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NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY

An Authority of the State of Hawaii attached to the Department of Business, Economic Development & Tourism

Source of 100% Hawaii Deep Seawater

September 1, 2011

RECEIVED '11 SEP -6 P2:13 OFC. OF ENVIRONMENTAL QUALITY CONTROL

Gary Hooser, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Subject: Draft Environmental Assessment, West Hawaii Explorations Academy Relocation TMK (3rd) 7-3-043:083, North Kona District, Island of Hawaii

Dear Mr. Hooser:

The Natural Energy Laboratory of Hawaii Authority (NELHA), has reviewed the draft environmental assessment for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish notice of availability for this project in the next available edition of the Environmental Notice. We have enclosed the following:

- One paper copy of the Draft EA
- A CD containing the .pdf file for the EA and a MS Word file with the OEQC transmittal documents, including OEQC Environmental Notice Publication Form, project summary, the distribution list for the Draft EA, and a sample "Dear Participant" letter
- A hardcopy of the OEQC submittal material

Please contact Jeff Nichols, NELHA Engineering Projects Coordinator, at (808) 327-9585, x237 if you have any questions.

Very truly yours,

Gregory P. Barbour
Executive Director

Attachments: As noted above

cc: (w/o attach) Ron Terry, Ph.D.,
Project Environmental Consultant

73-4460 Queen Kaahumanu Hwy., #101, Kailua-Kona, Hawaii USA 96740-2637
Phone: (808) 327-9585 Fax: (808) 327-9586 Email: nelha@nelha.org Website: http://www.nelha.org

OEQC Publication Form
The Environmental Notice

RECEIVED
'11 SEP -6 P2:13
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Name of Project: West Hawai'i Explorations Academy Relocation

Applicable Law: Chapter 343, HRS

Type of Document: Draft EA

Island: Hawai`i

District: North Kona

TMK: (3rd. Div.) 7-3-043:083

Permits Required:
- County of Hawai'i, Department of Public Works, Building Division Approval and Building Permit
- County of Hawai'i, Department of Public Works, Engineering Division, Grading Permit
- County of Hawai'i, Planning Department Plan Approval
- County of Hawai'i, Special Management Area Permit (obtained through prior approval)
- State Department of Health, National Pollutant Discharge Elimination System Permit
- State Historic Preservation Division, Chapter 6e Historic Sites Clearance (obtained)
- Federal Aviation Administration, Aeronautical Study Clearance (potential)

Name of Applicant or Proposing Agency:	West Hawai'i Explorations Academy
Address	73-4460 Queen Ka'ahumanu Highway, #105
City, State, Zip	Kailua-Kona, HI, 96740
Contact and Phone	Ken Melrose (808) 345-0854
Approving Agency:	Natural Energy Laboratory of Hawaii Authority NELHA
Address	73-4460 Queen Kaahumanu Hwy, #101
City, State, Zip	Kailua-Kona, HI 96740-2637
Contact and Phone	Jeff Nichols, NELHA Engineering Projects Coordinator (808) 327-9585
Consultant	Geometrician Associates
Address	PO Box 396
City, State, Zip	Hilo HI 96721
Contact and Phone	Ron Terry (808) 969-7090

Project Summary

The West Hawai'i Explorations Academy (WHEA) proposes to relocate its campus within the Natural Energy Laboratory of Hawai'i Authority (NELHA) from a shoreline property to a more suitable site away from the Kona International Airport and outside the tsunami evacuation zone. The new site will be in an area of NELHA with access to the seawater that forms the basis of many of the hands-on scientific curriculum at the school. The permanent campus would allow for the eventual expansion from 195 to 300 students in the 7th to the 12th grades. The school will have solar hot water, a 10 kW photovoltaic system, xerophytic landscaping, and many other environmentally advanced features that both reduce energy use and serve for education in high technology, energy and environmental engineering, including alternative wastewater treatment technologies. Impacts include grading of the pahoehoe surface and associated minor impacts on sedimentation, dust, noise, and visual quality, all of which will be temporary and mitigated as feasible. No archaeological sites are present on or near the site. A few individuals of the relatively rare plant maiapilo, the designated school flower, are present on and surrounding the site. These plants will be salvaged as practical and maiapilo plants will be used for landscaping.

DRAFT ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

TMK (3rd. Div.) 7-3-043:083 (por.)
North Kona District, Hawai‘i Island, State of Hawai‘i

September 2011

Prepared for:

Natural Energy Laboratory of Hawai‘i Authority (NELHA)
73-4460 Queen Ka‘ahumanu Hwy. #101
Kailua-Kona HI 96740-2637

DRAFT ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

TMK (3rd. Div.) 7-3-043:083
North Kona District, Hawai‘i Island, State of Hawai‘i

APPLICANT:

West Hawai‘i Explorations Academy
73-4460 Queen Ka‘ahumanu Highway, #105
Kailua-Kona, HI, 96740

APPROVING AGENCY:

Natural Energy Laboratory of Hawai‘i Authority (NELHA)
73-4460 Queen Ka‘ahumanu Hwy. #101
Kailua-Kona, HI 96740-2637

CONSULTANT:

Geometrician Associates LLC
PO Box 396
Hilo HI, 96721

CLASS OF ACTION:

Use of State Land
Use of State Funds

This document is prepared pursuant to:

The Hawai‘i Environmental Policy Act,
Chapter 343, Hawai‘i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai‘i Department of Health Administrative Rules (HAR)

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SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The West Hawai‘i Explorations Academy (WHEA) proposes to relocate its campus within the Natural Energy Laboratory of Hawai‘i Authority (NELHA) from a shoreline property to a more suitable site away from the Kona International Airport and outside the tsunami evacuation zone. The new site will be in an area of NELHA with access to the seawater that forms the basis of many of the hands-on scientific curriculum at the school. The permanent campus would allow for the eventual expansion from 195 to 300 students in the 7th to the 12th grades. The school will have solar hot water, a 10 kW photovoltaic system, xerophytic landscaping, and many other environmentally advanced features that both reduce energy use and serve for education in high technology, energy and environmental engineering, including alternative wastewater treatment technologies. Impacts include grading of the pahoehoe surface and associated minor impacts on sedimentation, dust, noise, and visual quality, all of which will be temporary and mitigated as feasible. No archaeological sites are present on or near the site. A few individuals of the relatively rare plant *maiapilo*, the designated school flower, are present on and surrounding the site. These plants will be salvaged as practical and *maiapilo* plants will be used for landscaping.

PART 1: PROJECT DESCRIPTION, LOCATION AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location and Property Ownership

The project location is a 5.083-acre area in Kona under the control of the Natural Energy Laboratory of Hawai‘i Authority (NELHA), an agency of the State of Hawai‘i, near Keahole Point on the Island of Hawai‘i (see Figures 1-3 for maps and photos of area). Following a recently approved consolidation and resubdivision action, the site consists of most of TMK 7-3-043:083 outside of two areas reserved for road widening and a pipeline.

1.2 Purpose and Need

The West Hawai‘i Explorations Academy (WHEA) is a successfully operating public charter school that has been open since 1993 for students from the 7th through the 12th grade. The current temporary site (see Figure 1) has the advantage of being near the shoreline, but this also places it near the tsunami zone. Furthermore its already high noise levels are due to increase with modifications and expansions to runways at Kona International Airport. The new site (see Figure 1) would lack these disadvantages and still be within an area with access to the seawater that forms the basis of many of the hands-on scientific curriculum at the school.

1.3 Project Description

The project would relocate the WHEA campus from its temporary shoreline site about a mile away and build a permanent campus with facilities that would allow for an eventual expansion from 195 to 300 students. The planned campus, which is depicted in Figure 4, would include the following elements:

- Administration building
- High school village and a middle school village with a total of 9 classroom buildings
- Outdoor amphitheater
- Multi-purpose room and kitchen and servery building
- Laboratories
- STEM (Science, Technology, Math and Engineering) learning center/shop
- Covered outdoor spaces and other facilities for agriculture, aquaculture, and marine science student projects, and courts for tennis and basketball

A number of the facilities in the school are being designed for LEED Silver Certification. An unusual feature will be the opportunity to use cold deep seawater for air conditioning, condensate irrigation and science education. The school will have solar hot water, a 10 kW photovoltaic system, mostly xerophytic landscaping, and many other environmentally advanced features that both reduce energy use and serve for education in high technology, energy and environmental engineering, including alternative wastewater treatment technologies.

Figure 1 Location Map

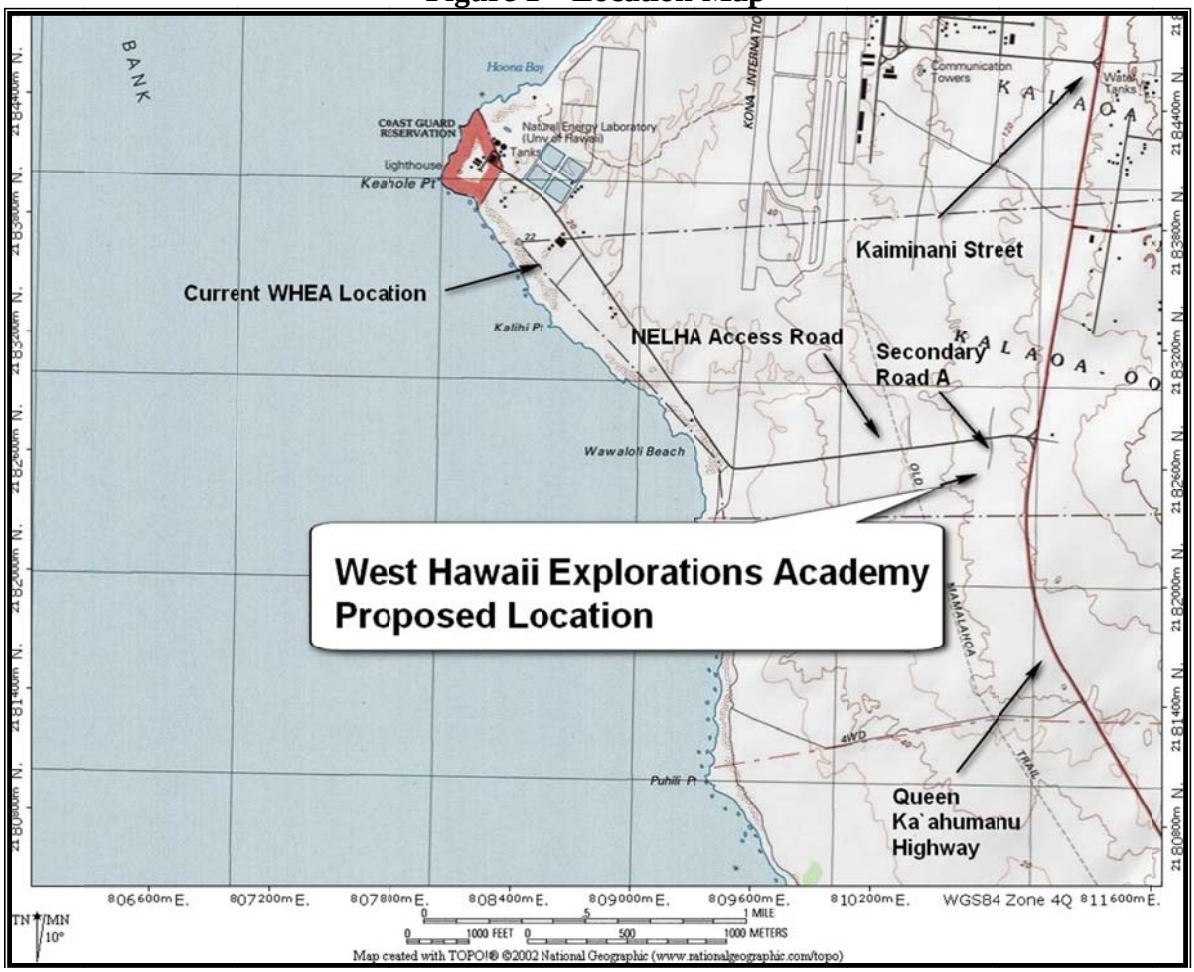


Figure 2 TMK Map

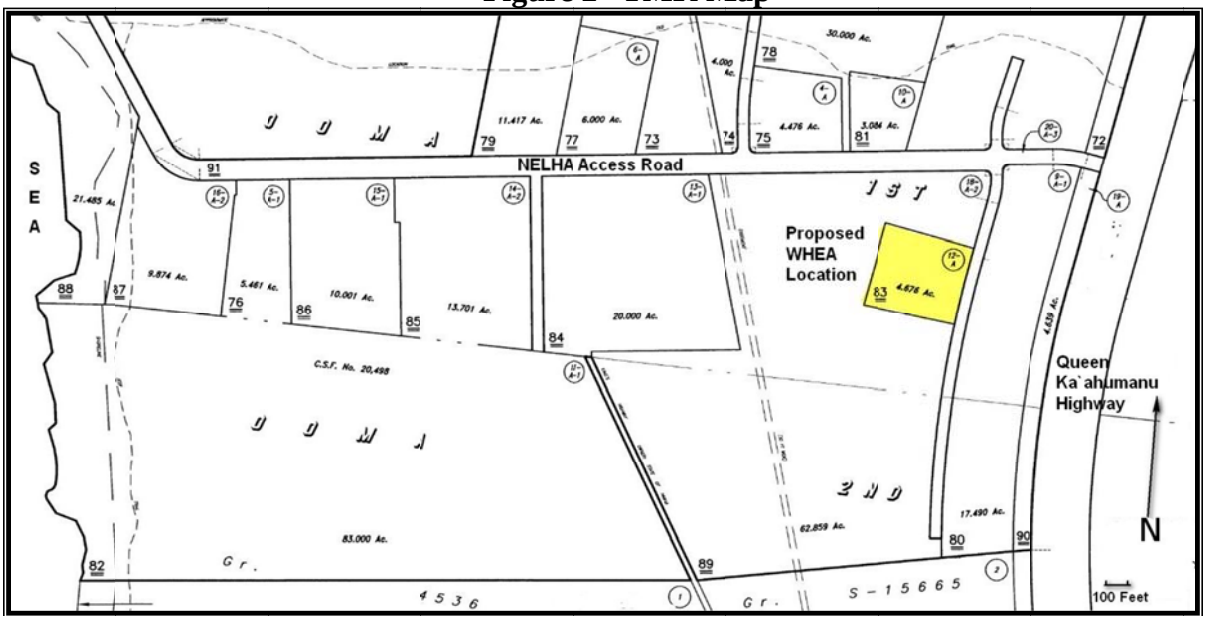
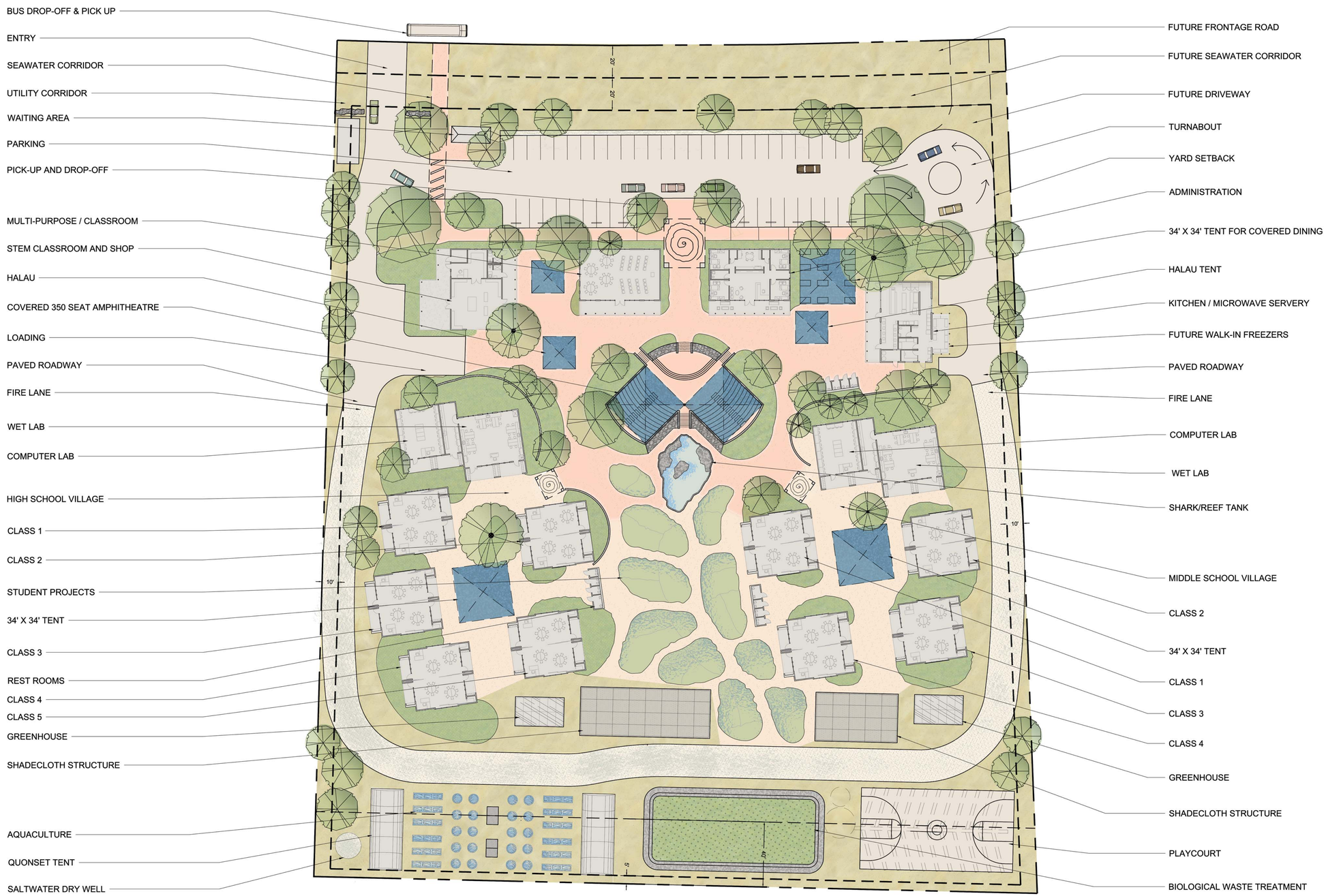


Figure 3
Project Site Photos

▲*Mauka* north end of project site ▼ *Makai* south end of project site



1
G0.03

SITE PLAN

1" = 30'-0"

0 10 20 40 60 100

FERRARO CHOI

FERRARO CHOI AND ASSOCIATES LTD
ARCHITECTURE / INTERIOR ARCHITECTURE / RESEARCH
733 BISHOP ST. SUITE 2620 HONOLULU HI 96813-4016
TEL 808 533 8880 FAX 808 599 3769 www.ferrarochoi.com

SIGNATURE

EXPIRATION OF LICENSE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. (SEC. 16-115) DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS)

WEST HAWAII EXPLORATIONS ACADEMY

HOST Park, Kailua-Kona, Hawaii

SHEET TITLE: SITE PLAN - OVERALL

REVISIONS:

CADD FILE:

PROJECT: 1261.000

DRAWN: KC

DATE: 4/22/2011

SHEET G0.03

OF SHEETS

The target date for relocation of the school is currently August of 2013. Phase I of the project, which would accommodate the existing enrollment, is estimated to cost $10 to 15 million. The second phase of the project would allow expanded enrollment to 300 students and add $3 to 4 million.

