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KATHRYN S. MATAYOSHI
SUPERINTENDENT

STATE OF HAWAI`I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI`I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

November 3, 2011

TO: Mr. Gary Hooser, Director
Office of Environmental Quality Control
Department of Health

FROM: Duane Y. Kashiwai, Public Works Administrator
Facilities Development Branch
Department of Education

SUBJECT: Finding of No Significant Impact for
Kahuku Storm Damage Reduction Project

The State of Hawai`i Department of Education has reviewed the Draft Environmental Assessment (DEA) for the Kahuku Storm Damage Reduction Project, Kahuku, Oahu, Hawaii, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish this notice in the next Environmental Notice.

You'll find enclosed a completed OEQC Publication Form, one (1) hard copy of the DEA and one (1) CD containing a Word copy of the project summary and a pdf of the DEA document. If you have any questions, please contact Gaylyn Nakatsuka at 377-8315.

DYK:jmb

Enclosure

Publication Form
The Environmental Notice
Office of Environmental Quality Control

Instructions: Please submit one hardcopy of the document along a with determination letter from the agency. On a compact disk, put an electronic copy of this publication form and a PDF of the EA or EIS. Mahalo.

Name of Project:	Kahuku Storm Damage Reduction Project
Applicable Law:	Consolidated Appropriations Act, 2008 (Public Law 110-161), Division C, Section 112
Type of Document:	Draft Environmental Assessment
Island:	O`ahu
District:	Kahuku
TMK:	1-5-6-006:003, 009, 010, 011 (por), 015, and 025
Permits Required:	National Pollutant Discharge Elimination System (NPDES) Permit, Coastal Zone Management Act Determination, Special Management Area Permit, City and County of Honolulu Department of Planning and Permitting Building Permit.

Name of Applicant or Proposing Agency:	Hawaii State Department of Education Facilities Development Branch Kalanimoku Bldg, Room 501 1151Punchbowl Street Honolulu, HI 96813 Attn: Duane Kashiwai (808) 586-0430
Co-Proponent	US Army Corps of Engineers Civil and Public Works Branch (CEPOH-PP-C), Building 230, Fort Shafter, HI 96858-5440 Mr. Milton Yoshimoto, Project Manager (808) 438-2250
Contact:	US Army Corps of Engineers Civil and Public Works Branch (CEPOH-PP-C), Building 230, Fort Shafter, HI 96858-5440 Mr. Milton Yoshimoto, Project Manager (808) 438-2250
Approving Agency or Accepting Authority:	Hawaii State Department of Education Facilities Development Branch Kalanimoku Bldg, Room 501 1151Punchbowl Street Honolulu, HI 96813 Attn: Duane Kashiwai (808) 586-0430
Consultant:	Environet, Inc. 650 Iwilei Road, Suite 204 Honolulu, HI 96817
Contact	Ms. Colette Sakoda 808-833-2225, Ext. 1004

Project Summary: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, and Chapter 343, Hawaii Revised Statutes, as amended, the U.S. Army Corps of Engineers (USACE) on

behalf of the Hawaii State Department of Education (DOE), Facilities Development Branch and as co-proponent gives notice that a Draft Environmental Assessment (DEA) has been prepared for the proposed action to implement stormwater mitigation measures at Kahuku High School; O`ahu, Hawai`i. This effort is being proposed under the legislative authority of the Consolidated Appropriations Act, 2008 (Public Law 110-161), Division C, Section 112. The USACE was authorized to design an environmentally sound and feasible stormwater collection and drainage system for Kahuku High School at the request of the State of Hawai`i Department of Education. The proposed action would route on-campus stormwater runoff to underground storage units that would be placed under the athletic field. The proposed action would meet the purpose and need under the legislative authority and mitigate potential flood damage to facilities on campus.

Draft Environmental Assessment

Kahuku Storm Damage Reduction Project

Kahuku, O‘ahu, Hawai‘i

U.S. Army Corps of Engineers, Honolulu Engineering District

Prepared By:
Environet, Inc.

October 2011

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
bgs	below ground surface
BMPs	best management practices
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIA	Cultural Impact Assessment
cy	cubic yards
CWA	Clean Water Act
DOE	State of Hawai‘i Department of Education
DOH	State of Hawai‘i Department of Health
DOT	State of Hawai‘i Department of Transportation
DLNR	State of Hawai‘i Department of Land and Natural Resources
DPP	City and County of Honolulu Department of Planning and Permitting
EA	Environmental Assessment
EDR	Engineering Design Report
ER	Engineer Regulation
FEMA	Federal Emergency Management Agency
ft	feet
HAR	Hawai’i Administrative Rules
HRS	Hawai‘i Revised Statutes
HTRW	Hazardous, Toxic, and Radioactive Waste
JaC	Jaucus sand
LCAs	Land Commission Awards
LUC	State of Hawai‘i Land Use Commission
LUST	Leaking Underground Storage Tank
msl	mean sea level
Mt	Mokuleia clay loam
mg/L Cl-	milligrams per liter of chloride
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OEQC	Hawai‘i State Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
OIA	O‘ahu Interscholastic Association
RCRA	Resource Conservation and Recovery Act
RMTC	R.M. Towill Corporation
SCS	Scientific Consultant Services, Inc.
SHPD	State Historic Preservation Division
TMK	tax map key
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UST	Underground Storage Tank
WWII	World War II
%	percent

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1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) is conducting an Environmental Assessment (EA) for the implementation of stormwater mitigation measures at Kahuku High School, O'ahu, Hawai'i. Alternative measures to reduce the impact of storm flooding on the high school campus were studied and one alternative was selected as the most appropriate mitigation measure (USACE, 2009). Environet has been retained under Contract No. W9128A-09-P-0025 to prepare an EA in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations (CFR) 1500-1508); Engineer Regulation (ER) 200-2-2, Environmental Quality Procedures for Implementing NEPA; and Chapter 343, Hawai'i Revised Statutes (HRS) and Act 50, as amended.

1.1 PROJECT LOCATION AND SETTING

Kahuku High School is located on the northeast coast of the Island of O'ahu, approximately 26 road miles from downtown Honolulu (Figure 1-1). The high school is situated within the community of Kahuku which is under the jurisdiction of the City and County of Honolulu. The campus is bordered by Kamehameha Highway to the north, Kahuku Park to the west, a cliff to the south, and Kahuku Fire and Police Station to the east. The area of interest includes the 26-acre sub-drainage area of the high school (split into Kahuku High 1 and 2) as well as Kahuku Park 1 and 2, and the Puuluana Road area across Kamehameha Highway, about 6.7, 12 and 0.6 acres, respectively (Figure 1-2). The highest elevation of the sub-drainage area is approximately 25 feet (ft) above mean sea level (msl) with the lowest elevation area at approximately 5 ft above msl. Kahuku Park 1 and 2, and Kahuku High 2 are areas with higher elevations sloping down towards the Kahuku High 1 area and Kamehameha Highway. A small wooded area covers the southern (higher elevation) end of the high school property while buildings and roads with less vegetation are located in areas of lower elevation. The lowest areas on campus occur around the gym, the school entrance located on the Kamehameha Highway side of the campus, and the football field. The park consists of an open area covered with landscaped grass.

1.2 PURPOSE AND NEED FOR ACTION

1.2.1 Existing Conditions

During high rainfall events the Kahuku High School watershed experiences flooding in the low lying areas. The flooding occurs mainly in and around the front entrance, gym, and football field, and in areas adjacent to Kamehameha Highway. The water collects in these areas for extended periods of time due to

lack of either adequate drainage infrastructure or ponds. The runoff from the park also collects in the areas adjacent to the highway adding to the overall flooding of the area. Park waters do not directly enter the football field due to a drainage berm that directs the water towards the highway. This berm disappears near the park/school boundary by the tennis courts and Building J. Runoff from the Puuluana Road area across Kamehameha Highway contributes to the flooding at the front entrance of the school. School staff report that it can take hours after the end of a rainfall event for the ponded runoff to drain or seep underground.

1.2.2 Past Flood Abatement Efforts

There are no stream channels within the area therefore most of the water accumulates through overland flow. The stormwater drainage systems at Kahuku High School consist mainly of a series of dry wells constructed in 1970, 1974, and 1994, and an 18-inch diameter perforated drain pipe stormwater system that drains the front entrance and gym area. The drain pipes were constructed in 1976 when a new (current) gymnasium was built (Figure 1-3). This system takes the runoff to a dry well located near the boundary of the school and the park. The park area relies on small drainage swales and berms along the park/school boundary to transport the runoff to the low-lying area of the park near Kamehameha Highway. An existing 24-inch culvert is located in a low point within a residence lot adjacent to the school and park fronting Kamehameha Highway. The culvert drains to a small detention basin within the grounds of the Kahuku Sugar Mill on the opposite side of the highway. This culvert is the only existing outlet for the stormwater that accumulates in the high school and park watersheds.

1.2.3 Purpose and Need

Under the legislative authority of the Consolidated Appropriations Act, 2008 (Public Law 110-161), Division C, Section 112, the USACE was authorized to design an environmentally sound and feasible stormwater collection and drainage system for Kahuku High School at the request of the State of Hawai‘i Department of Education (DOE). As the local sponsor of the project, DOE would be responsible for the Operation and Maintenance (O&M) of the drainage system so that it remains capable of providing the maximum protection for which it was designed.

Improvement to the existing drainage at Kahuku High School is needed to provide a solution to the recurring flooding problem that has caused inconvenience to countless students as well as community members for decades. School closure or class cancellation as a result of campus flooding interrupts the curriculum as well as interferes with outdoor activities that occur on the football field. The runoff that accumulates at the front entrance of the high school not only hinders the use of the two parking lots that

are used by faculty and campus visitors, but also slows down the traffic that passes by the high school entrance on Kamehameha Highway. Standing water on campus could pose health hazards after extended periods of time and should not be neglected. Flooding problems at Kahuku High School recur every year and need to be addressed in a timely manner in order to provide a better learning environment for the students as well as to better protect the health and well-being of the Kahuku community.

A total of four alternatives to reduce the impact of storm flooding on campus are discussed in this EA. One alternative was selected for further analysis including a more detailed design and in-depth planning.

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 26, 2009 DRAWN BY: MR REVIEWED BY: SG	LOCATION MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 1-1

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 21, 2009 DRAWN BY: SF REVIEWED BY: SG	KAHUKU HIGH SCHOOL DRAINAGE AREAS KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 1-2

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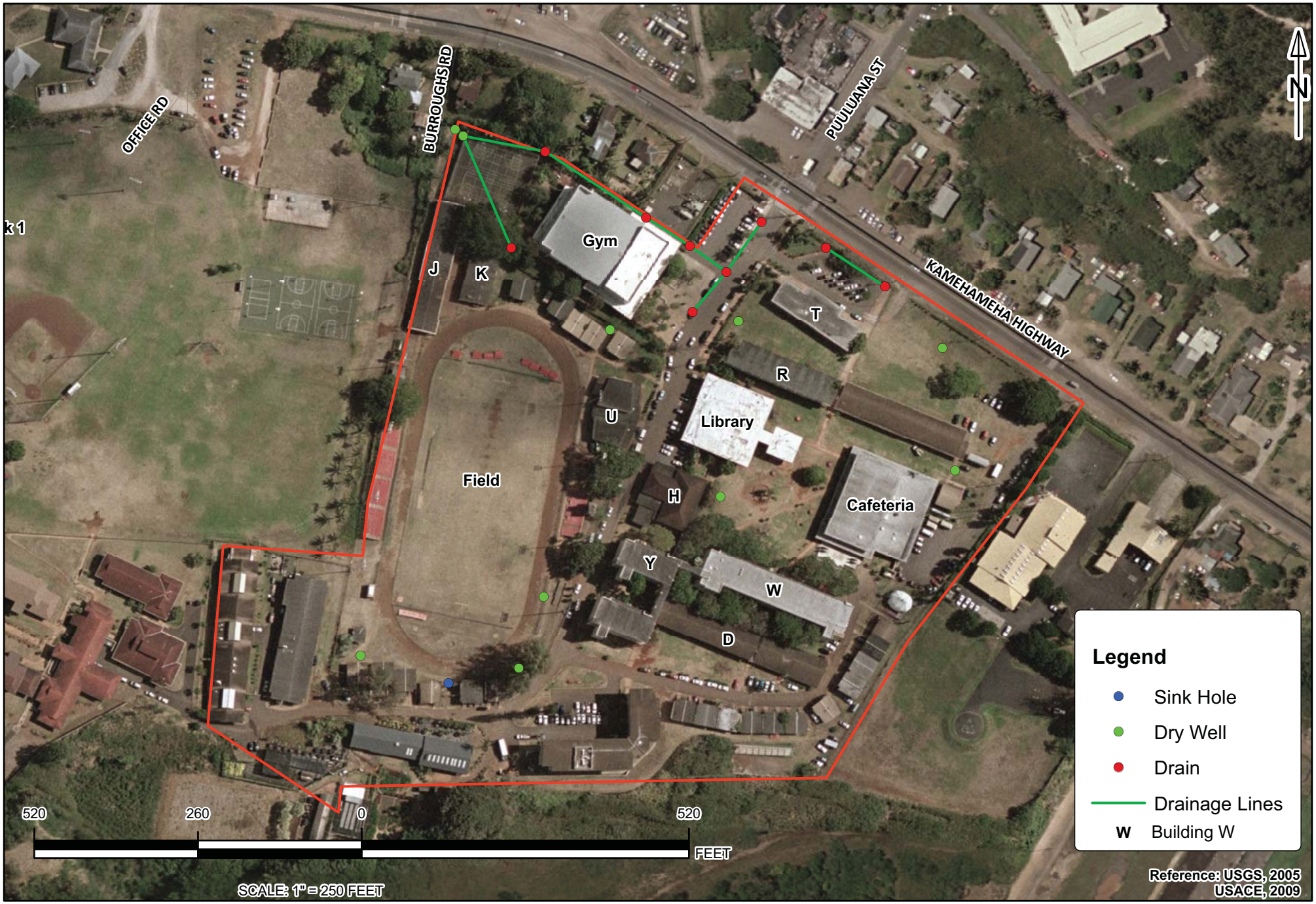

Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 21, 2009 DRAWN BY: SF REVIEWED BY: SG	EXISTING DRAINAGE SYSTEM AT KAHUKU HIGH SCHOOL KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 1-3

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2.0 ALTERNATIVES

2.1 ALTERNATIVE 1: Divert Water to Helipad Basin and Park Areas

Alternative 1 focuses on diverting the stormwater away from the low areas that lack adequate drainage outlets to areas that can drain the water more efficiently. This alternative includes installation of a drainage system that would collect stormwater and divert it to ponding areas with better drainage, such as the fire and police station helipad area and the low-lying areas Kahuku Park. The alternative includes the construction of two separate berms and two separate stormwater drains with associated piping. The first drainage system consists of a berm and stormwater drain located south of the football field that are designed to divert water from the upper watershed away from the football field and into the fire and police station helipad drainage basin. The fire and police station drainage basin has ample storage and outlet capacity to handle the water from this area. The second drainage system is a berm and stormwater drain that prevents the park stormwater from inundating the adjoining school lands. Figure 2-1 shows the estimated design requirements for this alternative. The preliminary cost estimate for this alternative is $977,000.

Alternative 1 would alleviate some of the flooding currently experienced at the football field by diverting the water to the fire and police station helipad area. It is the most cost-effective alternative and would also prevent stormwater and any associated pollutants dissolved within or transported by the stormwater from flowing directly to the ocean. However, during storm events greater than 10 percent (%) (10-year) events, the flash-flood nature of Hawaiian storms would likely overwhelm any stormwater drainage system leading to marginally less flooding rather than a full solution to the problem. Alternative 1 also does nothing to address the problem of the undersized drainage outlets in the low-lying areas of the park. As a result, any water that does pond would create a safety issue if the low-lying area cannot be separated from the rest of the park by a security barrier such as a fence. Stagnant water can also present health concerns. Alternative 1 also impacts neighboring properties owned by the City and County of Honolulu by creating maintenance and liability issues. Alternative 1 would not meet the project objective since it is not a comprehensive solution to the flooding problem on campus and may potentially have negative impacts to adjacent areas.

2.2 ALTERNATIVE 2: Underground Storage

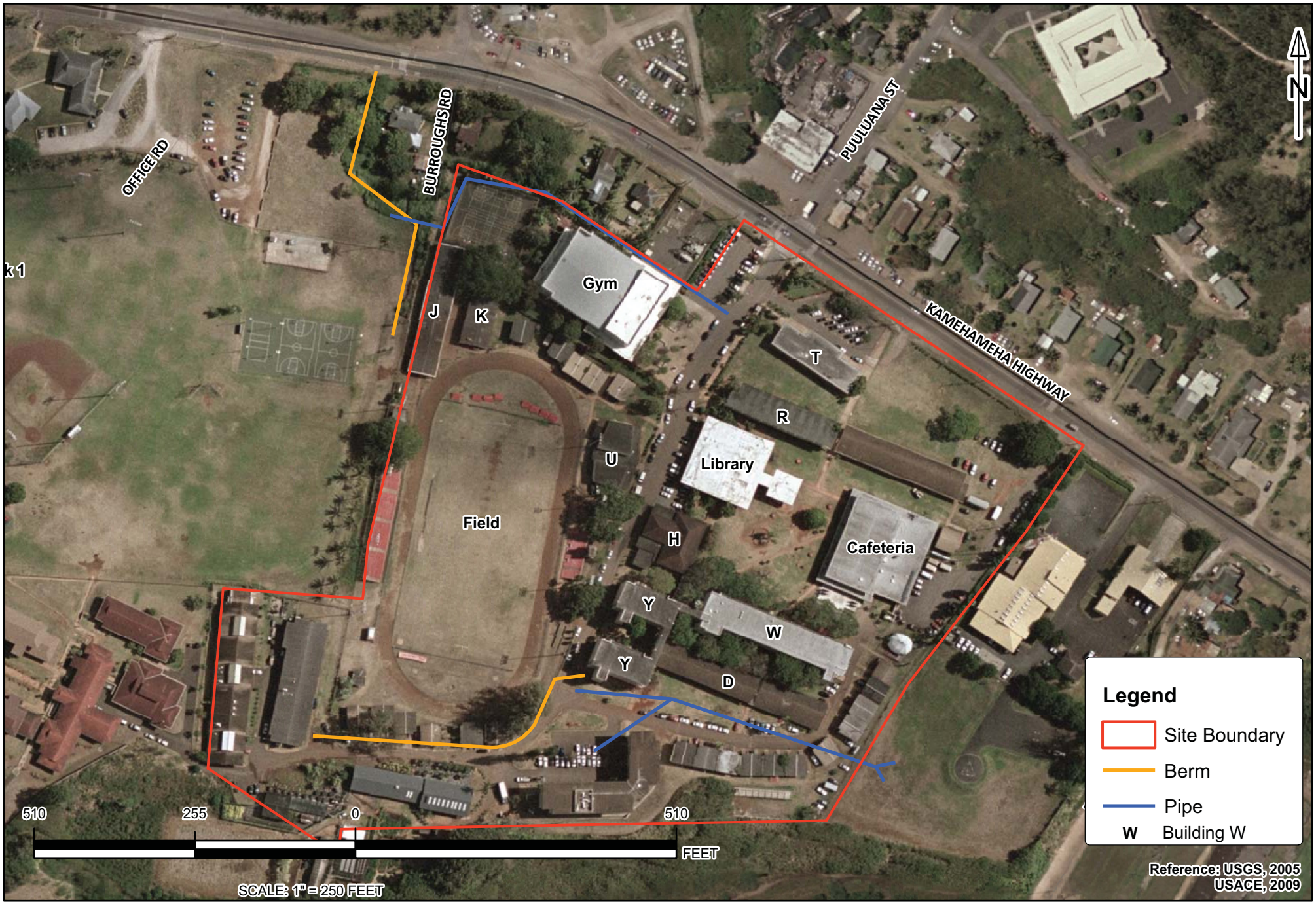
Alternative 2 involves storing stormwater runoff in a system of underground storage units built under the existing football field. The football field would be rebuilt on top of the storage units. The existing drainage and dry well system would be attached to the storage units and new inlets would be installed to collect the surface water that naturally ponds at the football field into the units. The water would be held within the underground storage units until it naturally infiltrates into the groundwater table. Figure 2-2 shows the features of Alternative 2. Preliminary cost estimate for this alternative is $3,965,000.

Alternative 2 would alleviate most of the flooding currently experienced at the football field by storing the water under the field itself. Some localized flooding in the low areas near the highway is likely to remain, however the majority of the flood waters would be stored within the storage units. Alternative 2 has added benefits of protecting the football field itself from flooding. It would also handle larger frequency floods than the other alternatives and does not require the use of any land outside the boundary of the Kahuku High School campus. Stormwater and the pollutants it may contain would be prevented from flowing directly to the ocean and stored in a way that minimizes safety or health concerns. The disadvantages of Alternative 2 include its high cost and lengthy duration of construction. Construction would take several months and involve the demolition of the football field and surrounding track, which would be reconstructed once stormwater collection unit construction is completed. Depending on the use of the field and track areas at that time, construction would have a short-term large impact on campus activities. Maintenance by flushing and/or pumping the underground storage units would be necessary depending on the natural drainage characteristics of the grounds under the football field and the amount of trash or sediment that may enter the storm drain system.

Alternative 2 is preferred as it would best reduce the flooding problems on campus by utilizing existing drainage systems on campus and would not require construction nor create impacts outside the high school boundary. A more detailed description and analysis of Alternative 2 is included in Section 3.

2.3 ALTERNATIVE 3: Culvert Diversion to Hospital Ditch

Alternative 3 involves draining the stormwater runoff away from the Kahuku High School campus by creating a large culvert underneath and adjacent to Kamehameha Highway that eventually flows into the Hospital Ditch and out to the ocean. Figure 2-3 illustrates the features of Alternative 3. This alternative follows what was proposed by Hida, Okamoto& Associates (1992) and USACE (2006). The preliminary cost estimate for this alternative is $4,666,000.



Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 21, 2009 DRAWN BY: SF REVIEWED BY: SG	KAHUKU HIGH SCHOOL - ALTERNATIVE #1 KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 2-1

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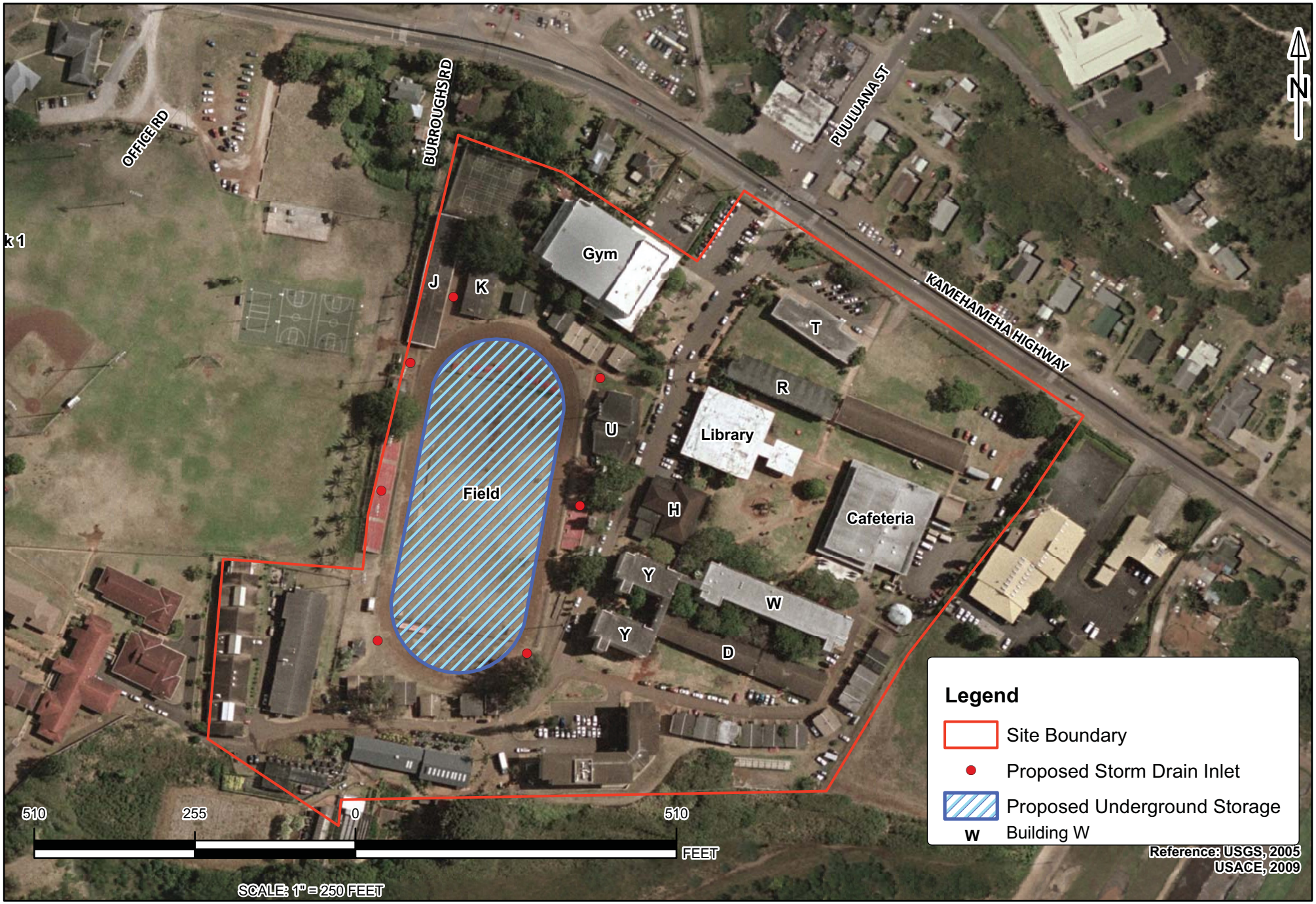

Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	KAHUKU HIGH SCHOOL - ALTERNATIVE #2 KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 2-2

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	KAHUKU HIGH SCHOOL - ALTERNATIVE #3 KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 2-3

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Alternative 3 would alleviate most of the flooding currently experienced at the lower campus and football field and would also benefit the surrounding areas by providing an adequate drainage outlet for Kahuku High School and the adjacent park areas. The large culvert would allow stormwater to flow away from the campus quickly, thus preventing flood damage to the high school. However, runoff would still pond on park land where the drainage culvert begins, presenting a safety hazard. In addition, a substantial amount of park land and private property would be required in order to build the drainage structure, and traffic on Kamehameha Highway would have to be diverted during construction. Alternative 3 is also the most expensive alternative of the three studied. Environmentally, Alternative 3 includes drawbacks because it would pass the stormwater runoff, including any pollutants, to the ocean via Hospital Ditch. This alternative would require coordination with a few private landowners, City and County of Honolulu, State of Hawai‘i Department of Transportation (DOT), and the United States Fish and Wildlife Service (USFWS) which owns parts of Hospital Ditch. Questions about maintenance and liability may occur amongst these parties.

This alternative would achieve project objectives, despite the ponding that may occur where the drainage culverts begin. However, considering the high cost and potential negative impacts to the surrounding areas and the ocean, this alternative may not be feasible.

2.4 ALTERNATIVE 4: No Action

Alternative 4 is to leave the existing conditions unchanged. While this is not a mitigation alternative to the flooding problem at Kahuku High School, it provides a reference point for comparison and evaluation of the three previously discussed alternatives. Having no construction costs, this alternative would be the least costly. Furthermore, school functions would not be affected by construction activities. However, the flooding problem would remain, with future costs expected for repairing flood damages and for maintenance. Stagnant water also presents a health concern as well as rendering the football field unusable for an extended period of time after storm events.

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3.0 ADDITIONAL DESIGN FOR PROPOSED ACTION

3.1 UNDERGROUND STORAGE UNIT DESIGN AND CAPACITY

The proposed underground storage unit capacity has been designed based upon a 2% (50-year) storm volume of about 120,000 cubic ft. It has been designed to reduce residual flooding at low ground elevations on campus from storms larger than 10% (10-year) events. Flood extents from 10% and 2% storms are shown in Figures 3-1 and 3-2, respectively. Figure 3-3 shows the residual flood extent from storms greater than 10% events up to 2% events. As mentioned earlier, some localized flooding is expected to remain in the low-lying areas near Kamehameha Highway. However, most of the flooding experienced at the football field would be alleviated by having the stormwater stored underground within the storage units. The underground storage unit capacity would be exceeded during storms events that are 2% or greater. In such cases, it is expected that pumping excess stormwater from the storage units would be necessary to prevent backup of water through the system. The storage unit has been designed to have a low point with manhole access and a concrete sump floor for pumping access, which would also allow cleaning of the storage unit when needed. Disposal of the excess stormwater and removed silt, sediment, trash, and debris is to be done in accordance with applicable laws. The manhole access would be located near Intake 5 by Building U (Figure 3-4).

Approximately 5,900 three-foot and 4,800 two-foot high Brentwood Storm Tank storage units (Figure 3-5) would be used with an invert elevation of 5 ft for the pipes entering the units. Figure 3-6 shows a cross section of the storage unit design. Based on the depth of the groundwater table, which is 3.5 to 4 ft below ground surface (bgs), it was determined that the lowest elevation of excavation for the storage units would be limited to about 4 ft bgs. Depending on further geotechnical investigations preceding construction, the invert elevation may need to be adjusted. The field level would be raised 1 to 3 ft above the current level, depending on the allowable excavation depth.

3.2 DISPOSAL OF EXCAVATED SOIL

Approximately 9,600 cubic yards (cy) of excavated soil is expected to be generated during the installation of the underground storage units. Assuming a height of 3 ft, approximately 1.98 acres of land would be needed to stockpile the soil. Alternatives that are currently considered for the disposal of the excavated soil include trucking the soil off campus to another DOE project construction site for reuse or allowing the project construction contractor to make a decision as to where to relocate the soil.

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	KAHUKU HIGH SCHOOL - 10% (10-YEAR) FLOOD EXTENT KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-1

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	KAHUKU HIGH SCHOOL - 2% (50-YEAR) FLOOD EXTENT KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-2

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	ALTERNATIVE 2 RESIDUAL FLOODING FOR STORMS GREATER THAN 10% UP TO 2% CHANCE EVENT KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-3

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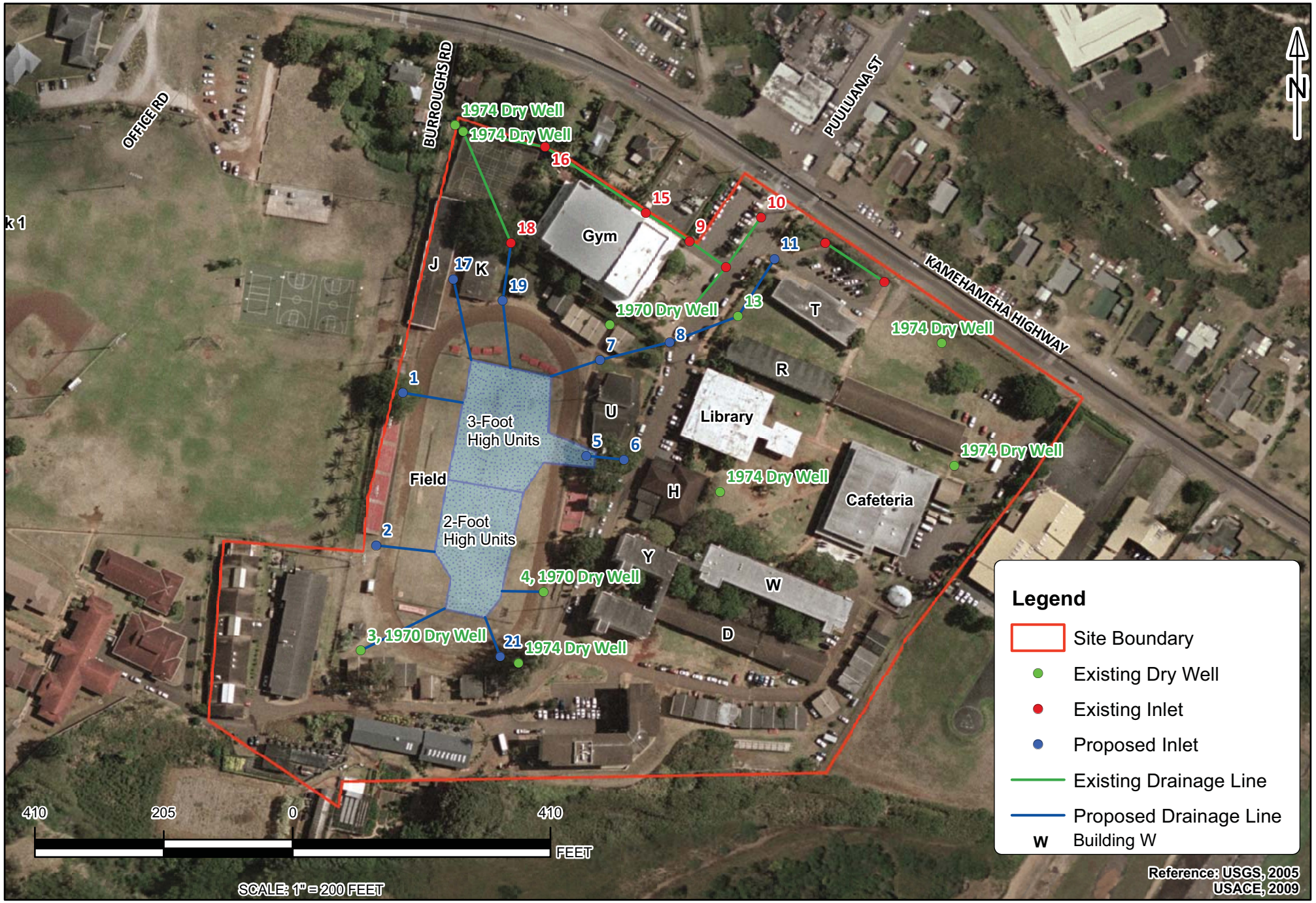

Environet, Inc.	PROJECT NO.: 109-005 DATE: OCTOBER 19, 2009 DRAWN BY: MR REVIEWED BY: SG	ALTERNATIVE 2 INLET AND PIPE LINE LAYOUT KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-4

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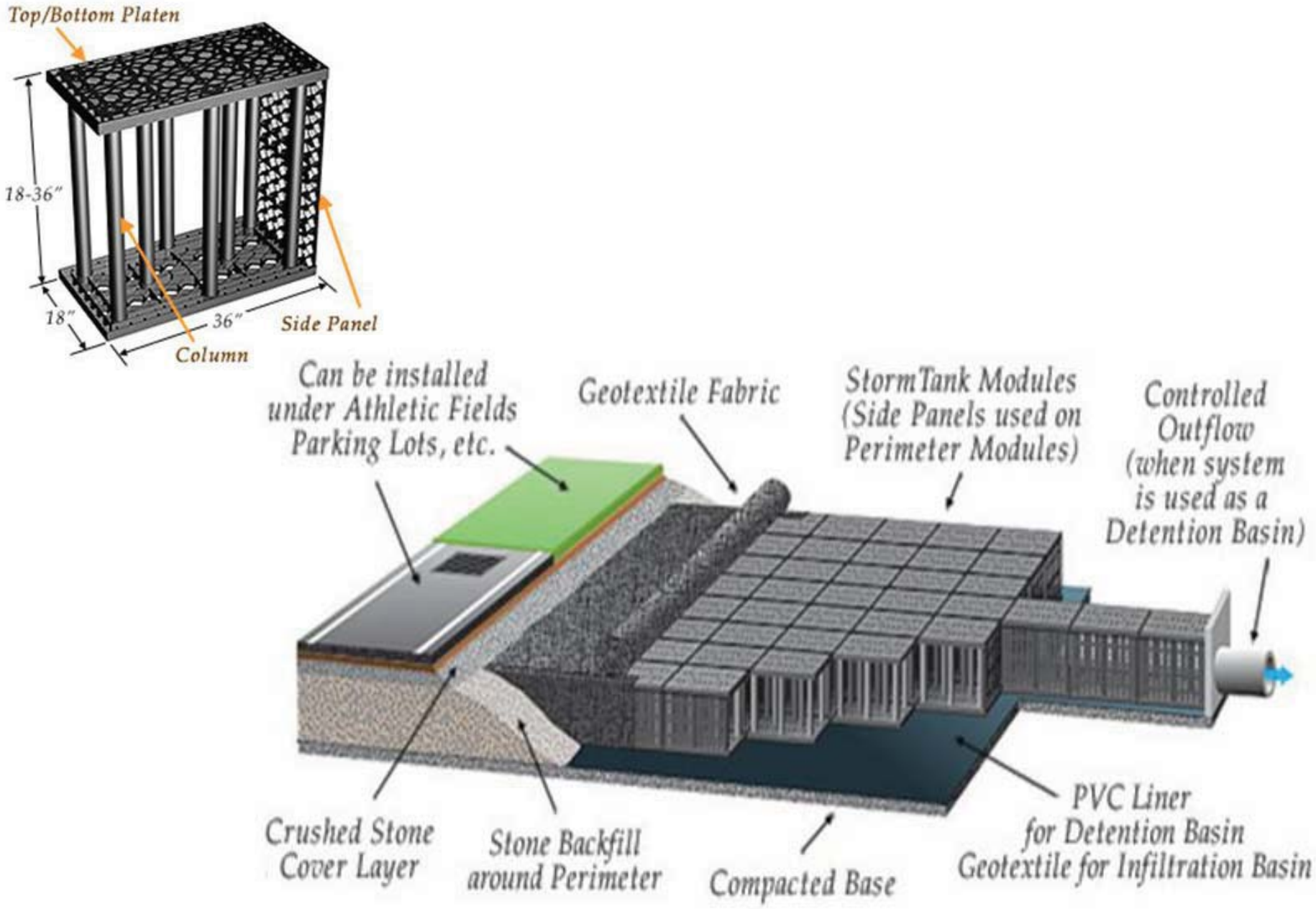

Use of brand names is for identification purposes only and does not constitute endorsement by the US Army Corps of Engineers

Reference: USACE, 2009

Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: MR REVIEWED BY: SG	**BRENTWOOD STORM TANK STORAGE UNITS DIMENSIONS AND EXAMPLE INSTALLATION** **KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I**	**FIGURE 3-5**

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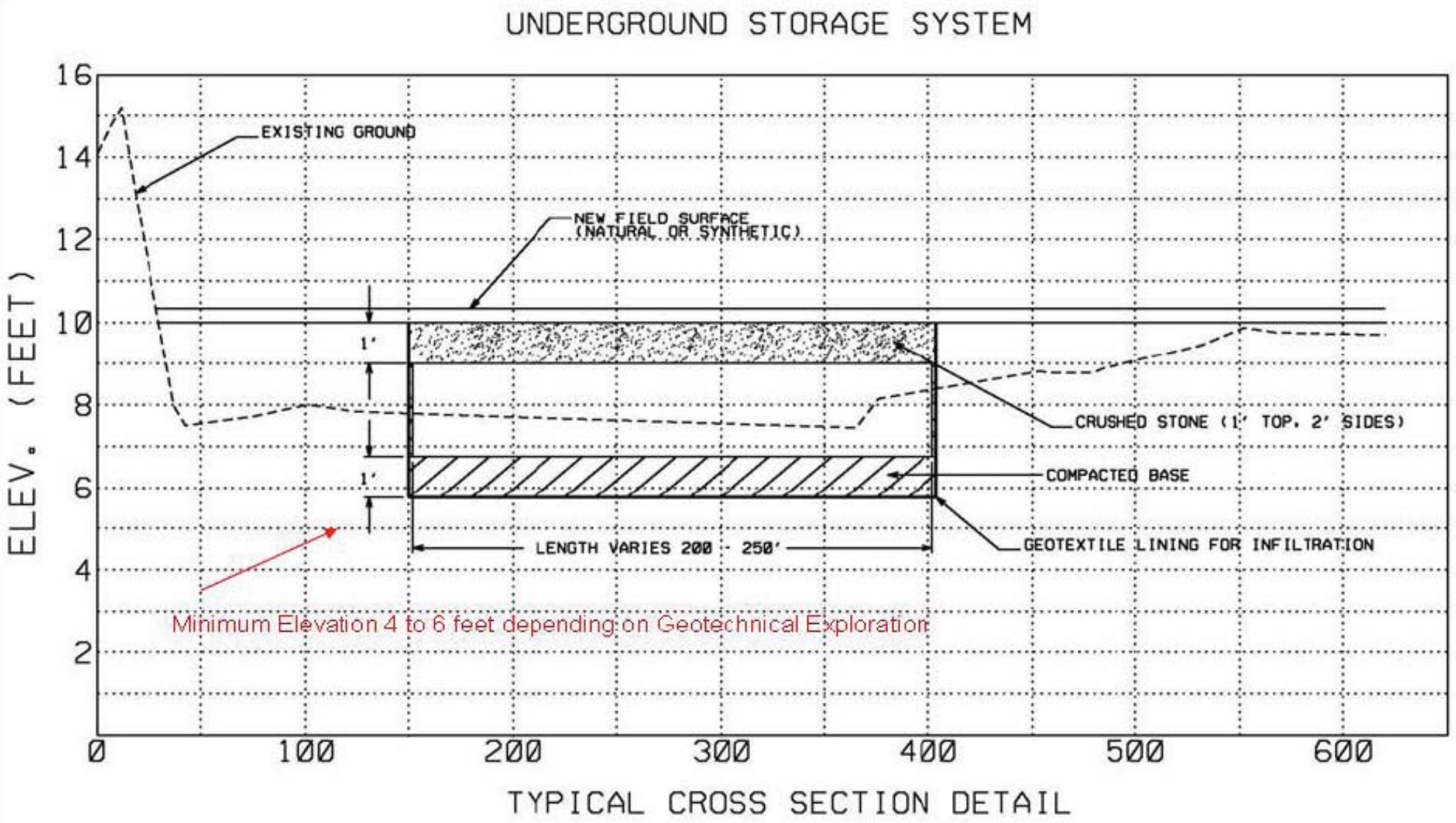

Reference: USACE, 2009

Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 24, 2009 DRAWN BY: SK REVIEWED BY: SG	STORAGE UNIT DESIGN CROSS-SECTION KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-6

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3.3 INLET AND PIPE DESIGN

The proposed inlet and pipe line layout is shown in Figure 3-4. Inlet locations and their corresponding drainage areas (Figure 3-7) were determined from 2-foot contour topographic data (1991 aerial photogrammetric map by RM Towill Corporation (RMTC)), a site visit by the USACE, and aerial images. The layout aimed to capture as much stormwater runoff as possible in the lower campus that is not captured by the already existing drainage system near the gymnasium. Detailed descriptions of calculations used to determine the inlet size and pipe capacities as well as minimum invert elevations required to maintain sufficient pipe velocity are included in the Engineering Design Report (EDR) prepared by the USACE (USACE, 2009).

3.4 OPERATION AND MAINTENANCE

No major components of the proposed underground storage system would require replacement over the economic life of the project (50 years). However, regular maintenance would be required to ensure the proper functioning of the system so that maximum storm damage protection is provided. An O&M Manual would be prepared during the plans and specifications phase of the proposed project. The items to be included are the following:

- Minimizing or eliminating the introduction of silt, sediment, trash, and debris into the storage units, catch basins, and pipe lines.
- Minimizing the introduction of silt, sediment, trash, and debris at all inlets during operation through best management practices (BMPs).
- Conduct semi-annual visual inspections of the manhole and inlets to check for sedimentation and debris.
- Evacuate debris and sediment from the manhole and inlets depending on findings from the inspection.

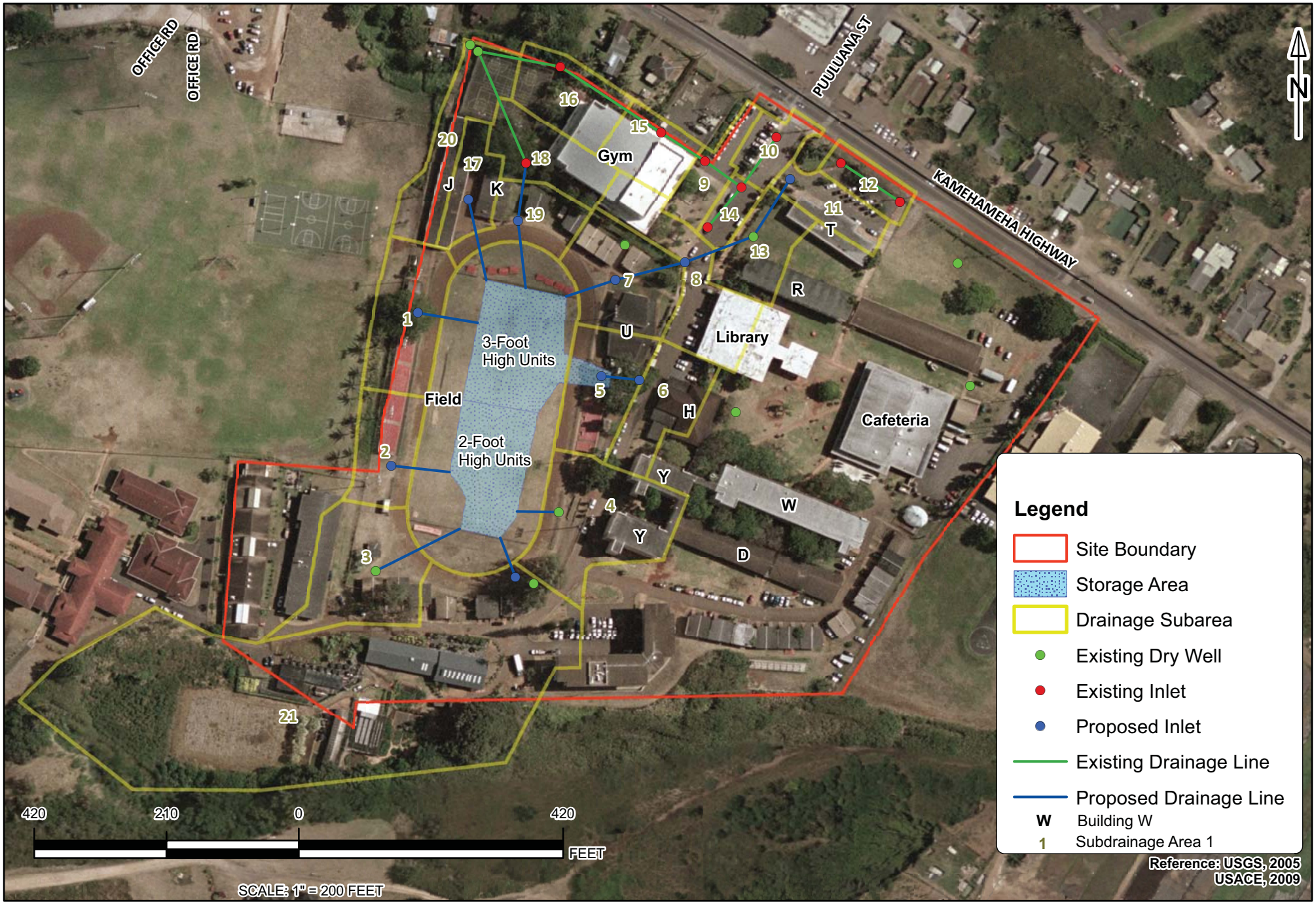
3.4.1 Infiltration Capability

Depending on the actual silt, sediment, trash, and debris load into the system, the infiltration performance of the geofabric and gravel underlayer would eventually be degraded. With degraded infiltration capability, the storage units may need to be pumped out after large storm events or on a periodic basis. Due to the design of the underground storage unit as an infiltration basin, flushing of the entire system may not be a practical approach in maintaining its infiltration performance. Rather, it would be more practical and effective to minimize materials that enter the system. Once the infiltration performance of

the storage units are degraded to the point where periodic pumping and flushing is necessary, it may become more feasible to replace the storage units.

