

DRAFT ENVIRONMENTAL ASSESSMENT

Puakō Marine Education and Research Center

Puakō, Island of Hawai'i, State of Hawai'i

University of Hawai'i at Hilo

December 2008



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Prepared for: University of Hawai'i at Hilo

Prepared By: Helber Hastert & Fee, Planners

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ACRONYMS AND ABBREVIATIONS

CDDA	Conservation District Use Application
COH	County of Hawai'i
CZM	Coastal Zone Management
DBEDT	Department of Business, Economic Development, and Tourism
DOBOR	Division of Boating and Ocean Recreation
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DOT	Department of Transportation
DOT-H	Department of Transportation – Harbors Division
DWS	Department of Water Supply
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
ft ²	square feet
gpd	gallons per day
HAR	Hawai'i Administrative Rules
HELCO	Hawaiian Electric Light Company
HRS	Hawai'i Revised Statutes
HZMP	Hawai'i Coastal Zone Management Plan
kV	kilovolt (s)
LEED	Leadership in Energy and Environmental Design
LOS	level of service
mgd	million gallons per day
mg/l	milligrams per liter
MHI	Main Hawaiian Islands
mph	miles per hour
MSD	Marine Science Department
NRHP	National Register for Historic Places
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
PER	Preliminary Engineering Report
PHRI	Paul H. Rosendahl Incorporated
RO	Reverse Osmosis
SHPD	State Historic Preservation Division
SMA	Special Management Area
SOH	State of Hawai'i
SSFM	SSFM International, Inc.
TIAR	Traffic Impact Assessment Report
TMK	Tax Map Key
UHH	University of Hawai'i at Hilo
U.S.	United States
USDA	U.S. Department of Agriculture

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EXECUTIVE SUMMARY

This Environmental Assessment (EA) is prepared in compliance with Chapter 343, Hawai'i Revised Statutes (HRS); Title 11, Section 200, Hawai'i Administrative Rules (HAR). This EA analyzes and documents potential environmental consequences associated with the proposed action and reasonably foreseeable alternatives.

Project objectives are to provide the University of Hawai'i at Hilo (UHH) Kalakaua Marine Education Center (KMEC) with a modern marine education and research center in West Hawai'i that would meet the Marine Science Department's (MSD's) instructional and educational research needs for their undergraduate and graduate marine science program, to support community outreach programs, and better serving the higher education needs of West Hawai'i. KMEC is responsible for field logistics for MSD (e.g., boats, vehicles), supervises the Marine Option Program, and operates the Marine Science Summer Program with UHH College of Continuing Education and Community Service.

Proposed Action. UHH proposes to design and construct a Marine Education and Research Center (Center) at a 5-acre portion of tax map key (3) 6-9-01: 01, Puakō, Lālāmilo ahupua'a, South Kohala District, island of Hawai'i, State of Hawai'i (SOH). The project site is currently undeveloped and is owned by the SOH. After construction, the Center would be managed by UHH. The Center is comprised of four basic components: (1) academic center and meeting rooms; (2) marine support facilities; (3) student and faculty living units as well as a caretaker's residence; and (4) associated parking and circulation which are collectively referred to as the "proposed action". The academic center includes classrooms and teaching and research labs, offices and other education and research support facilities. Marine support uses include small boat repair, maintenance, and storage facilities, and a dive locker (compressed air and scuba gear storage lockers). The caretaker's unit would provide for year-round, on-site security for the Center. Temporary housing for up to six faculty and 50 students would also be provided.

Purpose and Need. The purpose of the action is to provide modern facilities in support of UHH's undergraduate marine science program and marine science outreach programs. In addition, the proposed action would provide state-of-the-art operational facilities that meet UHH MSD's unique mission requirements for undergraduate marine science instruction and education in SOH and improve operational efficiency for the department. The action is needed to provide a field station and integrated academic and laboratory facilities in West Hawai'i to support KMEC and UHH MSD undergraduate programs. KMEC has limited access to facilities to conduct open-ocean and near shore field training of undergraduate students including scientific (scuba) diving. KMEC has leased wharf and warehouse space at the SOH Department of Transportation Harbors Division (DOT-H) facilities at Hilo Harbor to conduct portions of their in-water field methods for its undergraduates; however, access to this lease space is limited due U.S. Department of Homeland Security security requirements. Furthermore, the scuba field training component of the program is conducted on the Kona (west) side of the island where the coral reef environment is superior for field studies. All laboratory facilities and equipment are maintained at the UHH campus, away from the DOT-H-wharf and the scuba dive sites, and, therefore, are not conducive to the integration of field and laboratory methods.

Alternatives. Alternatives considered include (1) a limited “Phase 1” alternative (proposed action without academic center, faculty units, caretaker’s unit, and the meeting rooms); and (2) a “Phase 1A” alternative limited to temporary structures and support infrastructure; and (3) a No Action alternative. Other alternatives considered, but eliminated from further evaluation, include upgrading leased DOT-H wharf and warehouse space, and relocation/construction of new facilities within another location in West Hawai‘i.

Environmental Consequences. Environmental consequences of the proposed action and Phase 1 and Phase 1A alternatives are expected to be limited to the local and/or regional setting. Impacts are expected to be temporary and not significant, or can be minimized through the application of appropriate design and engineering methods. The existing vacant site would be irretrievable changed to a public education and research facility. There would be minor benefits at the island-wide level due to the positive economic effects associated with construction spending and increased opportunities for SOH and island of Hawai‘i undergraduates to gain academic and practical experience in marine science education and research. Impacts evaluated included short-term, long-term and cumulative impacts.

The proposed action would not result in significant adverse impacts to the following resource areas: land use compatibility, cultural resources, visual environment, traffic, infrastructure, flood hazard, ground and surface water resources, topography, geology, soils, biological resources, climate and air quality, noise, and the socio-economic environment. The proposed action would not create environmental health and safety risks that may disproportionately affect children and minority or disadvantaged population. When considered with other past, present, and reasonably foreseeable future actions, the proposed action would not result in any significant adverse cumulative impacts.

Based on the environmental analysis and a review of significance criteria specified in Section 11-200-12, HAR, the proposed action would not have a significant impact on human health or the environment and it is anticipated that a Finding of No Significant Impact is warranted.

1 INTRODUCTION

1.1 BACKGROUND

The Puakō Marine Education and Research Center (Center) is being proposed by the Kalakaua Marine Education Center (KMEC) of the University of Hawai'i at Hilo (UHH). UHH is one of three publicly-funded universities in the State of Hawai'i (SOH) and the primary institution of higher education in the County of Hawai'i (COH). The main UHH campus is located in Hilo on the island of Hawai'i.

UHH consists of six colleges with a current student enrollment of about 3,457 students, with approximately 90 percent of those students attending fulltime. KMEC is responsible for field logistics for UHH's Marine Science Department (MSD), and supervises the activities of UHH's diverse marine programs, including the Marine Science Summer Program, the QUEST (Quantitative Underwater Ecological Surveying Techniques) field training course, and the UHH Marine Option Program. MSD is part of the Natural Sciences Division of UHH's College Arts and Sciences. The mission of the undergraduate degree program in marine science is to provide students with a comprehensive understanding of the world's oceans and an appreciation of the importance of marine ecosystems to the global environment and human life, through a combination of hands-on laboratory and field experience, inquiry-based instruction, and direct interactive learning. This is supported by a broad background in the marine sciences, including basic knowledge of the natural science disciplines of biology, chemistry, physics, geology, and mathematics. MSD currently has over 200 students and is larger than the University of Hawai'i at Mānoa's marine sciences undergraduate program. However, without an adequate field station, KMEC is greatly hindered in its ability to provide high quality field instruction for its students and adequate research facilities for MSD students, faculty, and researchers. KMEC's marine facility is based at Hilo Harbor, utilizing SOH Department of Transportation Harbors Division (DOT-H) facilities.

UHH originally received approval from the State Department of Land and Natural Resources (Land Board) for a 65-year direct lease of five acres of land adjacent to the existing Puakō Boat Ramp on September 14, 1990 for the purpose of establishing a West Hawai'i base for KMEC. The proposed facility was to specialize in teaching marine sciences with priority given to undergraduate students and teachers from Hawai'i. An initial extension was granted by the Land Board on April 8, 2004. Conditions of the extension were to subdivide the boat ramp in connection with the KMEC subdivision, preserve public access to the shoreline, and comply with Chapter 343 HRS, as applicable. In addition, construction plans needed to be submitted to the Land Board within four years of the commencement of the lease and the facilities needed to be developed within seven years to avoid lease termination. UHH submitted a preliminary plat map for the 5-acre site to COH on November 14, 2006. COH acknowledged receipt of the application by letter dated January 23, 2007, indicating the processing of the application would be deferred until the applicant complied with COH Special Management Area and SOH Conservation District requirements. Because of time constraints, the UHH requested an extension of the Land Board's submittal deadlines which was granted at the Board's March 28, 2008 meeting. An additional two years were added to the deadlines for submitting plans and for facility construction.

1.2 PROPOSING AGENCY AND ACTION

UHH proposes to design and construct an approximately 40,000 square foot Center which would include five elements: (1) marine support facilities; (2) academic center; (3) temporary housing units for students and faculty, as well as a caretaker's unit; (4) meeting rooms; and (5) associated parking and circulation ("Proposed Action"). Marine support facilities include small boat repair, maintenance, and storage facilities, and a dive locker (compressed air and scuba gear storage lockers). The academic center includes classrooms, teaching and research labs, offices and computer facilities, saltwater aquarium tanks, and other research support facilities. The caretaker's unit would provide for continuous (24 hours a day/7 days a week/365 days a year) on site security for the Center. Faculty units would provide temporary housing for up to six faculty and student units would provide temporary housing for up to 50 students.

This environmental assessment (EA) was prepared in compliance with Chapter 343, Hawai'i Revised Statutes (HRS), as amended, and the environmental impact statement (EIS) regulations promulgated by Chapter 200 of Title 11, Department of Health, Hawai'i Administrative Rules (HAR). Since the proposed action involves the use of public land, including land within the State Conservation District, and public funds, it is subject to the Chapter 343 (HRS) environmental review process. The EA is also intended to satisfy requirements associated with SOH and COH permits to construct and operate the Center. The purpose of this document is to determine whether the proposed action may have a significant impact on the environment and whether an EIS is required.

1.3 PURPOSE AND NEED

The purpose of the Action is to provide a permanent field station for KMEC in West Hawai'i to support MSD's unique mission requirements for undergraduate marine science instruction, education and research in Hawai'i. A new marine education and research center situated at Puakō would provide the UHH undergraduate marine science program with an educational facility of exceptional value for training local students for careers in marine science and jobs in Hawai'i and conducting cutting edge marine research. West Hawai'i, in particular Puakō Bay and nearby coastal areas, is considered a world class area for conducting marine research on coral reefs, marine mammals and protected sea turtles. Access to these world class waters via a marine research and education center would increase the international stature of the MSD program and attract and retain the best and brightest faculty and students. UHH MSD, in conjunction with KMEC, has a longstanding interest in supporting marine science outreach programs, and protecting and conserving marine resources, a philosophy that is also shared by residents of West Hawai'i.

The Action is needed because currently KMEC is faced with significant logistical difficulties in offering programs in West Hawai'i due to the large distances involved in travelling from the Hilo Campus, particularly for overnight or multiple overnight programs, and the unique logistics involved in scuba diving (to avoid nitrogen or compression sickness associated with scuba diving, students and instructors are required to stay at sea-level overnight before ascending elevation to return to UHH). KMEC has in the past offered its undergraduate QUEST program focused on learning how to conduct ecological monitoring of coral reefs using scuba in Puakō Bay by overnighing at the nearby Hāpuna Beach State Park cabins.

A state-of-the art Center at Puakō is needed to train undergraduate students in marine science in ocean/in-water field methods and laboratory methods and to conduct research projects with undergraduate student participation. A fully instrumented Center is required to meet the instructional training requirements of KMEC, to provide job training for careers in marine science, and to meet the community outreach needs of MSD's marine science programs.

KMEC has limited access to facilities for conducting ocean/in-water field training of undergraduate students including scientific (scuba) diving. KMEC currently leases wharf and waterfront space and utilizes a shipping container inside a small fenced area at the SOH DOT-H wharf at Hilo Harbor to conduct open-ocean/in-water training in field methods; however, access to this leased space is restricted due to U.S. Department of Homeland Security requirements. Security requirements include background checks of KMEC boat captains, issuance of passes and identification badges, limitations in hours, and limitations in vehicle access. In addition, the leased space does not provide the needed space for boat and field equipment storage, maintenance, and repair. Additionally, KMEC is required to spend on instructional period providing a required security training lesson before students can enter the wharf/waterfront area. Furthermore, the Hilo area does not afford the same high quality of coral reef resources that West Hawai'i offers.

When completed, the Center would be a modern, state-of-the-art, marine science center located nearby Puakō Bay and the best-developed coral reefs in the Main Hawaiian Islands (MHI). During the academic year, peak use would be on weekends with less UHH use during the week. The Center would be available for use to the community during the week (through the academic year) including UHH College of Continuing Education Courses. The Center would be at capacity during the summer supporting KMEC's marine science summer program. The Center would utilize the Puakō Boat Ramp to launch the Center's boats.

Project Summary

Applicant:	University of Hawai'i at Hilo Kalakaua Marine Education Center c/o Facilities Planning and Construction Office University of Hawai'i at Hilo 200 West Kawili Street Hilo, HI 96720 Mr. Ted LeJeune (808) 974-7595
EA Preparer:	Helber Hastert & Fee, Planners 733 Bishop Street, Suite 2590 Honolulu, HI 96813 (808) 545-2055 Tom Fee / Martha Spengler
Accepting Authority:	University of Hawai'i at Hilo
Proposed Action:	The University of Hawai'i at Hilo proposes to design and build a state-of-the-art marine education and research center. The Center would be operated as a field station and laboratory by the Kalakaua Marine Education Center for the Marine Science Department and other university departments (e.g., Biology Department) carrying out marine-related education and research activities, largely in support of the UHH's undergraduate science programs and community outreach programs.
Chapter 343, Hawai'i Revised Statutes "Trigger":	Use of public land and funds, use of land classified as Conservation District
Location:	Five acres site near the intersection of Puakō Beach Drive and access road to State-owned Puakō Boat Ramp, Puakō, Lālāmilo ahupua'a, South Kohala District, Island of Hawai'i, State of Hawai'i (Figure 1-1)
Tax Map Key:	Undivided portion of (3) 6-9-01: 01 (Figure 1-2)
Landowner:	State of Hawai'i
Existing Land Uses:	Vacant, undeveloped
State Land Use District:	Urban and Conservation (General Subzone) (Figure 1-3)
Hawai'i County Zoning:	Open (Figure 1-4)

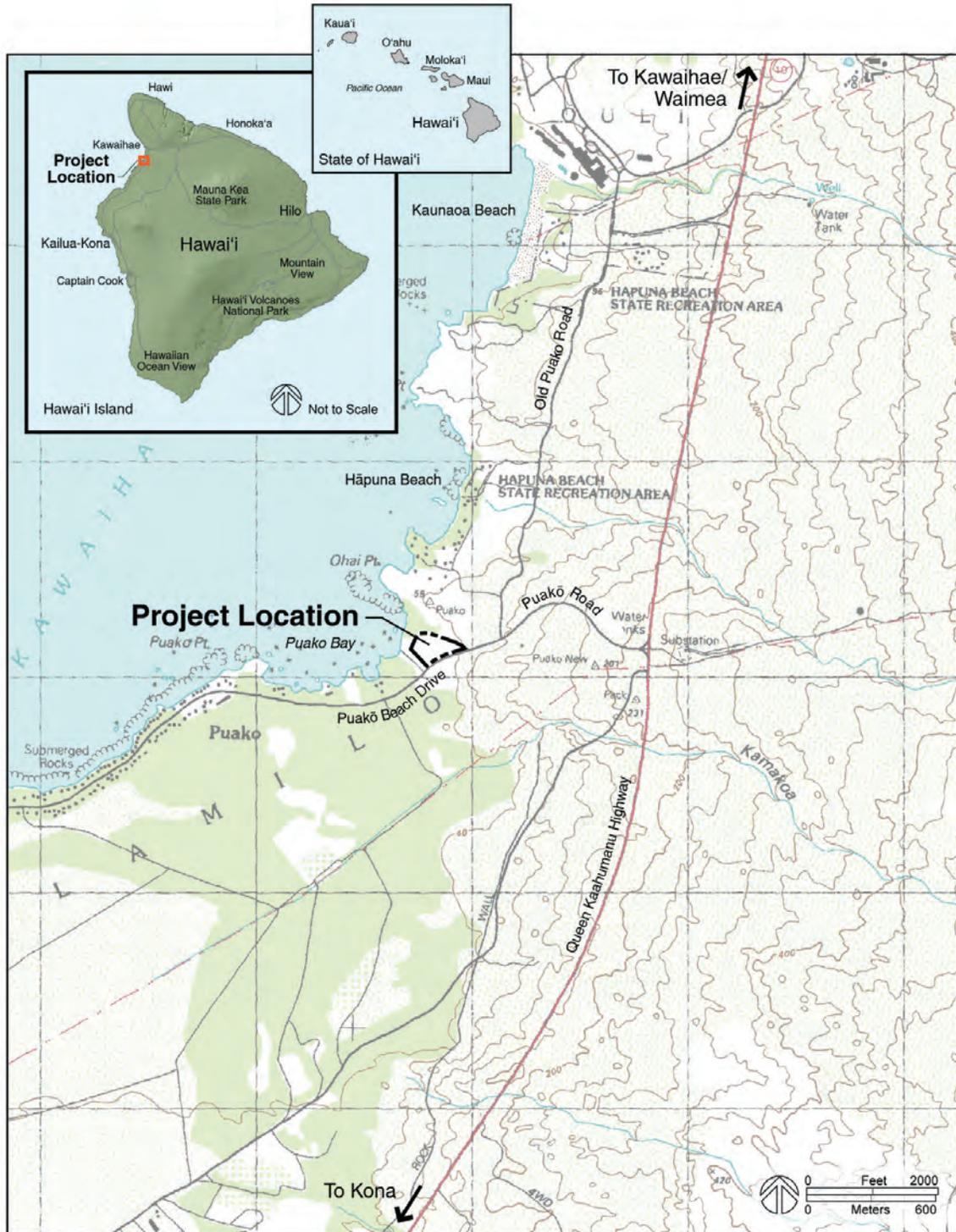


Figure 1-1: Location Map

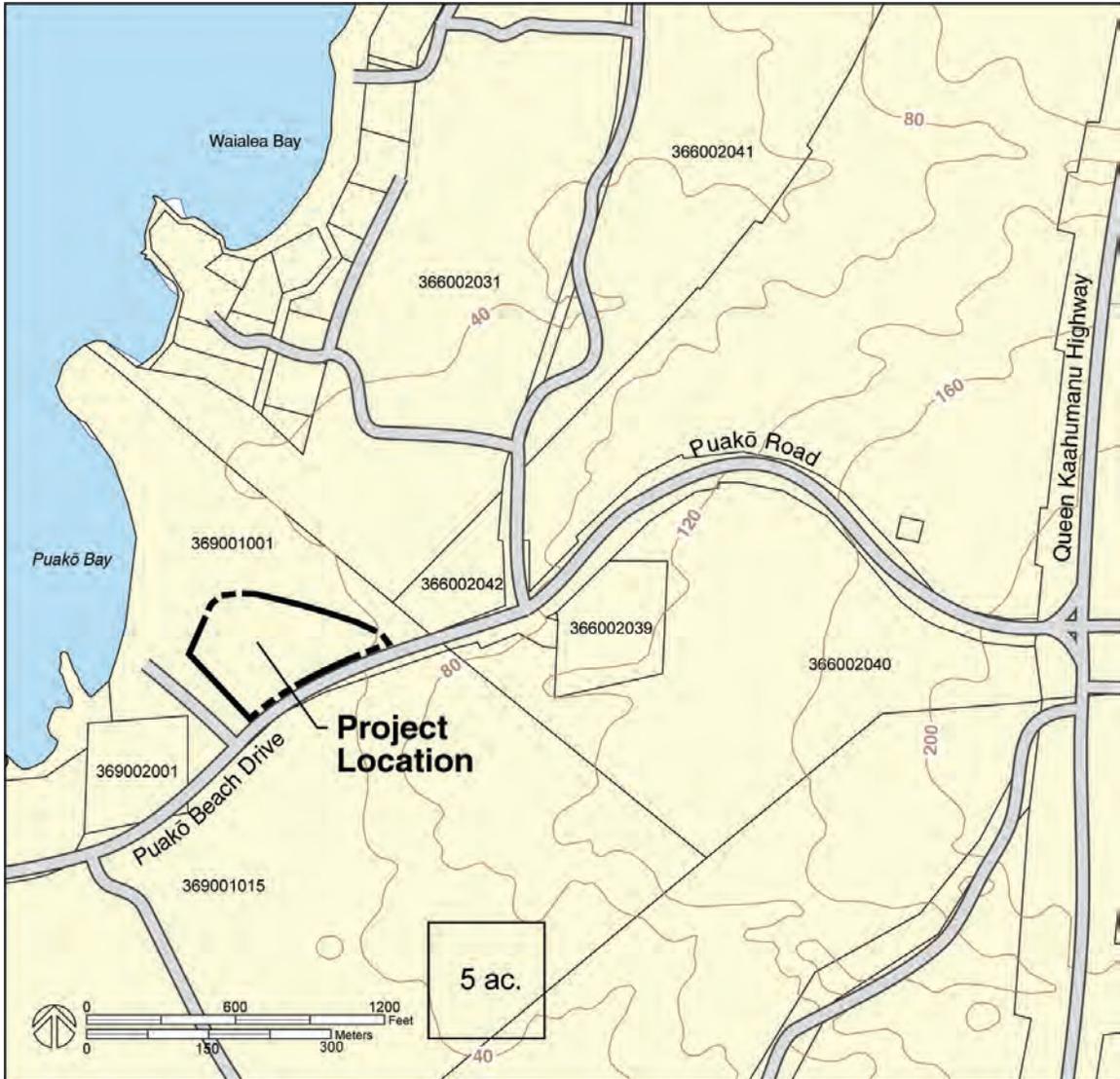


Figure 1-2: Tax Map Key Parcels

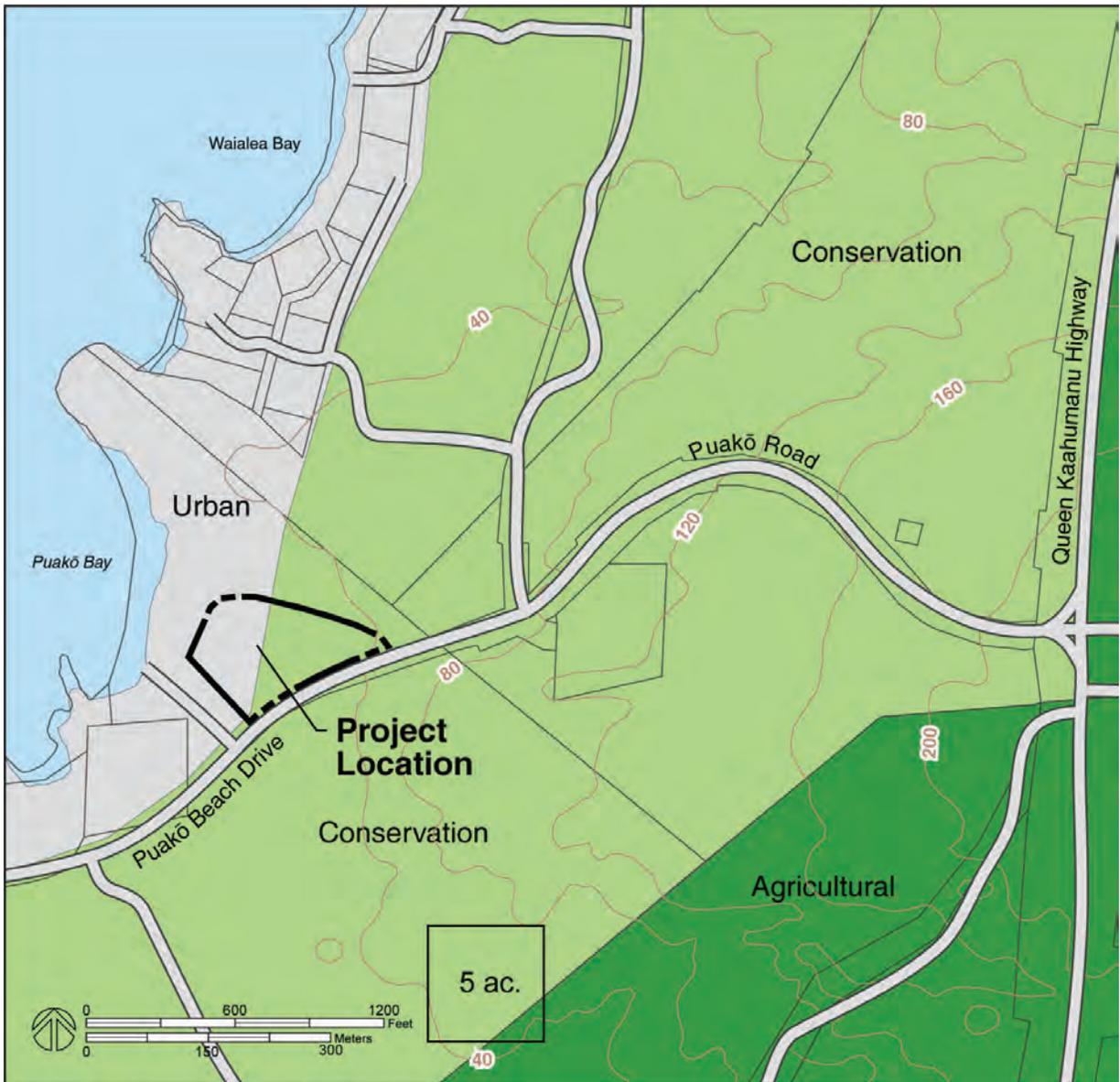


Figure 1-3: State Land Use Districts

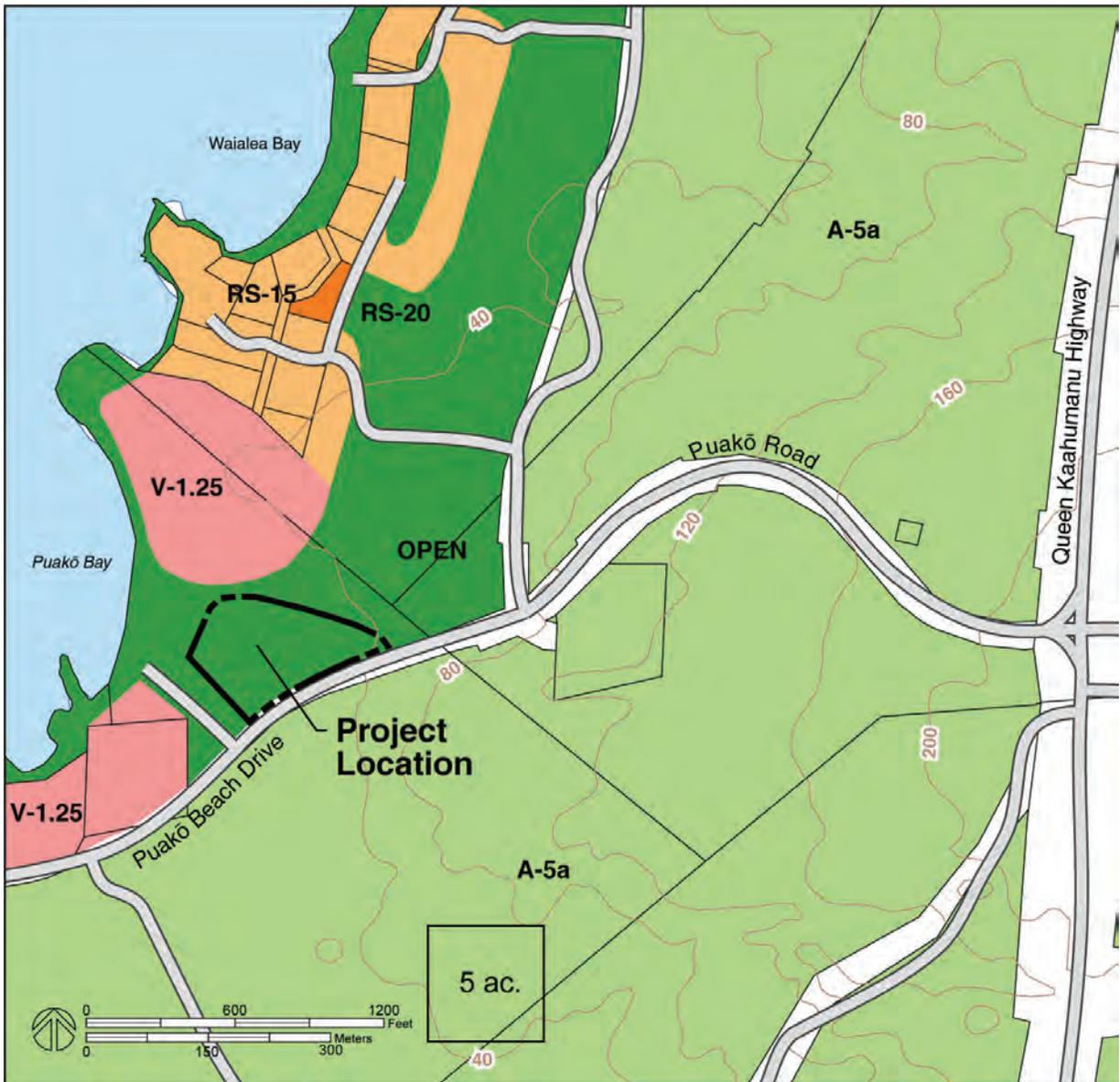


Figure 1-4: County Zoning

1.4 REQUIRED PERMITS AND APPROVALS

Agency	Permit
State of Hawai'i	
Department of Health	National Pollutant Discharge Elimination System (NPDES) permit Air Quality Permit (for emergency generator)
University of Hawai'i at Hilo	Finding of No Significant Impact (FONSI)
Department of Land and Natural Resources	Conservation District Use Permit, Commission on Water Resource Management Well Permit
County of Hawai'i	
Planning Commission	Use Permit, Special Management Area (SMA) Use Permit
Planning Department	Final Subdivision Approval, Grubbing and Grading Permit, and Building Permit(s), Water Supply Variance

1.5 ANTICIPATED DETERMINATION

Based on the information gathered during the preparation of the EA, it is anticipated that the direct, indirect, and cumulative effects of the proposed action will not have a significant effect on the environment; therefore, an EIS will not be required and a FONSI will be issued by the approving agency.

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2 PROPOSED ACTION AND ALTERNATIVES

2.1 PROJECT LOCATION

As shown on Figure 2-1, the proposed action would be developed on 5 acres of undeveloped, unimproved land at the intersection of Puakō Beach Drive and Puakō Boat Ramp Access Road, Puakō, Lālāmilo ahupua‘a, South Kohala District, island of Hawai‘i (hereinafter referred to as the “project site”). The project site is an unsubdivided portion of Tax Map Key (TMK) (3) 6-9-01: 01 (Figure 2-1). The remainder of TMK (3) 6-9-01: 01 is also undeveloped and includes a portion of the Ala Kahakai Shoreline Trail. West of the project site is the SOH-owned Puakō Boat Ramp Access Road with access to Puakō Bay. Puakō Beach Drive is located immediately southeast of the project site with SOH-owned, vacant, undeveloped land beyond the road. To the east of the project site is SOH-owned, vacant, undeveloped land with private single-family residential development beyond that.

2.2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Because funding for the Center could take place in phases, the alternatives to the proposed action include a Phase 1, a Phase 1A, and a No Action Alternative. Each alternative is described below. A comparison of the environmental impacts of the proposed action and the alternatives carried through the analysis (i.e., Phase 1 Alternative, Phase 1A Alternative, and the No Action Alternative) is presented in Table 2 at the end of this chapter.

2.2.1 Proposed Action

A preliminary space program was developed by KMEC and UHH MSD personnel to identify the variety of spaces and approximate sizing needed to create a world class facility. Precedents considered by the KMEC and MSD staff include marine research stations operated by other U.S. universities including:

- Friday Harbor Research Station in Puget Sound operated by the University of Washington
- The Rutgers University Marine Field Station on the Mullica River-Great Bay estuary, New Jersey
- The Moss Landing Marine Laboratories in Monterey Bay operated by a consortium of California State Universities



Friday Harbor Research Station

The preliminary program identified the need for approximately 40,000 square feet (ft²) of space to support MSD’s research and educational objectives (Table 2-1). Basic footprints were developed from the space program and organized in various configurations to explore use relationships and adjacencies, and overall site layouts and to support the impact analysis of this EA (Appendix A). A design exercise following major discretionary entitlements will identify specific building envelopes and site organization. The preferred land use plan is presented as Figure 2-1. It is conceptual and subject to change.

Table 2-1: Summary of Buildings and Spaces Associated with the Proposed Action

Facility	Description
Academic Center – total area of approximately 13,000 ft²	
Marine science laboratories	Two instructional-use laboratories with attached autoclave rooms.
Classrooms	Two 30-student classrooms.
Computer laboratory	Common-use for students, researchers, and faculty
Faculty laboratories	Two faculty-use, marine science laboratories
Faculty offices	Three two-person faculty offices
Student research laboratories	Five student research marine science laboratories
Research library	Common-use research library
Seminar room	Multi-purpose seminar room
Saltwater tanks	Three seawater tanks for marine flora and fauna
Reception area	Reception area for visitors and display area for on-going research and training projects carried out at the Center.
Dining hall/auditorium	Also used for community events on a space available basis
Marine Support – total area of approximately 6,250 ft²	
Dive locker	Storage for 80 scuba tanks, tri-mix, fill whips, compressor room, and small office
Boat storage	Storage for three 22-ft boats and one 40-ft boat
Marine shop	Equipment and boat repair, fabrication, and a small office space
Housing – approximately 21,000 ft²	
Student units	Transient housing units for students (50 beds) (incl restrooms and common area)
Faculty units	Six 2-bed/1-bath live/work units for transient faculty housing
Caretaker's unit	One 2-bed/1-bath caretaker's residence

The topographic survey conducted for the project defined a fairly level but undulating five-acre area adjacent to the Puakō Beach Drive. The makai edge of the site drops off fairly steeply toward the shoreline and the Ala Kahakai Trail, and a diagonal gully defines the north side. The boat ramp side is defined by a shallow gully on the makai side and rocky hillocks on the Puakō Beach Drive side. The conceptual land use plan (Figure 2-1) is a generalization of Site Plan Alternative “B” in Appendix A. It centers the planned campus within this naturally defined plain and places the academic center and associated meeting rooms astride the main entrance driveway next to Puakō Beach Drive. This is considered the primary “public realm” of the site. The faculty and student units are placed in an interior location, nearer to the shoreline. “Marine



Figure 2-1: Conceptual Land Use Plan

activities" (e.g., marine shop, dive locker and boat storage) are located on the Boat Ramp side of the property, collocated with the planned caretakers residence for maximum security, and serviced by the second driveway. The Center's small boats would be stored in this area and trailered next door to the boat ramp via the driveway and Puakō Beach Drive when needed (no direct connections to the ramp are proposed for security reasons). The two driveway connections with Puakō Beach Drive are spaced approximately 240 feet apart (with the western driveway spaced approximately 240 feet east of the existing Boat Ramp intersection). On site parking to accommodate up to 75 vehicles has been accommodated to meet COH off-street parking guidelines (this exceeds the number of stalls likely to be needed by the facility as KMEC and UHH MSD students will be required to bus over to the site from UHH so only faculty and visitors would be accessing the site with privately owned vehicles). A landscaped buffer would be maintained along Puakō Beach Drive and care will be taken in the design of the structures to blend them in with the arid, coastal setting. Topographic conditions provide a natural setback (approximately 120 - 160 feet) along the existing Boat Ramp which could to accommodate potential expansion of the ramp. As shown on the site plan, the entire site is set back from the shoreline approximately 200 feet and at least 80 feet from the Ala Kahakai Shoreline Trail.

Because of the site's proximity to the shoreline, students and faculty will easily be able to access shoreline areas in the vicinity of the Center as part satisfying field research objectives of the curriculum.

The proposed construction would take approximately three years to complete after funding is provided. The cost of the design and construction is estimated at \$12,000,000.

The Center would be in fulltime use by KMEC, MSD, other UHH programs, and/or community groups. During the academic year (mid August to mid December; mid-January to mid May), peak KMEC and MSD use would be on weekends with other UHH field programs using the facility during the week. The facility would be available for use to the community during the week (through the academic year) including the UHH College of Continuing Education Courses. The facility would be at capacity during the summer supporting KMEC's marine science summer programs.

The project will follow guidelines established in Chapter 196-9, HRS (Energy efficiency and environmental standards for state facilities). UHH's intent is to design and construct the Center to meet the Leadership in Energy and Environmental Design (LEED) silver standard. The construction of a "green," high tech, low-impact, state-of-the-art marine education and research facility is a major component of the vision established by the UHH marine scientists that conceived the project. The Center and the marine science programs that will be run out of it will enhance the understanding of sustainable building technology and at the same time, assist in improving the community's awareness and understanding of the region's near shore marine resources. The Center would offer an opportunity to showcase UHH's diverse efforts at sustainable environmental design. In accordance with LEED principles, solar water heating systems will be incorporated where cost effective. Water and energy efficiency practices will be implemented to reduce waste and increase conservation. Principles of waste minimization and pollution prevention, such as reducing, reusing, and recycling, will be incorporated as a standard operating practice, including programs for waste management in construction and demolition projects and office paper and packaging recycling programs. Life cycle cost-benefit analysis will

be used to purchase energy efficient equipment such as ENERGY STAR products and use utility rebates where available to reduce purchase and installation costs. Environmentally preferable products, including recycled and recycled-content, bio-based, and other resource-efficient products and materials will be procured when feasible.

2.2.2 Phase 1 and Phase 1A Alternatives

The Phase 1 Alternative in its complete form would include only two of the elements of the proposed action: (1) marine support facilities; and (2) temporary student and faculty housing units. This alternative would permit UHH to operate a field station at Puakō consisting of marine support facilities and temporary housing units for students and faculty.

Financial constraints may require that a preliminary stage or phase (Phase 1A) be utilized at the project site before a Phase 1 Alternative or the proposed action could be funded and completed. Phase 1A would consist of a simple, temporary field camp to accommodate up to 50 students, along with faculty and support staff. It would include a temporary equipment/boat storage shed, temporary covered camping platform, a potable water tank, solar-heated, low pressure shower/bathing facilities, and portable toilets or self-contained, composting toilets. The Phase 1A Alternative would allow KMEC students and faculty to make use of the project site during and until funding is available for the completion of the proposed action or complete Phase 1 Alternative.

Neither Phase 1 or Phase 1A Alternatives would include the academic center, separate faculty units, caretaker's residence, or conference/auditorium facility. They would not allow KMEC to provide integrated field, laboratory and educational activities or provide opportunities for academic and community meetings or conferences.

Similar to the proposed action, the Phase 1 and Phase 1A Alternatives would be located at the project site and the design and construction funds would be provided from UHH. The Phase 1 Alternative would include site clearing and grading similar to the proposed action but at a smaller scale. The Phase 1A Alternative would consist of very small scale site clearing and grading. For both Phase 1 and Phase 1A Alternatives, all laboratory research and the majority of the academic support would be conducted at the main UHH campus in Hilo. The Phase 1 and Phase 1A Alternatives would take less time and money to construct than the proposed action because of reduced scope.

Phase 1 and Phase 1A alternatives are referred to as the "action alternatives", distinguished from the "No Action Alternative" discussed below.

2.2.3 No Action Alternative

Under the No Action Alternative, no development would occur at the project site. UHH would continue to operate the KMEC ocean/in-water field method instruction from leased warehouse and wharf space at Hilo Harbor, supplemented by occasional overnight trips to Puakō for scientific scuba diving instruction. Overnight accommodations would likely consist of informal beach park camping. All laboratory work and academic support would continue to be conducted at the main UHH campus in Hilo.

2.2.4 Alternatives Considered But Eliminated From Further Evaluation

Increase Leased Space at DOT-H Hilo Harbor. Under this alternative, the existing, leased space at Hilo Harbor would be expanded and updated to provide marine support facilities. This alternative does not fully integrate in-water activities with academic support and research and is located a long distance from optimal coral reef study areas in West Hawai'i. Under this alternative, faculty and students would still require passes to access the area and in-water scientific diving would still occur in West Hawai'i (via car trip). As a result, this alternative does not significantly enhance KMEC or the UHH undergraduate MSD program and would not provide outreach to the community. Because this alternative did not meet the project objectives, it was not considered feasible and was eliminated from further consideration.

Another Location in West Hawai'i. This alternative involves leasing or purchasing land to build a marine education and research center at another location in West Hawai'i. Costs for developable, shoreline parcels in West Hawai'i, if available, are some of the highest in the world and would be prohibitively expensive. Even if an affordable site were found, it would not likely be in a coastal setting or proximate to Puakō Bay, the environment that UHH MSD feels it can be most effective in studying. An offsite location would require additional transportation costs and would not permit easy student and faculty access to shoreline areas. Therefore, this alternative is not considered feasible and was eliminated from further consideration.

2.3 ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES

Table 2 summarizes the environmental effects of the proposed action and the reasonable alternatives. The information in the table is summarized from Chapter 4, Environmental Consequences.

Table 2-2: Summary of Environmental Effects of the Proposed Action and Alternatives

Resource Issue	Proposed Action	Phase 1 Alternative	Phase 1A Alternative	No-Action
Land Use Compatibility	The project site would be used primarily for instruction and educational research of undergraduates enrolled in KMEC and UHH MSD programs. Currently the project site is unused and is undeveloped, vacant land. The proposed action is consistent with the South Kohala Community Development Plan and would complement the State's efforts in conserving marine natural resources in the West Hawai'i region.	Same as proposed action.	Same as Phase 1 Alternative except that all of the facilities would be temporary in nature.	Under the No Action Alternative the project site would continue vacant status and would not be compatible with the South Kohala Community Development Plan.
Cultural Resources	Historic Properties: DLNR State Historic Preservation Division has concurred with the project's Archaeological Assessment Survey that no historic properties would be affected by the proposed action (Appendix B).	Same as proposed action.	Same as proposed action.	No impact.
Natural Resources	The proposed action would have no effect on federal- and SOH-listed threatened, endangered or candidate flora or fauna species. None have been observed at the project site, and no unique habitat resources important to native or protected flora or fauna are found at the project site.	Same as the proposed action.	Same as proposed action.	No impact.

Table 2-2: Summary of Environmental Effects of the Proposed Action and Alternatives (Continued)

Resource Issue	Proposed Action	Phase 1 Alternative	Phase 1A Alternative	No-Action
Natural Resources (Continued)	The project site is set back from the shoreline by a minimum of 200 feet. Indirectly, the programs provided by the Center would increase awareness and stewardship of marine resources in West Hawai'i.	(Continued)	(Continued)	(Continued)
Visual Environment	A number of separate buildings would be constructed under the proposed action – most single story with the potential of one or two 2-story buildings. Buildings would be set back from Puakō Beach Drive and would not significantly impact established views of offshore waters or mountains. Landscape screening will be employed to further mitigate local visual effects. Site planning would adapt improvements to the undulating terrain to minimize the exposure of the new buildings.	Similar to the proposed action; however, fewer structures would be built resulting in a reduced visual impact.	Similar to Phase 1 Alternative; however, all structures would be temporary in nature and have a smaller footprint.	No impact.
Traffic	Construction vehicles will be managed to minimize construction period impacts. The project will have minimal effect on peak hour traffic conditions.	Similar to the proposed action; however, fewer structures would be built resulting in even less traffic generation.	Same as Phase 1 Alternative.	No impact.

Table 2-2: Summary of Environmental Effects of the Proposed Action and Alternatives (Continued)

Resource Issue	Proposed Action	Phase 1 Alternative	Phase 1A Alternative	No-Action
Infrastructure	<p>Minimal municipal water service is available (e.g., 600 gallons per day [gpd]). Standalone, onsite systems would be developed to provide potable water and treat and dispose of wastewater.</p> <p>Telecommunications and electrical infrastructure would be provided by West Hawai'i utility providers.</p>	<p>Similar to the proposed action except on a smaller scale.</p>	<p>Electrical would be similar to Phase 1 except on a smaller scale and would be limited to lighting and basic kitchen appliances. Potable water would be supplied via on-site water tank or cistern; wastewater disposal by outdoor showers and sinks that drain to the ground or containment; composting toilets or portable toilets; and telecommunications would be limited to wireless access. Potable water demands would be less than the Phase 1 Alternative. Wastewater disposal requirements would also be less than the Phase 1 Alternative and would be self contained.</p>	<p>No impact.</p>
Topography, Geology, Soils, Flood Hazard, Ground/Surface Water Resources	<p>Topography, soils, and geology would be disturbed as part of the Center's construction; however, these disturbances would be limited due to the Center's design (use of natural land forms in siting buildings) and limited grading and excavation (due to the hard basalt rock underlying the project site).</p> <p>Groundwater resources from the underlying brackish aquifer would be used as a potable water source. Treated wastewater effluent would be disposed of via an onsite irrigation system and/or in shallow absorption trenches after secondary wastewater treatment is completed.</p>	<p>Similar to the proposed action; however, physical impacts to the project site would be on a smaller scale.</p>	<p>Same as Phase 1 Alternative.</p>	<p>No impact.</p>

Table 2-2: Summary of Environmental Effects of the Proposed Action and Alternatives (Continued)

Resource Issue	Proposed Action	Phase 1 Alternative	Phase 1A Alternative	No-Action
Topography, Geology, Soils, Flood Hazard, Ground/Surface Water Resources (Continued)	In addition, surface water resources would be impacted during the construction phase; however, best management practices would be implemented to protect surface water resources. Development would increase the amount of impervious surfaces and associated storm water runoff. Storm water would be directed to on-site detention areas and native plant gardens and swales.	(Continued)	(Continued)	(Continued)
Air Quality and Noise	Local construction period air quality and noise disturbance is likely. The proposed action may include an emergency generator which would run on an occasional basis.	Similar to the proposed action but at a smaller scale.	Smaller footprint and temporary nature of construction would result in a smaller effect than the proposed action and Phase 1 Alternative.	No impact.
Hazardous and Regulated Materials	No significant impact. Any hazardous and regulated materials used, stored, or generated would be handled in accordance with applicable regulations.	No laboratories would be associated with the Phase 1 Alternative; therefore, fewer hazardous and regulated materials would be present at the project site.	Similar to the Phase 1 Alternative.	No impact.