1.4 Environmental Assessment Process

NELHA Background

By Act 236 of the Hawai‘i Revised Statutes, 1974, the State of Hawai‘i established the Natural Energy Laboratory of Hawai‘i (NELH) on 322 acres at Keahole Point on the Island of Hawai‘i. The physical characteristics of the site were considered uniquely suited for several significant State and federal energy programs. NELH was mandated to provide a support facility for research on the ocean thermal energy conversion (OTEC) process and its related technologies. The success of these programs was envisioned as highly significant for the intensive, long-term development of energy source alternatives to fossil fuels.

In 1979, a barge dubbed “Mini-OTEC,” anchored offshore of Keahole Point, demonstrated the world’s first production of net electrical power via closed-cycle OTEC. A year later, the NELH facilities that draw deep seawater from 2,000 feet and surface seawater from the 45-foot depth were constructed at Keahole Point. By 1984 it had become apparent that the seawater being pumped up for OTEC research could also be channeled into many other profitable uses. New legislation in 1984 legalized commercialization on State property, allowing NELH to host new tenant business ventures. In 1985, the State Legislature created the Hawaii Ocean Science and Technology (HOST) Park on an adjacent 548 acres at Keahole in anticipation of expansion needs of NELH’s growing businesses. In 1990, HOST Park and NELH were melded into one agency, the NELH Authority (NELHA), attached to the Hawai‘i State Department of Business, Economic Development & Tourism. In 1998-99, the Legislature expanded the activities allowed at NELHA to include other business activities that could enhance economic development and generate additional revenues to support the growing park. Today, NELHA is “landlord” to nearly 40 enterprises that generate about $50 million per year in total economic impact, including tax revenues, as well as more than 390 jobs, construction activity and high value product exports. Three pipeline systems constantly pump deep and surface seawater to shore, including the world’s deepest pipeline at 3,000 feet.

The cumulative impacts of long-term operation and expansion of NELHA operations were evaluated in four previously accepted environmental impact statements (EISs):

- Research Corporation of the University of Hawai‘i (RCUH). 1976. *Environmental Impact Statement for the Natural Energy Laboratory of Hawaii at Keahole Point, Hawaii (Phase I)*. Prep. by R.M. Towill Corp. for RCUH.
- Hawai‘i State High Technology Development Corporation (HTCD). 1985. *Final Environmental Impact Statement, Development Plan for the Hawaii Ocean Science and Technology Park and Expansion of the Natural Energy Laboratory of Hawaii, Keahole, North Kona, Hawaii*.

- Natural Energy Laboratory of Hawai‘i. 1987. *Final Environmental Impact Statement, Alternative Methods of Seawater Return Flow Disposal, Keahole, North Kona, Hawaii*.
- Natural Energy Laboratory of Hawai‘i. 1992. *Final Environmental Impact Statement, Development of Land Exchange Parcel*, *Natural Energy Laboratory of Hawaii*. Prep. by GK & Associates for NELHA.

In addition, the following EIS addressed the impacts of land development and proposed aquaculture uses on an adjacent 83-acre parcel obtained by NELHA in a 1986 land exchange:

- Hawai‘i County Planning Department. 1986. *Final Environmental Impact Statement, ‘O’oma II, North Kona, Hawaii.* Prepared for Hawai‘i County Planning Department and Kahala Capital Corporation by Helber, Hastert, Van Horn & Kimura.

As discussed in Section 3.6.4, the project is clearly of a type authorized by HRS Chapter 227D, which stated: “The purpose of the natural energy laboratory of Hawaii authority shall be to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawaii.” However, an Environmental Assessment (EA) is being conducted because the West Hawai‘i Explorations Academy involves a use of State land of a type not explicitly evaluated in the previous EIS documents for NELHA and because of expected use of State Grant in Aid and Capital Improvement Program funds.

Environmental Assessment Process

This EA process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria.

Part 4 of this document states the finding (anticipated in the Draft EA) that no significant impacts are expected to occur; Part 5 lists each criterion and presents the findings by NELHA, the approving agency. In the EA process, if the approving agency determines after considering comments to the Draft EA that no significant impacts would likely occur, then the agency issues a Finding of No Significant Impact (FONSI), and the action is permitted to occur. If the agency concludes that significant impacts are expected to occur as a result of the proposed action, then an Environmental Impact Statement (EIS) is prepared.

1.5 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the environmental assessment:

Federal:

Federal Aviation Administration

State:

Department of Land and Natural Resources
Department of Health, Safe Drinking Water and Clean Water Branches
Department of Transportation
Office of Hawaiian Affairs, Honolulu and West Hawai‘i

County:

Civil Defense Agency
County Council
Department of Environmental Management
Fire Department
Planning Department
Department of Water Supply

Private:

Kona Hawaiian Civic Club
Kona-Kohala Chamber of Commerce
Kona Outdoor Circle
Sierra Club
Janice Palma-Glennie
Keahole Point Associates

Copies of communications received during early consultation are contained in Appendix 1a and relevant aspects of reply letters are discussed in the text of the EA.

PART 2: ALTERNATIVES

2.1 Proposed Project

The action under consideration is described in Sections 1.1 to 1.3, above.

2.2 No Action

Under the No Action Alternative, the school would not relocate and would likely have to close when noise levels from the airport expansion became unbearable.

2.3 Alternate Sites

As discussed in Section 1.3 and illustrated in Figure 1, the current temporary site has the advantage of being near the shoreline at NELHA, but it is thus also near the tsunami zone. In addition, the already high noise levels are due to increase with modifications and expansions to runways at Kona International Airport. The new site was chosen by NELHA and offered to WHEA as the most suitable location in terms of NELHA's Master Plan. There are potentially other sites in Kona that might be appropriate for a charter school, but the location within this area of NELHA offers ideal access to the seawater that forms the basis of many of the hands-on scientific curriculum at the school. At this time, school officials have been unable to identify any other feasible and desirable sites within or outside of NELHA, and therefore none are carried forward for detailed analysis in this EA.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The NELHA property that will be leased is referred to throughout this EA as the *project site*. The term *project area* is used to describe the general environs in this part of Kona.

After a recently approved consolidation and resubdivision process, the site consists of most of TMK 7-3-043:083 outside of two areas reserved for road widening and a pipeline. It is located *makai* of the NELHA Gateway Center and south of the main NELHA Access Road (see Figures 1-3). All adjacent land is contained within NELHA and dedicated to research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawai‘i. Approximately 4,000 feet to the northwest is the nearest runway of the Kona International Airport, and Queen Ka‘ahumanu Highway is present 600 feet *mauka*.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

Environmental Setting

The climate in the area is warm and arid, with an average annual rainfall of about 20 inches (UH Hilo-Geography 1998:57). Geologically, the site is located at the foot of Hualālai volcano, and the surface consists of barely weathered pahoehoe basalt lava flows dated from 1,500 to 3,000 years ago (Wolfe and Morris 1996). In this dry climate, soil has not yet had time to form (U.S. Soil Conservation Service 1973).

The relatively flat and stable project site is not subject to subsidence nor landslides or other forms of mass wasting. The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the U.S. Geological Survey in this area of North Kona is Zone 4, on a scale of ascending risk from 9 to 1 (Heliker 1990:23). The hazard risk is based on the fact that Hualālai has steep slopes and is the third most historically active volcano on the island. Volcanic hazard Zone 4 areas have about 5 percent of their land area covered by lava or ash flows since the year 1800 and less than 15 percent of their land area covered by lava in the past 750 years. They are at lower risk than Zone 3 areas because the frequency of Hualālai eruptions is lower than those of Kilauea and Mauna Loa.

In terms of seismic risk, the entire Island of Hawai‘i is rated Zone 4 Seismic Hazard (*Uniform Building Code, 1997 Edition*, Figure 16-2). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 15, 2006, demonstrated.

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the project site that would make the proposed school relocation within NELHA imprudent, as demonstrated by the deep commitment to ocean technology-related infrastructure represented by the NELHA development. Facility design will meet all appropriate seismic standards. School officials are trained in evacuation procedures in the event of a volcanic emergency.

3.1.2 Flood Zones and Drainage

Existing Environment

As illustrated in Figure 1, the project site is about 0.9 miles from the ocean at an elevation of about 100 feet above sea level, well outside the area affected by coastal flooding. The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 1551660683 (9/16/1988) shows that the project site is in Flood Zone X, outside the 100-year area of coastal flooding (see Figure 4a for interpretation of Flood Zone boundary relative to development site). Maps printed by the Pacific Tsunami Warning Center and the Hawai‘i County Civil Defense Agency show the parcel outside the area that should be evacuated during a tsunami warning, unlike the current school location (http://www5.hawaii.gov/tsunami/maps.asp). No known areas of local (non-stream or ocean related) flooding are present at the project site.

Impacts and Mitigation Measures

The project does not involve construction within a flood zone. The project would be required to follow County regulations and policies related to flooding and drainage, among them Chapter 27 of the Hawai‘i County Code. Chapter 27 requires the difference between pre-development and post-development runoff to be contained onsite, limiting impacts.

In response to early consultation (see Appendix 1a) Quince Mento, Director of Hawai'i County Civil Defense, stated that WHEA should have plans for relocating students and faculty during a tsunami event, as roadblocks will be established at the intersection of Queen Ka‘ahumanu Highway and the NELHA Access Road. Although not subject to tsunami and not within the tsunami evacuation zone, the school would follow normal operating procedures during tsunami. The National Weather Service of the National Oceanic and Atmospheric Administration operates the Pacific Tsunami Warning Center and Alaska Tsunami Warning Center, which monitors sudden earth movements throughout the Pacific Basin. Tsunamis generated from earth movements on the Pacific Rim, including South America, Japan, California and Alaska, would allow for warning times between 4 and 15 hours, sufficient time for evacuation of NELHA. Sudden movement along faults close to Hawai‘i are unpredictable, allowing only minutes or perhaps an hour of warning time, and evacuation would be more problematic.

3.1.3 Water Features and Water Quality

Existing Environment

Aside from the Pacific Ocean, the project site is not near perennial surface water bodies. According to maps from the U.S. Fish and Wildlife Service confirmed by field inspection, no wetlands are present (http://www.fws.gov/wetlands/Data/Mapper.html). The nearest mapped wetlands are approximately 2.5 miles south at Kaloko-Honokohau National Historical Park.

The waters off Kona are classified by the State as class AA. Hawai‘i Administrative Rules (HAR) 11-54-03(c)(1) states that class AA waters are

> "high quality waters are those in which water quality is expected to exceed that necessary to support oceanographic research, propagation of aquatic communities and wildlife, compatible recreation and aesthetic enjoyment. It is the objective of class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected."

Coastal water quality in urban Kona, which lacks the heavy industry, history of intensive agriculture, or other factors that lead to contamination, is generally good (U.S. EPA 2000). However, the Natural Resources Defense Council has reported exceedances (http://www.nrdc.org/water/oceans/ttw/ttw2008.pdf) of bacteria in water quality at certain beaches, which local water quality scientists attribute mainly to wastewater (*Hawai‘i Tribune Herald*: 8/6/08:1)

Another source of water pollution is runoff from developed properties, which can carry chemicals, sediments and nutrients, even if they not located directly on the coast. Although not a chronic problem, periodic acute episodes have occurred in some construction sites. Proper implementation and enforcement of construction BMPs are important to safeguard water quality. After construction, reducing contamination relies on confining runoff, particularly "first-flush" runoff, which contains most of the contaminants, to drainage structures that capture and retain many of the pollutants, especially sediments.

In terms of groundwater, U.S. EPA and Department of Water Supply Annual Water Quality Reports for wells and water systems indicate no health-based or monitoring violations in at least the past 10 years (http://oaspub.epa.gov/enviro/). Although some chemical contamination has been found in a few, levels have been below maximum EPA-acceptable limits.

Impacts and Mitigation Measures

Initially, domestic wastewater would be treated through a septic system in conformance with Department of Health regulations. Conceptual plans allocate space on the site for future additional treatment with constructed wetlands and disinfection to allow wastewater re-use (see Figure 4). This wetlands would take effluent in a bypass from the septic tank and route it to

either a storage tank for underground irrigation or to the leach field for disposal or a treatment tank for treatment to R-1 quality so that the effluent could be used for serial irrigation. All treatment would occur per Department of Health regulations and would be subject to NELHA overview to ensure compliance with NELHA standards and policies.

The WHEA seawater disposal trench will be included in the NELHA Tenant Effluent Monitoring Program. The seawater introduced into the discharge basin will be professionally tested according to NELHA protocol to ensure that it meets standards for such disposal. All effluent for NELHA tenants is tested based on State water quality standards contained in Title 11, Chapter 62, Hawai‘i Administrative Rules. Testing is done for four analytes: total suspended solids, biological oxygen demand, total nitrogen, and total phosphorus. Testing will be performed by the NELHA Water Quality Lab quarterly for the first year. The goal is to ensure that effluent meets water quality standards and does not degrade the groundwater or marine waters.

The entire site is planned for grading. The project will be required to conform to Chapter 10 of the Hawai‘i County Code, which requires projects that disturb the ground to prevent erosion and sedimentation and obtain grubbing/grading permits from the County Department of Public Works. Because the project may disturb an acre or more than one acre of soil, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained by the contractor before the project commences. This permit requires the completion of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the emplacement of a number of best management practices (BMPs) for the project. These BMPs may include, but will not be limited to, the following:

- Minimization of soil loss and erosion by revegetation and stabilization of slopes and disturbed areas of soil, possibly using hydromulch, geotextiles, or binding substances, as soon as possible after working;
- Minimization of sediment loss by emplacement of structural controls possibly including silt fences, gravel bags, sediment ponds, check dams, and other barriers in order to retard and prevent the loss of sediment from the site;
- Minimizing disturbance of soil during periods of heavy rain;
- Phasing of the project in order to disturb a minimum necessary area of soil at a particular time;
- Application of protective covers to soil and material stockpiles;
- Construction and use of a stabilized construction vehicle entrance, with designated vehicle wash area that discharges to a sediment pond;
- Washing of vehicles in the designated wash area before they egress the project site;
- Use of drip pans beneath vehicles not in use in order to trap vehicle fluids;
- Routine maintenance of BMPs by adequately trained personnel; and
- Clean up of significant leaks or spills and disposal at an approved site, if they occur.

3.1.4 Flora, Fauna and Ecosystems

Existing Environment

The project site is entirely contained on lightly vegetated pahoehoe lava, as shown in photos in Figure 3. An inspection in May 2011 by Dr. Ron Terry found the vegetation to be typical of that found in other studies on coastal Kona lava flows (e.g., Geometrician Associates 2006), consisting of the species listed in Table 1 below. The most prominent species present are the non-native fountain grass *(Pennisetum setaceum)* along with the common indigenous herb *ʻuhaloa* (*Waltheria indica*). A notable feature on this site and many other locations at and near NELHA is the rare native shrub *maiapilo* (*Capparis sandwichiana*).

No threatened or endangered plant species were present or would be expected on the project site. Although moderately common in the shoreline from Keahole Point through Oʻoma to the south, *maiapilo* is considered a species of concern by the U.S. Fish and Wildlife Service and is often listed among rare plants in Hawaiʻi. Even if this status does not provide official legal protection, the U.S. Fish and Wildlife Service and the Hawaiʻi Department of Land and Natural Resources are interested in its protection.

Table 1. Plant Species Detected on Project Site

Scientific Name	Family	Common Name	Life Form	Status*
Acacia farnesiana	Fabaceae	Klu	Shrub	A
Capparis sandwichiana	Capparaceae	Maiapilo	Shrub	E
Chamaecrista nictitans	Fabaceae	Partridge pea	Herb	A
Chloris barbata	Poaceae	Swollen fingergrass	Grass	A
Dodonaea viscosa	Sapindaceae	ʻAʻaliʻi	Shrub	I
Lantana camara	Verbenaceae	Lantana	Shrub	A
Morinda citrifolia	Rubiaceae	Noni	Shrub	A
Pennisetum setaceum	Poaceae	Fountain grass	Grass	A
Rhynchelytrum repens	Poaceae	Natal red-top	Grass	A
Schinus terebinthifolius	Anacardiaceae	Christmas berry	Shrub	A
Sida fallax	Malvaceae	ʻIlima	Shrub	I
Sida rhombifolia	Malvaceae	Sida	Shrub	A
Tridax procumbens	Asteraceae	Coat buttons	Herb	A
Waltheria indica	Sterculiaceae	ʻUhaloa	Shrub	I

* A = alien, E = endemic, I = indigenous

No birds were observed during reconnaissance of the site, which contains very little habitat or food attractive to birds. Nevertheless, common non-native birds such as Common Myna (*Acridotheres tristis*) and Spotted Dove (*Streptopelia chinensis*) may occasionally be found on the site. No threatened or endangered birds would likely be present on the site.

Although not detected during this survey it is possible that small numbers of the endangered endemic Hawaiian Petrel *(Pterodroma sandwichensis),* or *uaʻu,* and the threatened Newell's Shearwater *(Puffinus auricularis newelli),* or *ʻaʻo,* over-fly the project site between the months

of May and November. To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters and external lights and man-made structures, all projects in Hawai'i should ensure that any external lighting be shielded, in keeping with Hawai'i County Code § 14 – 50 *et seq.* which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

No mammals were observed on the property. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), which might forage in the general area but would not roost on the project site because of the lack of appropriate trees, all terrestrial mammals currently found on the Island of Hawai'i are alien species, and most are ubiquitous. Wild cats (*Felis catus*), small Indian mongooses (*Herpestes a. auropunctatus*), and some species of rats and mice, such as roof rats *(Rattus r. rattus),* Norway rats *(Rattus norvegicus),* Polynesian rats *(Rattus exulans hawaiiensi),* and European house mice *(Mus musculus domesticus),* probably make occasional use of the project site, as they are common in Kona.