3.4.2 Pumping of Excess Stormwater During Large Storm Events

As stated earlier, the capacity of the proposed underground storage unit has been designed based upon a 2% (50-year) storm event. Consequently, in case of a large storm event that is 2% or greater, pumping of excess stormwater may be necessary in order to prevent back up of water through the system and to prevent flooding on campus. Even during storm events that are less than 2% storms, pumping of excess stormwater may eventually become necessary as the system loses its initial infiltration performance. A pumping truck may be used to pump excess stormwater off campus. This solution may be of limited use at the site, considering a 2% storm is likely to inundate not just the campus but also the surrounding areas. Pumping excess water from the campus may not be successful at eliminating ponding if water from surrounding areas immediately flows onto the campus as a result of pumping activities. It remains an option that can be explored if the need exists, however. The Honolulu Fire Department has assisted Kahuku High School with such cases in the past. A request for information regarding the frequency of such events and procedures they have followed to dispose of the pumped stormwater has been sent and responses will be incorporated into the Final EA. In order to ensure health and safety to students and faculty, cancellation of school or evacuation may be a preferred course of action during a large storm event.



Environet, Inc.	PROJECT NO.: 109-005 DATE: OCTOBER 19, 2009 DRAWN BY: MR REVIEWED BY: SG	ALTERNATIVE 2 INLET SUB-DRAINAGE AREAS KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 3-7

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4.0 AFFECTED NATURAL ENVIRONMENT

4.1 GEOLOGY AND SOILS

The island of O‘ahu consists of the Waianae and Ko‘olau Mountain Ranges, both of which are eroded remnants of great shield volcanoes. Lava flows from the Ko‘olau Volcano banked against the slope of Waianae Volcano to form the Schofield Plateau which is located in between the two ridges. After the two ranges were sculptured into their present form by fluvial and marine erosion, the island went through a complicated series of emergences and submergences. The project site is located on a coastal plain northeast of the Koolau Mountain Range which was formed during the changing sea levels. The relatively flat coastal plain extends up to approximately one mile inland and is composed of sediments from the land and coral, reef, and other marine sediments deposited on basaltic lavas. The surface soil within the project site primarily consists of Jaucus sand (JaC) deposits along Kamehameha Highway and Mokuleia clay loam (Mt) further inland (Figure 4-1). Mt deposits occur along relatively level coastal areas and are often found in association with JaC deposits. Mt exhibits moderate permeability, slow runoff, and a very slight erosion hazard. These soils are often used of the commercial production of sugarcane, truck crops, and as ranchlands. JaC exhibits rapid permeability, slow to very slow runoff, and slight erosion hazard, but erosion due to winds can be quite severe in areas with no vegetation (Foote et al., 1972).

4.2 CLIMATE

The Kahuku area has a subtropical climate characterized by relatively mild and constant temperatures, moderate humidity, prevailing northeasterly trade winds, and extreme variation in rainfall over short distances. Climate may vary spatially with altitude and in relation to prevailing local winds. Mean monthly temperatures vary from high-80 degrees Fahrenheit (°F) during the summer months (May through September) to high-70 °F during the winter months (October through April). Temperatures near Kahuku have ranged from a maximum of 93 °F to a minimum of 56 °F with a mean annual temperature of 76 °F.

4.3 PRECIPITATION

The uplands of O‘ahu receive a steady amount of rainfall as moist oceanic air is forced up and over the Ko‘olau Range by persistent northeasterly trade winds. During the winter months, sporadic southwesterly winds that accompany low-pressure systems bring intense and episodic rains to the Hawaiian Islands. The coastal plain receives a lesser proportion of total rainfall as trade wind precipitation and much greater

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Environet, Inc.	PROJECT NO.: 109-005 DATE: OCTOBER 21, 2009 DRAWN BY: MR REVIEWED BY: SG	SOILS MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 4-1

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proportion from winter storms. Following an orographic pattern, as rainfall and cloud cover increase with altitude and distance inland, median annual rainfall ranges from about 39 inches at the town of Kahuku and about 150 inches a the Ohia Ai Gulch, to over 300 inches near the crest of the Ko‘olau Range further south. The mean annual rainfall at the study area is about 50 inches a year (DLNR, 1982 and Giambelluca et al., 1986).

4.4 HYDROLOGY AND FLOODING

4.4.1 Surface Water

Since there are no surface stream channels within or surrounding the project area, surface water generally flows overland accumulating at lower portions of the area. As shown in the topographic map, the high school campus lies on a relatively flat area with higher lands to the southwest and northeast (Figure 4-2). The highest elevation on campus occurs at the upper campus at approximately 25 ft above msl and the lowest at the lower campus at approximately 5 ft above msl. The existence of very fine grain soils (silt and clay) or impermeable cap rock as indicated by soil test borings from previous geotechnical investigations (Ernest K. Hirata & Associates, Inc., 1989; Maurseth, Howe, Lockwood & Associates, 1970; Soils International, 1983; and Walter Lum and Associates, Inc., 1969) explains the poor subsurface drainage at the lower campus.

4.4.2 Groundwater

The project site overlies the Koolauloa aquifer system defined by the State of Hawai‘i Department of Health (DOH). The upper aquifer, code 30601116 (22221), is listed as an unconfined (the aquifer is not confined under pressure beneath relatively impermeable rocks or soil), basal (fresh water in contact with seawater), sedimentary (non-volcanic lithology) aquifer (Figure 4-3). This aquifer has potential use as a drinking water source and is listed as ecologically important. The irreplaceable aquifer has a low salinity (250-1,000 milligrams per liter of chloride (mg/L Cl-)) and has a high vulnerability to contamination. The lower aquifer, code 30601112 (21122), is listed as an unconfined, basal, dike (aquifers contained in dike compartments) aquifer, and has potential use as a drinking water source. The irreplaceable aquifer contains fresh water (less than 250 mg/L Cl-) and has a moderate vulnerability to contamination. The proposed action is not expected to have any impacts to the aquifers underlying the project site since excavation for the installation of the underground storage unit would be limited to depths above the groundwater table.

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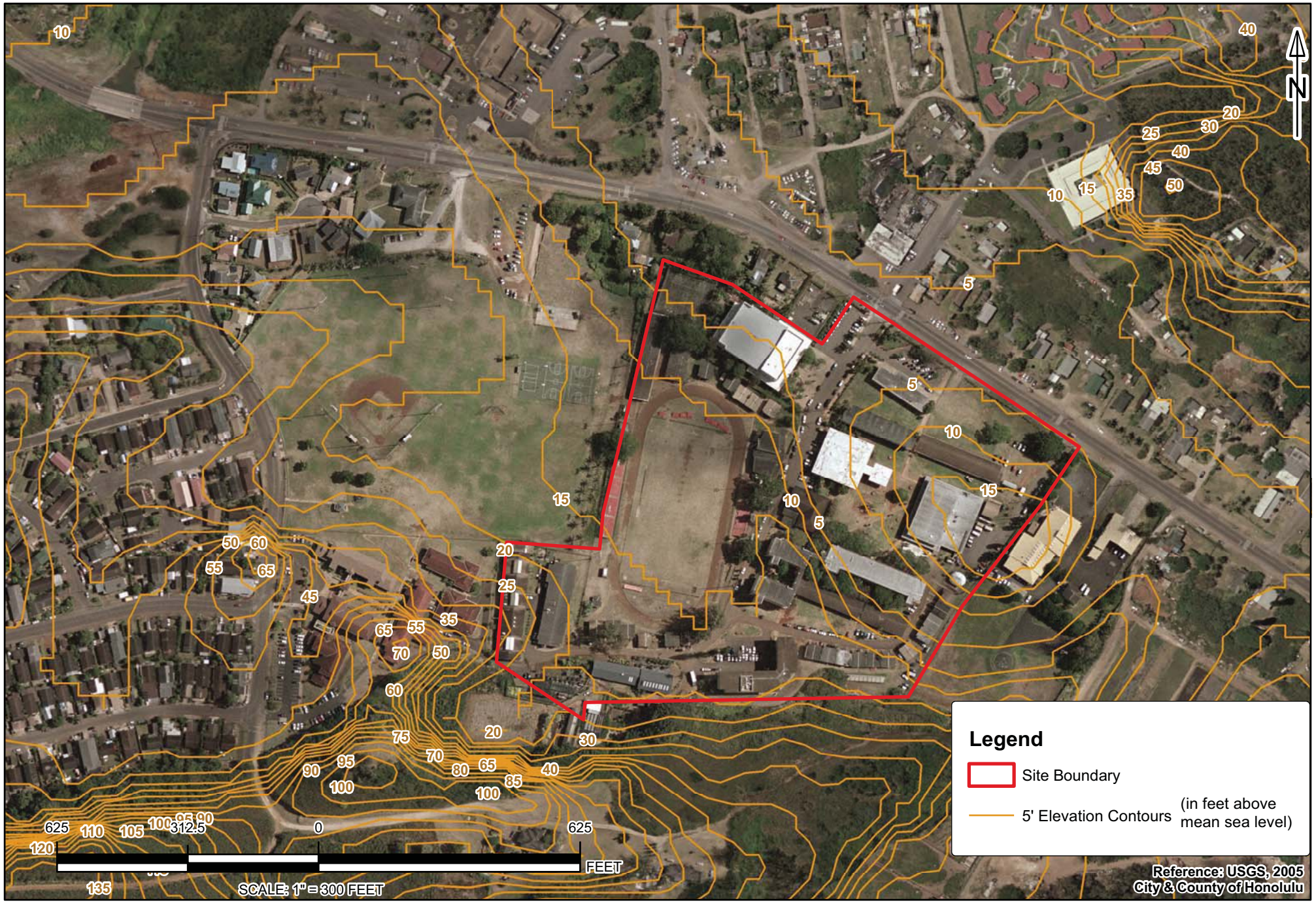

Environet, Inc.	PROJECT NO.: 109-005 DATE: JULY 10, 2009 DRAWN BY: MR REVIEWED BY: SG	TOPOGRAPHIC MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 4-2

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Environet, Inc.	PROJECT NO.: 109-005	AQUIFER MAP	FIGURE 4-3
	DATE: JULY 14, 2009		
	DRAWN BY: MR	KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	
	REVIEWED BY: SG		

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4.4.3 Flooding

The majority of the project area falls within Flood Zone X as defined by the Federal Emergency Management Agency (FEMA), indicating that the site does not lie within either the 100-year or the 500-year flood zone (Figure 4-4). A small portion of the eastern boundary of the project area falls within Flood Zone A. This designation indicates areas within the 100-year flood where base flood elevations are not defined.

4.5 BIOLOGICAL RESOURCES

Existing Conditions

A biological survey of the portion of Kahuku High School that could potentially be impacted by the proposed action was conducted on July 23, 2009. The survey area included the football field and surrounding parts of the campus that are potentially subject to construction activities. The full report by AECOS, Inc. is presented in Appendix A.

Flora

The majority of the plants encountered during the field survey were ornamentals, grasses in maintained lawns, or ruderal weeds in disturbed areas where maintenance is infrequent; typical of what would be found on a school campus or a managed/maintained area. A total of 86 species of flowering plants and one fern were identified during the field survey. Of these species, three (3.4%) are native species, with another three (3.4%) considered to be early Polynesian introductions to the Hawaiian Islands. The three native species; *‘ohai, pōhinahina,* and *koki‘o ke‘oke‘o* are all found in the planting bed near the library. Besides the plants that are weeds; ruderal species outside the regularly maintained areas, essentially all of the plant species within the survey area are planted for landscaping purposes. A full inventory of all the plants observed within the survey area is presented in Appendix A.

Fauna

Other than those supporting common lowland birds and introduced wild or feral mammals, no habitats are present within the project area and no animals of special concern were observed during the field survey. The large grassed football field likely provides a winter feeding/resting habitat for one or more Pacific Golden-Plover (*Pluvialis fulva*), known as *kolea* in Hawai‘i. However, none were observed during the survey since these birds migrate away from Hawai‘i to northern latitudes (Alaska) during the summer months. *Kolea* are known to depart Hawai‘i in late April to early May with adults returning in August and juveniles in October (DLNR, 2005). No federally endangered or threatened species, streams,

relatively permanent or non-relatively permanent waterways, or wetlands occur in the project area. The closest wetland occurs approximately 1,200 ft northwest of the campus (Figure 4-5). The only critical habitat that occurs in the surrounding area is Mokuauia Island, commonly known as Goat Island, located approximately 720 ft offshore from Malaekahana Bay which is approximately 0.75 miles southeast of the project site (Figure 4-6).

Potential Impacts and Mitigation

With the exception of Alternative 4, all alternatives share the potential for temporary construction-related impacts. Any vegetation clearing activities create a risk for the entry of terrigenous sediments into the adjacent near shore marine waters via runoff during earthmoving and related activities.

During torrential rains which occur regularly in Hawai‘i, runoff is inevitable. Alternative 3 would pass the stormwater runoff, including any pollutants, to the ocean via Hospital Ditch. In contrast, the impacts from the preferred alternative would be temporary and sedimentation and runoff may be reduced by implementation of BMPs during construction and possibly by avoiding construction during the wet season. The potential to introduce invasive plant species may be increased during construction activities especially within the grassed football field area. The proposed action would involve stripping of the grass on the football field. However, this is also anticipated to be temporary with restoration activities following the completion of the proposed action.

Since the project area does not contain any habitats for federally endangered or threatened or any other species of concern, no adverse impacts are anticipated. Impacts to the *kolea* that use the football field as a winter feeding/resting ground would be temporary as the species is expected to return to the area after project completion. Moreover, there is a possibility that the *kolea* might continue to utilize the football field as a resting ground during construction since activities are not anticipated to be large in scale. Impacts may be minimized by avoiding construction during the times that *kolea* are known to occur in Hawai‘i.

Environet, Inc.	PROJECT NO.: 109-005	FLOOD INSURANCE RATE MAP	FIGURE 4-4
	DATE: JULY 14, 2009		
	DRAWN BY: MR	KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	
	REVIEWED BY: SG		

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Environet, Inc.	PROJECT NO.: 109-005 DATE: JULY 14, 2009 DRAWN BY: MR REVIEWED BY: SG	WETLANDS MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 4-5

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Environet, Inc.	PROJECT NO.: 109-005 DATE: OCTOBER 14, 2009 DRAWN BY: MR REVIEWED BY: SG	CRITICAL HABITAT MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 4-6

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5.0 AFFECTED HUMAN ENVIRONMENT

5.1 HISTORIC AND CULTURAL RESOURCES

5.1.1 Archaeological Resources

An archaeological literature search and field inspection was conducted in July 2009 by Scientific Consultant Services, Inc. (SCS). The literature search focused on identifying known Land Commission Awards (LCAs) and land grants pertaining to the project area in order to assess past uses of the property. Additional research included a review of previous archaeological investigations conducted in or near the project area. The purpose of the field inspection was to identify any archaeological sites or features occurring within the project boundary. The literature search and field inspection report prepared by SCS is included in Appendix B.

The project area falls within the Kahuku (or formally Keʻana) Ahupuaʻa which is an area known for its historical and cultural significance to the island of Oʻahu. Although population declined rapidly with increased European contact as well as higher demand from chiefs to commoners, observations by Captain James Cook and Lieutenant James King during a visit in 1779 indicated that the region had a high population and was amply cultivated. Later in the 19th century, the majority of Kahuku Ahupuaʻa was utilized as ranchland as well as for sugarcane plantation purposes. A total of 83 LCAs were awarded in the Ahupuaʻa. However, none involved the lands of the project area.

Numerous archaeological sites have been identified previously in the Kahuku area including Puuala Heiau (State Site No. 260), Keana Cave, a burial grave (State Site No. 50-80-02-270), and natural features associated with legends. In addition, the State of Hawaiʻi Department of Land and Natural Resources (DLNR), State Historic Preservation Division (SHPD) has documented numerous inadvertent discoveries of traditional style burials along the coastal region of Kahuku.

The archaeological field inspection conducted on July 24, 2009 by SCS identified one previously unidentified surface feature. The feature, designated as State Site 50-80-02-7134 (SCS Site T-1), consisted of two parallel concrete retaining walls containing stairs located on the east side of the football field adjacent to the southern portion of Building Y just outside of the eastern fenceline. According to the Kahuku High School custodian, the stairs were constructed during the 1940s or 1950s and were associated with an outdoor stage, which no longer exists.

Potential Impacts and Mitigation Measures

Although State Site 50-80-02-7134 (SCS Site T-1) is considered to be a Historic Property since it is believed to be over 50 years old, it is not considered to have cultural or historical significance because the associated stage no longer exists. Construction activities during the proposed action will not have any impacts to State Site 50-80-02-7134 (SCS Site T-1) because the feature is located outside the football field area. Mitigation measures to avoid potential impacts to State Site 50-80-02-7134 (SCS Site T-1) during construction activities will be limited to marking the feature with marking tape and notifying all onsite workers of the presence of the archaeological feature. It is unlikely that additional surface archaeological features would be present given the extensive ground alterations associated with the construction of Kahuku High School. Based on the archival research and previous archaeology conducted in the coastal reaches of Kahuku Ahupua‘a and similar geographic setting, there is a relatively high probability of finding pre-Contact (and possibly early Historic Period) Native Hawaiian habitation sites and burials in subsurface deposits closer to the coastal areas outside of the project area. The soils within the project area include JaC deposits, which are known to be traditional interment sites for Native Hawaiian burials. The presence of JaC deposits is mitigated by the more inland location of the project area, indicating a relatively low probability of finding subsurface evidence of Traditional Native Hawaiian and/or early historic activities including hearths, midden deposits, and other occupation debris (e.g., stone tool waste, discarded artifacts related to habitation and fishing) during construction activities. Although the probability is low, the probability still exists; therefore, SCS has recommended on-site archaeological monitoring during all ground disturbing activities associated with the proposed action.

5.1.2 Cultural Resources

A Cultural Impact Assessment (CIA) was conducted in August and September 2009 by SCS pursuant to Act 50, enacted by the Legislature of the State of Hawai‘i in 2000, and in accordance with the Hawai‘i State Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impacts*, adopted by the Environmental Council in November 1997. The assessment involved identification of the possibility of cultural activities and resources occurring within the project area and its vicinity, and assessing the potential impacts on such resources. The assessment included archival and documentary research as well as communication with organizations with knowledge of the project area and its cultural resources, practices, and beliefs. The full report is included in Appendix C.

Historical and cultural source materials pertaining to the project area and archaeological reports specific to the project vicinity were extensively used to analyze “the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their

setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place" (SCS, 2009). The CIA describes the Ahupua‘a of Ke‘ana where the project area is located as once a populous area "exceeding fine and fertile" during pre-Contact times. However, changes in land ownership after the Great Māhele, ranching, sugar and pineapple cultivation, military occupation, and general urbanization have greatly altered the land uses in Kahuku. The CIA identifies several myths and archaeological sites pertaining to the general Kahuku area. However, none were found to indicate use of the project area for traditional cultural purposes within recent times.

CIA inquiry letters were sent to the History and Culture Branch Chief with SHPD, Ko‘olau Hawaiian Civic Club, and the O‘ahu Island Burial Committee. Additionally, CIA Notices requesting information on any cultural resources or activities at the proposed project area were published on August 30 and September 2 and 3, 2009 in *The Honolulu Advertiser* and in the August and September 2009 issue of the Office of Hawaiian Affairs (OHA) newspaper, *Na Wai Ola.* No responses were received from any of the organizations contacted or news periodical announcements.

Potential Impacts and Mitigation Measures

Since there were no cultural activities identified at the project area, no adverse impacts are anticipated, thus, no mitigation measures are required.

5.2 LAND USE AND VISUAL RESOURCES

Kahuku High School is situated in the core of Kahuku Village, a traditionally rural area. The coastal lowlands and uplands to about 200 ft altitude in the Kahuku area were cultivated for sugarcane by Kahuku Plantation Co. from 1890 to 1971. After the end of sugar cultivation, these lands were replaced by ranches, crop farms, and aquaculture fields (USGS, 2000). The Village historically developed around the Kahuku Sugar Mill, and although the mill is closed, settlement patterns remain with development limited to areas along Kamehameha Highway near the mill (RMTC, 2008).

The entire project area falls within the State of Hawai'i Land Use Commission (LUC) designation of Urban. The LUC designation for the surrounding areas, mainly to the south, is Agricultural (Figure 5-1). The City and County zoning designation of the project area is residential, surrounded by restricted agricultural land to the south and neighborhood business land to the north across Kamehameha Highway (Figure 5-2). In addition to residential housing clustered along the highway, a district park, hospital, and a fire and police stations are located adjacent to the highway (Figure 5-3). The visual setting of vegetation, agricultural lands, sparse buildings, and minimal road improvements is an important aspect of the Kahuku area in maintaining its rural characteristic.

Potential Impacts and Mitigation

Short-term land use impacts may be generated during the construction phase of the proposed action including limited access to the football field and other areas that may become blocked by construction activities or vehicles on campus. Of all the alternatives, with the exception of Alternative 4, the proposed action would have the least amount of land use disturbance off campus and is expected to provide an overall long-term benefit to land uses in the area by improving its drainage system.

Disturbed ground, stockpiles, heavy equipment operations, and construction worker activities would be apparent from areas adjacent to work areas during the construction phase of the proposed action. However, impacts are expected to be temporary, as these visual impacts are construction-related and the stripped grounds that contribute much to the visual disturbance would be restored to pre-construction condition at the end of the construction phase.

