observed on the reef flat proper, though numerous small dead corals littered wide areas of the reef flat. Most of these colonies were well worn and heavily overgrown with epiphytic algae, suggesting that they have been dead for many years. Live corals were observed on the upper edge of the patch reef slope, but overall coverage was less than 0.1 percent. However, massive colonies of dead corals formed a narrow corridor between about -1.5 to -2.5 m in depth. Dead coral coverage averaged about 60% along this narrow corridor. Represented species included *Porites compressa* and *Montipora verrucosa* (Table 3.5). The former is the dominant coral throughout most of Kaneohe Bay.

A total of 34 species of fish representing 21 families were recorded from the patch reef and adjacent slopes (Table 3.4). Overall densities were low, corresponding to the low density and topographic relief of represented corals. Most of the sightings were along the narrow corridor of dead coral which provides some degree of topographic relief. Only six species were listed as *abundant*. They included: the labrid, *Thalassoma duperreyi* (*hinalea lau-wili*); the goby, *P. mainlandi*; the acanthurids *A. triostegus* (*manini*) and *A. dussumieri* (*palani*); and the jack, *Caranx* sp. The sixth species was *Scarus* sp., representing a diverse group of unidentified juvenile parrotfish. Juvenile scarids are virtually impossible to identify in the field.

Although the aforementioned species were listed as *abundant*, this term is somewhat of a misnomer when considering that roughly 300 m of reef flat were censused during a typical 30-minute survey. The overall impression is one of extremely low fish diversity. About half of the *abundant* species represented isolated groups of individuals scattered across broad, largely uninhabited stretches of reef flat. Similarly, many of the species listed as *common* represented a single school or several schools observed on one or two occasions. Species fitting this category included: the *omilu* (*C. melampygus*); *aholehole* (associated with a few small schools amongst mangrove proproots); *weke* and *weke-'ula* (*Mulloides flavolineatus* and *M. vanicolensis*); the halfbeak, *Hemiramphus* sp.; and the parrotfishes, *Scarus sordidus*, *S. perspicillatus* and *S. dubius*.

Fishes recorded under the *rare* category included: the trumpetfish, *Aulostomus chinensis* (*nunu*); the moray eel, *Gymnothorax* sp. (puhi); the Moorish idol, *Zanclus canescens* (*kihikihi*); an unidentified juvenile boxfish; and the eagle ray, *A. narinari*. A single school of juvenile hammerhead sharks (*Sphyrna lewini*), each about 40 cm. in length, was observed beneath the pier.

Like the adjacent delta region, the macroinvertebrate fauna was limited to relatively few species (Table 3.5). Sponges (unidentified *Demospongiae*) and the bivalves *Chama* and *Ostrea* were the most abundant species. The latter was recorded in densities of up to 145/m^2 on isolated rock outcrops though a far greater number consisted of dead specimens. The colorful tube-dwelling polychaete *Sabellastarte* sp. was often conspicuous in localized areas, but was most abundant along the dead coral zone where densities averaged about 3/m^2.

SECTION 4.0

DISCUSSION AND CONCLUSIONS

4.1 Impacts to Kawa Stream and Estuary

Kawa Stream originates in the vicinity of the Hawaiian Memorial Park Cemetery at an elevation of about 400 ft. It then flows through the Pikoiloa residential area, Castle High School, Bayview Golf Center, and empties into Kaneohe Bay near the Waikalua-Loko fishpond, a distance of about 2.5 miles.

Urbanization of the watershed has had a major impact on the stream. The development of upland residential developments necessitated realigning or reinforcing the stream to provide flood protection. The entire stream, from its mouth to Mokukele Drive, has been channelized and is dredged and cleared of vegetation periodically. By 1977, only about 2,000 ft of the stream channel followed its original alignment; a 700-foot section was eliminated by removing of two large meanders at the present locations of Puaae Place and Pouhanu Place. Most of the stream banks in this section have been lined with concrete.

The existing Kawa Stream channel fronting the Bayview Golf Center was dredged to its present width around 1958. The wetlands at the mouth were filled for construction of the Kaneohe Sewage Treatment Plant. It was dredged again in 1965 to remove accumulated sediment (VTN Pacific, 1977).

Because of its history of man-induced changes, project related impacts to the tidal and non-tidal (lower stream zone) segments of Kawa Stream are not expected to be significant or long-term. These impacts will entail localized degradation in water quality resulting from earthmoving activities associated with channel realignment (Figure 4) and construction of new golf course fairways. Most of these impacts can be ameliorated through use of berms and swales to retain runoff waters from construction areas generated during periods of heavy rain.

Biological surveys conducted during the March to May 1989 period largely confirmed the results of earlier studies (Timbol and Maciolek, 1978; VTN Pacific, 1977) and showed that the lower stream zone was populated only with exotic species. Tilapia, which presently dominant the lower stream zone (in terms of biomass), were not recorded in Kawa Stream by Timbol and Maciolek (1978). Conversely, both Timbol and Maciolek (1978) and VTN Pacific (1977) recorded the Chinese catfish (*Clarias fuscus*) from the lower stream zone, a species that was not recorded during these 1989 surveys. However, this species is particularly secretive in habit, often burrows into soft mud bottoms, and could easily be overlooked.