Table 2-2: Summary of Environmental Effects of the Proposed Action and Alternatives (Continued)

Resource Issue	Proposed Action	Phase 1 Alternative	Phase 1A Alternative	No-Action
Socio-Economic	Positive benefit for UHH marine program students and staff with beneficial employment enhancement via career training to the community during the operational period. Minor beneficial island-wide effects associated with construction-period employment opportunities and associated government tax revenues. Insignificant increases in indirect/induced spending and impact to local businesses during the operational period. Positive impact to children and minority/disadvantaged populations through the availability of on-island, community-inclusive summer marine programs open to school-age children, including minority children.	Similar to the proposed action. The UHH marine program would be improved; however, the research laboratory component would not be included and all laboratory activities would continue to be conducted at the Hilo campus. Construction-period employment would be less than under the proposed action.	The site would provide a reliable location to run KMEC field programs but without the benefit of permanent structures and utilities. Construction-period employment would be less than the Phase 1 Alternative.	The continued use of Hilo-based boats and DOT-H wharf space to conduct the ocean-going portion of instruction and research and the continued use of West Hawai'i beaches (via overnight camp trips) to conduct in-water training would limit UHH's ability to support and expand its undergraduate marine program.

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3 AFFECTED ENVIRONMENT

This chapter describes the environmental setting of the project site and the environmental resources within the area of potential effect.

3.1 OVERVIEW

The project site is located on 5 acres of undeveloped, vacant land at Lālānilo, South Kohala District, on the northwest side of the island of Hawai'i (Figure 1-2, Location Map). The project site is a portion of TMK number 3-6-9-01: 001 and is owned by the SOH and leased to UHH.

Queen Ka'ahumanu Highway, via Puakō Beach Drive, provides the primary access to the project site. The highway links Kailua-Kona, the largest population center in West Hawai'i, with Kawaihae Harbor, a deep-draft commercial port. The highway also provides access to Kona International Airport, which accommodates both U.S. mainland and interisland flights, and Honokohau Harbor, a SOH-operated small boat harbor.

The two largest population and commercial centers on the island are Kailua-Kona, approximately 25 miles to the southwest, and Hilo, approximately 51 miles to the southeast. Waimea, South Kohala District's largest population and commercial center, is approximately 12 miles to the northeast of Puakō. Other residential communities within commuting distance of the project site are Kawaihae Village, Waikoloa Village, Puakō Beach Lots, Hawi, and Kapa'au.

The project site is vacant and undeveloped, the majority of the site is covered with non-native vegetation or exposed rock. The project site is an unsubdivided part of a 23.084-acre SOH owned parcel (TMK 6-9-01: 01) that extends out to Ohai Point to the north of the project site and south to encompass the Puakō Boat Ramp. Except for the boat ramp, the entire 23-acre parcel is undeveloped and vacant land. TMK 6-9-01: 01 is identified by the DLNR Land Division as ceded land under §5(b) of the Admissions Act (Public Law 86-3). The Ala Kahakai Shoreline Trail runs along the coastal edge of the parcel. The parcel is bounded to the south by COH-owned Puakō Beach Drive with SOH-owned, vacant, undeveloped land beyond the road (TMK 6-9-01: 15); to the east is SOH-owned, vacant, undeveloped land (TMKs 6-6-02: 40 and 42). The COH Puakō solid waste refuse station is located approximately 600 feet east of the project site within TMK 6-6-02: 39 (Figure 3-2). South of the boat ramp are undeveloped and developed residential lots, including single-family homes and condominiums.

The Puakō community consists mainly of single-family homes that were built along both sides of Puakō Beach Drive. There is one store in the community (Puakō Store) which is central to the community and serves as a meeting place and a place for information sharing. The coastline bordering Puakō is home to an extensive coral reef system while the dry lowlands to the east support a large kiawe forest.



Figure 3-1: Aerial Photo

Further north of the project site are residential home sites surrounding Waialea Bay and the Hāpuna State Recreational Area (TMK 6-6-02: 31). The State Recreational Area includes several beaches including Hāpuna Beach and Beach 69. Local residents, residents from the whole island, and tourist frequent these beaches, making them some of the most popular and crowded beaches on the island. The southern end of the Puakō community is called Paniau, a surf spot with a rock beach. Further south is Holoholokai Beach Park and the Mauna Lani Resort. Puakō contains several cultural and historical sites, including the Puakō petroglyph field and the Hokuoloa Church (COH 2008).

An underground aquifer within Puakō supports a dense kiawe forest (Puakō Forest). The forest is very lush and productive with large kiawe trees producing flowers heavy with nectar. A small bee-keeping company is producing internationally known, gourmet-quality honey from the forest (COH 2008).

3.2 LAND USE COMPATIBILITY

The 5-acre project site is vacant and unimproved; similar to open lands in the vicinity. The Waialea Bay residential community is located to the north of Ohai Point with the nearest homesite approximately 600 feet north of the project site (about two city blocks). The Puakō Boat Ramp anchors the southern side of the site. The ramp is very popular and is only one of two ramps serving the entire northwest Hawai'i area (the other is in Kawaihae Harbor). The ramp is the only available ramp during times of the year when the Kawaihae ramp is closed due to sand buildup. Conversations with community members indicate the ramp is at times congested and DLNR Division of Boating and Ocean Recreation (DOBOR) has indicated its intent to expand the ramp. Anecdotal information indicates the ramp parking area is increasingly used by tourists enjoying whale watch or other pleasure tours staged from the boat ramp. The project archaeologist indicated the project site – as well as surrounding vacant lands-- have been subjected to grassland fires in the recent past, with “bulldozer push piles associated with past fire control activities” observed on the site.

3.3 CULTURAL RESOURCES

Cultural resources include both historic properties and cultural values or traditional cultural practices. Historic properties are any prehistoric or historic districts, sites, buildings, structures, or objects, significant in American history, architecture, archaeology, engineering, or culture that are included in, or eligible for inclusion on, the National Register for Historic Places (NRHP). Historic properties include archaeological sites, historic buildings and structures, historic districts, and other evidence of human activity, as well as artifacts, remains, and records related to and located within such properties. Historic properties also include places of traditional religious and cultural importance to an Indian tribe or a Native Hawaiian organization. These traditional cultural properties are places associated with the practices and beliefs of a living community, are rooted in its history, and are important in maintaining the continuing cultural identity of the community. Historic properties are protected under Chapter 6E HRS, Section 11 of the State Constitution, and the NRHP.

Cultural values or traditional cultural practices reflect the beliefs of particular ethnic or cultural groups. These values and practices are identified in ethnographic studies and other personal accounts. The American Indian Religious Freedom Act of 1978 makes it federal policy to protect and preserve the rights of indigenous groups, including Native Hawaiians, to practice their traditional religion, access sites, and to conduct ceremonial and traditional rites.

3.3.1 Archaeological Resources

An archaeological assessment survey was prepared for the proposed action by Rechtman Consulting in 2008 to determine previous land use through archival research and to determine the presence or absence of subsurface historic properties representing previous pre-historic and historic use of the area (Appendix B). The 2008 archaeological assessment updated a 1994 archaeological inventory of the project site by Hunt and Pfeffer (1994) and a regional study by Jensen (1994). The following is a summary of the report findings.

The vacant, undeveloped land that comprises the project site does not have exceptional importance or meet the NRHP eligibility criteria for historic significance. Historic properties that

are located in the vicinity of the project site include the Puakō petroglyph field, a unique resource of the pre-contact period, and the Hokuloa Church, an historic building built in 1858 and still in use today.

The 1994 archaeological site inventory of the project site by Hunt and Pfeffer noted six possible archaeological features in the area and that each of those features had been subject to substantial disturbance from recent bulldozing. The 2008 archaeological assessment survey expanded on the 1994 inventory. Field surveys were conducted in February by a four-person field crew and the project site was thoroughly inspected by four archaeologists using 10-meter (30-foot) east-west pedestrian transects of the area. Care was taken to examine six previously-noted and suspected archaeological features (Hunter and Pfeffer 1994) and observations indicated that none were determined to currently represent definable archaeological resources. Therefore, no historic properties were identified by the current study (e.g., no significant cultural sites or deposits were encountered within the project site).

The only archaeological site observed in the project area, but not on the project site, is Site 19401 which is located north and mauka of the Ala Kahakai Shoreline Trail. It is a rectangular-shaped historic enclosure with coral-filled walls of stacked cobbles and boulders standing up to 4 feet tall. The interior of the enclosure contained soil and a metal bucket hoop and a metal strip with rivets (Rechtman Consulting 2008).

3.3.2 Chapter 343, Hawai'i Revised Statutes – Cultural Resources

Article XII, Section 7 of the Constitution of the State of Hawai'i (as amended) addresses traditional and customary rights, and states: "The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights." HRS Chapter 343 requires disclosure of the effects of a proposed action on the cultural practices of the community and State.

Cultural resources, as used in Chapter 343, HRS, include the "practices and beliefs of a particular cultural or ethnic group or groups" (Office of Environmental Quality Control [OEQC] 1997). The types of cultural practices and beliefs to be assessed may include "subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs" (OEQC 1997), and may also include traditional cultural properties or other historic sites that support such beliefs and practices. This section summarizes the historical context of the project area and identifies any known cultural practices occurring on the project area. Primary sources of information for this section included Jensen (1994) and *Puakō: An Affectionate History* published by the Puakō Historical Society in 2000.

Settlement Patterns

An historical documentary research report was prepared by Kepa Maly for the Hāpuna Beach State Recreation Area Expansion EIS (Belt Collins 2001). The report represents a compilation of information, translated Hawaiian legends, Land Commission Award records, and previous ethnographic and archaeological studies.

Though identified as Lālāmilo today, there is some confusion over the actual name of the land unit in which the project is located, early traditional accounts and mid-1800's land records generally identify the land as Puakō, rather than Lālāmilo. The name change occurred circa 1928 as territorial survey maps in that year began identifying the land as Lālāmilo (Maly in Jensen 1994).

Polynesian Settlement

Polynesian settlement of Hawai'i occurred in two major periods, A.D. 300 to 600 and A.D. 1100 to 1250. It is believed that for generations following initial settlement, the population clustered along the well watered windward slopes of the Hawaiian Islands where fresh water was available and agriculture could become established, and where access to marine resources was good. Small bays generally had a cluster of houses where fishermen and their families lived. Only after the best areas became populated and perhaps crowded (circa A.D. 800 to 1000) did the Hawaiians begin settling more remote, and less desirable areas (Maly in Jensen 1994).

In the Puakō region of South Kohala, potable water was primarily provided by coastal springs, water caves, dew fall, and catchment, and was used for some crop cultivation and to sustain human life. The ocean provided most of the meat of the Hawaiian diet. Because of the importance of fishing, and its high level of development, bays like Hāpuna and Waialea were prime locations for further settlement during this expansion period. Recent archaeological studies for surrounding areas indicate that initial settlement in this section of South Kohala occurred as early as circa A.D. 1200 (Maly in Jensen 1994).

The interior of Kohala (moku-o-loko) is one of the six major traditional districts of Hawai'i Island. The project area is situated in the Puakō-Lālāmilo Ahupua'a, in the okna (region) generally known as Kohala makani Apa apa'a . This region is famous for its strong land-drying winds. Legendary accounts depict this area as a rugged land buffeted by various winds (Maly in Jensen 1994).

Legendary and early historic period accounts tell us that fishing was an important occupation of residents of Puakō, and Anaehoomalu. The coastal zone was known for its lawaia oko hee (fishermen who fished with lutes for octopus from canoes). While people on the coast were primarily fishermen, extensive agriculture occurred in the uplands. Travelling via various trails, trade occurred between lowland and upland families.

Post Missionary Contact

After the death of Kamehameha I in 1819, American missionaries arrived in the Hawaiian Islands. Mr. Asa Thurston, a Christian missionary, visited the Puakō area in August 1823 and described it as a "considerable village". In 1835, Reverend Lorezo Lyons, a Christian minister at Waimea, visited Puakō which he described as larger than Kawaihae (Puakō Historical Society 2000). At this time, the village had its own small harbor to anchor native vessels, coconut groves were in existence which gave the village a "verdant aspect." Lyons reported that Puakō villagers made salt and caught fish which were exchanged for vegetables grown in the uplands (Puakō Historical Society 2000). He estimated the Kawaihae-Puakō population to be approximately 734 persons (Jensen 1994).

In 1853, a major outbreak of small pox spread from Waimea to Kawaihae and down towards Puakō. Famine and food shortage in the area also contributed to a decline in the population. In

addition, more promising economic opportunities were available on O‘ahu and in other larger towns across the islands which led many of the native people to migrate out of the region. In addition, the eruption of Mauna Loa in 1859 had a negative impact on the coastal villages when the lava flows entered the ocean. Lyons reported the effect of the lava flow had on the coastal village: “The heat of the volcanic stream that entered the sea near this place from [Mauna Loa] have killed or frightened away all of their fish” (Puakō Historical Society 2000).

In 1858, King Kamehameha III gave Lyons land in Puakō for use of his ministry. That same year, construction of Hokuloa Church began. The church was built by volunteers from the Puakō parish using coral blocks cut from the Puakō reef and koa wood from the high forests. It was dedicated in 1860; however, the Puakō community and church attendance declined shortly after the church was completed and by 1884 the church was in disrepair. In 1885, Hokuloa Church was restored and in 1885 it was rededicated; however, the population of both the village and church parish continued to decline.

Sugarcane Cultivation

In 1895, sugar cane was found growing in the wild at Puakō. This discovery spurred Mr. Robert Hind, who developed the Hawi Mill & Plantation Co., Ltd., into negotiations with the Parker Ranch to trade land in Hilo for land in Puakō to start a sugar plantation. The Hind sugarcane plantation included the present Puakō Boat Ramp, a piece of the shoreline, and approximately 1,500 to 1,800 acres of the kiawe forest east of Puakō Beach Drive (southeast of the project site). The first planting was around 1901 and employed a resident workforce of Hawaiians, Japanese, Chinese, and Filipinos. A wharf was built south of the Puakō Boat Ramp and the mill was established a “hundred yards or so” from the landing. The plantation had dormitories and a camp for over three hundred workers, a company store, two school houses, an office building, storage buildings, and an apiary. The mill closed in 1913 after a dozen years of poor production related to both weather and poor irrigation water quality and supply (Puakō Historical Society 2000).

After the sugarcane plantation closed at Puakō, only seven families remained in the village and the Hokuloa Church no longer held services. The Goto family remained on the old plantation running the apiary for the Hind family. Eventually, Asakichi Goto purchased the apiary in 1924 for \$35,000. His family continued to run the apiary until 1969 when a fire destroyed the remaining bee hives (Puakō Historical Society 2000).

The Hind family continued to grow alfalfa and Guinea grass on some of the former sugarcane land. Other crops were also tried including corn, sweet potatoes, Hawaiian tobacco, cotton, cabbage, tomatoes, coffee, and water melon; however, no large-scale farming occurred. Sources of water and feed allowed the Hind family to use the Puakō acreage as an area to fatten steers before shipping them to market from Kawaihae. Cattle drives from ranches to the north would frequently rest and water for up to two weeks at Puakō on their drives south to Kona. Kiawe wood was also gathered and sold by residents for use in cooking firewood in the early part of the 20th century (Puakō Historical Society 2000).

Residential Development

In the late 1920s and early 1930s, three wealthy local families purchased land in the vicinity of Puakō for vacation and weekend retreats. The presence of these three wealthy families in the

Puakō area paved the way for the eventual subdivision of the lands at Puakō in 1950. The first of these was Mr. Leslie Wishard who purchased 2 acres of land at Wailea Bay in 1929. Later he expanded his land holdings to 12 acres which included the first frame house in the Puakō area. Soon after, Mr. Francis Hyde li Brown acquired land at Kalāhuipua'a which included several ancient fishponds. In 1937, the Ruddle family traded some land in Hilo for 7.5 acres at Paniau where they built two houses and enlarged an ancient 'au 'au (community bathing pool) into a swimming pool (Puakō Historical Society 2000).

During World War II, Puakō became more accessible due to the Marine Corps presence at Kawaihae Harbor and a defense system that included paths, gun emplacements, bunkers, fox holes, and trenches. Landing sites were designated and roads and trails were developed in the area south of Kawaihae. Among these improvements was a jeep trail that extended along the shore as far as Kalāhuipua'a, crossing Paniau on the beach itself extending south to a bridge built just south of the present day boat ramp. As a result, the trip from Puakō to Kawaihae was shortened to two hours. In 1946 a devastating tsunami hit Hawai'i and impacted the coastal communities of South Kohala including Puakō (Puakō Historical Society 2000).

In 1950, the SOH subdivided the land in Puakō into 160 lots. The land sale occurred in 1952 in the form of a public auction in Hilo. A second tsunami hit the village in 1960 causing one home to be washed out to sea and then redeposited on land. In 1964, the Kawaihae-Puakō road was improved and paved. The Mauna Kea Beach Hotel opened in 1965 just north of Puakō. In 1975, the Queen Ka'ahumanu Highway was completed from the new Keāhole Airport to Kawaihae Harbor. In January 1980, a storm crossed the island of Hawai'i causing considerable damage to Puakō and other communities. Three homes were destroyed and 83 were damaged by sea water that flooded the community. A large brush fire was accidentally set by campers at Waialea Bay in 1987. Strong winds caused the fire to rapidly spread toward houses along the coastal community destroying seven homes and causing millions of dollars in property damage (Puakō Historical Society 2000). In October 2007, another brush fire threatened Puakō. This fire may have been purposefully set and consumed approximately 1,000 acres of land near the village (COH 2008).

Oral History Interviews

To supplement the archival research and provide additional cultural context, input was sought from organizations and individuals who were thought to have expertise or pertinent knowledge on the project area. Inquiries were sent to the following parties:

- UHH Hawaiian Studies Division
- Office of Hawaiian Affairs' West Hawai'i office
- Cultural Historian, Historic Preservation Division State of Hawai'i, DLNR
- Association of Hawaiian Civic Clubs
- Puakō Community Association
- Dr. Robert Rechtman, Rechtman Consulting LLC (project archaeologist)

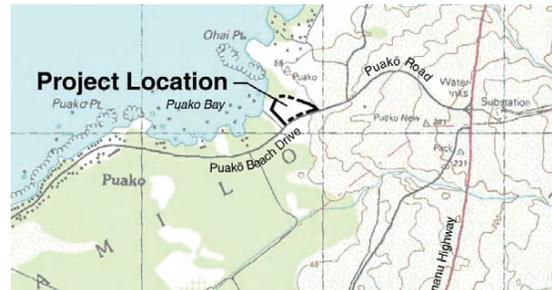
Responses were received from the Association of Hawaiian Civic Clubs, Puakō Community Association and Dr. Rechtman. Five individuals who were associated with past uses of the project area and its environs or who were familiar with cultural issues related to the area were subsequently identified and interviewed: Reverend John Hoover, Ms. Katy Lowry, Mr. J.K.

Spielman, Ms. Pohai Kirkland, and Mr. Ski Kwiatkowski. Reverend Hoover is a pastor with the Hokuloa United Church of Christ in Puakō and has been familiar with the area since 1970. Ms. Lowry is one of Leslie Wishard’s children (see “Residential Development” in this section) and has been familiar with the Puakō area since 1930. Mr. Speilman is a long-time resident of the Paniau area south of Puakō. Ms.Pohai Kirkland is with the South Kohala Civic Club. Mr. Kwiatkowski has been familiar with the Puakō area for 43 years and is knowledgeable about traditional Hawaiian cultural practices and petroglyphs in the area. The following is a summary of their contributions.

The individuals interviewed were not aware of any activities, including traditional cultural practices, at the project site. Warehouses associated with the former Puakō Sugar Mill were located in the general area of the project site. Most of the mill buildings were on concrete slabs and would be easy to find (none are located within the project area). There were some raised platforms associated with the former mill that Ichiro Goto used in connection with his honey-making. Two wells were located south of the former wharf (associated with the mill), and one was farther inland. Otherwise, the general area was, historically, a canoe landing and, from time to time, a military encampment during the frequent Hawaiian wars (pre-European contact). Fishermen use Ohai Point (west of the project site) for fishing. Graves are located up hill and behind the dump (east of the project site). There are some house site remains (e.g., pottery shards, ink wells) along the coast in that area. Puakō Bay had abundant limu up until ten years ago when it was over harvested.

3.4 VISUAL ENVIRONMENT

The site is not generally visible from the Queen Ka’ahumanu Highway, which passes by about 200 feet upslope and about 0.5 miles away at its closet point. The site becomes visible to motorists on Puakō Road as they pass by the Hāpuna Beach Road intersection and the COH refuse station, and continue a gradual decent into the Puakō



Community. The prominent views from the Puakō Access Road are more distant views, over the site, of Puakō Bay and out towards Puakō Point. The roadway frontage along the site includes several large stands of Kiawe which screen the interior portions of the site from view. The southern corner of the site contains some rocky knolls that terminate at the Puakō Boat Ramp intersection. The site is generally visible from the Waialea Bay homesites closest to the site – across the Ohai Point headland (about 600 feet or two city blocks away). Close range views of the southwest edge of the site are also available from the adjacent Puakō Boat Ramp. Coastal views of the site are available from boats in Puakō Bay from Ohai Point on the north side (see inset photo), and from several headlands along the south side of the Bay. Because the site is tucked into the head of the bay, it is not in a conspicuous location from the perspective of coastal viewplanes.



Aerial view of site over Ohai Point

The visual environment of the site is captured in Figure 3-2. Site features include open, grassed fields, clusters of kiawe, gullies, hillocks, and ravines.

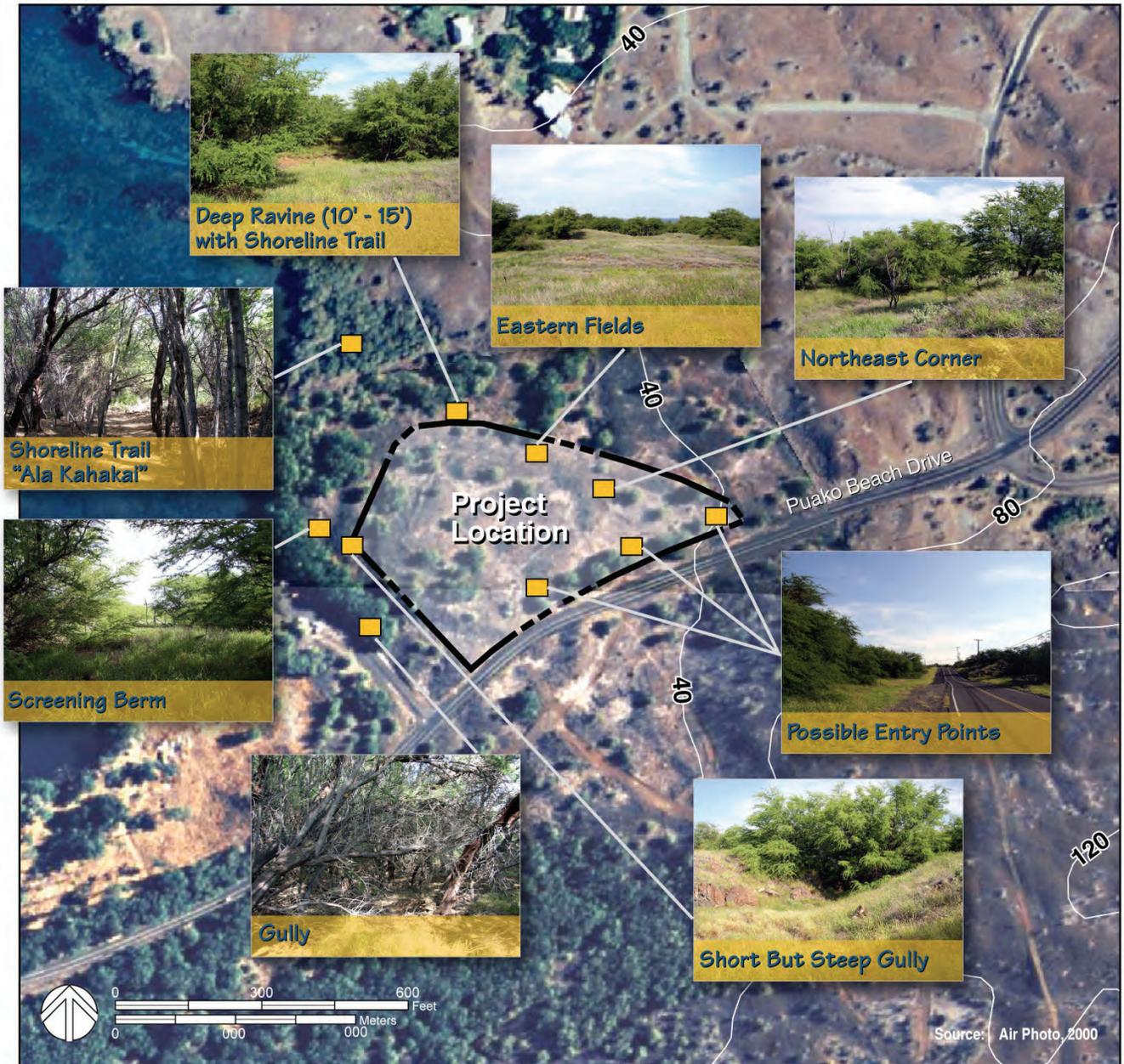


Figure 3-2: Site Photos

3.5 TRAFFIC

Vehicular access to the project site is provided by Queen Ka‘ahumanu Highway, Puakō Road, and Puakō Beach Drive. Queen Ka‘ahumanu Highway stretches approximately 33 miles across the North and South Kohala Districts in West Hawai‘i. It connects the harbor community of Kawaihae to the north with the major coastal town of Kailua-Kona to the south. The highway

continues south as Kuakini Highway, which leads to Keauhou and Honalo, approximately 2.5 miles south of Palani Road in Kailua-Kona, and continues south around the island of Hawai'i to Hilo. Queen Ka'ahumanu Highway at its north end intersects with Kawaihae Road, which runs east to Waimea and intersects with the Hawai'i Belt Road, which continues along the northwest coast of the island to Hilo.

Queen Ka'ahumanu Highway carries traffic with direct origins and/or destinations at Keāhole International Airport, Honokohau Small Boat Harbor, Kawaihae Harbor, Kailua-Kona, Mauna Kea Beach Resort, Mauna Lani Resort, Waikoloa Beach Resort, Waikoloa Village, Kona Village Resort, Kona Industrial Center, and Kaloko Industrial Center, among others. The two-lane, two-way SOH highway has a right-of-way (ROW) width that varies, up to approximately 350 feet. This wide dimension was provided to accommodate future widening. Each travel lane measures 12 feet across, and is accompanied by 10-foot-wide stabilized shoulders. The posted speed limit varies from 35 to 55 miles per hour (mph). A major widening project between the Airport and Kailua-Kona is presently underway to increase highway capacity.

In the vicinity of the project site, Queen Ka'ahumanu Highway is a two-lane rural highway with a posted speed limit of 35 mph. The existing intersection of Puakō Road and the highway is unsignalized with acceleration and deceleration storage lanes. There is an existing gated road opposite Puakō Road which services an existing utility substation. The intersection operates as a two-way Stop-sign controlled intersection with highway traffic having the right-of-way.

The two-lane roadway provides access to the project site and the Puakō residential community (approximately 170 residential lots). It originates at Queen Ka'ahumanu Highway as Puakō Road and extends southwest approximately 3 miles to the northern border of the Mauna Lani Resort. The roadway intersects old Kawaihae-Puakō Road approximately 1,800 feet from the highway, and 500 feet east of the project site where it becomes Puakō Beach Drive. The project site has approximately 600 feet of frontage along the Puakō Beach Drive, on the outside of a gradual climbing curve in the road. The two-lane segment of the road fronting the project site runs within a 40-foot ROW with approximately 24 feet of pavement width. Speed limits along the Puakō Road and Puakō Beach Drive are posted at 25 mph. The SOH Puakō Boat Ramp and parking area are located immediately west of the project site with direct connection to Puakō Beach Drive via a stop controlled T intersection.

A Traffic Impact Assessment Report (TIAR) was prepared for the nearby Puakō Bay Investors LLC development of eight lots southwest of the Puakō Boat Ramp (just south of the project site) (SSFM International, Inc. [SSFM] 2006). Based on historical traffic count data and field observations (August 2006), SSFM determined weekday morning and afternoon peak hours along Queen Ka'ahumanu Highway generally occurred between 6:30 and 7:30 am and between 3:15 and 4:15 pm, respectively, with the morning peak hour occurring approximately 15 minutes earlier in the vicinity of the project site. Traffic conditions during the afternoon peak hour were observed to be noticeably busier than the morning peak hour. Figure 3-3 reproduced from the SSFM TIAR, shows the resulting peak hour traffic volumes by turning movements at the Queen Ka'ahumanu Highway - Puakō Road intersection, for both the morning and afternoon peak hours.

The TIAR concluded that most vehicle movements for the intersection currently operate at Level of Service (LOS) A (little or no delay) for both morning and evening peak hours (Table 3-1). Vehicles from Puakō Road operate at LOS C (average traffic delays) during both peak hours.

The left-turn onto the Queen Ka’ahumanu Highway from the utility substation driveway (mauka of the highway) operates at LOS E (very long traffic delays) (there are very few cars utilizing this portion of the intersection as it only serves the utility substation).

Table 3-1: Existing (2006) Conditions -- Unsignalized Intersection Puakō Road at Queen Ka’ahumanu Highway

Intersections and Movements	Morning Peak Hour		Afternoon Peak Hour	
	Delay ¹	LOS ²	Delay ¹	LOS ¹
Queen Ka’ahumanu Highway				
Northbound Left Turn to Puakō Road	9.3	A	8.9	A
Southbound Left Turn to utility driveway	8.0	A	8.8	A
Puakō Road Eastbound approach	19.5	C	20.2	C
Utility substation driveway -- Westbound approach	0.0	A	45.7	E

Notes: 1/ Delay is average vehicle delay per vehicle in seconds

2/ LOS shown for lane and for overall approach

Source: SSFM 2006 Table 2

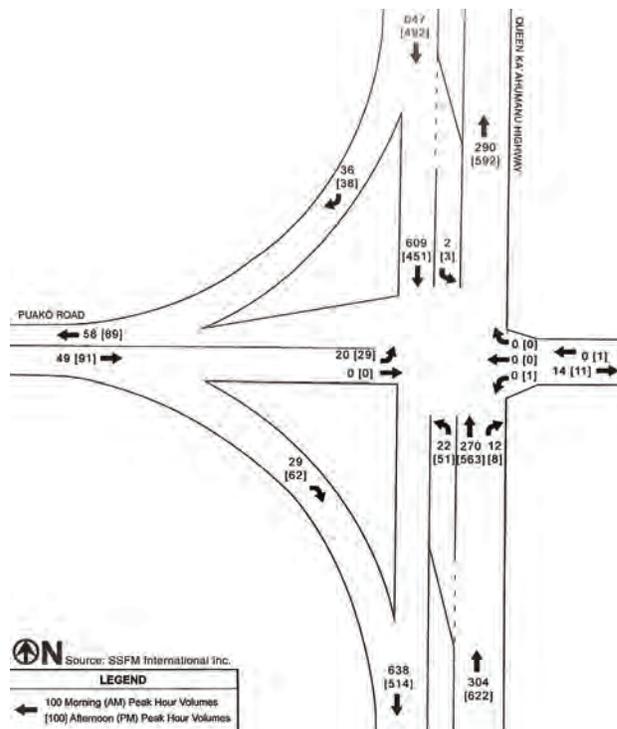


Figure 3-3: Existing (2006) Traffic Counts at Study Intersections

3.6 UTILITIES

3.6.1 Potable Water

The Puakō area is located in the West Mauna Kea Aquifer Area Sector which has two COH, Department of Water Supply (DWS) water systems: (1) Waimea Water System that covers mauka areas and (2) Lālāmilo Water System which services coastal areas including the project site. The project site is not currently connected to the COH water system (SSFM 2008).

The Lālāmilo Water System is supplied by surface water sources in the mountain regions and groundwater wells from along Kawaihae Road and Mauna Kea areas. Water from these sources are combined and conveyed through DWS distribution piping. As the Lālāmilo Water System expanded to accommodate the new coastal developments south of Kawaihae, high level exploratory deep wells were drilled along Kawaihae Road in order to supplement the limited supply of water from Waimea. The water was of marginal quality and had high chloride content. Water from these wells was blended with fresh mountain water to supply the coastal developments. In 1977, the SOH drilled exploratory wells on its Lālāmilo lands. These wells and subsequent additional wells were drilled with financing from the developer of Mauna Lani Resort. The water in these wells was of good quality and was also included as part of the system. Two Parker Ranch wells replaced the two Kawaihae wells that serviced the Lālāmilo Water System during the 1990s (COH 2008).

In the Puakō area, the DWS system includes an existing 12-inch diameter waterline along Puakō Beach Drive. The estimated static pressure on this waterline is 118 pound per square inch. The DWS has expressed that it can provide a 5/8-inch water service to the project site with a maximum flow of 600 gpd (roughly equivalent to the needs of single-family residential dwelling) (SSFM 2008).

3.6.2 Wastewater

There is no public wastewater collection system in the South Kohala District or at the project site. Existing wastewater systems consist of cesspools, septic tanks, and private collection and treatment facilities (COH 2008). The project site is located within a Critical Wastewater Disposal Area (CWDA) (HAR Rules 11-62) which is an area where the disposal of wastewater has or may cause adverse effects to human health and/or the environment due to hydrogeological conditions. Because of its location in a CWDA, DOH may impose more stringent requirements including, but not limited to, meeting higher effluent standards for wastewater systems, limiting the method of effluent disposal and requiring flow restriction devices on water fixtures.

3.6.3 Electrical

Hawai'i Electric Light Co. Inc.'s (HELCO) electrical transmission system on the Big Island consists primarily of 69 kilovolt (kV) lines, but two areas – Puna and North Kohala – are served by lines with 34.5 kV capacity. Most areas on the island have a looped system allows an alternate feed to the user when storms or accidents damage a section of a transmission line (Belt Collins 2001).

With a 69-KV line connecting the Waikoloa substation with the Waimea-Kawaihae line, a looped service is provided to the South Kohala District. This significantly increases the reliability of

service to the coastal areas. Since the project site lies adjacent to this looped service, power outages are expected to be rare (Belt Collins 2001).

An overhead 12.47 KV, 3-phase transmission line runs along the Queen Ka'ahumanu Highway, Puakō Spur Road. A substation in Kawaihae and above the Puakō Spur Road (Mauna Lani Substation) connects into this loop system (Belt Collins 2001). Service lines from the transmission line hook up with the Puakō Beach Residential Lots. Currently, there is no service to the project site.

3.6.4 Communications

Verizon Hawai'i currently provides communications services to the Puakō Residential Lots area from the Queen Ka'ahumanu Highway and Puakō Spur/Beach Road.

3.6.5 Solid Waste

Currently, solid waste is not being generated at the project site; however, there are several abandoned cars on the property. Refuse collected in the area of the project site is generally deposited at the Puakō transfer station. COH trucks then haul the solid waste to the Pu'uana'hulu landfill which replaced the Kealakehe landfill in October 1993. The 300-acre landfill site contains 150 acres for landfill purposes, currently serves 12 transfer stations and an area that extends from Laupahoehoe on the north coast to Kapa'au in North Kohala and Waiohinu at South Point.

3.6.6 Drainage

The project site is unimproved and generally slopes toward Puakō Bay to the west. It is underlain by permeable volcanic basalt rock and contains intact and collapsed underground lava tubes creating an undulating and uneven drainage pattern across the site. Surface water drainage at the project site is through infiltration into the subsurface soil with limited surface runoff.

3.6.7 Police, Fire and Emergency Services

Police service for the South Kohala District, which includes Puakō, is the COH's Police Department's Area II Operations Bureau which is headquartered in Waimea (COH Department of Planning 2008). A staff of 18 officers operate from the 24-hour station. Other stations are at Kapa'au in North Kohala and Kealakehe near Kailua-Kona. Both the Waimea and Kapa'au police stations are of relatively recent construction, and both have room for additional staff (Belt Collins 2001).

The South Kohala Fire Station on Queen Ka'ahumanu Highway currently serves the Kawaihae-south Kohala coastal area. The station is equipped with a fire engine, tanker truck, and medic unit. It is staffed by a 24-hour crew of six firefighters and a paramedic who is qualified to provide advanced life support services. Located 2.25 miles from the project site, the station can immediately respond to emergency calls at Puakō (Belt Collins 2001).

Other stations in the region include the Waimea station, which has a full crew on duty 24-hours a day, and the Waikoloa Village Fire and Emergency Medical Interim Facility, which provides fire protection and basic life support emergency aid. Although the Waimea station is located the farthest, it can respond to calls along the Kohala coast in about 20 to 25 minutes. Additional engines can be dispatched from North Kohala, if needed (Belt Collins 2001).

3.7 NATURAL HAZARDS

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) coverage for the project site is provided by community panel number 155166 0277 C (FEMA 1988). The project site is located in Zone X, which signifies that it is an area that is outside the 500-year flood plain (Figure 3-4). The shoreline area north or south of the project site by Puakō Bay is located Zone AE which signifies that the base flood level has been determined. In this area, the base flood level is 8 feet (FEMA 1988).

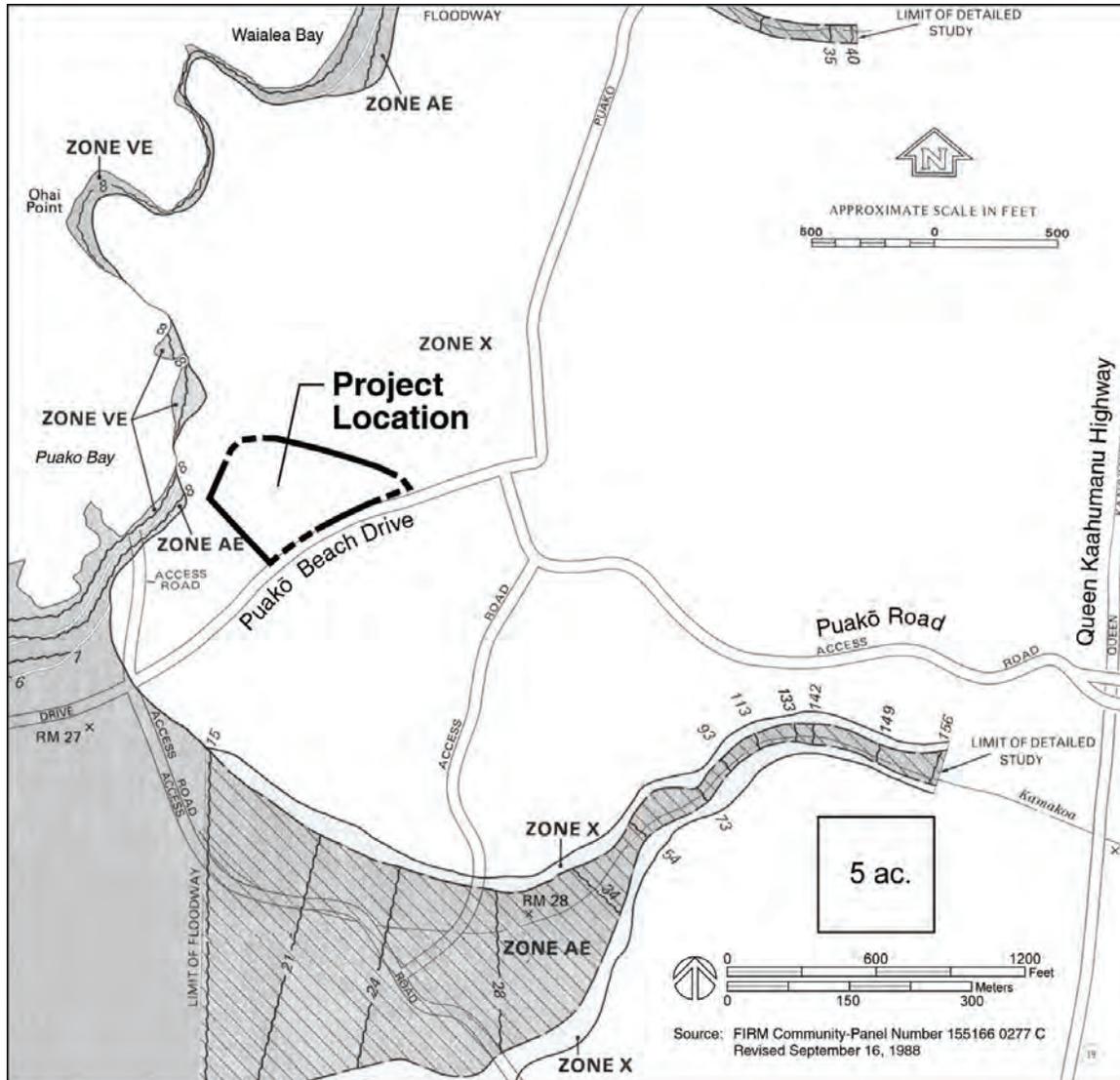


Figure 3-4: Flood Insurance Rate Map

The island of Hawai'i is the youngest of the Hawaiian islands and the most volcanically active. The project site is located in Zone 8 which is the eighth least-hazardous of nine zones. Zone 8 covers a large area on the lower flanks of Mauna Kea that has not been affected by lava for at

least 10,000 years. Other related volcanic activities such as deposition of volcanic ash, explosive eruptions, volcanic gases, ground fractures, subsidence, and collapsed features have not been significant occurrences in the project area during historical times (Harding Lawson 1991 in Belt Collins 2001).

Hawai'i Island experiences thousands of earthquakes a year. The entire island of Hawai'i is in Seismic Zone 3, the next to highest hazard zone, due to its history of large earthquakes (USGS 2008). All new structures must be designed to resist forces associated with earthquakes

3.8 GROUND AND SURFACE WATER RESOURCES

There are no surface streams in the vicinity of the project site. The project site is in the West Mauna Kea Aquifer Sector which is comprised of the Waimea Aquifer System. This aquifer sector comprises 270 square miles. Its southern boundary is from Puakō Point to the Humū'ula Saddle is the trace of the Mauna Loa/Mauna Kea geologic contact, where as the northern boundary from Kawaihae to Waimea follows the Mauna Kea/Kohala contact. From Waimea the boundary strikes southeasterly along a weak rift zone to the summit of Mauna Kea. All exposed rocks belong to the Mauna Kea Volcano. At high elevations the Laupahoehoe Volcanics cover the Hamakua Basalt; lower down, the Hamakua Basalt is exposed. Sediments have no hydrological importance.

The Waimea aquifer system has a sustainable yield, or estimated maximum amount of water that the aquifer can safely produce, of 24 million gallons per day (mgd). Current use of the aquifer system is 11.05 mgd, including agricultural use, which is 46 percent of the sustainable yield (COH 2008)

The project site is located within a CWDA (HAR Rules 11-62) which is an area where the disposal of wastewater has or may cause adverse effects to human health and/or the environment due to hydrogeological conditions.

The average annual rainfall ranges from 10 to 50 inches. The aquifer system is dry, but Waikoloa Stream, which rises in the Kohala Mountains, flows across Mauna Kea lavas near the northern boundary (well to the north of the project site). Before diversions were constructed starting more than a century ago, Waikaloa Stream may have been perennial all the way to the sea.

A basal lens reaches to about 4 miles inland. Beyond, the water becomes high-level, although the mode of occurrence is not understood. Wells at about the 1,200-foot elevation develop fresh water. Near Waiki'i and also near Waimea the groundwater level stands about 1,500 feet above sea level. Slightly thermal basal water is found along the Kawaihae to Waimea road below an elevation of 1,000 feet. At the coast, basal springs discharge brackish water.

The project site is underlain by a basal, unconfined flank aquifer that is currently used for drinking water. The water has low salinity (250 to 1,000 milligrams per liter chlorides), is considered irreplaceable, and has a high vulnerability to contamination.

3.9 GEOLOGY, SOILS AND TOPOGRAPHY

The island of Hawai'i is the youngest and most southeasterly of the emerged volcanic edifices of the Hawaiian Archipelago. The island is composed of five large shield volcanoes, one rising to nearly 14,000 ft above sea level. The oldest is Kohala, and the youngest is Kilauea. Kohala and

perhaps Mauna Kea are essentially dormant, but Hualalai, Mauna Loa, and Kilauea have been active in historic time.

The ages of the five shield volcanoes, determined from radioactive dating, imply that volcanic activity was contemporaneous among them over periods of time. Kohala, the oldest, has been dated at 700,000 years. For Hualālai the oldest accessible rocks are 120,000 years old. Rocks of the Laupahoehoe Volcanics of Mauna Kea have been dated as young as 3,600 years, but the older Hamakua Volcanics of the same volcano are as old as 375,000 years. The oldest rocks of Mauna Loa, the Ninole Basalt, have a date of 540,000 years, but the youngest are just a few years old. The oldest rocks of Kīlauea are about 25,000 years old.

The United States Department of Agriculture (USDA 1972) classifies the soil type at the project site as Kawaihae extremely stony very fine sandy loam, 6 to 12 percent slopes. This soil is found on the leeward coastal plain of Mauna Kea. In a representative profile the surface layer is dark reddish-brown extremely stony very fine sandy loam about 2 inches thick. Below this is dark reddish-brown and dusky-red stony silt loam and loam. Hard pahoehoe lava bedrock is at a depth of about 33 inches. The surface layer is neutral, and the subsoil is neutral to mildly alkaline. Permeability is moderate, runoff is medium, and erosion hazard is moderate (USDA 1972).

3.10 BIOLOGICAL RESOURCES

There are no federally- or SOH-listed flora or fauna species located at the project site. Subsections 3.10.1 and 3.10.2, respectively, describe the flora and fauna in the vicinity of the project site.

3.10.1 Flora

A botanical survey was completed by Geometrician Associates, LLC in 2008. The project site is located in a dry area (less than 10 inches of rain per year) and has been previously disturbed by grazing animals and fires. The vegetation in areas that are fairly undisturbed with similar geology and climate are dominated by ilima (*Sida fallax*), pohuehue (*Ipomoea pes caprae*) and 'aki'aki grass (*Zporobolus virginicus*). Diverse coastal and diverse dry-forest trees and shrubs may also have been present prior to disturbance (Geometrician Associates, LLC 2008).

The current vegetation of the project site is savannah comprised mainly of alien plants such as kiawe (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*). Shoreline vegetation located north and northwest of the project site and near the boat ramp on the project site includes milo (*Thespesia poulnea*), a native tree species, and kou (*Cordia subcordata*) (Geometrician Associates, LLC 2008).

There are no federally- or SOH-listed threatened or endangered species were found during the 2008 botanical survey. Four indigenous plants were noted on the project site: (1) kou; (2) ilima; (3) milo; and 'uhala (*Waltheria indica*). Twelve alien plants were recorded: (1) hairy abutilon (*Abutilon grandifolium*); (2) alena (*Boerhavia acutifolia*); (3) buffel grass; (4) garden spurge (*Chamaesyce hirta*); (5) lamb's quarters (*Chenopodium murale*); (6) aweoweo (*Chenopodium oahuensis*); (7) wild spider flower (*Cleome gynandra*); (8) koali kuahulu; (*Merremia aegyptia*) (9) fountain grass (*Pennisetum setaceum*); (10) kiawe; (11) Cuba jute (*Sida rhombifolia*); and (12) golden crown beard (*Waltheria indica*) (Geometrician Associates, LLC 2008).

3.10.2 Fauna

No federally- or SOH-listed threatened or endangered fauna are known to be present within the project site. Terrestrial fauna at the project site is typical of the habitat and surrounding area which can include dogs, cats, mongoose, rats, mice, and pigs.