Environet, Inc.	PROJECT NO.: 109-005 DATE: JULY 20, 2009 DRAWN BY: MR REVIEWED BY: SG	STATE LAND USE MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 5-1

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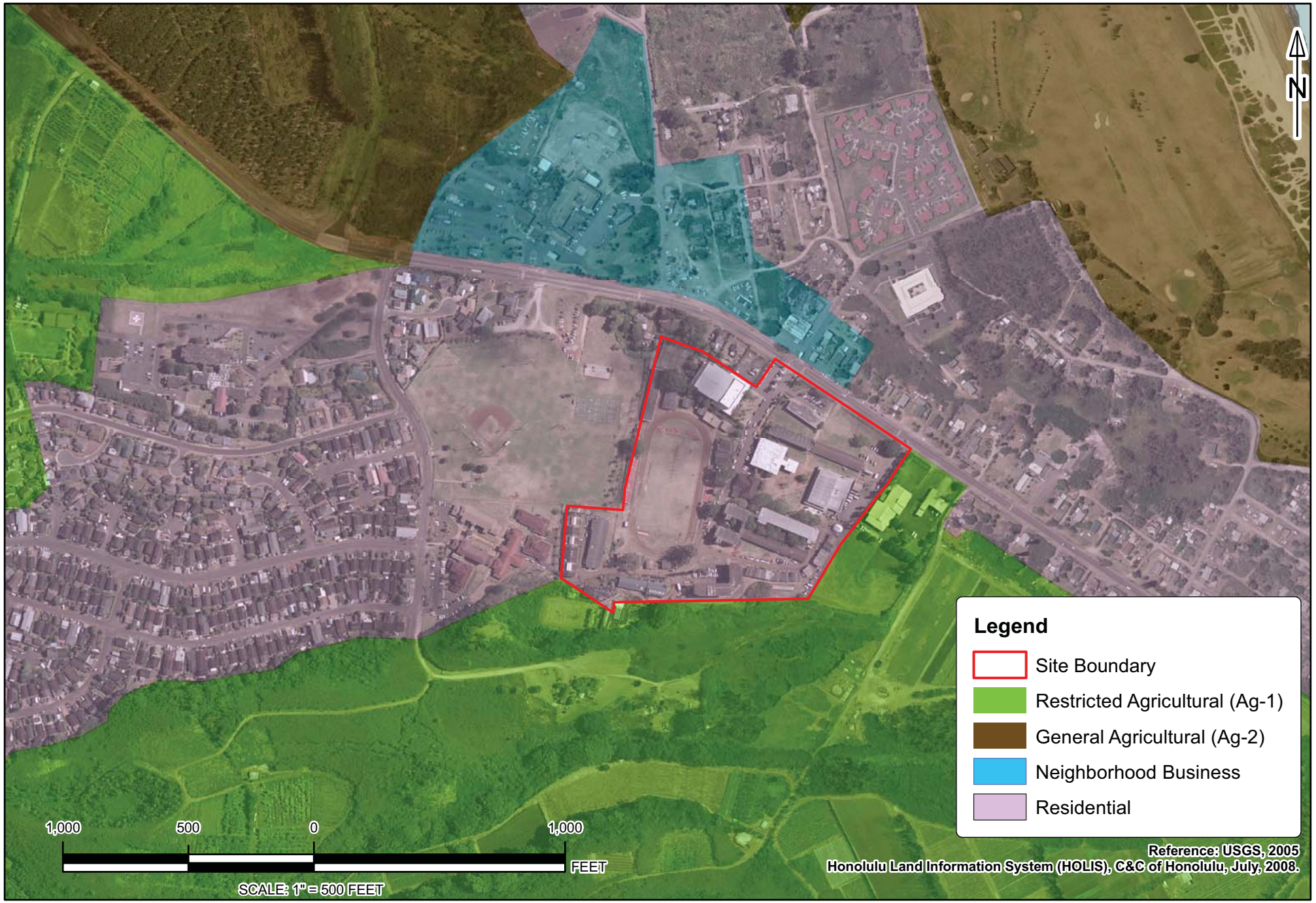

Environet, Inc.	PROJECT NO.: 109-005 DATE: JULY 21, 2009 DRAWN BY: SF REVIEWED BY: SG	CITY AND COUNTY ZONING MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 5-2

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Environet, Inc.	PROJECT NO.: 109-005 DATE: AUGUST 21, 2009 DRAWN BY: SF REVIEWED BY: SG	TMK AND SURROUNDING PROPERTY USE MAP KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 5-3

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5.3 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

One Leaking Underground Storage Tank (LUST) site, two Resource Conservation and Recovery Act (RCRA) generators, and four Underground Storage Tank (UST) sites are present within a quarter-mile radius from the project site (Figure 5-4). Table 5-1 through 5-3 summarizes the locations and status of these sites. There are no known Hazardous, Toxic, and Radioactive Waste (HTRW) occurrences within the project area.

Table 5-1: LUST Sites within a Quarter-Mile of Kahuku High School

Facility	LUST ID	Address	Status
LUST-1 Kahuku Police Station	9-200123	56-470 Kamehameha Highway	Cleanup completed 12/12/2001

Table 5-2: RCRA Generators within a Quarter-Mile of Kahuku High School

Facility	Owner	Address	Classification
RCRA-1 Texaco Station	Kahuku Mill Corporation	56-565 Kamehameha Highway	Small quantity generator
RCRA-2 Kahuku Village	The Estate of James Campbell	56-485 Kamehameha Highway	Small quantity generator

Table 5-3: UST Sites within a Quarter-Mile of Kahuku High School

Facility	Facility ID	Address	Note
UST-3 Kahuku Gas Station	9-201721	56-565 Kamehameha Highway	3-gasoline tanks currently in use
UST-4 Kahuku Gas Station	9-203289	56-460 Kamehameha Highway	1-diesel tank currently in use
UST-5 Kahuku Gas Station	9-200123	56-470 Kamehameha Highway	1-gasoline tank currently in use, 2-gasoline tanks permanently out of use
UST-6 Kahuku Gas Station	9-201870	56-485 Kamehameha Highway	2-gasoline tanks permanently out of use, 1-used oil tank permanently out of use

The LUST site is listed as having been cleaned up in 2001, and thus it is unlikely that this site would be contributing HTRW to the site. The RCRA generators and UST sites are regulated by state and federal laws and regulations, and are presumed to be in compliance with all applicable environmental restrictions and requirements.

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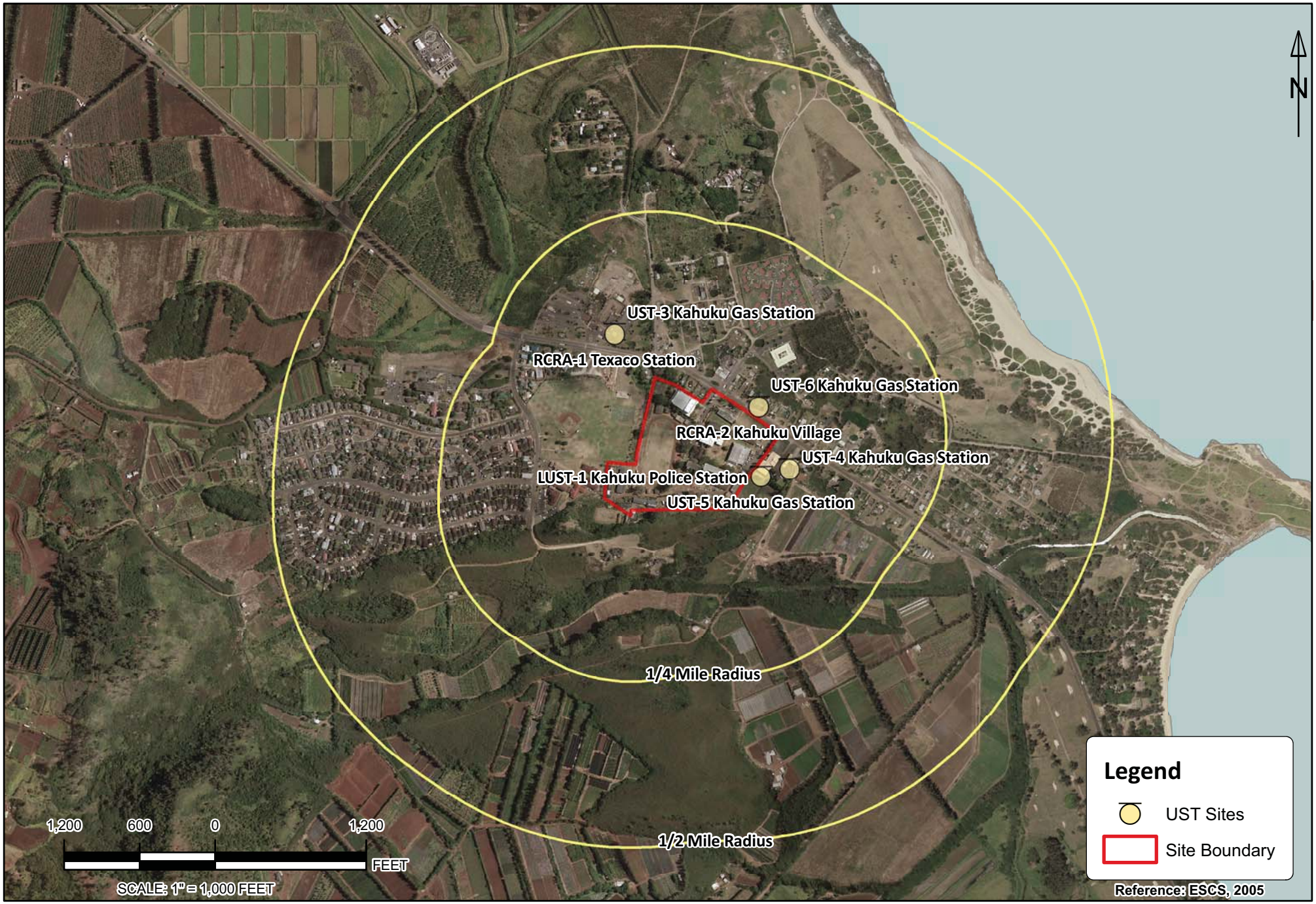

Environet, Inc.	PROJECT NO.: 409-005 DATE: OCTOBER 19, 2009 DRAWN BY: MR REVIEWED BY: SG	HTRW SITES WITHIN THE VICINITY OF KAHUKU HIGH SCHOOL KAHUKU HIGH SCHOOL KAMEHAMEHA HIGHWAY, KAHUKU, O'AHU, HAWAI'I	FIGURE 5-4

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Potential Impacts and Mitigation

As the project area is not known to contain any HTRW materials, excavated soil that would be generated from the project site is not anticipated to be hazardous. Lands inland of Kamehameha Highway in Kahuku Village, however, were historically used for sugar cane cultivation (RMTC, 2008), and it is possible that pesticide and herbicide residuals remain in the soils at Kahuku High School. As a conservative measure, any soil excavated from the site and allocated to be disposed of at a landfill or to be reused would be subject to proper testing and evaluation for suitability for the chosen use.

5.4 NOISE

Ambient noise in the project area is relatively low due to its rural location. Noise-generating activities are currently dominated by wind and vehicular traffic along Kamehameha Highway and other local roadways. Normal daytime noise sources also include student activities on campus, lawn mowers, bird calls, and occasional aircraft overflight. Since the proposed action is not expected to generate a significant increase in noise levels, no noise study was conducted for this project.

Potential Impacts and Mitigation

Noise impacts from all available alternatives would be limited to typical construction noise audible in the area in the immediate vicinity of the construction work sites. Impacts would be short-term and limited to daytime hours during weekdays. According to DOH noise regulations as specified for construction related activities, noise-generating construction activities are not allowed during nighttime hours or on Sundays and holidays. Other DOH regulations include the use of properly muffled construction equipment and ensuring that noise levels fall within the permitted levels during the use of heavy equipment such as backhoes, excavators, and bulldozers. Compliance with such regulations would minimize noise impacts on campus and other areas during the construction phase. In addition to compliance with DOH regulations, consultation with the high school may be necessary to ensure that elevated noise levels during construction do not interfere with classes, as classrooms adjacent to the football field are not air conditioned and windows are usually kept open during classes. Scheduling construction activities during summer recess may be necessary as a mitigation measure to avoid conflict with classroom activities. No long-term noise impacts are expected for any of the alternatives.

5.5 AIR QUALITY

The ambient air quality in the project area is considered to be relatively good due to prevailing northeasterly trade winds, its rural location, and absence of industries in the area. Natural air pollutants in the area include ocean spray, wind-blown dust, brush fires, and occasional volcanic emissions from the

Island of Hawai‘i. Anthropogenic sources include vehicle exhaust, refuse burning, barbecues, and other minor sources such as paint, varnish, and aerosol sprays.

Potential Impacts and Mitigation

Air quality impacts from the available alternatives are not expected to be significant. Short-term air quality impacts are expected from fugitive dust and vehicular emissions generated during construction activities. Dust control measures such as watering of the unpaved work areas, use of wind screens, and keeping paved roads used for project area access clean would be implemented in order to minimize fugitive dust emissions. Increased vehicular emissions during the construction phase is expected both from on-site construction equipment and vehicles, and from vehicles traveling to and from the project site including construction vehicles and vehicles used by commuting construction workers. Fugitive dust and vehicular emissions may reach areas outside the boundary of the project area. However, impacts are not expected to be significant and should be temporary. Once the construction is completed, air quality in the project area is expected to return to its ambient condition.

5.6 RECREATION AND RESOURCE USE

Several beach parks, state parks, and golf courses exist in the vicinity of the project area. These recreational facilities are used extensively by the local community and people who travel from outside the area. Recreational use of the project area is limited to events and activities on campus that involve the students, their families, and others.

Potential Impacts and Mitigation

Since the proposed action would not affect areas outside the boundary of the high school, there would be no adverse impacts to recreational users outside the campus. There would be limited temporary impacts during construction to those who attend the high school, teachers, and possibly others during events on campus. Impacts to football field users may be large depending on the duration of construction activities. However, given the extent of problem that would be solved by the proposed action, these impacts may be considered relatively small in the long-term. Additionally, the proposed action would possibly benefit public park users and those who use the beach by reducing the amount of storm runoff that flows outside the campus boundary.

5.7 ECONOMIC AND SOCIAL RESOURCES

Kahuku is a Census Designated Place (CDP) in the District of Koʻolauloa on the island of O‘ahu. From the 1900s until World War II (WWII), Kahuku’s economy was based primarily on sugar plantations and

refineries. After WWII, sugar production slowly declined as tourism and construction became the major economic drivers in the community with agriculture and retail also playing a smaller role. Turtle Bay Resort as well as the scenic natural landscape of Kahuku are a major tourist attractions in the area (Hawai‘i State Info, 2006).

The Kahuku CDP had a total population of 2,097 as of the 2000 census. The unemployment rate in Kahuku was 9%, which was slightly higher than the unemployment rate of 6.3% for the State of Hawai‘i. The per capita income for Kahuku in 2000 was $12,340 compared to $21,525 for the State of Hawai‘i. The mean household income was $39,135 falling well below the State mean income of $49,820; 14.6% of individuals in Kahuku fall below the poverty line (U.S. Census Bureau, 2000).

The majority of the children of high school age in the community attend public schools. Only 2.4% attend private schools and 3.6% of children in the age range of 16-19 years are not enrolled in school (U.S. Census Bureau, 2000), leaving 94% attending public schools such as Kahuku High School.

Potential Impacts and Mitigation Measures

All available alternatives, with the exception of Alternative 4, would generate short-term economic vitality for the community by providing temporary construction opportunities for the duration of the project. Alternative 3 would generate a small amount of extended economic vitality because of the maintenance necessary to flush out the underground storage tanks and disposal of the blockage items.

The varsity football team at Kahuku High School, known as the Kahuku Red Raiders, has been known for its success as it is currently ranked second in the O‘ahu Interscholastic Association (OIA) East Division. There is a community pride associated with the Kahuku Red Raiders. The implementation of the proposed action would drastically improve the condition of the football field during wet weather and would positively impact not only Kahuku High School students and sports teams, but also the community.

Executive Order 12898 which addresses environmental justice in minority populations and low-income populations states that “…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and…”. While Kahuku’s community income profile is defined as falling below poverty line, the population is not subject to environmental justice issues since Kahuku is a rural community and the income and ethnicity of the area reflect the general profile of some of O‘ahu’s rural North Shore communities, and because the proposed action is to provide an engineering solution to a recurring flooding problem and the long-term impact is a direct benefit to the community.

5.8 CUMULATIVE IMPACTS

Cumulative impacts are two or more individual effects which, when considered together, compound or increase the overall impact. Cumulative impacts can arise from the individual effects of a single action or from the combined effects of past, present, or future actions. Thus, cumulative impacts can result from individually minor but collectively significant actions taken over a period of time. The cumulative impacts of the proposed action along with past and reasonably foreseeable future projects proposed were assessed based upon available information.

Continental Pacific, LLC plans to develop the Kahuku Village Subdivision on 172.7 acres of land separated from Kahuku High School by Kamehameha Highway (RMTC, 2008). Drainage improvements and flood mitigation are proposed for the development and are not expected to create any adverse cumulative impacts for the proposed alternatives for Kahuku High School. No other projects are planned on campus or in the surrounding properties that would compound or increase the impact of the proposed alternatives.

5.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

A better drainage system is needed for Kahuku High School. No long-term negative impacts are anticipated from any of the alternatives available, with the exception of the discharge of stormwater runoff directly to the ocean via Hospital Ditch that would occur under Alternative 3. The preferred alternative would provide a reduction in the frequency and magnitude of flooding events at the high school with minimal impacts to the environment, most of which could be avoided or mitigated through the use of BMPs and proper O&M.

5.10 PROBABLE ADVERSE ENVIRONMENTAL IMPACTS WHICH CANNOT BE AVOIDED

As stated in previous sections, temporary noise, air, and visual impacts are unavoidable during construction. Stripping of the existing lawn on the football field especially would inevitably increase runoff during construction and may affect the Golden-Plovers that utilize the field as a winter feeding/resting habitat. These temporary negative impacts would be mitigated to the extent possible by implementing BMPs as well as by possibly avoiding construction during the wet winter season.

Above all, the proposed action would have the largest adverse impact upon the students who utilize the football field for regular practice. However, the benefits of implementing an improved drainage system for Kahuku High School outweigh the drawbacks of temporary disturbance during construction. The proposed underground storage system is expected to drastically improve drainage at the football field.

6.0 ECONOMIC ANALYSIS

[Awaiting information from USACE]

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7.0 COMMENTS AND COORDINATION

7.1 COMMUNITY MEETINGS

A community meeting was held at Kahuku High School on April 22, 2008. Attendees included community members, high school staff, and representatives from USACE, DOE, USFWS, and Senator Daniel K. Inouye’s office. The main topics that were discussed during the meeting included causes of flooding on campus, ways to improve drainage on campus, and drainage system maintenance issues. The community meeting memorandum prepared by USACE is included in Appendix D.

The main locations where stormwater flows over land and enters the campus were discussed. These locations included the east side of the campus and areas facing Kamehameha Highway. Community members commented that the dry wells installed in the 1970s do not work and agreed that installation of new drains that would drain the stormwater that currently ponds on campus would alleviate flooding problems on campus. It was also agreed that the low spot of the campus is the football field and diverting excess stormwater towards this area would be a good option. Issues on poor maintenance of the existing drainage systems outside the campus which aggravates flooding problems on campus were also brought up. The importance of maintenance was stressed during the meeting.

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8.0 PERMITS AND APPROVALS

Several permits and approvals may be required prior to construction of the project. Application for most of these permits would be made after the environmental review process (40 CFR 1500-1508 and Chapter 343 HRS) is completed. State and Local regulations pertaining to the proposed action are as follows:

National Pollutant Discharge Elimination System (NPDES) Permit

Under the Clean Water Act (CWA) Section 402, a NPDES permit is required for point source discharges of pollutants into surface waters of the United States. The NPDES permit program is administered by the DOH Clean Water Branch under Hawai'i Administrative Rules (HAR) Chapter 11-55.

DOT Highways Right-of-Entry

If the proposed action is to involve work in the State highway right-of-way for any of the drainage features, a right-of-entry permission would be required from the DOT.

City and County of Honolulu Department of Planning and Permitting (DPP) Building Permit

Building Permits would be required for all proposed construction work related to the proposed action.

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9.0 REFERENCES

DLNR, 1982 Median rainfall, State of Hawai'i. Division of Water and Land Development Circular C88, 44 p.

_____, 2005. Draft: Migratory Birds, Kolea or Pacific Golden Plover *Pluvialis fulva.* February 4, 2005. <www.state.hi.us/dlnr/dofaw/cwcs/files/Pacific_Golden_Plover.pdf> Accessed October 12, 2009.

Ernest K. Hirata & Associates, Inc., 1989. Foundation Investigation, Kahuku High School Area 01, Replace Light Pole, Laie, O'ahu, Hawai'i. DAGS Job No. 32-16-2651. State of Hawai'i, Department of Accounting and General Services. WO 89-1725. February 7, 1989. 5p. plus appendices.

Foote, D., E. Hill, S. Nakamura, and F. Stephens, 1972. Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Molokai, and Lanai, State of Hawai`i. USDA Soil Conservation Service, GPO, Washington, DC.

Giambelluca, T.W., Nullet, M.A., and Schroeder, T.A, 1986. Rainfall atlas of Hawai'i. State of Hawai'i Department of Land and Natural Resources, Division of Water and Land Development Report R76, 267 p.

Hawai'i State Info, 2006. Hawai'i State Info, The Hawaiian Islands; Kahuku, Honolulu County, Hawai'i. <http://www.hawaiistateinfo.com/kahuku.php> Accessed July 31, 2009.

Hida, Okamoto & Associates, Inc., 1992. Drainage Study Phase II for Kahuku High and Intermediate School. March 27, 1992. 10p. plus appendix.

Maurseth, Howe, Lockwood & Associates, 1970. Report Foundation Investigation, Proposed Gymnasium Building, Kahuku High School, Kahuku, O'ahu, Hawai'i. State of Hawai'i, Department of Accounting and General Services. Project No. H-84. November 18, 1970. 5p. plus appendices.

R. M. Towill Corporation (RMTC), 2008. Draft Environmental Assessment, Kahuku Village Subdivision. Prepared for Continental Pacific, LLC. June 2008.

SCS, 2009. A Cultural Impact Assessment of the Kahuku Storm Damage Reduction Project, O'ahu Island, Hawai'i. September 2009.

Soils International, 1983. Report Soils Investigation, Proposed Industrial Education Classroom, Kahuku High School, Kahuku, O'ahu, Hawai'i. DAGS Job No. 02-16-7313. State of Hawai'i,

Department of Accounting and General Services. Project No. H-0552-F. August 29, 1983. 10p. plus appendices.

U.S. Census Bureau, 2000. United States Census 2000. < http://www.census.gov/main/www/cen 2000 .html> Accessed July 31, 2009.

USACE, 2006. Kahuku Watershed Study, Feasibility Report and Environmental Assessment.

USACE, 2009. Engineering Design Report. Kahuku Storm Damage Reduction Project, Island of O‘ahu, State of Hawai‘i. Department of the Army, USACE Honolulu District, Fort Shafter, Hawai‘i. July 27, 2009.

United States Geological Survey (USGS), 2000. Water-Resources Investigation Report 99-4171. Hydrology and Water and Sediment Quality at James Campbell National Wildlife Refuge Near Kahuku, Island of O‘ahu, Hawai‘i. Prepared in cooperation with the U.S. Fish and Wildlife Service, Department of the Interior. Honolulu, Hawai‘i.

Walter Lum and Associates, Inc., 1969. Preliminary Soil Exploration, Classroom Building “A” – 1st Increment, Kahuku High-Intermediate & Elementary School, Kahuku, O‘ahu, Hawai‘i. TMK 5-6-06:3, DAGS Job. No. 02-16-5415.2. State of Hawai‘i, Department of Accounting and General Services. 14p.

Appendix A*:*

Biological Survey

Biological survey for the Kahuku Storm Drainage Reduction Project at Kahuku High School on Oʻahu.

July 25, 2009 **DRAFT** *AECOS* No. 1208

Eric B. Guinther
AECOS Inc.
45-939 Kamehameha Highway, Suite 104
Kāneʻohe, Hawaiʻi 96744
Phone: (808) 234-7770 Email: guinther@aecos.com

Introduction

This report presents results of a biological survey—essentially a botanical survey—of that portion of the Kahuku High School campus in Kahuku that could potentially be disturbed by a proposed storm drainage reduction project. The survey area encompassed the athletic field and surrounding parts of campus where existing drains would likely be connected to a detention structure under a portion of the athletic field. The effort is part of environmental due diligence under the direction of Environet, Inc.[1] The project is described in detail in a report by the U.S. Army Corps of Engineers (USACE, 2009).

Methods

An initial visit to the project area was made on July 1, 2009 to establish the area for the survey based upon the selected project alternative. It was related that no part of the project would be located off of the campus.

A return visit was made on July 23 and a botanical survey of the project area made by traversing a wandering transect that covered all areas of the campus potentially subject to construction related impacts (see Fig. 1).

Results

The results of the field survey are summarized in Table 1, a listing of the flora identified from the project area. A total of 86 species of flowering plants and one fern were identified. The plants were roughly quantified using an abundance scale as explained in the key to Table 1.

[1] This report will become part of the public record for the project environmental assessment.