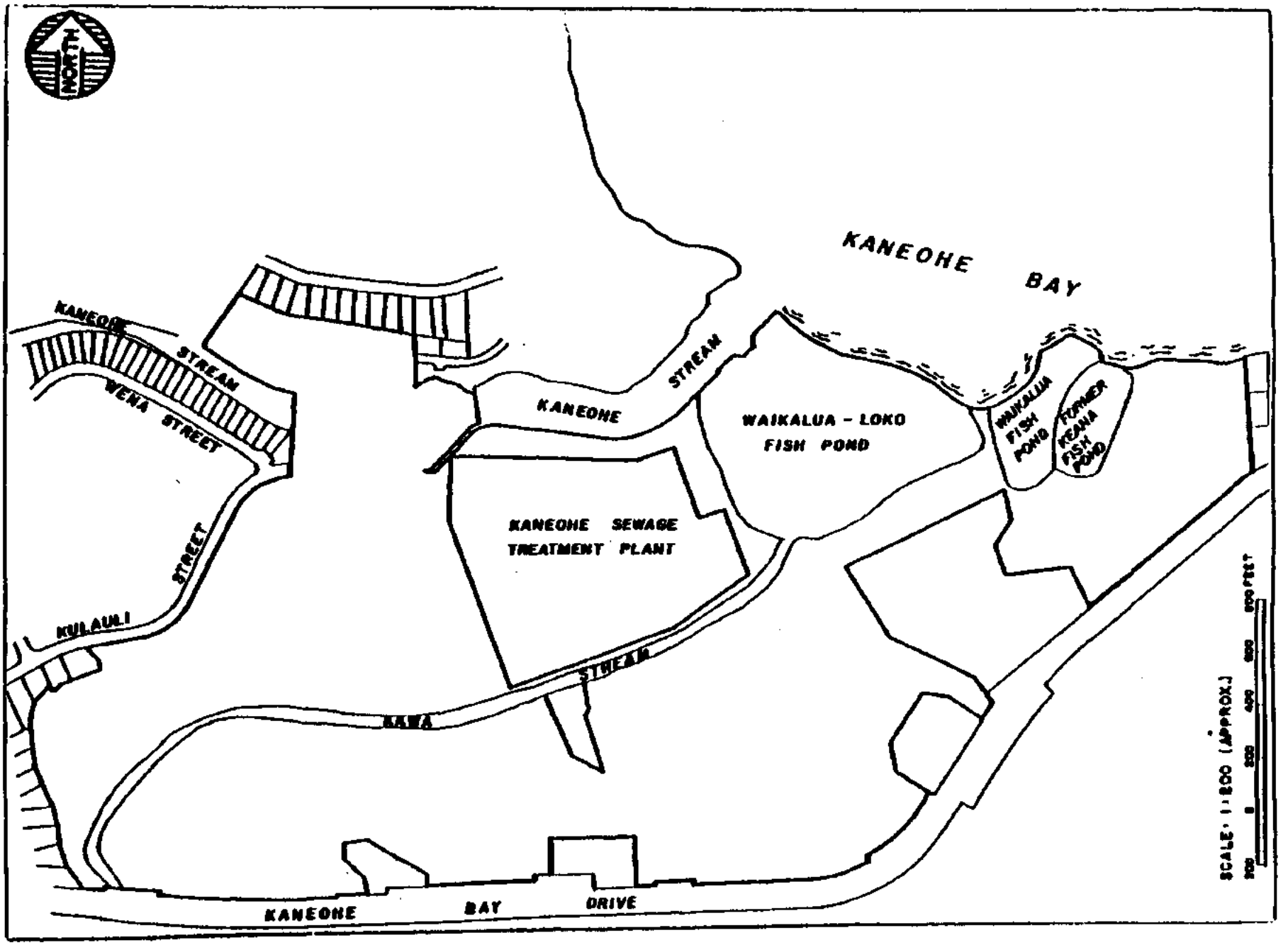


Figure 4. Bayview Golf Course: Proposed Realignment of Kawa Stream.

Literature reviews, combined with the results of 1989 baseline surveys, indicate that no endemic stream fishes, mollusks or crustaceans have been observed in the lower reaches of Kawa Stream for at least the past eleven years. Because of the domination of the stream by generally undesirable, introduced species, any project-related impacts on this biota is not considered significant.

The estuarine segment of the stream was inhabited by both exotic and indigenous species. *Ahoiehole* were the only species native to Hawaii that were recorded in the estuarine reaches of the stream. Diversity of fishes was low and represented populations were small.

Silt and sediment generated by project-related earthmoving and construction activities are likely to produce short-term high turbidity levels in the estuarine segments of the stream, particularly during periods of heavy or sustained rainfall. However, such levels are not expected to significantly exceed the reading of 66.1 NTU that was recorded on April 8, 1989, except in localized areas immediately adjacent to construction areas. The reported range of wet weather turbidities for Kawa Stream are 2 to 89 NTU with a mean of 28 NTU (VTN Pacific, 1977). Estuarine species are generally adapted to a wide range in turbidity levels, as well as, other water quality parameters. No long-term or significant impacts on estuarine biota are anticipated.

Water quality analyses have been conducted on Kawa Stream as a part of the Kaneohe Bay Urban Water Resources Study coordinated by the U.S. Army Corps of Engineers (Konno, *et al.*, 1976); the results are presented in Table 4.1 and compared with other streams that discharge into Kaneohe Bay.

For most parameters, the quality of Kawa Stream is better than or comparable to other streams. However, there are some notable exceptions. Kawa Stream exhibited the greatest range of temperature and the highest mean temperature of any of the streams, which may be due to the combination of low average flow and concrete channels. It also had one of the highest dissolved oxygen concentrations, perhaps due to flourishing filamentous algae. The stream also had some of the highest concentrations of dissolved organic carbon and total organic carbon; the reasons for which are not known. Kawa Stream was also high in several nitrogen measurements (Konno *et al.*, 1976).

Table 4.1 Kawa Stream, Wet Weather Water Quality Compared with Data from Other Stream Stations Studies[1].

Parameter	Unit	Kawa Stream[2]		Other Streams[3]
		Range	Mean	Overall Range
Streamflow	cfs	2-3	2.5	1.5 - 29
pH		7.5-8.0	7.6	6.0-8.6
Temperature	°C	23.0-27.2	24.6	20.0-26.7
Dissolved Oxy.	mg/l	8.3-10.2	9.6	6.0-10.4
Turbidity	NTU	2-89	28.0	1-140
Vol. Sus. Sol.	mg/l	1.5-2.75	2.25	0.25-89.0
Susp. solids	mg/l	6-49	18.0	3-640
Diss. Org C.	mg/l	>1-13.75	5.0	>1-5.2
Total Org C.	mg/l	5.5-17.8	10.8	>1-32.25
Total Phosphorus	mg/l	0-0.32	0.12	0-1.47
Diss TKN	mg/l	>0.02-2.02	0.8	>0.02-1.2
TKN	mg/l	>0.07-2.12	0.79	>0.02-6.17
Nitrate + Nitri	mg/l	0.42-1.4	0.92	0.04-0.71
Total N	mg/l	1.28-2.78	1.7	0.05-7.25
Chlorophyll-a	mg/l	0.3-1.4	0.9	0-19.8
Fecal Coliform	#/100 l	1,000-5,300	3,600	>10-250,000
Fecal Strept.	#/100 l	400-3,300	2,200	>10-100,000

Note

1 Source Konno, *et. al.*, 1976.

2 Sampling station located above Kaneohe Bay Drive.

3 Kaneohe (2 stations), Waihee, Kahuluu, Waikane, Waiahole, Kaaahala, and Heeiu Streams and culverts from Valley of the Temples and Holulua subdivisions, which drain into Kaneohe Bay.