As part of its botanical assessment, Geometrician Associates assessed the value of the project site as bird habitat. The kiawe-buffel grass savannah is not particularly conducive to native birds. All of the birds noted were common and non-native; however, due to its close proximity to the shoreline, native shorebirds could be present nearby. Of these, the Pacific golden plover or kōlea (*Pluvialis fulva*) would likely make use of the project site. Indigenous migratory shorebirds in the Puakō area include: (1) ruddy turnstone or 'akekeke (*Arenaria interpres*); (2) sanderling or huna kai (*Calidris alba*); (3) wandering tattler or 'ūluli (*Heteroscelus incanus*); (4) bristle thighed curlew (*Numenius tahitiensis*); (5) black-crowned night heron or auku'u (*Nycticorax nycticorax hoactli*); and (6) kōlea (*Pluvialis fulva*).

3.11 MARINE ENVIRONMENT

HAR Chapter 54 "Water Quality Standards" classifies the nearshore waters at Puakō as Class AA which signifies that these waters should remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or action. Furthermore, the wilderness character of this area should remain protected with no zones of mixing permitted in this class. Class AA waters can be used for oceanographic research, the support and propagation of shell fish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment.

As part of the Hāpuna Beach State Recreation Area Expansion EIS (Belt Collins 2001), a marine environmental survey was conducted of the nearshore waters in the vicinity of Puakō Bay to identify the existing physical, chemical, and biological characteristics of the area (Marine Research Consultants 1991 in Belt Collins 2001).

Physical Characteristics

The predominant physical feature of the shoreline in this area is the basaltic cliff of pahoehoe lava, interspersed with pockets of white, calcareous sand. The nearshore subtidal areas that do not front a sand beach are composed of basaltic boulders and sharp lava fingers. The seaward edge of these lava shoreline areas consist of either a relatively flat basaltic bench or a vertical sea ledge of approximately 3 to 6 ft.

The reef area is divided into three major zones: (1) shallow nearshore zone characterized by a flat reef platform; (2) a mid-reef zone composed of irregular bottom topography, characterized by extensive reef growth; and (3) a deep reef zone composed of dome-shaped elongated ridges of accumulated coral growth separated by sand channels. This zonation is atypical of West Hawai'i which is usually characterized by a deep reef slope.

The flat reef platform in the nearshore environment is covered with a limestone veneer, along with scattered basaltic boulders that have entered the ocean after breaking off from the shoreline. Areas of sandy bottom are also common throughout this underwater zone. A dominant characteristic of the bench is extensive pitting by bioerosional action of sea urchins. The

relatively barren nature of the inner areas of Puakō Bay suggests it may have been recently affected by events that have increased siltation to the point that it has killed reef corals. In areas fronting sand beaches, for example, the most shoreward reef zones are essentially absent of coral. They have bottom structures consisting of expanses of white sand.

Within 80 and 160 ft of the shoreline, the reef platform changes from a flat bench to uneven hummocky surfaces separated by sand patches. Coral coverage increases gradually with distance from the shore.

The outer reef area in the vicinity of Puakō displays a unique structure. Extending seaward, the coral hummocks gradually change orientation from a random pattern to a series of elongated fingers with long axes perpendicular to the shoreline. At the 30 to 60 foot depth, the fingers have the appearance of elongated knolls or ridges that rise off the sea bottom as much as 15 feet. They stretch out to 160 feet and are generally 30 to 50 feet wide. These elongated fingers are regularly spaced and are separated by channels of fine white sand. These ridges may be the result of bioaccumulation of calcium carbonate generated through an active reef building process.

Water quality analysis of the area's nearshore water chemistry was conducted in March 1991. It revealed that dissolved nutrients including nitrate, total nitrogen, orthophosphate phosphorous, and silica displayed horizontal gradients with highest values closest to the shoreline and the lowest values at the most seaward sampling sites. Correspondingly, salinity was lowest closest to the shoreline. These patterns indicate that groundwater is entering the marine environment near the shoreline and mixing with ocean water (Marine Research Consultants 1991 in Belt Collins 2001).

Along with horizontal gradients in water chemistry constituents, there is also vertical stratification within the water column. The stratification is the result of incomplete mixing of a low-density surface layer originating from groundwater and stream water overlying a layer of denser ocean water. The greatest differences between surface and deep water nutrient concentrations occur at the nearshore locations and decrease with increasing distances from the shoreline.

Water samples were analyzed and compared to DOH criteria for open coastal waters under "wet" conditions. Only nitrate was found to exceed DOH criteria levels and was attributed to groundwater flowing outward (efflux) at the nearshore interface (a natural process). Turbidity and chlorophyll levels did not exceed DOH criteria levels; however, they were noticeably higher at the southern end of Hāpuna Bay. They may be the result of planktonic populations that may be trapped within that corner of the Bay.

Biological Characteristics

The 1991 study included nine transects across the study area to observe the benthic (bottom) and reef fish community structure. The area's coral structure differs substantially in each reef zone. Small encrustations of corals that can withstand the rigors of sediment, freshwater input, and water motion characterize the shallow reef bench. Whereas, the mid-depth reef, which is relatively protected from wave action, contains very large colonies of *Porites lobata*. The deep reef ridges are primarily composed of *P. compressa*. The coral cover of the hard sea bottom increases with depth while species diversity decreases.

The reef fish community is typical of communities found in other undisturbed Hawaiian reef environments. It is characterized by six general categories: (1) juveniles; (2) plantivorous damselfishes; (3) herbivores; (4) rubble-dwellers; (5) swarming tetrodons; and (6) surge-zone fishes. The relative scarcity and timid behavior of some fishes indicates that they have experienced predation and that the area has been subjected to fishing.

An evaluation of nearshore water chemistry off the proposed 8-lot residential project located south of the Puakō Boat Ramp was conducted in July 2006. A total of 45 water samples were collected on transects perpendicular to shore, extending from the shoreline to a distance of approximately 300 to 350 meters (900 to 1,050 feet) offshore. Samples were also collected from five potable water wells and three irrigation wells upslope of the 8-lot residential project. These samples were chemically analyzed for specific constituents in SOH Department of Health water quality standards.

Analytical results revealed that waters samples from the nearshore environment exceed the geometric mean criteria for water with salinity greater than 32%. Evaluating water chemistry data using the mixing criteria specified for water with salinity less than 32% indicates that total nitrogen exceeds the criterion at two to of the three sampling sites, although site specific data indicates that the concentrations of total nitrogen are below what would be expected under pristine conditions. However using the SOH Department of Health (DOH) mixing criteria, orthophosphate phosphorous is in compliance at all three transect site (Puakō Bay Investors LLC 2006).

3.12 CLIMATE AND AIR QUALITY

The average annual rainfall along the South Kohala coast is 10 inches per year. The average daily high temperature range in this area is 83 to 87 degrees Fahrenheit, and the average low temperature range is 70 to 75 degrees Fahrenheit. The South Kohala coast is characterized by a dry and arid environment, with pale yellow vegetation, beige to red-brown rock, and barren black lava fields. Pockets of white sand beaches occur along the rocky coastline (COH 2008).

SOH DOH monitors air quality on the island of Hawai'i. The air in Hawai'i is relatively clean and low in pollutants. Based on air quality data collected and published by DOH, Hawai'i complies with the standards of the Clean Air Act of 1970, as well as the National Ambient Air Quality Standards and the State Ambient Air Quality Standards for carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, particulate matter, and lead. SOH is recognized as an attainment area. Air quality in the vicinity of the project site is considered good as there are no point sources of pollutants in the vicinity. The relatively high air quality can also be attributed to the region's constant exposure to winds which quickly disperse emissions in the area.

Locally generated atmospheric pollutants at the project site are primarily emissions from the combustion engines and fugitive dust from construction activities and unpaved surfaces. Winds aid in the dispersion of air pollutants generated by area activity.

3.13 HAZARDOUS AND REGULATED MATERIALS

There are no known hazardous/regulated material release or disposal sites at the project site. No hazardous or regulated materials are currently stored or used at the project site.

3.14 NOISE

There are no stationary noise generators in the vicinity of the project site. The major noise generator in the vicinity is vehicular traffic along Puakō Beach Drive and vehicle and small boat engine noise generated at the Puakō Boat Ramp. Other noise contributors include voices from people using the boat ramp and boat engines from the boat ramp, as well as wind and waves from the ocean. The nearest existing noise sensitive uses are single family homes in the Waialea Bay subdivision directly north of the site (the nearest of these homes are approximately 600 feet away (about two city blocks)). An 8-lot residential subdivision is planned for a site just west of the boat ramp (the equivalent of one city block away).

3.15 SOCIO-ECONOMIC

In 2000, COH had a population of 145,873 and South Kohala was the fourth most populated district with a population of 13,079 (COH Data Book 2008). South Kohala is one the fastest growing areas on the island; the population of the district increased from 1,538 persons in 1960 to 13,079 in 2000. The population of Puakō in 2000 was 429 persons (COH Data Book 2008).

In 2000, Puakō contained 701 housing units with a total of 214 occupied. The median house price in South Kohala in 2006 was \$549,950 up 144 percent from \$225,000 in 2001 (COH 2008). The median house price of in Puakō in 2000 was \$734,400 (COH Data Book 2008).

In 2004, the civilian work force for COH was 78,500 with 7,850 persons for the South Kohala district. In the same year, unemployment for the county was 3.8 percent and only 1.3 to 1.8 percent for the district (COH Data Book 2008).

The economic characteristics of the South Kohala District are shaped by the Mauna Kea Resort, Mauna Lani Resort, and Waikaloa Beach Resort which account for 40 percent of all hotel rooms in COH. South Kohala hotels are some of the COH's largest employers accounting for 3,378 jobs and employing residents from all over the county. Tourism is the leading economic industry in the district, cattle ranching, agriculture, and astronomy are also well established in the district (COH 2008).

4 ENVIRONMENTAL CONSEQUENCES

4.1 OVERVIEW

This chapter evaluates the potential environmental consequences associated with the proposed action, the Phase 1 Alternative, and the No Action Alternative. The probable direct, indirect, short-term, long-term and cumulative impacts of the proposed action and alternatives on relevant environmental resources are discussed.

Environmental consequences of the proposed action and Phase 1 Alternative are expected to be limited to the local and/or regional setting. Implementation of the proposed action will enhance the quality of instruction KMEC and UHH MSD is able to provide and will indirectly increase the attractiveness of the marine sciences program and its stature in the local, state and national arena. In addition, the presence of the Center and KMEC would allow for the continuing study and monitoring of the marine habitat and its presence would reduce unauthorized or illegal activities. There would also be minor benefits at the island-wide level due to the positive economic effects associated with construction activities.

4.2 LAND USE COMPATIBILITY

4.2.1 Proposed Action

Under the proposed action the Center would be used primarily as a field station and for instruction and educational research of undergraduates enrolled in KMEC and UHH MSD programs. The land use associated with the proposed action is compatible with the surrounding land uses within the Puakō area. The Center has been planned for the site since the early 90's and is discussed in the *Hāpuna Beach State Recreation Area Expansion EIS* (2001) and is recommended for development in the pre-final South Kohala Community Development Plan (2008 -- see related discussion in Section 14.16.5). The proposed action would take place on land within the SOH's Conservation District (general subzone) and Urban District, and COH zoned "Open" district and Special Management Area.

The proposed Center is considered a public use which is an identified use in the State Conservation District and COH open zoning district. In addition, the project site was selected because of its close proximity to Puakō Bay, with its protected waters, year round climate, access to a high quality marine environment (reefs, mammals, sea turtles), and the Puakō Boat Ramp, and favorable lease agreement terms from the landowner, DLNR. A Special Management Area Use Permit, Use Permit, building permits and final subdivision approval will be required from COH to construct the Center. A Conservation District Use Permit from SOH DLNR would also be required. These permit process will create a regulatory framework to ensure the proposed action is developed and operated in a way that supports the greater community and minimizes incompatible effects.

Construction and operation of the Center would result in a significant change in land use intensity: from a vacant parcel to a fully developed public research and education center. Construction would occur in a phased manor as funds become available and would involve site clearing, grading, limited excavation, installation of utilities, and vertical construction, and the creation of paved parking areas and driveways. Staging and parking for the construction of the Center would occur at the project site.

The adjacent Puakō Boat Ramp would be used to launch the Center's small boats with approximately two launches and retrievals per day, primarily on the weekends, within a maximum of about 735

events per year. To the extent possible, Center staff would launch and retrieve small craft during non-peak times to minimize congestion at the ramp. The boat ramp presently experiences about 4,380 launches per year (personal communication, D. Mersburgh, Kawaihae Harbor Agent, DLNR DOBOR 2008).

4.2.2 Phase 1 Alternative

The impact of the Phase 1 Alternative would be similar to the proposed action with a few exceptions. Under this alternative the building footprint would be smaller and would not include an Academic Center, a caretaker's residence, separate temporary housing for faculty, or conference/auditorium facilities. During the operational phase, the intensity of land use would be less than the proposed action because of the reduced footprint and facilities. Under Phase 1A, the impacts would be similar to that of the Phase 1 Alternative but with a much smaller and temporary development footprint. The reduced footprint and facilities under this alternative would impact the optimization of the Center as an instructional and research facility, and reduce its effectiveness for community outreach.

4.2.3 No Action Alternative

The No Action Alternative preserves the status quo. The UHH MSD would continue with academic instruction and research at the Hilo campus and KMEC would continue to conduct in-water instruction from the Hilo Harbor facility, with overnight trips to West Hawai'i for scuba instruction and instruction in other in-water field methods. There would be no change to land use and thus no effect on land use compatibility under the No Action Alternative.

4.3 CULTURAL RESOURCES

4.3.1 Archaeological Resources

No effects on archaeological resources or historic properties are anticipated from the proposed action. The project's archaeological assessment (Appendix B) stated that no significant cultural sites or deposits were encountered at the project site. Furthermore, there is a low potential for encountering historic and cultural properties during construction of the proposed Center. The archaeological assessment was reviewed and accepted by SHPD (DLNR SHPD 2008). By letter dated September 5, 2008, SHPD determined that "no historic properties will be affected by the project" (Appendix E).

Although no historic properties or cultural materials were identified at the project site, in the unlikely event subsurface prehistoric deposits or human burials are inadvertently discovered during construction activities, such activities would be immediately suspended in the vicinity of the discovery, and DLNR-SHPD would be notified as outlined in Hawai'i Administrative Rules § 13-284-12. Care would be taken not to impact Site 19401 (Section 3.3.1) located to the north of the project site, during development activities associated with the project area.

4.3.2 Cultural Resources

There are no Native Hawaiian (or other ethnic groups') cultural practices customarily and traditionally exercised for subsistence, cultural and religious purposes that are known to occur on the project site. The proposed action will not adversely affect traditional Hawaiian rights related to gathering, access, or other customary activities within the project area or its vicinity, or any cultural practices or beliefs.

4.4 VISUAL ENVIRONMENT

Development of the Center would result in a significant change in the appearance of the site from motorists driving along Puakō Beach Drive, from boaters launching and retrieving small boats at the Puakō Boat Ramp, and from several coastal spots along adjacent shoreline areas. Most of the buildings planned for the site would be residential in scale (single-story and within a 15-foot height limit assuming pitched roofs). The academic center could be a two-story facility to create maximum efficiency (reducing overall footprint and achieving other economies of scale). A two story structure could be 25 feet high. The design of the structures would work with the terrain as much as possible to minimize grading and overall site development costs. A thirty-foot setback from Puakō Beach Drive would be established and planted with indigenous or native plantings to soften the impact of development to motorists. The potential use of site-generated reclaimed water will be considered as an irrigation source to help establish and maintain this buffer. Buildings sited along the Puakō Bay side of the property would be set back a minimum of 200 feet from the shoreline, and set back from the edge of the plateau that forms the seaward edge of the site to minimize the effects of new structures. Every effort would be made to harmonize the built environment with the dry coastal landscape, including selection of earth tone exterior paint colors and roofing materials that complement the dry landscape setting.

The impact of the Phase 1 Alternative would be similar to the proposed action; however, far fewer structures would be constructed and potential visual effects would therefore be less. Phase 1A, consisting of several temporary structures and a very compact footprint, would be located away from the roadway and view of nearby residences. The No Action Alternative preserves the status quo, no vegetation clearing, grading, or building construction would occur.

4.5 TRAFFIC

A first phase of the Center is expected to be in operation by 2010. The Center is planned to have two driveway connections to Puakō Beach Drive. At this point, it is not determined whether the driveways will connect internally or will be kept separate. Adequate sight distance will be maintained at the driveway entrances. The driveways are spaced approximately 240 feet apart and the west driveway is approximately 240 feet east of the existing Puakō Boat Ramp stop-controlled T intersection.

Future traffic conditions for 2010 without the project were projected in the SSFM 2006 study. Based on a review of historic trends, an average daily traffic growth rate of 3.5 percent annually was identified and applied to the baseline volumes. Traffic associated with the nearby eight lot subdivision was added to these volumes to identify future 2010 traffic forecasts without the project.

Future traffic with the Center was forecast by adding project generated traffic to the forecasted traffic without the project. The standard three step procedure of trip generation, trip distribution and traffic assignment was used to estimate peak hour traffic volumes for the project.

4.5.1 Trip Generation

The trip generation methodology is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE). This methodology uses trip generation rates to estimate the number of trips that proposed project will generate during the morning and afternoon peak hours. As discussed in Chapter 2, the project is comprised of a mix of uses including approximately 15,000 square feet of academic uses (classrooms, labs, offices, meeting rooms, etc.), one caretaker's

residence, six faculty apartments and a 50-bed student dormitory. By University policy, students staying in the dorms will be bused to the site from the UHH Campus and thus would not have privately owned vehicles at the Center.

ITE has established projected per student trip rates associated with University/College use. For conservatism, it was assumed that the 15,000 sf academic center was used by students other than those in the dormitory units, as might be the case if community outreach classes or other local academic uses of the Center were implemented.

The UHH Marine Sciences Department will utilize the Center primarily on weekends, arriving from the UHH Campus on Friday afternoon and returning to the UHH Campus on Sunday afternoon. For analysis purposes, it is assumed that three 15-passenger vans and three faculty vehicles would arrive at the Center at about 4:30 pm on Friday afternoon (after the weekday peak hour) and would depart back to UHH about 4 pm on Sunday. Some additional utilitarian trips (shopping, supplies, etc.) would be generated through the weekend from the caretaker's residence, faculty apartments, and perhaps one of the 15 passenger vans. The majority of the trips during the weekend would be internal to the Center and the adjacent boat ramp. Based on the foregoing assumptions, weekend use is projected to be nominal.

Table 4-1 below summarizes traffic estimates if the relevant ITE weekday peak hour trip generation rates were applied to each of the major land use components.

Table 4-1: Trip Generation

Trip Generation Rates	Morning Peak Hour			Afternoon Peak Hour		
	Total	Enter	Exit	Total	Enter	Exit
University/College (ITE #540) (per student)	0.2	0.2	0.0	0.2	0.1	0.1
Faculty Apartments (ITE #220) (per apartment)	0.5	0.1	0.4	0.6	0.4	0.2
Caretakers Residence (ITE #210) (per residence)	0.8	0.2	0.6	1.0	0.6	0.4
Trip Generation						
University/College (ITE #540) (50 students)	10.5	8.4	2.1	10.5	3.2	7.4
Faculty Apartments (ITE #220) (6 apartments)	3.1	0.6	2.4	3.7	2.4	1.3
Caretakers Residence (ITE #210) (1 residence)	0.8	0.2	0.6	1.0	0.6	0.4
Total	14.3	9.2	5.1	15.2	6.2	9.0

An estimated 14.3 trips are generated in the AM peak hour (9.2 enter and 5.1 exit) and 15.2 trips are generated in the PM peak hour (6.2 enter and 9.0 exit). These trip estimates are higher than the estimates based on the expected use, and are well within the threshold of 100 vehicles per hour in the peak direction suggested by ITE (1991) as the level at which significant traffic impacts can be expected and a traffic study should be conducted.

4.5.2 Trip Distribution and Assignment

The trip distribution step estimates the distribution of vehicle trips to their predicted origins and destinations. The traffic assignment step assigns these vehicle trips to specific routes on the roadway network by estimating probably approach and departure routes. Based on the Center's location, traffic entering or exiting the site will travel in only two directions: either north towards Kawaihae or south towards Kailua-Kona. For planning purposes, it was assumed that the vehicles were equally split north and south on the Queen Ka'ahumanu Highway.

4.5.3 Analysis Results for Future Conditions

1. Without Project Scenario

Figure 4.1 indicates forecasted turning movements at the Queen Ka’ahumanu Highway intersection in 2010 without the project. Baseline traffic volumes were escalated 3.5 percent as discussed above to account for regional growth and traffic associated with the planned eight lot subdivision was added (this scenario corresponds to the “with project” scenario described in the SSFM TIAR). Based on SSFM’s analysis, there would be minimal change to the operating conditions and level of service associated with the highway facility by 2010. Only slight increases in delays would be experienced for vehicles from Puakō Road making left turns onto the highway.

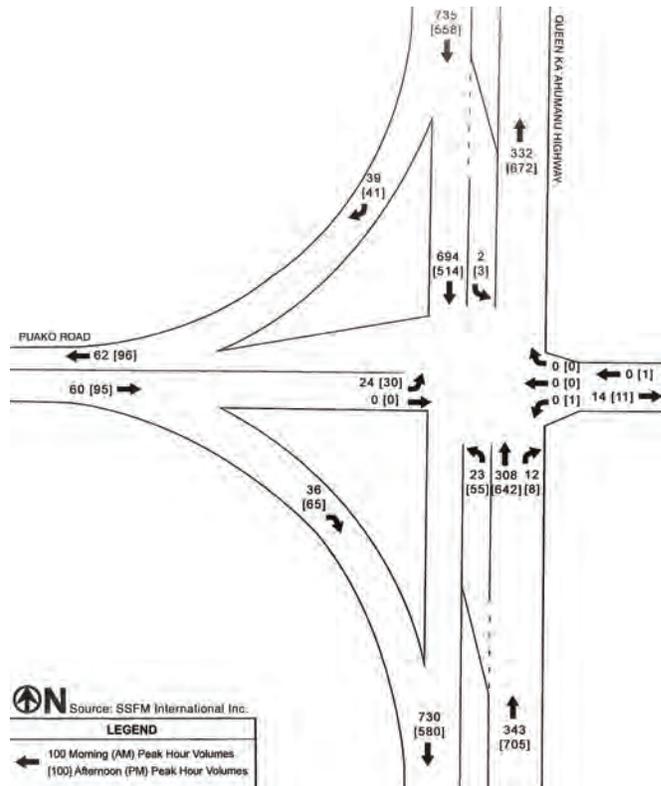


Figure 4-1: Future 2010 Traffic Forecasts Without the Project

2. With Project Scenario

Weekday peak hour trips generated by the project were added to the 2010 “without project” scenario to assess project impact. Figure 4.2 indicates forecasted turning movements at the Queen Ka’ahumanu Highway intersection in 2010 with the project; as noted above, the project would add no more than 5-10 vehicles in each direction during the weekday peak hour.

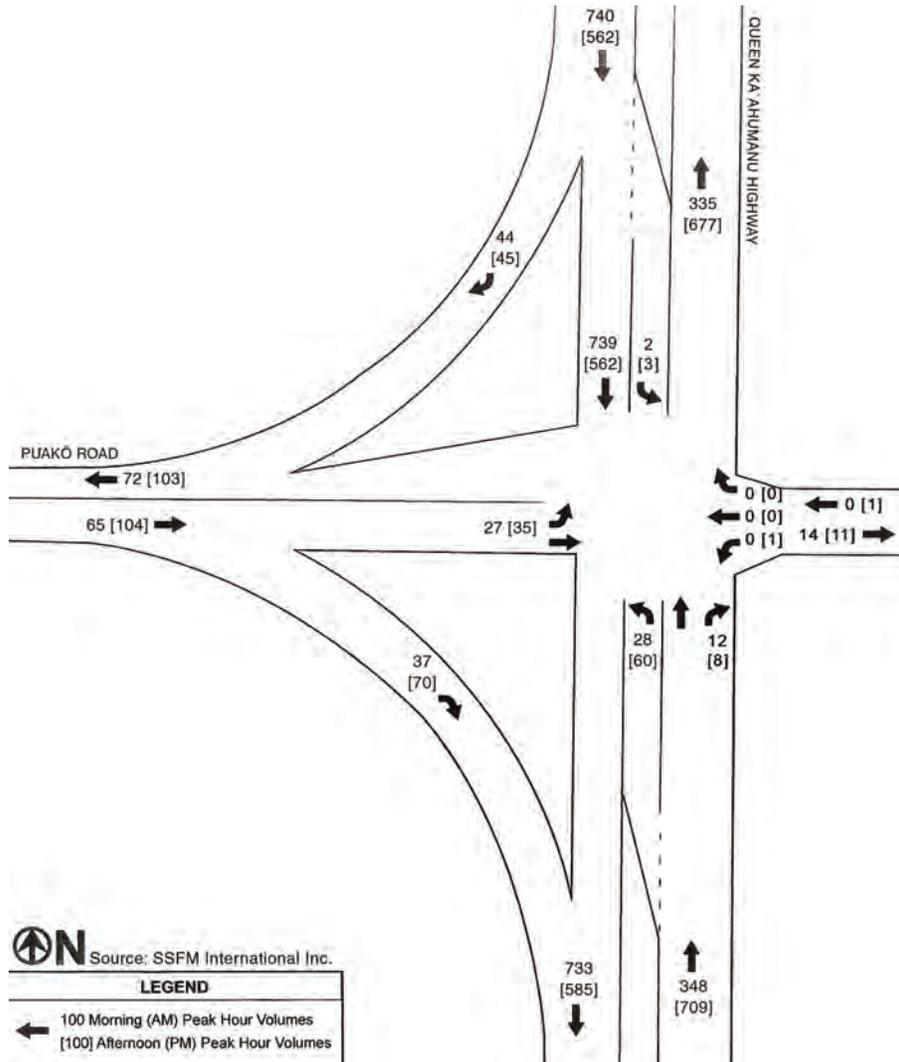


Figure 4-2: Future 2010 Traffic Forecasts With the Project

The analyses show potential levels of service and vehicle delay effects as summarized in Table 4-2 below.

Table 4-2: Future (2010) Conditions – Unsignalized Intersection Puakō Road at Queen Ka‘ahumanu Highway

	2010 without project		2010 with project		Changes
	Delay	LOS	Delay	LOS	Delay
Morning Peak Hour					
Queen Ka‘ahumanu Highway					
Northbound Left-Turn to Puakō Road	9.4	A	9.4	A	0.0
Southbound Left Turn to utility driveway	8.1	A	8.1	A	0.0
Puakō Road - Eastbound approach	16.4	C	18.4	C	2.0
Utility substation driveway -Westbound approach	34.0	D	35.0	D	1.0
Afternoon Peak Hour					
Queen Ka‘ahumanu Highway					
Northbound Left-Turn to Puakō Road	9.0	A	9.1	A	0.1
Southbound Left Turn to utility driveway	9.1	A	9.1	A	0.0
Puakō Road - Eastbound approach	20.9	C	24.7	C	3.8
Utility substation driveway -Westbound approach	56.4	F	59.5	F	3.1

Source: Julian Ng, Inc. November 2008

4.5.4 Conclusions

The proposed project will have minimal effect on peak hour traffic conditions. Analyses of the traffic impacts of the facility without consideration of the operation show increases in average vehicular delays at the unsignalized intersection of Puakō Road and Queen Ka‘ahumanu Highway of less than 4 seconds, not enough to change the level of service for left turns from the highway or for the stopped

approaches to the highway. The proposed operation, in which students will be transported to the site in vans, is expected to have less traffic impact.

The Phase 1 Alternative would have less of an effect on peak hour traffic because it wouldn't include the academic uses or caretaker's residence. The Phase 1A Alternative would have a negligible effect on area traffic.

4.6 UTILITIES

It is UHH's intent to design the Center in accordance with Leadership in Energy and Environmental Design (LEED) standards. The design would incorporate energy conservation and sustainability elements into the proposed Center's utility system including meeting basic COH building permit standards. In accordance with sustainable practices, UHH will consider using energy efficient equipment such as the Environmental Protection Agency's ENERGY STAR rated products, utilize solar water heater units, include radiative barriers in roofs and walls, employ low-flow toilets and shower heads, and utilize native, drought-resistant plants. Project designers would give consideration to the potential for implementing a net-metered photovoltaic system.

4.6.1 Potable Water

This section is summarized from the Preliminary Engineering Report (PER) prepared by SSFM (2008) included as Appendix D.

Proposed Action

Currently, there is no potable water service or storage at the project site and the County's municipal system can only supply service for the equivalent of one single family dwelling (600 gpd). According to the project's PER, potable water demand for the proposed action is anticipated to be approximately 5,400 gpd (average) to 8,100 gpd (maximum). The preliminary design basis for the potable water system includes extraction from a shallow brackish well, with pumping to an on-site desalination and disinfection facility. The domestic water system would include a pressurized distribution system, incorporating a pump and a hydro-pneumatic tank system, to maintain adequate working pressures.

Although additional field testing and water sampling would be required to confirm the most suitable treatment method, a membrane filtration process involving reverse osmosis (RO), would likely be selected as it is the most widely used process for desalinating (removing salt and minerals from the water) seawater and brackish water. RO units can be installed in modules to increase plant capacity as demand increases and to provide redundancy in operation.

In addition to the desalinated water supply, a supplemental connection with the 5/8-inch water service and meter from DWS is recommended. While this connection is not required, it would provide for additional redundancy in the supply, offset peak demands, and provide a nominal volume of water in the event the desalination facility or production wells are temporarily out of commission. Any meters serving the project site would need to have a reduced pressure type backflow prevention assembly installed within 5 ft of the meter prior to activation of water service.

There may be opportunities to re-use secondary-treated effluent from the wastewater treatment facility and rainwater catchment systems for irrigation purposes. Accordingly, landscaping will consist of drought tolerant species that are adapted to the Puakō environment. The potable water system does not include any allowance for irrigation demand.

The existing 12-inch waterline along Puakō Beach Drive has sufficient capacity and pressure to provide the minimum fire water flow for a school use (SSFM 2008).

Phase 1 Alternative

Under the Phase 1 Alternative, potable water demand would be similar to the proposed action, only at a smaller scale. The potable water demand is anticipated to be 3,000 gpd (average) to 4,500 gpd (maximum) per day because of the smaller building footprint and limited use as a field station. Phase 1A would consume less potable water which would be supplied by a temporary, 10,000-gallon potable water tank or cistern.

No Action Alternative

The No Action Alternative preserves the status quo and would not require potable water service.

4.6.2 Wastewater

This section is summarized from the PER prepared by SSFM included as Appendix D.

Proposed Action

Currently, there is no wastewater service at the project site. Under the construction phase of the proposed action, the Contractor would be required to provide and maintain portable toilet facilities for construction workers. Wastewater from the portable toilets would be properly disposed of at an off-site location by the Contractor., the wastewater maximum flow rate is estimated at approximately 33,000 gpd. This rate is calculated using DOH criteria that requires a multiplication factor of 4.5 to convert from average day flow to maximum flow. It should be noted that the design average day wastewater flow is far higher than the estimated water demand based on COH DWS criteria.

The anticipated wastewater characteristics are expected to be comparable with characteristics of residential sewage. No heavy metals or toxic pollutants are expected. To meet the DOH raw wastewater characteristics of biological oxygen demand (100 to 400 milligrams per liter [mg/l]), total suspended solids (150 to 400 mg/l), total nitrogen (20 to 40 mg/l), total phosphorus (5 to 15 mg/l), and fecal coliform (100 million colony forming units per 100 milliliters), a secondary treatment facility is required (SSFM 2008).

An aerobic process treatment facility sited on the north side of the property is recommended in order to achieve minimum DOH-required separation distance from the water wells. The required area for the wastewater disposal is dependent upon percolation rates of the subsurface materials.

A sewage lift station would be required near the lowest end of the developed area. Each building would be serviced by a gravity collection system that would ultimately discharge into the sewage lift station. The preliminary sewer sizes are anticipated to be 4-inches to 6-inches and would be sized to convey the peak flows from the individual buildings.

The recommended secondary treatment system is either a Rotating Biological Contactor or Membrane Biological Reactor facility. These two treatments are able to adapt to variations in peak flows without compromising the treatment process and quality of the effluent. As part of the treatment process, disinfection using either chlorination or ultraviolet light would be employed to kill pathogens in the treated effluent before the effluent is discharged.

Treated wastewater would be disposed via absorption trenches or seepage beds which consist of a field of perforated PVC pipes surrounded by gravel bedding material. A distribution box is used to split the effluent flow in to the pipes, allowing effluent to disperse through the gravel bed. The size of absorption trenches is dependent upon soil conditions and percolation rates and would be designed to meet DOH standards for size, setbacks, and a reserve area for the future backup system.

Phase 1 Alternative

Under the Phase 1 Alternative, the wastewater system would be similar to that of the proposed action except that it would be scaled back as this alternative does not include an Academic Center, faculty units, caretaker's residence, or conference/auditorium facility. Phase 1A would utilize composting toilets or portable toilets. Water from the low-pressure, solar-heated shower/bathing facilities would be retained on site and allowed to infiltrate into the ground.

No Action Alternative

The No Action Alternative preserves the status quo and would not generate and/or dispose of wastewater at the project site.

4.6.3 Electrical

Currently, there is no electrical service to the project site. Energy conservation and sustainability measures would be employed at the proposed Center.

Under the proposed action and Phase 1 Alternative, electrical power would be provided by the existing HELCO electrical system infrastructure along Puakō Beach Drive. The proposed action and Phase 1 Alternative would not impact delivery of electrical service to Puakō customers. Under both action alternatives, the Center would utilize energy-efficient fixtures and equipment in compliance with federal, State, and local regulations. In addition, under all action alternatives, outdoor lighting would be limited to downward shielded fixtures to minimize light pollution and impacts to migratory birds flying at night and nesting sea turtles.

The No Action Alternative preserves the status quo. The No Action Alternative would not impact the electrical service or use at the project site (e.g. no electrical service or use).

4.6.4 Communications

Currently, there is no communications system at the project site. Communications services (e.g., telephone, cable television [CATV]) for the proposed action would be provided by the existing utility providers and system infrastructure in the area. The Phase 1 Alternative would be the similar to the proposed action. Under Phase 1A, all telephone communications would be by mobile phone. CATV and telephone land lines would not be available for internet access. The No Action Alternative preserves the status quo and would not require a communications system.

4.6.5 Solid Waste

The construction and operational periods of the proposed action and Phase 1 Alternative, including Phase 1A, would result in a minor increase in the regional generation and disposal of solid waste. The No Action Alternative would not create solid waste. A Solid Waste Management Plan is required by COH Department of Environmental Management guidelines.

4.6.6 Drainage

The proposed action would create impervious surfaces by the construction of facilities, parking, and circulation driveways. As much as practical, roof top and other impervious surface rainfall runoff would be directed to garden areas, bio-swales, and bio-drainage basins which would allow the water to percolate through underlying soil and rock. The existing surface runoff characteristics within the vicinity of the project site would largely be preserved under the action alternatives. The No Action Alternative preserves the status quo and would not change the existing drainage at the project site.

4.6.7 Police, Fire and Emergency Services

The proposed action and Phase 1 alternative will increase the demand for Police, Fire and Emergency Services due to the increase in on-site population and physical improvements. In its pre-assessment comments, the Police Department indicated concerns about vehicle ingress and egress to the planned facility, potential effects of project traffic on the Queen Ka'ahumanu intersection, and the need for a secondary evacuation route from Puakō be completed and functional prior to breaking ground of the facility. The project traffic study indicates the project will only generate between 5-10 new trips in the peak hours and will not adversely effect LOS at the Queen Ka'ahumanu Highway intersection. The development of the secondary emergency access route is not the responsibility of the applicant.

Under the proposed action and Phase 1 Alternative, state-of-the art fire suppression and alarm systems and fire-retardant materials would be used in the construction of the Center's facilities and structures. Chemical storage at the Center would be properly stored in flammable storage cabinets, as appropriate. In addition, the Center would be subject to routine safety and fire audits by UHH and COH officials. Furthermore, under both action alternatives, the vegetation at the site would be converted from the largely non-native, flammable, dry-land savannah grass and scrub to less-flammable native species thereby reducing the potential for wildland fires.

Under Phase 1A, all structures would be temporary and fire suppression would be limited to hand-held, portable fire extinguishers.

Under the No Action Alternative, the project site would continue in its undeveloped state with flammable, dry-land, savannah grass and shrubs. There would be no on-site fire suppression and the potential for wildland fires would remain high.

4.7 NATURAL HAZARDS

The proposed action and Phase 1 Alternative would not significantly impact existing flood hazard conditions since the existing topography and regional geomorphology would not be significantly altered at the project site or surroundings. Under the action alternatives, the structures constructed would be required to conform to COH building codes which require that all structures be designed to resist forces expected in Seismic Zone 3.

The No Action Alternative preserves the status quo and would be have no impact to the flood hazard at the project site.

4.8 GROUNDWATER AND SURFACE WATER RESOURCES

No surface streams would be impacted by the proposed action or action alternatives. The proposed action and Phase 1 Alternative would utilize an RO desalination system to provide potable water. The source water would be from the underlying brackish groundwater aquifer. A maximum of 16,000 gpd of brackish water would be extracted from shallow groundwater production wells on the upgradient portion of the project site. In turn, a smaller amount of concentrated brine water (resulting from the RO process for potable water) would be released into shallow trenches or seepage beds across and/or downgradient from the water wells. Under Phase 1A, potable water would be supplied by a connection to the existing 12-inch COH waterline via a 5/8-inch meter to fill the on-site water tank (i.e., no wells or seepage beds).

Under the proposed action, the Center would employ an on-site, secondary wastewater treatment plant and treated effluent would be discharged to shallow absorption trenches or seepage beds. The project site is located within a CWDA where DOH may impose more stringent requirements including, but not limited to, meeting higher effluent standards for wastewater systems, limiting the method of effluent disposal and requiring flow restriction devices on water fixtures.

The Phase 1 Alternative would be similar to the proposed action; however the quantity of wastewater generated and disposed of would be less. Phase 1A would employ DOH-certified composting toilets or commercial portable toilets.

The No Action Alternative preserves the status quo and would not impact groundwater or surface water resources.

4.9 GEOLOGY, SOILS AND TOPOGRAPHY

The proposed action and Phase 1 Alternative would include grading and grubbing at the site and limited excavation as part of the construction period. These activities would not have a significant impact on the overall geology, soils, and topography of the project site area. Top soil would be retained on site and used in landscaping; best management practices (BMPs) would be in place to prevent fugitive dust emissions and silt runoff during rainfall events.

The No Action Alternative preserves the status quo and would not impact geology, soils, and topography.

4.10 BIOLOGICAL RESOURCES

The proposed action would have no effect on federal- and SOH-listed threatened, endangered or candidate flora or fauna species. None have been observed at the project site, and no unique habitat resources important to native or protected flora or fauna are present at the project site. Habitat for protected shorebirds exists in the vicinity of the project site; however, the project site is not considered habitat or potential habitat for these birds. The proposed action would have a beneficial impact on the marine environment in nearby Puakō Bay and the South Kohala coast by providing marine education and research skills to UHH students and educational outreach to the community that would increase knowledge and, ultimately, protection of these ecosystems.

The Phase 1 Alternative would be similar to the proposed action; however, the footprint of the Center would be smaller. The No Action Alternative preserves the status quo and would adversely impact

the flora at the project site by perpetuating the existence of non-native, flammable, savannah grass and shrubs.

4.11 MARINE ENVIRONMENT

The proposed action is set back from the shoreline by at least 200 feet and will not have direct effect on the marine environment. It has the potential to impact marine water quality indirectly via stormwater runoff, treated wastewater effluent absorption trenches and potable water system-related brine disposal trenches, as well as the adverse effects on the marine environment associated with the Center's research and educational activities (e.g., increased small boat activity, scuba diving, etc.).

Stormwater runoff impacts will be minimized by the design and maintenance of an onsite drainage system. Potential effects associated with treated waste water and brine discharges will be mitigated by complying with DOH design standards. Potential adverse effects on the marine environment due to the increased presence of Center staff and students would be more than offset by the increased knowledge and understanding of the marine ecosystem that the increased presence would bring.

4.12 CLIMATE AND AIR QUALITY

The proposed action would not have a significant direct or indirect impact on the climate at or around the project site. The proposed action would not generate any new emissions. Best management practices will be implemented to mitigate fugitive dust generated during the site preparation and construction activities of the proposed action. The proposed action would positively impact the climate by removing the largely non-native, flammable savannah grass and shrubs with less flammable, native plant species. The Phase 1 Alternative would be similar to the proposed action except the site preparation and construction period would be for a shorter duration.

The No Action Alternative preserves the status quo and has the potential to provide fuel (flammable brush and grasses) in the event of a wildland fire.

4.13 HAZARDOUS AND REGULATED MATERIALS

No hazardous or regulated materials are currently stored, used, or disposed of at the project site and hazardous and regulated materials used during the construction and operational periods would be handled in accordance with applicable regulations.

The Phase 1 Alternative would be similar to the proposed action. The No Action Alternative preserves the status quo and has the potential to attract dumping at the site due to the unrestricted nature of access to the project site.

4.14 NOISE

The proposed action would result in a short-term increase in noise levels as a result of the site preparation and construction activities. During the operational period, noise will be generated by the Center from sources such as vehicle traffic, small boat engines, power tool use in the marine shop area, and the noise generated by students and faculty in the routine conduct of the Center's research and educational activities. The nearest existing noise sensitive uses are single family homes in the Waialea Bay subdivision directly north of the site (the nearest homes are approximately 600 feet away [about two city blocks]). Noise from the project could also effect the nearest of the homes in the 8-lot residential subdivision planned for a site just west of the boat ramp. Since these nearest homes

are immediately adjacent to the boat ramp – one the principal noise generators in the vicinity, which may mask any additional noise generated by the proposed action. It's likely that the nearest homes will experience some nuisance levels of noise during the construction period. During the operational period, Center management will work with neighbors to ensure that noise levels are appropriate for a residential setting. Project construction and operational activities will comply with HAR, Chapter 11-46 "Community Noise Control" administered by the State DOH. The Phase 1 Alternative would be similar to the proposed action except that the noise associated with site preparation and construction activities would be of much shorter duration.

The No Action Alternative preserves the status quo. There would be no construction period noise and there would be no change in noise levels associated with the project site.

4.15 SOCIO-ECONOMIC

Under the proposed action and Phase 1 Alternative, as many as 65 persons would utilize the Center on a daily basis (50 students, 2 persons per faculty unit (x 6), and a 3 person household in the caretakers residence) with the potential for additional visitors using the Center's conference/auditorium facility for community meetings, lectures, classes. Assuming the average daily population of the Center is 65 persons, then the Puakō residential population would increase to approximately 494 persons (an overall increase of about 14 percent).

The proposed action would have a long-term social benefit for UHH students, faculty, and staff currently using the substandard, inadequate, leased waterfront space at Hilo Harbor and participating in the overnight trips to West Hawai'i for in-water field method instruction. Furthermore, the proposed action would improve operational capabilities in support of KMEC's and UHH's MSD for community outreach. The MSD is likely to grow as a result of the proposed action in terms of the number of students, quality and scope of academic programs, and extramural funding (particularly federal funding). If adequately funded for operations, the UHH MSD would become recognized as one of the Nation's premier undergraduate marine science programs. The proposed action would result in an increased ability to train local students for careers in marine science and jobs in the community and State. It would enhance MSD's prospects for obtaining additional grants from federal agencies to support such training; and would allow MSD to expand its services to the community.

The proposed action would result in short- and long-term direct, indirect and induced beneficial impacts to the economy. Building costs are estimated at \$12,000,000. Short-term employment levels would increase during the construction phase, resulting in minor positive economic benefits related to increased employment income, income taxes, general excise tax revenues and indirect and induced effects on the local West Hawai'i economy

The Phase 1 Alternative would result in similar socio-economic impacts as the proposed action with some exceptions. The construction-period employment levels would be slightly less than those of the proposed action as only the marine facilities and student housing units would be constructed. Phase 1A would have a negligible effect on construction-period employment levels.

The No Action Alternative would adversely impact the existing socio-economic environment. This alternative would forego the short-term benefit of creating temporary renovation/replacement period employment and the long-term benefit of improving quality of life for UHH students, faculty, and staff

now operating within the marine science program that does not meet operational requirements. Furthermore, the No Action Alternative would not allow for any substantial community outreach.

4.16 CONSISTENCY WITH THE OBJECTIVES OF FEDERAL, STATE AND COUNTY LAND USE POLICIES, PLANS AND CONTROLS

This section provides an overview of the proposed action's consistency with relevant sections of major Federal, State and County land use policies, plans and controls. A listing of required environmental permits and approvals is included in Chapter 1.

4.16.1 Federal Policies, Plans and Controls

The Federal government has no direct jurisdiction over the project.

4.16.2 State of Hawai'i Policies, Plans and Controls

1. Hawai'i State Constitution

Article XI Section 1: For the benefit for future generations, the State and its political subdivisions shall conserve and protect Hawai'i's natural beauty and all natural resources, including land, water, air minerals, and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation of self sufficiency.

Discussion: The proposed action and action alternatives will include development of the project site with one- and two-story buildings built into the existing topography (e.g., very limited excavation) and replacement of the largely non-native savannah grass and shrubs with native plants and landscaping. Under both action alternatives, the Center would improve the botanical setting of the project site and have a low-contour footprint that would not significantly impact the natural beauty of the area. Under both action alternatives, the natural resources are conserved and protected and likely enhanced as a result of potential marine biological and oceanographic monitoring of the coastal waters.

Article XII, Section 7 of the Hawai'i State Constitution: The State affirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants who are descendents of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the rights of the State to regulate such rights.

Discussion: Customary and traditional rights exercised for subsistence, cultural, and/or religious purposes are not affected under the proposed action and alternatives.

Article XI, Section 9 of the Hawai'i State Constitution: Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection, and enhancement of natural resources.

Discussion: The proposed action and action alternatives would provide a clean and health environment including control of pollution and conservation, protection, and enhancement of natural resources.

2. Hawai'i State Plan

The Hawai'i State Plan, established through the State's legislative process, represents public consensus regarding expectations for Hawai'i's future. Chapter 226, HRS, as amended, describes the purpose of the State Plan as follows:

“[it] shall serve as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State of Hawai‘i; provide the basis for determining priorities and allocating limited resources, such as public funds, services, manpower, land, energy, water, and other resources; improve coordination of state and county plans, policies, programs, projects, and regulatory activities; and establish a system for plan formation and program coordination to provide for an integration of all major state and county activities.” (Chapter 226-1, HRS; Findings and Purpose).

It is the goal of the Hawai‘i State Plan to achieve:

1. A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai‘i’s present and future generations.
2. A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
3. Physical, social, and economic well-being for individuals and families in Hawai‘i, that nourishes a sense of community responsibility, or caring, and of participation in community lifestyle.

The objectives and the policies of the State Plan that are relevant to the proposed action and alternatives include the following:

Section 226-6 Objectives and Policies for the Economy – In General.

Planning for the State’s economy in general shall be directed toward achievement of the following objectives:

- (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai‘i’s people.
- (2) A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands.