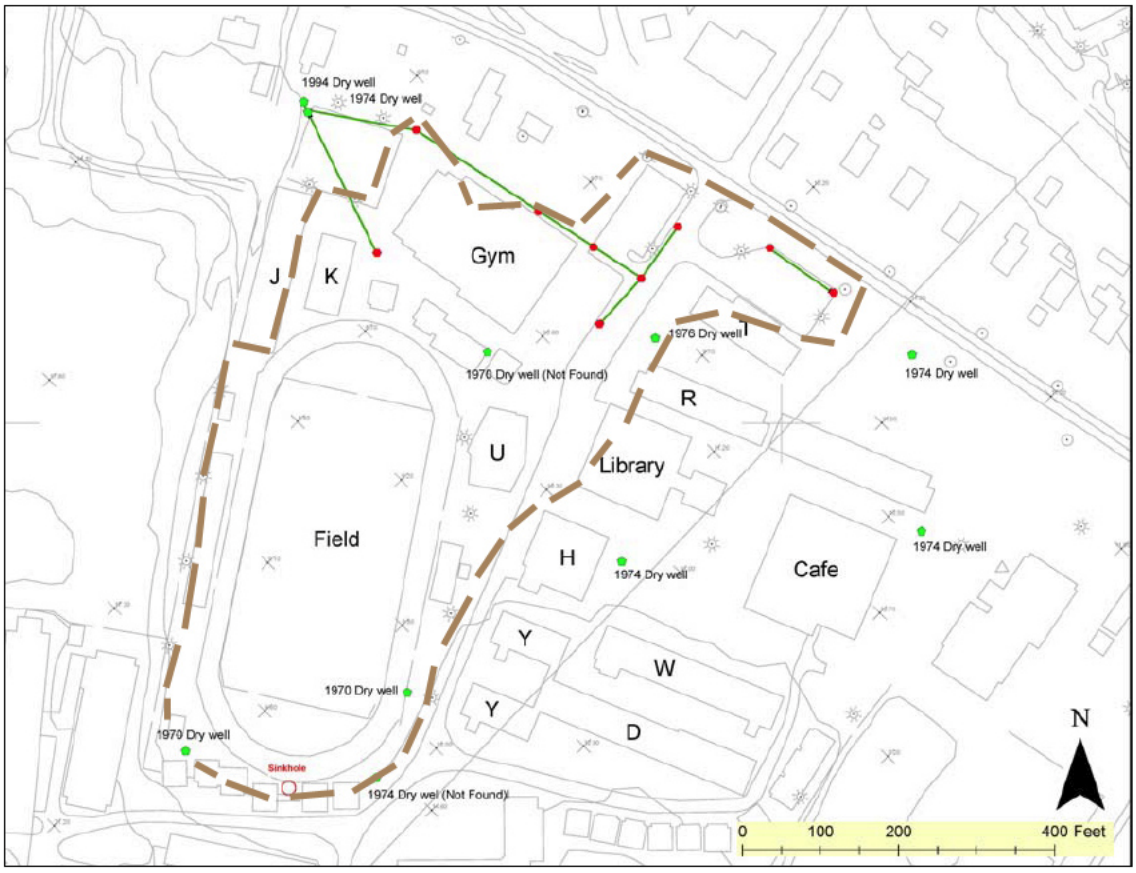

Figure 1. Kahuku High School campus, with biological survey area indicated as outlined by brown dashed line. Green and red dots and lines show existing drains and drywells. Main project area is "Field."

Discussion

Because the project area is a school campus and a managed/maintained area, the majority of plants encountered are ornamentals, grasses in maintained lawns, or ruderal weeds typical of disturbed areas where plant maintenance is infrequent. In terms of native plants versus non-native, only 3 species (3.4%) are native, with another 3 (3.4%) considered to be early Polynesian introductions to the Hawaiian Islands. An example of the latter is *niu* or coconut palm. The three native species (*ʻohai, pōhinahina*, and *kokiʻo keʻokeʻo*) are all part of a planting bed near the library where native species are used in the landscaping. The status of naturalized (Nat) versus ornamental (Orn) may be

Table 1. Flora listing for the Kahuku High School Flood Abatement Project, O'ahu, Hawai'i

Species listed by family	Common name	Status	Abundance	Notes
	FERNS			
POLYPODIACEAE				
Phymatosorus grossus (Langsd. & Fisch.) Brownlie.	*laua'e*	Nat	R1	
	FLOWERING PLANTS DICOTYLEDONES			
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	R1	<1>
AMARANTHACEAE				
Alternanthera pungens Kunth	khaki weed	Nat	U	<1>
Amaranthus sp.	---	Nat	R	<1, 3>
APOCYNACEAE				
Nerium oleander L.	oleander	Orn	U	
Plumeria rubra L.	plumeria	Orn	O	
ARALIACEAE				
Polyscias guilfoylei (W. Bull) L.H. Bailey	panax	Orn	U	
Schefflera actinophylla (Endl.) Harms	octopus tree	Nat	R	
ASCLEPIADACEAE				
Marsdenia floribunda (Brongniart) Schlechter	stephanotus	Orn	O	
ASTERACEAE (COMPOSITAE)				
Bidens alba (L.) DC	beggar's tick	Nat	U	<1>
Calyptocarpus vialis Less.	---	Nat.	O2	<1>
Conyza sp.	horseweed	Nat	U	<1>
Sonchus oleraceus L.	sow thistle	Nat	R	<1>
Sphagneticola trilobata (L.) Pruski	wedelia	Nat	U2	
BIGNONIACEAE				
Tabebuia heterophylla (A. P. de Candolle) Britt.	pink tecoma	Orn	C	
BORAGINACEAE				
Heliotropum procumbans Mill.	---	Nat	R	<1>
BRASSICACEAE				
Lepidium virginicum L.	---	Nat	R	<1>
CARACACEAE				
Carica papaya L.	papaya	Nat	R	
CASUARINACEAE				
Casuarina equisetifolia L	common ironwood	Nat	R1	

Table 1 (continued).

Species listed by family	Common name	Status	Abundance	Notes
CLUSIACEAE				
Clusis rosea Jacq.	autograph tree	Nat	U2	
CONVOLVULACEAE				
Ipomoea obscura (L.) Ker-Gawl.	field bindweed	Nat	R	<1>
CUCURBITACEAE				
Coccinia grandis (L.) Voigt	scarlet-fruited gourd	Nat	R	<1>
EUPHORBIACEAE				
Acalypha godseffiana M. T. Masters	acalypha	Orn	R1	
Chamaesyce prostrate (Aiton) Small	prostrate spurge	Nat	R	<1>
Chamaesyce hirta (L.) Millsp.	garden spurge	Nat	O	<1>
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	Nat	U	<1>
Codiaeum variegatum (L.) Blume	croton	Orn	U1	
Macaranga tanarius (L.) Müll. Arg.	---	Nat	R	
FABACEAE				
Cassia fistula L.	golden shower	Orn	R	
Cassia x nealiae H.S. Irwin & Barneby	rainbow shower	Orn	O	
Delonix regia (W.J. Hook.) Rafinesque	royal poinciana	Orn	R	<3>
Indigofera hendecaphyla Jacq.	prostrate indigo	Nat	O	<1>
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat	U1	<1>
Sesbania tomentosa W.J. Hook. & Arnott	*ʻohai*	**End**	R	<2>
LYTHRACEAE				
Lagerstoemia speciosa (L.) Pers.	giant crepe-myrtle	Orn	R1	
MALVACEAE				
Hibiscus arnottianus A. Gray	*kokiʻo keʻokeʻo*	**End**	R	<2>
Hibiscus rosa-sinensis L.	Chinese hibiscus cv.	Orn	C	
Malvastrum coromandelianum (L.) Garck	false mallow	Nat	U	<1>
Sida ciliaris L.	---	Nat	R	<1>
MORACEAE				
Ficus macrophylla Persoon	Moreton Bay fig	Orn	U	
Ficus microcarpa L.	Chinese banyan	Nat	U	
MYRTACEAE				
Callistemon sp.	bottlebrush	Orn	R	<3>
Psidium guajava L.	common guava	Nat	R	<1>
NYCTAGINACEAE				
Boerhavia coccinea Mill.	false *alena*	Nat	R	<1>
Bougainvillea spectabilis Wilden.	Bougainvillea	Orn	C	
PASSIFLORACEAE				
Passiflora cf. *edulis* Sims	passion fruit	Nat	R	<3>

Table 1 (continued).

Species listed by family	Common name	Status	Abundance	Notes
PHYTOLACCACEAE				
Rivina humilis L.	coral berry	Nat.	R	<1>
PLANTAGINACEAE				
Plantago lanceolata L.	nrw-lvd. plantain	Nat	O3	<1>
Plantago major L	brd-lvd. plantain	Nat	R	<1>
PORTULACACEAE				
Portulaca oleracea L.	pigweed	Nat	R	<1>
RUBIACEAE				
Hedyotis corymbosa (L.) Lam.	---	Nat	U	<1>
Morinda citrifolia L.	*noni*, Indian mulberry	**Pol**	R	
Spermacoce assurgens Ruiz & Pav.	buttonweed	**Nat**	U	<1>
SAPOTACEAE				
Chrysophyllum oliviforme L.	satinleaf	Nat	R	<3>
VERBENACEAE				
Vitex rotundifolia L. fil.	*pōhinahina*	**Ind**	R2	<2>
MONOCOTYLEDONES				
AGAVACEAE				
Cordyline fruticosa (L.) A. Chev.	*ki*, ti	**Pol**	U2	<2>
Dracaena marginata Lam.	money tree	Orn	U	
Sanseviera trifasciata Prain	bowstring-hemp	Orn	R2	
ARACEAE				
Syngonium podophyllum Schott	nephthytis	Orn	R	
ARECACEAE				
Cocos nucifera L.	coconut, *niu*	**Pol**	U	
Dypsis lutescens (H. Wendl.) Beentji & Dransfield	golden-fruited palm	Orn	R	
Pritchardia cf. *pacifica* Seem. & H. Wndl.	Fiji fan palm	Orn	O	<3>
Veitchia merrillii (Beccari) H.E. Moore	Manila palm	Orn	C	
CANNACEAE				
Canna sp.	garden canna	Orn	R	<3>
COMMELINACEAE				
Tradescantia spathacea Swartz	Moses-in-the cradle	Orn	R	
CYPERACEAE				
Cyperus gracilis R. Br.	McCoy grass	Nat	R2	
LILIACEAE				
Crinum asiaticum L.	giant spider lily	Nat	R1	
Hippeastrum sp.	amaryllis	Orn	R	<3>

Table 1 (continued).

Species listed by family	Common name	Status	Abundance	Notes
POACEAE				
Axonopus compressus (Swartz) P. Beauv.	carpetgrass	Nat	R	
Axonopus fissifolius (Raddi) Kuhl.	nrw-lvd. carpetgrass	Nat	O	
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	Nat	A	
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	U	<1>
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	A	
Digitaria insularis (L.) Mez. ex Ekman	sourgrass	Nat.	R1	<1>
Echinochloa colona (L.) Link	jungle-rice	Nat	R	<1>
Eleusine indica (L.) Gaertn.	wiregrass	Nat	U	<1>
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult.	lovegrass	Nat	R	<1>
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	A	
Paspalum conjugatum Bergius	Hilo grass	Nat	R	
Paspalum dilatatum Poir.	Dallis grass	Nat	O	<1>
Sporobolis africanus (Poir.) Robyns & Tourmay	African dropseed	Nat	R	<1>
Sporobolus sp.	dropseed	Nat.	U2	
Urochloa maxima (Jacq.) Webster	Guinea grass	Nat	U2	<1>
Urochloa subquadripara (Trin.) Webster	---	Nat	O	
indet.	new playing field turf	Orn	R3	
STRELITZIACEAE				
Strelitzia reginae Dryander	bird-of-paradise	Orn	R	
ZINGERBACEAE				
Alpinia purpurata (Viel.) K. Schum.	red ginger cv.	Orn	U	

Legend to Table 1

STATUS = distributional status for the Haaiian Islands:

- **Ind** = Indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
- Nat = Naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
- Orn = Ornamentals; plants that are maintained as part of the landscaping .
- Pol = Aboriginal (Polynesian) introduction; "canoe plants."

ABUNDANCE = occurrence ratings for plants by area:

R – Rare	seen in only one or perhaps two locations.
U - Uncommon-	seen at most in several locations
O - Occasional	seen with some regularity
C - Common	observed numerous times during the survey
A - Abundant	found in large numbers; may be locally dominant.
AA - Very abundant	abundant and dominant; defining vegetation type.

Numbers following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this where abundance, where encountered, tends to be greater than the occurrence rating:

1 – several plants present
2 - many plants present
3 – locally abundant

Table 1 (continued).

NOTES: <1> – Plants that are weeds; ruderal species outside regularly maintained areas.
<2> – Native plant that is ornamental in this situation.
<3> – Plant lacking key diagnostic characteristics (flower, fruit).

somewhat misleading. Essentially all of the plants not flagged with Note <1> are plantings for landscaping purposes. Many landscape plants (including the grasses that dominate the playing field and other lawn areas) have become naturalized, by which is meant they are non-native or introduced species that can now be found in the wild and grow and spread without human intervention. Thus, "status" refers to the species status in the Hawaiian Islands and not the use of the plant within the project survey area. Ornamental plants have not escaped human cultivation.

No streams, relatively permanent or non-relatively permanent waterways, or wetlands occur in the project area. Although a survey to develop a faunal listing for the project area was not undertaken, no animals of special concern were encountered by the biologist on July 1 or 23. No habitats other than those supporting common lowland birds and introduced wild and feral mammals are present. However, the large grassed playing field likely provides winter feeding/resting habitat for one or more Pacific Golden-Plover (*Pluvialis fulva*); none was seen on the survey because these birds migrate away from Hawai'i to northern latitudes (Alaska) for the summer months. No federally endangered or threatened species (Federal Register, 2005; USFWS, 2005) were encountered during the survey, and none is anticipated to utilize habitats in the project area.

References

Army Corps of Engineers (USACE). 2009. Engineering Design Report. Kahuku Storm Damage Reduction Project, Island of Oahu, State of Hawaii. Dept, of the Army, U.S. Army Corps of Engineers, Honolulu District, Fort Shafter, Hawaii. 23 pp.

Federal Register. 2005. Department of the Interior, Fish and Wildlife Service, 50 CFR 17.Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. *Federal Register*, 70 No. 90 (Wednesday, May 11, 2005): 24870-24934.

U.S. Fish & Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants. 50 CFR 17:11 and 17:12.

_____. 2008. USFWS Threatened and Endangered Species System (TESS), online at http://ecos.fws.gov/tess_public/StartTESS.do.

***Appendix B**:*

Archaeological Literature Search and Field Inspection

SCS Project Number 1072-2

LITERATURE SEARCH AND FIELD INSPECTION OF THE KAHUKU STORM DAMAGE REDUCTION PROJECT KAHUKU AHUPUA`A, KO`OLAULOA DISTRICT, O`AHU ISLAND, HAWAI`I [TMK: (1) 5-6-006:003, 009, 010, 011 (por.), 015, and 025]

Prepared by:
Cathleen A. Dagher, B.A.
and
Robert L. Spear, Ph.D.
August 2009
Revised September 2010

Prepared for:
Environet, Inc.
650 Iwilei Road, Suite 204
Honolulu, HI, 96817

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INTRODUCTION

At the request of Environet, Inc., Scientific Consultant Services, Inc. (SCS) has been contracted to provide a literature search and field inspection for the Kahuku Storm Damage Reduction Project. The literature search entails investigating known Land Commission Awards (LCAs) and other documents pertaining to the area to be impacted by the ground alterations associated with the Kahuku Strom Damage Project. Specifically, this includes the Kahuku Intermediate and High School property and an adjacent park located immediately to the west of the school ground located in the village of Kahuku, Kahuku Ahupua`a, Ko`olauloa District, O`ahu Island, Hawai`i [TMK: (1) 5-6-006:003, 009, 010, 011 (por.), 015, and 025] (Figures 1, 2, and 3).

Archival research focused on identifying LCAs and land grants located along the length of the project corridor and assessing how these properties were utilized in the past. Based on project area maps, no LCAs were awarded in the current project area. Additional research includes a review of previous archaeological investigations conducted in or near the current project area and a report detailing the findings of known archaeological sites within and near the project area. The Archaeological Field Inspection was conducted of the project area on July 24, 2009 by SCS archaeologist Cathy Dagher. One previously unidentified site (State Site 50-80-02-7134, two parallel concrete retaining walls with incorporated stairs, associated with a now destroyed outdoor stage, which were constructed during the 1940s or ‘50s) was documented during the Field Inspection.

PROJECT AREA

The project area consists of the Kahuku Intermediate and High School grounds and the adjacent park to the west, located on the northeast coast of the island of O`ahu, within the village of Kahuku, Kahuku Ahupua`a, Ko`olauloa District, O`ahu Island, Hawai`i. The project area is bounded on the north by Kamehameha Highway, on the west by Pualaea Street, on the east by TMK: (1) 5-6-006:020, which houses the Honolulu Police Department, Kahuku Branch, and on the south by natural topographic features. The project area is comprised of an urban landscape and has been thoroughly developed with modern infrastructure, pavement, utilities, and ornamental foliage. Thus, the overall project area has been subject to prior alterations, including grubbing, grading, and landscaping. Please note that the Archaeological Field Inspection included three proposed alternative project areas (see Figure 3).

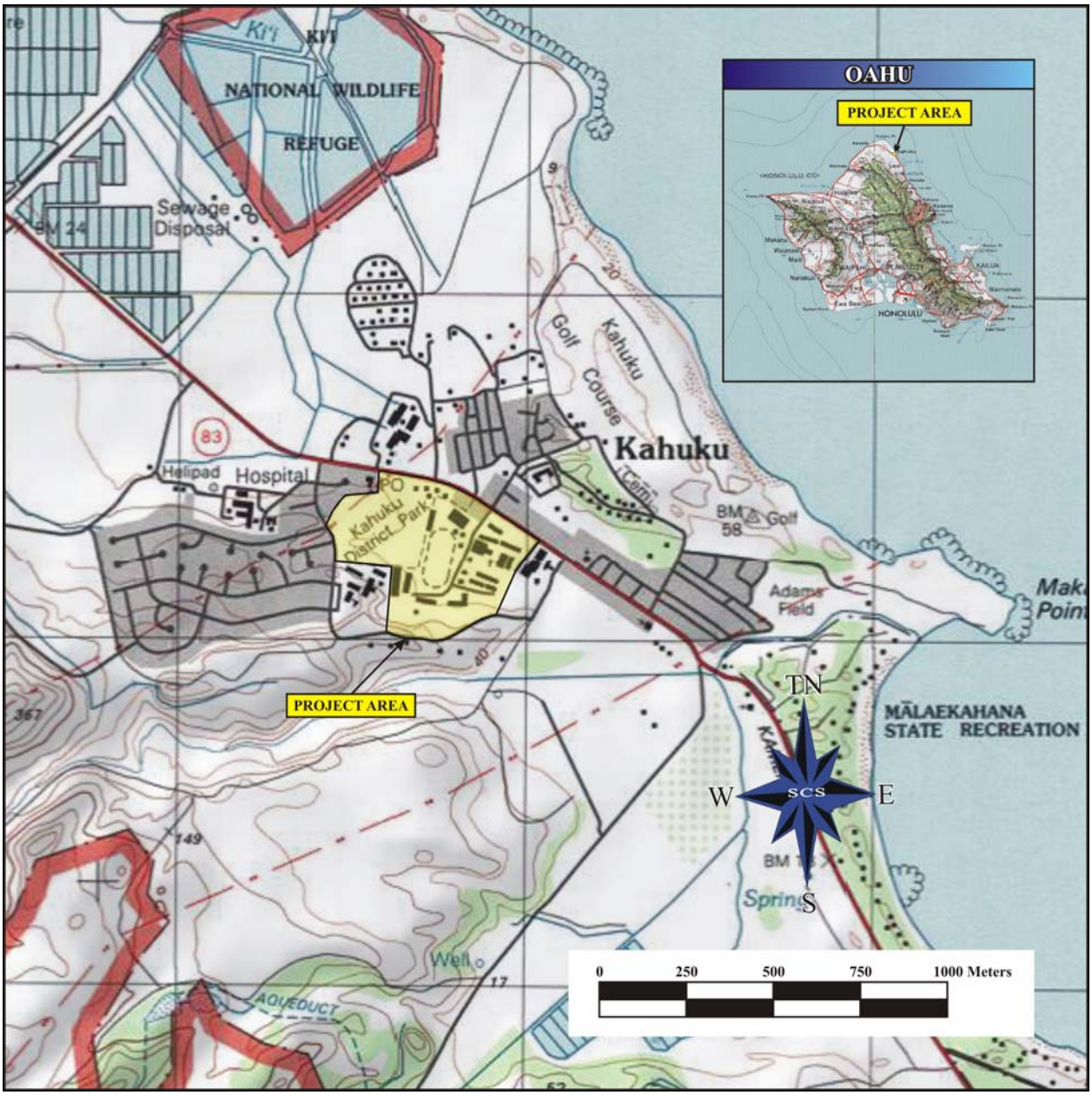


Figure 1: USGS Quadrangle (Kahuku) Showing Project Area Location.

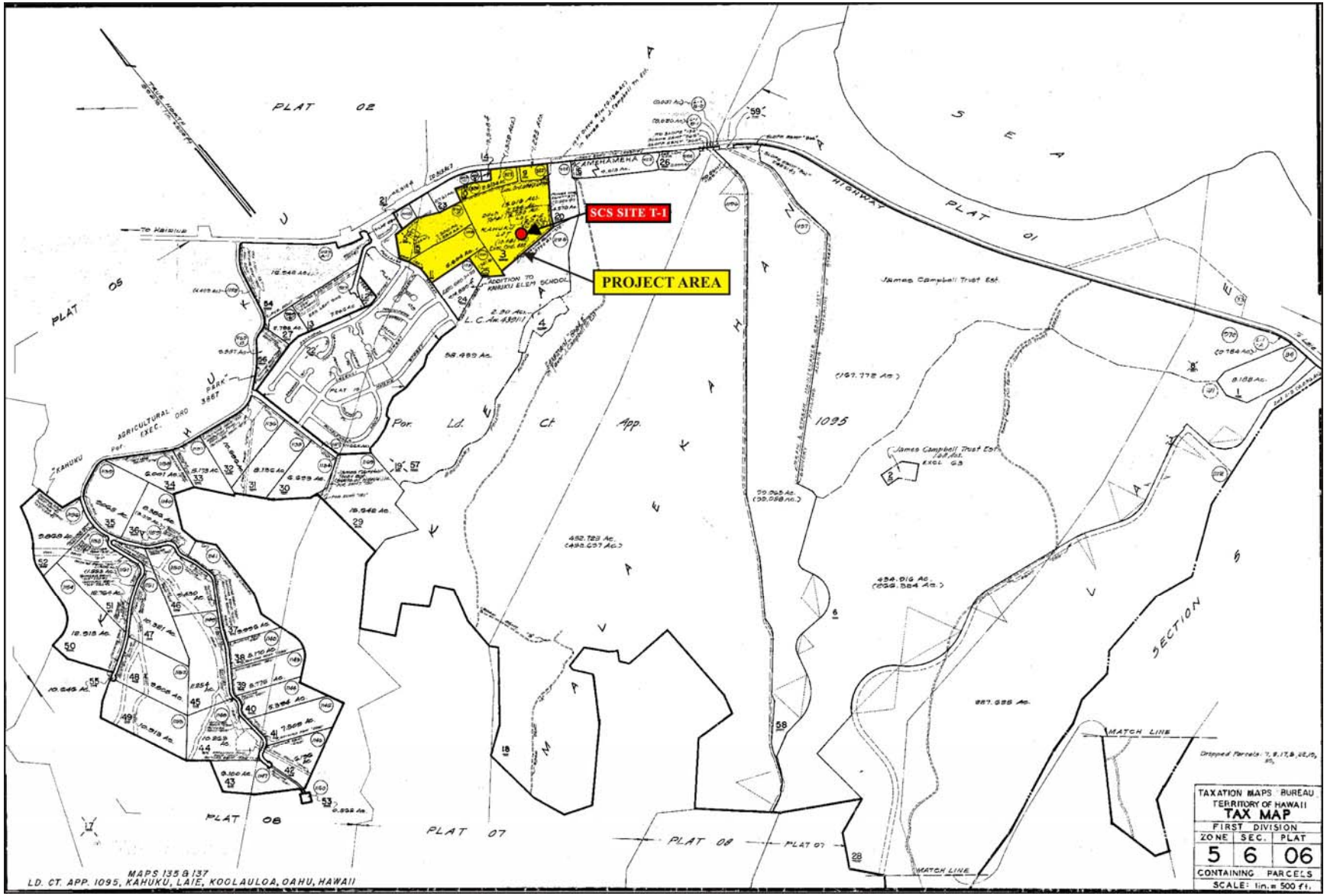


Figure 2: Tax Map Key [TMK: (1) 5-6-006: Various] Showing Project Area Location and Location of State Site 50-80-02-7134 (SCS Site T-1).