4.2 Impacts to Kaneohe Stream and Estuary

Kaneohe Stream drains northeasterly to Kaneohe Bay. The stream drainage basin is located near the southern section of the Kaneohe Bay watershed where considerable urban development has taken place. Urbanization has resulted in encroachment of the stream's flood plain, and construction of a dam affected the Kamooalii and Kuou tributaries of the stream. Other forms of channel modification in Kaneohe Stream include concrete lined channels, realigned channels, vegetation removal, and the presence of an elevated culvert. By 1978, nearly 25% of the total 28 km channel length has been modified (Norton, *et al.*, 1978).

Project related impacts to Kaneohe Stream and estuary are not anticipated to be significant or long-term in nature and would be limited largely to short-term silt and sediment loading associated with the construction phase of the project. However, existing baseline water turbidity levels associated with storm-water runoff are typically high (86.3 NTU reading recorded on April 8, 1989). Thus, silt and sediment loading associated with the construction phase of the project are not expected to result in conditions not experienced presently at the mouth of the stream. Existing terrain in the estuarine segment of the stream is relatively flat and would not change appreciably with the proposed project.

Landscaping associated with golf course fairways and greens would reduce likely existing runoff from the small filled peninsula (running parallel to the revetted south side of Kaneohe Stream), which generally lacks vegetative groundcover. However, observations during periods of heavy rainfall runoff suggested that this area is not a significant source of sediment. The proposed project would eliminate the existing auto-wrecking yard on the peninsula, which may be contributing hydrocarbons and other pollutants, directly or indirectly, to Kaneohe Stream, estuary and nearshore waters.

4.3 Impacts to Waikalua-Loko Fishpond

Early aerial photo maps, prior to 1969, indicate that Kawa Stream previously discharged into Waikalua-Loko Pond. Between 1969 and 1978, Kawa Stream was realigned (during the wetland reclamation activities associated with construction of the Kaneohe Wastewater Treatment Plant) and presently, discharges into Kaneohe Bay on the east side of the pond.

The proposed alignment of Kawa Stream would result in the pond being restored to its former role as a settling basin during periods of heavy runoff. This action would be expected to result in the following consequences:

(1) increase the rate of pond infilling with terrigenous

materials;
(2) reduce ambient pond salinities during periods of heavy runoff;
(3) increase the distribution and abundance of *Rhizophora* throughout the pond;
(4) alter existing flushing and circulation patterns (particularly during periods of heavy runoff); and,
(5) reduce biological productivity of the pond for certain marine and estuarine fishes and invertebrates.

However, it should be noted that existing natural, albeit man-induced or accelerated, processes are and will continue to exert many of these same effects through normal coastal ecological succession processes. These would occur with or without the impacts associated with the proposed project.

Although some of the above changes may be construed as damaging to water and environmental quality, many of these impacts can be attenuated or mitigated by provision of a carefully executed water quality and environmental management plan for the fishpond. For example, periodic dredging of pond has the potential to improve the productivity of the now shallow, heavily silted pond. Control of rapidly spreading mangroves would maintain the open water habitat of the fishpond, while preserving the structural integrity of the fishpond walls. In the absence of a program to control the spread of mangroves the fishpond walls will continue to deteriorate.

Restoration of the pond to its former role as a sedimentation basin will result in a reduction in the present levels of silt and sediment discharged into Kaneohe Bay. Kawa Stream is one of the smaller perennial streams that discharge into Kaneohe Bay. Its sediment contribution is about 3% of the total amount of stream-generated sediment, reaching the bay annually (or about 6% of the total entering south Kaneohe Bay). It, nonetheless, accounts for between 320 and 1,210 tons/yr of sediment (VTN Pacific, 1977). This contribution is small in relation to the sediment loading in the bay as a whole. Localized improvements in nearshore water quality can be expected. These improvements are likely to include a reduction in storm-generated turbidity levels and a diminution in the quantity of high BOD (biological oxygen demand) organic materials that presently discharge into the bay. In essence, Waikalua-Loko Fishpond would revert to its former cultural role as a sediment retention basin and nutrient sink for organic materials of terrestrial origin.

4.4 Impacts to Kaneohe Bay Waters

Impacts to Kaneohe Bay waters are not expected to be either significant or long lasting. The area supports the lowest diversity and, with the exception of the oyster, *Ostrea*, the lowest population density of marine organisms the survey team has

ever encountered in nearshore Hawaiian waters. Because of the absence of hard substrata, recovery of the benthic coral and associated communities in the nearshore waters of Kaneohe Bay, fronting the proposed project site, is not expected to occur, with or without the project.

SECTION 5.0

REFERENCES

Devaney, D.M., M. Kelly, P. Jae Lee, L.S. Motteler, 1976. *Kaneohe: A History of Change (1778-1950)*. Prepared for U.S. Army Crops of Engineers, Pacific Ocean Division, Contract No. DACW-84-76-C-0009.

Konno, S.K., C.K. Kondo, H.H. Lee & R.J. Oldnall, 1976. *Wet-weather water quality monitoring Kaneohe Bay, Oahu, Hawaii*. Water Resources Research Center, University of Hawaii. Completion Report for Urban Studies Section, Pacific Ocean Division, U.S. Army Corps of Engineers.

Norton, S.E., A.S. Timbol & J.D. Parrish, 1978. *Stream Channel Modification in Hawaii, Part B: Efffect of Channelization on the Distribution and Abundance of Fauna in Selected Streams*. Office of Biological Services, Fish and Wildlife Service, U.S. Department of the Interior.

Timbol, A.S and J.A. Maciolek, 1978. *Stream a Channel Modification in Hawaii, Part A: Statewide Inventory of Streams, Habitat Factors and Associated Biota*. Office of Biological Services, U.S. Fish and Wildlife Service, U.S. Department of the Interior.

VTN Pacific, 1977. *Environmental Impact Statement for the Kawa Stream Flood Control Project*. Department of Public Works, City and County of Honolulu.

Table 3.4 Checklist of Fishes, Bayview Golf Course.