To achieve the general economic objectives, it shall be the policy of this State to:

- (2) Expand Hawai‘i’s national and international marketing, communications, and organizational ties, to increase the state’s capacity to adjust to and capitalize upon economic changes and opportunities occurring outside the State.
- (3) Promote Hawai‘i as an attractive market for environmentally and socially sound investment activities that benefit Hawai‘i’s people.
- (15) Increase effective communication between the educational community and the private sector to develop relevant curricula and training programs to meet future employment needs in general, and requirements of new, potential growth industries in particular.

Section 226-8 Objectives and Policies for the Economy – Visitor Industry

- (4) Planning for the State’s visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawai‘i’s economy.
- (b) To achieve the visitor industry objective, it shall be the policy of this State to:
- (8) Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawai‘i’s cultures and values.

Section 226-10 Objectives and Policies for Economy – Potential Growth Activities.

- (a) Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawai'i's economic base.
- (b) To achieve the potential growth activity objective, it shall be the policy of this State to:
 - (5) Expand Hawai'i's capacity to attract and service international programs and activities that generate employment for Hawai'i's people.
 - (6) Enhance and promote Hawai'i's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts.

Section 226-12 Physical Environment – Scenic, Natural Beauty, and Historic Resources

- (a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multicultural/historical resources.
- (b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:
 - (1) Promote the preservation and restoration of significant natural and historic resources.
 - (4) Protect those special areas, structures, and elements that are an integral and functional part of Hawai'i's ethnic and cultural heritage.

Section 226-21 Objectives and Policies for Socio-Cultural Advancement – Education.

- (a) Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.
- (b) To achieve education objective, it shall be the policy of this State to:
 - (2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.
 - (9) Support research programs and activities that enhance the education programs of the State.

Discussion: The development of the Puakō Marine Education and Research Center would diversified the State's economic base, by providing a stable, clean, high-tech, environmentally-friendly employment and educational opportunities for local students. The Kohala coast is well-known for its unique marine setting including protected marine mammals and sea turtles and proximity to healthy, diverse coral reef communities and clean marine waters. The proposed action will produce economic benefits that are detailed in Sections 3.14 and 4.14.

3. Hawai'i State Plan: Functional Plans

The State Functional Plans are plans that set forth the policies, statewide guidelines, and priorities within a specific field of activity. Functional plans have been developed for agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism, transportation, and water resources development.

The State Functional Plans have been reviewed and those that have direct relevance to the Proposed Plan are presented here.

Recreational Functional Plan (1991)

Issues Area II. Mauka, Urban, and Other Recreation Opportunities

Objective II-A: Plan, develop, and promote recreational activities and facilities in mauka and other areas to provide a wide range of alternatives.

Policy II-A (1): Plan and develop facilities and areas that feature the natural and historic/cultural resources of Hawai'i. Develop interpretive programs for these areas.

Issues Area IV. Resource Conservation Management

Objective IV-A: Promote a conservation ethic in the use of Hawai'i's recreational resources.

Policy IV-A (1): Emphasize an educational approach, in coordination with enforcement efforts, to promote environmental awareness.

Discussion: Located on the beautiful and scenic Kohala coast, the Puakō area provides the opportunity for ocean recreation, boating, snorkeling, scuba diving, paddling, and sailing. The proposed action would potentially improve the marine water quality of the South Kohala district through continued water quality monitoring, reporting, and research. The proposed action or action alternatives would utilize the Puakō Boat Ramp to launch and retrieve the Center's boats on a daily basis during peak Center use periods. This would contribute a maximum of two launches per day, primarily on the weekends, under a maximum of about 735 launches a year (representing a 17 percent increase in the use of the boat ramp).

Conservation Lands Functional Plan (1991)

The objective of the State Conservation Lands Functional Plan is to provide for a management program allowing for judicious use of the State's natural resources balanced with the need to protect these resources to varying degrees.

Objective IA: Establishment of databases for inventories of existing lands and resources.

Objective IB: Establishment of criteria for management of land and natural resources.

Objective IIA: Establishment of plans for natural resources and land management.

Objective IIB: Protection of fragile or rare natural resources.

Objective II C: Enhancement of natural resources.

Objective IID: Appropriate development of natural resources.

Objective IIF: Increase enforcement of land and natural resource use laws and regulations.

Objective IIIA: Expansion and promotion of a public conservation ethic through education.

Discussion: The Conservation Lands Functional Plan does not specifically refer to the project site which lies within the State Conservation District. The proposed action and action alternatives are consistent with the Conservation Lands Functional Plan as they will provide a marine education and research center that will assist SOH natural resources agencies in the improvement of coastal water quality through research and education. Furthermore, under the proposed action or action alternatives, the vegetation at the project site will be removed and replaced with native plants and landscapes among low-profile, low-foot print structures.

Higher Education Functional Plan (1987 Draft)

The State Higher Educational Functional Plan is "intended to serve as a guide to the objectives and policies pursued by the post-secondary education community in meeting its many responsibilities."

- Objective A:** Maintain a number and variety of postsecondary education institutions sufficient to provide the diverse range of programs required to satisfy individual and societal needs and interests.
- Policy A (2):** Focus increased attention on the role higher education plays in supporting the economic development of the State.
- Objective B:** Attain the highest level of quality, commensurate with its mission and objectives, of each education, research, and public service program offered in Hawai'i by an institution of higher education.
- Policy B (2):** Maintain and strengthen the position of the University of Hawai'i as a leading national and international research center.
- Policy B (3):** Identify for program enrichment and emphasis those programs considered important in terms of State needs and emphases, those programs for which special advantages in Hawai'i provide an opportunity for national or international prominence, and those programs which have already achieved such prominence.

Discussion: UHH is able to recruit world class talent and conduct superior research because it has access to some of the world's finest coral reefs in the MHI and clean, high quality coastal ecosystems. The development of a marine education and research center at Puakō with state-of-the-art equipment would significantly enhance the undergraduate marine science programs at the UHH. The implementation of the proposed action and, to a lesser extent, the action alternatives would allow KMEC and UHH MSD to provide training to local students for potential positions in the marine science community.

4. State Land Use Districts

All lands in the State of Hawai'i have been classified in one of four land use districts by the State Land Use Commission, pursuant to HRS, Chapter 205, and Chapter 15-15, HAR. The four land use districts are: (1) Conservation; (2) Agricultural; (3) Urban; and (4) Rural. The Conservation District is the most restrictive of the four districts authorized under Hawai'i's Land Use Law, HRS Chapter 205.

As shown in Figure 1-3, the project site straddles the State Urban District and State Conservation District boundary. A District Boundary interpretation by the State Land Use Commission confirmed this status (the entire area was originally placed in the State Urban District until the Land Use Commission's 1974 Boundary Review when a significant amount of land in the State Urban District was transferred to the Conservation District as part of the Hāpuna Beach State Park development project). The State Land Use Law delegates land use regulatory authority over the Urban District to the Counties (through their zoning powers) and vests land use regulatory authority of the Conservation District with DLNR.

DLNR administers public lands in the Conservation District pursuant to HRS Ch. 183C. That chapter makes the following statement of public policy: "...the legislature finds that lands within the State land use conservation district contain important natural resources essential to the preservation of the State's fragile natural ecosystems and the sustainability of the State's water supply. It is therefore, the intent of the legislature to conserve, protect, and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare."

The State Land Use Law (HRS § 205-2(e)) defines the Conservation Districts to include: areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous and endemic plants, fish and wildlife, including those which are threatened or endangered; preventing floods and soil

erosion; forestry; open space and areas whose existing openness, natural condition or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources; areas of value for recreational purposes; other related activities; and other permitted uses not detrimental to a multiple use conservation concept.

As a matter of policy, DLNR has indicated its support of establishing the Center at the Puakō site through its willingness to lease State land in the Conservation District to UHH for this purpose.

5. State Conservation District Rules

Because part of the site lies within the State Conservation District, development activities must comply with rules established by DLNR codified in Chapter 13-5 HAR. DLNR has established four types of subzones within the Conservation District (general, resource, limited and protective) based on resource characteristics, and adopted regulations identifying permitted uses and permitting requirements for each of the subzones. The Conservation District portion of the project site is within the general subzone, the least restrictive of the four subzones. The objective of the general subzone is to designate open space where specific conservation uses may not be defined, but where urban use would be premature.

According to the Conservation District Rules, the general subzone encompasses:

- Lands with topography, soils, climate, or other related environmental factors that may not be normally adaptable or presently needed for urban, rural, or agricultural use; and
- Lands suitable for farming, flower gardening, operation of nurseries or orchards, grazing; including facilities accessory to these uses when the facilities are compatible with the natural physical environment.

In evaluating the merits of a proposed land use, the DLNR shall apply certain criteria set out in §13-5-30(c) HAR. Those criteria directly related to the action alternatives include:

1. The proposed land use is consistent with the purpose of the conservation district.

Discussion: Public purpose uses by SOH or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district is considered an identified land use within the State Conservation District (§13-5-22(b) P-6), HAR). Public purpose uses require a Conservation District Use Permit (CDUP) from the Land Board. This Chapter 343, HRS EA is prepared in part to support the processing of a CDUP for the proposed action or action alternatives.

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

Discussion: As noted above, public purpose use such as the proposed action or action alternatives is considered an identified land use and considered a permitted use in the General Subzone. The Center would support DLNR's management responsibilities for coastal waters by increasing scientific awareness of coastal processes in West Hawai'i and working with the community to protect and conserve coastal resources.

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

Discussion: The proposed action or action alternative's consistency with the objectives and policies of the Hawai'i Coastal Zone Management Program (HCZMP) (Chapter 205-A, HRS) is reviewed in Section 14.16.5 (6) below. The proposed action or action alternatives would not have

reasonably foreseeable direct or indirect short term or long term effects on any coastal use or resources in the State's coastal zone.

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

Discussion: The proposed action or action alternatives would strengthen the SOH's scientific awareness of coastal process in the West Hawai'i area through its marine research and educational programs. The Center would also be available to provide technical assistance to West Hawai'i residents. Graduates of KMEC and MSD programs that benefit from spending time at the Center would presumably stay involved in marine sciences, and may become employed in public and private occupations that are focused on marine research. The Center offers an excellent vehicle and partner for DLNR, to bootstrap its conservation and coastal lands management responsibilities.

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

Discussion: The proposed action or action alternatives are compatible with locality and surroundings, appropriate to the physical conditions and capabilities of the project site as discussed in Section 4.2. Its location adjacent to Puakō Road, one half mile from the Queen Ka'ahumanu Highway, adjacent to Puakō Bay and a public boat ramp make it an ideal location for a field station. Planned development would be consistent with the low-profile, residential character of Puakō in terms of siting, heights, coloration, and character of facilities, in a manner that is appropriate to the physical environment of the South Kohala Coast. The Hāpuna Beach State Recreation Area Expansion EIS (Belt Collins 2001) recognizes the development of the Center at the Puakō site and the pre-final South Kohala Community Development Plan (July 2008) supports the construction and operation of the Center at the Puakō site (Section 14.16.5 (8)).

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

Discussion: The proposed action or action alternatives would change the open space character of the site to a public research and education complex comprised of a number of buildings, parking areas, driveways, etc. UHH intends to strive for LEED certification and to develop a state-of-the-art field station that will attract scientists from around the world to study West Hawai'i's coastal waters.

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

Discussion: The proposed action or action alternatives would not be impact the public health and safety of the community. The proposed action will support UHH's undergraduate marine science program and outreach programs to the community which will benefit the welfare of Hawai'i's citizens.

6. Hawai'i Coastal Zone Management Area Program

The Hawai'i Coastal Zone Management Program (HCZMP) (Chapter 205-A, HRS) applies to all State agencies. The proposed action would not have reasonably foreseeable direct or indirect short term or long term effects on any coastal use or resources in the State's coastal zone. Objectives and policies of the HCZMP are described in Chapter 205-A (2) HRS, Part I. The project's conformance with relevant objectives of the HCZMP is reviewed below:

Objective 1: Recreational Resources: Provide coastal recreation opportunities accessible to the public.

Discussion: The project site is approximately 200 feet inland (east) of the coastline and adjacent to the SOH-owned Puakō Boat Ramp. The Ala Kahakai Trail traverses the coastal area between the project site and coastline. The project is set back from the trail and would not impact the public's use and enjoyment of the trail. As noted in Section 3.2, the Puakō Boat Ramp is very popular and is only one of two ramps serving the entire northwest Hawai'i area (the other is in Kawaihae Harbor). The ramp presently experiences about 4,380 launches per year (personal communication, D. Mersburgh, Kawaihae Harbor Agent, DLNR DOBOR 2008). The ramp is the only available ramp during times of the year when the Kawaihae ramp is closed due to sand buildup and is therefore extremely important in providing "coastal recreation opportunities accessible to the public." Conversations with community members indicate the ramp is at times congested and DLNR DOBOR has indicated its intent to expand the ramp. Anecdotal information indicates the ramp parking area is increasingly used by tourists enjoying whale watch or other pleasure tours staged from the boat ramp.

The Center has been setback from the existing edge of the boat ramp by about 120 - 160 feet to allow for planned expansion. No direct connection between the Center and the ramp is planned. The ramp would be used to launch the Center's boats with approximately two launches and retrievals per day, primarily on the weekends (maximum of about 735 events per year). To the extent possible, Center staff would launch and retrieve small craft during non-peak times to minimize congestion at the ramp.

Objective 2: Historic Resources: Protect, preserve, and where, desirable, restore those natural manmade historic and prehistoric resources in the CZM area that are significant in Hawaiian and American history and culture. Historic Resources Policies: (A) Identify and analyze significant archaeological resources; and (B) Maximize information retention through preservation of remains and artifacts or salvage operations.

Discussion: The project's archaeological assessment (Appendix B) stated that no significant cultural sites or deposits were encountered at the project site. Furthermore, there is a low potential for encountering historic and cultural properties during construction of the proposed Center. The archaeological assessment was reviewed and accepted by SHPD (DLNR SHPD 2008). By letter dated September 5, 2008, SHPD determined that "no historic properties will be affected by the project" (Appendix E).

Objective 3: Scenic and Open Space Resources: Protect, preserve and where desirable, restore or improve the quality of coastal scenic and open space resources.

Discussion: The proposed action would not significantly impact scenic viewplanes. The profile of the proposed Center's structures would be low (one- and two-stories) and the footprint of the buildings would be small in keeping with character of the Puakō area. The proposed Center's structures would be fitted to the project site's undulating topography and thus limiting its visibility from Puakō Beach Drive, coastline, and adjacent boat ramp.

Objective 4: Coastal Ecosystems: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Discussion: Under the proposed action or action alternatives, site preparation activities would include grubbing and grading as well as a limited amount of excavation. Best management practices would be employed by the contractor to avoid and minimize fugitive dust emissions and surface water runoff from the project site. The proposed action is to construct a marine education and research center to train undergraduate and others about South Kohala's valuable coastal ecosystems and reefs. These activities would enhance the ecosystems and reefs by promoting proper care and interaction with the ecosystems and associated reefs. The proposed action and the action alternative would largely use the existing drainage pattern at the project site and create

bio-swales and bio-basins to handle rainwater runoff from impervious surfaces. No adverse impacts to surface water quality are anticipated.

Objective 5: Economic Uses: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Discussion: The health and well-being of the State's marine and coastal ecosystems are vitally important to the economy of Hawai'i County and to the State. The proposed action or the action alternatives would enhance the UHH marine science program, provide job training for careers in marine science for local people, and promote conservation, stewardship, technical understanding, and preservation of the marine and coastal environment of the Kohala Coast.

Objective 6: Coastal Hazards: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Discussion: The proposed action or action alternatives would provide vital marine water quality research and monitoring which would improve the technical understanding of erosion patterns in coastal areas and marine pollution.

Objective 7: Managing Development: Improve the development and review process, communication and public participation in the management of coastal resources and hazards.

Discussion: The proposed action or action alternatives would improve the knowledge base regarding coastal resources and hazards for the South Kohala coast through marine research and education; thus allowing for an improvement in the development and review process of actions potentially impacting these resources. In addition, the Center would improve communication about these resources to the public and allow for greater public participation in decision making.

Objective 8: Public Participation: Stimulate public awareness, education, and participation in coastal management.

Discussion: The proposed action or action alternatives would provide community outreach and education regarding marine resources and coastal processes allowing for greater public participation in coastal management.

Objective 9: Beach Protection: Protect beaches for public use and recreation.

Discussion: The proposed action or action alternatives would provide marine education and research skills to UHH students and public outreach programs to the community which would promote the protection of South Kohala's marine and coastal ecosystems including beaches and other areas currently used by the public for recreation and subsistence.

Objective 10: Marine Resources: Implement the State's ocean resources management plan.

Discussion: The proposed action or action alternatives would provide marine education and research skills to UHH students and marine science public outreach to the community in an effort to promote stewardship and conservation of the State's marine and coastal resources which is consistent with the Hawai'i Ocean Resource Management Plan (Department of Business and Economic Development and Tourism [DBEDT] 2006).

7. State Environmental Policy

Chapter 344, HRS, the State Environmental Policy, encourages productive and enjoyable harmony between people and their environment. The policy promotes efforts which will prevent or eliminate damage to the environment and biosphere, stimulate the health and welfare of humanity, and enrich the understanding of the ecological systems and natural resources to Hawai'i's people. The Environmental Policy seeks to conserve natural resources and enhance the quality of life for

residents of Hawai'i. Expanding citizen participation in the decision making process is one of the guidelines specified in Chapter 344, HRS.

Discussion: The proposed facility will promote the understanding of the marine environment, including ecological systems and natural resources, by improving the post-secondary science instruction facilities available to the people of the State of Hawai'i. The sustainable features incorporated into the building's design will minimize use of the earth's natural resources. The entitlement process includes multiple opportunities for public input, in the EA, SMA use permit and Conservation District Use Permit approval processes. Requests for input during the EA's pre-assessment consultation process were sent on August 29, 2008 to 35 Federal, State, and County agencies; public utilities; elected officials; and other potentially interested organizations. In addition, KMEC and UHH MSD staff held a community meeting with the Puakō Community Association on July 16, 2008 to discuss plans for the project and to solicit feedback and concerns.

4.16.3 County of Hawai'i Policies, Plans and Controls

1. County of Hawai'i General Plan

The COH General Plan ("General Plan") establishes the long-range goals and policies, which guide comprehensive development and appropriate uses of land resources. The General Plan contains goals, policies, and standards under in several categories that are relevant to the proposed action. Categories include economic, environmental quality, historic sites, natural beauty, natural resources and shoreline, recreation, and land use. This section addresses the consistency of the proposed action with relevant policies of the County.

Economic

Goals: Economic development and improvement shall be in balance with the physical and social environments of the island of Hawai'i.

Policies: The County of Hawai'i shall continue to encourage the expansion of the research and development industry by working with and supporting the university, private sector, and other agencies' programs developed to aid the County of Hawai'i.

The County shall promote a distinctive identity for the island of Hawai'i to enable government, business and travel industries to promote the County of Hawai'i as an entity separate and unique within the State of Hawai'i.

Discussion: The proposed action is consistent with the economic goals and policies of the General Plan. The proposed action would be operated by an educational, non-profit entity, the UHH, and would promote the marine education and research skills for UHH students.

Historic Sites

Goals: Protect and enhance the sites, buildings and objects of significant historical and cultural importance to Hawai'i. Access to significant historic sites, buildings and objects of public interest should be made available.

Policies: Signs explaining historic sites, buildings, and objects shall be in keeping with the character of the area or the cultural aspects of the feature.

Discussion: The project site does not encompass any archaeological features and, therefore, signs are not warranted there.

Natural Beauty

Goals: Protect scenic vistas and view planes from becoming obstructed. Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

Policies: Increase public pedestrian access opportunities to scenic places and vistas.

Discussion: The proposed action or action alternatives would involve the construction of one- and two-story structures sited within the topographical contours of the project site to minimize its visibility from Puakō Beach Drive and the coast line. The proposed Center would be open to the public for community meetings, events, and classes and would not inhibit public pedestrian access to the Puakō coast or the coastal trail.

2. Land Use Policy Allocation Guide Map

The County's Land Use Policy Allocation Guide map designates the project areas "Low Density and Open." The County's Facilities Map does not identify any COH public facilities in the area of project site.

Discussion: The proposed action or action alternatives are in conformance with this designation.

3. South Kohala CDP Pre Final Draft July 2008

The South Kohala Community Development plan is one of several CDPs being developed by the COH. The South Kohala CDP Prefinal Draft dated July 2008 has been approved by the South Kohala CDP Steering Committee and will be going before the Hawai'i County Planning Commission and County Council for adoption as an ordinance. The CDP provides district-wide baseline information and policies, as well as planning policies and action programs for the four communities identified in the plan (including the Puakō Community). A summary of relevant policies is provided below.

District Wide Policies:

General Policy No. 1. Preserve the culture and sense of place of South Kohala communities.

Discussion: As noted above, the SHPD concurred with the findings of the project's archaeological assessment and determined that no historic properties will be affected by the project. The proposed action or action alternatives would assist the community in promoting awareness of the significant marine resources of the region, and the important role these resources play in West Hawai'i's culture and sense of place.

General Policy No. 5. Promote environmental stewardship and the concept of sustainability.

Discussion: As noted, the proposed action or action alternatives and the marine science programs would enhance the understanding of sustainable building technology and at the same time, assist in improving the community's awareness and understanding of the region's marine resources. The Center would offer an opportunity to showcase UHH's diverse efforts at sustainable environmental design and become a partner with the Puakō community to promote these important concepts.

Puakō Community Plan policies

Policy No. 1: Manage the effects of growth and development. The plan recognizes that additional planned development in the vicinity, even the proposed introduction of the Superferry to Kawaihae, has the potential to severely impact the integrity and character of the Puakō community. To mitigate potential effects, it identifies several actions:

- Control speeding on Puakō Beach Drive

- DLNR should actively manage increasing public use of the Puakō boat ramp and expand facilities as necessary

Discussion: The introduction of a permanent caretaker as part of the proposed action will provide a new presence in this stretch of Puakō Beach Drive that should help increase community security and deter unwelcome activities such as speeding and loitering in the project vicinity. The project site has been setback from the existing boat ramp to allow for possible expansion of the facility.

Policy 3: Environmental Stewardship, Strategy 3.2: Encourage the development of the UHH Kalakaua Marine Center north of the Puakō boat ramp. Although the specific research activities at the proposed Marine Research Center are still to be determined, the center could play an important role in helping to improve the marine water quality of the nearby area. One possible role that the marine center could fulfill is conducting regular marine water quality monitoring. Should future water quality monitoring show that the coastal waters are put at severe risk by nearby coastal developments, it would be more likely that public monies would be allocated to remedy the pollution from coastal developments. In any case, consistent monitoring and data collection should be maintained for the near shore waters.

Discussion: The proposed action or action alternatives would implement this strategy.

4. Zoning

The entire site is located within the “Open” zoning district. The COH exerts land use regulatory authority over the portion of the property within the State Urban District. Section 25-5-160 of the COH Zoning Code provides the following purpose of the “Open” district: [it] applies to areas that contribute to the general welfare, the full enjoyment, or the economic well-being of open land type use which has been established, or is proposed. The object of this district is to encourage development around it such as a golf course and park, and to protect investments which have been or shall be made in reliance upon the retention of such open type use, to buffer an otherwise incompatible land use or district, to preserve a valuable scenic vista or an area of special historical significance, or to protect and preserve submerged land, fishing ponds, and lakes (natural or artificial tide lands). According to Section 25-5-162(a)(12) of the COH zoning code, permitted uses in the Open District include Public uses and structures.

Discussion: The intent is to seek a Use Permit for the proposed action under § 25-5-162(a)(12) of the COH zoning code as "public uses and structures" and/or under §25-5-162(a)(3) as "community buildings." The Use Permit is issued by the Planning Commission.

5. Special Management Area

The proposed project is located within the COH's Special Management Area and development of the site will require a COH SMA use permit issued by the Planning Commission. Pursuant to Chapter 205A, HRS (Sections 205A-2 HRS and 205A-26 HRS, as amended), and the Rules of Practice and Procedures of the Hawai'i County Planning Commission, actions proposed within the SMA are evaluated with respect to SMA objectives, policies and guidelines. A written statement discussing the proposed development in relationship to the objectives and policies as provided by Chapter 205A, HRS, and the Special Management Area guidelines is required as part of the COH application process.

Discussion: A complete discussion of the proposed action or action alternatives' conformance with Chapter 205A, HRS is provided above under Section 14.16.5 (6) “Hawai'i Coastal Zone

Management Area Program.” The intent is to seek a SMA Use Permit(s) to permit the subdivision and development of the proposed action or action alternatives.

4.17 CUMULATIVE IMPACTS

Cumulative impacts are effects on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what entity undertakes such actions. The cumulative impact analysis considered reasonably foreseeable future actions (summarized in Table 4-3) as the context for evaluating the significance of incremental impact.

According to the Pre-Final South Kohala Community Development Plan (July 2008) discussed above in Section 14.16.5 (3), major development proposals in the Puakō area have the potential to severely impact the integrity and character of the Puakō community. A summary of foreseeable developments identified in the CDP and in the early consultation part of this EA are presented in Table 4-3.

Table 4-3: Foreseeable Development in the Project Vicinity

Project	Description
Puakō Boat Ramp Expansion	SOH Division of Boating and Ocean Recreation has indicated it intends to expand the existing ramp.
Bridge ‘Āina Le‘a Villages	Proposed development on the mauka side of Queen Ka‘ahumanu Highway, almost directly across from Puakō, of 2,406 homes, up to five golf courses, golf academy, commercial villages, and a 40-unit resort lodge. The development includes 864 lots in the State agricultural district. In addition, 234 acres will be set aside for open space and 26 acres for parks. A 5 acre ilima preserve area is planned. Total project area is 3,000 acres.
Stanford Carr Development	Proposed project within the Mauna Lani Resort and mauka of the Puakō forest, is the development of 691 residential units, 284 hotel units, and three golf holes are planned.
Colony Capital	Proposed golf course planned on the mauka end of the Puakō forest.
Puakō Bay Investors LLC	Proposed 8-lot single family residential subdivision along Puakō Beach Drive south of the Puakō Boat Ramp.

The major developments described above will increase resident and visitor populations, increase demands on public facilities and services, increase traffic congestion and will continue the dramatic growth the West Hawai‘i region has seen over the past 20 years. Each of the developments will go through their own government permitting processes that have the capability of ensuring that impacts of each project are mitigated, and that appropriate controls and conditions are in place to manage them over time. Development of the Center will incrementally add to the growth and irreversible change occurring in the region. It will add demand on the Puakō Boat Ramp which is already planned for expansion by DLNR. From a mitigating standpoint however, it is a relatively small development in comparison with many of the planned projects, and it serves a public purpose (education and research) that will benefit Hawai‘i’s citizens.

In the context of projected regional growth, the proposed action can be viewed as a mitigating influence. Regional growth has added significant human pressures on coastal and nearshore resources. Community residents interviewed as part of the early consultation process indicated that the marine environment is being stressed by this increased pressure, and that marine baseline studies and a keener awareness of the importance of a healthy and vibrant marine ecosystem are vitally important. MSD’s mission is to provide a comprehensive understanding of the world’s oceans

and an appreciation of the importance of marine ecosystems to the global environment and human life. Because of this, the Center offers a tremendous opportunity for marine scientists, government representatives and community organizations to work together under a common purpose of creating a better understanding of changes in the marine environment -- to better understand causal relationships between natural and anthropomorphic forces-- and to identify and implement management strategies to minimize adverse effects.

Based on the forgoing assessment, the proposed action or action alternatives, collectively with future private and government actions planned in the area, would not have a significant cumulative impact on the environment. As discussed elsewhere in this EA, the proposed action is expected to have minor incremental effects on topography, soils, surface and ground water, natural hazards, air quality, noise, biological resources, cultural resources, potable water, wastewater, storm drainage, electrical power, police and fire protection, socio-economic resources, traffic and visual resources, when considered collectively with the foreseeable actions listed. Considered cumulatively though, these incremental effects are small and are offset by the public purpose of the action and the long term benefits to the marine environment that would accrue to the region if the Center is permitted to be developed.

4.18 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The proposed action or action alternatives would not significantly increase energy requirements as the activities that would take place at the proposed Center are currently occurring elsewhere on the island (DOT-H Hilo Harbor facilities, various camping grounds in West Hawai'i, UHH main campus). It is reasonable to conclude that the newly constructed Center would be more energy efficient than the older facilities at Hilo Harbor and UHH main campus since the renovated facility would comply with current energy efficiency standards and policies.

4.19 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

This section lists the trade-offs between short- and long-term gains and losses due to the proposed action. "Short-term" refers to the renovation period; "long-term" refers to the operational period.

- Short-term loss due to air quality and noise impacts during renovation;
- Short-term gains to the local economy resulting from construction activity and direct/indirect spending;
- Long-term productivity and efficiency gains through providing adequate facilities that increase operational efficiency;
- Long-term improvement in community education and outreach;
- Long-term gain in morale and quality of life for KMEC and UHH MSD personnel and students working in improved facilities that meet operational requirement;
- Long-term indirect and induced economic benefits resulting from increased enrollment in the UHH MSD;
- Long-term operational gains in instructional and research capabilities of the UHH MSD staff and students.

4.20 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Resources that are committed irreversibly or irretrievably are those that cannot be recovered if the proposed project is implemented. The proposed action and the Phase 1 Alternative would irreversibly and irretrievably commit the five acre site to a developed state. Phase 1A is considered temporary

and can be reversed. They would also irreversibly commit general development costs including fiscal resources, labor, fuels, energy, and construction equipment and materials, as well as operational phase resources such as electricity, water and materials. The No Action Alternative would not commit any resources.

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5 DETERMINATION AND SUPPORTING RATIONALE

This EA has been written to comply with Chapter 343, HRS and Chapter 11-200, HAR, in addition to other requirements identified in Section 1.4. This section is included to meet the requirements of Chapter 343, HRS and Chapter 11-200, HAR.

5.1 DETERMINATION

Based on the information and analysis presented in this document, the proposed action is not expected to result in a significant impact on the environment. The proposed action or action alternatives will not have a significant short-term, long-term or cumulative adverse impact on the environment; therefore, preparation of an Environmental Impact Statement will not be required. In accordance with Chapter 343, HRS and Chapter 11-200, HAR, UHH is anticipating that a FONSI will be issued for the proposed action.

5.2 FINDINGS AND REASONS SUPPORTING THE DETERMINATION

In determining whether an action may have a significant impact on the environment, the applicant or agency must consider all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short and long-term effects. The FONSI was based on review and analysis of the significance criteria specified in Section 11-200-12, HAR. A discussion of each of the criteria and findings are presented below.

1. Involves an irrevocable commitment or loss of or destruction of natural or cultural resources

The project site encompasses lands that have been previously disturbed and used for a fire break. Previous flora and fauna surveys have determined no presence of federal- or SOH-listed endangered, threatened or candidate species that could be jeopardized by the proposed action (see Sections 3.10 and 4.10). No significant archaeological or architectural resources would be impacted by the proposed action or alternatives. The project site is located approximately 200 feet mauka (inland) from the Puakō coastline; however, the proposed action and alternatives would not further impact traditional cultural property or cultural practices. The proposed action would not involve grading and grubbing activities and limited excavation in preparation for the construction of the low-profile, low-foot print Center structures. The largely, non-native savannah grasses and scrub vegetation would be replaced with appropriate native plants and landscapes. The proposed one- and two-story structures would not adversely affect important view planes. Proposed construction activities would follow best management practices to minimize disturbance to surface waters, air quality, noise, and traffic.

Construction of the Center would not adversely impact scenic views (see Sections 3.4. and 4.4.1). The proposed siting would maintain the overall visual quality of the existing view planes. The proposed action and, to a lesser degree, the Phase 1 and Phase 1A alternatives would be visible from portions of Puakō Beach Drive and Puakō Bay.

2. Curtails the range of beneficial uses of the environment

The proposed action would provide a state-of-the-art marine educational and research facility and would provide positive long-term benefits associated with such facilities. The Phase 1 and Phase

1A alternatives would support marine education and research, but to a lesser degree. Construction and operation of the facility would be handled in accordance with federal and SOH regulations, thereby minimizing potential impacts to the Conservation lands at and around the project site (see Section 4.15.).

3. Conflicts with the State’s long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed action or action alternatives are consistent with the State’s long-term environmental policies, and the policies and guidelines specified in Chapter 344, HRS, Executive Orders, and Court Decisions, as demonstrated by the discussion in this chapter and Section 4.15.

4. Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;

The proposed action or, to a lesser degree, the Phase 1 and Phase 1A alternatives, would have direct and indirect economic benefits to the State and County through the flow of construction spending. The project would also improve post-secondary public educational services to Hawai‘i County residents. As discussed in Section 4.3, the proposed action is not expected to adversely affect traditional Hawaiian rights related to gathering, access, or other customary activities within the project area or its vicinity or any cultural practices or beliefs. There are no Native Hawaiian (or other ethnic group’s) cultural practices customarily and traditionally exercised for subsistence, cultural and religious purposes that are known to occur on the project area. The scale of the new buildings will not affect important *mauka-makai* views.

5. Substantially affects public health;

The proposed action or action alternatives would not substantially affect public health. There would be some typical short-term construction-related impacts (e.g., noise and air quality) in the area, but these would be temporary and comply with State and County regulations. Standard construction BMPs would be used to minimize the temporary impacts. Though none are known, if hazardous or regulated materials are encountered at the project site (e.g., grading, construction activities), these materials would be stored, handled, and disposed of in accordance with applicable federal and SOH regulations to minimize potential impacts to human health and the environment.

6. Involves substantial secondary impact, such as population changes or effects on public facilities;

The proposed action or action alternatives would not result in island-wide population growth. The student and faculty units associated with the proposed action would increase the number or persons temporarily residing in Puakō (up to 50 students, 6 faculty, and one caretaker family). While UHH MSD expects to experience enrollment increases over current levels in future years, the proposed Center in itself is not intended to generate significant increases in the student population. Potential impacts to public facilities are discussed in Section 4.6. The proposed action would construct and operate its own standalone water and wastewater systems and work with HELCO and CATV providers to provided services. The traffic assessment indicates the proposed action or action alternatives would not have a significant traffic impact.

7. Involves a substantial degradation of environmental quality;

The proposed action or action alternatives would not substantially degrade environmental quality. Long-term impacts to air and water quality, noise levels, and natural resources would be minimal. The use of standard construction and erosion control best management practices will minimize the anticipated construction-related short-term impacts.

8. Is individually limited and cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

The proposed action or action alternatives, collectively with known future private and government actions planned in the vicinity, would not have a significant cumulative impact on the resource areas analyzed. Implementation of the proposed action would irrevocably commit the vacant site for urban-type, albeit public uses. It is expected to have minor incremental effects on topography, soils, surface and ground water, natural hazards, climate and air quality, noise, biological resources, archaeological and cultural resources, potable water, wastewater, storm drainage, electrical power, solid and hazardous waste, police and fire protection, socio-economic factors, traffic, parking, and visual resources, when considered collectively with foreseeable actions.

9. Substantially affects a rare, threatened, or endangered species, or its habitat;

No threatened, endangered or candidate listed bird, mammal, or plant species protected by Federal and State regulations would be impacted by the proposed action or action alternatives. There are no significant biological resources, including habitat for protected species, in the project vicinity.

10. Detrimentially affects air or water quality or ambient noise levels;

The proposed action or action alternatives would not substantially affect air or water quality or ambient noise levels. The use of best management practices would minimize construction-related impacts, and the project would comply with applicable federal, SOH and COH regulations and standards. The replacement of permeable surfaces with impervious surfaces would increase the rate of storm water runoff. Most of the runoff will be directed to onsite detention systems designed in accordance with state and county standards that will remove pollutants at levels that meet LEED requirements. Surface water quality and air quality would not be significantly impacted. Increases in ambient noise that may result from operation of the Center or the minor increase in traffic is not expected to impact noise sensitive receptors.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

The project site is not located within an environmentally sensitive area. It set back 200 feet from the coastline and is not within an identified floodplain or subject to storm wave hazards. Although it is considered a coastal site, site elevations range from 20 to 70 feet above sea level (average elevation is approximately 40 feet) so it should not be any more susceptible to subject to tsunami wave impacts than other properties in the Puakō community.

12. Substantially affects scenic vistas and viewplanes identified in County or State plans or studies;

The proposed action or action alternatives would not obstruct or affect scenic vistas and viewplanes identified in County or State plans or studies.

13. Requires substantial energy consumption.

The proposed action will require additional energy consumption; however, as part of the planned LEED accreditation, the facility's total electrical power demand may be offset by the production of electrical power on-site through solar PV panels and other energy-saving technologies. The Phase 1 and Phase 1A alternatives would consume less energy than the proposed action.

6 CHAPTER 343, HRS PRE-ASSESSMENT CONSULTATION

A total of 35 agencies (including divisions/offices of DLNR), organization, or elected officials were contacted during the pre-assessment consultation phase of the Draft EA in accordance with Chapter 343, HRS requirements as summarized below. A total of 18 responses were received including seven from DLNR, 10 from other agencies, one from a local resident. Parties who responded to the pre-assessment consultation are identified by an asterisk (*). A copy of the pre-assessment consultation letter, written comments received in response to the pre-assessment consultation and subsequent response letters addressing those comments are presented in Appendix E.

A meeting with the Puakō Community Association was held on July 16, 2008 as part of the early consultation process. The KMEC and UHH MSD staff presented plans for the site and residents provided advice and recommendations on how to proceed.

Federal

National Oceanic and Atmospheric Agency Marine Fisheries Service
USDA, Natural Resources Conservation Service
Department of the Army, Army Corps of Engineers
U.S. Department of the Interior, Fish and Wildlife Service

State of Hawai'i

Office of Environmental Quality Control

*Department of Accounting and General Services

Department of Land and Natural Resources (DLNR)

*DLNR Historic Preservation Division

*DLNR Commission on Water Resource Management

*DLNR Division of Boating and Ocean Recreation

*DLNR Land Division

*DLNR Office of Conservation and Coastal Lands

DLNR, Division of Aquatic Resources

DLNR, Division of Conservation and Resources Enforcement

DLNR, Division of Forestry and Wildlife

DLNR, Division of State Parks

DLNR, Engineering Division

*Department of Hawaiian Homelands

*Office of Hawaiian Affairs

Department of Business, Economic Development, Tourism, CZM

*Department of Business, Economic Development, Tourism, Office of Planning

*Department of Transportation

University of Hawai'i-Environmental Center

Department of Health, Environmental Planning

Hawai'i County

Planning Department

*Department of Research and Development

*Department of Water Supply

*Fire Department

Civil Defense Agency

* Police Department

Department of Public Works

*Department of Environmental Management

Department of Parks and Recreation

Utility Companies

Hawaiian Telecom

Hawai'i Electric Light Company

Community and Other Organizations

Puakō Community Association

Sierra Club, Hawai'i Chapter

The Nature Conservancy of Hawai'i

Elected Officials

U.S. Senator – Mr. Daniel Akaka

U.S. Senator – Mr. Daniel Inouye

U.S. Representative – Ms. Mazie Hirono

State Senator – Mr. Paul Whalen

State Representative – Ms. Cindy Evans

Hawai'i County, Office of the Mayor- Mr. Harry Kim

County Council Chairperson and 9th District Representative – Mr. Pete Hoffmann

Residents

*Mr. Chad Wiggins

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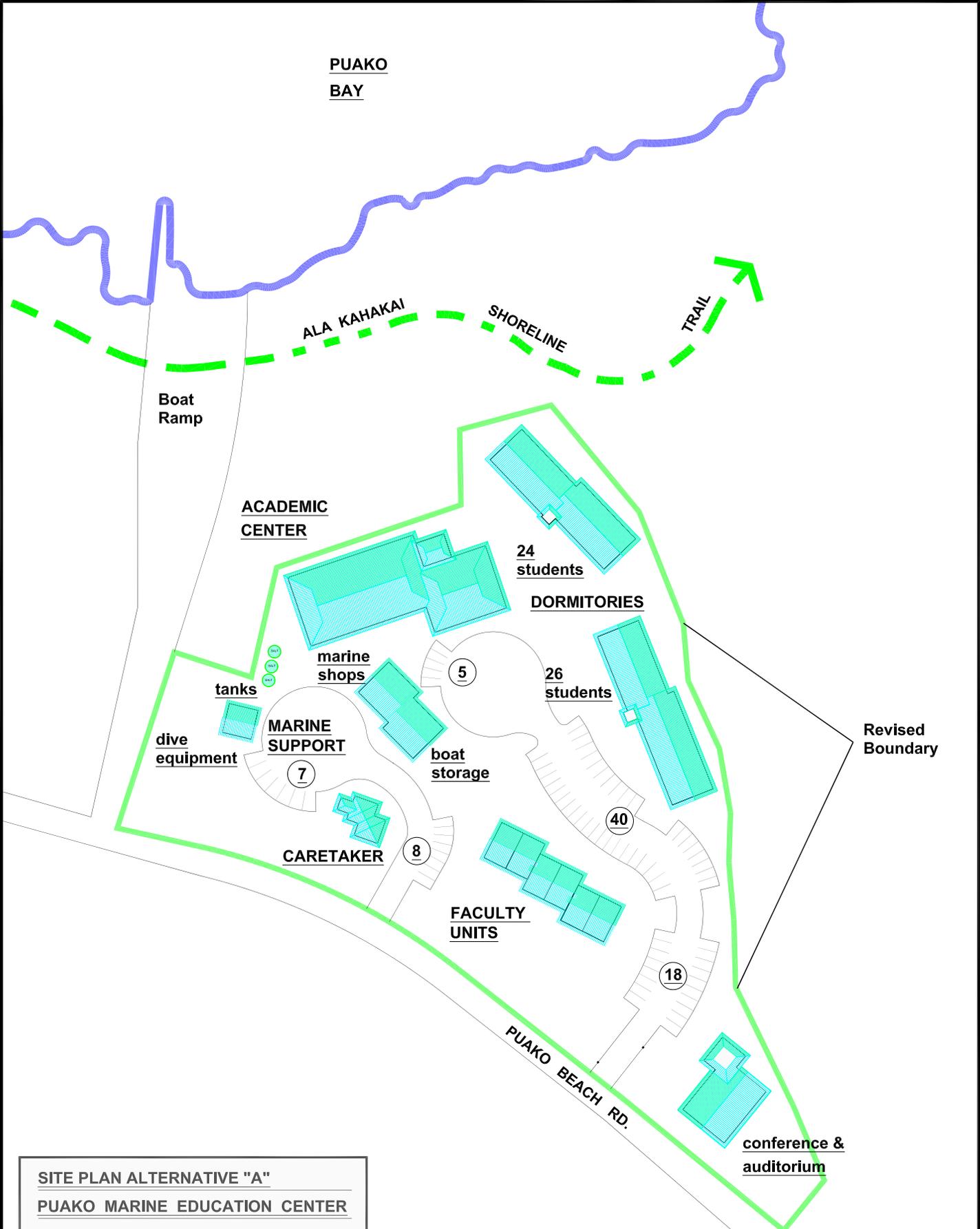
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Appendix A

Alternative Schematic Plans being considered

Helber Hastert & Fee, Planners

**PUAKO
BAY**



Revised Boundary

**SITE PLAN ALTERNATIVE "A"
PUAKO MARINE EDUCATION CENTER**

PARKING: 80 STALLS

FEBRUARY 28, 2008



Helber Hastert & Fee
Planners, Inc.



**PUAKO
BAY**

Boat
Ramp

ALA KAHAKAI
SHORELINE

TRAIL

**ACADEMIC
CENTER**

24
students

DORMITORIES

26
students

marine
shops

tanks

dive
equipment

**MARINE
SUPPORT**

boat
storage

CARETAKER

**FACULTY
UNITS**

Revised
Boundary

**conference &
auditorium**

PUAKO BEACH RD.

**SITE PLAN ALTERNATIVE "A"
PUAKO MARINE EDUCATION CENTER**

PARKING: 80 STALLS

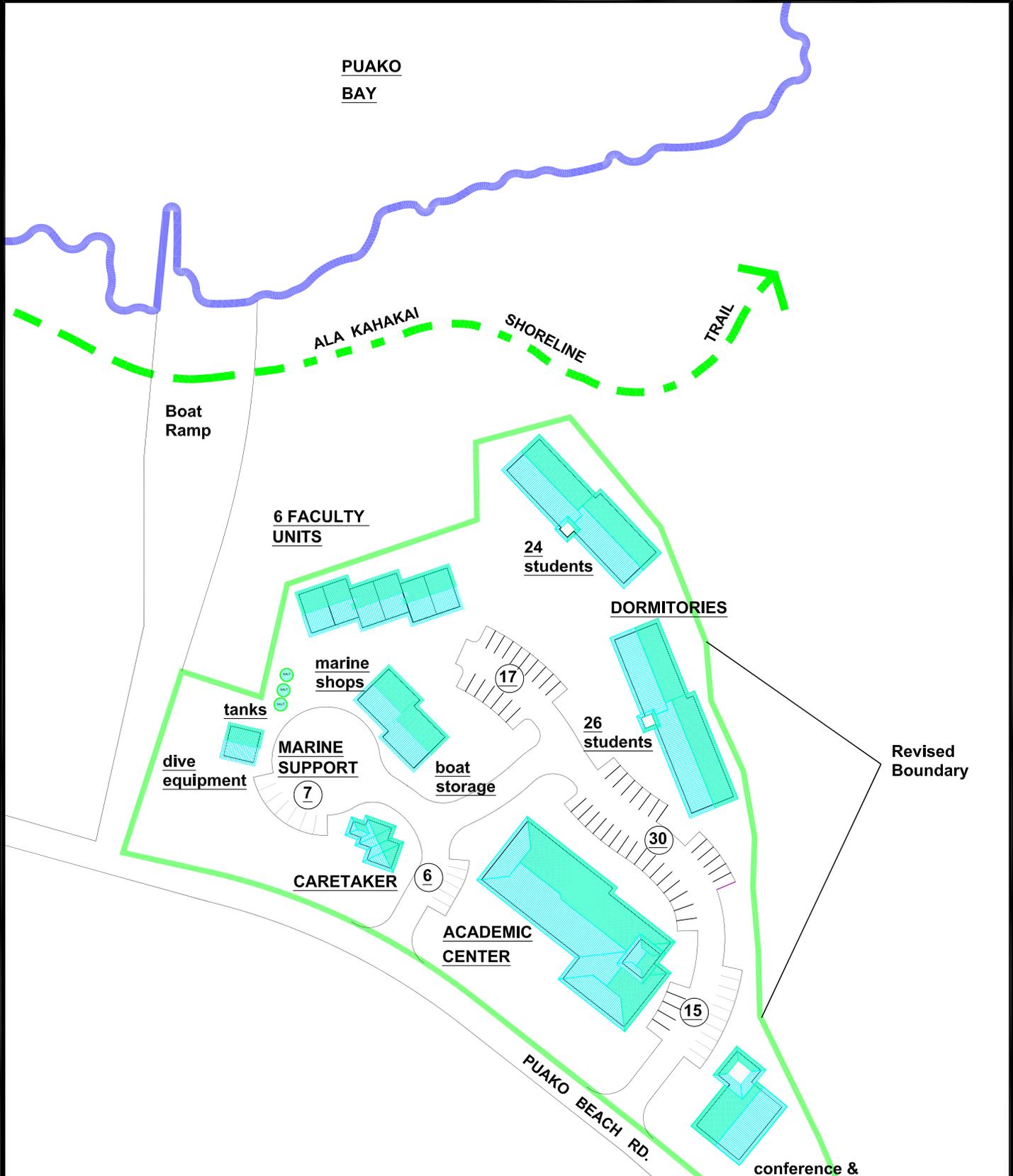
FEBRUARY 28, 2008

APPROX. SCALE: 1"=40'
0' 10' 20' 40' 80' 120'

Helber Hastert & Fee
Planners, Inc.