Impacts and Mitigation Measures

No substantial adverse effects to flora and fauna will occur. The rare *maiapilo* plants, which are distinct and easily identifiable, will be salvaged where possible, but as most of the site will be graded, only a few may be able to be preserved in situ. However, the *maiapilo* plant is the designated school plant and has special meaning for the school, and it will be incorporated along with other Hawaiian plants in the facility landscaping.

The project will not involve any unshielded lighting for either construction or operation, in conformance with Hawai'i County Code § 14 – 50 *et seq,* which will avoid impacts to listed seabirds.

Factors that impair urban Kona's coastal water quality and potentially affect threatened or endangered marine species are wastewater, chemical contaminants from industrial and commercial uses, and polluted runoff from streets and parking lots. As there are no surface streams in the project area and runoff directly into the ocean is generally not observed, the typical pathway of pollutants is via groundwater, where it is partially remediated through the natural process of slow infiltration through soil and rock.

The facility would not increase runoff from the project site into the ocean and would treat all wastewater in conformance with strict permit requirements in order to avoid pollution. No marked effect to water quality or other marine conditions is expected to occur as a result of the project, and no adverse effect of any sort to any species of marine life is expected.

3.1.5 Noise

Environmental Setting

Noise on the project site is moderate to high based on its location about 4,500 feet from the nearest runway of Kona International Airport (KOA). Aside from the airport, there is currently no substantial noise at the site. Other sources of noise include Queen Ka‘ahumanu Highway (State Highway 19), located about 600 feet east, the NELHA Access Road, and nearby ocean technology and other land uses.

The noise descriptor used to assess environmental noise by many federal and State of Hawai‘i agencies, including Department of Housing and Urban Development (HUD), the Federal Aviation Administration (FAA) and the Hawai‘i Department of Transportation (DOT), is the Day-Night Average Sound Level (DNL). DNL is a representation of the average noise during a typical day of the year. DNL levels of 55 or less are typical of quiet rural or suburban areas. DNL exposure levels of 55 to 65 are typical of urbanized areas with medium to high levels of activity and street traffic. DNL exposure levels above 65 are representative of dense urban sites and areas near large highways or airports.

Various agencies have different standards of noise compatibility. HUD standards are as follows[1]:

- **Acceptable**. (DNL not exceeding 65 decibels) The noise exposure may be of some concern but common building constructions will make the indoor environment acceptable and the outdoor environment will be reasonably pleasant for recreation and play.
- **Normally Unacceptable**. (DNL above 65 but not exceeding 75 decibels) The noise exposure is significantly more severe; barriers may be necessary between the site and prominent noise sources to make the outdoor environment acceptable; special building constructions may be necessary to ensure that people indoors are sufficiently protected from outdoor noise.
- **Unacceptable**. (DNL above 75 decibels). The noise exposure at the site is so severe that the construction cost to make the indoor noise environment acceptable may be prohibitive and the outdoor environment would still be unacceptable.

DOT Airports is currently completing its federally-required 14 CFR Part 150 Noise Compatibility Program (NCP) update for KOA. A draft report dated June 2009 is available at: (http://www.kona-airport.com/downloads/KOA%20150%20chpt%207.pdf).

Table 3 of the NCP provides recommendations for local land use compatibility with DNL sound levels. Its standards consider noise levels above 60 DNL generally incompatible with residential land uses without noise level reduction measures that reduce interior noise levels to 45 DNL or less. Commercial and government uses, as well as government services and office buildings serving the public, are considered compatible with noise levels that exceed 65 DNL only if noise

[1] U.S. Department of Housing and Urban Development’s (HUD) *Noise Assessment Guidelines* (NAG), ; web-based *Day/Night Noise Level Assessment Tool* (V.1), HUD Office of Environment and Energy Environmental Planning Division.

reduction measures are incorporated into areas of the facility in which the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

The 14 CFR Part 150 NCP for KOA also includes aircraft noise contour maps for current conditions (2008) as well as projections for the year 2013 and "long-range" (date undefined). These maps were developed using operational forecasts, existing aircraft flight tracks for the existing runway, and assumed flight tracks for a proposed new runway. Potential noise impacts from additional military operations at KOA were also investigated. Several relevant maps are duplicated in full in Appendix 3 of this EA. Under all scenarios, noise at the project site is modeled to be between 55 and 60 DNL, in other words, well within the acceptable range.

The updated 14 CFR Part 150 NCP for KOA includes measures to abate aircraft noise through pilot education, controlling land development, monitoring the impacts of noise on non-compatible land uses, and implementing and updating the program. As part of the program, DOT seeks to foster coordination between DOT Airports Division, Hawai‘i County, and the State Land Use Commission regarding development, land reclassifications, and rezoning proposals near the airport so that DOT Airports Division can have the opportunity to comment on projects and their potential impact on compatible land use development.

Impacts and Mitigation Measures

Construction would involve grading, compressors, vehicle and equipment engine operation. These activities may generate noise exceeding 95 decibels at times, potentially impacting nearby noise sensitive receptors at the NELHA Gateway Center. In cases where construction noise is expected to exceed the State Department of Health (DOH) "maximum permissible" property-line noise levels, builders must obtain a permit per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction. DOH reviews the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers. WHEA and/or its construction contractor will consult with DOH to determine if a permit will be required and what, if any, noise reduction measures are necessary. WHEA will also coordinate with NELHA to minimize inconvenience to activities occurring at the NELHA Gateway Center.

Operationally, the facility would generate the moderate levels of noise found in public schools with active programs. No noise impacts upon current uses or future uses are expected.

WHEA has considered DOT Airports land use compatibility criteria in its evaluation of the appropriateness of the site. It should be noted that the current WHEA site has noise levels of around 65 DNL, which in the long term may rise. Airport noise at the new location should not be a major impact.

Through the EA process, WHEA is coordinating with DOT Airports Division and the Hawai‘i County Planning Department to obtain recommendations on the compatibility of the land use and recommendations for measures that might mitigate noise further than those already planned.

3.1.6 Air Quality and Odors

Environmental Setting

Air quality in Hawai‘i is generally good, below criteria levels for most pollutants in most locations at almost all times. While there are no State DOH air monitoring stations in the immediate vicinity of the proposed WHEA facility, air quality in this relatively remote area can be considered to be in compliance with the State’s ambient air quality standards. The nearest DOH monitoring station is at Kealakekua, approximately 15 miles south of Keahole Point. Kealakekua is a more populated area with more motor vehicle traffic but has consistently demonstrated compliance with ambient standards over the years. Air pollution in West Hawai‘i is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic aerosol haze (vog) that persistently blankets North and South Kona.

Impacts and Mitigation Measures

Operationally, the project should not have any substantial air quality impacts. The proposed action will not measurably affect air quality except minimally during grubbing, grading and construction. In order to minimize impacts from dust, WHEA and/or its contractor will consult with the Department of Health (DOH) and, if required, will prepare a dust control plan compliant with provisions of Hawai‘i Administrative Rules, Chapter 11-60.1, “Air Pollution Control,” and Section 11-60.1-33, “Fugitive Dust.”

3.1.7 Scenic Resources

Environmental Setting

The general area around NELHA is a utilitarian landscape devoted to industrial, science and technology and aquaculture uses (see Figure 3). No sites considered significant for their scenic character in the Hawai‘i County General Plan are present nearby. The closest such sites are approximately three miles south at Kaloko Pond and five miles north at Makalawena Beach. While the area is designated for ocean-related industrial operations, a land use where scenic considerations are not paramount, the shoreline areas are scenic and used for public recreation. The project site is located almost a mile from the shoreline in a non-scenic area.

Impacts and Mitigation Measures

The project will not detract from the scenic values of the area, which are focused on the coast rather than the project site. However, the project facilities are being designed to have visual interest as well be functional for the school (see Site Plan in Figure 4).

3.1.8 Hazardous Substances, Toxic Waste and Hazardous Conditions

Existing Environment

No systematic assessment of the project site was conducted to determine if hazardous materials, toxic substances or other hazardous conditions are or may have once been present on the site. Reconnaissance of the very open site during topographic, botanical and design surveys did not reveal evidence of such conditions, nor have there been reports of such conditions. Because there is no evidence that the project site has been previously used or developed for any purpose, the potential for use or storage of regulated or hazardous chemicals onsite is low. Based on this, there does not appear at this time to be any outstanding concern related to these issues. If evidence of suspicious materials or conditions appears during excavation or other construction, WHEA may undertake a systematic assessment of the area in question to determine if further evaluation and remediation are required.

Impacts and Mitigation Measure

The use of the project site for a school does not involve large or reportable quantities of hazardous materials or toxic substances. Small quantities of cleaning and agricultural chemicals will be present. They are relatively low hazard and will not be used or stored in quantities sufficient to trigger government monitoring or reporting.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics and Land Use Compatibility

The project will serve the public students and parents of Kona and will not involve any effects on population or other socioeconomic factors. The only social consideration has to do with land use compatibility.

As discussed in Section 3.6.2, the project appears to be completely conformant with all land use designations. In relation to the compatibility with other aspects of airport operations, the Federal Aviation Administration (FAA), which must consider the safety of airport operations and users adjacent to the airport, was consulted during early consultation. The FAA noted that airport noise may be an issue, and recommended consultation of Hawai‘i DOT noise studies for the airport. As discussed in Section 3.1.6, the school is outside the area with high and unacceptable noise levels. Furthermore, consultation of maps and communications from the FAA indicate that the property is outside the current and future proposed runway protection zone. From current data, it would appear that the project, as with development that lies immediately adjacent, is compatible with airport operations, and that construction of the operation of the school will not pose a hazard to the airport, staff, or the general public.

3.2.2 Archaeological Resources

Existing Resources, Impacts and Mitigation

An archaeological assessment of the project site was performed by Rechtman Consulting. The report is attached in full in Appendix 2 and is summarized in this section.

As a result of an earlier archaeological study of NELHA (Barrera 1985), four sites (SIHP Site 10151, 10152, 10153, and 10158) had been recorded in the general vicinity; no sites were recorded on the project site itself (see Figure 5). Site 10151 was a cluster of three marine shells; Sites 10152 and 10153 were stone cairns; and Site 10158 was a *pāhoehoe* excavation. Rechtman Consulting, LLC also conducted a field inspection (Rechtman 2010) for the nearby Goodfellow Bros. reservoir site and found the area to be void of archaeological resources. On December 13, 2010, Robert B. Rechtman, Ph.D. and J. David Nelson, B.A. conducted a thorough surface examination of the project site. Ground visibility was excellent throughout within only light vegetation of fountain grass and *noni*. The ground surface consists of undulating fractured pahoehoe across most of the lot with the remainder having been completely graded in the past. No archaeological resources were observed and the likelihood of encountering subsurface resources is extremely remote. Based on these negative findings, the archaeologist requested by letter of December 14, 2010, that the State Historic Preservation Division (SHPD) issue a written determination of "no historic properties affected" in accordance with HAR 13§13-284-5(b)1. To date, no response has been received. In the unlikely event that archaeological resources are encountered during subsurface development activities within the current study area, work in the immediate area of the discovery will be halted and SHPD will be contacted.

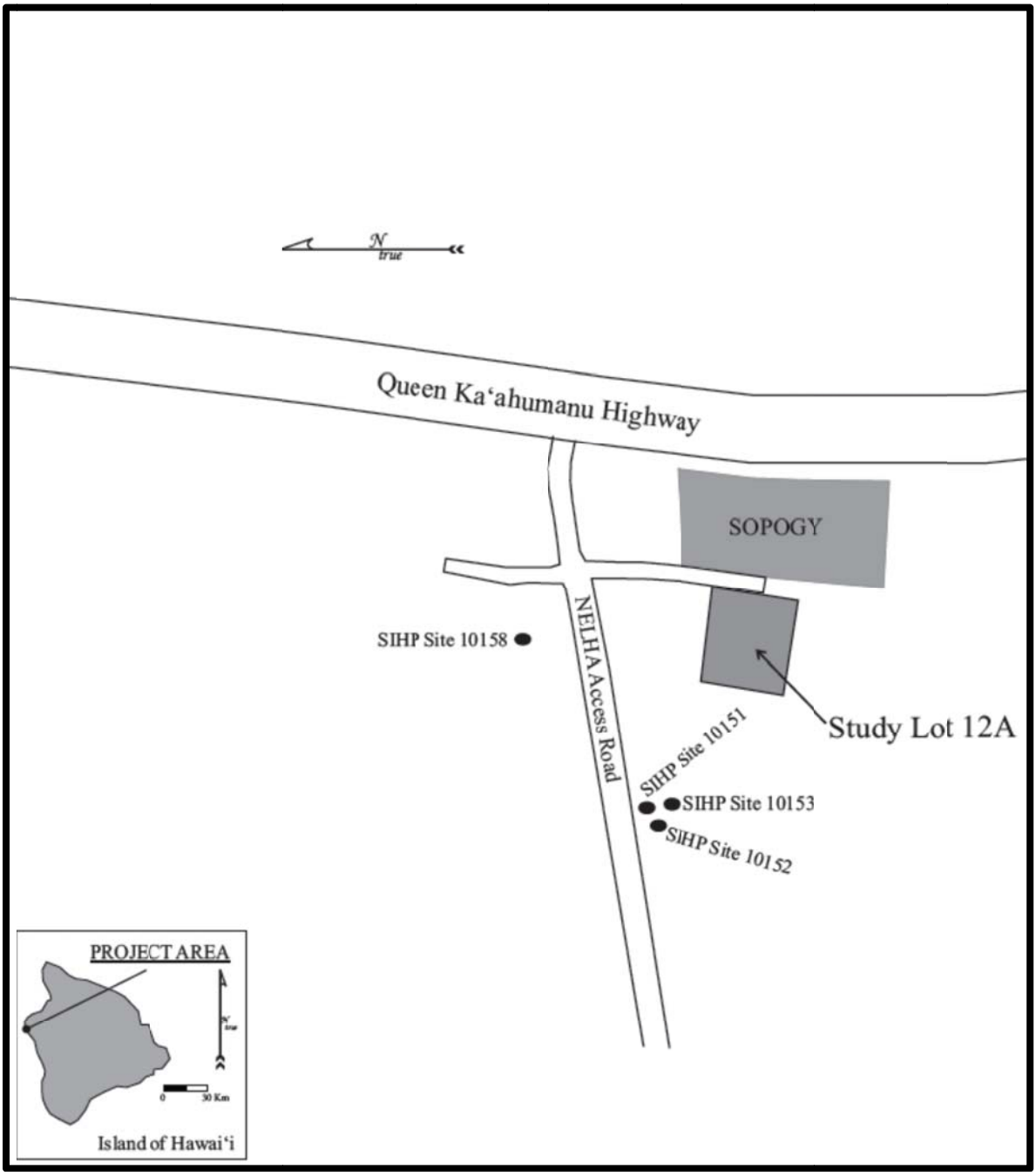
3.2.3 Cultural Practices and Sites

The cultural impact assessment contained in this section is based partially on other research performed by the EA author in the Kekaha region of Kona, and also on a document by Hawaiian cultural consultant Lani Kamau Yamasaki prepared as part of a WHEA stakeholder charette from 2011, entitled *The Spirit, Sense and Place of Hawaiian Culture,* which is contained in Appendix 4.

Cultural-Historical Background

According to the model developed by Kirch (1985), the Settlement or Colonization period of Hawai‘i was between A.D. 300-600, with colonists possibly from the southern Marquesas Islands. Early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Order was kept through adherence to their ancient and ingrained philosophy of life and through the principle of genealogical seniority. Hawaiians brought from their homeland a variety of Polynesian customs including the major gods of Kane, Ku and Lono; the *kapu* system of law and order; *pu‘uhonua* or places of refuge or asylum; the *‘aumakua* concept of a family or ancestral spirit and the concept of *mana*.

Figure 5 Archaeological Sites in Vicinity



The Development Period, which lasted from A.D. 600-1100, brought changes that included an evolution of traditional tools as well as some distinctly Hawaiian inventions. The evolution of the adze was an example of the former, while the latter included the two-piece fishhook and the octopus-lure breadloaf sinker. Another invention was the *lei niho palaoa*, an item worn by those of high rank and symbolized a trend toward greater status differentiation.

The Expansion Period from A.D. 1100 to 1650 saw an increase in social stratification and major socioeconomic changes. It also was a time of expansive settlement, with the development of the most favorable windward areas as well as more marginal areas on the island's leeward side. This was the time of the greatest population growth, as large irrigated field systems were developed and expanded into more arid areas. *Loko* or fishpond aquaculture also flourished during this period, excellent examples of which are contained three miles south of Keahole Point at Kaloko. The second major migration to Hawai'i also occurred during the Expansion Period, with the settlers for this expansion coming from Tahiti in the Society Islands.

The concept of the *ahupua'a* was established in Hawai'i during the 15th century, adding a new component to what was already a well-stratified society. *Ahupua'a* were usually wedge or pie-shaped, encompassing all of the eco-zones from the mountains to the sea and extending several hundred yards beyond the shoreline, assuring a diverse subsistence resource base. This land unit became the equivalent of a local community with its own social, economic and political significance.

Ahupua'a were ruled by *ali'i 'ai ahupua'a* or lesser chiefs and managed by a *konohiki*. *Ali'i* and *maka'ainana*, or commoners, were not confined to the boundaries of *ahupua'a* as resources were shared when a need was identified. *Ahupua'a* were further divided into smaller sections such as *'ili, mo'o'aina, pauku'aina, kihapai, koele, hakuone and kuakua*. The chiefs of these land units have their allegiance to a territorial chief or *mo'i* (often translated as king).

An increase in war marked the Proto-Historic Period (A.D. 1650-1795), both locally and between islands. Hawai'i's history took a sharp turn on January 18, 1778 with the arrival of British Captain James Cook in the islands. On a return trip to Hawai'i 10 months later, with the Maui turmoil still raging, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai'i Island. Cook exchanged gifts with Kalaniopu'u at Kealakekua Bay the following January, and Cook left Hawai'i in February. However, Cook's ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

The following year, in 1780, Kalaniopu'u designated his son, Kiwalao, to be his successor, and granted Kamehameha guardianship of the war god Kuka'ilimoku. When it appeared Kiwalao was not honoring his land claims, Kamehameha usurped Kiwalao's authority with a sacrificial ritual and retreated to his district of Kohala where he farmed the land, growing taro and sweet potatoes. Civil war broke out when Kalaniopu'u died in 1782 and Kiwalao was killed. The wars between Maui and Hawai'i Island would continue until 1795.