TAXA/GENUS (COMMON NAME)	KAWA STR	KAWA EST	KANEOHE STR	KANEOHE EST	WAIKALUA POND	KANEOHE BAY
SPHYRAENIDAE (BARRACUDA)						
Spyhraena barracuda (barracuda)	-	-	-	R	R	-
CARANGIDAE (ULUAS, JACKS)						
Caranx melampygus (omilu)	-	C	-	R	-	C
Caranx ignobilis (pauu)	-	-	-	-	-	F
Caranx sp. (papio)	-	R	-	R	C	A
CHANIDAE (MILKFISHES)						
Chanos chanos (milkfish, *awa*)	-	-	-	-	C	F
LABRIDAE (WRASSES)						
Thalassoma duperreyi (hinalea lau-wili)	-	-	-	-	-	A
Stethojulis axillaris (o'maka)	-	-	-	-	-	F
KUHLIIDAE (AHOLEHOLE)						
Kuhlia sandwicensis (aholehole)	-	A	-	C	A	C
CHAETODONTIDAE (BUTTERFLYFISHES)						
Chaetodon miliaris	-	-	-	-	-	C
POMACENTRIDAE (DAMSELFISHES)						
Abudefduf abdominalis (maomao)	-	-	-	-	-	F
Dascyllus albisella (aloiloi)	-	-	-	-	-	C
Chromis ovalis	-	-	-	-	-	F
AULOSTOMIDAE (TRUMPET FISHES)						
Aulostomus chinensis (nunu)	-	-	-	-	-	R
MURAENIDAE (MORAY EELS)						
Gymnothorax sp. (puhi)	-	-	-	-	-	R
ZANCLIDAE (MOORISH IDOLS)						
Zanclus canescens (kihikihi)	-	-	-	R	-	R
GOBIIDAE (GOBIES)						
Psilogobius mainlandi	-	C	-	C	-	A
Bathygobius sp.	-	C	-	C	-	C
BLENNIIDAE (BLENNIES)						
Istiblennius sp.	-	R	-	R	-	F
unident. blenny	-	-	-	-	-	F

Table continues

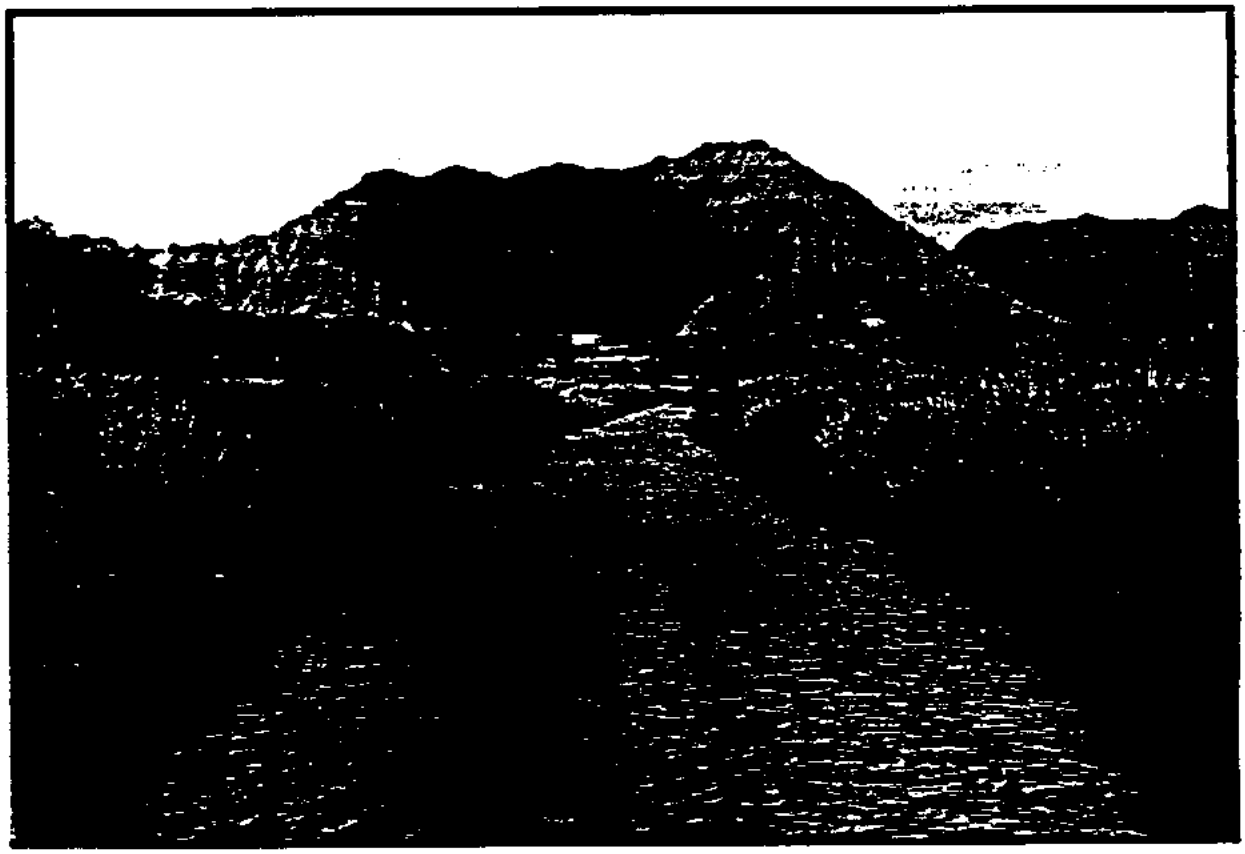
TAXA/GENUS (COMMON NAME)	KAWA STR	KAWA EST	KANEOHE STR	KANEOHE EST	WAIKALUA POND	KANEOHE BAY
OSTRACIONTIDAE (BOXFISH)						
Ostracion meleagris (moa)	-	-	-	-	-	F
unident. boxfish	-	-	-	-	-	R
CICHLIDAE (TILAPIAS)						
Oreochromis mossambicus (tilapia)	A	C	A	C	C	-
MULLIDAE (GOATFISHES)						
Mulloides flavolineatus (weke)	-	-	-	-	-	C
Mulloides vanicolensis (weke-'ula)	-	-	-	-	-	C
POECILIIDAE (GUPPIES)						
Poecilia reticulatus (guppy)	A	-	A	-	-	-
Gambusia affinis (mosquito fish)	C	-	C	-	-	-
SYNODONTIDAE (LIZARD FISHES)						
Synodus variegatus ('ulae)	-	-	-	-	-	F
POMACENTRIDAE (DAMSELFISHES)						
Abudefduf adbominalis (mamo)	-	-	-	R	-	C
ACANTHURIDAE (SURGEONFISHES)						
Acanthurus triostegus (manini)	-	C	-	R	-	A
Acanthurus dussumieri (palani)	-	-	-	R	-	A
HEMIRAMPHIDAE (HALFBEAKS)						
Hemiramphus sp.	-	F	-	F	-	C
MUGILIDAE (MULLETS)						
Mugil cephalus (ama'ama)	-	F	-	F	C	C
SCARIDAE (PARROTFISHES)						
Scarus sordidus	-	-	-	-	-	C
Scarus perspicillatus	-	-	-	-	-	C
Scarus dubius	-	-	-	-	-	C
Scarus sp. (juveniles of above)	-	-	-	-	-	A
SPHYRNIDAE (HAMMERHEAD SHARKS)						
Sphyrna lewini (mano kihiki)	-	-	-	-	-	F
MYLIOBATIDAE (EAGLE RAYS)						
Aetobatus narinari	-	-	-	-	-	R
Total Families	2	8	2	11	6	21
Total Species	3	10	3	14	6	34