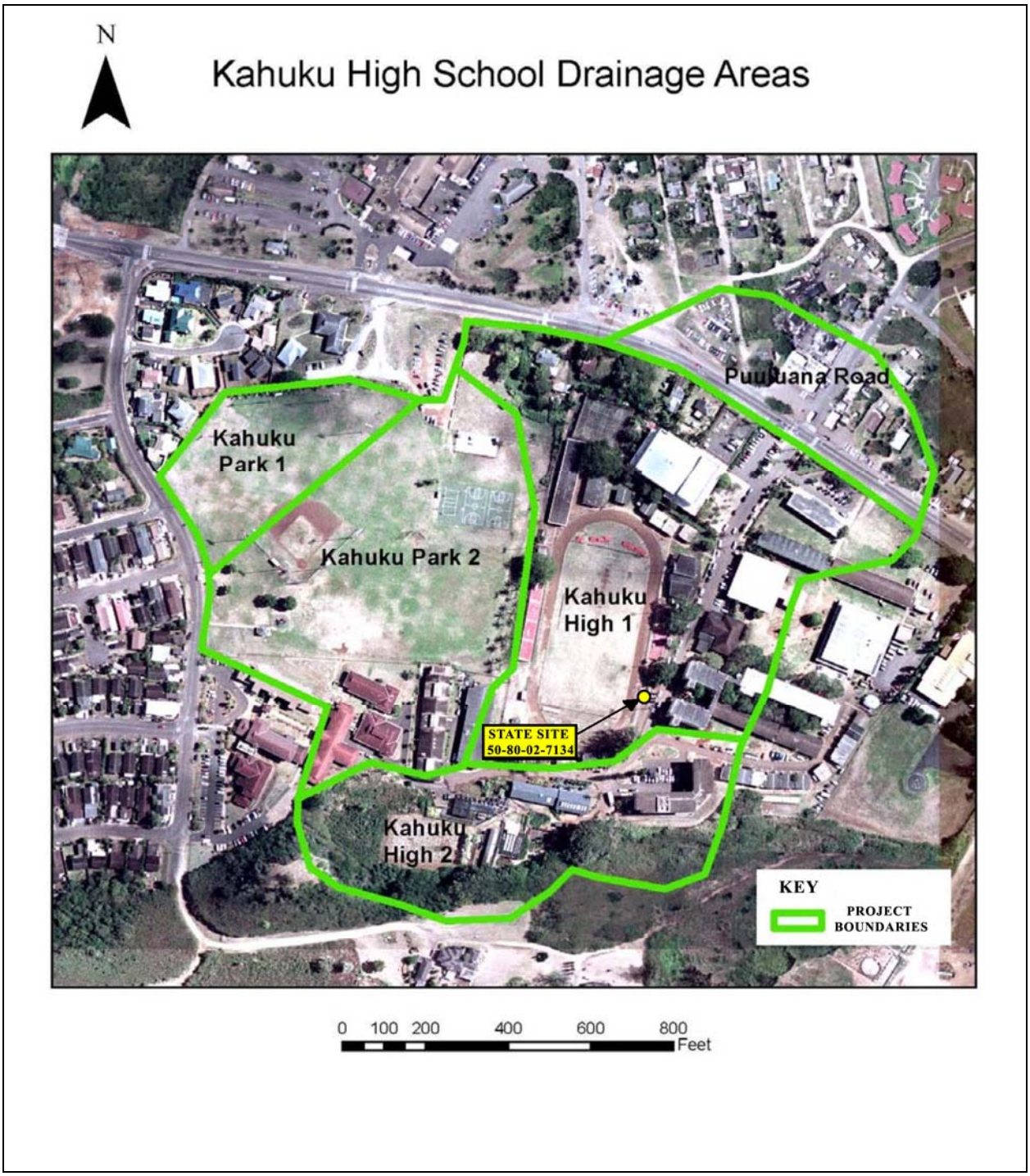


Figure 3: Kahuku High School Drainage Areas and Site Location Map. (Note Football Field is Kahuku High 1).

CLIMATE AND SOILS

The project area is situated approximately 12600 feet inland at elevations ranging from 20 to 40 feet above mean sea level. Mean annual rainfall in the area is approximately 850 mm (34 inches) (Armstrong 1983; Giambelluca *et al.* 1986), significantly less than the typical windward coast setting, and more in common with the drier North Shore of O`ahu. Portions of the project area are covered with asphalt and concrete; where present, vegetation is dominated by grassy lawns, coconut palms (*Cocus nucifera*), and small ornamental shrubs and flowering plants. According to Foote *et al.* (1972: 48, 49, 95: Map 46) the project area is comprised of Jaucus sands (JaC) deposits just south of Kamehameha Highway and Mokuleia clay loam (Mt) farther inland. The Mokuleia clay loam deposits occur along relatively level coastal areas and are often found in association with Jaucus sand deposits. The Mokuleia clay loam exhibits moderate permeability, slow runoff, and a very slight erosion hazard. These soils are often used for the commercial production of sugarcane, truck crops, and as ranchlands (*ibid*: 95). The Jaucus sands exhibit rapid permeability, slow to very slow runoff, slight erosion hazard, but erosion due to winds can be quite severe in areas with no vegetation (*ibid*: 48, 49).

CULTURAL HISTORICAL CONTENT

TRADITIONAL SETTLEMENT PATTERNS

Early settlement and agricultural development was probably first established on the windward side of the Hawaiian Islands and may have begun as early as A.D. 300s-600s on O`ahu during what is known as the Colonization Period (Cordy 1974; Kirch 1974, 1985:298; Hommon 1976). Most likely arriving from east Polynesia, these early inhabitants brought with them tools, fishing gear, and other artifacts, as well as useful plants and animals. Settling in favorable localities offering both fishing and agricultural opportunities and having near access to inland resources was a priority (Kirch 1985). Although receiving the majority of their protein from fish, Handy and Handy have stated: "…for every fisherman's house along the coasts there were hundreds of homesteads of planters in the valley and on the slopes and plains between the shore and forest" (1978: vi).

During the pre-Contact Period (pre-1778), there were primarily two types of agriculture, wetland (*lo`i*) and dry land (*kula*), both of which were dependent upon geography and physiography. River valleys, especially those on the windward side of an island, provided ideal conditions for wetland *kalo* (Colocasia esculenta) that incorporated pond fields and irrigation canals (*`auwai*). Other cultigens such as *kō* (sugar cane, Saccharum officinaruma) and *mai`a* (bananas, *Musa sp.*) were also grown and, where appropriate on the tablelands and dryer slopes, the production of such crops as *`uala* (sweet potato, Ipomoea batatas) occurred. Coastal sections

with fringing reefs eventually gave rise to the only true aquaculture developed in Polynesia: the fishpond (Kirch 1985:211). Unique to Hawai`i, fishpond technology allowed production and harvesting of marine life on a scale that was no longer dependent on the natural population, greatly expanding the food base. This was a typical pattern seen during traditional times on all the Hawaiian Islands (Kirch 1985; Kirch and Sahlins Vol. 1, 1992:5, 119.)

Oral history notes that the division of O`ahu's lands into districts (*moku*) and sub-districts was solidified by the *ali`i nui*, Mā`ili-kūkahi, during the early part of the 16th Century (Kamakau 1991:54; Cordy 2002:19). O`ahu contained six districts including Ko`olauloa and Waialua. Further land divisions within the *moku* were *ahupua`a*. The residents were able to harvest from both the land and the sea associated with the particular *ahupua`a* in which they lived. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111).

PRE-CONTACT PERIOD

Some of the earliest references to Kahuku Ahupua`a were made by European visitors. Observations by Captain James Cook and Lieutenant James King during a visit in 1779 indicate that the region had a high population and was amply cultivated (Handy and Handy 1972: 462 and Dorrance 1998). As they sailed past Kahuku on their way to Kaua`i, King noted in his journal that, "Nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valley, which the whole face of the country conveyed" (Handy and Handy 1972:462; Dorrance 1998:119). However, only 13 years later, Captain George Vancouver observed that the land did not appear as rich and prosperous as had been described previously (Handy and Handy 1972:462; Dorrance 1998:119). Vancouver, unlike Cook, visited during the dry season, possibly occasioning these differences in opinion. However, it is also very likely that 13 years of contact with Europeans and their diseases had already had a massive negative impact on the population of the region (Anderson and Williams 1998:23). In 1838, one observer noted that "much taro land lies waste, because the diminished population of the district does not require its cultivation" (E.O. Hall in McAllister 1933:153, Handy and Handy 1972:462).

The dramatic decline in population and cultivation that is reflected in the written accounts mentioned above may reflect a period of social upheaval in O`ahu. O`ahu was a recently conquered land —invaded first by Maui (c. 1783) and later by Hawai`i (1795)—and the social, political and economic landscape had been restructured. Kirch and Sahlins (1992) were able to document some of these processes for the Waialua District, located southeast of the project area.

Although the feudal system was not in essence changed with the conquest, greater demands were made on the labor and products of the commoners than had been made traditionally (Kirch and Sahlins 1992:27). It may not have been unexpected to be required to pay more taxes after being conquered by a foreign power, such as Hawai`i Island, although the sudden and dramatic incorporation of the Hawai`i Islands into an economic World System resulted in increased demands by the chiefly elite whose needs had changed in order to suit their new position in this westernized world.

More demands were made of fewer and fewer people, leading to increasing social and economic stress. The observations of Vaillant, a French captain who visited the Islands in 1836, summarize these changes perfectly:

> Yet if one considers that the needs of these chiefs were [before the Europeans] very limited, as they were practically the same as those of the people (kanakas), little was needed to satisfy them. Since they have been in constant contact with Europeans, the latter have caused to be born in them needs which they knew not before, in order to satisfy which they are obliged to press more on the people. This then is the cause of the difference that has ensued in the situation of the kanaka: the establishment of the Whites in the Islands; for the father of the family has no hope of doing anything that will increase the well-being of his wife and children, since the more he acquires, the more the chiefs demand of him [Vaillant, cited in Kirch and Sahlins 1992:27].

Nevertheless, there was a limit to what chiefs could extract from the commoners based on traditional productive activities. With the discovery of China's predilection for sandalwood, Hawaiian chiefs discovered that money did indeed grow on trees and a new source of capital was tapped to the fullest extent possible. The period between approximately 1810 and 1830 was dominated by the sandalwood trade, during which time commoners were required to provide labor for the collection of sandalwood to finance the political economies of King Kamehameha, his high chiefs, and their descendants. The labor tax was so onerous that production of food was neglected, leading to starvation and further population decline:

> In the 1820s, the chiefs mounted massive campaigns of sandalwood cutting in the mountains using the forced labor of the people living on their large estates. Exacted as a kind of ground rent, the common people's work was poorly remunerated or not at all. Nor did the people have access to the sandalwood trade on their own account,

> except as granted by the *ali`i* on rare occasions and to a limited extent. And in contrast to the previous period of the provisioning trade, when the king and chiefs were known to encourage agricultural production, the division of labor to sandalwood entailed some neglect of cultivation. Scarcities of food were reported by Haole visitors in Honolulu, as well as rumors of famine among sandalwood cutters in the mountains. A drastic population decline, begun in the conquest period due to European-introduced diseases, probably accelerated after the turn of the century. By 1830 Hawaiian numbers were well below half the 300,000 to 350,000 usually accepted as the figure for Cook's time [Kirch and Sahlins 1992:4].

Although the above description gives a general picture of Hawai`i under the sandalwood trade, it may help explain why there are such great differences between the written accounts in 1810 through 1815 and 1838 in relation to the state of cultivation of the land. That people in the Kahuku region were actively involved in sandalwood collection is evidenced by Levi Chamberlain's observations while making a tour of mission schools in O`ahu in 1928. He visited at least one school near the project area that was attended by sandalwood cutters, in addition to visiting four mission schools in Lā`ie, Mālaekahana, Kahuku, and a small school somewhere on the flat lowlands of Waiale`e Ahupua`a (Chamberlain 1957:35–6, cited in Anderson and Williams 1998:24). Unfortunately, Chamberlain did not include more specific details in his account.

In the highly competitive political atmosphere of early 19th century Hawai`i, the forests were rapidly depleted of this precious resource. However, by this time, the traditional productive pursuits and lives of common people had been disrupted, possibly leading to continued population decline and population movements. As Vaillant (in Kirch and Sahlins: 1992:27) observed, with "no hope of doing anything that will increase the well-being of his wife and children," many people moved to the new commercial centers in search of work, further exacerbating the loss of a traditional way of life that was tied to the land and to the sea.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the

government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

A search of the Waihona `Aina database indicates eighty-three LCAs were awarded in Kahuku Ahupua`a. However, none of these awards involved the lands of the current project area.

Soon after the Māhele, between the years 1851 and 1852, the great majority of land in Kahuku Ahupua`a was sold to Charles Gordon Hopkins by Kamehameha III (Nakamura 1981:6). According to Anderson and Williams (1998:27), Charles Gordon Hopkins began his Mālaekahana Ranch with the purchase of livestock in 1850. Around the same time, Robert Moffitt began the Kahuku Ranch through the acquisition of large leases of Government land (Anderson and Williams 1998). A couple of decades later, Herman A. Widemann bought both ranches: Mālaekahana Ranch in 1867 and 1872, and Kahuku Ranch in 1873. However, these were almost immediately sold to Julius L. Richardson in 1874. Two years later, "Kahuku and Malaekahana Ranch" was purchased by James Campbell. According to Anderson and Williams, these ranches included both Pahipahi`ālua and Waiale`e Ahupua`a at the time of sale to Campbell (Anderson and Williams 1998:27–28).

After purchasing the 15,000-acre "Kahuku and Malaekahana Ranch" in 1876, Campbell sold his interest in the Pioneer Mill Co. to his remaining partner and moved to Honolulu with his wife Abigail. In 1889, Campbell leased his Honouliuli and Kahuku lands to Benjamin Dillingham for a 50-year term (Kuykendall 1967:68, Vol. III). Dillingham proceeded to build a railroad that would facilitate the transportation of sugar cane to the processing mills and to the ports. This railroad system not only serviced his sugar plantation, but it also provided transportation for other sugar plantations. Dillingham subleased a portion of Kahuku to James Castle, who proceeded to create the Kahuku Plantation, which was chartered in 1890.

The Kahuku Plantation was a small operation, with less than 4,000 acres planted (Dorrance 1998:120). By 1935, the Kahuku Plantation had more than doubled in size and extended to Hau`ula (*ibid.*). The mid-1930s also saw a plantation hospital, a movie theater, a nine-hole golf course, and other recreational facilities including, tennis courts (*ibid.*: 121). As the production of sugar became less expensive to produce elsewhere, the Kahuku Mill closed its doors in 1971.

When James Campbell died in 1900, his will ensured that the Campbell Estate would remain relatively untouched, as it could not be sold, mortgaged, or given away. However, in 1952, the Trustees "petitioned the Circuit Court and were granted the power to make certain long-term leases" (*ibid*: 25). This made large tracts of land in Kahuku available to the government.

During WWII, the U.S. Army placed a battery of four eight inch cannons between the sugar mill and the coast of Kahuku (Dorrance 1998:121). Subsequently, the U.S. Army constructed a landing strip just southwest of Kahuku. Large portions of Kahuku are still in use today by the military for training purposes.

PREVIOUS ARCHAEOLOGY

The earliest systematic survey of archaeological sites on O`ahu was conducted by McAllister (1933) in 1930. Numerous sites were noted by McAllister at that time. Of note were: Site 260, Puuala Heiau, destroyed at the time of McAllister's survey, but said to have be located on the ridge above Kahuku Ranch; Site 261, a water hole called Punamano located on near Kahuku Point and associated with legend; Site 262, a natural basin containing brackish water, associated with legend; Site 263, Keanakua Fishing Shrine, located on Kahuku Point; Site 264, natural basins on Kahuku Point said to be used in manufacturing salt ; Site 265, two stones known as Kahoa located approximately 250 feet from the shoreline and are associated with legend; Site 266, Kalaewila Heiau, located on slight rise at Kahuku Point; Site 267, Kalaiokahipa Ridge, a burial cave and associated with legend; Site 268, a fishpond known as Kaauhelemoa. Site 270, Keana Rockshelter located near the mountain side of the public school associated with legend (McAllister 1933: 152 – 155).

More recent archaeological studies have been conducted in the Kahuku area by the Bishop Museum (Clark 1978; Sinoto 1981; Rogers-Jourdane 1982), Paul H. Rosendahl, Inc., (Bath e*t al.* 1984), and Cultural Surveys Hawaii (Hammatt 2008; O'Hare *et al.* 2008). In

addition, numerous archaeological investigations have been carried out in the U.S. Army Kahuku Training Area (Chapman 1970; Rosendahl 1977; Davis 1981; Farrell and Cleghorn 1995; Williams and Patolo 1998; Drolet 2000; Zulick and Cox 2002; Buffum *et al.* 2004; O'Rourke 2004; Peterson and Desilets 2005; and Zulick 2006). In addition, numerous archaeological investigations have been carried out in the U.S. Army Kahuku Training Area (listed in Patolo *et a*l. 2009).

In 1978, the Kualoa Archaeological Research Project conducted an Archaeological Reconnaissance Survey of the Ko`olauloa Housing Project area and the Park Expansion (Clark 1978 in O'Hare *et al*. 2008)). The Park Expansion area was comprised of two parcels which included the current site of the Kahuku Elementary School and the Kahuku Regional Park (in O'Hare *et al.* 2008). During the Reconnaissance Survey, two previously identified sites were relocated: Site 50-80-02-269, a platform initially recorded by McAllister, and Site 50-80-02-270, Keana Cave which appears to have been a burial cave as evidenced by the human skeletal remains located on the slope at the entrance to the cave (O'Hare *et al.* 2008). A nearby rockshelter contained possible human skeletal remains and wood fragments, suggesting use as a burial cave. The survey identified an historic burial with a date of 1945 (O'Hare *et al.* 2008).

In 1979, William Barrera conducted a more intensive survey and subsurface testing of the Ko`olauloa Housing Project area. Five sites were identified; Sites 50-80-02-1425 through -1429, all of which appeared to be associated with the Historic Plantation Era (*ibid*). The Bishop Museum conducted a reconnaissance survey of the Kahuku School Expansion project area (Schilt 1979 in O'Hare *et al.* 2008). During the survey Sites 50-80-02-269 and -270 were relocated and Sites 50-80-02-2478, a rectangular stone mound, and Site -2479, a small rockshelter (O'Hare *et al.* 2008).

In 1980, the Bishop Museum conducted an *Archaeological Reconnaissance Survey of Ki`i Pond and Punamanō Wetland Refuge Units, Kahuku, O`ahu, Hawaii* (Sinoto 1981). The findings of the Reconnaissance Survey indicated that both the areas appeared to have undergone extensive ground alterations. According to Sinoto (1981), the Ki`i Pond area had been subject to prior dredging and filling and during the Plantation Era, was used as an irrigation reservoir. The Punamanō area had also been subject to previous ground altering activities, including evidence that the area had been subject to mechanical alterations (bulldozing), remnants of building foundations, and the remnants of concrete military bunkers. No new sites were identified during the survey. However, Punamanō Spring (Site 261) was relocated near the southern boundary of the project area and an historic railroad grade was noted along the northern boundary of the project area. Subsequently, in 1982, the Bishop Museum conducted an Archaeological

Reconnaissance Survey of Marine Culture Enterprises Land in Kahuku, O`ahu Island (Jourdane 1982). No new sites were identified during the survey, which included limited subsurface testing. However, this area also exhibited extensive historic and modern ground alterations including: paved roads, concrete foundations, historic railroad bed, the Kahuku airstrip and artifacts such as, metal ladders, engine parts, historic trash, and porcelain fragments

In 1984, PHRI conducted a Subsurface Archaeological Reconnaissance Survey Kuilima Resort Expansion Project (Bath *et al.* 1984). The excavation of 135 test units, 124 auger tests, and 11 faced-section tests of subsurface exposures yielded pre-Contact sites including burials, habitation, agricultural deposits, Historic walls, and a modern military structure. The age of these sites ranged in age from the early pre-Contact Period (possibly as early as 165 B.C to A.D. 210) to modern.

Archaeological investigations along the Kahuku coast have yielded the inadvertent finding of numerous burials. A total of fourteen burials containing a minimum of 24 individuals (MNI=24) have been found at Turtle Bay Resort between Kawela Bay and Kahuku Point (O'Hare and Hammatt 2007 in O'Hare *et al*. 2008).

The State Department of Land and Natural Resources, State Historic Preservation Division has documented numerous inadvertent discoveries of traditional style burials along the coastal region of Kahuku. In 1998, the inadvertent finding of human skeletal remains representing an adult of Polynesian ancestry on Campbell Estate property in Kahuku was documented by the State Historic Preservation Division ((Dagher 1998). This site was subsequently designated Site 50-80-02-5594. Komori (1992) documents the inadvertent finding of infracranial remains on the surface of the Kahuku Sand Dunes. In addition, subsurface cultural deposits were noted in three areas. This site was subsequently designated Site 50-80-02-4518.

In addition, numerous archaeological studies have been carried out in the U.S. Army Kahuku Training Area (Chapman 1970; Rosendahl 1977; Davis 1981; Farrell and Cleghorn 1995; Williams and Patolo 1998; Drolet 2000; Zulick and Cox 2002; Buffum *et al.* 2004; O'Rourke 2004; Peterson and Desilets 2005; and Zulick 2006). For a summary of the findings of these investigations, please refer to Patolo *et al*. 2009)

KAHUKU HISTORICAL SEQUENCE

The long, yet not well-understood, historical sequence of the Kahuku area proceeds from pre-Contact through modern times, from traditional and Plantation-era agricultural pursuits to modern building construction. The Kahuku area itself has been considered one of Hawai`i's legendary places (*wahi pana*) as many legendary and traditional accounts point to this mythically rich area of O`ahu (Sterling and Summers 1978:148-150). Kahuku Ahupua`a has also been reported to have been a verdant area well-suited for the cultivation of wetland taro and other traditional crops (Handy and Handy 1972:462-463). The accounts of well-stocked fishponds, *ko`a* (fishing shrines), and legends referring to fishing in the area indicate marine resources were plentiful during the pre-Contact Period. Thus, it is quite probable that Kahuku was capable of supporting a large population as evidenced by the observations by Captain James Cook and Lieutenant James King, in 1779, which indicate that the region had a high population and was amply cultivated (McAllister 1933:153).

During the Historic Period, Kahuku was further tied to agricultural pursuits as well. Sugarcane production occurred extensively in the area from the middle to latter portions of the nineteenth century to the mid to late twentieth century. The industry faced some difficulty though as Native Hawaiians owned and worked their own lands and thus, had little incentive to work on plantations. This labor vacuum was filled by immigrants, predominantly Chinese laborers in the beginning and later, Portuguese, Filipino, and Japanese laborers.

In brief, archival research and a synthesis of past archaeological work in the Kahuku area depicts traditional cultivation of taro and habitation having occurred with some frequency in the past within and near the current project area. Thus, we may infer that structural features associated with agriculture, including terraces, mounds, and/or ditches (*`auwai*), were present at some point. Additionally, walls and platforms denoting house plots once occurred within, and adjacent to, the project area.