Two American vessels visited Hawaiian waters in 1790. The crew of one of the ships, the *Eleanor*, massacred more than 100 Hawaiians at Olowalu on Maui, and then sailed to Hawai‘i Island, where one of its crew, John Young, went ashore, where he was detained by Kamehameha. The other vessel, the *Fair American*, was captured off the western coast of Hawai‘i and its entire crew – with the exception of Isaac Davis – was killed. Kamehameha did not take part but kept the *Fair American* as part of his fleet. Young eventually made his way to Hawai‘i Island where he became governor, living at Kawaihae.

By 1796, Kamehameha had conquered every island kingdom except Kauai, but it wasn't until 1810, after Kaumuali‘i of Kauai pledged his allegiance to Kamehameha, that all of the Hawaiian Islands were unified under a single ruler. Subsequently there was a continuation of the trend toward intensification of agriculture, *ali‘i*-controlled aquaculture, settling of upland areas and development of traditional of oral history. However, the western influence was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier was flourishing. That contributed to the breakdown of the traditional subsidence system, as farmers and fishermen were required to toil at logging which resulted in food shortages and a decline in population.

Following the death of Kamehameha I in 1819, the relaxing of customary *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of *‘aumakua* images was allowed to continue. The Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions as many of the *ali‘i* were eager to assimilate western-style dress and culture. But at the same time, the continuing sandalwood trade was becoming a heavier burden on commoners. The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of Western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price.

The *Mahele ‘Aina* that took place in 1848 placed all land in Hawai‘i into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were "subject to the rights of the native tenants," or those individuals who lived on the land and worked it for their subsistence and for their chiefs. This land tenure change, while useful for promoting a western-style economy, led to alienation of many Hawaiians from the land and disrupted the older subsistence economy and culture. By the late 19th century, Hawai‘i was no longer an independent kingdom, having been annexed by the United States as part of its imperial expansion in the Pacific.

The next significant change was the development of tourism and the growing influence of the military, leading to urbanization and modernization in a multi-ethnic society that had been created by the immigration of sugar cane laborers. For rural areas of Hawai‘i such as Kona, the first half of the 20th century years saw less urbanization and instead was dominated by agriculture, cattle ranching, and the initial phases of tourism. Just as native Hawaiian cultural practices became severely threatened by encroaching land use and loss of the language and culture, the native Hawaiian renaissance from the 1970s onward re-energized the culture.

Kalaoa and Kekeha

The project site is located in the *ahupua'a* of Kalaoa in the district of North Kona. The cultural context of Kalaoa owes much to its place within northernmost portion of North Kona, called "Kekaha", a term used to describe an arid coastal region. Native residents of the region affectionately referred to their home as Kekaha-wai-'ole o nā Kona ("Waterless Kekaha of the Kona district"), or simply as the '*āina kaha*. Kepā Maly conducted a study of the lands of Honokōhau in 2000. His report is an excellent source of cultural information for all lands in Kekaha. The study used both archival-historical research and oral history interviews with descendants of the native Hawaiian families and others who were known to be familiar with the natural and cultural landscape and history of land use in Honokōhau and the Kekaha region.

Kona was apparently first settled along the sheltered and watered bays in the region extending south from Kailua. As population increased, people began establishing permanent settlements in arid Kekaha. Kona, like other large districts on Hawai'i, was divided into '*okana* or *kalana* (ancient regions). In the region now known as Kona 'akau (North Kona), there are several *kalana*. The southern portion of North Kona was known as "Kona kai 'ōpua" (interpretively translated by Maly as "Kona of the distant horizon clouds above the ocean"), and included the area extending from Lanihau (the present-day vicinity of Kailua Town) to Pu'uohau. The inhabitants of Kekaha developed unique relationships of harmony with their delicate environment, scarce in fresh water but rich in marine resources. They built extensive fishponds at 'Aimakapā and 'Ai'ōpio, practiced salt making in various locations, carefully nurtured *mauka* agricultural field systems, and gathered diverse forest and mountain resources. A number of *wahi pana* or storied places associated with history and legend are present, and there are also *heiau* and other features that have vital functions in symbolizing and enabling the relationship among the Hawaiian people, resources, and spiritual activities.

As with many other regions of rural Hawaii, the cumulative effects of cultural change, market economies, the attractions of larger towns such as Honolulu and Lahaina and the wider world, and the scourge of Western diseases served to depopulate Kekaha. By the time of the *Māhele,* Kalaoa was divided into five *ahupua'a*, Kalaoa 1st through 5th. All five of the Kalaoa *ahupua'a* were retained as Government lands. No *kuleana* (plots claimed by commoners or *maka'ainana* for residence or farming) were claimed in the Keahole Point area.

In 1924 J.W.H.I. Kihe wrote that about 1870 there were many inhabitants and several schools at Kiholo, Makalawena, Kalaoa and Kaloko, but that "those families are all gone, and the land is quiet." A survey by archaeologist John Reinecke for Bishop Museum also found the shoreline along Kekaha had historically been a desirable place to live when fishing was a mainstay of the region. However, by the time Reinecke carried out his survey in 1930, the population along the coast from Kailua to Kawaihae had dwindled to less than 75. He also found a paucity of archaeological sites, which he attributed to several factors, including destruction by man, cattle, and storms and tsunami that swept over the low-lying coast. Cattle ranching, which began in the mid-1800s, changed traditional agricultural practices and necessitated construction of rock walls to control the movement of livestock. Even the arid district of Kekaha was heavily grazed.

At least two trails of regional importance passed through the lands of Kalaoa, including the *alaloa***,** parts of which were later modified beginning in the 1840s into what is now known as the *Alanui Aupuni* (Government Road) or Mamalahoa Trail or King's Highway. The trail crossed the *makai* lands to link royal centers and coastal communities and remained in use in some form through the 1970s. Remnants of the trail are present about 1,000 feet *makai* of the WHEA project site (see Figure 1). It was not until the Queen Ka'ahumanu Highway was opened in the early 1970s that travel for the general public was possible across the shoreward plains of much of Kekaha.

Twentieth century trends in Kona paralleled those in other districts of Hawai'i, but its rural nature insulated it to some degree from severe change at first. Cattle ranching and coffee farming remained important. Tourism developed only slowly in Kona, with the first major hotel, the Kona Inn, not being built until 1928. Starting in the 1960s, the area between Kailua-Kona and Keauhou became increasingly dedicated to resort residential land use, while Kekaha for many decades had only one hotel, the Kona Village. Despite this, Kekaha became intimately involved in tourism with the development of the Kona International Airport (to replace the small airport just north of Kailua) along with construction of the Queen Ka'ahumanu Highway, which provided a *makai* link between the resort areas of Kona and Kohala.

As the 20th century wore on, the isolated beaches of Kekaha that were formerly enjoyed only by Hawaiian families and ranchers (whose members frequently overlapped) were converted to easily accessible public parks and the "backyards" of hotels and resort residential housing. Nevertheless, even in this somewhat challenging and transformed environment, native Hawaiians continue their cultural practices, in the form of fishing, gathering, and ceremonial uses. The importance of perpetuating access for these practices and the rights of native Hawaiians to continue them have been affirmed in several Hawai'i Supreme Court decisions involving land use in Kona.

Cultural Resources and Practices Related to West Hawai'i Explorations Academy

West Hawai'i Explorations Academy's situation on Hawaiian ceded lands in the *pāhoehoe* fields within the *ahupua'a* of Kalaoa, in the arid land known as Kekaha, informs its school philosophy. *Mauka* of WHEA lies the *Wao Akua*, realm of the gods and home to O'oma's fragile native forest. Sheltered from trade winds by Mauna Loa, Mauna Kea and Hualalai nearby, Keahole Point, otherwise known as Ka-Lae-O-Keahole (Fisherman's Point), is known for the strong sea breeze from the south named *Eka* and its strong ocean current. Neighboring "landmarks" include Wawaloli Beach and Pine Trees – a popular surf spot. The blossom of the native *maiapilo* is WHEA's school flower, chosen for its grace, beauty, strength, adaptability, and resilience to thrive in harsh conditions.

Those participating in a charette for WHEA in February 2010 (see Appendix 4) expressed that the school reflects the *maiapilo* in myriad ways. This theme of reflection was repeated throughout the charette and alludes to the relationship between the school, its objectives, educational framework and approach to learning, and the Hawaiian values, ideals and observed

structures inherent in the total environmental and social context the school resides within. Hawaiian culture has a central place in WHEA life. This is especially relevant within the school's place-based, project-based curriculum, as noted through the values and belief systems expressed and demonstrated by students, their parents, faculty, spouses of faculty, grandparents of students, *kupuna* or elders, board members and other key stakeholders throughout the charette. In a regularly practiced and integrated way, these Hawaiian values and practices such as *aloha, ʻohana, lokahi, kuhao, laulima, kokua, hoʻokipa*, *naʻauao*, *malama aina*, *aloha kai*[2] have allowed WHEA to flourish under seemingly adverse conditions, and like the maiapilo, go beyond mere survival to ultimately thrive interdependently within its chosen environment with grace and robustness.

In the view of charette participants, as detailed in Appendix 4, WHEA exemplifies Hawaiian values and principles best through their actions. They stated that the economy valued by Hawaiians in words and actions are demonstrated in the planning, design and building of the school's new campus, including the selection of building materials, which will be derived as much as possible from materials of the Hawaiian *ʻaina* that are sustainably harvested or produced. WHEA also strivers to follow the basic elements of indigenous community-based economic development, focusing on creating sustained abundance, self-sufficiency and wellness through *malama ʻaina* – caring for the land and sea in an enlightened way. *Malama ʻaina* embraces in many ways the core values and principles expressed by WHEA that are associated with indigenous economic development including environmental balance, cultural integrity, spirituality, vision, personal efficacy, responsibilities and consequences, vibrant initiatives, social respect, political and civic participation, control of assets, kinship, productivity, skills, health and wellness, trade and exchange, and income.

WHEA's new master plan and campus design are based upon the values, principles, beliefs and some of the traditional ecological knowledge and practices associated with life within an *ahupuaʻa*. This is reflected in their project-based curriculum, e.g., food gardens, medicinal gardens, *heʻe* or squid tank, *mano or* shark tank, and *opihi* tank. By definition, the *ahupuaʻa* is a land division usually extending from the uplands to the sea, so called because the boundary was marked by an *ahu* (alter) of stones surmounted by an image of a *puaʻa* (pig). The *puaʻa* represents *Lono*, the Hawaiian god of agriculture, fertility and healing. Lono is manifest at WHEA in his various *kino lau* or forms such as the *kukui* tree (representing the earth) and the *humuhumunukunukuapuaa* (representing the sea), illustrating the school's belief, "*As above, so below.*" This Hawaiian belief is also found throughout many ancient world civilizations and reflects WHEA's recognition of the relationship between the earth, the sea and the sky.

Stakeholders in the charette identified five Hawaiian values and principles exemplified through the *ahupuaʻa* model as key to implement within WHEA's new master plan and campus design: 1) sustained and renewable resources; 2) self-sufficiency; 3) interdependence; 4) reciprocity; and 5) resilience. These values and principles were recognized as vital to insure WHEA's overall

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[2] *aloha* (love, charity), *ʻohana* (family), *lokahi* (unity), *kuhao* (self-reliance), *laulima* (cooperation), *kokua* (service, help), *hoʻokipa* (hospitality), *naʻauao* (learned, enlightened), *aloha kai* (love and care for the sea).

well-being, productivity, longevity and positive orientation towards the future, including upholding their *kuleana* throughout the ahupuaʻa, Hawaiʻi Island, Hawaiʻi Nei and their global community. In essence, these five values and principles can be described as *lokahi*. Within the traditional *ahupuaʻa* system, employing the spiritual values and practices associated with *malama ʻaina* and *lokahi* were essential in traditional resource management practices to maintain a healthy ecological balance within the *ʻaina* – which includes the land, sea and sky. In turn, the *ahupuaʻa* supplied all of the everyday household needs required in creating a vibrant social and economic environment for communities to thrive in an on-going closed sustainable system. By emulating the *ahupuaʻa model*, WHEA feels they will eventually achieve self-sufficiency. Additional information on WHEA's culturally-based philosophy and guiding principles can be found in Appendix 4.

Impacts and Mitigation Measures

The valued natural, cultural and historical resources still present in Kekaha, including Kalaoa and the project site, will be honored and utilized by the West Hawaiʻi Explorations Academy, which represents a significant cultural benefit. No adverse impacts have been identified. No caves, springs, *puʻu*, gathering resources, archaeological sites, burial sites for *ʻiwi kupuna* or other features that might be adversely affected are present on or near the project site. The rare plant *maiapilo* (*Capparis sandwichiana*), used in traditional Hawaiian medicine, is present in and surrounding the project site. Construction will salvage plants to the extent feasible and will incorporate existing individuals and/or plant *maiapilo* and other native Hawaiian plants in the facility landscaping. Continued traditional use of wild *maiapilo* can occur through plants surrounding the project site.

The Office of Hawaiian Affairs in Honolulu and West Hawaiʻi and the Kona Hawaiian Civic Club were consulted by letter on October 26, 2010, to determine whether they had any information and specifically comments concerning resources or practices. Response letters to date have not indicated any specific resources or practices. The Office of Hawaiian Affairs was supplied a copy of the Draft EA for its comment on these findings.

3.3 Infrastructure

3.3.1 Utilities and Public Services

Existing Facilities and Services,

Electrical power to WHEA facility would be supplied by Hawaiʻi Electric Light Company (HELCO via a line on the NELHA Access Road. Telephone and data service are available from both Oceanic Cable and Hawaiian Telephone. Potable water service is available via at the existing 8-inch water line along the NELHA Access Road.

No sanitary sewer system or other wastewater treatment is available on or near the project site.

Fire, police and emergency management services are readily available in this part of Kona. A police substation is located in Kealakehe, about five road miles way. A fire station is located on Palani Road, approximately seven miles away by road, and there is also a fire station at Kona International Airport, just north of NELHA. EMT services are provided by the Hawai‘i County Fire Department. Acute care services are available at Kona Hospital, approximately 15 miles to the south.

Impacts and Mitigation Measures

Electricity and telephone/data service will be installed in underground lines via a trench from Secondary Road A. NELHA-supplied cold seawater will be provided via underground water lines installed from the NELHA Access Road. Potable water will be supplied from the existing 8-inch line. The system supplies adequate fire flow for the school.

An Individual Wastewater System (IWS) will be installed for human wastewater. As discussed above in Section 3.1.3 in the context of wastewater, conceptual plans allocate space on the site for future additional treatment with constructed wetlands and disinfection to allow wastewater re-use. Solid waste from the facility will be dealt with through the existing proactive school recycling policy. Disposal of residual waste will be by a commercial refuse company. Solid waste generated during construction will be dealt with appropriately. A solid waste management plan is in development for review by the County Department of Environmental Management.

3.3.2 Traffic

Introduction

As explained in the *2000 Highway Capacity Manual* (Institute of Transportation Engineers 2000), the concept of level-of-service (LOS) is often used to describe the quality of traffic flow. There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. LOS D is typically considered acceptable for peak hour conditions in urban areas. LOS is usually applied to peak hour traffic, which is the “worst-case” scenario.

NELHA commissioned a traffic study (PB Americas 2011) that included analysis of the performance of the NELHA intersections with Queen Ka‘ahumanu Highway. This analysis was within the context of expanded operations at NELHA and a widened Queen Ka‘ahumanu Highway that would have limited access beginning in about 2015 at the current NELHA Access Road, along with a new intersection at Kaiminani Street that would provide full movements into NELHA (see Figure 1 for intersection locations and Appendix 5 for detailed diagrams of intersections).

The traffic study considered traffic associated with existing and future cultural/educational facilities at NELHA (such as WHEA) in the traffic projections. The study concluded that the Queen Ka‘ahumanu Highway intersections serving NELHA, including the intersections of

Queen Ka‘ahumanu Highway with the NELHA Access Road and the current and future configurations of Kaiminani Street, would operate at Level of Service D or better in 2015, the minimum acceptable level. Future regional roadway improvements associated with nearby land uses would likely improve circulation, but the overall growth in traffic would keep LOS at nearly the same levels for NELHA intersections.

Research conducted for this EA included analysis of the principal internal intersection in NELHA that could possibly be affected by the school relocation: NELHA Access Road with Secondary Road A (see Figure 1). In order to quantify and describe the traffic-related characteristics and determine if traffic operations on the NELHA Access Road would be impacted, Phillip Rowell Associates prepared a Traffic Impact Assessment (TIAR). The full report is contained in Appendix 5 and summarized below.

Existing and Proposed Facilities

The project site is located on a road currently referred to as Secondary Road A, which intersects the NELHA Access Road, which in turn intersects Queen Ka‘ahumanu Highway (see Figure 1). This provides the only access to the relocated school site. Currently, all traffic movements at the intersection of the NELHA Access Road and Queen Ka‘ahumanu Highway are allowed.

As mentioned above, the State Department of Transportation has a project to widen Queen Ka‘ahumanu Highway that is scheduled for completion in 2015. When complete, the intersection of the NELHA Access Road and Queen Ka‘ahumanu Highway will be limited to right turns into and right turns out of the NELHA Access Road. Left turns in and out will be required to utilize a reconstructed four-way intersection to the north at Kaiminani Street, which is illustrated in Attachment B of Appendix 5. Therefore, traffic to the school from the south on Queen Ka‘ahumanu Highway or away from the school towards the north from the NELHA Access Road will be obliged to use the intersection of Queen Ka‘ahumanu Highway at Kaiminani Drive.

Impacts and Mitigation

Under the assumptions listed above, the intersection of Secondary Road A and the NELHA Access Road was analyzed in the TIAR. The TIAR undertook a number of procedural steps, including estimating the number of peak hour trips that the school would generate according to methodology and data from the Institute of Transportation Engineers (“Trip Generation Handbook,” 1998; “Trip Generation,” 2003). The morning peak hour of project-generated traffic typically coincides with the peak hour of the adjacent street. The afternoon peak hour of the project is around 2:30 PM, which is earlier than the afternoon peak hour of the street. As shown, the school would generate 141 trips during the morning peak hour, 86 inbound and 55 outbound. During the afternoon peak hour, it would generate 87 inbound and 33 outbound trips, for a total of 54 trips.