**PUAKO
BAY**



Revised Boundary

SITE PLAN ALTERNATIVE "B"
PUAKO MARINE EDUCATION CENTER

PARKING: (75) STALLS

FEBRUARY 28, 2008



**PUAKO
BAY**



SITE PLAN ALTERNATIVE "B"
PUAKO MARINE EDUCATION CENTER

PARKING: (75) STALLS

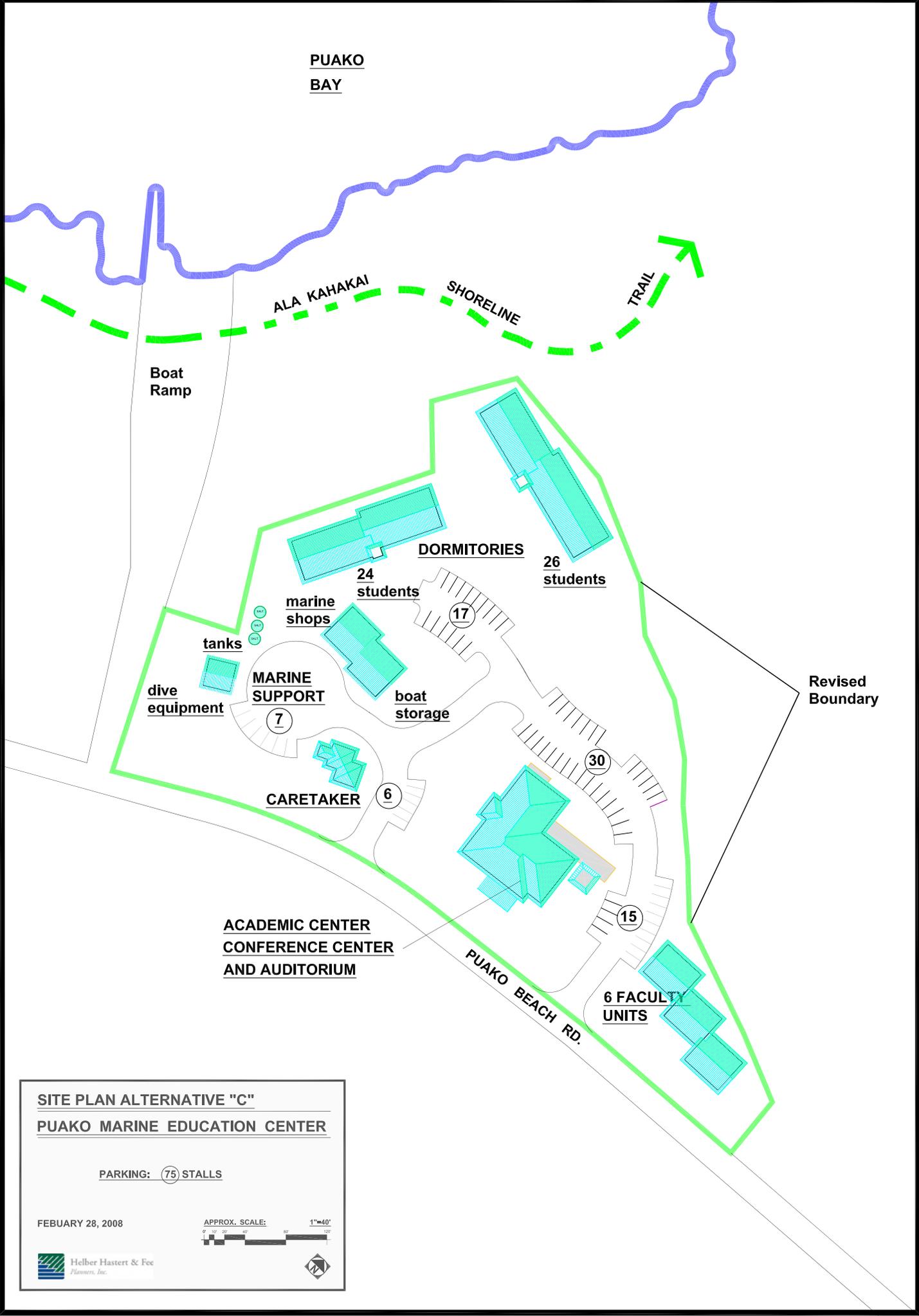
FEBRUARY 28, 2008

APPROX. SCALE: 1"=40'
0 10 20 40 80 120

Helber Hastert & Fee
Planners, Inc.



**PUAKO
BAY**



ALA KAHAKAI SHORELINE

TRAIL

Boat Ramp

DORMITORIES

24 students

26 students

marine shops

tanks

dive equipment

MARINE SUPPORT

7

boat storage

CARETAKER

6

**ACADEMIC CENTER
CONFERENCE CENTER
AND AUDITORIUM**

Revised Boundary

6 FACULTY UNITS

PUAKO BEACH RD.

**SITE PLAN ALTERNATIVE "C"
PUAKO MARINE EDUCATION CENTER**

PARKING: 75 STALLS

FEBRUARY 28, 2008

APPROX. SCALE: 1"=40'



**PUAKO
BAY**



ALA KAHAKAI

SHORELINE

TRAIL

Boat Ramp

DORMITORIES
24 students

DORMITORIES
26 students

marine shops

tanks

dive equipment

MARINE SUPPORT

boat storage

CARETAKER

**ACADEMIC CENTER
CONFERENCE CENTER
AND AUDITORIUM**

6 FACULTY UNITS

Revised Boundary

PUAKO BEACH RD.

**SITE PLAN ALTERNATIVE "C"
PUAKO MARINE EDUCATION CENTER**

PARKING: 75 STALLS

FEBRUARY 28, 2008

APPROX. SCALE: 1"=40'



Appendix B

Archaeological Survey

Rechtman Consulting LLC. March 2008

RC-0533

An Archaeological Assessment Survey of the Proposed
UHH Puakō Marine Educational Center Development Area
(TMK: 3-6-9-01:001 por.)

Lālāmilo Ahupua‘a
South Kohala District
Island of Hawai‘i



An Archaeological Assessment Survey of the Proposed
UHH Puakō Marine Educational Center Development Area
(TMK: 3-6-9-01:001 por.)

Lālāmilo Ahupua‘a
South Kohala District
Island of Hawai‘i

PREPARED BY:

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and
Robert B. Rechtman, Ph.D.

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March 2008

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e-mail: bob@rechtmanconsulting.com
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

RECHTMAN CONSULTING

EXECUTIVE SUMMARY

At the request of the Helber Hastert & Fee, Rechtman Consulting, LLC conducted an archaeological survey of a five-acre area (TMK:3-6-9-01:001 por.) for the proposed construction of the University of Hawai'i at Hilo (UHH) Puakō Marine Educational Center within Lālamilo Ahupua'a, South Kohala District, Island of Hawai'i. The area is located adjacent to the Puakō Boat ramp along the Puakō Beach Road. This area was previously included as part of a larger archaeological inventory survey conducted by Jensen (1994), and an inventory survey conducted for the same proposed development project by Hunt and Pfeffer (1994). Hunt and Pfeffer (1994) recorded six possible archaeological features in the area and tested one of them. They noted, however, that all had been subject to "substantial disturbance" from "recent bulldozing" (Hunt and Pfeffer 1994:13) for fire-breaks and other fire-fighting efforts.

Fieldwork for the current project was conducted on February 12, 2008 by Matthew R. Clark, B.A. Olivier M. Bautista, B.A., and Michael K. Vitousek, B.A. under the direction of Robert B. Rechtman, Ph.D. The project area was thoroughly inspected by fieldworkers walking east/west pedestrian transects spaced at ten-meter intervals. Upon completion of the pedestrian survey, an intensive effort was made to locate the six possible features previously recorded by Hunt and Pfeffer (1994) in the area.

As a result of the current fieldwork, all six of the previously noted and suspected feature areas were fully examined, and none were determined to currently represent definable archaeological resources. Therefore, no historic properties were identified during the current study. Two of the potential features recorded by Hunt and Pfeffer (1994) were positively identified, however, neither constitutes a definable archaeological feature. Both of these areas appear to represent bulldozer push piles associated with past fire control activities. Rough concentrations of bulldozed stones were discovered in the areas where the remaining four features.

As there were no significant cultural sites or deposits encountered within the study area, it is recommended that no further archaeological work need be conducted prior to development. However, in the unlikely event subsurface prehistoric deposits or human burials are inadvertently discovered during construction activities, such activities should be immediately suspended in the vicinity of the discovery, and DLNR-SHPD notified as outlined in the Hawai'i Administrative Rules 13§13-284.

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INTRODUCTION

At the request of the Helber Hastert & Fee, Rechtman Consulting, LLC conducted an archaeological survey of a five-acre area (TMK:3-6-9-01:001 por.) for the proposed construction of the University of Hawai'i at Hilo (UHH) Puakō Marine Educational Center within Lālāmilo Ahupua'a, South Kohala District, Island of Hawai'i (Figures 1 and 2). The area is located adjacent to the Puakō Boat ramp along the Puakō Beach Road. This area was previously included as part of a larger archaeological inventory survey conducted by Jensen (1994), and an inventory survey conducted for the same proposed development project by Hunt and Pfeffer (1994). Although Hunt and Pfeffer (1994) recorded six possible archaeological features in the area and tested one of them, they noted that all had been subject to "substantial disturbance" from "recent bulldozing" (1994:13) for fire-breaks and other fire-fighting efforts. These potential features were relocated during the current fieldwork, but none are currently considered to be archaeological resources. According to Hawai'i Administrative Rules 13§13-284-5, when no archaeological resources are discovered during an archaeological survey the production of an Archaeological Assessment report is appropriate. The current project was undertaken in compliance with both the historic preservation review process requirements (HAR 13§13-275-5) of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) and the County of Hawai'i Planning Department, and is intended to accompany all required State and County environmental submittals and permit applications.

This report contains summary background information concerning the project area's physical setting, cultural contexts, previous archaeological work, and current survey expectations based on the previous work. Also presented is an explanation of the project's methods, a detailed description of the potential features previously recorded by Hunt and Pfeffer (1994) within the project area, and a discussion of the findings of the current study.

Project Area Description

The current project area consists of five acres of State-owned land (TMK:3-6-9-01:001 por.) within Lālāmilo Ahupua'a, South Kohala District, Island of Hawai'i (see Figures 1 and 2). The irregularly-shaped project area is located to the northeast of the Puakō Boat ramp parking lot along the *makai* shoulder of Puakō Beach Road (Figure 3). Its northern and western boundaries follow the natural toe of a slope bordering undeveloped State-owned land. The Ala Kahakai Shoreline Trail runs along the coast *makai* of the project area.

Elevation within the project area ranges from 20-40 feet above sea level. The area receives an average annual rainfall of less than 10 inches, and has a mean temperature of 78 degrees Fahrenheit (Kennedy 1980). Terrain is relatively level within the project area, but the ground surface slopes away from the northeastern and southwestern boundaries into moderate drainages. Soils in this general area consist of a surface layer of dark reddish-brown Kawaihae extremely stony very fine sandy loam about 2 inches thick on top of dark reddish-brown and dusky-red stony silt loam and loam with *pāhoehoe* lava bedrock that originated from Mauna Kea Volcano at a depth of about 33 inches (Sato et al. 1973). Vegetation consists primarily of *kiawe* (*Prosopis pallida*) and grasses (Figure 4).

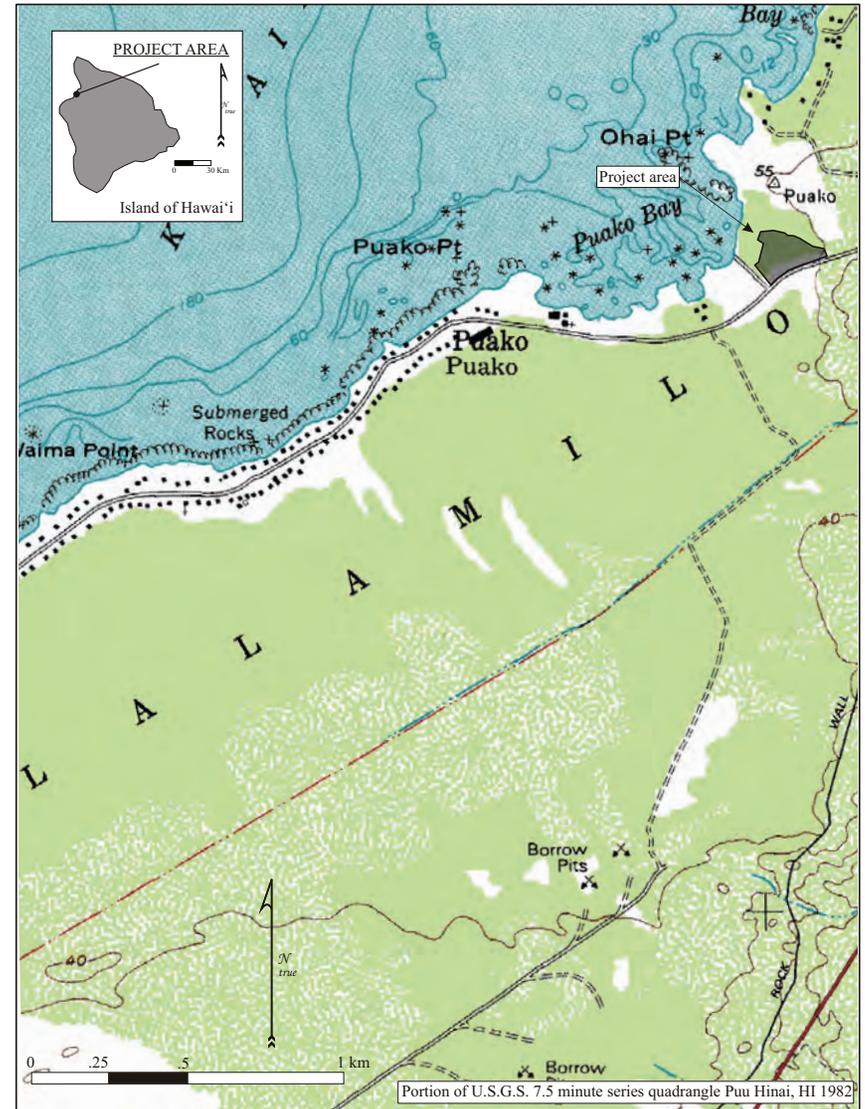


Figure 1. Project area location.

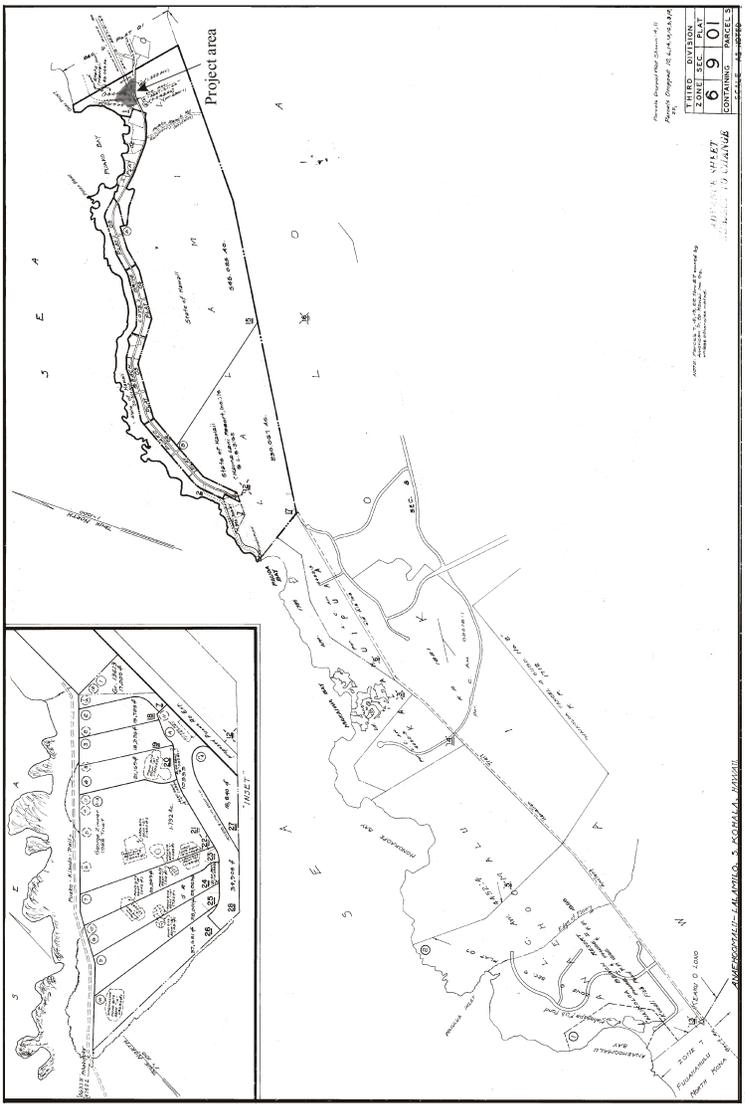


Figure 2. Tax Map Key (TMK) 3-6-9-01 showing the current project area (portion of Parcel 001).

Figure 3. Aerial photograph of project area.



Figure 4. View to northeast of the current project area.

Evidence of significant land-alteration is present across most of the project area. Hunt and Pfeffer, who examined the area in 1994 for an archaeological inventory survey, reported that bulldozing for fire breaks and other fire fighting efforts had recently occurred within the project area at that time. It is likely that further bulldozing has occurred since then, as fires occur regularly in this dry area. Most recently, in October of 2007, fire breaks were bulldozed on a parcel across Puakō Beach Drive from the current project area. The bulldozing left push piles and cobble rubble strewn across that parcel that were still observable at the time of the current fieldwork. The recent bulldozing on that parcel attests to the large amount of land alteration that must have occurred within the current project area in the past. There is also evidence of a bulldozed road (destroyed by fire breaks in sections) that once looped around the project area. This road is not currently drivable, but the presence of several vehicles (Figure 5) abandoned within the project area suggests that it once was. Several bulldozer push comprised of mixed soil and cobbles were noted along the route of this former road.

BACKGROUND

To generate set of expectations regarding the nature of archaeological resources that might be encountered on the study parcel, and to establish an environment within which to assess the significance of any such resources, previous archaeological studies relative to the project area and a general historical context for the region are summarized.

Previous Archaeological Research

Two previously conducted archaeological studies have encompassed the current project area. These studies include a phased archaeological inventory survey conducted by Paul H. Rosendahl, Inc. (PHRI) between 1990 and 1994 (Burgett and Rosendahl 1990; Dunn 1992; Jensen 1994) and an archaeological inventory survey for the same proposed development as the current study (Hunt and Pfeffer 1994). Both studies are discussed in detail below. Numerous other studies have been conducted along the South Kohala coast in the general Puakō area from Kawaihae to Waikōloa *ahupua'a*. These studies are summarized below and listed in Table 1.



Figure 5. View to west of an abandoned vehicle within the current project area.

Table 1. Previous Archaeological-Historical Investigations.

<i>Year</i>	<i>Author</i>	<i>Ahupua'a</i>	<i>Type of Study</i>
1930	Reinecke	General	Reconnaissance
n.d.	Emory	Lālāmilo	Excavation
1964	Smart	Lālāmilo	Excavation
1971	Ching	General	Intensive survey
1972	Rosendahl	Waikōloa, Lālāmilo	Excavation
1972	Rosendahl	Lālāmilo	Reconnaissance
1973	Barrera	General	Intensive survey
1975	Kirch	Waikōloa	Intensive survey, excavation
1979	Kirch	Lālāmilo	Excavation
1980	Kennedy	Lālāmilo	Intensive survey
1982	Kaschko and Rosendahl	Kawaihae 2 nd , 'Ōuli	Reconnaissance, historical
1982	Tomonari-Tuggle	Lālāmilo	Reconnaissance
1983	Rosendahl	'Ōuli	Intensive survey
1983	Clark and Kirch	General	Intensive survey
1984	Welch	Lālāmilo	Intensive survey
1985	Rosendahl	Kukio 1 st	Reconnaissance
1988	Welch	Lālāmilo	Intensive survey, excavation
1989	Welch	Lālāmilo	Intensive survey, excavation
1989	Jensen	Waikōloa	Intensive survey
1989	Jensen	'Anaeho'omalu	Excavation
1989	Jensen	Waikoloa	Intensive survey
1990	Burgett and Rosendahl	Lālāmilo	Intensive survey
1991	Jensen	Waikōloa	Excavation
1992	Dunn	Lālāmilo	Intensive survey, excavation
1992	Burgett et al.	Lālāmilo	Intensive survey, excavation
1993	Greene	Kawaihae	Arch./Historical Assessment
1993	Graves	'Ōuli	Data recovery

continued on next page

Table 1 continued.

<i>Year</i>	<i>Author</i>	<i>Ahupua'a</i>	<i>Type of Study</i>
1993	Boudreau and Graves	Lālāmilo	Data recovery
1993	Maly and Rosendahl	'Ōuli	Archaeological Site Preservation Plan and Historical Overview
1994	Jensen	Lālāmilo	Intensive survey
1994	Landrum and Williams	'Anaeho'omalu	Archaeological
1995	Nees and Williams	'Anaeho'omalu	Archaeological
1996	Ogden	'Anaeho'omalu	Archaeological Site Preservation Plan
2002	Dougherty and Rechtman	Lālāmilo	Archaeological and Cultural Assessment
2007	Clark and Rechtman	Lālāmilo	Inventory Survey

The investigations listed in Table 1 vary from general reconnaissance level surveys to intensive data recovery efforts. They have identified a wide range of Precontact and Historic site types including caves (lava tubes), petroglyphs, cairns, trails, overhang shelters, burials, a *holua* slide, and features associated with both temporary and permanent habitation including: house platforms, overhangs, terraces, modified outcrops, paved areas, U-shape enclosures, sinkholes, walls, and rubble excavation areas. Coastal and inland (*maukaimakai*) trail networks have also been documented throughout the South Kohala and North Kona Districts. The trails were most likely used for coastal travel between *ahupua'a* and for resource exchange between the coastal areas and the upland agricultural fields. The absence or minimal presence of agricultural features in this coastal zone suggests an emphasis on marine exploitation and habitation (Dougherty and Rechtman 2002).

The current project area was previously included as part of a 750-acre archaeological inventory survey conducted by PHRI for the expansion of the Hapuna Beach State Recreation Area. The project was undertaken in three phases: Phase I — survey and initial site identification (Burgett and Rosendahl 1990); Phase II — completion of inventory-level fieldwork at sites that required additional evaluation and documentation (Dunn 1992); and Phase III — analysis of all recovered cultural materials, including site and feature distributions, as well as description and analysis of recovered cultural material and ecofactual remains (Jensen 1994). The project identified 164 sites containing 425 features including C-shapes, alignments, cairns, walls, cleared areas, paved areas, enclosures, midden scatters, modified outcrops, mounds, overhangs, terraces, rubble concentrations, trails, and upright stones that were interpreted as being used for agriculture, ranching, hunting, military, marker, possible ceremonial, temporary habitation, recreation, and indeterminate. None of the recorded sites were within the current project area, but four were located in the general vicinity to the north and west of the project area. These sites included an agricultural terrace (SIHP Site 19400), two Historic temporary habitation enclosures (SIHP Sites 19401 and 19403), and a Historic wall (SIHP Site 19402). As a result of Jensen's (1994) work Sites 19401 and 19403 were recommended for further data recovery excavations, and Sites 19400 and 19402 were recommended for no further work.

Hunt and Pfeffer (1994) conducted an archaeological inventory survey for the same proposed development as the current study (Appendix A). Their project area was a different shape than the current project area, but it encompassed largely the same area. Hunt and Pfeffer (1994) identified six possible archaeological features within the project area, and conducted subsurface testing at of one of them. They noted, however, that all of the features had been subject to "substantial disturbance" from "recent bulldozing" (1994:13) for fire-breaks and other fire-fighting efforts.

The features were described as: Feature 1 — a crude stone alignment and rubble in poor condition and altered significantly (largely destroyed by bulldozing) with only modern rubbish present; Feature 2 — stone clusters (disturbed platform?) in poor condition and altered significantly (largely destroyed by bulldozing) with only modern rubbish present; Feature 3 — a complex with a stone-faced terrace, stone alignments and paving in poor condition and partially altered (disturbed by some bulldozing) with only

modern rubbish present; Feature 4 — a crude, amorphous mound of stone in poor condition and significantly altered by recent bulldozing; Feature 5 — a stone cluster unaltered(?) and in good(?) condition with only modern rubbish present; and Feature 6 — a north/south stone alignment in poor condition that appeared to have been disturbed, but not by bulldozing (Hunt and Pfeffer 1994:15-21). A 1-meter by 1-meter test unit excavated at Feature 3 revealed 38 centimeters of fine clay loam with cobbles and boulders on bedrock, but no midden or artifacts. All of the suspected features were mapped in detail by Hunt and Pfeffer (1994).

As a result of the study the features were all determined to be of indeterminate Prehistoric or Historic origins. Features 1, 2, and 3 were thought to have been used for habitation purposes and Features 4, 5, and 6 served an unknown function. Hunt and Pfeffer (1994:22) assessed all of the features as only marginally significant. They recommended that Features 1, 2, 4, 5, and 6 needed no further work, but that Feature 3 should be preserved if possible, as it was outside the proposed area of development for the project. They further recommended that an archaeological monitor should present for initial grubbing and grading of the area in case buried deposits are unearthed.

Cultural-Historical Contexts

A generalized Cultural-Historical context for Hawai'i Island, South Kohala District, and the specific study *ahupua'a*, along with the expected settlement patterns for the area are presented in order to assess the current project area expectations.

A Generalized Model of Hawaiian Prehistory

The generalized cultural sequence that follows is based on Kirch's (1985) model. The Settlement or Colonization Period is believed to have occurred in Hawai'i between AD 300–600 from the southern Marquesas Islands. This was a period of great exploitation and environmental modification, when early Hawaiian farmers developed new subsistence strategies by adapting their familiar patterns and traditional tools to their new environment (Kirch 1985; Pogue 1978). Their ancient and ingrained philosophy of life tied them to their environment and kept order. Order was further assured by the conical clan principle of genealogical seniority (Kirch 1984). According to Fornander (1969), the Hawaiians brought from their homeland certain universal Polynesian customs: the major gods *Kame, Ku,* and *Lono*; the *kapu* system of law and order; cities of refuge; the '*aumakua* concept; various superstitions; and the concept of *mana*.

The Development Period (A.D. 600–1100) brought about a uniquely Hawaiian culture. The portable artifacts found in archaeological sites of this period reflect not only an evolution of the traditional tools, but some distinctly Hawaiian inventions. The adze (*ko'i*) evolved from the typical Polynesian variations of plano-convex, trapezoidal, and reverse-triangular cross-section to a very standard Hawaiian rectangular quadrangular tanged adze. A few areas in Hawai'i produced quality basalt for adze production. Mauna Kea on the island of Hawai'i was a well-known adze quarry. The two-piece fishhook and the octopus-lure breadloaf sinker are Hawaiian inventions of this period, as are '*ulu maika* stones and '*lei niho palaoa*. The later was a status item worn by those of high rank, indicating a trend toward greater status differentiation (Kirch 1985).

The Expansion Period (A.D. 1100–1650) is characterized by the greatest social stratification, major socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. Early dates from leeward Kohala (Kapa'anui) were reported by Dunn and Rosendahl (1989); these sites are believed to have been temporary campsites (Wulzen and Goodfellow 1995). The greatest population growth occurred during the Expansion Period. Subsistence patterns intensified as crop farming evolved into large irrigated field systems and expanded into the marginal dryland areas. The *loko* or fishpond aquaculture flourished during this period (Bellwood 1978; Kirch 1985).

It was during the Expansion Period that a second major migration settled in Hawai'i, this time from Tahiti in the Society Islands. According to Kamakau (1976) the *kahuna* Pa'ao settled in the islands during the 13th century. Pa'ao was the keeper of the god Ku'ka'ilimoku, who had fought bitterly with his older brother, the high priest Lonopele. After much tragedy on both sides, Pa'ao escaped Lonopele's wrath by

fleeing in a canoe. Kamakau (1991:100–102) told the following story in 1866:

Puna on Hawai'i Island was the first land reached by Pa'ao, and here in Puna he built his first *heiau* for his god Aha'ula and named it Aha'ula [Waha'ula]. It was a *luakini*. From Puna, Pa'ao went on to land in Kohala, at Pu'uēpa. He built a *heiau* there called Mo'okini, a *luakini*. It is thought that Pa'ao came to Hawai'i in the time of the *ali'i* La'au because Pili ruled as *mo'i* after La'au. You will see Pili there in the line of succession, the *mo'o kū'auhau*, of Hanala'anui. It was said that Hawai'i Island was without a chief, and so a chief was brought from Kahiki; this is according to chiefly genealogies. Hawai'i Island had been without a chief for a long time, and the chiefs of Hawai'i were *ali'i maka'āinana* or just commoners. There were seventeen generations during which Hawai'i Island was without chiefs—some eight hundred years.

There are several versions of this story that are discussed by Beckwith (1976), including the version where Mo'okini and Kaluawilinau, two *kāhuna* of Moikeha, decide to stay on at Kohala. The bones of the *kahuna* Pa'ao are said to be deposited in a burial cave in Kohala in Pu'uēpa [possibly Pu'uēpa?] (Kamakau 1964:41).

The concept of the *ahupua'a* was established during the A.D. 1400s (Kirch 1985), adding another component to a then well-stratified society. This land unit became the equivalent of a local community, with its own social, economic, and political significance. *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or lesser chiefs; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land, which was managed by a *konohiki*. *Ahupua'a* were usually wedge or pie-shaped, incorporating all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986).

The *ali'i* and the *maka'āinana* (commoners) were not confined to the boundaries of the *ahupua'a*; when there was a perceived need, they also shared with their neighbor *ahupua'a ohana* (Hono-ko-hou 1974). The *ahupua'a* was further divided into smaller sections such as the *'ili*, *mo'o'aina*, *pauku'aina*, *kihapai*, *koele*, *hakuone*, and *kaakua* (Hommon 1986, Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mo'i* (king). *Heiau* building flourished during this period as religion became more complex and embedded in a sociopolitical climate of territorial competition. Monumental architecture, such as *heiau*, “played a key role as visual markers of chiefly dominance” (Kirch 1990:206).

The Proto-Historic Period (A.D. 1650–1795) is marked by both intensification and stress. Wars occurred between intra-island and inter-island polities. Sometime between A.D. 1736 and 1758, in the reign of Kalaniopu'u, Kamehameha I was born in the *ahupua'a* of Kokoiki, North Kohala near the Mo'okini Heiau [there is some controversy about his birth year, see Kamakau 1992:66–68]. It has been related that at the time of his birth an army was encamped on the leeward Kohala shore, between the *ahupua'a* of Koai'e and Pu'uēpa, preparing for an attack on Maui (Kamakau 1964:67; Tomonari-Tuggle 1988:1-57). The birth event is said to have occurred on a stormy night of rain, thunder, and lightning, signified the night before by a very bright, ominous star, thought by some to be Halley's comet [this is also controversial] (Kamakau 1992). Kamehameha's ancestral homeland was in Halawa, North Kohala (Williams 1919).

This period was one of continual conquest by the reigning *ali'i*. Ke'eumoku, son of Keawepoepo, set up a fort at Pololu and Honokane; he was attacked there by Kalaniopu'u, so he moved to Maui. About A.D. 1759 Kalaniopu'u conquered East Maui, defeating his wife's brother, the Maui king Kamehamehanui, by using Hana's prominent Pu'u Kau'iki as his fortress. He appointed one of his Hawai'i chiefs, Puna, as governor of Hana and Kipahulu. Kahekili became king of Maui in A.D. 1766 when Kamehamehanui died following an illness. Ke'eumoku took his widow, Namahana, a cousin of Kamehameha I, as his wife. Their daughter, Ka'ahumanu, the future favorite wife of Kamehameha I, was born in a cave at the base of Pu'u Kau'iki, Hana, Maui in A.D. 1768 (Kamakau 1992). In A.D. 1775 Kalaniopu'u and his Hana forces raided and destroyed the neighboring Kaupo district, then launched several more raids on Molokai, Lanai, Kaho'olawe, and parts of West Maui. It was at the battle of Kalaeoka'ilio that Kamehameha, a favorite of Kalaniopu'u, was first recognized as a great warrior and given the name of Pai'ea (hard-shelled crab) by the Maui chiefs and warriors (Kamakau 1992). During the battles between Kalaniopu'u and Kahekili (1777–1779), Ka'ahumanu and her parents left Maui to live on the island of Hawai'i (Kamakau 1992).

History After Contact

Captain James Cook landed in the Hawaiian Islands on January 18, 1778. Ten months later, on a return trip to Hawaiian waters, Kamehameha visited Cook on board the *Resolution* off the East coast of Maui while Kalaniopu'u was at war with Kahekili; Kamehameha helped Cook navigate his way to Hawai'i Island (Kamakau 1992). The following January [1779], Cook and Kalaniopu'u met in Kealakekua Bay and exchanged gifts. In February, Cook set sail; however, a severe storm off the Kohala coast damaged a mast and they had to return to Kealakekua. Cook's return occurred at an inopportune time, and this misfortune cost him his life (Kuykendall and Day 1976).

Around A.D. 1780 Kalaniopu'u proclaimed that his son Kiwalao would be his successor, and he gave the guardianship of the war god Ku'ka'ilimoku to Kamehameha. Kamehameha and a few other chiefs were concerned about their land claims, which Kiwalao did not seem to honor, so after usurping Kiwalao's authority with a sacrificial ritual, Kamehameha retreated to his district of Kohala. While in Kohala, Kamehameha farmed the land, growing taro and sweet potatoes (Handy and Handy 1972). After Kalani'opu'u died in A.D. 1782 civil war broke out: Kiwalao was killed. The wars between Maui and Hawaii continued until A.D. 1795 (Kuykendall and Day 1976; Handy and Handy 1972).

In A.D. 1790 two American vessels, the *Eleanora* and *Fair American*, were in Hawaiian waters. Following an altercation between his crew and natives, the Captain of the *Eleanora* massacred more than 100 natives at Olowalu [Maui], then sailed away leaving one of its crew, John Young, on land. The other vessel, the *Fair American*, was captured off the west Hawai'i coast and its crew killed except for one member, Isaac Davis. Kamehameha also observed this but did not participate, although he did prevent Young and Davis from leaving. He also kept the vessel as part of his fleet. Young eventually became governor of the island of Hawai'i. By 1796 Kamehameha had conquered all the island kingdoms except Kauai. It wasn't until 1810, when Kaumuali'i of Kauai gave his allegiance to Kamehameha, that the Hawaiian Islands were unified under one ruler (Kuykendall and Day 1976).

Demographic trends during this period indicate population reduction in some areas, due to war and disease, yet increases in others, with relatively little change in material culture. However, there was a continued trend toward craft and status specialization, intensification of agriculture, *ali'i* controlled aquaculture, upland residential sites, and the enhancement of traditional oral history. The Kū cult, *luakini heiau*, and the *kapu* system were at their peaks, although western influence was already altering the cultural fabric of the Islands (Kirch 1985; Kent 1983). Foreigners had introduced the concept of trade for profit, and by the time Kamehameha I had conquered O'ahu, Maui and Moloka'i, in 1795, Hawai'i saw the beginnings of a market system economy (Kent 1983). This marked the end of the Proto-Historic Period and the end of an era of uniquely Hawaiian culture.

Hawai'i's culture and economy continued to change drastically as capitalism and industry established a firm foothold. The sandalwood (*Santalum ellipticum*) trade, established by Euro-Americans in 1790 and turned into a viable commercial enterprise by 1805 (Oliver 1961), was flourishing by 1810. This added to the breakdown of the traditional subsistence system, as farmers and fishermen were ordered to spend most of their time logging, resulting in food shortages and famine that led to a population decline. Kamehameha did manage to maintain some control over the trade (Kuykendall and Day 1976; Kent 1983).

Kamehameha I died on May 8, 1819 in Kailua-Kona, and once again the culture of Hawai'i was to change radically. Six months after his death, his son and successor, Liholiho (Kamehameha II), met with *kuhina nui*, Ka'ahumanu, and a council of chiefs and chiefesses at Kawaihāe. His advisors, which included the *kahuna* Hewahewa, convinced him to abolish the *kapu* system. He signified his agreement by sitting down and eating with his mother Keopulani, breaking the *'ai kapu* (Oliver 1961; Kuykendall and Day 1976; Kamakau 1992).

Liholiho's cousin, Kekuaokalani, caretaker of the war god *Ku-Kailimoku*, disagreed and revolted. By December of 1819 the revolution was quelled. Kamehameha II sent edicts throughout the kingdom renouncing the ancient state religion, ordering the destruction of the *heiau* images, and ordering that the *heiau* structures be destroyed or abandoned and left to deteriorate. He did, however, allow the personal family religion, the *'aumakua* worship, to continue (Oliver 1961; Kamakau 1992).

In October of 1819, seventeen Protestant missionaries set sail from Boston to Hawai'i. They arrived in Kailua-Kona on March 30, 1820 to a society with a religious void to fill. Many of the *ali'i*, who were already exposed to western material culture, welcomed the opportunity to become educated in a western style and adopt their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government. During this period, the sandalwood trade was wreaking havoc on the commoners, who were weakening with the heavy production, exposure, and famine just to fill the coffers of the *ali'i* who were no longer under any traditional constraints (Oliver 1961; Kuykendall and Day 1976). On a stopover in the Kohala district Ellis wrote:

About eleven at night we reached Towaihae [Kawaihae], where we were kindly received by Mr. Young. . . . Before daylight on the 22nd, we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts. (Kuykendall and Day 1976:42, 43; Ellis 1984:397)

The lack of control of the sandalwood trade was to soon lead to the first Hawaiian national debt as promissory notes and levies were initiated by American traders and enforced by American warships (Oliver 1961). The Hawaiian culture was well on its way towards Western assimilation as industry in Hawai'i went from the sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar industry. The windward portions of Kohala became a center of sugarcane production, although sugarcane cultivation in Kohala had its origins in prehistory.

Pukui (1983) cites two proverbs that reference both Kohala and sugarcane. She provides an explanation and notes that Hawaiian proverbs have layers of meaning that are best left to the imagination of the reader:

He pa'a kō kea no Kohala, e kole ai ka waha ke 'ai
A resistant white sugar cane of Kohala that injures the mouth when eaten.

Pukui explains this proverb as follows:

A person that one does not tamper with. This was the retort of Pupukea, a Hawai'i chief, when the Maui chief Makakuikalani made fun of his small stature. It was later used in praise of the warriors of Kohala, who were known for valor (1983:95).

I 'ike 'ia no o Kohala i ka pae kō, a o ka pae kō ia kole ai ka waha.
One can recognize Kohala by her rows of sugar cane which can make the mouth raw when chewed.

Pukui interprets this proverb as follows:

When one wanted to fight a Kohala warrior, he would have to be a very good warrior to succeed. Kohala men were vigorous, brave, and strong (1983:127).

Sugarcane (*Saccharum officinarum*) was a Polynesian introduction that served a variety of uses. The *kō kea* or white cane was the most common, usually planted near Hawaiian homes for medicinal purposes, and to counteract bad tastes (Handy and Handy 1972:185). Sugarcane was a snack, condiment, famine food; fed to nursing babies, and helped to strengthen children's teeth by chewing on it (Handy and Handy 1972:187). It was used to thatch houses when *pili* grass (*Heteropogon contortus*) or *lau hala* (*Pandanus odoratissimus*) were not abundant (Malo 1903). Sugarcane was also used in relation to taro and sweet potato. Handy and Handy (1972:186) explain:

In wet-taro farming, cane was planted along the embankments separating the flooded terraces and flats. In dry-taro and sweet-potato fields on the sloping *kula* or in the lower forest zone, cane was planted as hedges along the lines of stone and rubbish thrown up between the fields. Thus it helped the planter to utilize to the maximum his soil and water, and acted as a windbreak against the gusty breezes which blow in most valley bottoms, along the coasts, and on the uplands where taro is grown.

Sugarcane was grown on all islands, and when Cook arrived he wrote of seeing sugarcane plantations. The Chinese on Lāna'i are credited with producing sugar first, as early as 1802. However, it was not until 1835 that sugar became established commercially, replacing the waning sandalwood industry (Oliver 1961, Kuykendall and Day 1976).

Puakō and Lālāmilo Ahupua'a

The name Puakō literally translates as "sugarcane blossom" (Pukui et al. 1974). Early land use in the coastal Puakō area focused primarily on marine resource procurement with an emphasis on salt production. The legends surrounding the naming of Puakō also mention salt production, which was documented by early explorers: "The next morning, Puakō rose early and began carrying sea water to the salt ponds for making salt" (Fornander 1916-1917 Vol. 4-3:560-568). Prior to the *Māhele*, present day Lālāmilo Ahupua'a was referred to as Waikōloa Iki. Dunn (1992) elaborates on the place names of the area:

Early references refer to the area of Lalamilo as "Puako"; the name of Puako today refers to a small village on the coast of Lalamilo. Land Index records of the mid-1800s reveal that Lalamilo was the name of an 'ili in Puako, but a 1928 Territory of Hawaii map and later references show the *ahupua'a* is named Lalamilo. Whether the *ahupua'a* of Puako got absorbed into other *ahupua'a* and the 'ili of Lalamilo became an *ahupua'a* itself, or the names just got switched around is unclear (Dunn 1992, Appendix B:B-1).

Lorenzo Lyons, a minister in Waimea, visited Puakō in 1835. He briefly described the village as follows:

Puako is a village on the shore, very like Kawaihae, but larger. It has a small harbor in which native vessels anchor. Coconut groves give it a verdant aspect. No food grows in the place. The people make salt and catch fish. These they exchange for vegetables grown elsewhere. [in Doyle 1953:85]

By the middle of the nineteenth century the ever-growing population of Westerners forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership, and the Great *Māhele* became the vehicle for determining ownership of native lands. During this period, termed the Legacy of the Great *Māhele* (1848-1899), land interests of the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki*, were defined. The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission (Chinen 1961:13).

During the *Māhele* all lands were placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. All three types of land were subject to the rights of the native tenants therein. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i to legally set the boundaries of all the *ahupua'a* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries was authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of which had also been claimants for *kuleana* during the *Māhele*. This information was collected primarily between A.D. 1873 and 1885 and was usually given in Hawaiian and transcribed in English as they occurred.

PROJECT AREA EXPECTATIONS

Given the results of previous work in Puakō, Precontact archaeological resources present within the current project area could include platforms, terraces, caves, overhangs, enclosures, mounds, modified outcrops, or trails (Jensen 1994). Burials, if present, may be discovered within platforms or caves. Historic features, such as enclosures, foundations, core-filled walls, or roads, would likely be related to the Puako Sugar Plantation or later ranching endeavors (Maly 1999). It is likely that any features present within the project area will have been severely impacted by land alterations associated with modern fire control efforts.

Hunt and Pfeffer (1994) previously recorded six possible features within the project area (see Appendix A). They noted that all of the features had been subject to substantial disturbance from recent bulldozing for fire-breaks and other fire-fighting efforts, but suggested that three of the features may have formerly been used for Precontact or Historic habitation. The other three were of indeterminate function and age. These potential former features may still be extant within the project area, unless the have been destroyed by even more recent bulldozing for firebreaks and other fire-fighting efforts.

FIELDWORK

Fieldwork for the current project was conducted on February 12, 2008 by Matthew R. Clark, B.A. Olivier M. Bautista, B.A., and Michael K. Vitousek, B.A. under the direction of Robert B. Rechtman, Ph.D.

Methods

The project area was thoroughly inspected by fieldworkers walking east/west pedestrian transects spaced at ten-meter intervals. Upon completion of the pedestrian survey, an intensive effort was made to locate the six possible features previously recorded by Hunt and Pfeffer (1994) in the area. When located, the reported feature areas were compared to the individual feature plan views prepared by Hunt and Pfeffer (1994), plotted on a map of the proposed development area using a Garmin 76s handheld GPS technology, photographed, and reevaluated and reassessed.

Findings

As a result of the current fieldwork, all six of the previously noted and suspected feature areas were fully examined, and none were determined to currently represent definable archaeological resources. Therefore, no historic properties were identified during the current study. Two of the potential features recorded by Hunt and Pfeffer (1994) were positively identified (Features 2 and 4). Both of these features generally conform to the detailed plan views provided in their report (see Appendix A); however, neither constitutes a definable archaeological feature. Both of these areas appear to represent bulldozer push piles associated with past fire control activities. Rough concentrations of bulldozed stones were discovered in the areas where the remaining four features (Features 1, 3, 5, and 6) had been recorded, but the stone collections only vaguely matched the plan views prepared by Hunt and Pfeffer (1994).

The only archaeological site observed during the current field investigation, Site 19401 (previously recorded by Jensen 1994), was observed just to the north of the project area *mauka* of the Ala Kahakai Shoreline Trail. Jensen (1994:A128-A129) described this site as a rectangular shaped Historic enclosure with core-filled walls of stacked cobbles and boulders standing up to 1.15 meters tall. The interior of the enclosure contained soil and a metal bucket hoop and a metal strip with rivets were noted in the area.

RECOMMENDATIONS

As there were no significant cultural sites or deposits encountered within the study area, it is recommended that no further archaeological work need be conducted prior to development. However, in the unlikely event subsurface prehistoric deposits or human burials are inadvertently discovered during construction activities, such activities should be immediately suspended in the vicinity of the discovery, and DLNR-SHPD notified as outlined in the Hawai'i Administrative Rules 13§13-284. Care should also be taken not to impact Site 19401 during development activities associated with the current project area.

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Appendix A

Archaeological Inventory Survey
Kalakaua Marine Laboratory/Education Center
Puako, Lalamilo, South Kohala, Hawai'i Island

Terry L. Hunt, Ph.D.

and

Michael T. Pfeifer, B.A.

Prepared for University of Hawai'i at Hilo

May 1994

INTRODUCTION

This report describes the results of archaeological inventory survey and provides an assessment of the parcel proposed for development of the University of Hawai'i-Hilo Kalakaua Marine Laboratory/Education Center in Puako, Lalamilo Ahupua'a, South Kohala, Island of Hawai'i (Tax Map Key: Third Division, Zone 6, Section 9, Plat 01, Parcel 01 [por.]).

At the request of the Administration of University of Hawai'i-Hilo, Dr. Terry Hunt, Ms. Melissa Kirkendall, Mr. Jonas Madeus, conducted intensive survey of the approximate five acre parcel now under consideration for construction of the Kalakaua Marine Laboratory. Initial work included a literature review of previous archaeological and historical research in the area. Field survey was conducted in early August, 1992, using project maps that delineated the project area. In October, 1993, Dr. Terry Hunt and Mr. Steven Kay conducted test excavations to evaluate the potential for buried deposits. This testing followed the recommendations of State Historic Preservation Division (SHPD) archaeologists Mr. Kanalei Shun and Dr. Ross Cordy. Our survey and excavation were undertaken to provide information on archaeological resources in the project area as part of the historic preservation review requirements of the State Historic Preservation Division.