FIELD INSPECTION RESULTS

On Friday July 24, 2009 an Archaeological Field Inspection was conducted of the entire project area by SCS archaeologist Cathleen Dagher, B.A. (see Figures 1 and 2). During the Field Inspection one previously unidentified surface feature was identified. State Site 50-80-02-7134 (SCS Site T-1) consists of 2 parallel concrete retaining walls containing stairs located adjacent to the southern portion of Building Y on the east side of the football field and just outside of the eastern fenceline. According to Sonia Dominguez, the Kuhuku High School Custodian, the stairs were constructed during the 1940s or 1950s and were associated with an outdoor stage, which no longer exists. As this feature is believed to be over 50 years old, it is considered to be an Historic

Property. The retaining walls and associated stairs appear to be in good condition and have undergone limited alteration resulting from forces of nature. However, the associated stage no longer exists. Thus, we believe this site is no longer has cultural or historical significance.

STATE SITE 50-80-02-7134 (SCS SITE T-1)

State Site 50-80-02-7134 (SCS Site T-1) consists of two parallel concrete retaining walls with incorporated stairs (Figure 4). This site is located approximately 52 feet (16 meters) west (292 degrees) of the northwest corner of the south wing of Building Y. The bottom retaining wall measures 39.8 by 1.5 by 2.4 feet high (12.16 by 0.45 by 0.76 meters high). All of the steps associated with the lower retaining wall measure 4.0 by 0.9 feet (1.22 by 0.30 meters) and range in height from 4 to 6 inches (12 to 17 centimeters) in height.

The upper retaining wall measures 36 by 1.3 by 1.6 feet high (11.0 by 0.4 by 0.5 meters high). All of the steps associated with the upper retaining wall measure 4.0 by 0.9 feet (1.22 by 0.30 meters) and range in height from 4 to 7 inches (12 to 17 centimeters) in height.

CONCLUSION AND RECOMMENDATIONS

Archival research and a review of previous archaeological studies have shown that the Kahuku area has a considerable cultural history. During the Field Inspection one previously unidentified surface structure believed to be over 50 years in age was identified in close proximity to the football field. However, given the extensive ground alterations associated with the construction of Kahuku High School, it is unlikely that additional archaeological features will be present on the ground surface.

Archival research and previous archaeology conducted in the coastal reaches of Kahuku Ahupua`a, and similar geographic setting, has found that there is a relatively high probability of finding pre-Contact (and possibly early Historic Period) Native Hawaiian habitation sites and burials, in subsurface deposits closer to the coast, outside of the project area. As stated elsewhere in this document, the soils within the project area include Jaucus sand deposits. The Jaucus sands are known to be a traditional interment site for Native Hawaiian burials (Kirch 1985). The presence of these soil types is mitigated somewhat by the more inland location of the project. The inland project location suggests a relatively low probability of finding subsurface evidence of Traditional Native Hawaiian and/or early historic burials or other activities including hearths, midden deposits, and other occupation debris (e.g., stone tool waste, discarded artifacts related to habitation and fishing). While the potential is low, the potential still exists, so on-site Archaeological Monitoring is recommended for all ground altering activities associated with the current undertaking.

Figure 4: State Site 50-80-02-7134 (SCS Site T-1) Historic Foundation with Steps. View to East.

REFERENCES

Anderson, Lisa and Scott S. Williams

1988 *Historic Preservation Plan for the Kahuku Training Area*. Ogden Environmental and Energy Services, Honolulu. For U.S. Army Engineer Division, Pacific Ocean, Fort Shafter, Hawaii.

Athens, J.S., and J. Ward

1993 Environmental Change and Prehistoric Polynesia Settlement in Hawai`i. *Asian Perspectives* 32(2): 205-223.

Chinen, Jon J.

1961 *Original Land Titles in Hawaii*. Copyright 1961 Jon Jitsuzo Chinen. Honolulu.

Condé, Jesse and Gerald Best

1973 *Sugar Trains Narrow Gauge Rails of Hawaii.* Glenwood Publishers. Felton California.

Cordy, Ross

1974 Cultural adaptation and evolution in Hawaii: A suggested new sequence. *Journal of the Polynesian Society*, 83:180-91.

2002 *The rise and Fall of the O`ahu Kingdom*. Mutual Publishing: Honolulu.

Dagher, Cathleen

1998 *Inadvertent Discovery of a Human Burial at Campbell Estate Property, Kahuku, Ko`olauloa, O`ahu.* Department of Natural Resources, State Historic Preservation Division, Kapolei, HI.

Daws, Gavin

1968 *Shoals of Time.* University of Hawaii Press, Honolulu.

Dorrance, William H.

1998 *O`ahu's Hidden History*. Mutual Publishing. Honolulu, Hawaii.

Foote, D., E. Hill, S. Nakamura, and F. Stephens

1972 *Soil Survey of the Islands of Kaua`i, O`ahu, Maui, Molokai, and Lanai, State of Hawai`i.* USDA Soil Conservation Service, GPO, Washington, DC.

Fornander, A.

1980 *An Account of the Polynesian Race.* Charles E. Tuttle Company, Rutland

Giambelluca, T.W., M.A. Nuller, and T.A. Schroeder

1986 *Rainfall Atlas of Hawai`i*. Report R76. Water Resources Research Center, University of Hawai`i, Manoa, for the Department of Land and Natural Resources, State of Hawai`i, Honolulu, HI.

Hammatt, Hallatt H.
2008 *Interim Report: Cultural Impact Assessment for the Kahuku Village Subdivision Project Kahuku, Keana, and Mālaekahana Ahupua`a, Ko`olauloa District, O`ahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027*. Cultural Surveys Hawaii. Kailua, HI. Ms. On file at SHPD, Kapolei.

Handy Craighill
1940 *The Hawaiian Planter*. Bishop Museum Bulletin 161. Bishop Museum, Honolulu.

Handy, Craighill E.S. and Elizabeth Green Handy
1972 *Native Planters on Old Hawaii.* Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Hommon, Robert John
1976 The Formation of Primitive States in Pre-Contact Hawai`i. Unpublished Ph.D. dissertation, Dept. of Anthropology, the University of Arizona.

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

1991 *Tales and Traditions of the People of Old, Nā Mo`olelo a ka Po`e Kahiko*. Bishop Museum Press, Honolulu.

Kame`eleihiwa, Lilikalā
1992 *Native land and Foreign Desires: Pehea Lā E Pono Ai*? Bishop Museum Press, Honolulu.

Kelly, Marion
1983 *Na Māla o Kona*: *Gardens of Kona*. Report 83-2, Department of Anthropology. Bishop Museum. Bishop Museum Press, Honolulu.

Kirch, Patrick
1974 The chronology of early Hawaiian settlement. *Archaeology and Physical Anthropology in Oceania*, 9:110-19.

1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

Kirch, P.V. and M. Sahlins
1992 *Anahulu: The Anthropology of History in the Kingdom of Hawaii*. Volume I: Historical Ethnography, by M. Sahlins; Vol. 2: The Archaeology of History, by P.V. Kirch. University of Chicago Press, Chicago, Illinois.

Komori, Eric
1992 *Inadvertent Discovery of Human Burial, Kahuku, O`ahu.* Department of Natural Resources, State Historic Preservation Division, Kapolei, HI.

Kuykendall, R.S.
1938 *The Hawaiian Kingdom, 1778-1854.* University of Hawaii Press, Honolulu.

Lyons, C.J.
1875 Land Matters in Hawaii. *The Islander*, Vol. 1. Honolulu.

Malo, David
1951 *Hawaiian Antiquities*. Bishop Museum Press. Honolulu.

McAllister, J.G.
1933 *Archaeology of Oahu*. Bishop Museum Bulletin 104. Bishop Museum Press, Honolulu.

Nakamura, Barry
1981 Archaeological Reconnaissance Survey of Ki`i and Punamanō Wetland Refuge Units, Kahuku, O`ahu Island. Department of Anthropology, Bishop Museum. Ms. On file at SHPD, Kapolei.

O'Hare, Constance R., David W. Shideler, Hallatt H. Hammatt
2008 *Archaeological Inventory Survey Plan for the Kahuku Subdivision Project, Kahuku, Keana, and Mālaekahana Ahupua`a, Ko`olauloa District, O`ahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027.* Cultural Surveys Hawaii. Kailua, HI. Ms. On file at SHPD, Kapolei.

Patolo, Tomasi, Michael Dega, and Nancy Farrell
2009 *Phase I Archaeological Survey With Limited Subsurface Testing In Support of Designated "Go" Areas For Stryker Maneuver in the U.S. Army Kahuku Training Area, Ahupua`a of Waimea, Pupukea, Kaunala, Waiale`e, Pahipahi`alua, 'Opana, Kawela, Hanakaoe, 'O`io, 'Ulupehupehu, Paumalu, Kahuku, Keana, Malekahana, La`ie, and Kaipapa`u, Ko`olauloa District, Island of O`ahu, Hawai`i [TMK (1) 5-6, 5-7, 5-8, and 5-9: Various]*. SCS Honolulu, HI.

Pukui, M.K. and S.H. Elbert
1986 *Hawaiian Dictionary*. Revised and enlarged edition. University of Hawaii Press, Honolulu.

Pukui, M.K., S.H. Elbert, and E. Mo`okini
1973 *Place Names of Hawai`i*. University of Hawaii Press, Honolulu.

Rogers-Jourdane, Elaine H.
1982 *Archaeological Reconnaissance Survey of Marine Culture Enterprises Land in Kahuku, O`ahu Island.* Department of Anthropology, Bishop Museum. Ms. On file at SHPD, Kapolei.

Rosendahl, Paul H.
1984 *Subsurface Archaeological Reconnaissance Survey Kuilima Resort Expansion Project, Lands of Opana, Kawela, Hanakaoe, Oio, Ulupehupehu, Punalau, and Kahuku, Koolau, Island of O`ahu TMK: 5-6-03[Por. 1]; 5-7-01, -03 [Por. 1], -06.* Ms. On file at SHPD, Kapolei.

Silva, C. L.
1987 Appendix A: Historical Documentary Research - West Loch Estates Project Area. In *Archaeological Reconnaissance Survey for Environmental Impact Statement, West Loch Estates Golf Course and Park*, by A.M. Dicks, A.E. Haun, and P.H. Rosendahl. Prepared for City and County of Honolulu by Paul H. Rosendahl, Ph.D., Inc., Hilo.

Sinoto, Aki
1981 *Archaeological Reconnaissance Survey of Ki`i and Punamanō Wetland Refuge Units Kahuku, O`ahu Island.* Department of Anthropology, Bishop Museum. Ms. On file at SHPD, Kapolei.

Sterling, E.P. and C.C. Summers
1978 *Sites of Oahu*. Bishop Museum Press, Honolulu.

Vancouver, George
1984 *A Voyage of Discovery to the North Pacific Ocean and Round the World, 1791-1795*. Edited by W. Kaye Lamb. The Hakluyt Society, London.

Waihona `Aina Corporation
2006 Website: www.waihona.com/get.Claim.asp. Accessed in July 2009.

Wilcox, Carol
1996 *Sugar Water: Hawaii's Plantation Ditches*. University of Hawai`i Press, Honolulu.

***Appendix C**:*

Cultural Impact Assessment

SCS Project Number 1072-CIA-1

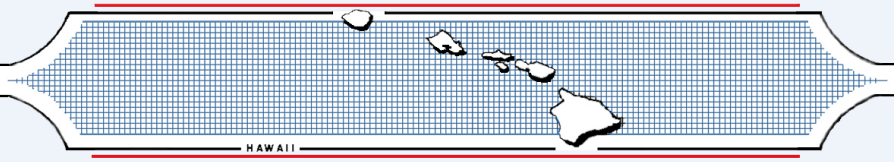
A CULTURAL IMPACT ASSESSMENT OF THE KAHUKU STORM DRAMAGE REDUCTION PROJECT, O`AHU SLAND, HAWAI`I [TMK 5-6-006: various]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

September 2009

Prepared for:
Environet, Inc.
650 Iwilei Road, Suite 204
Honolulu, Hawaii 96817

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 975 Honolulu, Hawai`i 96813

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) has been contracted by Environet, Inc., to conduct a Cultural Impact Assessment of the Kahuku Storm Damage Reduction Project, O`ahu Island [TMK: 5-6-006: various] (Figures 1 and 2). Out of four alternatives proposed by the Department of The Army, Alternative 2 was adopted (see Figure 1 and 2).

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "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" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`*a tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights…may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

In Section 1 of Act 50, enacted by the Legislature of the State of Hawai`i (2000) with House Bill 2895, it is stated that:

> …there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights…[H.B. NO. 2895].

Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shore line developments on the "cultural practices of the community and State" as part of the HRS Chapter 343 environmental review process (2001).

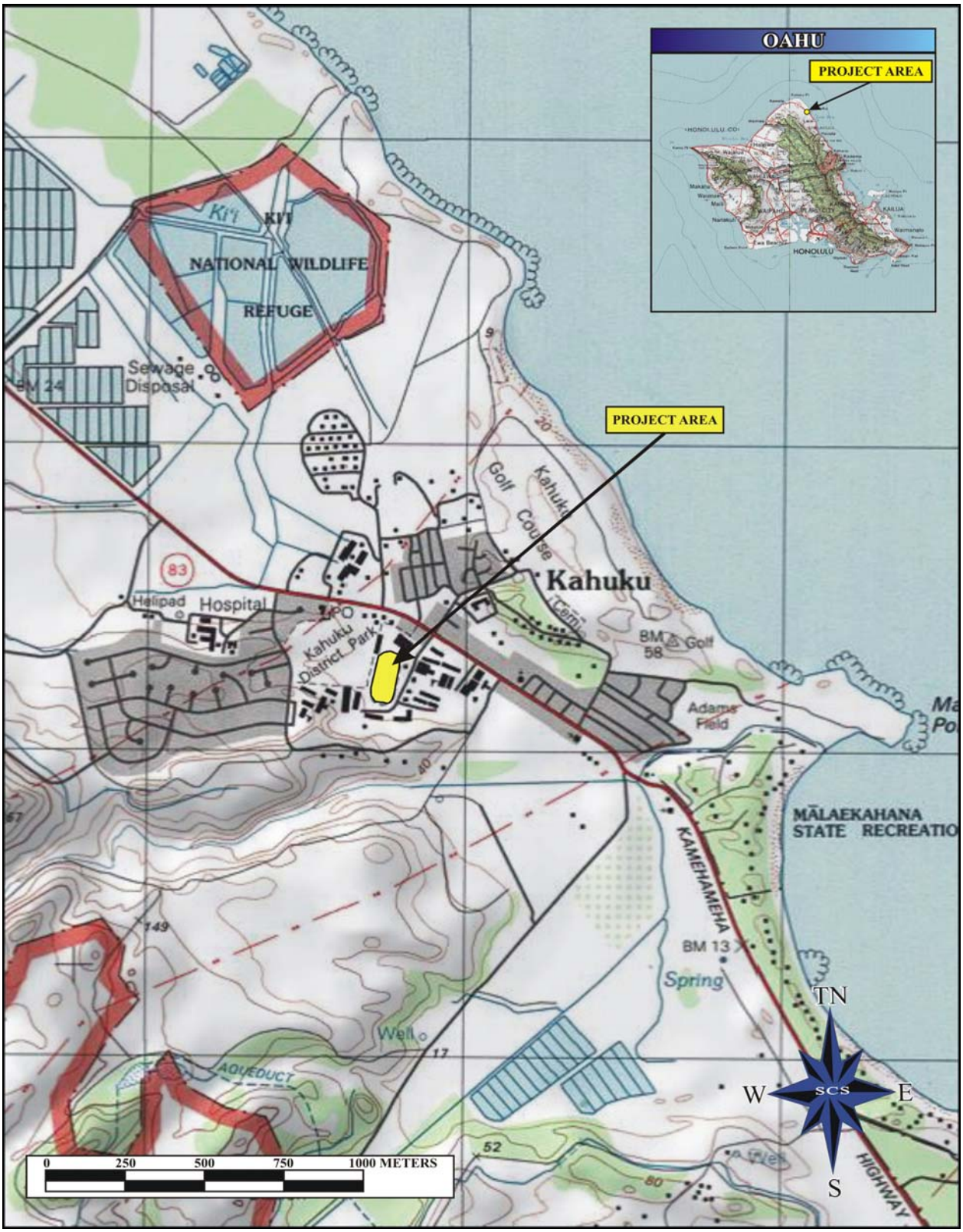
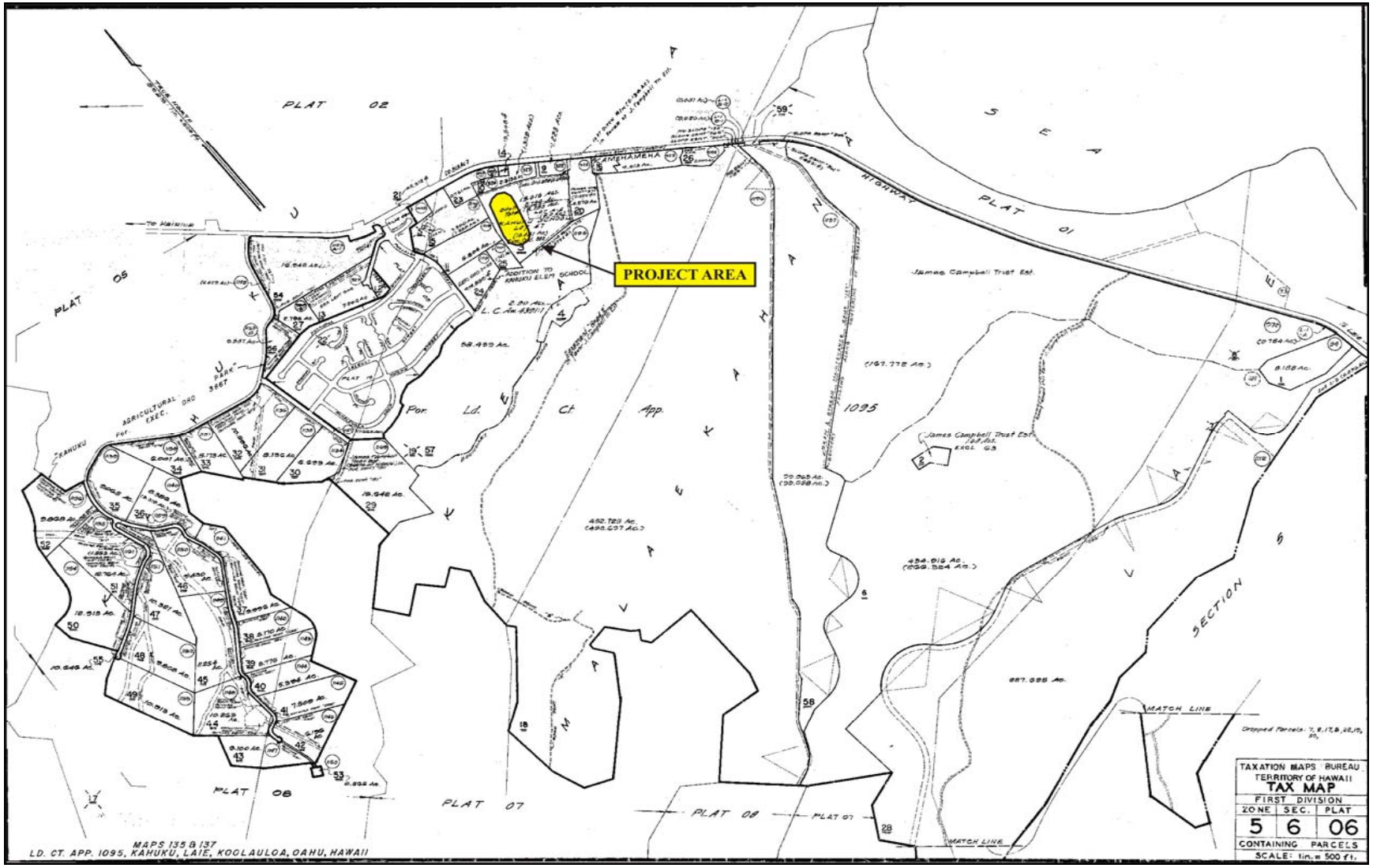


Figure 1: USGS Quadrangle Map Showing Project Area.


PROJECT AREA
PLAT 02
PLAT 05
PLAT 01
PLAT 08
PLAT 07
KAMEHAMEHA HIGHWAY
ADDITION TO KAHUKU ELEM. SCHOOL
L.C.Aw. 4391:1
Por. Ld. Ct. App. 1095
James Campbell Trust Est.
MATCH LINE
SECTION 6
TAXATION MAPS BUREAU
TERRITORY OF HAWAII
TAX MAP
FIRST DIVISION
ZONE 5 SEC. 6 PLAT 06
CONTAINING PARCELS
SCALE: 1in. = 500 ft.
MAPS 135 & 137
LD. CT. APP. 1095, KAHUKU, LAIE, KOOLAULOA, OAHU, HAWAII

It also re-defined the definition of "significant effect" to include "the sum of effects on the quality of the environment including actions impact a natural resource, limit the range of beneficial uses of the environment, that are contrary to the State's environmental policies. . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State" (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 40, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, "the broad geographical area, e.g. district or *ahupua`a*" (OEQC 1997). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a Cultural Impact Assessment is to identify the possibility of cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of "traditional" was explained in *National Register Bulletin*:

> Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations', usually orally or through practice. The traditional cultural significance of a historic property, then is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]

METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the "Cultural Impact Assessment Methodology", the OEQC states that:

"…information may be obtained through scoping, community meetings, ethnographic interviews and oral histories…" (1997).

This report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997), when possible. The assessment concerning cultural impacts may address, but not be limited to, the following matters:

(1) a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints of limitations which might have affected the quality of the information obtained;

(2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;

(3) ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the

project area, as well as information concerning the persons submitting information or being interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

(5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;

(6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;

(7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;

(8) an explanation of confidential information that has been withheld from public disclosure in the assessment;

(9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;

(10) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices, or beliefs; the potential of the proposed action to isolate cultural resources, practices, or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;

(11) the inclusion of bibliography of references, and attached records of interviews which were allowed to be disclosed.

Based on the inclusion of the above information, assessments of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission

Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological project reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws, and guidelines, when knowledgeable individuals are able to identify cultural practices in, or in close proximity to the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed that this process does not include formal ethnographic interviews or oral histories as described in the OEQC's *Guidelines for Assessing Cultural Impacts* (1997). The assessments are intended to identify potential impacts to ongoing cultural practices or resources within a project area or in its close vicinity.

No interviews were conducted for the present project as there were no responses from any of the contacted organizations and/or individuals. There was one inquiry as to the exact location of the project area brought about from the announcement in the Maui News, from the Waikapū Community Association.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the information available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

Letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phillis (Coochie) Cayan, History and Culture Branch Chief with SHPD; the Ko`olau Hawaiian Civic Club; and Cy Bridges with the O`ahu Island Burial Committee (Appendix A). An e-mail with Sonia Garcia of Environet asking if she had informants to suggest for interviews, was sent. Ms. Garcia did not know of anyone specific. In addition, a Cultural Impact Assessment Notice was published on August 30 and September 2, and 3, 2009 in *The Honolulu Advertise*r and in the August or September issue if the OHA newspaper, *Na Wai Ola* (Appendix B). These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

PROJECT AREA AND VICINITY

The project area is located within the grounds of Kahuku High School, under the football field. Kahuku High School is located on the northeast coast of the island of O`ahu, Hawai`i within the community of Kahuku and along Kamehameha Highway.

CULTURAL HISTORICAL CONTEXT

The island of O`ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai`anae and Ko`olau Mountain ranges were formed by two volcanoes. Through the millennia the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970).