Existing peak hour traffic volumes for the intersection of Queen Ka‘ahumanu Highway at Kaiminani Drive and Queen Ka‘ahumanu Highway at the NELHA Access Road were obtained from the NELHA traffic study (PB Americas 2011) (See Attachment C of Appendix 5). Existing

traffic operating conditions of the study intersections were determined using the methodology described in the *2000 Highway Capacity Manual* (Institute of Transportation Engineers 2000). This included analysis of level-of-service (LOS). Appendix 5 contains tables and maps that display these volumes and levels-of-service for each intersection.

The next step was to estimate the background traffic (future traffic conditions without the proposed project) at the year 2015. The estimated 2015 background traffic projections for 2015 were obtained from the NELHA traffic study. These projections include background growth, traffic generated by future development and roadway improvement projects, including estimated traffic generated by future NELHA development. The results are shown in Appendix 5.

The project-related traffic was then superimposed on background traffic volumes. The traffic impacts of the project were assessed by analyzing the future levels-of-service with and without project-generated traffic The purpose of this analysis was to identify potential operational deficiencies in the project area and to quantify changes in the intersection levels-of-service as a result of project generated traffic.

The principal conclusions of the traffic impact assessment were that all internal roadways at NELHA carrying school traffic would operate at acceptable levels-of-service. The level-of-service analysis determined that the traffic movements of the intersection of the NELHA Access Road at Secondary Road A would operate at LOS A, which implies minimal delays and good operating conditions. An assessment of the need for a separate left turn lane for vehicles turning left into the project from the NELHA Access Road determined that established guidelines for the need are not satisfied for either morning or afternoon peak hour conditions, and that a separate left-turn lane is not required. As all controlled traffic movements would operate at LOS A, no specific mitigation for effects to traffic operation is recommended.

Additional details concerning traffic and roadways may be found in Appendix 5.

3.4 Secondary and Cumulative Impacts

The proposed project is minor and does not appear to have the potential to involve any secondary impacts, such as population changes or effects on public facilities.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts. The adverse effects of the project are very limited in severity, nature and geographic scale. At the current time there appear to be very few roadway, utility or development projects being undertaken in the NELHA area that would combine in such a way as to produce adverse cumulative effects related to the construction phase, such as dust, water quality, or traffic congestion.

Approval for the proposed multiple-use O‘oma Beachside Village, which lies directly to the south and for which a number of studies were prepared during 2008-2010, has been denied by the State Land Use Commission and the project does not appear likely to proceed. Various projects to expand and improve the Kona International Airport are likely to occur over the next

years, but none would interact in any substantial way with the school (see discussion on the special case of noise in 3.1.5, above). Further improvement to the Queen Ka‘ahumanu Highway (State Highway 19) will also be undertaken over the next 10 years, but again, these would not interact in any substantial way with the proposed facility other than traffic, which is considered above in Section 3.3.2. Additional facilities at NELHA are also anticipated, including the construction of a Monk Seal Rehabilitation Facility, but even if several projects occur at once, the relatively minor scale of the projects and the spacing of lots within NELHA would prevent adverse affects from accumulating.

3.5 Required Permits and Approvals

The project requires granting the following permits and approvals, which are listed by responsible agency:

- County of Hawai‘i, Department of Public Works, Building Division Approval and Building Permit
- County of Hawai‘i, Department of Public Works, Engineering Division, Grading Permit
- County of Hawai‘i, Planning Department Plan Approval
- County of Hawai‘i, Special Management Area Permit (obtained through prior approval)
- State Department of Health, National Pollutant Discharge Elimination System Permit
- State Historic Preservation Division, Chapter 6e Historic Sites Clearance (in process)
- Federal Aviation Administration, Aeronautical Study Clearance (potential)

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai‘i State Plan and Hawai‘i State Land Use Law

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the *Hawai‘i State Plan* are individual and family self-sufficiency, social and economic mobility and community or social well-being. The proposed facility would improve community well-being by providing an optimum location for a successful public charter school.

Chapter 205 Hawai‘i Revised Statutes classifies all land in the State of Hawai‘i into one of four land use categories – Urban, Rural, Agricultural, or Conservation – and determines permissible uses in each district. The project site is in the State Land Use Urban District. The proposed use is consistent with intended uses for this land use district.

3.6.2 Hawai‘i County Zoning, Special Management Area and General Plan

The project site is zoned MG-3a, General Industrial. The project site is also within the Special Management Area of the Hawai‘i Coastal Zone. According to a letter from the Hawai‘i County Planning Department in response to early consultation (see Appendix 1a), the project would require a Special Management Area Permit. Per a letter of June 16, 2004, which allowed the

original establishment of WHEA within NELHA (see end of Appendix 1a), the Planning Director has previously determined that the project was consistent with its designated zoning. Furthermore, the Director determined that the school was previously permitted through uses approved in Special Management Area Permit No. 239.

The *General Plan* for the County of Hawai‘i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i. The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai‘i County Planning Department). The *General Plan* itself is organized into thirteen functional elements. In general, the proposed project would be consistent with the goals, policies and objectives, standards, and principles for several functional areas. This section addresses the consistency of the proposed action with relevant policies of the County.

Environmental Quality Goals:

- Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.
- Maintain and, if feasible, improve the existing environmental quality of the island.
- Control pollution.

Environmental Quality Policies:

- Take positive action to further maintain the quality of the environment.

Discussion: The school would incorporate measures to prevent pollution and promote conservation and has as part of its mission environmental education and stewardship.

Historic Sites Goals:

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

Discussion: No archaeological sites are present on the property and none will be affected.

Natural Beauty Goals:

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

Natural Beauty Policies:

- Increase public pedestrian access opportunities to scenic places and vistas.

Discussion: The proposed facility would not degrade the scenic environment of the area or inhibit public pedestrian access.

Land Use Goals:

- Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.
- Protect and preserve forest, water, natural and scientific reserves and open areas.

Land Use Standards

- The designated land uses will be delineated on the General Plan Land Use Pattern Allocation Guide Map. The broad-brush boundaries indicated are graphic expressions of the General Plan policies, particularly those relating to land uses. They are long-range guides to general location and will be subject to: a) existing zoning; and b) State Land Use District. Similarly, the acreages allocated represent alternatives for the various levels of economic activity and supporting functions, such as resort, residential, commercial and industrial activities. Land required for community and governmental services and programs as well as new towns and resort centers may be accommodated within the allocated acreages.

Discussion: The *Hawai'i County General Plan Land Use Pattern Allocation Guide (LUPAG) and Facilities Map* components of the *General Plan* are graphic representations of the Plan's goals, policies, and standards as well as of the physical relationship between land uses. They also establish the basic urban and non-urban form for areas and the planned public and cultural facilities, public utilities and safety features, and transportation corridors. The project site is classified as Industrial in the LUPAG. As discussed above in this section, the school has been found to be is consistent with this designation. The proposed facility would be conveniently located with respect to utilities, public services and access.

3.6.3 Kona Community Development Plan

The Kona Community Development Plan (CDP) encompasses the judicial district of North and South Kona, and was developed under the framework of the February 2005 County of Hawai'i General Plan. Community Development Plans are intended to translate broad General Plan Goals, Policies, and Standards into implementation actions as they apply to specific geographical regions around the County. CDPs are also intended to serve as a forum for community input into land-use, delivery of government services and any other matters relating to the planning area.

The General Plan now requires that a Community Development Plan shall be adopted by the County Council as an "ordinance," giving the CDP the force of law. This is in contrast to plans created over past years, adopted by "resolution" that served only as guidelines or reference documents to decision-makers. The Kona CDP was adopted in September 2008 by the County Council. The version referenced in this Environmental Assessment is at:

http://www.hcrc.info/community-planning/north-and-south-kona-cdp/cdp-final-drafts/Final%20KCDP_Sept%202008_text.pdf

The Plan has many elements and wide-ranging implications, but there are several major strategies that embody the guiding principles related to the economy, energy, environmental quality, flooding and other natural hazards, historic sites, natural beauty, natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation and land use. The West Hawai‘i Explorations Academy is generally consistent with all aspects of the Kona CDP. It is in keeping with the Plan's guiding principles in Chapter 3, including particularly item No. 6:

> **Provide infrastructure and essential facilities concurrent with growth**.

Through education of Kona's children in sustainable economic activities, it also conforms with item No. 7:

> **Encourage a diverse and vibrant economy emphasizing agriculture and sustainable economies.**

The West Hawai‘i Explorations Academy's curriculum supports education through the interaction with nature, an aspect of sustainability specifically discussed in the Vision Statement section of the Plan in Item 3.3.2 (2).

Furthermore, Economic Policy 1.3 supports commercial development of the *mauka* NELHA area by businesses incubated at the NELHA's research area.

> **Action ECON–1.3b: Develop a master plan for the commercial development of the mauka area of NELHA and obtain entitlements (DBEDT, NELHA, 1-2).**

3.6.4 Consistency with HRS Chapter 227-D

HRS Chapter 227D states the following:

> **"§227D-2 Establishment of the natural energy laboratory of Hawaii authority; purpose.** (a) There is established the natural energy laboratory of Hawaii authority, which shall be a body corporate and politic and an instrumentality and agency of the State. The authority shall be placed within the department of business, economic development, and tourism for administrative purposes, pursuant to section 26-35. The purpose of the natural energy laboratory of Hawaii authority shall be to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawaii and to engage in retail, commercial, or tourism activities that will financially support that research, development, and commercialization at a research and technology park in Hawaii. Its duties shall include:
>
> 1) Establishing, managing, and operating facilities that provide sites for:

(A) Research and development;
(B) Commercial projects and businesses utilizing natural resources, such as ocean water or geothermal energy;
(C) Compatible businesses engaged in scientific and technological investigations, or retail, commercial, and tourism activities; and
(D) Businesses or educational facilities that support the primary projects and activities…"

In that the West Hawai‘i Explorations Academy supports research and development of natural energy resources and ocean-related research, technology, and industry in Hawai‘i, it is a legal and suitable tenant of NELHA with an existing and approved sub-lease.

PART 4: DETERMINATION

Based on the findings below, the Natural Energy Laboratory of Hawaii Authority is expected to determine that the project will not significantly alter the environment, as impacts will be minimal, and is expected therefore to issue a Finding of No Significant Impact (FONSI). A final determination will be made upon consideration of comments to the Draft EA.

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, Hawai‘i Administrative Rules, outlines those factors agencies must consider when determining whether an Action has significant effects:

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost. Archaeological sites have been inventoried, and no significant resources are present.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed school relocation expands and in no way curtails beneficial uses of the environment.
3. *The proposed project will not conflict with the State's long-term environmental policies*. The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor and fulfills aspects of these policies calling for an improved environment. It is thus consistent with all elements of the State's long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will not adversely affect the social welfare of the community and will contribute to education and social welfare.
5. *The proposed project does not substantially affect public health in any detrimental way.* The project will not affect public health in any way; wastewater and stormwater will be appropriately treated. Noise has been taken into careful consideration in project siting and design.

6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities*. No adverse secondary effects are expected to result from the project.
7. *The proposed project will not involve a substantial degradation of environmental quality*. The project is minor, and would thus not contribute to environmental degradation.
8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* A few individuals of the relatively rare plant *maiapilo* are present on and surrounding the site. *Maiapilo* will be salvaged where feasible and used for landscaping, along with other native plants.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is not related to other activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.
10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* No adverse effects on air quality or noise would occur. Noise levels on the site are acceptable and far lower than those found on the current site, which is one of the reasons for the relocation.
11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the property is located in an area with volcanic and seismic risk, the entire Island of Hawai‘i shares this risk, and the project is not imprudent to construct. The property is almost a mile from the shoreline and outside any flood zone.
12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas and viewplanes identified in the Hawai‘i County General Plan will be adversely affected by the project.
13. *The project will not require substantial energy consumption*. The school will have solar hot water, a 10 kW photovoltaic system, an emphasis on xerophytic vegetation, and many other environmentally advanced features that both reduce energy use and serve for education in high technology, energy and environmental engineering, including alternative wastewater treatment technologies.

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ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

APPENDIX 1a
Comments in Response to Pre-Consultation and 2004 Planning Letter

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William P. Kenoi
Mayor

BJ Leithead Todd
Director

Margaret K. Masunaga
Deputy

County of Hawai'i

PLANNING DEPARTMENT
Aupuni Center • 101 Pauahi Street, Suite 3 • Hilo, Hawai'i 96720
Phone (808) 961-8288 • Fax (808) 961-8742

May 12, 2011

Mr. Ron Terry
Geometrician Associates, LLC
PO Box 396
Hilo, HI 96721

Dear Mr. Terry:

SUBJECT: Early Consultation for Draft Environmental Assessment
Project: Relocation/ Expansion of West Hawai'i Explorations Academy (WHEA)
TMK: (3) 7-3-043:083 and 089; North Kona, Hawai'i

Thank you for your letter dated April 26, 2011 requesting comments from this office regarding the preparation of a Draft Environmental Assessment (DEA). WHEA is proposing the relocation of the WHEA campus and eventual expansion from 195 to 300 students. The campus would include an administration building, a high school village, a middle school village, an outdoor amphitheater, a multi-purpose room, and a kitchen building. The site would also include a number of labs, a STEM learning center/ shop, covered outdoor spaces and other facilities for agriculture, aquaculture, marine science student projects and court sports.

The project site is proposed for a 5.083 acre property within portions of the subject parcels, which is under the control of the Natural Energy Laboratory of Hawai'i Authority (NELHA). The project area is zoned MG-3a (General Industrial - 3 acre minimum lot size). The project site is situated within the State Land Use Urban district and designated as Industrial by the Land Use Pattern Allocation Guide (LUPAG).

The project site is also located entirely within the Special Management Area (SMA). According to Hawai'i Revised Statutes (HRS) Chapter 205A-22 and Planning Commission (PC) Rule 9-4(e) (1) (A) and (E), "development" includes *Placement or erection of any solid material or any gaseous, liquid, solid, or thermal waste* and *Construction, reconstruction, demolition, or alteration of the size of any structure.* Therefore, the proposed project requires either a Special Management Area Minor Permit or a Special Management Area (Major) Use Permit.

Please note that Section 25-5-157 of the Hawai'i County Code (Zoning) states that Plan approval shall be required for all new structures and additions to existing structures in the MG district.

We have no further comments to offer, at this time. However, please keep us informed and provide our department with a copy of the Draft Environmental Assessment for our review and comment.

If you have any questions or if you need further assistance, please feel free to contact Bethany Morrison of this office at 961-8138.

Sincerely,

for BJ LEITHEAD TODD
Planning Director

BJM:cs
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NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 19, 2011

Geometrician Associates, LLC
Box 396
Hilo, Hawaii 96721

Attention: Mr. Ron Terry, Principal

Ladies and Gentlemen:

Subject: Early Consultation for Environmental Assessment for Relocation/Expansion of West Hawaii Explorations Academy (WHEA) at NELHA

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Division of State Parks, Land Division-Hawaii District, Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0414. Thank you.

Sincerely,

for Russell Y. Tsuji
Administrator

54746

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIV 2011

2011 MAY 11 P 2:53

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 28, 2011

'11 MAY -2 A11:12

DEPT. OF LAND & NATURAL RESOURCES

RECEIVED
STATE PARKS DIV

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
x Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Hawaii District
x Historic Preservation

FROM: Charlene Unoki, Assistant Administrator
SUBJECT: Early Consultation for Environmental Assessment for Relocation/Expansion of West Hawaii Explorations Academy (WHEA)
LOCATION: Island of Hawaii
APPLICANT: Geometrician Associates, LLC

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 18, 2011.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

(✓) We have no objections.
( ) We have no comments.
( ) Comments are attached.

Signed:
Date: 5/5/11

3r2/7-3-42:83,89

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 28, 2011

RECEIVED
LAND DIVISION
HILO, HAWAII
2011 APR 32 P 1:16

RECEIVED
LAND DIVISION
HILO, HAWAII
2011 MAY -2 P 1:21

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__ Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
x Div. of State Parks
x Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Hawaii District
x Historic Preservation

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Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Date: 5-18-11

William P. Kenoi
Mayor

Darryl J. Oliveira
Fire Chief

Glen P. I. Honda
Deputy Fire Chief

County of Hawai'i

HAWAI'I FIRE DEPARTMENT
25 Aupuni Street • Suite 2501 • Hilo, Hawai'i 96720
(808) 932-2900 • Fax (808) 932-2928

May 18, 2011

Mr. Ron Terry
Geometrican Associates, LLC
PO Box 396
Hilo, Hawai'i 96721

SUBJECT: EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENET FOR RELOCATION/EXPANSION OF WEST HAWAI'I EXPLORATIONS ACADEMY (WHEA), NELHA
TMK: (3) 7-3-043:083 AND 089 (POR.)

In regards to the above-mentioned early consultation Environmental Assessment, no special environmental impacts or conditions however the Fire Department would require the following, at a minimum:

Fire apparatus access roads shall be in accordance with UFC Section 10.207:

"Fire Apparatus Access Roads

"**Sec. 10.207.** (a) **General.** Fire apparatus access roads shall be provided and maintained in accordance with the provisions of this section.

"(b) **Where Required.** Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access as measured by an unobstructed route around the exterior of the building.

"**EXCEPTIONS:** 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of this section may be modified.

"2. When access roadways cannot be installed due to topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 10.301 (b).

"3. When there are not more than two Group R, Division 3 or Group M Occupancies, the requirements of this section may be modified, provided, in the opinion of the chief, fire-fighting or rescue operations would not be impaired.

"More than one fire apparatus road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

"For high-piled combustible storage, see Section 81.109.

"(c) **Width.** The unobstructed width of a fire apparatus access road shall meet the requirements of the appropriate county jurisdiction.

"(d) **Vertical Clearance.** Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

"**EXCEPTION:** Upon approval vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance.

"(e) **Permissible Modifications.** Vertical clearances or widths required by this section may be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

"(f) **Surface.** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities." (20 tons)

"(g) **Turning Radius.** The turning radius of a fire apparatus access road shall be as approved by the chief." (45 feet)

"(h) **Turnarounds.** All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus.

"(i) **Bridges.** When a bridge is required to be used as access under this section, it shall be constructed and maintained in accordance with the applicable sections of the Building Code and using designed live loading sufficient to carry the imposed loads of fire apparatus.

"(j) **Grade.** The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief." (15%)

"(k) **Obstruction.** The required width of any fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under this section shall be maintained at all times.

"(l) **Signs.** When required by the fire chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both."

Water supply shall be in accordance with UFC Section 10.301(c):

"(c) **Water Supply.** An approved water supply capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are hereafter constructed, in accordance with the respective county water requirements. There shall be provided, when required by the chief, on-site fire hydrants and mains capable of supplying the required fire flow.

"Water supply may consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.