Table 3.5 Checklist of Invertebrates, Bayview Golf Course.

TAXA/GENUS (COMMON NAME)	KAWA STR	KAWA EST	KANEOHE STR	KANEOHE EST	WAIKALUA POND	KANEOHE BAY
SCLERACTINIA (HARD CORALS)						
Porites compressa	-	-	-	-	-	C
Montipora verrucosa	-	-	-	-	-	C
PORIFERA (SPONGES)						
Unident. *Demospongiae* 1	-	-	-	R	-	C
Unident. *Demospongiae* 2 (red)	-	-	-	-	-	C
CLASS BIVALVIA						
Chama sp.	-	-	-	-	-	A
Ostrea sandvichensis	-	A	-	-	A	A
ANNELIDA (SEGMENTED WORMS)						
SEDENTARIA						
SABELLIDAE						
Sabellastarte sp.	-	-	-	-	-	A
SERPULIDAE						
Hydroides sp.	-	-	-	F	F	C
CHORDATA						
ASCIDIACEA						
Didemnum edmondsoni	-	-	-	-	-	A
Didemnum sp.	-	-	-	-	C	A
CRUSTACEA (SHRIMPS/CRABS)						
Macrobrachium lar (prawn)	R	-	R	-	-	-
Balanus sp. (barnacle)	-	C	-	C	C	C
HOMARIDAE (LOBSTER/CRAWFISH)						
Procambarus clarkii (crayfish)	C	-	C	-	-	-
DIOGENIDAE						
Unident. hermit crab	-	-	-	-	F	F
GRAPSIDAE						
Metopograpsus messor (crab)	-	F	-	F	C	F
Grapsus tenuicrustatus (crab)	-	F	-	F	C	F
PORTUNIDAE						
Thalamita integra (crab)	-	F	-	-	-	F
Thalamita crenata (hapa crab)	-	-	-	R	-	-
OCYPODIDAE						
Ocypode ceratophthalma	-	-	-	R	-	-
No. species	2	5	2	7	7	15

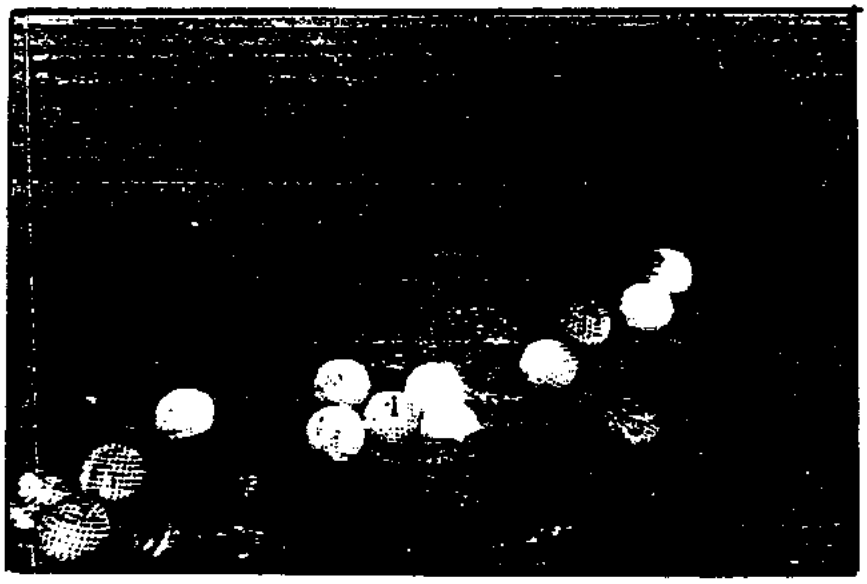
Photograph 1. Kawa Stream, Channelized Lower Stream Zone (Non-tidal Zone).

Photograph 2. Kawa Stream, Channelized Estuarine Segment (View = West to East).



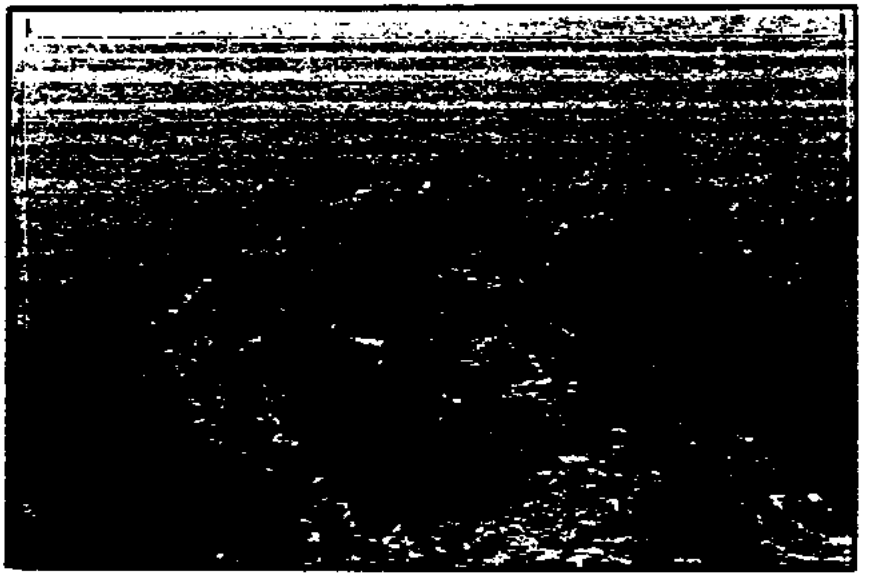
Photograph 3. Kawa Stream, Channelized Estuarine Segment (View = East to West).