SCOPE OF WORK

As per the guidelines set up under Federal and State of Hawai'i regulations concerning historic and cultural preservation (as specified by the DLNR/SHPD) the inventory survey of this parcel of land was conducted with the express aim of identifying, through the use of historic research, field survey, and excavation (as

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necessary), all sites and features of potential archaeological significance located within and adjacent to the project area.

In such a survey there are four basic objectives that are pursued: 1) the identification of all sites or site complexes in the project area; 2) an evaluation of the potential significance of the identified archaeological remains; 3) a determination of the possible impact to any such sites during subsequent development of the project area; and 4) a proposal describing the need for any further archaeological work to be conducted in the project area.

Based on these specifications, and in consultation with archaeologists at the State Historic Preservation Division, we determined that a necessary and sufficient scope of work for this project would include, but not be limited to the following specific tasks: 1) a review of the available archaeological and historical information relevant to the project area including, the evaluation of available historical literature, archaeological reports, historic documents and records, maps, and any other material relevant to the historic background of the project area; 2) a 100% pedestrian field survey of the project parcel; 3) limited subsurface testing of surface features identified in the project area (for the purposes of identifying the potential for significant subsurface deposits, culturally valuable deposits, and possibly material suitable for determining the age of the sites in question); and 4) the synthesis of the above information into an appropriate report document for submission to the DLNR/SHPD.

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All levels of the inventory survey were carried out in accordance with the guidelines specified by DLNR/SHPD. As specified, all sites were evaluated using the criteria contained in the Code of Federal Regulations (36 CFR Part 60) used to establish the cultural significance of any and all sites encountered. These criteria are included in the site description and conclusion sections of this report.

PROJECT AREA DESCRIPTION

The project area is located in Puako, South Kohala, Hawai'i Island (TMK 6-9-01:01 por.; see Figure 1). Roughly rectangular, the project area is bordered on the east (*māuka*) by Puako Road, on the west (*maka*) by a narrow strip of undeveloped (zoned for conservation) coastal land, on the south (Kona) side by the recently constructed Puako Boat launching ramp, and on the north (Kohala) side by an undeveloped parcel (Figure 1).

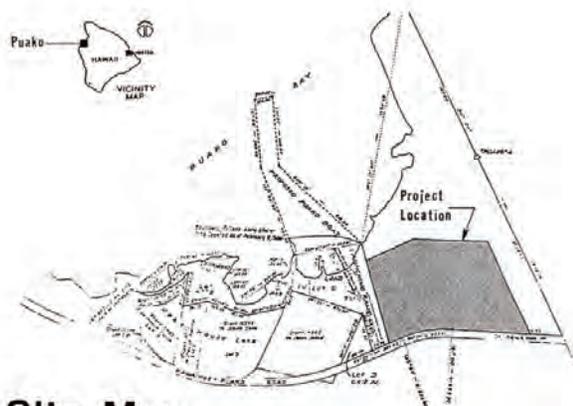
The project area is located on the dry leeward coast of the Island of Hawai'i, described as " . . . an arid, gently sloping land, with limited vegetation, thin soils, and a high proportion of relatively recent volcanic materials" (Rosendahl 1992:2). The project area has an annual estimated average rainfall of less than 10 inches and an average temperature of 78 degrees F.

The majority of the project area was bulldozed prior to fieldwork, thereby destroying and altering the original vegetation and surface topography. The project area consists of sloping pahoehoe lava flows covered with aeolian silt loam and sparse sandy deposits. Throughout the project area the dominant vegetation is

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exotic in nature and consists predominantly of *Naawe* (*Prosopis pallida*), various exotic grass species, and native *Ilima* (*Sida liliak Walp*).



Site Map

UHH Marine Education Center - Puako

Figure 1. Location of project area.

PREVIOUS ARCHAEOLOGICAL RESEARCH

A number of archaeological investigations have been completed in the general vicinity of the project area. As summarized in Rosendahl (1992a) work in the general vicinity has included studies by Ching (1971), Rosendahl (1972), Kennedy (1980), Tomonari-Tuggle (1982), and Welch (1984). Further work in the Puako area included excavation, extensive survey, and mapping of the Puako Petroglyph fields by the Bishop Museum in 1964 (Rosendahl 1992b). More recent work includes two projects conducted by Rosendahl (1992a, 1992b) in the Puako/Lalamilo area in May and July of 1992.

Rosendahl (1992b:4) summarizes previous excavations in the area by noting that the primary emphasis of previous work has been concentrated on salvage and contract archaeological excavations for hotel development and road construction, along with several more extensive surveys conducted by the DLNR and the Bishop Museum on the Puako Petroglyph Field. No previous archaeological work has been undertaken in the project parcel.

From these works it seems that the primary focus of prehistoric use of the Puako area involved: a) the use of temporary habitation shelters utilized by people travelling between the coast and inland areas; b) temporary and permanent habitation and agricultural pursuits by people involved in marine exploitation; and c) storage facilities for marine-exploitation gear and/or other permanent coastal activities (Rosendahl 1992a:2).

PREHISTORIC AND HISTORIC LAND USE

The project area is located in the small land section of Puako, a division or named land section of Lalamilo, South Kohala, Hawai'i Island. The place name Puako seems to have referred to a larger area than today. Puako now refers to the area of land extending from Puako Village south to the village of Paniau (Rosendahl 1992a:4). Pukui *et al.* list Puako as: village, quadrangle, bay, point; land division and flume, Kohala and Waipi'o qds., Hawai'i (1976:191). They define Lalamilo as, "land section, Puako qd. Hawai'i" (Pukui *et al.* 1976:126). This stands in contrast to later maps which give the name of the *ahupua'a* as Lalamilo (Rosendahl 1992a:4). It is unclear how the name changed, but today the *ahupua'a* is referred to as Lalamilo, and includes a smaller area known as Puako.

Several early visitors to the Hawaiian Islands noted the South Kohala area in their descriptions. Menzies, a crewman with Vancouver in 1792 described the South Kohala area as "... barren and rugged with volcanic dregs and fragments of black lava . . . in consequence of which the inhabitants were obliged to have recourse to fishing for their sustenance" (1920:99).

In their travels throughout the island of Hawai'i the reverends William Ellis and Asa Thurston make only brief mention of Puako, describing it as, "From Puukapu he [Asa Thurston] directed his steps towards the sea-shore, and in the twilight of the evening reach Puako, a considerable village, four or five miles southwards of Towaihae . . ." (Ellis 1963:289).

John Papa I'i described the land of Puako as being centered on fishing when he observed that, "the sustenance of those lands was fish" (Ii 1963:109).

Further descriptions of the Puako area are provided in Handy's *Hawaiian Planter*, in which he describes the South Kohala coastal area and Puako as follows:

From Puako to Anaehoomalu at the southern end of Kohala and from Kapalaao, at the northern extreme of Kona, to Kailua there are no streams whatever, and certainly there were no terraces. South Kohala produced much dry taro in the lower forest zone which formerly extended far down over what is now open pasture (Handy 1940:119).

The coastal section of Waimaa, now called South Kohala, has a number of small bays with sandy shores where fishermen used to live, and where they probably cultivated potatoes in small patches. Anaehoomalu, Waialua Honokaope, Kalahuihua and Pauoa all have sandy strips along the sea; and there is an area of black cinder in this section where sweet potatoes might be grown in rainy seasons. Puako was a sizable fishing village at one time where there were undoubtedly many sweet potato patches (Handy 1940:163).

This description of the South Kohala area reinforces similar historic accounts indicating that the subsistence patterns of the Puako area centered on marine exploitation and probably limited dryland farming of taro and sweet potatoes. Indeed, several accounts state that the villagers of Puako did not grow much in the

way of vegetable crops and traded fish for vegetables for their survival (Rosendahl 1992a:8-3).

SETTLEMENT PATTERNS

The project area lies in the named area of Puako, just east (*mauka*) of Puako Bay and to the north of Puako Village. Due to its small size and lack of known historic and/or prehistoric sites, a summary of the well documented settlement pattern research already accomplished for the Puako/Lalamilo area as reported in Rosendahl (1992a, 1992b) is given here.

Kirch (1979) suggests an initial occupation of the area south of the present project parcel to about AD 1200. This is based on findings at two rockshelter caves at Kalahulpua'a. Kirch also states that major occupation of the area occurred from AD 1500-1700. This occupation seems to coincide with an increase in the number and type of sites in the South Kohala area (Rosendahl 1992a:5). Little work has been done in the direct vicinity of the project area to establish the settlement pattern for the Puako Bay area.

Historic accounts refer to the presence of an established fishing village during the mid-1800s, indicating that there may have been prehistoric settlement as well. However, the statements by several historic sources (see above, and Rosendahl 1992a, 1992b for details) indicate that little food was grown at Puako Village, and that the villagers relied on trade to augment their diet with vegetables and other foods. If this was indeed the case, then the Puako area would have been susceptible to famine, especially with loss of agricultural trade. This indicates

that the sites may have been predominantly of temporary or recurring habitation, with associated marine-related structures in the vicinity of the project area.

However, Handy (1940:163) stated that Puako was once a sizable fishing village that grew many sweet potatoes. Nevertheless, fluctuations in rainfall (typical of leeward environments in Hawai'i) would make agriculture, even in limited amounts, an unpredictable investment over any length of time.

Rosendahl (1992a, 1992b) summarizes the settlement topography of the Puako/Lalamilo area into three zones: Coastal, characterized by scattered small settlements and temporary habitation sites along the coast, housing people engaged in maritime exploitation (fishing, gathering of shellfish and seaweed, and salt production) and limited agricultural production of sweet potato and dryland taro; Barren, characterized by scattered temporary habitation sites and limited agricultural plots and terraces traversed by trails leading from the upland to coastal zones; and Upland, the major occupation and agricultural zone, consisting of scattered settlements, and extensive agricultural terracing and irrigation plots (Rosendahl 1992a:6-7).

Based on this information, it appears that the coastal portion of the Puako/Lalamilo area was utilized primarily for maritime exploitation. Agricultural pursuits in the dry coastal zone would be comparatively marginal. As Kirch (1979:186) suggests for the area "a pattern of upland residence and agricultural activity, with repeated intermittent occupation of coastal sites in order to exploit

marine resources (principally protein), would be a maximizing strategy in the West Hawai'i ecosystem."

HISTORIC LAND TENURE

In 1848 the Hawaiian system of land ownership was replaced with a Western-style, individually based land ownership system. Termed "The Great Mahele" (referring to division), this event separated the land ownership from a system where the king owned everything, to one where individual chiefs and *konohiki* could own land outright. In order for the chiefs and *konohiki* to receive their lands, they were required to submit requests for ownership to the Land Commission. This commission awarded or denied their applications. Once this process had been completed the Land Commission offered fee simple title to native tenants who occupied or improved the land.

In the named area of Puako, only four Land Commission Awards (LCA) are listed. Three of the claims were awarded to individuals, the fourth was awarded to King Lunalilo as part of his crown lands. The LCAs are as follows:

L.C.A. 375B to Akahi, consisting of .37 acres; L.C.A. 4102 to Kamahelei, consisting of .38 acres; L.C.A. 3736 to Wahakane, consisting of 1.08 acres; and L.C.A. 8559-B to Lunalilo, Wm. C. acreage unknown.

None of these LCAs is included in the project parcel and all lie just to the south of the project area. The relatively few LCAs awarded in the area suggest a low population density, at least in the historic period. Also implied is that there was relatively little in the way of desirable land at the time of the Great Mahele.

ARCHAEOLOGICAL SURVEY AND FIELDWORK

Our field survey covered 100% of the project area parcel. The visibility of the ground surface was excellent, due to very little vegetation cover. Inspection of the project area reveals that a large portion of the central part of the parcel has been bulldozed. The bulldozing of the area appears to have been done to cut firebreaks. The bulldozing may have also been done in fire-fighting efforts. Bulldozing has thoroughly disturbed large portions of the project area and destroyed the archaeological features that might have once been found there.

In field survey we discovered six sites/features described below. Figure 2 shows the location of these features in the project area (field map copies are included in an appendix). These archaeological resources have seen substantial disturbance with recent bulldozing. This fact makes interpretation of age and function problematic. Thus, in most cases, the original form, potential function, and other associations can only be weakly inferred given the alterations described.

Examination of disturbed areas, where earth had been excavated, reveals little potential for buried deposits. This supposition was confirmed with test excavation (see below). Erosion and sedimentation have been limited in area, and soil features suggest relative stability to the present surface. However, one feature showing the greatest potential (in terms of integrity and potential for subsurface deposit) was tested by excavation. Test excavation was also conducted with the intent of recovering material for dating.

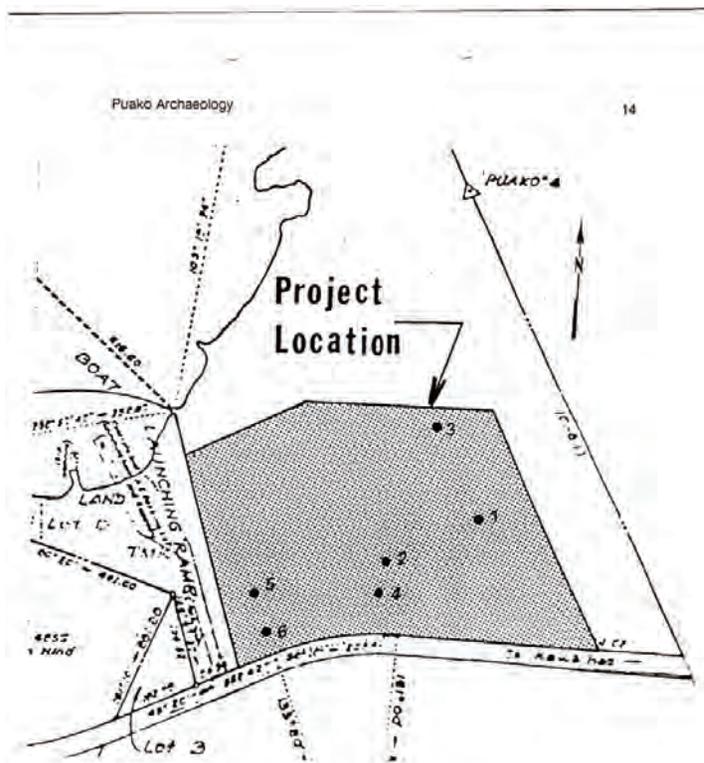


Figure 2. Project area, showing locations of archaeological features

SITE/FEATURE DESCRIPTIONS

Field No.: 1

Type/Form: Crude stone alignment and rubble

Condition: Poor, largely destroyed by bulldozing

Integrity: Altered significantly

Artifacts: Modern rubbish only

Midden: None

Probable Age: Prehistoric/Historic

Functional Interpretation: Habitation

Dimensions: 30.10 m by 9.20 m

Description: A single course of basalt boulders forms a crude north-south alignment that has been extensively modified, perhaps even *created* by bulldozing. At the southern end of the alignment is an arrangement of stones that may form a rectangle of 9.20 m by 10.10 m. This is evidenced only by loose rubble within the maximal dimensions denoted. This may have been a rectangular enclosure that has been significantly altered by bulldozing.

Significance: potential information content

Recommendation: No further work required in mitigation phase; no longer significant

Puako Archaeology

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Field No.: 2**Type/Form:** Stone clusters/disturbed platform?**Condition:** Poor, largely destroyed by bulldozing**Integrity:** Altered significantly**Artifacts:** Modern rubbish only**Midden:** None**Probable Age:** Prehistoric/Historic**Functional Interpretation:** Habitation**Dimensions:** 26.05 m by 9.62 m

Description: Three clusters of stone and stone rubble are situated in an east-west orientation. These stones appear to represent disturbed mounds, with a possible disturbed rectangular enclosure or platform at the eastern end. Bulldozing has greatly altered the original form of this site.

Significance: potential information content

Recommendation: No further work required in mitigation phase; no longer significant

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Field No.: 3**Type/Form:** Complex (stone-faced terrace; stone alignments and paving)**Condition:** Poor, disturbed by some bulldozing**Integrity:** Partly altered**Artifacts:** Modern rubbish only**Midden:** Marine shell (very little)**Probable Age:** Prehistoric/Historic**Functional Interpretation:** Habitation**Dimensions:** 18.50 m by 14.30 m

Description: This complex is located in the small gulch on the northwest edge of the project area. The complex is formed by a stone-faced terrace on the southeastern side of the gulch. Crude stone alignments and boulder paving are found on the floor of the gulch. These features appear to represent a disturbed (bulldozed) platform, perhaps originally square or rectangular in form.

Test Excavation: A one-meter square test excavation unit was placed in the southern edge of the structure. The unit was excavated to test for the presence of stratified/buried archaeological remains, associated with the structure, or predating its construction.

Excavation proceeded by hand as a single stratigraphic unit (following natural stratigraphy). All sediment was screened through an 1/8" mesh. The upper portion of the deposit had a weak boundary separating the A (10YR 2/2, very dark brown) and B (10YR 3/4, dark yellowish brown) soil horizons. This soil

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is comprised of a fine clay loam with cobbles and boulders. The sedimentary and soil context can be interpreted as evidence for *in situ* weathering of parent material and some aeolian deposition. The sedimentary picture is one of relative stability, and a small net amount of deposition.

Excavation revealed no midden or artifacts. No materials suitable for dating were recovered. Indeed the sedimentary/soil evidence suggests little disturbance or deposition associated with human activity below the boulders that form the feature. Excavation was completed in sterile deposits and exposed bedrock with maximal depths at 38 cm below surface.

Significance: potential information content

Recommendation: No further work required in mitigation phase; no longer significant. However, this site is outside the present construction plans, and could be preserved.

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Field No.: 4

Type/Form: Stone cluster

Condition: Poor, disturbed by bulldozing.

Integrity: Altered significantly

Artifacts: None

Midden: None

Probable Age: Prehistoric/Historic

Functional Interpretation: Unknown

Dimensions: 7.90 m by 4.10 m

Description: A crude, amorphous mound of stone significantly altered by recent bulldozing.

Significance: potential information content

Recommendation: No further work required in mitigation phase; no longer significant

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Field No.: 5**Type/Form:** Stone cluster**Condition:** Good (?)**Integrity:** Unaltered (?)**Artifacts:** Modern rubbish only**Midden:** None**Probable Age:** Prehistoric/Historic**Functional Interpretation:** Unknown**Dimensions:** 2.50 m by 1.50 m**Description:** A small cluster of stone, possibly from a disturbed mound or cairn.**Significance:** potential information content**Recommendation:** No further work required in mitigation phase; no longer significant

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Field No.: 6**Type/Form:** Stone alignment**Condition:** Poor, disturbed**Integrity:** Altered**Probable Age:** Prehistoric/Historic**Functional Interpretation:** Unknown**Dimensions:** 11.60 m by 2.00 m**Description:** A north-south alignment of stone that appears to have been disturbed, although no bulldozing is evident in this part of the project area.**Significance:** potential information content**Recommendation:** No further work required in mitigation phase; no longer significant

RECOMMENDATIONS

Plans for developing the Marine Laboratory at Puako can proceed unencumbered by concerns of historic preservation. Features 1,2,4,5 and 6 are of marginal significance. At best they are significant for their information content. The information content has been collected in survey, where they have been recorded by description, measurement, mapping, and test excavation. On these features, no further data collection is necessary. Thus, inventory survey and impact mitigation have arguably been accomplished in a single phase of field and documentary research.

Site/Feature 3, the possible platform remains (disturbed) and terrace, should be preserved if possible. This feature is in the gulch on the northwest edge of the parcel. It lies beyond the area of development in the current project plans.

Finally, all initial grubbing, earthwork/excavations on the project parcel should be monitored by a trained archaeologist. There remains the possibility that buried deposits, including burials, exist on the property but are not evident in surface features. In the event archaeological materials are unearthed, work must stop while a new mitigation plan is devised.

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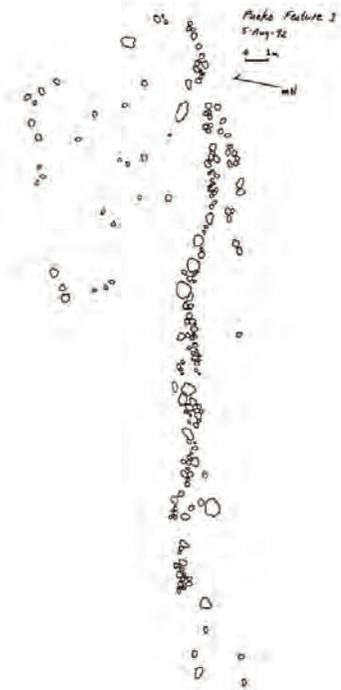
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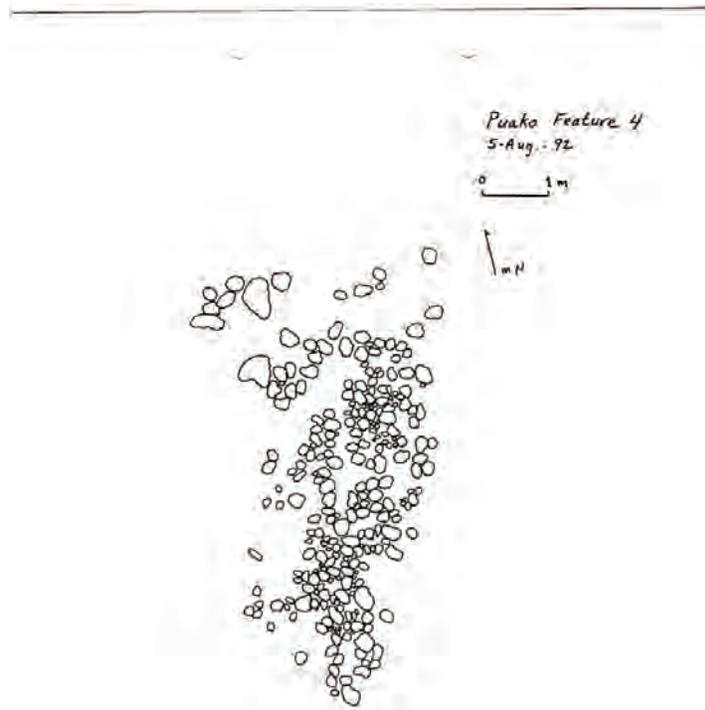
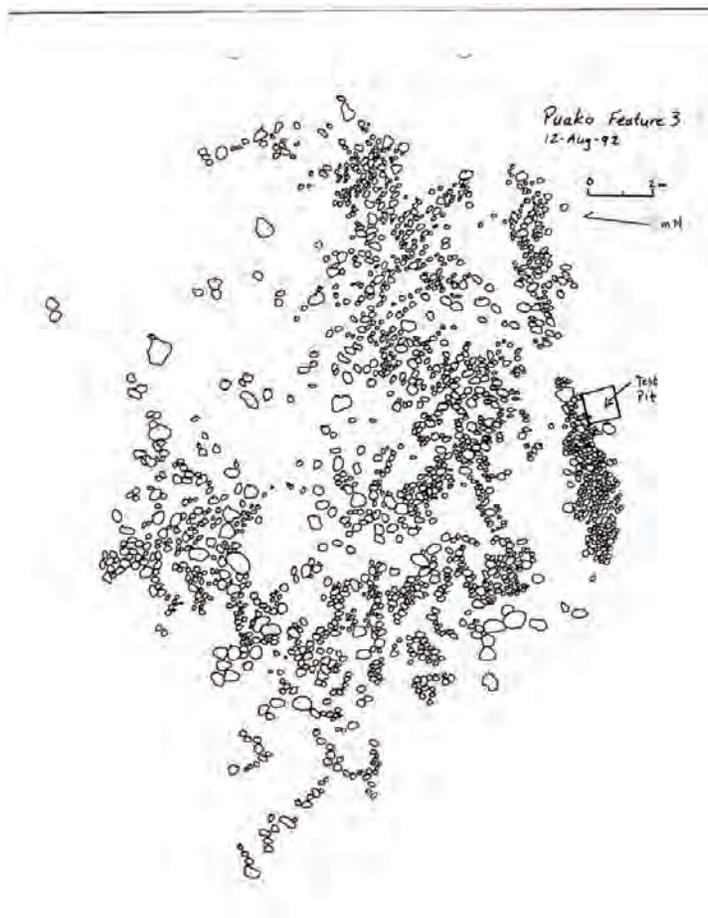
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Appendix: Sketch Maps of Archaeological Features

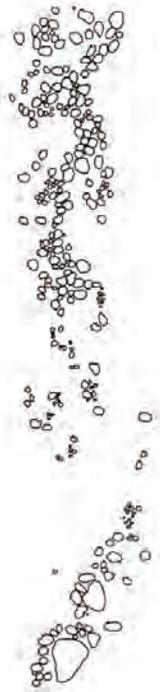




Puako Feature 5
5-Aug-92



Puako Feature 6
11-Aug-92



Appendix C
Botanical Survey
Geometrician Associates LLC, February 2008

Botanical Survey
TMK 6-9-01:01 (por.)
Puako, South Kohala, Island of Hawai'i

By Ron Terry, Ph.D. and Patrick J. Hart, Ph.D.
Geometrician Associates, LLC
Prepared for Helber Hastert & Fee, Inc.
February 2008

Introduction

This report describes the results of a botanical survey of a 5.00-acre portion of TMK 6-9-01:01 bordering Puako Beach Road and the Puako Boat Ramp access road in the northern end of Puako Village on the Big Island of Hawai'i. The site is proposed for use as the Puako Marine Education Center. As aerial photographs show (Figure 1), the makai edge of the proposed site boundary is located about 200 feet from the shoreline.

Purpose and Methodology

The objectives of the botanical survey were to 1) describe the vegetation; 2) list all species encountered; 3) identify threatened or endangered plant species; and 4) make an informal assessment of quality of the habitat for native birds. The area was surveyed by Ron Terry and Pat Hart in January 2008. Plant species were identified in the field and, as necessary, collected and keyed out in the laboratory. Special attention was given to the possible presence of any federally (USFWS 2006) listed threatened or endangered plant species.

Vegetation Type and Influences

The geologic substrate in this area is Pleistocene-era lavas from Mauna Kea (Wolfe and Morris 1996). The area is one of the driest on the Big Island, with an average annual rainfall of about 10 inches (UH Hilo Dept. of Geography 1998:57). It is difficult to speculate on the prehuman vegetation of the area, since the introduction of certain grasses, grazing animals and fire have changed the soil and microclimate of the area. It may have been similar to the strand vegetation found along much of the shoreline of the Hawaiian Islands. Gagne and Cuddihy (1990) describe the vegetation in fairly undisturbed areas with similar geology and climate as dominated by ilima (*Sida fallax*), pohuehue (*Ipomoea pes caprae*), and 'aki'aki grass (*Sporobolus virginicus*). Diverse coastal and diverse dry-forest trees and shrubs may also have been present.

The current vegetation of the area is a savanna comprised mainly of the alien plants kiawe (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*). A number of other mainly

Figure 1
Airphoto of Subject Property



alien plants are present. Shoreline vegetation makai of the property contains a fair number of the native tree milo (*Thespesia populnea*) and also some kou (*Cordia subcordata*). A very small island of this vegetation, whether natural or encouraged by man, is also present within the subject property near the boat ramp road.

Degrading influences on the vegetation on the subject property include bulldozing, junk piles, and particularly the spread of alien species, notably kiawe (*Prosopis pallida*).

Flora

A full list of plant species found on the site is contained in Table 1, below. Although the status of milo is unresolved, this report assumes it to be an indigenous species. Only four of the plants found on the property are natives, all of which are indigenous (found in Hawai'i as well as elsewhere), with no endemics (found in Hawai'i and nowhere else).

Table 1
Plant Species Identified on Subject Property

Scientific Name	Family	Common Name	Life Form	Status
<i>Abutilon grandifolium</i>	Malvaceae	Hairy abutilon	Shrub	A
<i>Boerhavia acutifolia</i>	Nyctaginaceae	Alena	Vine	A
<i>Cenchrus ciliaris</i>	Poaceae	Buffel grass	Grass	A
<i>Chamaesyce hirta</i>	Euphorbiaceae	Garden spurge	Herb	A
<i>Chenopodium murale</i>	Chenopodiaceae	Lamb's quarters	Shrub	A
<i>Chenopodium oahuensis</i>	Chenopodiaceae	Aweoweo	Shrub	A
<i>Cleome gynandra</i>	Capparaceae	Wild spider flower	Shrub	A
<i>Cordia subcordata</i>	Boraginaceae	Kou	Tree	I
<i>Merremia aegyptia</i>	Convolvulaceae	Koali kua hulu	Vine	A
<i>Pennisetum setaceum</i>	Poaceae	Fountain grass	Grass	A
<i>Prosopis pallida</i>	Fabaceae	Keawe	Tree	A
<i>Sida fallax</i>	Malvaceae	Ilima	Shrub	I
<i>Sida rhombifolia</i>	Malvaceae	Cuba Jute	Herb	A
<i>Thespesia populnea</i>	Malvaceae	Milo	Tree	I
<i>Verbesina encelioides</i>	Asteraceae	Golden crown beard	Herb	A
<i>Waltheria indica</i>	Sterculiaceae	'Uhaloa	Herb	I

Notes: Alien (A), Indigenous (I)

Threatened and Endangered Species

No listed or proposed threatened or endangered plant species were found. Given the context, it is somewhat unlikely that one would be found.

Figure 2
Typical Vegetation on Project Site



Value as Bird Habitat

As part of the vegetation assessment, Geometrician Associates was asked for a general assessment of the value of the area as bird habitat. The kiawe-buffel grass savanna is not particularly conducive to native birds. As would be expected during a survey of a few hours in this vegetation type, all birds we saw were common and non-native. However, as the property is only 200 feet from the shoreline, native shorebirds could be present nearby. Of these, only the Golden Plover would likely make use of the actual project site. Birds that might commonly be seen on or near the subject property are listed in Table 2.

Table 2
Native Shorebirds in Puako Area

<i>Arenaria interpres</i>	Ruddy Turnstone	Indigenous visitor
<i>Calidris alba</i>	Sanderling	Indigenous visitor
<i>Heteroscelus incanus</i>	Wandering Tattler	Indigenous visitor
<i>Numenius tahitiensis</i>	Bristle thighed Curlew	Indigenous visitor
<i>Nycticorax nycticorax hoactli</i>	'Aukuu	Indigenous resident
<i>Pluvialis fulva</i>	Kolea	Indigenous visitor

Impacts and Mitigation Measures

The proposed Puako Marine Education Center would likely have no adverse impact on native vegetation or flora, as no rare, threatened or endangered plant species are present and the vegetation is non-native. In general, because of the poor habitat, which is almost ubiquitous in thousands of acres surrounding the project site, we do not expect that development would have any adverse effect on native bird habitat.

We recommend that the Center utilize primarily native plants in landscaping and that the use of herbicides and pesticides be minimized, in order to reduce the potential for water quality impacts that may affect native shorebirds.

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Appendix D

Preliminary Engineering Report
SSFM International, December 2008



SSFM 2007_150.000



SSFM 2007_150.000

PRELIMINARY ENGINEERING REPORT

For

**Puako Marine Education and
Research Center**

Waikoloa, Hawai'i

Prepared for

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Prepared by:

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December 2008

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I. PURPOSE

The purpose of this report is to research, evaluate and determine means to provide potable water distribution and domestic wastewater collection for the development of the Puako Marine Education and Research Center ("Center"). Services include preparing a Preliminary Engineering Report to support the Environmental Assessment and Special Management Area approvals process.

The Center is intended to incorporate sustainable design initiatives and it is desired that the site development be a *Leadership in Energy and Environmental Design* (LEED) certified facility when complete.

II. PROJECT DESCRIPTION

A. General Location

The Department of Land and Natural Resources is preparing to subdivide a 5-acre parcel next to the existing Puako Boat Ramp for the University of Hawai'i at Hilo to construct a Marine Education and Research Center. The center will include classrooms, conference spaces, office/administration, student units for 50 persons, small boat storage, maintenance building, and a scuba locker.

The project site is located in the District of South Kohala, on the northwestern portion of the Big Island and south of Kawaihae Harbor as shown on the Location Map, Figure 1. The east boundary of the project site is Puako Beach Drive.

The project site may be found on the State of Hawaii tax maps identified as TMK No. 6-9-001: portion 001.

B. Topographical Features

Shrubs, wild grasses and trees, mostly Algarroba trees (also known as Mesquite or locally as Kiawe trees), can be found on site. The elevations of the site range from 20 feet to about 60 feet above main sea level. The site slopes away from Puako Beach Drive and towards the ocean.

C. Climate

The project area is located within the driest climates in Hawai'i, with an average annual rainfall of approximately 7 inches. Temperatures can be as much as 86°F in the summer and 65°F in the winter.



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Cool breezes, winds that sweep over the top of the mountain and down the slopes, in the mornings usually come from the east causing cold to cool mornings. Some time after noon, the breeze turns around and comes from the west. This is the Naulu wind, a convection wind, where heated air moves up the slopes of the mountains and pulls along the air from the ocean. The Naulu wind and rain will usually come during the winter storm months.

This is the only region in the Hawaiian Islands where summer rainfall will sometimes exceed winter rainfall. There is a marked diurnal wind regime, with well-developed and reliable land and sea breezes, especially in the summer. Summer is the season with a high frequency of late afternoon or early evening showers. It is noteworthy that in this dry area, September is the warmest month of the year on the Big Island. This occurrence of highest temperatures in late summer and early autumn is typical of areas that are overlain by fresh ocean air.

III. PROJECT BUILDINGS, USAGE AND OCCUPANCY

A number of options and configurations have been considered during the conceptual planning stage. The facility arrangement and site layout however is not expected to have a significant impact on the water and wastewater requirements. Prior to establishing the site plans, we recommend that a detailed geotechnical investigation be completed to determine the areas best suited for building locations, in-ground wastewater disposal fields and potential well extraction locations. Although not within the scope of this assignment, this information will also be required in support of the overall stormwater management plan, to control on-site drainage, without jeopardizing the extraction wells or wastewater disposal field facilities.

Figure 2 illustrates the preliminary site plan for the project. The relevant building uses and properties have been summarized in Table 1. These have been used as the basis for estimating the potable water demands and wastewater generation rates.



**Table 1
Building Summary**

Building	Description
Student Unit	Total of 50 beds . Student housing on weekends and weekdays.
Faculty Housing	6 housing units with a total of 12 beds, year-round occupancy.
Caretaker Residence	Self contained 1,000 sq.ft building with 2 beds and occupied year-round.
Academic Center	8,300 sq.ft building that contains: classroom seating for 60 people, faculty offices; 2 instructional labs; 6 student labs; 3 faculty labs and 2 washrooms.
Conference / Auditorium	3,000 sq.ft room with an estimated 75 seats. Auditorium would be part of the Academic Center
Boat Storage	Boat storage for 3 – 4 boats
Marine Shop	Dive locker, equipment storage and repair
Saltwater Tanks	Three (3) 100 sq.ft tanks

IV. WATER SYSTEM

A. Existing Conditions

The County of Hawaii Department of Water Supply (DWS) has jurisdiction over the public water system in the project area.

Referring to DWS' "Hawaii County Water Use and Development Plan Update" - Draft Report (December 2006), the water service area for the subject property is referred to as the West Mauna Kea Aquifer Area Sector. In this "Sector Area", the DWS has two existing water systems: The Waimea Water System that covers mauka areas and the Lalamilo Water System services the coastal areas.

DWS' Lalamilo water system is supplied by surface water sources in the mountain regions plus groundwater wells along Kawaihae Road and Mauna Kea. Water from



these public water sources is combined and conveyed through the Department of Water Supply distribution piping. The DWS' distribution system in the project area includes an existing 12-inch diameter waterline along Puako Beach Drive. The estimated static pressure in this waterline is 118 psi. The Department of Water Supply has noted they are able to provide a single 5/8-inch water service to the property, and that supply is restricted to a maximum of 600 gallons per day (gpd). This supply yield is roughly equivalent to a typical single-family residential dwelling.

There are two private water systems within a 5-mile radius of the subject property: (1) The Mauna Kea Resort has five brackish wells that are used to irrigate the golf course; while potable water to the resort is provided by DWS. (2) The Waikoloa Resort also has a private water system within a 4 to 5-mile radius of the subject property. Neither source has excess supply capacity.

B. Water Supply Options

As mentioned above, the Department of Water Supply is able to provide a potable water supply of 600 gpd. While this supply yield would be a benefit to the Center, it would not be sufficient to satisfy the water demand requirements discussed below and an alternate water supply would be required.

Since there are no private water systems in the area that have available capacity, the Center would be required to develop their own on-site water system. Potential on-site water supply sources may include:

- surface water from a stream or gulch;
- a deep, freshwater well;
- rainwater collection and re-use;
- a shallow brackish well (or ocean intake) with desalination;

Surface Water Source

There are no perennial (continually flowing) streams near the subject property. A moderate size gulch exists south of the property but water does not flow in the gulch year-round and it cannot be considered as a reliable potable water source.

Deep, Groundwater Well

As noted in the aforementioned 2006 DWS' Report, the groundwater source in the West Mauna Kea Aquifer area sector has a sustainable yield of 24 million gallons per day. This is sufficient to meet current demands for the region but insufficient to meet future build-out and agricultural demands. A deep, groundwater well may be developed to service the property, however the long-term supply yield of the aquifer



does not appear to be sustainable. Also, there is a strong probability that a deep well close to the ocean will have a high chloride content and will require desalinization.

Rainwater Collection

Rainfall collection and on-site re-use for potable water is limited for this site as the area is arid and has an average rainfall of approximately 7 inches per year. As such, rainwater re-use as a primary potable water source is not considered a viable alternative.

Shallow, Brackish Well

It is anticipated that the groundwater in the area is brackish, although the chloride content is not likely to differ much from that of sea water. A shallow groundwater well could be drilled, or potentially excavated, makai of the development site to access local groundwater, without the need for an ocean intake pipe. The brackish water would then require desalinization, and the treated water could be pumped and distributed to the Center buildings. While desalinization treatment facilities require operation, maintenance and high amounts of energy, this is the preferred alternative since it has a long-term supply yield, is sustainable and uses innovative technology indicative of an educational and LEED facility.

C. Water Demand Estimates

Water demands include either potable or non-potable water use. Reasonable and accurate estimates are required for the subject property as freshwater supply in the area is limited and a rare resource. In turn, measures to promote water conservation and re-use will also be critical in lowering the projected demands, and should be implemented as much as possible to conserve freshwater resources and reduce the amount of wastewater to be treated.

Non-Potable Water

The required amount of water for non-potable use (i.e. irrigation) is anticipated to be minimal. There may be opportunities to re-use the effluent from the wastewater treatment facility for irrigation; however the potable water system has not included any allowance for irrigation demand.

Site landscaping should be limited to indigenous plants that can survive in the local climate without irrigation. Some minor and temporary irrigation may be required in the initial landscaping stages to aid in establishing new plants.



Potable Water

For potable water usage, demand projections have been developed in accordance with Table 100-18 of the Department of Water Supply Water System Standards, 2002; for a School zoning designation.

Table 2 of this report provides a breakdown of the projected water demands, in accordance with the DWS Standards, for each building. It is anticipated that the number of students and corresponding water demand will vary during full semester and non semester months when students are not on campus. In considering the above, we have estimated the water demand rates under two scenarios. This includes lower demand periods that may be expected when student housing is not occupied and higher demands that may be experienced during the full semester. Based on the above, the overall water demands are estimated as follows:

	Non Student Rates	Full Semester Rates
Average Daily demand	2,120 gal/day	5,440 gal/day
Maximum Daily demand	3,180 gal/day	8,160 gal/day

The average daily demand rate of 60 gallons per day per student was assigned to the student units.

An average day rate of 100 gallons per day per person was assigned to the faculty and caretaker since these are assumed to have individual kitchens and laundry facilities, which will consume more water than the average student facility.

The average day rate of 4,000 gallons per acre (or 0.1 gallons per square foot) was assigned to the academic center, auditorium, marine shop and boat storage to account for water consumption in the various buildings.

The maximum daily demand was obtained using a "demand factor" to estimate the peak daily flow in comparison to an average daily use. As outlined in the DWS standards a demand factor of 1.5 was utilized within our analysis.

D. Fire Flows

Based on our initial discussions with the Department of Water Supply, fire protection for the proposed Center can be provided by the DWS water system through the existing 12-inch diameter waterline along Puako Beach Drive.

Table 100-19 of DWS Standards indicates the minimum fire flow required for school land-use is 2000 gpm. This fire flow must be sustained for a period of 2 hours, during



which the residual pressure shall not drop below 20 psi and the maximum velocity in a watermain shall not exceed 10 ft/s.

DWS has indicated that the existing 12-inch watermain on Puako Beach Drive is adequate in providing the necessary 2,000 gpm fire flow in accordance with their standards. Therefore on-site storage tanks or fire pumps are not required to service the proposed Center. As such, other than on-site hydrants and/or building sprinkler connections, no off-site upgrades are anticipated to ensure adequate fire protection for the development site.

TABLE 2 - WATER DEMANDS AS PER DWS STANDARDS

Building	Total Area (sq. ft)	# of Beds or Seats	Unit Consumption Rate	NON STUDENT RATES		FULL SEMESTER RATES	
				Average Weekday Demand (Gal/Day)	Average Weekend Demand (Gal/Day)	Max Day (Weekend) Demand (Gal/Day)	
Student Dormitories							
24 Unit Dormitory	3900	24	60 Gal/Day/Student	0	1,440	2,160	
26 Unit Dormitory	4300	26	60 Gal/Day/Student	0	1,560	2,340	
Faculty Housing	4800	12	100 Gal/Day/Person	1,200	1,200	1,800	
Caretaker Residence	1000	2	100 Gal/Day/Person	200	200	300	
Academic Centre							
-1 Classrooms	1200	60	0.1 Gal/Day/Sq.ft	0	120	180	
-2 Offices	600	0	0.1 Gal/Day/Sq.ft	60	60	90	
-3 Instructional Laboratories	2000	0	0.1 Gal/Day/Sq.ft	0	200	300	
-4 Student Research Laboratories	600	0	0.1 Gal/Day/Sq.ft	60	60	90	
-5 Faculty Laboratories	600	0	0.1 Gal/Day/Sq.ft	60	60	90	
-6 Washrooms	600	0	0.1 Gal/Day/Sq.ft	60	60	90	
Conference / Auditorium	3000	75	0.1 Gal/Day/Sq.ft	300	300	450	
Boat Storage	1500	0	0 Gal/Day/Sq.ft	0	0	0	
Marine shop	1500	0	0.1 Gal/Day/Sq.ft	150	150	225	
Saltwater Tanks	300	0	0.1 Gal/Day/Sq.ft	30	30	45	
Notes:			TOTAL	2,120	5,440	8,160	

1. Max Day Peaking Factor = 1.5 as per County Water Supply Board Standards
2. Average demand rate of 60 gal/day/student is as per County Water Supply Board Standards
3. Average water demand of 0.1 Gal/Day/Sq.ft was assigned to Academic Centre as per County Water Supply Board Standards
4. During weekdays, it was assumed no students were on site and the classrooms and instructional labs were not in use

E. Proposed Water System

The preliminary design basis for the proposed water system includes extraction from a shallow brackish well, with pumping to an on-site desalination and disinfection facility, after which the treated water is distributed to the individual buildings and facilities. A schematic of the water supply system has been included as Figure 3.

Desalination is currently used to establish potable water in areas of the Middle East and Caribbean and pilot facilities have been established in North America and the State of Hawaii (on Oahu and the Big Island).

Although additional field testing and water sampling would be required to confirm the most suitable treatment method, it is anticipated that a membrane filtration process, involving reverse osmosis would be the selected method. Reverse osmosis (RO) filtration is the most widely used process for seawater and brackish water desalination.

In reverse osmosis the feed water is forced, at high pressures through a permeable membrane, separating the salts and minerals from the water. A number of commercially available RO units are readily available and are widely used in the manufacturing, agricultural and pharmaceutical industries. The units can be installed in modules to increase plant capacity as demand increases and to provide redundancy in operation. Supply costs for these units has decreased substantially in recent years, making this option much more feasible. Budget costs on the equipment supply of a 10,000 gpd RO unit are in the order of \$55,000.

Additional field testing of the groundwater yield and water quality parameters will be required prior to equipment selection to confirm the most suitable and cost effective water treatment process.

In addition to the desalinated water supply, we recommend a supplemental connection with a 5/8-inch water service and meter from the Department of Water



Supply 12-inch watermain along Puako Beach Road. While this connection to DWS is not required, it would provide for additional redundancy in the supply, offset peak demands and provide a nominal volume of water in the event the desalination facility or wells are temporarily out of commission.

A large diameter, water storage tank for fire suppression is not anticipated since fire protection is available from the existing watermain on Puako Beach Drive. The domestic water system is expected to include a pressurized distribution system, incorporating pump and a hydro-pneumatic tank system, to maintain adequate working pressures. The pumps will draw water from the clear well, and pump into the hydro-pneumatic tanks. Hydro-pneumatic tanks are commonly used in lower demand applications and in conjunction with groundwater wells. The pressure tanks act as a small reservoir, to meet the periods of low demand, and to minimize the number of on/off cycles for the pumping system. The tanks can range in size and can be assembled in a parallel bank to provide additional storage volumes. The operating volume of the tanks is generally based on the estimated system demand and available pumping rate. Frequent starting and stopping of pumps can lead to premature failure of the motors and starters, so increasing the volume of dynamic storage in the pressure tanks helps to reduce the number of times a pump would need to start, especially during low-flow periods. It is usually preferred to have the pumps run for a minimum of 2 minutes, once they have started. If the demand continues, then the pumps will keep running until the demand decreases and the pressure in the tank rises to a defined set point. At this set point, the pump will then turn off automatically.

If there is a wide variation in flow, the pumps can be equipped with variable speed drives. These variable speed drives will ramp the speed of the pump up or down to maintain a constant discharge pressure, and keep pace with the variation in system demand. Although there is additional cost associated with the variable speed drives, there are some benefits in reduced electrical demand, as well as a reduction in the required volume of pressure tanks, since the pump has the ability to slow down during low demand periods.

Figure 4 illustrates the proposed water distribution system. The location of the shallow wells and treatment facilities is for illustration purposes as the exact location is dependent upon findings from the geotechnical investigations and topographical survey.

Water Supply and Treatment Process

Desalination is the process of removing salt and minerals from the water. After the water is desalinated, the treated water is often disinfected through either chlorine



and/or ultraviolet light disinfection. The treated water is then distributed to the users while the salt concentrated excess water, or brine is then discharged to the sea or subsurface.

The treated water is delivered to a nearby clear well, to provide some on-site balancing storage. As system demand increases, the water level in the clear well drops, and upon reaching a pre-set level, calls for the desalination equipment to be turned on. As demand decreases, the water level in the clear well rises, which in turn sends a signal for the desalination pump to turn-off. The clear well material can vary depending on local preferences, such as concrete fiberglass or plastic. They are typically in the range of 500 to 1000 gallons to allow sufficient storage volume to meet the instantaneous peak flow rates.