"The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be protected as set forth by the respective county water requirements. All hydrants shall be accessible to the fire department apparatus by roadways meeting the requirements of Section 10.207.

DARRYL OLIVEIRA
Fire Chief

RP:lpc

William P. Kenoi
Mayor

William T. Takaba
Managing Director

Frank J. DeMarco, P.E.
Director

Hunter Bishop
Deputy Director

County of Hawai'i

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
25 Aupuni Street • Hilo, Hawai'i 96720
(808) 961-8083 · Fax (808) 961-8086
http://co.hawaii.hi.us/directory/dir_envmng.htm

May 3, 2011

Mr. Ron Terry, Principal
Geometrician Associates, LLC
P. O Box 396
Hilo, HI 96721

RE: Early Consultation for EA for Relocation/Expansion of West Hawai`i Explorations Academy (WHEA), NELHA, TMK: 7-3-043:083 and 089 (por.) North Kona District, Island of Hawai`i

Dear Mr. Terry,

We have no comments to offer on the subject project.

Thank you for allowing us to review and comment on this project.

Sincerely,

Frank DeMarco

Frank J. DeMarco, P.E.
DIRECTOR

The FAA would like to opportunity to review the draft EA for the proposed Relocation/Expansion of the West Hawaii Explorations Academy (WHEA).

Noise generated from an airport are typically not compatible with schools if they are located in an area that exceeds 65 Day-Night Average Sound Level (Ldn). Attached is FAA's Noise Metric Chart. Additional information on FAA's guidance on noise may be found at:
www.faa.gov/airports/environmental/airport_noise

Recommend you consult with the Hawaii department of Transportation on the noise policy and if they have an existing noise exposure map showing the noise levels at the proposed WHEA.

Gordon Wong
FAA Honolulu Airports District Office
T: 808-541-3565
F: 808-541-3566
E: gordon.wong@faa.gov

(See attached file: FAA Noise Metrics.pdf)

From: Mento, Quince [mailto:QMento@co.hawaii.hi.us]
Sent: Tuesday, May 03, 2011 12:04 PM
To: rterry@hawaii.rr.com
Subject: Early consultation for W. Hawai'i Explorations EA

Ron,

Thank you for your invitation to comment. I'm not certain if this is applicable, but the proposed W. Hawai'i Explorations Academy in well outside the predicted tsunami inundation zone. However, the Academy should anticipate evacuation during a tsunami event as roadblocks will be established at the intersection of Queen Kaahumanu Hwy & OTECH Rd. The school should have plans for relocating students and faculty during such an event.

Thank you,

Quince Mento
Hawai'i County Civil Defense

Aloha Ron- The Office of Hawaiian Affairs is in receipt of your April 26, 2011 letter seeking comments ahead of an draft environmental assessment (DEA) to support the proposed relocation (project) of the West Hawaii Explorations Academy (WHEA) to a 5.083 land parcel under the control of the Natural Energy Laboratory of Hawai'i Authority. WHEA currently operates from a temporary location within the NELHA and the project will provide a permanent campus and accommodate an anticipated increase in student enrollment.

OHA has no substantive comments at this time. We do seek confirmation that an archaeological inventory survey or assessment has been conducted for the project area and submitted to the Department of Land and natural Resources-State Historic Preservation Division for review and approval. We also suggest that native species be considered in project landscaping plans.

Thank you for initiating consultation at this early stage. We look forward to reviewing the DEA and providing additional comments at that time.

Thank you, Keola Lindsey

Keola Lindsey
Office of Hawaiian Affairs
Compliance Monitoring Program
711 Kapiolani Boulevard
Honolulu, Hawaii 96813
keolal@oha.org (email)
(808) 594-0244 (office)

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii

PLANNING DEPARTMENT
Aupuni Center • 101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720
Phone (808) 961-8288 • Fax (808) 961-8742

June 16, 2004

Anna Sanders, Chair
WHEAPCS Local School Board
West Hawai'i Explorations Academy
73-4460 Queen Ka'ahumanu Highway, #105
Kailua-Kona, HI 96740

Dear Ms. Sanders:

SUBJECT: Proposed Establishment of the West Hawai'i Explorations Academy
TMK: 7-3-009: 044; O'oma 1st, North Kona, Hawai'i

We apologize for our much-delayed response to your March 1, 2004 letter, requesting confirmation from this office that would allow the West Hawai'i Explorations Academy public charter school (WHEAPCS) to relocate upon the subject property. With this letter, we confirm that the establishment of the WHEAPCS upon the subject property will be consistent with its General Industrial (MG-3a) designation as well as with uses permitted within the Special Management Area (SMA) as approved by SMA Use Permit No. 239.

As mentioned within your letter, the WHEAPCS curriculum incorporates the unique resources of the NELHA. School projects are related to the use of surface sea water, cold sea water, and solar exposure, all of which are in abundant supply within HOST Park.

For your information, any proposed improvements upon the subject property will require the issuance of Final Plan Approval by this office. Once Final Plan Approval has been issued, you may then commence with the preparation of plans for a building permit. Please consult with this office to coordinate the submittal of plans for Plan Approval review.

Again, please accept our apology for our tardy response. Please contact Daryn Arai of this office should you have any questions or require additional information regarding this matter.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

DSA:mad
P:\WP60\SUBDIV\Documents\Subc2004-2\LWHEAPCS-HOSTPark7-3-43-42.doc

cc w/ltr: SMA 239
West Hawaii Office

Mr. Jeff Smith
NELHA
73-4460 Queen Kaahumanu Hwy., #101
Kailua-Kona, HI 96740-2637

ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

APPENDIX 2
Archaeological Letter Report

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RECHTMAN CONSULTING, LLC
507-A E. Lanikaula St. Hilo, Hawaii 96720
phone: (808) 969-6066 fax: (808) 443-0065
e-mail: bob@rechtmanconsulting.com
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

December 14, 2010

RC-0720

Theresa Donham, M.A.
Acting Archaeology Branch Chief
DLNR-SHPD
40 Poʻokela Street
Hilo, HI 96720

Dear Theresa:

Ken Melrose of Paʻahana Enterprises LLC, on behalf of his client West Hawaii explorations Academy (WHEA) asked Rechtman Consulting, LLC to conduct a field inspection of a roughly four acre lot (Lot 12A) within the HOST park at NELHA, ʻOʻoma 1st Ahupuaʻa, North Kona, Island of Hawaiʻi. The lot is situated directly across the street and *makai* of the SOPOGY solar energy collector site near the intersection of Queen Kaʻahumanu Highway and the NELHA access road; and directly adjacent to the newly constructed Goodfellow Bros., Inc reservoir (Figure 1). WHEA has received permission from NELHA to use the lot for a new campus location. As a result of an earlier archaeological study (Barrera 1985) four sites (SIHP Site 10151, 10152, 10153, and 10158) had been recorded in the immediate vicinity of the current area; no sites were recorded on the study property (see Figure 1). Site 10151 was a cluster of three marine shells; Sites 10152 and 10153 were stone cairns; and Site 10158 was a *pāhoehoe* excavation. Rechtman Consulting, LLC also conducted a field inspection (Rechtman 2010) for the Goodfellow Bros. reservoir site and found the area to be void of archaeological resources.

On December 13, 2010, Robert B. Rechtman, Ph.D. and J. David Nelson, B.A. conducted a thorough surface examination of the study area. Ground visibility was excellent throughout within only light vegetation (Fountain grass and a few *noni*) cover. The ground surface consists of undulating fractured *pāhoehoe* across roughly 80% of the lot (Figure 2) with the roughly 20% northern portion of the lot having been completely graded in the past (Figure 3). No archaeological resources were observed and the likelihood of encountering subsurface resources is extremely remote. Based on these negative findings, on behalf of our client, we are requesting that DLNR-SHPD issue a written determination of "no historic properties affected" in accordance with HAR 13§13-284-5(b)1.

In the unlikely event that archaeological resources are encountered during subsurface development activities within the current study area, work in the immediate area of the discovery will be halted and DLNR-SHPD contacted as outlined in Hawaiʻi Administrative Rules 13§13-275-12.

Should you require further information, or wish to visit the lot, please contact me directly.

Respectfully,

Bob Rechtman, Ph.D.
Principal Archaeologist

References Cited

Barrera, W.
1985 Ke-ahole Point, Hawaii: Archaeological Reconnaissance. Chiniago Inc., Honolulu.

Rechtman, R.
2010 Letter Report dated September 3, 2010 submitted to DLNR-SHPD for Lot 11A in the HOST Park at NELHA. Rechtman Consulting Report RC-0704. Prepared for Goodfellow Bros., Inc.

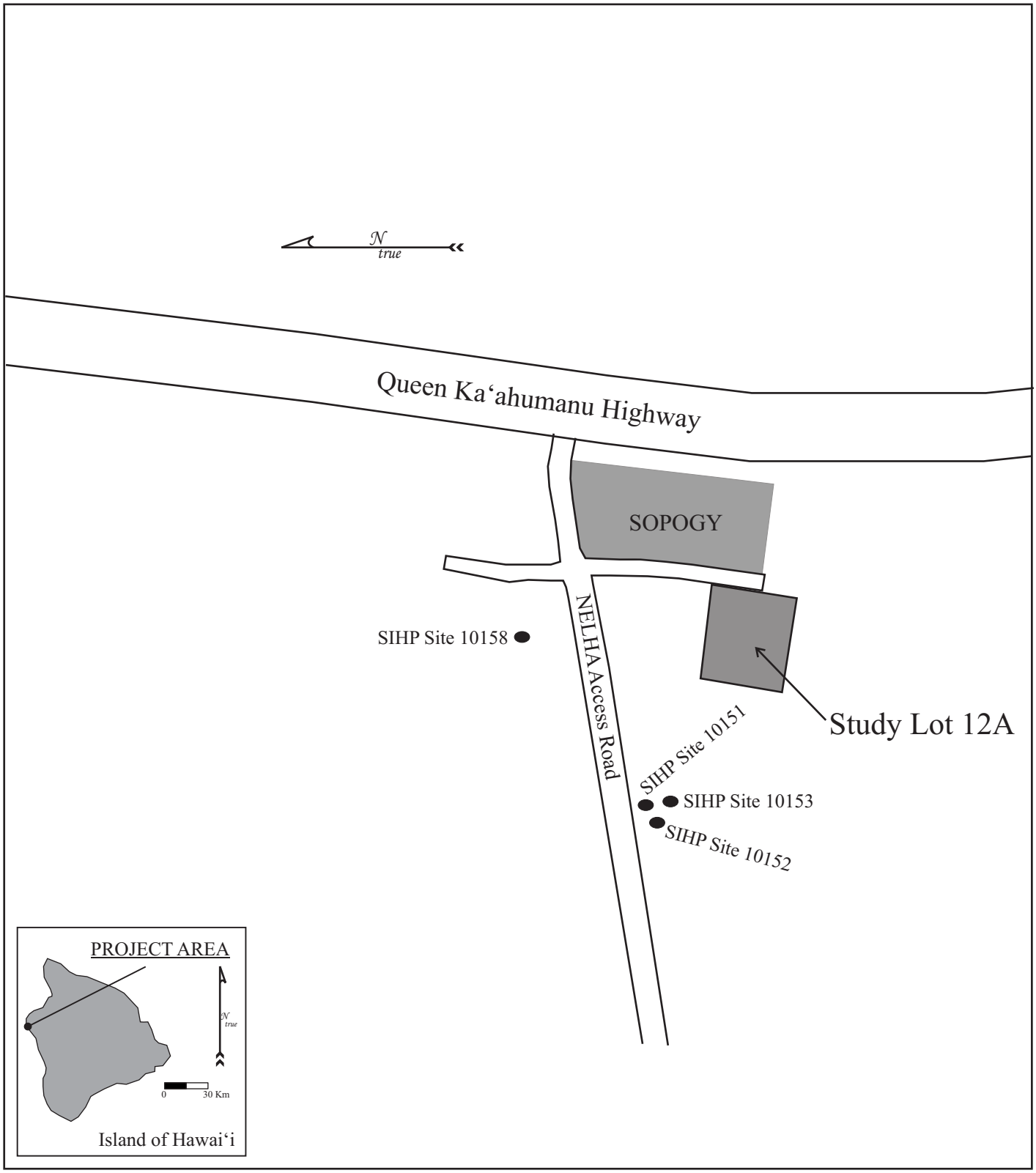

Figure 1. Location of study lot.

Figure 2. Typical undulating *pāhoehoe* throughout most of the study lot.

Figure 3. Grubbed northern portion of the study lot.

ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

APPENDIX 3
14 CFR Part 150 Noise Compatibility Program Update Noise Contour Maps for Kona International Airport

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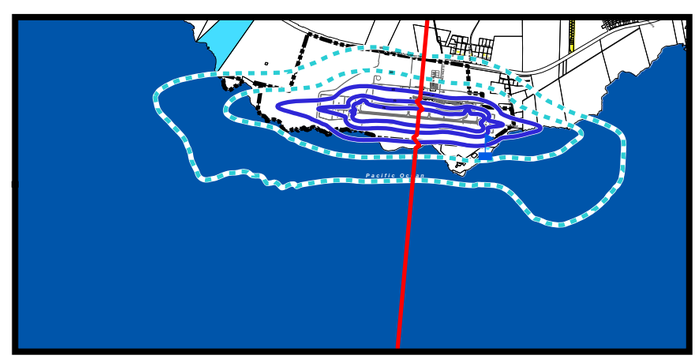
06MP06-7C-06/19/09

55
QUEEN KAAHUMANU HWY
60
65
70
75
KUPALOKE S
KAIMINANI DR
LAUI ST
PUKIAWE ST
KEAHOLE ST
AULEPE ST
PAOO ST
KUPIPI ST
OTEC RD
Pacific Ocean

LEGEND

- Airport Property
- 2008 Noise Exposure Contour - (55 to 60 DNL)
- 2008 Noise Exposure Contour - (65 to 75 DNL)
- Residential
- Noise-Sensitive Institutions
- School
- Water
- Non Noise-Sensitive Land Use



Source: Prepared by Coffman Associates.

Note: Contours pending final Master Plan airfield concept.

NORTH

0 2,000
Feet

DRAFT

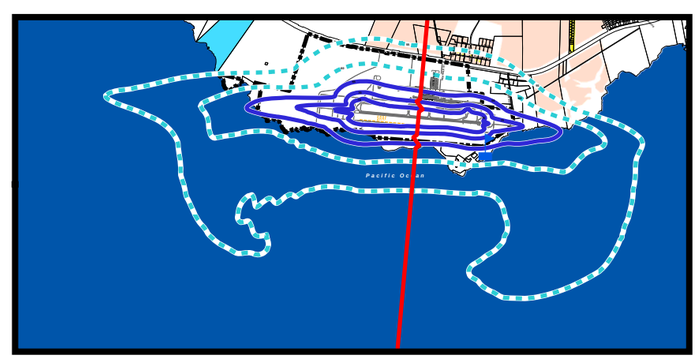
Exhibit 7C (Con't)
2008 NOISE EXPOSURE CONTOURS
WITH LAND USE (SOUTH)

06MP06-7D-06/19/09

QUEEN KAAHUMANU HWY
KUPALOKE S
KAIMINANI DR
LAUI ST
PUKIAWE ST
KEAHOLE ST
AULEPE ST
PAOO ST
KUPIPI ST
OTEC RD
SAAF
Pacific Ocean
55
60
65
70
75

LEGEND

- Airport Property
- Short Austere Airfield (SAAF)
- 2013 Noise Exposure Contour - (55 to 60 DNL)
- 2013 Noise Exposure Contour - (65 to 75 DNL)
- Residential
- Noise-Sensitive Institutions
- School
- Water
- Growth Risk Areas
- Non Noise-Sensitive Land Use



North South

Source: Prepared by Coffman Associates..

Note: Contours pending final Master Plan airfield concept.

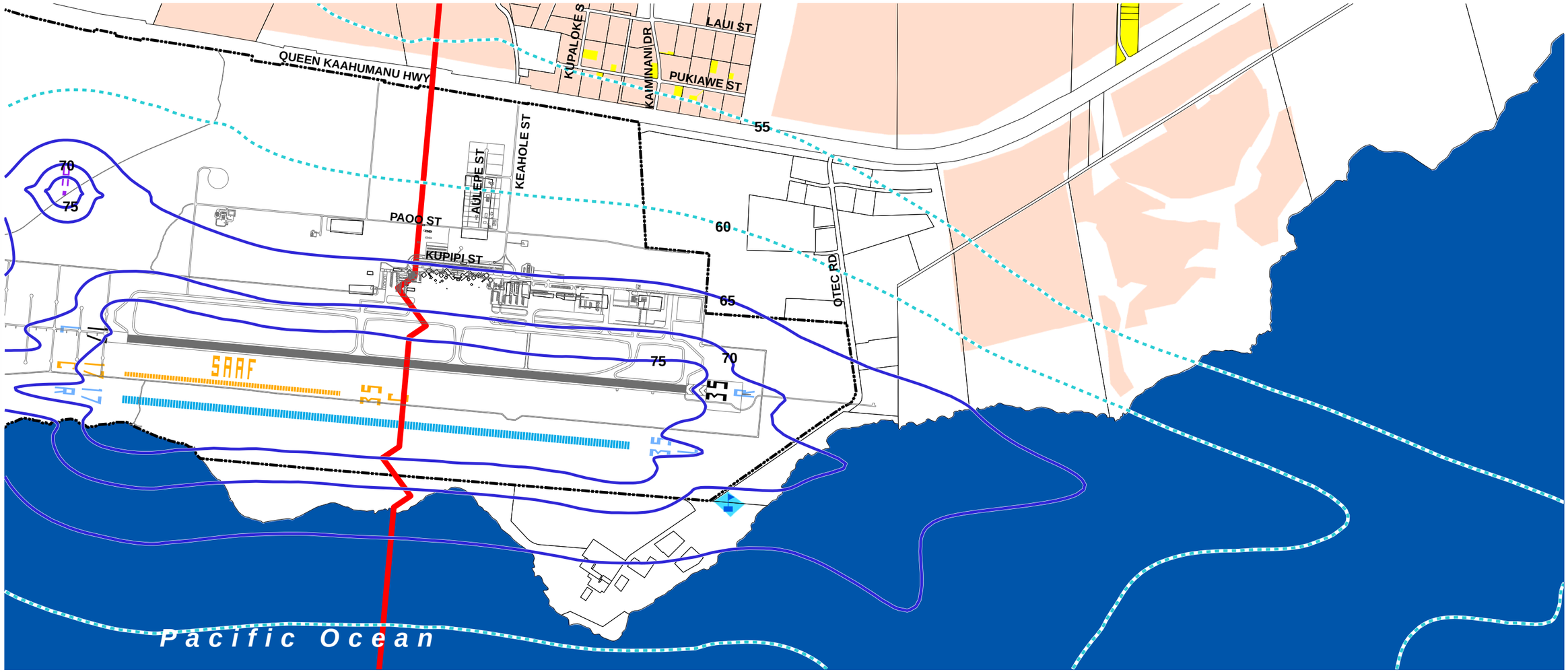
NORTH

0 2,000
Feet

DRAFT

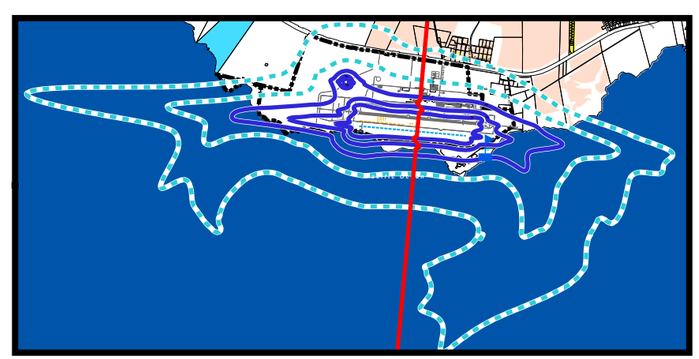
Exhibit 7D (Con't)
2013 NOISE EXPOSURE CONTOUR
WITH LAND USE (SOUTH)

06MP06-7E-06/19/09



LEGEND

- Airport Property
- Short Austere Airfield (SAAF)
- Ultimate Runways
- Long Range Noise Exposure Contour - (55 to 60 DNL)
- Long Range Noise Exposure Contour - (65 to 75 DNL)
- Residential
- Noise-Sensitive Institutions
- School
- Water
- Growth Risk Areas
- Non Noise-Sensitive Land Use



Source: Prepared by Coffman Associates.