Photograph 4. Kaneohe Stream Estuary and Mouth.



Photograph 5. Golf Balls on Unconsolidated Substratum of Kaneohe Stream Delta.

Photograph 6. Typical Patch Reef Perspective.



Photograph 7. Dead Coral Heads on Upper Patch Reef Slope.

Appendix X: Waikalua Fishponds Letters of Support (August 2020)

HOUSE OF REPRESENTATIVES

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

June 8, 2020

TO: City and County of Honolulu
Clean Water and Natural Lands Fund

FROM: Representative Lisa Kitagawa
State House, District 48 – Kāneʻohe, Kahaluʻu, Waiāhole

SUBJECT: Waikalua Loko Iʻa – Conservation Easement Request

Aloha,

Thank you for the opportunity to share my support of Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's (PAF) request for funding from the City and County of Honolulu's Clean Water and Natural Lands Fund, as well as other conservation easement funding sources. I strongly support HILT and PAF's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity.

As the State Representative for the geographic area that Waikalua Loko Iʻa is in, as well as much of the area that directly borders Kāneʻohe Bay, I would like to take this opportunity to share my support for this request. The community that I represent has also shared that protecting our environment and natural resources are important, not only for our generation, but for future generations as well. Protecting Waikalua Loko Iʻa, as well as Kāneʻohe Bay, is a priority, not only for me, but for many in our community.

I have also had numerous opportunities to visit Waikalua Loko Iʻa to learn about the mission and vision of the fishponds and its surrounding area. My family and I have also volunteered on community work days and my children have learned about the importance of maintaining the fishpond, as well as its cultural significance and history. Waikalua Loko Iʻa provides a hands-on opportunity for the keiki of our community to participate in the process of protecting our environmental and cultural resources. A conservation easement will ensure that future generations will also have this opportunity as well.

The following highlights the main reasons that I support the permanent protection of Waikalua Loko Iʻa:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring that the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the fishponds and the Kāneʻohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishpond complex in an urban area, ensuring Waikalua Loko Iʻa's cultural integrity.

Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families.

I greatly value the availability of public conservation funding for projects such as Waikalua Loko Iʻa and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko Iʻa.

If you have any questions, I can be reached at repkitagawa@capitol.hawaii.gov or 808-586-8540.

Mahalo for the opportunity to share my support for this request.

Representative Lisa Kitagawa
House District 48 — Kāneʻohe, Kahaluʻu, Waiāhole
Hawaiʻi State Capitol, Room 310 • Honolulu, HI 96813
Phone: (808) 586-8540 • Email: repkitagawa@capitol.hawaii.gov

HAWAIʻI STATE LEGISLATURE
Senator Jarrett Keohokalole
STATE CAPITOL
415 SOUTH BERETANIA STREET
HONOLULU, HAWAIʻI 96813

June 16, 2020

Aloha,

I strongly support Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity.

As a child, I fished off this pond with my brothers, cousins, and other neighborhood kids of the Waikalua area. My father and uncles learned to fish this area and told us stories of the abundant populations of oysters, crabs, and ʻopae that fed families here for generations. One of the reasons I ran for office was because to my children, these are merely stories. The abundant populations of food in this area are gone. I got involved, volunteered, and eventually helped secure state funding toward the Waikalua Loko Iʻa to address this issue and the loss of nearshore marine ecosystems across the state.

The acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the two fishponds and the Kāneʻohe Bay ecosystem.

The conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and access for cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families. I greatly value the availability of public conservation funding for projects such as Waikalua Loko Iʻa and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko Iʻa.

Mahalo,

Jarrett Keohokalole

State Senator (District 24: Kāneʻohe, Kailua)

June 16, 2020

Aloha,

The Kailua-Kalaheo Complex Area strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity.

The following highlights the main reasons the Kailua-Kalaheo Complex Area supports the permanent protection of Waikalua Loko I'a:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. The Kailua-Kalaheo Complex Area greatly values the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Lanelle Hibbs
Complex Area Superintendent
Kailua-Kalaheo Complex Area

UNIVERSITY of HAWAI'I®
WINDWARD
COMMUNITY COLLEGE

Office of the Chancellor

June 5, 2020

Aloha,

Windward Community College strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity. Windward Community College worked with Pacific American Foundation to purchase the current property of the fishpond using a Housing and Urban Development Community Partners grant, which benefits education at all levels through their outreach, ʻāina (land/water) and science programming. It is a jewel of our community, where we as residents visit to help restore habitat and marvel at the amazing beauty of both nature and Hawaiian engineering.

We would be ecstatic to see this further protection for this very precious community resource. The acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the two fishponds and the Kāneʻohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko Iʻa's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families.

Windward Community College greatly values the availability of public conservation funding for Waikalua Loko Iʻa and strongly supports the use of public funds for the acquisition of a conservation easement to permanently protect this beautiful, precious educational resource.

Mahalo,

Ardis Eschenberg, PhD
Chancellor
Windward Community College

45-720 Keaʻahala Road
Kāneʻohe, Hawaiʻi 96744
Telephone: (808)-235-7402
Fax: (808)-247-5362
www.windward.hawaii.edu

An Equal Opportunity / Affirmative Action Institution

Hawai'i Institute of Marine Biology

UNIVERSITY of HAWAI'I
MĀNOA

Shae Kamaka'ala
Director of 'Āina Protection
Hawaiian Islands Land Trust
500 Kalanianaole Ave. #1
Hilo, HI 96720

June 4, 2020

Aloha,

The Hawai'i Institute of Marine Biology (HIMB) strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity. HIMB is an independent research unit within the School of Ocean Earth Science and Technology (SOEST) at the University of Hawai'i at Mānoa. Our mission is to conduct multi-disciplinary research and education in all aspects of tropical marine biology and ecology. We are a a center of innovation for science and technologies that advance the informed stewardship and conservation of Hawai'i's marine and coastal biodiversity.