PAST POLITICAL BOUNDARIES

Traditionally, the division of Oahu's land into districts (*moku*) and sub-districts was said to be performed by a *Mā`ilikukahi* who was chosen by the chiefs to be the *mō`īho`oponopono o ke aupuni* (administrator of the government; Kamakau 1991). Cordy places Mā`ilikukahi at the beginning of the 16th century (2002). Mā`ilikukahi created six districts and six district chiefs (*ali`i `ai moku*). Land was considered the property of the king or *ali`i `ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed

smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land. It is said that Mā`ilikukahi gave land to *maka`āinana* (commoners) all over the island of O`ahu (*ibid*).

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili` āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili `āina* or *`ili* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa `āina* residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61). The present project area was located in the *ahupua`a* of Ke`ana, which literally means "the cave" (Pukui *et al.*1974:103).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985).

***NĀ WAHI PANA*/LEGENDARY PLACES**

Ke`ana is a small *ahupua`a* whose name referred to a cave located near the Kahuku sugar mill. Legend has it that the cave was the home of a mother and her two sons. Disobeying their mother's instructions to remain silent during thunderstorms, they cried out in alarm and were turned to stone by Kānehekili, the god of thunder (Emerson 1978 :233) There are two pillar-shaped stones that were once the boys, that mark the entrance to the cave.

There are several myths concerning how the lands of Ke`ana and Kahuku came to be (Chamberlain 1957; Paki 1972). Levi Chamberlain, a missionary, was told a legend concerning the creation of this part of the island:

> The natives tell a marvelous story respecting the origin of this district which they say floated in from the sea, and attached itself to the ancient shore of the island, that there was subterranean communication between the sea & the ancient shore, by which a shark used to pass, & make depredations up on land. The basis of the tract, which is 5-7 miles in length, & from 1 to 2 miles in breadth, appears to be of coral; and it was evidently redeemed from the sea…[1957:35-36]

Paki's (1972) version recounts that Kahuku was a separate island that was populated by *menehune* (legendary race of small people who worked at night). As an island, Kahuku didn't have a fresh water supply, forcing the *menehune* to paddle their island into O`ahu coves every night to replenish their water supply. A man from Kahuku suggested that all the people make hooks of whalebone, fixing them to *olonā* ropes to catch the island and hold it fast. This worked well and the *menehune* were unable to free it from the ties.

A large, deep pool named Polou was located on the border of Ke`ana and Kahuku. Another version relates that Kahuku was once a floating land blown around by the winds. Hawaiians said that Polou was the place where Kahuku fastened on to O`ahu. One could dive into the pool and at a depth of 40 fathoms and rest on a rock shelf. Below this, one could look towards Mālaekahana and see the hook holding the islands together. Another pool, named Kalou, marks the spot where Kahuku was attached to Waiale`e.

HISTORIC LAND USE

Some of the first historical descriptions of O`ahu were of the northern coast, including land near the project area, recorded by members of Capt. Cook's third voyage in 1779 and leaving no doubt as to a viable population and associated activities located along their route. Leaving Hawai`i Island for the second time, Captain Clerke, who had succeeded to command of the *H.M.S. Resolution* following the death of Captain Cook, entered in his journal:

> Run round the Noern [northern] Extreme of the Isle [O`ahu] which terminates in a low Point rather projecting [Kahuku Point]; off it lay a ledge of rocks extending a full Mile into the Sea, many of them above the surface of the Water; the country in this

> neighborhood is exceeding fine and fertile; here is a large Village, in the midst of it run up a large-Pyramid doubtlessly part of a Morai [Beaglehole 1967:572, Part One, Vol III].

The north side of O`ahu was also praised by Lieutenant King, who recorded:

> We…sailed along its NE & NW sides but saw nothing of the Soern [Southern] part. What we did see of this Island was by far the most beautiful country of any in the Group; particularly the Neck that Stretches to the Noward: & its NW side. Nothing could exceed the verdure of the hills, nor the Variety which the face of the Country display'd. It [s north–eastern] parts were cliffy, and rugg'd to the Sea side, but the Valleys look'd exceedingly pleasant, near the N Point [Kahuku Point] we were charmd with the narrow border full of Villages, & the Moderate hills that rose behind them; but as we came more into the bay which the N & West extremity forms, the low land extended far back, & was highly cultivated. Where we Anchord was a charming Landscape [Waimea Bay; Beaglehole 1967:611, Part one, Vol. III].

Surgeon, David Samwell added more information concerning its physical appearance and the population's activities:

> This Island has a pleasant Appearance, having much wood upon it; the Land is in general high…the Island produces plenty of breadfruit, Cocoa nuts, Plantains, Yams, Taroo root & sweet Potaotes & Sugar Canes and …there are many hogs upon it. In the afternoon saw the appearance of a good anchoring place in an open road [roadstead] with a fine Sandy Beach, on which stood many Towns, with green Plants behind extending to the Hills which rose at no great distance off; as we were sailing along we saw three or four of their burying Places called E-heiaw [*heiau*] with the kind of high obelisks erected on them of wood, & on the Pales which inclosed them we could see with our Glasses many human Skulls. We saw many Indians sitting by their Houses looking at us & shouting now & then. Between two and three o'Clock both Ships came to an Anchor about ¾ of a mile distant off shore, before the mouth of a small River [Waimea Bay; Beaglehole 1967:1221, Part Two, Vol III].

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). There were nine LCA claims registered for land in the Ke`ana Ahupua`a, however none were within the project area.

RANCHING

Ranching became an early commercial success once a 1794 *kapu* originated by Kamehameha I was lifted and cattle could be legally hunted for their skins, tallow, and meat. Providing these and other cultivated western resources to an ever-increasing foreigner population meant a great profit for those who took the opportunity. Once land became available through the Māhele, large grants of land in the Ko`olauloa District were leased or sold to foreigners for the pasturing of cattle and sheep. Charles Hopkins formed the Mālaekahana Ranch around 1850 with a purchase of livestock from Kahuku, the general area of the proposed project. Robert Moffitt had acquired a number of large leases for government lands in the Ko`olauloa District around the same time, forming the Kahuku Ranch. Oliver Emerson, son of the missionary Nathaniel Emerson whose station included Ko`olauloa, noted:

> Kahuku…was once a populous district green with forests of *lauhala* trees, nestled among which the homes of the natives were sheltered from the strong trade winds. They used the choice *lauhala* leaves for lining their grass huts and for skillfully braided

> mats for their gravel floors. While the fruit also had its uses. But Kahuku had passed from the control of its chief to that of an Englishman. The pastures of his big ranch extended along the shore for 12 miles, reaching inland to the mountain chain, and he was so autocratic that the natives could not own a dog, or pasture a cow or horse, without his consent. The depredations of herds and flocks on their small homesteads became unbearable, but they appealed in vain for their beloved *hala* trees and patches of vegetables…There was no redress, however, and with the fading of the forests the people also disappeared and the once populous district of Kahuku [Ko`olauloa] became a lonely sheep and cattle ranch [Emerson 1928:135-136].

James Campbell purchased the Kahuku and Mālaekahana Ranch in 1876. The land area included 14 *ahupua`a* from Mālaekahana north, including Ke`ana, to Waiale`e, along with approximately 3,000 branded cattle, 90 horses, approximately 1,700 sheep, carts, yolks, harness, agricultural implements, tools, furniture, personal and mixed property (Drolet 2000).

SUGAR AND PINEAPPLE CULTIVATION

During the middle to late 19th century and into the 20th century, sugarcane and pineapple became dominant cash crops in Hawai`i. Campbell, then quickly leased lands to James Castle and Alexander Young to form the Kahuku Plantation. Pineapple was grown in some portions of the uplands and camps for the plantation workers were situated in the lowlands of several Ko`olauloa *ahupua`a*.

MILITARY

During WWII, the U.S. Army placed a battery of four eight inch cannons between the Kahuku sugar mill and the coast (Dorrance and Morgan 2000). Subsequently, the U.S. Army constructed a landing strip just southwest of Kahuku. Large portions of Kahuku are still in use today by the military for training purposes.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who know of cultural resources and activities that may be affected by the project or who know its history, conducting research identifying sensitive areas and previous land use, holding

meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort". However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phillis (Coochie) Cayan, History and Culture Branch Chief with SHPD; the Ko`olau Hawaiian Civic Club; and Cy Bridges with the O`ahu Island Burial Committee (Appendix A). In addition, a Cultural Impact Assessment Notice was published on August 30 and September 2, and 3, 2009 in *The Honolulu Advertise*r and in the August or September issue if the OHA newspaper, *Na Wai Ola*. These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as I`i, Kamakau, Malo, Beckwith, Chinen, Kame`eleihiwa, Fornander, Kuykendall, Kelly, Handy and Handy, Puku`i and Elbert, Thrum, Sterling, and Cordy have contributed, and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2009 Data base.

In addition, archaeological reports specific to the project vicinity were reviewed. The earliest systematic survey of archaeological sites on O`ahu was conducted by McAllister (1971) in 1930. Numerous site were identified by him in the Kahuku area at that time, however Most of these referred to sites located in the coastal area or on the ridges. An exception was Site 270, Ke`ana Rockshelter which was located near the mountain side of the public school. There were no other sites recorded for Ke`ana Ahupua`a (McAllister 1971: 152 – 155).

More recent archaeological studies have been conducted in the Kahuku area by the Bishop Museum (Clark 1978; Sinoto 1981; Rogers-Jourdane 1982), Paul H. Rosendahl, Inc.

(PHRI) (Bath e*t al.* 1984); Cultural Surveys Hawaii (Hammatt 2008; O'Hare *et al.* 2008). In addition, numerous archaeological investigations have been carried out in the U.S. Army Kahuku Training Area (listed in Patolo 2009).

In 1978, a reconnaissance survey of the Ko`olauloa Housing Project and the Park Expansion area was conducted. The Park Expansion area was comprised of two parcels, the current site of the Kahuku Elementary School and the Kahuku Regional Park (O'Hare *et al.* 2008). Two previously identified sites were relocated: Site 50-80-02-269 consists of a platform initially recorded by McAllister (*ibid*.); Site 50-80-02-270, Keana Cave, appears to have been a burial cave as evidenced by the human skeletal remains located on the slope at the entrance to the cave. A nearby rock shelter contained possible human skeletal remains and wood fragments, suggesting use as a burial cave. The survey identified an historic burial with a date of 1945 (Patolo 2009).

In 1979, William Barrera conducted a more intensive survey and subsurface testing of the Ko`olauloa Housing Project area. Five sites were identified; Sites 50-80-02-1425 through -1429, all of which appeared to be associated with the Historic Plantation Era (*ibid*). The Bishop Museum conducted a reconnaissance survey of the Kahuku School Expansion project area (Schilt 1979 in O'Hare *et al.* 2008). During the survey Sites 50-80-02-269 and -270 were relocated and Sites 50-80-02-2478, a rectangular stone mound, and Site -2479, a small rock shelter (O'Hare *et al.* 2008).

The State Department of Land and Natural Resources, State Historic Preservation Division has documented numerous inadvertent discoveries of traditional style burials along the coastal region of Kahuku. In 1998, the inadvertent finding of human skeletal remains representing an adult of Polynesian ancestry on Campbell Estate property in Kahuku was documented by the State Historic Preservation Division ((Dagher 1998). In addition, subsurface cultural deposits were noted in three areas, which were subsequently designated, Site 50-80-02-4518.

Archaeology deals with material remains, and although cultural beliefs are often reflected through some sort of architecture, like *heiau*, or *ko`a,* there are many examples of cultural associations still important to the community with no physical structures to mark their significance. One such place, *Ulukukui O Lanikāula*, located on Moloka`i, is considered an extremely sacred spot. Another might be Kīlauea and Halema`uma`u, home of Pele. These places have become important sites supporting a traditional belief system still held by the many peoples of Hawai`i. They contain no

identified archaeological features, however they are highly meaningful "…because of [their] association with cultural practices or beliefs of a living community . . ." (King 2003:3).

CIA INQUIRY RESPONSE

No responses were received from any of the above listed organizations or news periodical announcements. Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). To our knowledge, the project area has not been used for traditional cultural purposes within recent times.

CULTURAL ASSESSMEMNT

Based on, no additional suggestions or information from the contacted organizations, newspapers, and negative results of the archival research, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities. Because there were no cultural activities identified within the project area, there are no adverse effects.

REFERENCES CITED

Beaglehole, J.C. (ed.)

1967 *The Voyage of the Resolution and Discovery*, Part one and Two, Vol. III. Published for the Hakluyt Society. The University Press: Cambridge.

Chamberlain, Levi

1957 "Tour Around Oahu. 1828". In Sixty-fifth Annual Report of the Hawaiian Historical Society for the Year 1956. Advertiser Publishing Co.: Honolulu.

Chinen, Jon

1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.

Cordy, Ross

2002 *The rise and Fall of the O`ahu Kingdom*. Mutual Publishing: Honolulu.

Dagher, Cathleen

1998 *Inadvertent Discovery of a Human Burial at Campbell Estate Property, Kahuku, Ko`olauloa, O`ahu.* Department of Natural Resources, State Historic Preservation Division, Kapolei, HI.

Daws, G.

1962 *Shoal of Time: History of the Hawaiian Islands.* University of Hawai`i Press. Honolulu.

Dorrance, William and Francis Morgan

2000 *Sugar Islands*. Mutual Publishing. Taiwan.

Drolet, Richard

2000 *Archaeological Inventory Survey of Area A1, Kahuku Training Area, O`ahu Island, Hawai`i*. Prepared for U.S. Army Corps of Engineers.

Emerson, Nathaniel B.

1978 *Pele and Hiiaka*. Charles E. Tuttle Company, Inc. Japan.

Emerson, Oliver Pomeroy

1928 *Pioneer Days in Hawaii*. Doubleday, Doran & Company, Inc.: New York.

Hammatt, Hallatt H.
2008 *Interim Report: Cultural Impact Assessment for the Kahuku Village Subdivision Project Kahuku, Keana, and Mālaekahana Ahupua`a, Ko`olauloa District, O`ahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027*. Cultural Surveys Hawaii. Kailua, HI. Ms. On file at SHPD, Kapolei.

Kamakau, Samuel
1991 *Tales and Traditions of the People of Old, Nā Mo`olelo a ka Po`e Kahiko*. Bishop Museum Press, Honolulu.

1961 *Ruling Chiefs of Hawaii*. The Kamehameha Schools Press. Honolulu.

Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press. Honolulu.

Kelly, Marion
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

1998 Gunboat Diplomacy, Sandalwood Lust and National Debt" In *Ka Wai Ola OHA,* Vol. 15, No. 4, April 1998.

King, Thomas
2003 *Places that Count*. Rowen & Littlefield Publishers, Inc. Walnut Creek.

Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press. Chicago.

Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai`i Press. Honolulu.

Lucas, Paul F. Nahoa
1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai`i Committee for the Preservation and Study of Hawaiian Language, Art and Culture.. University of Hawai`i Press.

Lyons, C.J.
1875 Land Matters in Hawaii". *The Islander*, Vol. I. Honolulu.

Macdonald, Gordon and Agatin Abbott
1970 *Volcanoes in the Sea.* The University Press of Hawaii. Honolulu.

McAllister, J.G.
1933 *Archaeology of Oahu*. Bishop Museum Bulletin 104. Bishop Museum Press, Honolulu.

Menzies, Archibald
1928 *Hawaii New, 128 Years ago*. W.F. Wilson, ed. New Freedom Publishers: Honolulu.

Paki, Pilahi
1972 *Legends of Hawaii. Oahu's Yesterday*. Victoria Publishers, Ltd., Honolulu.

O'Hare, Constance R., David W. Shideler, Hallatt H. Hammatt
2008 *Archaeological Inventory Survey Plan for the Kahuku Subdivision Project, Kahuku, Keana, and Mālaekahana Ahupua`a, Ko`olauloa District, O`ahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027.* Cultural Surveys Hawaii. Kailua, HI. Ms. On file at SHPD, Kapolei.

OEQC (Hawaii State Office of Environmental Quality Control)
1997 "Guidelines for Assessing Cultural Impacts." Adopted by the Environmental Council, November 1997

Pantaleo, J, and A. Sinoto
1996 *Archaeological Subsurface Sampling of the Proposed Maui Lani Development Phases I and IA, Wailuku Ahupua`a, Wailuku District, Maui Island*. For Maui Lani Partners, Hawai`i.

Parker, Patricia and Thomas King
1990 Guidelines for Evaluating and Documenting Traditional Cultural Properties. *National Register Bulletin.* No. 38. U.S, Department of the Interior, National Park Service.

Patolo, Tomasi, Michael Dega, and Nancy Farrell
2009 *Phase I Archaeological Survey With Limited Subsurface Testing In Support of Designated "Go" Areas For Stryker Maneuver in the U.S. Army Kahuku Training Area, Ahupua`a of Waimea, Pupukea, Kaunala, Waiale`e, Pahipahi`alua, 'Opana, Kawela, Hanakaoe, 'O`io, 'Ulupehupehu, Paumalu, Kahuku, Keana, Malekahana, La`ie, and Kaipapa`u, Ko`olauloa District, Island of O`ahu, Hawai`i [TMK (1) 5-6, 5-7, 5-8, and 5-9: Various]*. SCS Honolulu, HI.

Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai`i Press: Honolulu.

Rogers-Jourdane, Elaine H.
1982 *Archaeological Reconnaissance Survey of Marine Culture Enterprises Land in Kahuku, O`ahu Island.* Department of Anthropology, Bishop Museum. Ms. On file at SHPD, Kapolei.

Rosendahl, Paul H.
1984 *Subsurface Archaeological Reconnaissance Survey Kuilima Resort Expansion Project, Lands of Opana, Kawela, Hanakaoe, Oio, Ulupehupehu, Punalau, and Kahuku, Koolau, Island of O`ahu TMK: 5-6-03[Por. 1]; 5-7-01, -03 [Por. 1], -06.* Ms. On file at SHPD, Kapolei.

Sinoto, Aki
1981 *Archaeological Reconnaissance Survey of Ki`i and Punamanō Wetland Refuge Units Kahuku, O`ahu Island.* Department of Anthropology, Bishop Museum. Ms. On file at SHPD, Kapolei.

Sterling, E.P. and C.C. Summers
1978 *Sites of Oahu*. Bishop Museum Press, Honolulu.

Vancouver, George
1984 *A Voyage of Discovery to the North Pacific Ocean and Round the World, 1791-1795*. Edited by W. Kaye Lamb. The Hakluyt Society, London.

Waihona `Aina
2009 Website http://waihona.com/getClaim.asp.

APPENDIX A: CIA INQUIRY LETTERS

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Cy Bridges
Ko`olauloa District Rep.
O`ahu Island Burials
bridgesc@polynesia.com

August 24, 2009

Dear: Mr. Bridges

Scientific Consultant Services, Inc. (SCS) has been contracted by Environet, Inc., to conduct a Cultural Impact Assessment (CIA) of the Kahuku Storm Damage Reduction Project (TMK: 5-6-006 Various). According to documents supplied by Environet, Inc, the project proposes a measure to reduce the impact of storm flooding on the campus of Kahuku High School. Four alternatives were proposed by the Dept. of the Army, and Alternative 2 was adopted. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs…

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai`i 96813

Phyllis Coochie Cayan, History and Culture Branch Chief August 24, 2009
C/O State Historic Preservation Division
601 Kamokila Blvd. Room 555
Kapolei, Hawai`i 96707

Dear Ms. Cayan:

Scientific Consultant Services, Inc. (SCS) has been contracted by Environet, Inc., to conduct a Cultural Impact Assessment (CIA) of the Kahuku Storm Damage Reduction Project (TMK: 5-6-006 Various). According to documents supplied by Environet, Inc, the project proposes a measure to reduce the impact of storm flooding on the campus of Kahuku High School. Four alternatives were proposed by the Dept. of the Army, and Alternative 2 was adopted. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs…

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai`i 96813

Ko`olauloa Hawaiian Civic Club
C/o Cathleen Matton
P.O. Box 532
Hau`ula, HI 96717

August 24, 2009

Dear Ms. Mattoon:

Scientific Consultant Services, Inc. (SCS) has been contracted by Environet, Inc., to conduct a Cultural Impact Assessment (CIA) of the Kahuku Storm Damage Reduction Project (TMK: 5-6-006 Various). According to documents supplied by Environet, Inc, the project proposes a measure to reduce the impact of storm flooding on the campus of Kahuku High School. Four alternatives were proposed by the Dept. of the Army, and Alternative 2 was adopted. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs…

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosure (2)

APPENDIX B: LEGAL NOTICE

The Honolulu Advertiser
605 KAPIOLANI BLVD
HONOLULU, HI 96813

LEGAL ADVERTISING 08/26/09 12:14 PM

RECEIPT

CLASSIFIED: (808) 525-7420
FAX: (808) 525-5448

Please note: Check your ad the FIRST day it appears in the paper.
The Honolulu Advertiser will not be responsible for errors after the first insertion of any advertisement.

2i

Account Information

Name:	
Company:	SCIENTIFIC CONSULTANT SERVICES
Address:	711 KAPIOLANI BLVD 975
City:	HONOLULU, HI 96813
Account ID:	23090
Account #:	
Telephone:	(808) 597-1182

Publications:	Start	Stop	Inserts
The Honolulu Advertiser	08/30/09	09/03/09	3
Online	08/30/09	09/03/09	3

Ad Information

Ad ID:	721352
Run dates:	08/30/09 to 09/03/09
Class:	Legal Ads
Sales Person:	TOYAMA
Printed by:	TOYAMA
Inserts:	6
Lines:	30
Columns:	1
Depth (Inches):	2.125
Net Cost:	$192.50
Tax:	$9.07
Paid Amount:	$201.57
Amount Due:	$0.00
Keywords:	
P.O. number:	1072

Payments:

Method	Card Type	Name on Card	Last 4 Digits	Expire Date	Check Number	Amount Paid
CC	MC	SUARRA BAKER	5287	03/12		$201.57

Ad Copy: (Actual Size)

CULTURAL IMPACT ASSESSMENT NOTICE:

Information requested by SCS of cultural resources or ongoing cultural activities on or near this parcel in Kahuku, Oahu, TMK: 5-6-006. Please respond within 30 days to SCS at (808) 597-1182.

(Hon. Adv.: Aug. 30; Sept. 2, 3, 2009) (A-721352)

1072

Received Time Aug.26. 12:09PM

***Appendix D**:*

April 2008 Community Meeting Memorandum

Memorandum

To: The Record

From: Michael Wong

Date: 23 April 2008

Subject: Kahuku High School Drainage Community Meeting

The subject meeting was held at the Kahuku High School Cafeteria on 22 April from 6 to 730pm. About 14 community members and high school staff attended with 6 agency persons attending or presenting (3 Corps of Engineers, 1 Department of Education, 1 Fish and Wildlife Service, and 1 staff person from Senator Inouye's office). A briefing was presented and questions and comments were addressed or noted. Overall the meeting went well.

Specific flooding concerns that were brought up are listed below. My comments in italics:

Flows from the east/dead man's gulch *(Keealu Gulch)*impact high school by entering campus on east side. *This would be outside flows entering campus.*

Flows from across Kamehameha Highway also enter the campus from the superette area and other high ground behind there. *This would be outside flows entering campus.*

Dry wells installed in 1970s do not work; community told school this was a waste of money.

If drainage pathways towards the low area/detention area west of high school (*low area is on City Park land*) is kept clean, then flows would leave the campus.

Hospital Ditch cannot accept High School flows without improvement to ditch.

Put French drains in on campus and on athletic field.

Athletic field is low spot. Drainage towards low area would be good. New drains would also help areas by PE building, which also have ponded water.

Old drain grate and drainage system across Kamehameha Highway is plugged up. System worked prior to beautification work in front of sugar mill—now does not work and creates flooding problems to High School.

During plantation time—plantation kept ditches clean and no flooding problems—it's a maintenance issue.