Desalination plants typically use large amounts of energy as it takes several volumes of seawater or brackish water to produce one volume of desalinated water. The ratio of desalinated water to seawater volume used is called the recovery ratio. The maximum recovery ratio is around 40 to 50%, however they generally operate in the range of 15 to 40%, depending on the feed water parameters.

A high recovery ratio means higher energy costs during desalination because sea water is pumped through the membrane filters at high pressures (1000 psi); however this reduces the volume of water withdrawn from the subsurface and the volume of brine solution that is discharged back to sea.

A low recovery rate requires less energy to drive the system during desalination, but requires higher volumes of water to be pumped from the sea, or from the brackish water source, as well as an increased volume of brine solutions to discharge at sea.

Considering the environmental sensitivity of the marine area, it is recognized that brine disposal will be a significant issue. The recommended disposal method includes a subsurface disposal area. It is anticipated that this development site contains fractured rock, which will aid in the natural discharge capacity; however additional field testing will be required within the geotechnical investigations to confirm the site suitability for ground disposal.

As an alternative, should the subsurface disposal area not be feasible, the brine solution may also be combined with the treated effluent from the wastewater treatment facility to dilute the chloride concentration. The effluent quality would be required to meet the requirements for ocean discharge, prior to disposal through a marine outfall pipe.



Figure 4 illustrates the proposed arrangement for the extraction wells, desalination and water distribution system. Since the Center is expected to have a wide variation in flow between full semester days and days when no students are on campus, it is recommended that the treatment system include two package desalination units. The smaller unit would operate primarily when system demand is low, while the larger unit could be used during peak flow periods. This will also aid reducing the energy consumption and in managing the production of brine waste, since the water treatment system will be sized to more closely match the water demand. Although the rated capacity will vary depending on the equipment selection, we suggest that the systems have a rated capacity of 2,000 gpd and 8,500 gpd respectively. The installation of two desalination units will also provide the Center with system redundancy if one of the units is out of commission for repairs or maintenance.

Power Requirements

Desalination systems require a high amount of energy. HELCo currently has 230 Volt – 3 Phase power on the fronting street and is expected to be sufficient to run the pre-fabricated desalination system. Confirmation of the electrical supply capacity will be required when the total system demands have been determined.

Solar powered desalination units are continuing to improve with the technological advances however; they are primarily restricted to very small units. As the technology and efficiency of solar power continues to improve, the Center development may be able to integrate solar or alternative energy means such as wind power or geothermal energy sources

Maintenance Items

The on-site desalination and disinfection system will require routine maintenance. The following is a list of common maintenance items:

- On a weekly basis, visual inspection the equipment for condition, leaking and ensure adequate flow is being conveyed;
- Replacement of the pre-filter elements;
- Backwash filters and clean membranes;
- Replacement of the membrane cartridges; (approx 1.5 to 2 years)
- Replenish disinfection chemicals and/or equipment (I.e. hypochlorite or UV bulbs)



V. WASTEWATER

A. Existing Conditions

Although there are over 700 residential houses and condominiums situated in the Puako area, there is no public sanitary sewer system in the area. The residential properties have their own individual sewer system, typically using a septic tank or aerobic treatment units with effluent disposal into the ground.

All wastewater systems on the island must conform to the State of Hawaii, Hawaii Administrative Rules, Title 11, Department of Health Chapter 62 for Wastewater Systems. The US EPA may also be involved with the regulation of discharge to the subsurface under the Underground Injection Control (UIC) program.

Under the Department of Health (DOH) Standards, "Individual Wastewater Systems" (IWS) are defined as a facility designed to receive and dispose of no more than 1,000 gallons per day; these tend to be septic tanks and small household aerobic units. As the predicted wastewater flows for the Center are greater than 1,000 gpd, the Department of Health requires that a treatment unit be constructed. The Department of Health defines "treatment unit" as a plant or facility that has power operated treatment process equipment.

B. Design Standards

Outlined below are the wastewater design criteria / parameters, applicable to the Puako Marine Education Center (systems greater than 1,000 gpd). This criteria was obtained from the "Hawaii Administrative Rules, Title 11, Department of Health, Chapter 62 – Wastewater Systems".

Wastewater Flows & Process Criteria

As per Appendix F in DOH Standards (Title 11 – Chapter 62), the wastewater flows should be estimated using:

- Average wastewater flow = 100gpd per student (for schools with boarding);
- Multiplication Factor (peak flow / average flow) = 4.5;

Treatment Process Criteria

The components of the treatment process shall adhere to the following:

- Aeration tank loading < 12.5 lb / 1,000 ft³;
- Detention time > 4 hours;
- Surface overflow rate < 300 gpd / ft² (based on average flow);



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- Disposal system to be sized for peak flow;
- Disposal system to have reserve area set aside for future replacement;

Treated Effluent Quality

Effluent quality parameters for designing wastewater treatment facility are:

- Average BOD < 30 mg/L;
- Average TSS < 30 mg/L;
- Effluent pH in the range of 6 – 9;
- Fecal Coliforms < 23 / 100 mL;
- 50% reduction in nitrogen (for Coastal areas);
- Continuous disinfection of treated effluent

Facility Setbacks

The location of the treatment facility and disposal system must comply with the following setbacks:

- Treatment Unit > 25 ft from a property line;
- Disposal system > 5 ft from a property line;
- Treatment & Disposal systems > 10 ft from a building;
- Treatment & Disposal systems > 50 ft from stream and ocean;
- Disposal system > 500 ft from a potable water supply;

C. Wastewater Flows & Characterization

Wastewater Flows

In total, 63 beds are proposed at the Center (50 students, 12 faculty beds and 1 caretaker). As noted above, the water demand and the sewage generation rates will vary widely depending on the resident population. Table 3 presents a break-down of the projected wastewater flows using the State Department of Health standards. A summary of the sewage generation rates, depending on student occupancy, is presented as follows:

	Non Student Rates	Full Semester Rates
Average Daily flow	2,090 gal/day	7,410 gal/day
Maximum Daily flow	9,405 gal/day	33,345 gal/day

It should be noted that the Department of Health criteria includes a multiplication factor of 4.5 to convert from average day flow to maximum day flow. For a facility design such as this, and considering the emphasis on water and energy

TABLE 3 - WASTEWATER FLOWS AS PER DOH STANDARDS

Building	Total Area (sq. ft)	# of Beds or Seats	Wastewater Flow Rate	NON STUDENT RATES		FULL SEMESTER RATES	
				Average Weekday Flow (Gal/Day)	Average Weekend Flow (Gal/Day)	Peak Day (Weekend) Flow (Gal/Day)	
Student Dormitories							
24 Unit Dormitory	3900	24	100 Gal/Day/Student	0	2,400	10,800	
28 Unit Dormitory	4300	28	100 Gal/Day/Student	0	2,800	11,700	
Faculty Housing	4800	12	100 Gal/Day/Person	1,200	1,200	5,400	
Caretaker Residence	1000	2	100 Gal/Day/Person	200	200	900	
Academic Centre							
- Classrooms	1200	60	0.1 Gal/Day/Sq.ft	0	120	540	
- Offices	600	0	0.1 Gal/Day/Sq.ft	60	60	270	
- 2 Instructional Laboratories	2000	0	0.1 Gal/Day/Sq.ft	0	200	900	
- 6 Student Research Laboratories	600	0	0.1 Gal/Day/Sq.ft	60	60	270	
- 3 Faculty Laboratories	600	0	0.1 Gal/Day/Sq.ft	60	60	270	
- 4 Washrooms	600	0	0.1 Gal/Day/Sq.ft	60	60	270	
Conference / Auditorium	3000	75	0.1 Gal/Day/Sq.ft	300	300	1,350	
Boat Storage	1500	0	0 Gal/Day/Sq.ft	0	0	0	
Marine shop	1500	0	0.1 Gal/Day/Sq.ft	150	150	675	
Saltwater Tanks	300	0	0 Gal/Day/Sq.ft	0	0	0	
Notes:			TOTAL	2,090	7,410	33,345	

1. Max Day Peaking Factor = 4.5 as per State Department of Health, Wastewater Branch, Standards
2. Average demand rate of 100 gal/day/student is as per State Department of Health, Wastewater Branch, Standards
3. Average wastewater flow for the Academic Centre matches the water demand estimates because DOH does not have a flow criteria for these facilities
4. During weekdays, it was assumed no students were on site and the classrooms and instructional labs were not in use



conservation, it is our opinion that a peaking factor of this magnitude is not warranted. If an equalization tank is utilized to reduce the peak flow rates, then the impact of the peaking factors will be reduced and the peak flow estimates should be reviewed to ensure that the treatment and disposal facilities are designed to meet the adjusted flow estimates.

It should also be noted that the design average day wastewater flow is higher than the estimated water demand, based on the Department of Water Supply criteria. The primary reason for the difference is that DOH requires wastewater systems be sized for 100 gpd / student whereas County of Hawaii DWS requires 60 gpd / student be used for estimating water demands. Since the Center is intending to have common kitchen and laundry facilities for the student units, the rate of 100 gpd / student is likely quite conservative.

Since wastewater treatment facilities are typically sized for the peak inflow rates, as noted above, they often incur operational problems when the flow rates drops substantially. This can be more problematic within some treatment processes as the bacteria become "starved" and are no longer able to breakdown the organic material. We recommend that the wastewater treatment facility include an equalization tank, to mitigate the peak flows, and allow the treatment system to operate on a more consistent and effective basis over a slightly longer duration. The high flow rates generated over morning and evening hours would be moderated within the equalization tank and processed through the treatment facility over the following 6 to 10 hours. This will also serve to reduce the size of the wastewater treatment facility along with the associated subsurface disposal field. A variance or separate approval may be required from the approving agencies to include the equalization tanks and obtain credit for a reduction in the design flow rate.

Wastewater Quality

The anticipated wastewater characteristics are expected to be comparable with characteristics of residential sewage. No heavy metals or toxic pollutants found in industrial wastewater, that may inhibit a biological nutrient treatment process are expected.

Slightly higher levels of BOD and coliforms may be present due to the reduction in laundry facilities, and the potential of graywater re-use will result in the sewage being concentrated with more blackwater.

Table 4 lists the expected quality or characteristics of the raw wastewater stream.



Table 4
Raw Wastewater Quality / Characteristics

Parameter	Concentration / Loading
BOD	100 – 400 mg/Litre
TSS	150 – 400 mg/Litre
Total Nitrogen	20 – 40 mg/Litre
Total Phosphorus	5 – 15 mg/Litre
Fecal Coliforms	100 Million CFU / 100mL

D. On-Site Wastewater Treatment

To meet the DOH effluent criteria discussed above, a secondary treatment facility is required. Secondary treatment includes screening and grit removal, followed by a biological process and settling clarifiers. Based on early consultation with the County of Hawaii, Environmental Management, this project is located within a critical wastewater disposal area (CWDA) as defined in HAR-62-05. Within these areas, the Director may impose more stringent requirements for wastewater systems. These additional requirements may be related to higher effluent standards, restrictions on methods of disposal or the requirement for flow restriction devices on water fixtures. Additional consultation will be required, with the Wastewater Branch to confirm the additional requirements or restrictions.

Treatment Process Review

The biological processes used for secondary treatment are either: aerobic, anaerobic, or a combination. Anaerobic processes will not likely be effective for the Center due to the relatively low wastewater flow rates; therefore an aerobic process is recommended. The more common aerobic treatment processes are:

- Activated sludge – a treatment process where the wastewater is mixed with microorganisms (through agitation and induced aeration) allowing solid particles to form and settle in suspension while the treated effluent continues on. The solid particles form into a sludge, which is returned to the start of the process for further treatment prior to offsite disposal.
- Trickling Filter – a process where the wastewater travels through a permeable medium (rocks, gravel, peat moss, etc.), causing a layer of microbial film to grow, and liquid effluent goes through a final settling process before it is fully treated;



- Rotating Biological Contactors (RBC) – a series of circular plastic disks are submerged in wastewater and slowly rotated to allow the absorption of oxygen, thereby inducing microorganisms to grow on the surface of the discs and biologically degrade. The effluent then flows through a settling tank before being discharged; and
- Membrane Biological Reactor (MBR) – following the screening works, fine bubbles of air are introduced into the wastewater (referred to as mixed liquor) as it flows through a series of membrane filters. Part of the mixed liquor does not penetrate the membranes and is recycled back to the start of the process, while the clean water penetrates the fibers of the membrane and is then pumped as treated effluent.

The main advantages of the Activated Sludge Process are: process requires less space; can be flexible and adapt to pH and temperature ranges; and has minor odor problems. Disadvantages include high operating costs, requirement for continuous air supply and can be sensitive to variations in flow regime. Since flows from the Center will vary significantly depending on student occupancy, there is the potential for the microorganisms to “starve” and reduce the effectiveness of the treatment process.

A trickling filter provides good quality effluent with moderate operating costs. It is also more flexible in terms of receiving “shock” loading with respect to flows and influent quality. However, it has a high upfront capital cost, the potential for media beds to become clogged and is more odorous.

Rotating Biological Contactors (RBC) would be a reasonable process for the Center as they provide good quality effluent, accommodate a range in flows, have a short retention time, less odor issues and provide less sludge. The downsides to a RBC facility include the requirement for a small building to house the unit and the mechanical drives and bearing shafts will require repair and regular maintenance.

The use of Membrane Biological Reactor (MBR) technology has increased significantly in the past 5 – 10 years. It provides the ability to meet stringent effluent requirements, and a reduced footprint when compared to a conventional activated sludge plant. With the increased popularity, the capital costs have decreased significantly and are now very comparable to conventional technologies discussed above. This technology would also be applicable for use at the Center.

Treatment Plant Site Evaluation

Based on topography, the preferred location of the secondary treatment facility is on the north side of the property. As noted above, the Department of Health requires a



minimum separation between the disposal area and water wells of 500 ft. In order to achieve the minimum separation, we have placed the disposal area as far north as possible.

The required area for disposal field is unknown at this time, since it is dependent upon the percolation rate of the subsurface materials. For discussion purposes, however; with a design flow rate in the range of 12,000 gal/day and an assumed percolation rate of 5 minutes per inch, the required absorption area would be 7500 square feet. Confirmation of the percolation rate is required prior to the design of the disposal area.

The treatment and disposal systems should be located with maximum separation from the extraction wells. Factors that should be considered when selecting the location of the treatment facility are:

- Findings from geotechnical investigations;
- Site topography and available land area;
- Minimum setbacks identified above in Section B; and
- Proximity to buildings with respect to odor control.

E. Proposed Wastewater System

Based upon the topography and site layout plans we anticipate that a sewage lift station would be required near the lowest end of the developed area. Each building would be serviced by the gravity collection system that would ultimately discharge into the sewage lift station. The lift station would then pump the sewage up to the equalization tank and treatment facility for treatment and disposal. Figure 5 illustrates the proposed wastewater system.

Collection System

The collection system would consist of sewer service lines from each building, which would drain by gravity to the sewage lift station. The preliminary sewer sizes are anticipated to be 4" to 6" and should be sized to convey the peak flows from the individual buildings.

Treatment System

The recommended secondary treatment process is either a Rotating Biological Contactor or Membrane Biological Reactor facility. These two treatment facilities are able to adapt to variations in peak flows without compromising the treatment process and quality of the effluent.



In the State there are a few distributors (or vendors) of pre-fabricated wastewater treatment facilities. These vendors are familiar with the local standards, and some companies will also provide operational and maintenance services. During design the wastewater flows, characteristics and effluent requirements should be verified and design packages should be solicited from the various local vendors to determine the most cost effective treatment system.

As part of the treatment process, disinfection using either chlorination or ultra-violet light will likely be required to kill pathogens in the treated effluent before the effluent is discharged, regardless of whether effluent is discharged to the ocean or ground. We recommend that the effluent disinfection system utilize the same process as the water supply disinfection system to simplify the operations and maintenance procedures.

Disposal System

It is important to note that hydrogeological work (soil and percolation testing) has not yet been completed for the subject property so the feasibility of subsurface disposal cannot be verified at this time.

There are various disposal options for the site: (1) discharge to the ocean via an outfall (2) shallow discharge to the ground (3) injection wells to discharge deep into the ground and (4) evaporation.

An outfall to the ocean would require numerous permits and environmental studies, and may be difficult to obtain the necessary approvals. This method is not recommended.

The climate for the region is well suited for disposal by evaporation, however this would require large open-air retention ponds which the site topography and footprint would not permit. Also, there is the potential for nuisance issues such as odor control and attraction of birds, mosquitoes and insects. This method is not recommended.

Disposal into the ground is the recommended approach. Deep injection wells are expensive so a shallow disposal system is preferred. While soil and groundwater conditions need to be verified before this option is deemed viable, it is anticipated that the ground conditions in the area may permit subsurface disposal since the neighboring residential properties also use this approach.

Subsurface disposal could be completed using absorption trenches or seepage beds, as both are common practices in the State. These systems consist of a "field" of perforated PVC pipes, surrounded by gravel bedding material. A distribution box is



used to split the effluent flow into the various PVC pipes, allowing the effluent to disperse throughout the gravel bed. The size of the absorption trenches, including length of piping, varies based on the soil conditions and percolation rates. Also, the disposal system must be designed to comply with DOH Standards for size, setbacks (see Section B) and have reserve area set aside for the future backup system.

Power Requirements

Whether a RBC or MBR process technology is designed, the secondary treatment facility will require power. Based on a review of pre-fabricated treatment units on the market, the treatment unit could likely run off 230 Volt – 3 Phase Power. HELCo representatives have confirmed that 3 phase power is available on Puako Beach Drive. Until the loading requirements for the entire development site are known however, they were unable to confirm if any offsite upgrades would be required.

Odor Control

Odors at or near the treatment facility will come from either the headworks room or the sludge/equalization storage tanks. The biological process will minimize generation of objectionable odors.

There are a number of measures that can be undertaken to provide odor control. These include mechanical devices such as extraction equipment and vent pipes, or chemical measures implemented in the sludge storage tanks, after the treatment process.

Maintenance Items

The on-site wastewater treatment facility will require routine maintenance. As the treatment facility requires a certified professional to operate and maintain the facility, as well as regularly report on effluent quality, it is recommended that a private company be hired to provide these services.

As mentioned above there are local companies in the State that can be contracted to operate and maintain the treatment facility. The possibility may exist to retain one company to operate and maintain both the water desalination and the wastewater treatment facilities.

VI. SUSTAINABILITY & LEED DESIGN

It is intended that sustainable and green building features will be incorporated into the design of the Center. These features will range from the selection of building materials to energy efficiency, water conservation and re-use, air quality and site



footprint. As part of the green building approach, the Center would be a likely candidate facility to apply to the US Green Building Council for LEED certification.

During the preliminary engineering stage we have identified potential water and wastewater related measures that could be implemented to achieve LEED credits. A brief discussion of the various features is provided below.

A. Landscaping

Water efficient landscaping could be incorporated into the site development. This could include the use of indigenous plants that require little to no irrigation. Instead of potable water, irrigation could be through rainwater capture and re-use or graywater recycling.

B. Innovative Water & Wastewater Technology

Another LEED credit could be through use of innovative technologies to provide potable water supply and reduce wastewater generation.

Innovative potable water technology could include use of brackish water and desalination as this technique does not withdraw freshwater from the local aquifer, thus preserving the sustainable yield.

Waterless urinals, composting toilets, low flow fixtures and re-use of graywater are measures that could be implemented to reduce wastewater generation rates. If graywater re-use is implemented, whether for usage in bathroom facilities or irrigation, design of the treatment and re-circulation system must be in accordance with Hawaii State Department of Health Standards.

C. Water Use Reduction

In addition to receiving credit for innovative technologies, additional LEED credits could be achieved if the volume of potable water was reduced by 20% and a further credit is available if the reduction is more than 30%.

As mentioned above, water consumption can be reduced through the use of low-flow toilets and plumbing fixtures, waterless urinals, composting toilets and graywater re-use.

Upon review of the Uniform Plumbing Code (adopted by the State) an estimation of fixture units was completed for two scenarios: (1) use of "standard" plumbing fixtures and (2) use of "low-flow" plumbing fixtures and waterless urinals. This was done to



quantify the potential reduction in water-use and assess if the 20% or 30% LEED criteria could be met.

Based on our preliminary review, it appears the use of "low-flow" toilets, sink faucets and shower fixtures, combined with waterless urinals and limited laundry facilities, could result in a 23% reduction in the number of fixture units. This correlates to an estimated 20% reduction in water usage, for LEED's credit.

It may be difficult to further reduce water usage and achieve the additional credit for 30% reduction; unless graywater re-circulation was implemented.

A more accurate quantification, including supporting documentation and calculations, of reduction in water-use would need to be completed during the facility planning and design stage.

VII. PERMITS

The following summarizes the anticipated water and wastewater permits that may be required. Additional permits, other than those listed below, may be required for works associated with erosion and sediment control, solid waste and storm water discharge.

National Pollution Discharge Elimination Permit (NPDES)

National Pollution Discharge Elimination System (NPDES) permits will be required for this project. The following are the anticipated NPDES permits that will be required.

Form C

This permit will be required if more than 1 acre of land will be disturbed during construction. A NPDES General Permit Coverage Authorizing Discharges of Storm Water Associated with Construction Activities will be required for this project. It is anticipated that the general application will be applicable as no surface water runs through State Parks.

Form F

NPDES General Permit Coverage Authorizing Discharge of Hydrotesting Waters will be required if the hydrotesting waters will be discharged on site.

Form G

NPDES General Permit Coverage Authorizing Discharges of Associated with Construction Activity Dewatering. This permit may not be required if groundwater



SSFM 2007_150.000

is not likely to be encountered. Groundwater existence will be confirmed when geotechnical investigations are completed.

Clean Water Act Section 401 Water Quality Certification (WQC)

This permit, issued by the State of Hawaii Department of Health, Environmental Management Division, Clean Water Branch, is required for applicants conducting activities, including the construction or operation of facilities, which might result in any discharge into navigable waters. This project will need to obtain a determination from the Clean Water Branch as to whether a WQC will be required.

U.S. Army Corps of Engineers Permit

If it is determined that either a water intake or outfall (desalination concentrate and / or treated wastewater effluent) is required to the sea (navigable waters), then permits may be required from the US Army Corps of Engineers.

Underground Injection Control (UIC)

The project is located below the UIC line, where the underlying aquifer is not considered to be a drinking water source. However, if underground injection wells are wells used for injecting wastewater effluent and/or desalination concentrate into the subsurface then a permit may be required from State of Hawaii, Department of Health.

Department of Health, Wastewater Branch

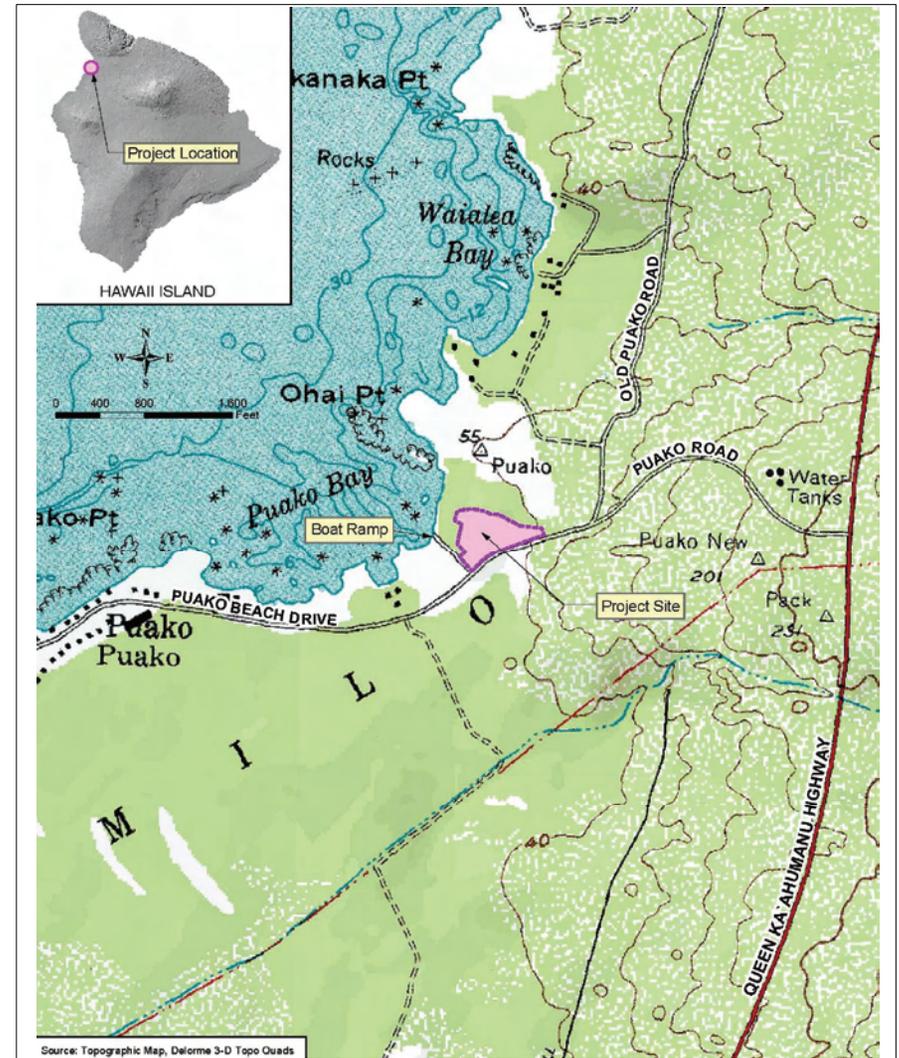
The State of Hawaii Department of Health, Wastewater Branch administers the permitting process for all new wastewater systems including septic tanks, individual wastewater systems such as septic tanks and on-site treatment facilities. Approvals from the Wastewater Branch will be required, and are anticipated to include the Individual Wastewater Systems permit as well as the Biosolids/Treatment Works permits.

Count of Hawaii Water Supply, Approvals and Variance

Since the Department of Water Supply cannot provide adequate water supply to the proposed development, without significant system expansions, a Water Variance from the County of Hawaii, Planning Department will be required in order to develop an alternative water supply as part of the subdivision process.

Well Construction/Pump Installation Permit

The Commission on Water Resource Management, under the Department of Land and Natural Resources, has jurisdiction over land-based surface water resources, and issues permits to regulate the use of surface and ground water in the State of Hawaii. A permit for the well construction and pump installation will be required.

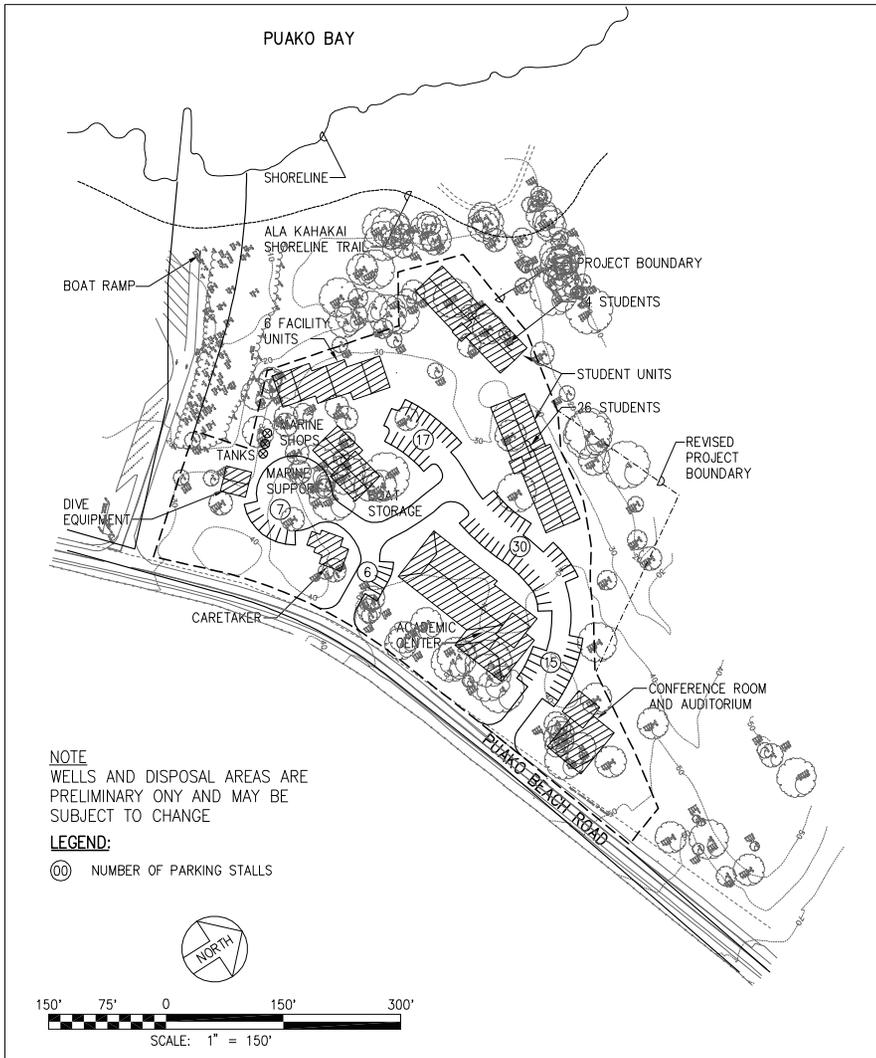


PUAKO MARINE EDUCATION CENTER
LOCATION MAP

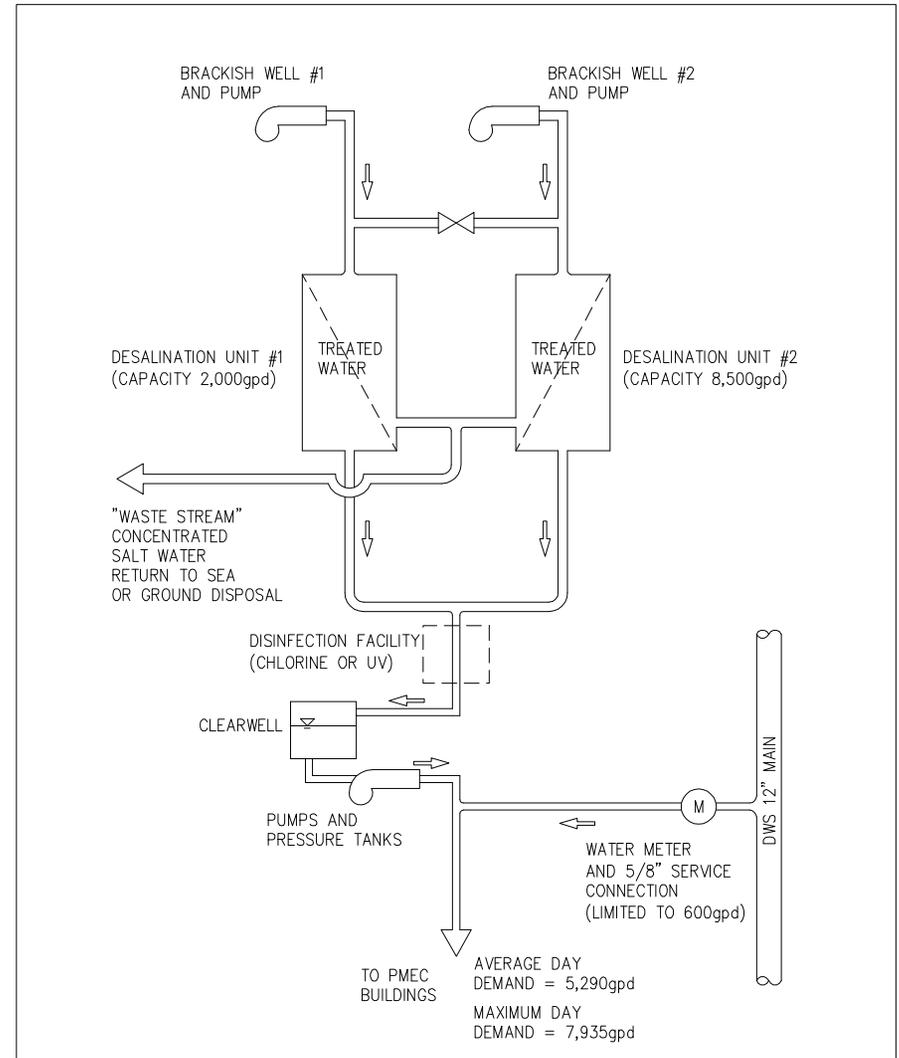
FIGURE
1

SCALE: AS SHOWN

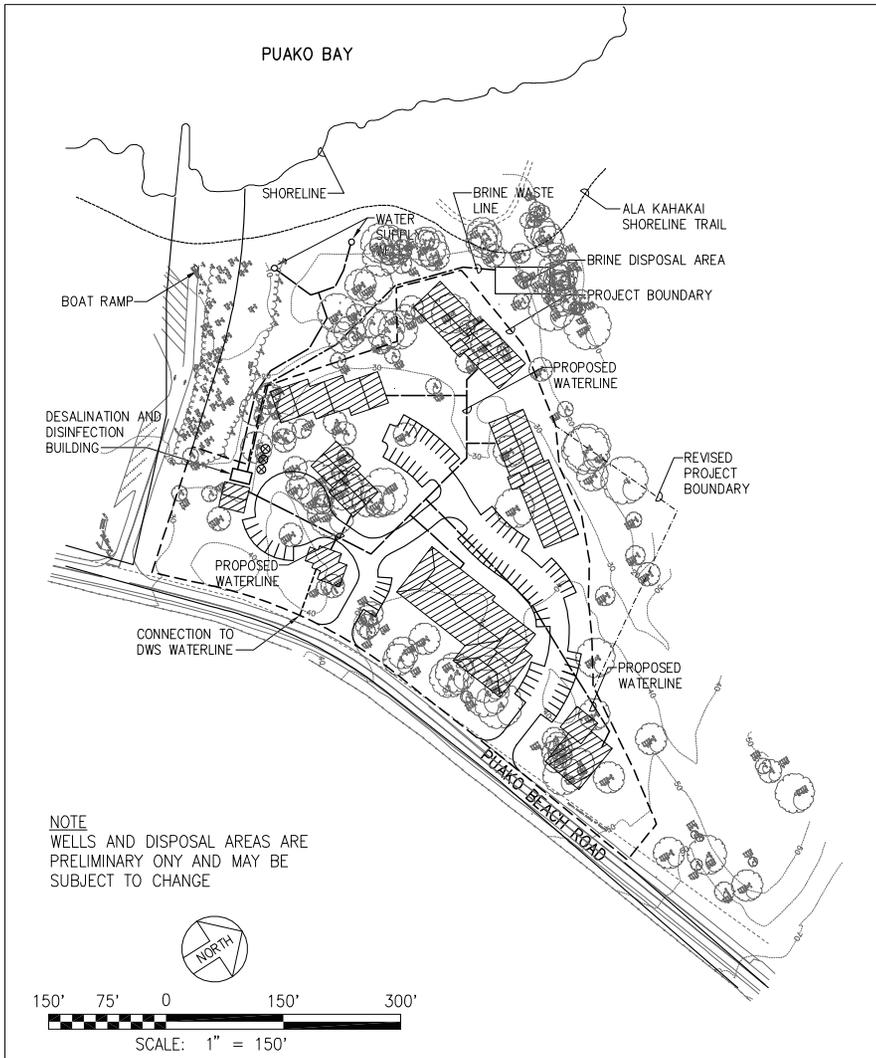
DATE: DECEMBER 2008



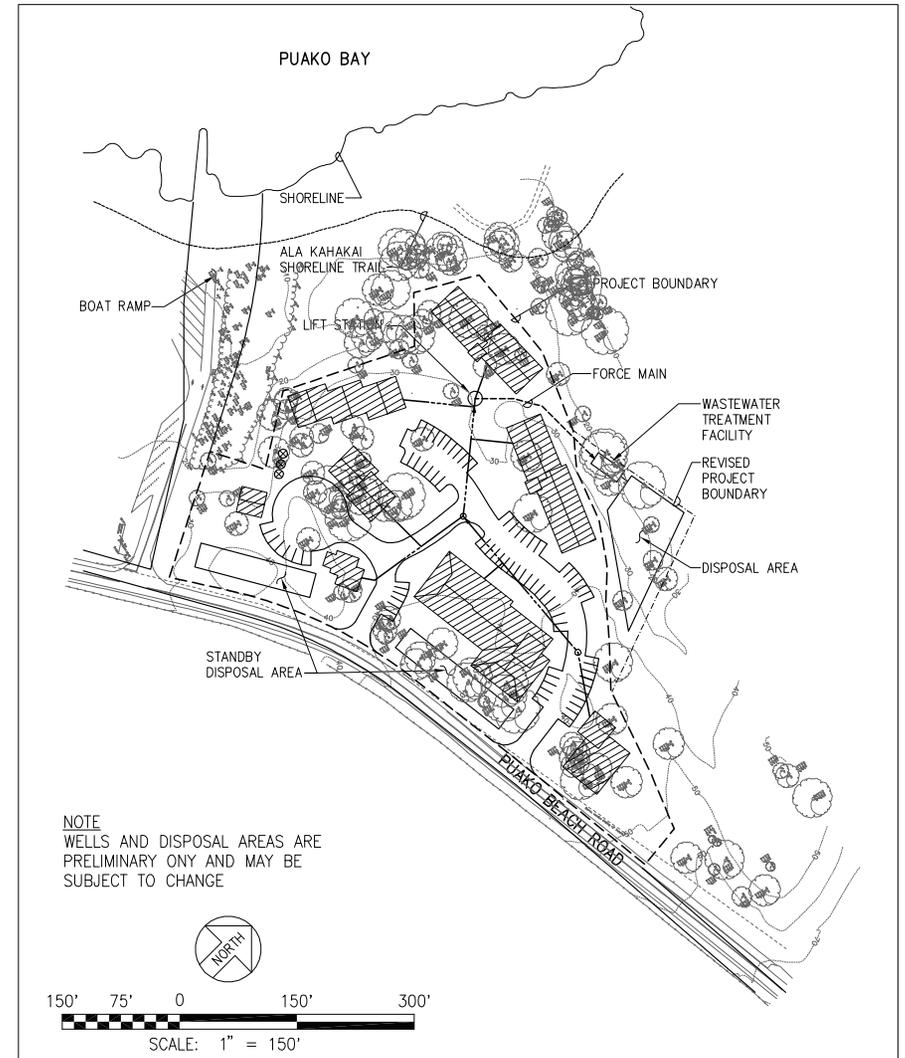
	PUAKO MARINE EDUCATION CENTER SITE PLAN ALTERNATIVE B		FIGURE 2
	SCALE: 1" = 150'	DATE: DECEMBER 2008	



	PUAKO MARINE EDUCATION CENTER WATER SYSTEM PROCESS SCHEMATIC		FIGURE 3
	SCALE: AS SHOWN	DATE: DECEMBER 2008	



	PUAKO MARINE EDUCATION CENTER PROPOSED WATER SYSTEM		FIGURE 4
	SCALE: 1" = 150'	DATE: DECEMBER 2008	



	PUAKO MARINE EDUCATION CENTER PROPOSED WASTEWATER SYSTEM		FIGURE 5
	SCALE: 1" = 150'	DATE: DECEMBER 2008	

Appendix E
Chapter 343, HRS
Pre-Assessment Consultation Correspondence

August 29, 2008

To: See Distribution List



**University of Hawai'i at Hilo Puakō Marine Education and Research Center
Draft Environmental Assessment Pre-Assessment Consultation
Puakō, Lālāmilo Ahupua'a, South Kohala District, Island of Hawai'i, Hawai'i
TMK (3) 6-9-01: 01 (portion)**

Aloha,

The University of Hawai'i at Hilo (UHH) proposes to construct a new marine education and research center on a 5-acre parcel at the intersection of Puakō Beach Drive and the access road to the Puakō Boat Ramp. The proposed center would include academic/academic-support uses (labs, classrooms, etc.), marine support (dive locker, small boat storage, etc.), student and faculty sleeping units, and parking facilities. When completed, the facility would be a modern, state-of-the-art, marine educational and research center located nearby Puakō Bay and the best-developed coral reefs in the Main Hawaiian Islands. Under the Proposed Action, the center would be operated as a field station and laboratory by the UHH Kalakaua Marine Education Center for the UHH Marine Science Department and other UHH departments (e.g., Biology Department) carrying out marine-related education and research activities, largely in support of the UHH undergraduate science programs and community outreach programs.

Our firm has been retained to prepare the environmental assessment (EA) for the proposed construction in compliance with Chapter 343, Hawai'i Revised Statutes. The proposed facility will also require a Special Management Area Use Permit (major) and a County Use Permit from the County of Hawai'i and a Conservation District Use Permit from the State of Hawai'i.

This pre-assessment consultation is intended to ensure that interested parties are notified of the forthcoming Draft EA, and given the opportunity to identify relevant issues and concerns that should be addressed in the EA. A project summary and location map are enclosed for your information. Should you have any written comments, please submit them by September 15, 2008 to:

Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813
Attn: Martha Spengler
mspengler@hhf.com

Thank you for your interest in this project. If you have any questions or concerns on the forthcoming EA or would like to be removed from the list of parties to review the EA, please contact Martha Spengler, project planner, at (808) 545-2055 or via e-mail at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

Attachments

cc: Mr. Glenn Tomiyoshi, UHH Facilities Planning and Construction

Pacific Guardian Center • 733 Bishop Street, Suite 2590 • Honolulu, Hawai'i 96813

Tel. 808.545.2055 • Fax 808.545.2050 • www.hhf.com • e-mail: info@hhf.com

Helber Hastert & Fee

Planners, Inc.

Distribution:

Approving Agency

UHH Vice Chancellor for Administrative Affairs, Debra Fitzsimmons

Federal Agencies

National Oceanic and Atmospheric Administration Marine Fisheries Service
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Army Engineer District, Honolulu
U.S. Fish and Wildlife Service

State of Hawai'i Agencies

Office of Environmental Quality Control
Department of Accounting and General Services (main office and Hawai'i District Office)
Department of Land and Natural Resources (DLNR) Board of Land and Natural Resources and Conservation and Coastal Lands
DLNR, Commission on Water Resources Management
DLNR, Division of Aquatic Resources
DLNR, Division of Boating and Aquatic Recreation (main office and Hawai'i District Manager)
DLNR, Division of Conservation and Resources Enforcement
DLNR, Division of Forestry and Wildlife
DLNR, Division of State Parks
DLNR, Engineering Division
DLNR, Historic Preservation Division (main office and Hawai'i Island Office)
DLNR, Land Division (main office and Hawai'i Island Office)
Department of Business, Economic Development, Tourism (DBEDT), Coastal Zone Management
DBEDT Office of Planning

Department of Health Environmental Planning Office
Department of Hawaiian Home Lands
Office of Hawaiian Affairs
Department of Transportation (Director and State Transportation Planning Office)
University of Hawai'i-Environmental Center

County of Hawai'i Agencies

Civil Defense Agency
Department of Research and Development
Department of Public Works
Department of Water Supply
Fire Department
Planning Department
Police Department
Department of Parks and Recreation
Department of Environmental Management

Utility Companies

Hawaiian Telecom
Hawai'i Electric Light Company

Citizens Groups / Organizations / Other

Puakō Community Association
Sierra Club, Hawai'i Chapter
The Nature Conservancy

Elected Officials

U.S. Senator – Mr. Daniel Inoué
U.S. Senator – Mr. Daniel Akaka
U.S. Representative – Ms. Mazie Hirono
State Senator (3rd District) – Mr. Paul Whalen
State Representative (7th District) – Ms. Cindy Evans
Hawai'i County, Office of the Mayor – Mr. Harry Kim
County Council Chair and Member (9th District) – Mr. Pete Hoffmann

Helber Hastert & Fee
Planners, Inc.

Project Summary

Applicant: Kalakaua Marine Education Center for the Marine Science Department
University of Hawai'i at Hilo (UHH)
200 West Kawili Street
Hilo, HI 96720
Dr. Walter Dudley and Dr. Jason Turner

EA Preparer: Helber Hastert & Fee, Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813
(808) 545-2055
Tom Fee / Martha Spengler

Accepting Authority: University of Hawai'i at Hilo

Proposed Action: UHH proposes to design and build a state-of-the-art marine education and research center. The center would be operated as a field station and laboratory by the UHH Kalakaua Marine Education Center for the UHH Marine Science Department and other UHH departments (e.g., Biology Department) carrying out marine-related education and research activities, largely in support of the UHH undergraduate science programs and community outreach programs.

Chapter 343, Hawai'i Revised Statutes "Trigger": Use of State lands and funds, use of land classified as Conservation District

Tax Map Key: (3) 6-9-01: 01 portion

Location: Five acres site at intersection of Puakō Beach Drive and access road to SOH-owned Puakō Boat Ramp, Puakō, Lāilāmilō ahupua'a, South Kohala District, Island of Hawai'i, State of Hawai'i

Landowner: State of Hawai'i

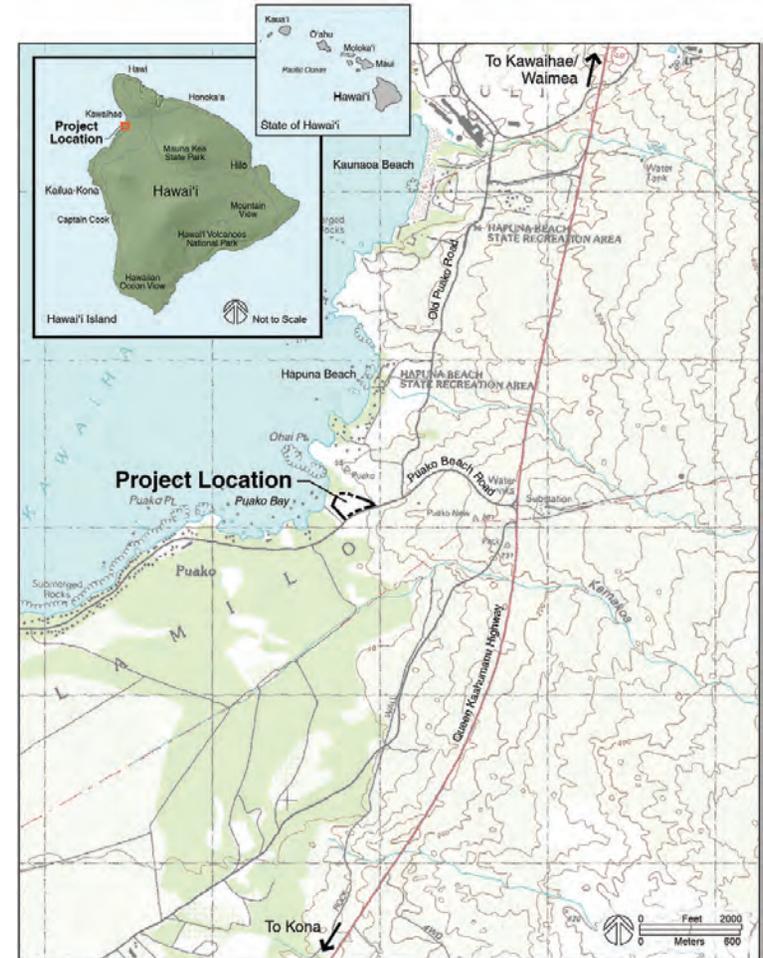
Existing Land Uses: Vacant, undeveloped

State Land Use District: Urban and Conservation (General Subzone)

Hawai'i County Zoning: Open and V1.25 (resort/hotel)

Other Land Use Approvals: Special Management Area Use Permit and County Use Permit (County of Hawai'i) and a Conservation District Use Permit (State of Hawai'i)

Helber Hastert & Fee
Planners, Inc.