HIMB is proud to be a long-time partner of PAF and other sustainability-minded community organizations in Kāne'ohe Bay. We therefore support the permanent protection of Waikalua Loko I'a for the following reasons:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. HIMB greatly values the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Judith Lemus, Ph.D.
Interim Director

Moku O Lo'e (Coconut Island)
P.O. Box 1346
Kāne'ohe, Hawai'i 96744-1346
Telephone: (808) 236-7401
Fax: (808) 236-7443

An Equal Opportunity/Affirmative Action Institution

DAVID Y. IGE
GOVERNOR

DR. CHRISTINA M. KISHIMOTO
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
James B. Castle High School
45-386 KANEOHE BAY DRIVE
KANEOHE, HAWAII 96744

June 5, 2020

Aloha,

Castle High School strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity. As principal of CHS we have developed a strong relationship with PAF, the fish pond, and the surrounding community. CHS Academies regularly engage in work based learning opportunities with the staff and work site. These place based, authentic learning experiences have strengthened our students' connections with their culture and 'aina, and the work has opened their eyes to the many career options available in their own back yard. As a result of the collaboration, the curriculum in the Medical, Engineering, and Natural Resources pathways has been enhanced due to the ease of accessibility of this site. Students have been able demonstrate the necessary employability skills such as communication, collaboration, growth mindset, and critical thinking through project based learning opportunities the they have participated in.

The following highlights the main reasons I support the permanent protection of Waikalua Loko I'a:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. The Castle High community greatly value the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Bernie Tyrell
Principal, James B. Castle High School

June 16, 2020

Aloha,

The Kailua-Kalaheo Complex Area strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity.

The following highlights the main reasons the Kailua-Kalaheo Complex Area supports the permanent protection of Waikalua Loko I'a:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. The Kailua-Kalaheo Complex Area greatly values the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Lanelle Hibbs
Complex Area Superintendent
Kailua-Kalaheo Complex Area

June 15, 2020

HAROLD K.L. CASTLE FOUNDATION

Closing the achievement and preparation gaps in public education

Restoring nearshore marine ecosystems

Strengthening Windward Oahu communities

Aloha,

The Harold K.L. Castle Foundation strongly supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity. The public monies spent would be returned many fold in the form of a beautifully restored fishpond that has become an important educational resource for children, youth, and families throughout Ko'olaupoko and all of O'ahu.

As a longtime supporter of 'aina based education on the Windward side and a funder of both the Pacific American Foundation and the Hawaiian Islands Land Trust, the Harold K.L. Castle Foundation supports the permanent protection of Waikalua Loko I'a for three main reasons:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and access for cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. The Harold K.L. Castle Foundation greatly values the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Terrence R. George

President & Chief Executive Officer

1197 Auloa Road
Kailua, Hawai'i
96734

tel 808-263-7073
fax 808-261-6918
www.castlefoundation.org

156C Hamakua Dr.
Kailua, HI 96734
(808)778-9146

June 4, 2020

Aloha,

Children and Youth Day strongly support Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity.

The following highlights the main reasons Children and Youth Day support the permanent protection of Waikalua Loko Iʻa:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the two fishponds and the Kāneʻohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko Iʻa's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families. Children and Youth Day greatly value the availability of public conservation funding for projects such as Waikalua Loko Iʻa and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko Iʻa.

Mahalo,

Susie Chun Oakland Event Chair CYD Planning Committee	Ray Sanborn CEO, Kama'aina Kids Event Administration	Herb Lee Jr. Executive Director, Pacific American Foundation Event Fiscal Management

DAVID Y. IGE
GOVERNOR OF HAWAI'I

COMMISSION MEMBERS

JOSHUA KAAKUA, Ed.D
Chairperson

SUZANNE CASE
JONATHAN CHING, D.ARCH
HŌKŪLANI HOLT
CARMEN HULU LINDSEY
SAUMALU MATAAFA
MICHELLE PESCAIA

Michael K. Nāhoʻopiʻi
Executive Director

KŪKULU KE EA A KANALOA

KAHOʻOLAWE ISLAND RESERVE COMMISSION

811 Kolu Street, Suite 201, Wailuku, HI 96793
Telephone (808) 243-5020 Fax (808) 243-5885
Website: **http://kahoolawe.hawaii.gov**

June 9, 2020

Subject: Letter of Support for Conservation Easement for Waikalua Loko I`a Conservation Easement

Aloha,

On behalf of the Kaho`olawe Island Reserve Commission, we strongly support Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's (PAF) initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity.

The Kahoʻolawe Island Reserve Commission (KIRC) was established in 1993 by Act 340 to manage Kahoʻolawe, its surrounding waters and its resources, in trust for the general public and for the future Native Hawaiian sovereign entity. The Kahoʻolawe Island Reserve (Reserve) consists of the island of Kahoʻolawe and its surround waters up to two nautical miles.

The mission of the KIRC is the physical and spiritual restoration of Kaho`olawe and its surrounding waters. The Pacific American Foundation has been one of our longest partners is working to restore the physical island of Kaho`olawe as well as educating the people of Hawaii about the special and unique resources of the island. Since 2004, our two organizations have worked closely to develop cultural-and place-based educational programs to encourage the youth of Hawaii to become the future stewards of the unique cultural and natural history of the islands. The acquisition of this conservation easement continues our joint efforts to protect, promote and restore the stewardship efforts that both of our organizations are based upon.

We support the permanent protection of Waikalua Loko I`a as a significant cultural component of the Kāneohe community and a significant cultural asset to help promote native Hawaiian cultural identity, education and welfare. Ensuring that this traditional, native fishpond remains intact and viable is important not only for its historical and cultural importance but also for its potential future, food resource as the State is seeking to increase its diversified economy and create more food sustainability.

The KIRC values the availability of public conservation funding for projects such as Waikalua Loko I`a and strongly supports the use of public funds for the acquisition of a conservation easement to permanently protect this unique resource. If you have any further questions you can contact me at (808) 243-5020 or **mnahoopii@kirc.hawaii.gov**.

Sincerely,

Michael Nāhoʻopiʻi, Executive Director

'ōlelo
COMMUNITY MEDIA

June 8, 2020

Aloha,

Thank you for the opportunity to submit our support of Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity.

The following highlights the main reasons `Olelo Community Media supports the permanent protection of Waikalua Loko I'a:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko I'a's cultural integrity.

Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families.

In closing, `Olelo Community Media strongly supports Pacific American Foundation and the availability and use of public conservation funding for Waikalua Loko I'a well as the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo, for the opportunity to share our support of Waikalua Loko I'a and Pacific American Foundation.

Sincerely,

Sanford Inouye
President and CEO

1122 Māpunapuna Street, Honolulu, Hawai'i 96819 Tel: (808) 834-0007 Fax: (808) 836-2546 www.olelo.org

KUA'ĀINA ULU 'AUAMO

June 10, 2020

RE: Letter of Support for Waikalua Loko Iʻa

Aloha mai,

Kuaʻāina Ulu ʻAuamo's (KUA) writes today in strong support of Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity.