Note: Contours pending final Master Plan airfield concept.

NORTH

0 2,000
Feet

DRAFT

Exhibit 7E (Con't)
LONG RANGE NOISE EXPOSURE
CONTOURS WITH LAND USE (SOUTH)

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ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

APPENDIX 4
The Spirit, Sense and Place of Hawaiian Culture

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DRAFT Executive Summary 2/28/11

West Hawaii Explorations Academy
Stakeholder Charrette February 2011

The Spirit, Sense and Place of Hawaiian Culture

Malama Aina

"Take care of the land and in turn the land will provide for all of our needs."
Olelo Noeau – Hawaiian proverb
A WHEA High School Project

West Hawaii Explorations Academy (WHEA) is situated in *pahoehoe* fields within the *ahupuaa* of Kalaoa, on the North Kona Coast of Hawaii Island adjacent to Kalaoa-Ooma ahupuaa. This area is also known as the Kekaha land area of Hawaii Island known for its arid environment. *Mauka* from WHEA lies the *Wao Akua*, realm of the gods and home to Ooma's fragile native forest. WHEA is on ceded lands and are tenants of the Natural Energy Laboratory of Hawaii (NELHA). Largely sheltered from the predominant trade winds by Mauna Loa, Mauna Kea and Hualalai nearby Keahole Point, otherwise known as Ka-La-O-Keahole (Fisherman's Point) is known for the strong sea breeze from the south named *Eka* and its strong ocean current. Neighboring "landmarks" include Wawaloli Beach and Pine Trees – a popular surf spot. The native flower *maiapilo*, is WHEA's school flower chosen for its grace, beauty, strength, adaptability, and resilience to thrive in harsh conditions. WHEA reflects the maiapilo in myriad ways.

This theme of reflection and mirroring was repeated throughout the charrette and alludes to the relationship between the school, its objectives, educational framework and approach to learning, and the Hawaiian values, ideals and observed structures inherent in the total environmental and social context the school resides within. The purpose of this executive summary is to simply mirror what was experienced and heard from WHEA's stakeholders in the charrette.

Hawaiian culture has a central place in WHEA life. This is especially relevant within the school's place-based, project-based curriculum as noted through the values and belief systems expressed and demonstrated by students, their parents, faculty, spouses of faculty, grandparents of students, *kupuna* or elders, board members and other key stakeholders throughout the charrette. In a regularly practiced and integrated way, these Hawaiian values and practices such as, *aloha, ohana, lokahi, kuhao, laulima, kokua, hookipa*, *naauao*, *malama aina*, *aloha kai*, [1] etc. have allowed WHEA to flourish under seemingly adverse conditions, and like the maiapilo, go beyond mere survival to

[1] aloha (love, charity), ohana (family), lokahi (unity), kuhao self-reliance), laulima (cooperation), kokua (service, help), hookipa (hospitality), naauao (learned, enlightened), aloha kai (love and care for the sea).

Lani Kamau Yamasaki, Author
Hawaiian Cultural Consultant, 'Ano'ano Aloha, Inc.

ultimately thrive interdependently within its chosen environment with grace and robustness.

Co-executive directors Heather Nakakura and Curtis Muraoka made a point of saying, "WHEA is more Hawaiian culture-oriented than most folks know." As best exemplified by our traditional kupuna, WHEA doesn't waste time talking about Hawaiian values and principles, they just "do"!

Economy is valued in words and actions, and anticipated to be demonstrated in the planning, design and building of the school's new campus, including the selection of building materials, which should as much as possible come from the Hawaiian aina and be sustainably harvested or produced within Hawaii. While this is an ideal to work towards, it's acknowledged that resources may be limited in the Islands. Whether locally produced or obtained from off-island sources, the goal will be to utilize environmentally appropriate materials.

WHEA appears to follow the basic elements of indigenous community-based economic development, which focuses on creating sustained abundance, self-sufficiency and wellness through malama aina – *caring for the land and sea in an enlightened way*. Malama aina embraces the core values and principles expressed by WHEA in many ways that are associated with indigenous economic development including environmental balance, cultural integrity, spirituality, vision, personal efficacy, responsibilities and consequences, vibrant initiatives, social respect, political and civic participation, control of assets, kinship, productivity, skills, health and wellness, trade and exchange, and income.

Malama aina was practiced by the Hawaiian ancestors throughout everyday life in the ancient ahupuaa system. Through the ahupuaa and malama aina, the ancestors were able to create sustained abundance and self-sufficiency in all ways. By employing the ahupuaa model, WHEA aspires to bridge the past and present including all planning and design considerations, operational programs, facilities management, resource management, building materials etc. with incorporating science and technology that is culturally appropriate, as well as *pono* or proper and beneficial for Hawaii's aina and community.

The Ahupuaa Model

WHEA's new master plan and campus design is based upon the values, principles, beliefs and some of the traditional ecological knowledge (TEK) and practices associated with life within an ahupuaa as reflected in their project based curriculum i.e. food gardens, medicinal gardens, *hee* or squid tank, *mano or* shark tank, *opihi* tank, etc. By definition, the ahupuaa is a land division usually extending from the uplands to the sea, so called because the boundary was marked by an *ahu* (alter) of stones surmounted by an image of a *puaa* (pig). – *The Hawaiian dictionary, Mary Kawena Pukui and Samuel Elbert*.

The puaa represents *Lono*, the Hawaiian god of agriculture, fertility and healing. Lono was visible at WHEA in his various *kino lau* or forms such as the *kuku*i tree (representing

the earth) and the *humuhumunukunukuapuaa* (representing the sea), illustrating the school's belief, "*As above, so below.*" This Hawaiian belief is also found throughout many ancient world civilizations and reflects and mirrors WHEA's recognition of the relationship between the earth, the sea and the sky (see WHEA school symbols for the earth, sea and sky).

Stakeholders identified these five Hawaiian values and principles exemplified through the ahupuaa model as key to implement within WHEA's new master plan and campus design: 1) sustained and renewable resources; 2) self-sufficiency; 3) interdependence; 4) reciprocity; and 5) resilience. These values and principles were recognized as vital to insure WHEA's overall well-being, productivity, longevity and positive orientation towards the future, including upholding their *kuleana*[2] throughout the ahupuaa, Hawaii Island, Hawaii and their global community. In essence, these five values and principles can be described as lokahi (see *Lokahi Triangle model*).

Within the traditional ahupuaa system, employing the spiritual values and practices associated with malama aina and lokahi were essential in traditional resource management practices to maintain a healthy ecological balance within the aina – which includes the land, sea and sky. In turn, the ahupuaa supplied all of the everyday household needs required in creating a vibrant social and economic environment for communities to thrive in an on-going closed sustainable system. By emulating the ahupuaa model, WHEA feels they will eventually achieve self-sufficiency.

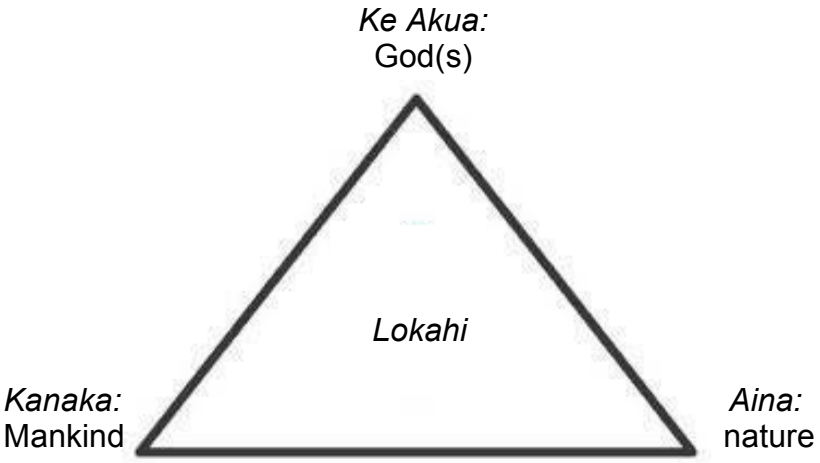
WHEA envisions their future campus to serve as a center/social hub for community life within the ahupuaa, which means opening their doors beyond normal school hours. This vision is reflected in their wish-list and requirements for facilities that are adaptable, flexible, simple, replicable and energy independent to fit any given project or situation i.e. terrain, climate and weather – like structures in old Hawaii. It also points towards the need to have facilities, which can serve multiple purposes such as classrooms, assemblies, performing arts, graduations, market-places etc. like *halau* – a longhouse. WHEA would also like to have the capacity to supply both campus and community needs, including and not limited to year-round food gardens (food security), and cutting plants (plumeria and heliconia were specifically mentioned) for events such as graduation. In addition, they spoke of having a certified kitchen and café to serve campus needs and the public. This vision addresses the relevance of connective corridors, trails and pathways in relation to WHEA site within the ahupuaa.

Just as WHEA's values, principles and practices are reflected in their buildings, they are equally present in the campus landscape. The landscape tells the story of WHEA and their connection to the aina, their place within the ahupuaa and their relationship to community. Trails and pathways serve as connective corridors throughout the campus, and may also "branch" to include the nearby Mamalahoa Trail and Ala Kahakai Trail. There is a central water feature running from mauka to *makai*, which may be looked upon as the *Waters of Kane.* Some stakeholders felt that the central water feature was akin to the *kuamoo*, spine or backbone in relation to WHEA's position in the community.

---

[2] kuleana: right, privilege, concern, responsibility, title, business, property, estate, portion, jurisdiction, authority, liability, interest, claim, ownership, tenure, affair, province; reason, cause, function, justification; small piece of property, as within an ahupuaa. Hawaiian Dictionary: Pukui and Elbert.

Lokahi Triangle



Lokahi

Lokahi literally means "unity, agreement and harmony" and may be depicted using the model called the "Lokahi Triangle." This value describes the interdependence between *Ke Akua*/the spiritual realm, *ke kanaka* and the *aina* that is necessary to creating healthy relationships and self-sufficiency. Perhaps lokahi best portrays WHEA's epistemology and place-based approach in designing project-based curriculum. The schools' projects include Aloha Kai, Shark Lagoon, Malama Aina, Cold Water Agriculture, School Gardens, Vog Project, and a Galaxy Garden to name a few.

These PBL projects designed by students fundamentally represent lokahi and demonstrate WHEA's deep respect and commitment to care for the earth, the sea and the sky as shown in the school's symbols of the native *hapuu* fern (earth), the nautilus (sea) and the galaxy (sky) as depicted in their website.

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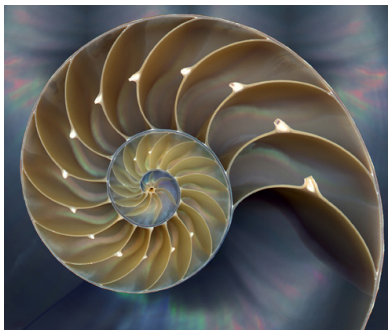

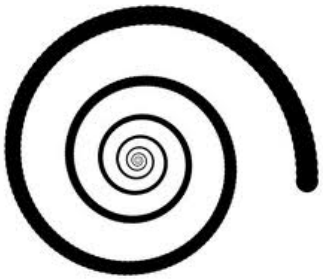

If one looks carefully at all three symbols, a pattern resembling a "sacred spiral" or *piko*[3] emerges. From a Hawaiian worldview, the piko represents WHEA's connectivity to the Hawaiian aina as their source of nourishment and life, and their place within the universal web of life. It also represents the *moolelo* and the kuamoo – backbone/spine connecting past, present and future generations.

Aina and Moolelo: stories, traditions, history and accounts

The physical aina provides sustenance for our bodies. It also distinguishes our ancestral homelands. Knowing the moolelo of one's aina and birthplace including stories, legends, historical accounts, *wahi pana* (celebrated areas), landmarks, names of the winds, rains, mountains, bodies of water, flora, fauna, etc. is an essential part of Hawaiians' understanding of the aina and gives one a sense of connection and belonging. It is equally important to understand the moolelo of one's adopted homeland and workplace – where one spends most of their productive hours for the same reasons.

Having working knowledge of the moolelo from the ahupuaa will influence and enhance the design of WHEA's new campus and assist towards their ability to achieve self-sufficiency through having this intimate knowledge of their home. Aside from briefly acknowledging the remnants of ancient fishing villages, archeological sites, Ooma's native forest, a guardian honu and perhaps *mano* or shark, and a side discussion about

[3] Navel, navel string, umbilical cord

the winds, there was very little discussion of moolelo throughout the charrette. It would serve to better inform the design of the campus grounds and facilities if further research is placed towards tracing the moolelo from the area.

For instance, Keahole Point is known for the fishpond of Paiea, Kamehameha I. As earlier shared, the area is also known for Eka, a strong sea breeze. Neighboring Wawaloli Beach is named for Wawaloli, a demigod who changed from a *loli* or sea cucumber into a man to seduce girls who visited his seashore home. WHEA expressed a desire to become more familiar with the moolelo of Kalao and Ooma, and identified persons within the school and community that would make excellent candidates for oral history interviews.

The Aina: Marine and Flora Life

Native Marine Life
WHEA school projects features many native species including the mano, sea horse, opihi, humuhumunukunukuapuaa and many more. It was mentioned that every year there is a student hee project. At the end of each school year, the marine life is released back into their native habitats.

Native Flora
A partial list of native flora of the Ooma Forest, as described by an instructor includes: *hapuu, mamake, amau, kolea* and *lehua*.

WHEA's present campus includes the following native flora: *aalii, kookoolau*, *ilima, ki, loulu, naupaka, niu, kukui, ohai, kalo uala, pauohiiaka, lauwae, maia, hala, halapepe, akia, mao, nau, mao hau hele,* and *nanea.* According to a board member, *kaunaoa* also grows on the coastline.

Native plants seen growing in the pahoehoe fields in between fountain grass from the "platform" overlooking WHEA's new campus include: *maiapilo, noni, ilima* and *uhaloa*.

The native plants seen on the site, as well as, natives of the present campus and hardy candidates from throughout the ahupuaa should be used in creating the landscape surrounding the buildings. Careful selection of native planting material will support the ahupuaa design concept, and reinforce the connection to aina, culture and moolelo.

*The above should not be construed as a complete plant inventory.

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Conclusion

Bridging the past, present and future in creating the spirit, feel, and design of WHEA's new campus while embracing Hawaii's spiritual, cultural and physical landscape is imperative to WHEA stakeholders, and a bench-mark for the school to achieve sustainability in a way that is linked to their core values, beliefs and practices.

Based upon the ancient ahupuaa - a healthy model of community social and economic stability, WHEA aspires to achieve self-sufficiency for the school and community while continuing to integrate the Hawaiian values, principles, beliefs and practices that compliment their day-to-day operations and informs their project-based curriculum. These values, principles, practices and belief systems should also inform the spatial relations, landscape, facilities and architecture of their campus and facilities. WHEA believes this foundation will lead them towards their vision of serving as a world-class model for education, sustainability, and community-building which can be replicated anywhere, while emulating the vastly successful aspects of the ancient ahupuaa system.

Summary of Opportunities Identified for Planning and Design:

- Employ WHEA values and goals as it relates to Hawaiian culture and elements of indigenous community-based economic development found within the traditional ahupuaa model towards building a sustainable campus, operational programs, project based curriculum and resource management practices e.g. sustained and renewable resources, self-sufficiency, interdependence, reciprocity and resilience.

- Identify moolelo relevant to the planning and the design of the new campus, including the selection of building materials. For example, having knowledge of the wahi pana, geography, wind, rains, flora, fauna and marine life in the area.

- Identify traditional ecological knowledge relevant to the planning, design, architecture and building of the new campus. This has the opportunity to influence the selection of building materials, which should as much as possible come from the Hawaiian aina and be sustainably harvested or produced within Hawaii. While this is an ideal to work towards, it's acknowledged that resources may be limited in the Islands. Whether locally produced or obtained from off-island sources, the goal will be to utilize environmentally appropriate materials.

- Employ WHEA's identified schools symbols such as maiapilo, hapuu, nautilus, and galaxy and further identify and understand other "symbols" important to WHEA. Is it acceptable to incorporate the piko as a design element for instance?

- Use project-based curriculum i.e. Aloha Kai and shark tank, and on-going projects such as food gardens (food security was an identified priority) and cold water nurseries to inform planning and design in relation to the ahupuaa "from mountains to sea" model. Planning considerations range to include spiritual

aspects to engineering, to design, to ongoing cultural resource management practices.

- Examine "wish-list" to inform planning and design in relation to the ahupuaa model i.e. a halau/open space that can also be sheltered for school assemblies, performance arts, and graduation ceremonies etc. This includes having "cutting gardens" for lei, performances etc. In addition to the halau, requirements for facilities require adaptability, flexibility and simplicity and must also be replicable and energy independent to fit any given project or situation i.e. terrain, climate and weather – like structures in old Hawaii.