Puakō Marine Education Center
University of Hawai'i at Hilo
Figure 1: Location Map
Puakō Island of Hawai'i, State of Hawai'i

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mrs. Nancy McMahon
Deputy State Historic Preservation Officer/State Archaeologist
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawai'i
601 Kamokila Boulevard, Room 555
Kapolei, HI 96707

**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mrs. McMahon,

Thank you for your letter dated September 5, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in Sections 3.3 and 4.3 of the draft Environmental Assessment (DEA). We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,



Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

September 5, 2008

Martha Spengler
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Spengler:

**SUBJECT: Chapter 6E-8 Historic Preservation Review –
Request for Pre-Assessment Consultation on a Draft Environmental Assessment for
the UH-Hilo's Proposed Puako Marine Education and Research Center
Lalamilo Ahupua'a, South Kohala District, Island of Hawai'i
TMK: (3) 6-9-001:001 (por.)**

Thank you for the opportunity to comment on the aforementioned project, which we received on September 4, 2008. This project involves the proposed construction of a new marine education and research center on a five acre parcel between the Puako Beach Drive and the access road to the Puako Boat Ramp.

We determine that **no historic properties will be affected** by this project because:

- Intensive cultivation has altered the land
- Residential development/urbanization has altered the land
- Previous grubbing/grading has altered the land
- An accepted archaeological inventory survey (AIS) found no historic properties
- SHPD previously reviewed this project and mitigation has been completed
- Other: *An accepted archaeological assessment (Clark and Rechtman 2008) for this parcel found no historic properties affected, and SHPD concurred with that assessment (Doc No. 0804MD17).*

In the event that historic resources, including human skeletal remains, cultural materials, lava tubes, and lava blisters/bubbles are identified during the construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Hawaii Island Section, needs to be contacted immediately at (808) 981-2979.

If you have questions about this letter please contact Morgan Davis at (808) 981-2979.

Aloha,



Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager
State Historic Preservation Division

LAURA R. THIELER
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR, WATER

AGRICULTURE
BOATING AND OCEAN RECREATION
BUREAU OF CONSERVATION
COMMISSION ON WATER RESOURCES MANAGEMENT
CONSERVATION AND COASTAL LAND
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

LOG NO: 2008.3920
DOC NO: 0809MD39
Archaeology

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Ken Kawahara, Deputy Director
Commission on Water Resource Management
Department of Land and Natural Services
State of Hawai'i
P.O. Box 621
Honolulu, HI 96809



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lalāmilō Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Kawahara,

Thank you for your letter dated September 4, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. We will send you a copy of the draft Environmental Assessment (DEA) when it is distributed.

We will send a copy of the DEA to DLNR Engineering Division so that they can include it into the State Water Projects Plan. Your comments are addressed in Section 4.6 (Utilities) and Section 4.8 (Groundwater and Surface Water Resources).

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

September 4, 2008

LAURA H. THIELEN
CHAIRPERSON
MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIKE, M.D., J.D.
KEN C. KAWAHARA, P.E.
IDENTITY DIRECTOR

REF: UHH Puako Marine Ctr.Pre-Assessment

Helbert, Hastert & Fee Planners
733 Bishop St., Ste. 2590
Honolulu, HI 96813
Attn: Martha Spengler

Dear Ms. Spengler:

**SUBJECT: University of Hawaii at Hilo Puako Marine Education and Research Center
Draft Environmental Assessment Pre-Assessment Consultation
Puako, Lalamilō Ahupuaa, South Kohala District, Island of Hawaii, Hawaii**

FILE NO.: NA
TMK NO.: (3)6-9-01:01(portion)

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at <http://www.hawaii.gov/dlnr/cwrmm>.

Our comments related to water resources are checked off below.

- 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
- 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
- 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
- 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at <http://www.usgbc.org/leed>. A listing of fixtures certified by the EPA as having high water efficiency can be found at <http://www.epa.gov/watersense/pp/index.htm>.

- 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at <http://hawaii.gov/dbedt/czm/initiative/lid.php>.
- 6. We recommend the use of alternative water sources, wherever practicable.
- 7. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM:

Additional information and forms are available at www.hawaii.gov/dlnr/cwrm/forms.htm.

- 8. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water.
- 9. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.
- 10. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 11. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 12. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 13. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.
- 14. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- 15. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 16. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- OTHER:
We recommend that the projected demands for both potable and non-potable water be included in the EA and that the proposed source(s) of water supply be identified.

If there are any questions, please contact Lenore Ohye at 587-0216.

Sincerely,


KEN C. KAWAHARA, P.E.
Deputy Director

LO:sd

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. William Andrews, Property Manager
Division of Boating and Ocean Recreation
Department of Land and Natural Resources
State of Hawai'i
333 Queen Street, Suite 300
Honolulu, Hawaii 96813



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Andrews,

Thank you for your email of September 3, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments pertaining to the proposed Center's use of the Puako boat ramp are addressed in Section 4.15.2 (#3) of the draft Environmental Assessment (DEA). The Division of Boating and Ocean Recreation's plans for expanding the boat ramp facilities are noted and addressed in Sections 2.1 (Project Location) and 4.16 (Cumulative Impacts) of the DEA. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

From: William.R.Andrews@hawaii.gov
Sent: Wednesday, September 03, 2008 2:48 PM
To: Martha Spengler
Cc: glennndht@hawaii.edu; jconey@hawaii.edu; Tom Fee; thl@hawaii.edu; Ed.R.Underwood@hawaii.gov; Dan.Quinn@hawaii.gov; Eric.T.Yuasa@hawaii.gov
Subject: Re: 2007155 Puako Marine Education and Research Center - Early Consultation Letter

Attachments: Early consultation letter _28Aug08_.pdf

Aloha Ms. Spengler,
Thank you for the information and including the Division of Boating and Ocean Recreation (DOBOR) as a stakeholder.
DOBOR continues to look forward to it's future expansion of an additional 3 acres north and adjacent the Puako Ramp to meet the growing need for parking and rest-room facility. In addition we understand that the University shall be utilizing the public ramp on a regular basis, it may be helpful to include DOBOR in the planning process. We look forward to meet to discuss the plans for this proposed project at a time convenient to all.
Much Mahalo,

William R. Andrews
Property Manager
Division Of Boating and Ocean Recreation
Department of Land and Natural Resources
333 Queen St., Suite 300
Honolulu, Hawaii 96813
Tel: (808) 587-1978
Fax: (808) 587-1977

"Martha Spengler" <mspengler@hhf.com>

09/03/2008 11:12 AM

To <william.r.andrews@hawaii.gov>
cc <thl@hawaii.edu>, "Tom Fee" <tfec@hhf.com>, <glennndht@hawaii.edu>, <jconey@hawaii.edu>
Subject 2007155 Puako Marine Education and Research Center - Early Consultation Letter

Mr. Andrews,
Mr. Ted Le Jeune of University of Hawaii at Hilo (UHH) Facilities Planning and Construction let me know that you would like to be included as a stakeholder for the Puako Marine Education and Research Center. Thank you for your interest in the proposed project; attached to this email is a copy of the early consultation letter for the proposed project. Please feel free to contact me with any questions or comments.

Sincerely,
Martha Spengler, REA
Senior Planner
Helber Hastert & Fee Planners Inc.

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mrs. Nancy Murphy
Hawai'i District Manager
Division of Boating and Ocean Recreation
Department of Land and Natural Resources
74-380 Kealahou Parkway
Kailua-Kona, HI 96740



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālamilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mrs. Murphy,

Thank you for your email of September 15, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. In reference to your concern about parking for the Puako Boat Ramp, there would be no loss of parking for boat ramp as a result of the Proposed Action or alternatives. We will send you a copy of the draft Environmental Assessment when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. Fee'.

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

From: Nancy.E.Murphy@hawaii.gov
Sent: Monday, September 15, 2008 8:45 AM
To: Martha Spengler
Cc: Daniel.K.Mersburgh@hawaii.gov; William.R.Andrews@hawaii.gov
Subject: UofH Puako Marine Education Center

Aloha to all,

Thank you for including us in your future plans. As the Hawaii District Manager for this island, we are always concerned with the future as it will influence the small boat harbors. The only real issue we have at Puako is the parking for the Puako boat ramp. We want to be sure that we will not lose what we already have. Anytime you want to me just give me a call and we can meet you on site or in my office.

Nancy Murphy
Hawaii District Manager

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733 Bishop Street, Suite 2590
Honolulu, HI 96813
808.545.2055 ext. 238
fax 808.545.2050
<<Early consultation letter _28Aug08_.pdf>>

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Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Morris Atta, Administrator
Land Division
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, HI 96809



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Atta,

Thank you for your letters dated September 15 and 26, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. We will send you a copy of the draft Environmental Assessment (DEA) when it is distributed.

Your comments, which also included comments from the Department of Land and Natural Resources (DLNR) Engineering Division and the Office of Conservation & Coastal Lands (OCCL), are noted and are addressed in Sections 1.4, 3.7, 3.8, 4.7, and 4.8 of the DEA. Section 1.4 addresses required permits and approvals, Sections 3.7 and 4.7 address flood hazards, tsunami, storm events, and volcanic/seismic events, and Sections 3.8 and 4.8 address groundwater and surface water issues including water demands and calculations.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office; Mr. Eric T. Hirano, Chief Engineer, DLNR Engineering Division; Mr. Samuel J. Lemmo, Administrator, DLNR OCCL.

LINDA LINGLE
GOVERNOR OF HAWAII

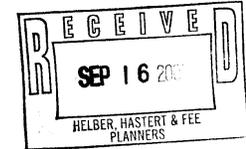


LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 15, 2008



Helber, Hastert & Fee Planners
733 Bishop Street Suite 2590
Honolulu, Hawaii 96813

Attention: Ms. Martha Spengler

Gentlemen:

Subject: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center, Puako, Hawaii, Tax Map Key: (3) 6-9-1:portion 1

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Engineering Division, Land Division, Office of Conservation & Coastal Lands, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Morris M. Atta
Administrator

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 4, 2008

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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LAND DIVISION
2008 SEP 12 P 3 42
DEPT OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/MorrisAtta
Ref.: PreConDEAUHHPuakoMarineEd
Hawaii.406

COMMENTS

- () We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ____.
- (X) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone X. The Flood Insurance Program does not have any regulations for developments within Flood Zone X.
- () Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ____.
- () Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- () Mr. Robert Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.
- () Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.
- () Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.
- () Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.
- () The applicant should include water demands and infrastructure required to meet project needs. Please note that projects within State lands requiring water service from the Honolulu Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.
- (X) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.
- () Additional Comments: _____
- () Other: _____

Should you have any questions, please call Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed:
ERIC T. HIRANO, CHIEF ENGINEER
Date: 9/11/08

MEMORANDUM

TO: DLNR Agencies:
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Commission on Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division - Hawaii District

FROM: Morris M. Atta
SUBJECT: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center
LOCATION: Puako, Hawaii, TMK: (3) 6-9-1:portion 1
APPLICANT: Helber, Hastert & Fee Planners

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 13, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- () We have no objections.
- () We have no comments.
- (X) Comments are attached.

Signed:
Date: 9/11/08

LINDA LINGLE
GOVERNOR OF HAWAII



LAURA H. THIELEN
CHIEF OF BUREAU
BOARD OF LAND & NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 4, 2008

MEMORANDUM

TO: **DLNR Agencies:**
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Commission on Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division - Hawaii District

RECEIVED
LAND DIVISION
2008 SEP 12 A 10:50
DEPT OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

FROM: *for* Morris M. Atta *Charlene*
SUBJECT: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center
LOCATION: Puako, Hawaii, TMK: (3) 6-9-1:portion 1
APPLICANT: Helber, Hastert & Fee Planners

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 13, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *for*
Date: 9/9/08

LINDA LINGLE
GOVERNOR OF HAWAII



LAURA H. THIELEN
CHIEF OF BUREAU
BOARD OF LAND & NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

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HONOLULU, HAWAII 96809

September 4, 2008

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2008 SEP 12 A 10:43

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

MEMORANDUM

TO: **DLNR Agencies:**
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Commission on Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division - Hawaii District

RECEIVED
OFFICE OF CONSERVATION
& COASTAL LANDS
2008 SEP -4 A 10:25
DEPT OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

FROM: *for* Morris M. Atta *Charlene*
SUBJECT: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center
LOCATION: Puako, Hawaii, TMK: (3) 6-9-1:portion 1
APPLICANT: Helber, Hastert & Fee Planners

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 13, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *for*
Date: 9/9/08

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LAND
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL V. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAIHOLOLA ISLAND RESERVE COMMISSION
LAND
STATE PARKS

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 26, 2008

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

REF:OCCL:TM

Correspondence: HA 09-47

Thomas A. Fee, Principal
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

SEP 12 2008

Dear Mr. Fee,

SUBJECT: Draft Environmental Assessment (EA) Pre-Assessment for the Proposed UH-Hilo Puako Marine Education and Research Center Located at Puako, Lalamilo, Hawaii Island, TMK: (3) 6-9-001:001

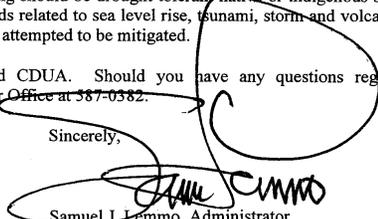
The Office of Conservation and Coastal Lands is in receipt of your correspondence regarding the subject matter. As noted, the parcel does appear to be dual zoned and lies within the General subzone of the Conservation District and the Urban State Land Use District. The proposed use is an identified land use within the Conservation District that requires the filing of a Conservation District Use Application (CDUA) pursuant to the Hawaii Administrative Rules (HAR), §13-5-22, P-6 PUBLIC PURPOSE USE-Land uses undertaken by the State of Hawaii or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district. This proposal requires a Board permit; therefore the decision to approve, modify or deny the construction of the proposal shall be at the discretion of the Board of Land and Natural Resources.

Should subdivision of the State parcel be required for this proposal, please include this use with the CDUA. Please note that a Special Management Area Permit must be obtained prior to presentation of this CDUA to the Board.

The OCCL notes the Ala Kahakai National Historic Trail Corridor is within the vicinity of the proposal. We suggest that the community and known traditional users of the area be consulted early on in the process. Any and all proposed landscaping should be drought tolerant native or indigenous species. As Puako is a low lying area, potential hazards related to sea level rise, tsunami, storm and volcanic/seismic events in this area should be expected and attempted to be mitigated.

We look forward to the draft EA and CDUA. Should you have any questions regarding this correspondence, contact Tiger Mills of our Office at 587-0382.

Sincerely,


Samuel I. Lemmo, Administrator
Office of Conservation and Coastal Lands

C: HDLO

Helber, Hastert & Fee Planners
733 Bishop Street Suite 2590
Honolulu, Hawaii 96813

Attention: Ms. Martha Spengler

Gentlemen:

Subject: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center, Puako, Hawaii, Tax Map Key: (3) 6-9-1:portion 1

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to Division of Aquatic Resources for their review and comment.

The Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,


Morris M. Atta
Administrator

Cc: Office of Planning

LINDA LINGLE
GOVERNOR OF HAWAII



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LAND DIVISION



2008 SEP 25 A 4:50
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

LAU LA H THIFLEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

1825

AM ✓

RN

September 4, 2008

MEMORANDUM

TO: **DLNR Agencies:**
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Commission on Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division - Hawaii District

FROM: Morris M. Atta

Chalene

SUBJECT: Pre-consultation for draft environmental assessment for proposed University of Hawaii at Hilo Puako Marine Education and Research Center

LOCATION: Puako, Hawaii, TMK: (3) 6-9-1:portion 1

APPLICANT: Helber, Hastert & Fee Planners

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by September 13, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *[Signature]*

Date: *14 Sept 2008*

RECEIVED

SEP 08 2008

DAR -Hilo



Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Land
Department of Land and Natural Resources
State of Hawai'i
P.O. Box 621
Honolulu, HI 96809

**Subject: University of Hawai'i at Hilo Marine Education and Research Center Environmental Assessment
Puako, Lālamilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Lemmo,

Thank you for your letter dated September 12, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in Sections 1.4 (required permits and approvals), 3.3/4.3 (archaeological and cultural resources), and 3.7/4.7 (physical hazards) of the draft Environmental Assessment (DEA). We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,



Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LAND
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

Thomas A. Fee, Principal
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Fee,

SUBJECT: Draft Environmental Assessment (EA) Pre-Assessment for the Proposed UH-Hilo Puako Marine Education and Research Center Located at Puako, Lalamilo, Hawaii Island, TMK: (3) 6-9-001:001



Correspondence: HA 09-47

SEP 12 2008

Laura H. Thiele
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
Russell V. Tsuji
FIRST DEPUTY
Ken C. Kawahara
DEPUTY DIRECTOR - WATER
Aquatic Resources
BOATING AND OCEAN RECREATION
BUREAU OF CONSERVATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
SINGAPORE
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

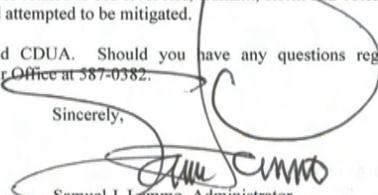
The Office of Conservation and Coastal Lands is in receipt of your correspondence regarding the subject matter. As noted, the parcel does appear to be dual zoned and lies within the General subzone of the Conservation District and the Urban State Land Use District. The proposed use is an identified land use within the Conservation District that requires the filing of a Conservation District Use Application (CDUA) pursuant to the Hawaii Administrative Rules (HAR), §13-5-22, P-6 PUBLIC PURPOSE USE-Land uses undertaken by the State of Hawaii or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district. This proposal requires a Board permit; therefore the decision to approve, modify or deny the construction of the proposal shall be at the discretion of the Board of Land and Natural Resources.

Should subdivision of the State parcel be required for this proposal, please include this use with the CDUA. Please note that a Special Management Area Permit must be obtained prior to presentation of this CDUA to the Board.

The OCCL notes the Ala Kahakai National Historic Trail Corridor is within the vicinity of the proposal. We suggest that the community and known traditional users of the area be consulted early on in the process. Any and all proposed landscaping should be drought tolerant native or indigenous species. As Puako is a low lying area, potential hazards related to sea level rise, tsunami, storm and volcanic/seismic events in this area should be expected and attempted to be mitigated.

We look forward to the draft EA and CDUA. Should you have any questions regarding this correspondence, contact Tiger Mills of our Office at 587-0382.

Sincerely,



Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

C: HDLO

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Micah Kane, Chairman
Hawaiian Homes Commission
Department of Hawaiian Home Lands
State of Hawai'i
P.O. Box 1879
Honolulu, HI 96805

**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālamilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Kane,

Thank you for your letter dated September 15, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. We will send you a copy of the draft Environmental Assessment when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,



Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office



LINDA LINGLE
GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

P.O. BOX 1879
HONOLULU, HAWAII 96805

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION
KAULANA H. PARK
DEPUTY TO THE CHAIRMAN
ROBERT J. HALL
EXECUTIVE ASSISTANT

September 15, 2008



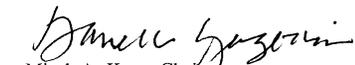
Ms. Martha Spengler
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Spengler:

Thank you for the opportunity to participate in the consultation process in preparation of a draft environmental assessment report for the University of Hawaii at Hilo's Puako Marine Education and Research Center in Lalamilo, South Kohala, Hawaii. The Department of Hawaiian Home Lands has no comments to offer.

Should you have any questions, please call the Planning Office at (808) 620-9480.

Aloha and mahalo,


Micah A. Kane, Chairman
Hawaiian Homes Commission

fn

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Clyde Nāmu'o, Administrator
Office of Hawaiian Affairs
State of Hawai'i
711 Kapiolani Boulevard, Suite 500
Honolulu, HI 96813



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Nāmu'o,

Thank you for your letter dated September 9, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed Sections 3.6 and 4.6 in the draft Environmental Assessment (DEA). Sections 3.6 and 4.6 address utilities including anticipated use of alternative energy sources, native, drought-tolerant plants, and the minimization of upward and lateral lighting in conjunction with the Proposed Action. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

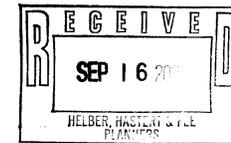
cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

PHONE (808) 594-1888



FAX (808) 594-1865

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813



HRD08/3812

September 9, 2008

Martha Spengler
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, Hawai'i 96813

RE: Request for comments on the proposed Puakō marine education and research center pre-assessment consultation, Lālāmilo, Kohala, Hawai'i, TMK: 6-9-1:01.

Aloha e Martha Spengler,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated August 29, 2008. OHA has reviewed the project and offers the following comments.

OHA offers our general support for this proposed marine related education and research center. We do, however, have some perennial areas of concern related to projects such as these. We will particularly look forward to reviewing further information regarding access in the area, cultural practices in the area, impacts to water quality, and proposed mitigations to wildlife in the area.

OHA also notes that on January 28, 2008 Assistant Secretary of the Department of Energy Alexander Karsner and Hawaii Governor Linda Lingle signed a groundbreaking memorandum of understanding between the state government and the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. The agreement created the Hawaii Clean Energy Initiative, which seeks to transform Hawaii's energy portfolio into a predominately renewable energy mix, moving away from reliance on fossil fuels. Act 95, Session Laws of Hawai'i set a new original renewable portfolio standard goal of approximately 20 percent of the electric energy supply in Hawai'i to be generated from renewable resources by 2020. However, it is estimated that Hawai'i can potentially meet between 60 and 70 percent of its future energy needs from clean, renewable energy sources. As this proposal includes new buildings, OHA asks if the applicant has considered compliance with Act 96 enacted by the Legislature of the State of Hawai'i (2006). The purpose of this Act is to provide one segment of a larger

Martha Spengler
September 9, 2008
Page 2

comprehensive approach to achieving energy self-sufficiency for the state by incorporating green building practices and installing renewable energy resources while using environmentally preferable products. OHA also notes that Hawai'i Revised Statutes §196-9 sets energy efficiency and environmental standards for state facilities which should be complied with.

OHA would also like to suggest that the project area be landscaped with drought tolerant native or indigenous species that are common to the area. Any invasive species should also be removed. Doing so would not only serve as practical water-saving landscaping practices, but also serve to further the traditional Hawaiian concept of mālama 'āina and create a more Hawaiian sense of place. This would also help to reduce the amount of impervious surfaces in the project area, thereby reducing runoff as well. Tree and landscape planting to shade paved parking areas and provide shade and cooling to building elements and outdoor use areas should also be considered.

Further, because this project is so close to the coast, all outdoor lights should be fully shaded or full cut-off styles. Uplighting should be avoided. Every effort should be made to avoid lighting situations where light glare projects upwards or laterally. Lighting that directly illuminates the shoreline and ocean waters or directed toward the shoreline is prohibited under Hawaii Revised Statutes §205A-30.5. Large, high-intensity floodlights located on building tops or poles should also be avoided. Use of amber colored or other color (such as blue or green) filters or bulbs should be used to assist in decreasing risk of seabird attraction and the potential confusion of honu. For the same reasons, OHA also recommends the use of motion detection-activated lights to prevent lights from being on for extended periods of time. Also, the painting of buildings and other facilities should be in earth tones; white or reflecting colors are to be avoided.

Thank you for the opportunity to comment. We look forward to reviewing the draft environmental assessment. If you have further questions, please contact Grant Arnold by phone at (808) 594-0263 or e-mail him at granta@oha.org.

'O wau iho nō me ka 'oia 'i'o,



Clyde W. Nāmu'o
Administrator

C: OHA Kona CRC Office

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Abbey Seth Mayer, Director
Office of Planning
Department of Business, Economic Development, and Tourism
State of Hawai'i
235 Beretania Street, 6th floor
Honolulu, HI 96813

**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Mayer,

Thank you for your letter dated September 9, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. We will send you a copy of the draft Environmental (DEA)A when it is distributed.

Your comments are noted and are addressed in Sections 3.1, 3.3, 3.4, 3.6, 3.10, 3.11, 4.1, 4.3, 4.4, 4.6, 4.10, 4.11, and 4.17 of the DEA.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,



Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
ABBEY SETH MAYER
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-12243

September 9, 2008

Ms. Martha Spengler
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, Hawai'i 96813

Aloha Ms. Spengler:

Subject: University of Hawai'i at Hilo
Puakō Marine Education and Research Center
Draft Environmental Assessment/Pre-Assessment Consultation (DEA)
TMK: (3) 6-9-001:01 (portion)
Puakō, Lālāmilo Ahupua'a, South Kohala District, Island of Hawai'i

Thank you for sending the Office of Planning the Draft EA/Pre-Assessment Consultation for the above referenced proposal.

The Office of Planning requests that the Draft Environmental Assessment (DEA) consider the impacts of the proposed project on the following issues:

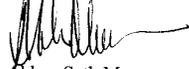
1. **Cultural/Historic Resources** – Please include an inventory survey of cultural and historic sites, with monitoring and preservation plans approved by the State Historic Preservation Division. The Kona and Kohala Coasts are rich in archaeological and historical resources; Puakō is well known for its petroglyph (ki'i pohaku) fields. Please discuss how access for Native Hawaiians for traditional and customary practices will be preserved to include visual landmarks if applicable.
2. **Environmental, Recreational and Scenic Resources** – Please include an inventory of flora and fauna on the project site and any required protections. Consider in the design of your field observations including both wet and dry season surveys to capture the fullest range of flora and fauna. Please include a description of recreational uses on or near the project site and whether the proposed development will in any way restrict access to the existing public boat launch ramp. A description of scenic resources should also be included. Please discuss the proximity of the project and its components to the State Conservation District, including coastal and offshore resources.

Ms. Martha Spengler
September 9, 2008
Page 2

3. **Energy** – Please include a discussion on how the proposed development will meet requirements in Section 196-9, Hawai'i Revised Statutes, which addresses energy efficiency and environmental standards for state facilities.
4. **Water Supply** – Water resource protection is a critical State issue. If the proposed project is within a designated Water Management Area, please include information on the drinking water and non-potable water sources that will be available for the project.
5. **Coastal Zone Management** – The State oversees protection of natural, cultural, and economic resources within the coastal zone. Please discuss how the proposed project will balance the competing values of economic development and preservation of coastal resources, including protection from hurricane, storm surge, flood hazard, volcano, and soil erosion as applicable and found in Chapter 205A, Hawai'i Revised Statutes.
6. **Use of State Lands** – The use and lease of State lands may affect beneficiaries of the State Office of Hawaiian Affairs. Please include a discussion of whether the land parcel in question is part of the ceded lands inventory and how that might affect the development of the facility.

The Office of Planning looks forward to receiving the DEA with the potential impacts and mitigation measures for the above issues addressed. If you have any questions, please call Scott Derrickson, AICP in the Land Use Division at 587-2805.

Sincerely,



Abbey Seth Mayer
Director

ASM/SD

c: DLNR Office of Conservation and Coastal Lands
Department of Health, Office of Environmental Quality Control

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Dr. Brennon Morioka, Director
Department of Transportation
State of Hawai'i
869 Punchbowl Street
Honolulu, HI 96813



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lāilānilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Dr. Morioka,

Thank you for your letter dated September 26, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed Sections 3.5 and 4.5 (traffic) of the draft Environmental Assessment (DEA). As requested, we will send you four copies of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

LINDA LINGLE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

September 26, 2008

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:
DIR 1357
STP 08-203
STP 8.3007

Ms. Martha Spengler
Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Spengler:

Subject: University of Hawaii at Hilo, Puako Marine Education & Research Center
Pre-Assessment Consultation, Draft Environmental Assessment (Draft EA)

The Department of Transportation (DOT) submits the following initial comments on the subject proposed marine center:

1. The center's road access will be at the intersection of Puako Beach Road and Queen Kaahumanu Highway. Although it appears the center may not generate any significant traffic impacts, a formal determination of the projected cumulative traffic at this highway intersection, including the project's traffic, is requested.
2. A traffic assessment report should be prepared and submitted as part of the forthcoming Draft EA. The report should cover anticipated trip generation, expected usage of the facility from initial construction through complete build-out and occupancy, and include any special uses or events that may be held at the center. A preliminary LOS analysis at the highway intersection should be included in the report. The traffic assessment will assist the DOT Highways Division in determining whether circumstances and growth in the area and traffic on Puako Beach Road necessitate any highway or intersection improvements.

The DOT requests four (4) copies of the Draft EA for further review and comments.

The DOT appreciates the courtesy of the consultation and for the opportunity to provide comments.

Very truly yours,

BRENNON T. MORIOKA, PH.D., P.E.
Director of Transportation

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Ernest Lau, Public Works Administrator
Department of Accounting and General Services
State of Hawai'i
P.O. Box 119
Honolulu, Hawaii 96810



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lāilānilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Lau,

Thank you for your letter dated September 10, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. We note that you have no comments at this time. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

LINDA LINGLE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

RUSS K. SAITO
COMPTROLLER
BARBARA A. ANNIS
DEPUTY COMPTROLLER

(P)1301.8

SEP 1 0 2008

Ms. Martha Spengler
Helber, Hastert & Fee, Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Spengler:

**Subject: Pre-Assessment Consultation for Draft Environmental Assessment
University of Hawaii at Hilo Puako Marine Education and Research Center
Puako, Lalamilo Ahupua'a, South Kohala District, Island of Hawaii
TMK (3) 6-9-01: 01 (portion)**

Thank you for the opportunity to provide comments on the Early Consultation Draft Environmental Assessment, University of Hawaii at Hilo Puako Marine Education and Research Center. The proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If there you have any questions regarding the above, please have your staff call Mr. David DePonte of the Planning Branch at 586-0492.

Sincerely,

ERNEST Y. W. LAU
Public Works Administrator

DD:mo

c: Ms. Katherine Kealoha, DOH OEQC
Mr. Glenn Okada, DAGS Hawaii District Office

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mrs. Jane Testa, Director
Department of Research and Development
County of Hawai'i
25 Aupuni Street, Room 109
Hilo, HI 96720



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puako, Lālamilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mrs. Testa,

Thank you for your letter dated September 15, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in the Sections 3.6 and 4.6 (utilities) of the draft Environmental Assessment (DEA). In addition, as requested in your letter, the Pre-final South Kohala Community Development Plan was reviewed in preparation of the DEA. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

Harry Kim
Mayor



County of Hawaii

DEPARTMENT OF RESEARCH AND DEVELOPMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8366 • Fax (808) 935-1205
E-mail: chresdev@co.hawaii.hi.us

Jane H. Testa
Director

Diane L. Ley
Deputy Director

September 15, 2008

TO: Martha Spengler
Project Planner
Helber, Hastert & Fee Planners
mspengler@hhf.com

FR: Diane Ley
Deputy Director

RE: University of Hawai'i at Hilo
Puako Marine Education and Research Center
Draft EA Pre-Assessment Consultation
Puako, Lalamilo Ahupua'a, South Kohala District, Island of Hawai'i,
Hawai'i, TMK (3) 6-9-01:01 (portion)

On behalf of the County of Hawai'i's Department of Research and Development, thank you for this opportunity to provide comments on relevant issues and concerns related to the upcoming environmental assessment (EA) for the proposed University of Hawai'i at Hilo's Puako Marine Education and Research Center.

The Center will enable the University to expand its educational and research outreach to the West side of the Island; hence, meeting the growing student demand for this popular program within close proximity to one of the best coral reefs on the island.

With respect to issues and concerns, the Department would encourage the review and continued monitoring of the draft Community Development Plan (CDP) for the South Kohala District. Through the CDP process, there has been a wealth of information gathered relative to the community's concerns and desires for the future of the region. The current version of the plan is available at www.hawaiiislandplan.com, or contact the Planning Department for further details about the plan and the planning process.

Martha Spengler
Helber, Hastert & Fee Planners
September 15, 2008
Page 2.

The Department also recommends that the EA address the proposed level of energy consumption foreseen and discussion of necessary adjustments to the local utility's distribution system. Issues related to energy conservation and energy sustainability should be addressed as means of supporting and moving toward the State's energy policies and those of the County of Hawai'i, as listed in the bullets below.

- All facilities should meet the minimum standard of the United States Environmental Protection Agency's Energy Star rating.
- All hot water requirements should be met with solar water heater units.
- All facilities should include radiative barriers or R-19 equivalent in roofs and R-11 in walls.
- Consideration should be given to third party contract for the installation of a net-metered photovoltaic system.

Furthermore, energy conservation and sustainability initiatives may afford the proposed project the ability to significantly offset its continuing electrical utility expenses. Certification as a Leadership in Energy and Environmental Design (LEED) project would be a higher-recognition effort towards this end.

The County's Department of Water Supply is the single largest consumer of energy on the Big Island. Finding ways to reduce consumption of water will have the ancillary benefit of reducing energy consumption. The Department encourages the consideration of such features as low-flow showerheads, low-flow toilets, provision of urinals in place of toilets, and even waterless urinals if feasible. In addition, landscaping that utilizes native and drought-tolerant plantings will reduce the need for watering.

Again, thank you for this opportunity to provide comments.

C: Harry Kim, Mayor County of Hawai'i

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Milton Pavao, P.E., Manager
Department of Water Supply
County of Hawai'i
345 Kekuaano'a Street, Suite 20
Hilo, HI 96720



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lāilāmilō Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Pavao,

Thank you for your letter dated September 11, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in Section 4.6.1 of the draft Environmental Assessment (DEA) document. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
345 KEKUAANO'A STREET, SUITE 20 • HILO, HAWAII 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

September 11, 2008

Ms. Martha Spengler
Helber, Hastert, and Fee Planners, Inc.
733 Bishop Street, Suite 2590
Honolulu, HI 96813



**PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
UNIVERSITY OF HAWAII AT HILO MARINE EDUCATION AND RESEARCH CENTER
TAX MAP KEY 6-9-001:001 (PORTION)**

We have reviewed the subject Pre-Environmental Assessment Consultation and have the following comments.

Water is available from an existing 12-inch waterline within Puako Beach Drive fronting the subject parcel. Water availability in the area is limited to one (1) 5/8-inch meter per existing lot of record, which is limited to a maximum daily usage of 600 gallons.

Prior to the installation of a meter for the proposed project, the Department will request estimated maximum daily water usage calculations, prepared by a professional engineer licensed in the State of Hawai'i, for review and approval. Further, any meter(s) serving the subject parcel shall have a reduced pressure type backflow prevention assembly installed within five (5) feet of the meter on private property before water service can be activated.

Please also be informed that the existing 12-inch waterline fronting the parcel is adequate to provide the required 2,000 gallons per minute fire flow, as per the Department's Water System Standards for the proposed type of land use.

Should there be any questions, you may contact Mr. Finn McCall of our Water Resources and Planning Branch at 961-8070, extension 255.

Sincerely yours,

Milton P. Pavao, P.E.
Manager

FM:dfg



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
345 KEKUNAŌ'A STREET, SUITE 20 • HILO, HAWAII 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

September 11, 2008

Ms. Martha Spengler
Helber, Hastert, and Fee Planners, Inc.
733 Bishop Street, Suite 2590
Honolulu, HI 96813



**PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
UNIVERSITY OF HAWAII AT HILO MARINE EDUCATION AND RESEARCH CENTER
TAX MAP KEY 6-9-001:001 (PORTION)**

We have reviewed the subject Pre-Environmental Assessment Consultation and have the following comments.

Water is available from an existing 12-inch waterline within Puako Beach Drive fronting the subject parcel. Water availability in the area is limited to one (1) 5/8-inch meter per existing lot of record, which is limited to a maximum daily usage of 600 gallons.

Prior to the installation of a meter for the proposed project, the Department will request estimated maximum daily water usage calculations, prepared by a professional engineer licensed in the State of Hawai'i, for review and approval. Further, any meter(s) serving the subject parcel shall have a reduced pressure type backflow prevention assembly installed within five (5) feet of the meter on private property before water service can be activated.

Please also be informed that the existing 12-inch waterline fronting the parcel is adequate to provide the required 2,000 gallons per minute fire flow, as per the Department's Water System Standards for the proposed type of land use.

Should there be any questions, you may contact Mr. Finn McCall of our Water Resources and Planning Branch at 961-8070, extension 255.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

FM:dfg

... Water brings progress...

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Darryl Oliveira, Fire Chief
Hawai'i Fire Department
County of Hawai'i
25 Aupuni Street, Suite 103
Hilo, HI 96720

**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lāilāmilō Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mr. Oliveira,

Thank you for your letter dated September 26, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your letter indicates that you have no comments at this time and that you would like to review the project when formal plans are developed. We will send you a copy of the draft Environmental Assessment when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,



Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office



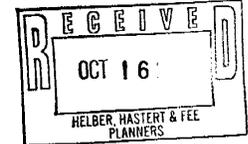
Harry Kim
Mayor



County of Hawai'i
HAWAII FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 981-8394 • Fax (808) 981-2037

Darryl J. Oliveira
Fire Chief

Glen P.I. Honda
Deputy Fire Chief



September 26, 2008

Attention: Thomas Fee, Principal
Helber Hastert & Fee, Planners
Pacific Guardian Center
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

RE: DRAFT ENVIRONMENT ASSESSMENT PRE-ASSESSMENT CONSULTATION
UNIVERSITY OF HAWAII AT HILO PUAKO MARINE EDUCATION AND
RESEARCH CENTER
TMK: (3) 6-9-01:01 (PORTION)

We have no comments to offer at this time in reference to the above-mentioned Draft Environmental Assessment Pre-Assessment Consultation. However we would welcome the opportunity to comment in the future with the development of more formal plans. The project area as proposed has historically presented issues of wildfire type events and associated hazards and those risks may best addressed in the planning stages.



DARRYL OLIVEIRA
Fire Chief

DO:lpc



Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Lawrence K. Mahuna, Police Chief
Police Department
County of Hawai'i
349 Kapiolani Street
Hilo, HI 96720



Subject: University of Hawai'i at Hilo Marine Education and Research Center Environmental Assessment Puakō, Lāilāmilō Ahupua'a, South Kohala, Hawai'i, State of Hawai'i TMK (3) 6-9-001: Por. of 1

Dear Mr. Mahuna,

Thank you for your letter dated September 9, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in Sections 3.5 and 4.5 the draft Environmental Assessment (DEA). We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

Harry Kim
Mayor



Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

County of Hawaii

POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2389

September 9, 2008

Mr. Thomas A. Fee, AICP
Principal
Helber, Hastert & Fee Planners
Pacific Guardian Center
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813



Dear Mr. Fee:

SUBJECT: University of Hawaii at Hilo Puako Marine Education and Research Center Draft Environmental Assessment Pre-Assessment Consultation, Puako, Lalamilo Ahupuaa, South Kohala District, Island of Hawaii TMK: (3)6-9-01:01 (portion)

Staff has reviewed the Draft Environmental Assessment Pre-Assessment Consultation for the above-referenced project and submits the following comments:

- That ingress and egress into the facility be planned for so as not to create a traffic problem along Puako Beach Road.
- That any traffic issues caused by this facility at the intersection of Puako Beach Drive and Queen Kaahumanu Highway be addressed.
- That a secondary emergency evacuation route from the Puako area be completed and functional prior to breaking ground on this facility.

Thank you for the opportunity to comment on this project. Should you have any questions, please contact Captain James Sanborn, Commander of the South Kohala District, at (808) 887-3080.

Sincerely,

LAWRENCE K. MAHUNA
POLICE CHIEF

HENRY J. TAVARES JR.
ASSISTANT CHIEF
AREA II OPERATIONS

JS:dmv

"Hawai'i County is an Equal Opportunity Provider and Employer"

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mrs. Bobby Jean Leithead Todd, Director
Department of Environmental Management
County of Hawai'i
25 Aupuni Street
Hilo, HI 96720



**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lāilāmilō Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**

Dear Mrs. Leithead Todd,

Thank you for your letter dated September 15, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed Sections 3.6.2 and 4.6.2 (wastewater) and Sections 3.6.5 and 4.6.5 (solid waste) in the draft Environmental Assessment document (DEA). We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

Pacific Guardian Center • 733 Bishop Street, Suite 2590 • Honolulu, Hawai'i 96813
Tel. 808.545.2055 • Fax 808.545.2050 • www.hhf.com • e-mail: info@hhf.com

Harry Kim
Mayor



Bobby Jean Leithead Todd
Director

Nelson Ho
Deputy Director

County of Hawaii
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street • Hilo, Hawai'i 96720-4252
(808) 961-8083 • Fax (808) 961-8086
http://co.hawaii.hi.us/directory/dir_envmng.htm

September 15, 2008

Helber, Hastert & Fee Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Attention: Martha Spengler

Subject: UHH Puako Marine Education and Research Center
Draft Environmental Assessment Pre-Assessment Consultation
Puako, Lalamilo Ahupua'a, South Kohala District
Island of Hawai'i, TMK: 6-9-01:01 (portion)

Dear Ms. Spengler,

Please find our comments below:

Wastewater Division: The area is within the Critical Wastewater Disposal area under HAR 11-62.

If you have further questions, please contact Dora Beck, P.E., Wastewater Division Chief, at 961-8513 (dbeck@co.hawaii.hi.us) or Lyle Hirota, Acting Wastewater Division Deputy Chief, at 961-8333 (lhirota@co.hawaii.hi.us).

Solid Waste Division: Submittal of a Solid Waste Management Plan is required as per the enclosed guidelines.

If you have further questions, please contact Mike Dworsky, P.E., Solid Waste Division Chief, at 961-8515.

Thank you for allowing us the opportunity to review and comment on this project.

Sincerely,

Bobby Jean Leithead Todd
DIRECTOR

enclosure

cc: Planning Dept.
SWD
WWD

Hawai'i County is an equal opportunity provider and employer.



1045A

Harry Kim
Mayor



Bobby Jean Leithead-Todd
Director

Nelson Ho
Deputy Director

County of Hawai'i
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
25 Aupuni Street • Hilo, Hawai'i 96720-4252
(808) 961-8083 • Fax (808) 961-8086

September 14, 2007

SOLID WASTE MANAGEMENT PLAN
Guidelines

INTENT AND PURPOSE

This is to establish guidelines for reviewing solid waste management plans, for which special conditions are placed on developments. The solid waste management plan will be used to: (1) encourage recycling and recycling programs, (2) predict the waste generated by the proposed development to anticipate the loading on County transfer stations, landfills and recycling facilities, and (3) predict the additional traffic being generated because of waste and recycling transfers.

REPORT

The consultant's report will contain the following:

1. Description of the project and the potential waste it may be generating: i.e. analysis of anticipated waste volume and composition. This includes waste generated during the construction and operational phases. Greenwastes will be included in this report for both construction grubbing and future operational landscape maintenance.
2. Description and location of the possible sites for waste disposal or recycling. We will not allow the use of the County transfer stations for any commercial development; commercial development as defined under the policies of the Department of Environmental Management Solid Waste Division.
3. Since the Department of Environmental Management promotes recycling, indicate onsite source separation facilities by waste stream; i.e. source separation bins of glass, metal, plastic, cardboard, aluminum, etc. Provide ample and equal space for rubbish and recycling.
4. Identification of the proposed disposal site and transportation methods for the various components of the waste disposal and recycling system, including the number of truck traffic and the route that truck will be using to transport the waste and recycled materials.

Solid Waste Management Plan Guidelines

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5. The report will include any impacts to County waste and recycling facilities, and the appropriate mitigation measures. All recommendations and mitigation measures will be addressed.
6. Description of the waste reduction component that analyzes techniques to be employed to achieve a reduction goal.
7. Analysis will be based on the highest potential use or zoning of the development.

REQUIREMENTS AND CONDITIONS

1. A solid waste management plan will be done for all commercial developments, as defined under the policies of the Department of Environmental Management, Solid Waste Division.
2. We will require the developer to provide or resolve all recommendations and mitigation measures as outlined in the report; besides any conditions placed on the applicant by the Department of Environmental Management.
3. A licensed environmental or civil engineer will draft and certify the solid waste management plan.

If you have need additional information, please contact Michael Dworsky, P.E., Solid Waste Division Chief at 808-961-8515.

CONCUR:

Handwritten signature of Bobby Jean Leithead-Todd.

Bobby Jean Leithead-Todd
DIRECTOR

10/13/03
Revised 09/14/07

Helber Hastert & Fee
Planners, Inc.

December 23, 2008

Mr. Chad Wiggins
cwiggins@tnc.org

**Subject: University of Hawai'i at Hilo Marine Education and Research Center
Environmental Assessment
Puakō, Lālāmilo Ahupua'a, South Kohala, Hawai'i, State of Hawai'i
TMK (3) 6-9-001: Por. of 1**



Dear Mr. Wiggins,

Thank you for your email of September 08, 2008 in response to our pre-assessment consultation letter concerning the above-referenced project. Your comments are noted and are addressed in Sections 2.2, 4.6, and 4.8 the draft Environmental Assessment (DEA). As discussed in your letter, under the Proposed Action, the Center would include a meeting room that would be available to the community on a space-available basis. We will send you a copy of the DEA when it is distributed.

Should you have any questions regarding this project, please contact Ms. Martha Spengler, Senior Planner, Helber, Hastert & Fee Planners Inc., by mail at Pacific Guardian Center, Makai Tower, 733 Bishop Street, Suite 2590, Honolulu, HI 96813; by phone at 808-545-2055 extension 238; or via email at mspengler@hhf.com.

Sincerely,

Thomas A. Fee, AICP
Principal

cc: Mr. Ted LeJeune, UH Hilo Facilities Planning and Construction Office

From: Chad Wiggins [cwiggins@TNC.ORG]

Sent: Monday, September 08, 2008 3:25 PM

To: Martha Spengler

Subject: Pre-assessment for UHH Puako Marine Education and Research Center

September 8, 2008

Attn: Thomas A. Fee, AICP
Helber, Hastert & Fee Planners

Aloha,

First of all, thank you for coming to the Puako community and explaining your vision for the Puako Marine Education and Research Center to those who were able to attend. As this process progresses, having an open dialogue with Puako residents will likely benefit both sides and it is encouraging to see that you are willing to maintain lines of communication.

There are a few relevant issues I'd like to highlight as you prepare the draft EA for this facility.

First is the watershed function of the lot where the proposed facility will be built. Since it is directly adjacent to the ocean, care must be taken to ensure that no sediment, fertilizer, or green waste is contributed to the ocean from this land before, during, or after construction.

Second is the potential for reducing the impervious surfaces in the final structures and considering green practices. It will be encouraging to know that you have been forward thinking in your design. Since Puako is subject to an underground aquifer with an uncertain future in light of development plans, every effort should be made to conserve and reuse water from sinks with storage basins that can fill toilet tanks and variable flush toilets (with solid and liquid flushing options) to low flow shower heads. Using solar power as a component of your energy will ease the pressure on the Puako grid and save money in the long term.

Third, as you know from our meeting at Hokuhoa Church, the impact of additional boat traffic on the Puako ramp worries those who make use of it. The community feels that the ramp is already overcrowded and any effort made on the part of UH to help relieve this congestion through providing parking facilities or making recommendations on the community's behalf is likely to engender broad based support from the fishing and boating community at Puako.

Fourth, since this project will create a new neighbor for Puako residents, having a community center in some form where people can socialize would be an outstanding gesture on the part of the University as they begin the process of building this much needed West Hawaii Facility.