Kuaʻāina Ulu ʻAuamo (KUA) means "grassroots growing through responsibility," our acronym KUA means back, or backbone. We serve as a backbone organization for grassroots rural and Native Hawaiian groups engaged in community-based natural resource management as a traditional and customary kuleana (responsibility). We employ a community-driven approach that currently supports a network of more than 36 mālama ʻāina community groups collectively referred to as E Alu Pū (move forward together), a network of 45+ loko iʻa (fishponds and fishpond complexes) called the Hui Mālama Loko Iʻa, and a network of limu loea (masters of use and propagation of native seaweeds) called the Limu Hui. Waikalua Loko Iʻa has been an active and contributing participant of the Hui Mālama Loko Iʻa and the Limu Hui every since KUA's facilitation of those networks (2013 and 2014 respectively).

KUA supports the permanent protection of Waikalua Loko Iʻa for these main reasons:

First, acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the two fishponds and the Kāneʻohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area to ensure Waikalua Loko Iʻa's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families.

Mahalo for the opportunity to express KUA's support. We greatly value the availability of public conservation funding for projects such as Waikalua Loko Iʻa and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko Iʻa.

Pūpūkahi i holomua,

Miwa Tamanaha
Co-Director

Kevin K.J. Chang
Co-Director

47-200 WAIHEʻE ROAD C/O KEY PROJECT KĀNEʻOHE, HI 96744 | 808.672.2545 kuahawaii.org

MĀLAMA HONUA
CHARTER SCHOOL

June 14, 2020

Aloha,

This letter is in strongly support Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's (PAF) initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko Iʻa (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāneʻohe, Oʻahu, is protected in perpetuity. Mālama Honua PCS, inspired by Hōkūleʻa and the Polynesean Voyaging Societyʻs World Wide Voyage, has partnered with PAF and utilized Waikalua as a learning resource for teacher training as well as student learning around the importance of caring for our land, water, and perpetuating our Hawaiian culture.

The following highlights the main reasons Mālama Honua PCS supports the permanent protection of Waikalua Loko Iʻa:

First, the acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko Iʻa can continue. The restoration and stewardship of Waikalua Loko Iʻa by Pacific American Foundation, the Kāneʻohe community, and volunteers and students from all over Hawaiʻi and beyond, directly improves the health of the two fishponds and the Kāneʻohe Bay ecosystem.

Secondly, the conservation easement will prohibit subdivision and development of an ancient Hawaiian fishponds complex in an urban area, ensuring Waikalua Loko Iʻa's cultural integrity. Third, the conservation easement safeguards Pacific American Foundation's current commitment to provide: access for community ʻāina-based learning, managed access to Kāneʻohe Bay, and access for cultural gathering and fishpond-related cultural practices to continue through the generations for Kāneʻohe families. Mālama Honua greatly values the availability of public conservation funding for projects such as Waikalua Loko Iʻa and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko Iʻa.

Mahalo,

Denise Y. Espania
Mālama Honua PCS School Director

BAYVIEW
GOLF COURSE

July 29, 2020

Aloha,

Bayview golf Course strongly support Hawaiian Islands Land Trust (HILT) and Pacific American Foundation's initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I'a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne'ohe, O'ahu, is protected in perpetuity.

We are supportive of the continued stewardship and protection of Waikalua Loko I'a that the Pacific American Foundation Hawaii, Inc has committed to for the last 25 years.

The acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring the restoration and stewardship work at Waikalua Loko I'a can continue. The restoration and stewardship of Waikalua Loko I'a by Pacific American Foundation, the Kāne'ohe community, and volunteers and students from all over Hawai'i and beyond, directly improves the health of the two fishponds and the Kāne'ohe Bay ecosystem.

Lastly, the conservation easement safeguards Pacific American Foundation and PAF Hi Inc.'s current commitment to provide: access for community 'āina-based learning, managed access to Kāne'ohe Bay, and for the continuance of cultural gathering and fishpond-related cultural practices to continue through the generations for Kāne'ohe families. Bayview Golf Course greatly values the availability of public conservation funding for projects such as Waikalua Loko I'a and strongly support the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I'a.

Mahalo,

Kerry Lau

Owner
Bayview Golf Park
45-285 Kaneohe Bay Dr.
Kaneohe, HI 96744

eliminating racism
empowering women
ywca
O‘ahu

YWCA Fernhurst
1566 Wilder Avenue
Honolulu, Hawai‘i 96822
808.941.2231

YWCA Kokokahi
45-035 Kāne‘ohe Bay Drive
Kāne‘ohe, Hawai‘i 96744
808.247.2124

YWCA Laniākea
1040 Richards Street
Honolulu, Hawai‘i 96813
808.538.7061

ywcaoahu.org

August 4, 2020

Clean Water and Natural Lands Advisory Commission
City and County of Honolulu

Aloha Commission members,

YWCA O‘ahu supports Hawaiian Islands Land Trust (HILT) and Pacific American Foundation’s initiative to raise public funding for a conservation easement in order to ensure Waikalua Loko I‘a (Waikalua Fishponds Complex), consisting of 17.9 acres in Kāne‘ohe, O‘ahu, is protected in perpetuity. Our campsite Kokokahi is adjacent to Waikalua Loko I‘a.

The acquisition of this conservation easement provides a rare opportunity to permanently protect a threatened coastline and estuary, while simultaneously ensuring that the restoration and stewardship work at Waikalua Loko I‘a can continue. The restoration and stewardship of Waikalua Loko I‘a by Pacific American Foundation, the Kāne‘ohe community, and volunteers and students from all over Hawai‘i and beyond, directly improves the health of the two fishponds and the Kāne‘ohe Bay ecosystem.

Over the years, we have seen the Pacific American Foundation use the site for educational and training purposes to bring awareness about the historic importance of the fishponds. The preservation of the property will allow not only Kāne‘ohe residents but also the people across the island access to learn and perpetuate traditional practices which have been handed down over the generations.

As its long-time neighbor, YWCA O‘ahu supports this initiative and values the availability of public conservation funding for projects such as Waikalua Loko I‘a and supports the use of public funds for the acquisition of a conservation easement to permanently protect Waikalua Loko I‘a.

Thank you for your consideration.

Noriko Namiki
CEO

YWCA IS ON A MISSION