  A market-place for produce and student wares (created from the garden), exhibit areas for student projects, a certified kitchen and a café were also on the list. Also, WHEA expressed the wish for their campus to become a hub for community activity outside of school hours. Consider how these sites fit within the ahupuaa model, especially in relation to connective corridors, trails and pathways.

- Utilize native plants that are seen on site or within the ahupuaa to provide landscape around the buildings and connection to the aina and moolelo.

Recommendations for Further Research:

- Conduct a charrette focused on Hawaiian values, cultural practices, moolelo and traditional ecological knowledge as it relates to planning and design for WHEA's new campus. For example, stakeholders expressed the need to have more Hawaiian culture visible in the design, facilities and landscape in their new campus. Note: Logene, Butter and Alika (Butter's son and a WHEA student) among many others that expressed this sentiment away from the larger group charrette.

- Conduct research to gather moolelo from the area. Identify lineal descendents of the area and conduct oral history interviews to gather local moolelo, which can inform the planning, design, architecture, and outdoor areas including trails and pathways. A better understanding of the archeology in the area will also serve towards this goal.

  This knowledge will enhance WHEA's ability to develop a sustainable campus and operational programs. In addition, it will also serve to inform project-based curriculum which has to potential to further assist WHEA towards their goal to achieve self-sufficiency, including social and economic development goals.

- Identify traditional ecological knowledge relevant towards the planning, design, architecture and outdoor areas, including trails and pathways. For example, the use of *makaloa* for waste treatment.

  Just as with identifying the moolelo from the area, knowledge of TEK will enhance WHEA's ability to develop a sustainable campus and operational programs. In addition, it will also serve to inform project-based curriculum, which

has the potential to further assist WHEA towards their goal to achieve self-sufficiency, including social and economic development goals.

- Identify sources of building materials from the aina such as concrete aggregates and natural stone, and locally produced materials with recycled content. Identify local building materials that are sustainably harvested, as well as certified. Whether locally produced or obtained from off-island sources, the goal will be to find and utilize environmentally appropriate materials.

- Investigate other "symbols" i.e. colors, forms, and metaphors etc. that upholds WHEA's vision, mission, curriculum and might contribute towards their long-range goals to achieve self-sufficiency.

- Conduct a comprehensive survey and inventory of native flora and fauna.

- Conduct a comprehensive survey of the mauka-makai trail systems in the ahupuaa, which intersect with the WHEA campus.

Note: Hawaiian diacriticals were purposely not used in this document in deference of traditional Hawaiian language. Throughout this document Hawaiian words are italicized when they were first introduced and exclude place names or names of persons.

Disclaimer: The purpose of this executive summary is to simply mirror what was experienced and heard from WHEA's stakeholders in the charrette. By no means can this summary be construed as a comprehensive cultural report, which might include more in depth investigation of moolelo, archeology, plant inventory, fauna inventory and other studies that would be found in an Environment Impact Assessment.

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ENVIRONMENTAL ASSESSMENT

West Hawai‘i Explorations Academy Relocation

APPPENDIX 5
Traffic Impact Assessment Report

Phillip Rowell and Associates
47-273 'D' Hui Iwa Street Kaneohe, Hawaii 96744 Phone: (808) 239-8206 FAX: (808) 239-4175 Email:prowell@hawiiantel.net

July 18, 2011

West Hawaii Explorations Academy
73-4460 Queen Kaahumanu Highway, #105
Kailua-Kona, HI 96740

Attn: Mr. Ken Melrose

Re: **Traffic Impact Assessment Report for the Relocation of West Hawaii Explorations Academy (WHEA) Kailua-Kona, Hawaii**

Dear Mr. Melrose:

Phillip Rowell and Associates have completed the following Traffic Impact Assessment Report (TIAR) for the proposed relocation of WHEA. The report is presented in the following format:

A. Project Location and Description
B. Purpose and Objective of Study
C. Study Approach
D. Description of Existing Streets and Intersection Controls
E. Existing Peak Hour Traffic Volumes
F. Level-of-Service Concept
G. Background Traffic Projections
H. Project Trip Generation
I. Background Plus Project Projections
J. Traffic Impact Assessment
K. Mitigation
L. Left Turn Storage Lane Requirements

A. Project Location and Description

The proposed action is the relocation of the West Hawaii Explorations Academy (WHEA) from its temporary shoreline relocation to a permanent campus with facilities that would accommodate expansion of the school from 195 to 300 students. The existing and proposed locations are on NELHA property.

The proposed relocation of WHEA is scheduled for 2013. Widening of Queen Kaahumanu Highway is scheduled to be completed by 2015. There will be an interim access and egress scenario for 2013 to 2015. During this time, access and egress will be via OTEC Road which is the existing NELHA access road. Currently, all traffic movements at the intersection of OTEC Road at Queen Kaahumanu Highway are allowed. At some point during the construction period, use of this intersection will be restricted to right turn to and right turns from OTEC Road.

Access to and egress from the school site will be via a driveway along the west side of a road west of and parallel to Queen Kaahumanu Highway. This road is currently referred to as Secondary Road A.

When widening of Queen Kaahumanu Highway is completed in 2015, access to and egress from the school at the intersection of Queen Kaahumanu Highway at OTEC will be limited to right turns into and right turns out of OTEC Road. Traffic from the south will use the intersection of Kaahumanu Highway at Kaiminani Drive. Traffic may make a U-turn or use Roads A and B, which will be new roads connecting the intersection of Queen Kaahumanu Highway at Kaimi Nani Drive with NELHA.

Attachment A is a copy of the project site plan and Attachment B is a schematic drawing of the future (2015) traffic circulation plan.

B. Purpose and Objective of Study

1. Quantify and describe the traffic related characteristics of the proposed project.

2. Assess the intersection of OTEC Road at Secondary Road A to determine the traffic requirements to operate at acceptable levels-of-service during the interim period (2013 to 2015) and upon completion of the Queen Kaahumanu Highway widening (2015), with and without Roads A and B.

C. Study Approach

1. *Define the Study Area*

The first step in defining the study area was to estimate the number of peak hour trips that the proposed project will generate. It was estimated that the project will generate 141 trips during the morning peak hour and 87 trips during the afternoon peak hour. This implies that the scope of the traffic assessment could be limited to an Small Development:Traffic Impact Assessment" as described by the Institute of Transportation Engineers[1]. Accordingly, the traffic impact assessment is limited to the intersection of OTEC Road at Secondary Road A.

Both the existing and proposed locations of WHEA are within the NELHA property. Therefore, traffic impacts will be limited to intersections and roadways within NELHA as any changes in traffic patterns associated with WHEA are within NELHA and will have no impacts on traffic conditions along Queen Kaahumanu Highway. Traffic associated with WHEA would be included in existing traffic counts along Queen Kaahumanu Highway and included in the traffic projections that are part of the Traffic Study for NELHA[2].

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[1] Institute of Transportation Engineers, *Transportation and Land Development*, 2002, Washington, D.C., page 3-6

[2] PB Americas, *Traffic Study Natural Energy Laboratory of Hawaii Authority*, April 2011

2. *Analyze Existing Traffic Conditions*

Existing traffic volumes along Queen Kaahumanu Highway were obtained from manual traffic counts and previous traffic studies. Traffic counts were performed during 2010 and 2011. The existing intersection were analyzed using the level-of-service analysis as described in the *Highway Capacity Manual*.

3. *Estimate Horizon Year Background Traffic Projections*

Background traffic conditions are defined as future traffic conditions without the proposed project. The design horizon year does not necessarily represent the project completion date of the project. It is a date for which future background traffic projections were estimated. For this project, we have used a design, or horizon, year of 2015. Horizon year background traffic conditions were obtained from the NELHA Traffic Study.

4. *Estimate Project-Related Traffic Characteristics*

The number peak-hour trips that the proposed project will generate was estimated using standard trip generation procedures outlined in the *Trip Generation Handbook*[3] and data provided in *Trip Generation*[4]. These trips were distributed and assigned based on approach and departure patterns used in previous traffic studies for projects in the area.

5. *Analyze Project Related Traffic Impacts*

The project-related traffic was then superimposed on background traffic volumes. A level-of-service analysis was performed using the methodology described in the *Highway Capacity Manual*[5] to quantify traffic operating conditions. The purpose of this analysis was to confirm that the intersection of OTEC Road at Secondary Road A will accommodate projected traffic volumes at acceptable levels-of-service.

D. Description of Existing Streets and Intersection Controls

Queen Kaahumanu Highway is located along the east side of NELHA and has a north-south orientation and is the major highway along the west side of the Island of Hawaii. Adjacent to NELHA, Queen Kaahumanu Highway is a two-lane highway with limited access. The posted speed limit is 45 miles per hour. State of Hawaii Department of Transportation currently has plans to widen this section of the highway to four lanes. Construction is imminent with completion scheduled for 2015.

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[3] *Trip Generation Handbook*, Institute of Transportation Engineers, Washington, D.C., 1998

[4] *Trip Generation*, Institute of Transportation Engineers, Washington, D.C., 2003

[5] Transportation Research Road, Highway Capacity Manual, 2000, Washington, D.C.

Kaiminani Drive is a two-lane, east-west collector road connecting Queen Kaahumanu Highway with Mamalahoa Highway, which is located mauka of Queen Kaahumanu Highway. The posted speed limit is 25 miles per hour.

The intersection of Queen Kaahumanu Highway at Kaiminani Drive is a signalized T-intersection. A separate left turn lane is provided for southbound to eastbound left turns from Queen Kaahumanu Highway and a separate right turn and deceleration lane is provided for northbound to eastbound right turns. Left turns from Queen Kaahumanu Highway are protected. The westbound approach of Kaiminani Drive to Queen Kaahumanu Highway has one left turn lane and one right turn lane.

OTEC Road provides access to and egress from NELHA from Queen Kaahumanu Highway. OTEC Road is a two-lane running the length of the NELHA property makai (west) of Queen Kaahumanu Highway. The posted speed limit is 25 miles per hour. The connection with Queen Kaahumanu Highway is gated and is closed from 8:00 PM to 6:00 AM.

The intersection of Queen Kaahumanu Highway at OTEC Road is an unsignalized T-intersection. A separate left turn lane and separate right turn lane is provided for turns from Queen Kaahumanu Highway into NELHA.

Immediately past the gate on OTEC Road is the intersection of OTEC with Secondary Road A. The plan for the future NELAH indicates that this road will be renamed Road D and Road C. Road C is the north leg of the intersection and Road D is the south leg. Road D is currently closed. Road D currently provides access to the visitors center and the solar farm, which are located along the east side of Road D between Road D and Queen Kaahumanu Highway. WHEA will be located along the west side of Road D across from the solar farm. Both roads are two-lanes wide.

The intersection of OTEC Road with Road C and Road D is an unsignalized, four-legged intersection. OTEC Road is the major roadway.

E. Existing Peak Hour Traffic Volumes

Existing peak hour traffic volumes for the intersection of Queen Kaahumanu Highway at Kaiminani Drive and Queen Kaahumanu Highway at OTEC Road were obtained from the NELHA traffic study. These counts are summarized on Attachment C.

The traffic counts include buses, trucks and other large vehicles. Mopeds and bicycles are not included. Pedestrian activity was negligible.

F. Level-of-Service Concept

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. *Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.*[6]

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 1 Level-of-Service Definitions for Signalized Intersections(1)

Level of Service	Interpretation	Volume-to-Capacity Ratio(2)	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay.

[6] Institute of Transportation Engineers, *Transportation Impact Analyses for Site Development: A Recommended Practice*, 2006, page 60

Table 2 Level-of-Service Definitions for Unsignalized Intersections(1)

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

G. Background Traffic Projections

Background traffic projections are defined as future background traffic conditions without the proposed project. The estimated 2015 background traffic projections for 2015 were obtained from the NELHA traffic study and are shown in Attachment D. These projections include background growth, traffic generated by future development and roadway improvement projects, including estimated traffic generated by future NELHA development.

H. Project Trip Generation

Future traffic volumes generated by a project are typically estimated using the methodology described in the *Trip Generation Handbook*[7] and data provided in *Trip Generation*[8]. This method uses trip generation equations and rates to estimate the number of trips that the project will generate during the peak hours of the project and along the adjacent street.

Trip generation does not provide trip generation data for a school with grades 7 through 12. Instead, Trip generation provides separate trip generation data for intermediate schools (grades 7 through 9) and high school (grades 9 through 12). For the trip generation analysis, it was assumed that there will be 130 intermediate school students and 170 high school students.

The trip generation analysis is summarized in Table 3. The trips shown are the peak hourly trips generated by the project. The morning peak hour of project generated traffic typically coincides with the peak hour of the adjacent street. The afternoon peak hour of the project is around 2:30 PM. Which is earlier than the afternoon peak hour of the street. As shown, the project will generate 139 trips during the morning peak hour, 86 inbound and 53 outbound. During the afternoon peak hour, the project will generate 87 inbound and 33 outbound trips for a total of 54 trips.

[7] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

[8] Institute of Transportation Engineers, *Trip Generation, 7th Edition,* Washington, D.C., 2003

Table 3 Trip Generation Analysis

Period & Direction		Intermediate School			High School			Total Trips
		Trips per Student or Percent	Students	Trips	Trips per Student or Percent	Students	Trips	
AM Peak Hour	Total	0.53	130	69	0.41	170	70	139
	Inbound	55%		38	69%		48	86
	Outbound	45%		31	31%		22	53
PM Peak Hour	Total	0.30		39	0.28		48	87
	Inbound	45%		18	32%		15	33
	Outbound	55%		21	68%		33	54

Project trips were distributed and assigned based on traffic approach and departure patterns of estimated from the traffic patterns provided in the NELHA traffic study. Based on this count the approach and departure patterns are:

To/ From	Percent AM	Percent PM
North via Queen Kaahumanu Highway	45	55
East via Kaimi Nani Drive	10	15
South via Queen Kaahumanu Highway	45	30
TOTAL	100	100

The resulting project trip assignments are shown in Attachment D. Project trips assignments are shown for two scenarios, Scenario A and Scenario B. Scenario A an represents traffic conditions with Road A and Road B. This is the plan represented in the NELHA Traffic Study. Scenario B represents traffic conditions without Road A and Road B. This plan represents interim conditions that would exist after Queen Kaahumanu Highway has been widened and Roads A and B have not yet been constructed.

I. Background Plus Project Projections

Background plus project traffic projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the background (without project) peak hour traffic projections for both scenarios. T his assumes that the peak hourly trips generated by the project coincide with the peak hour of the adjacent street. This represents a worse-case condition as it assumes that the peak hours of all the intersection approaches and the peak hour of the study project coincide. The resulting background plus project peak hour traffic projections are shown in Attachment D.

J. Traffic Impact Assessment

A level-of-service analysis was performed for "with project" conditions to confirm that the intersection will operate at an acceptable level-of-service and that there are no traffic operational deficiencies. A level-of-service analysis was not performed for "without project" conditions because traffic volumes without project traffic is negligible. The level-of-service analysis would estimate the delays to be zero.

The level-of-service analysis was performed for an unsignalized, T-intersection. All approaches were assumed to be one lane with no separate turn lanes.

The results of the level-of-service analysis are summarized in Table 5. Shown are the average vehicle delays and the levels-of-service of the controlled lane groups. Delays and levels-of-service are not calculated for uncontrolled movements. The analysis concluded that all controlled traffic movements will operate at Level-of-Service A, which implies good operating conditions and minimal delays.

Table 5 2015 Levels-of-Service - OTEC Road at Secondary Road A

	With Roads A and B				Without Roads A and B			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Approach and Movement	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Westbound Left & Thru	4.0	A	3.7	A	2.3	A	1.7	A
Northbound Left & Right	9.7	A	9.5	A	9.2	A	9.9	A

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. Delay is in seconds per vehicle.
3. LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. See Attachment E for Level-of-Service Calculation Worksheets.

K. Mitigation

Level-of-Service D is generally considered to be the minimum acceptable peak hour level-of-service for urban intersections.[9] As all controlled traffic movements will operate at Level-of-Service A, no mitigation is recommended.

[9] Institute of Traffic Engineers *Transportation Impact Analyses for Site Development, A Recommended Practice,* Washington, D.C., 2006, p 60.

L. Left Turn Storage Lane Requirements

An assessment of the need for a separate left turn lane for traffic turning into the project was performed using guidelines published by the Transportation Resource Board[10]. The assessment is presented as Attachment F. If the plotted intersection of the approaching volumes and the opposing volume falls above and right of the percentage of left turns, then a separate left turn lane should be considered. As previously noted, the posted speed limit along OTEC Road in the vicinity is 25 miles per hour. This implies that the design speed is 35 miles per hour. Since there is no graph for 35 miles per hour, the assessment was performed using the graphs for 40 miles per hour, which is the lowest speed limit that graphs were provided for. The assessment determined that a separate left turn lane was not warranted during either peak period. Accordingly, based on the findings of an accepted standard, a separate left turn lane is not recommended.

M. Summary and Conclusions

1. The proposed action is the relocation of the West Hawaii Explorations Academy (WHEA) from its temporary shoreline relocation to a permanent campus with facilities that would accommodate expansion of the school from 195 to 300 students. The existing and proposed locations are on NELHA property.

2. The TIAR is limited to the intersection of OTEC Road at Secondary Road A. All the remaining intersections were analyzed in the NELHA Traffic Study that was completed April 2011. The study report implied that traffic associated with WHEA is included in the traffic projections for the remaining intersections serving NELHA. The NELHA Traffic Study did not include the intersection of OTEC Road at Secondary Road A, which is the roadway serving the future location of WHEA. The purpose of this TIAR is to assess the intersection of OTEC Road at Secondary Road A to confirm that there will be no traffic operational deficiencies.

3. The NELHA Traffic Study concluded that the intersection of Queen Kaahumanu Highway at Kaimi Nani Road and Road A will operate at Level-of-Service D during the morning peak hour and Level-of-Service C during the morning peak hour[11]. The study also concluded that all movements at the intersection of OTEC Road at Road B will operate at Level-of-Service A and that all movements at the intersection of Queen Kaahumanu Highway at OTEC Road are uncontrolled, and therefore free flow.

4. Due to the project schedule, a trip generation study of the existing school campus could not be performed since the school had recessed for the summer. Therefore, the trip generation analysis is based on trip generation data contained in *Trip Generation* published by the Institute of Transportation Engineers. Based on Institute of Transportation Engineers trip generation data, it is estimated that the project will generate 141 trips during the morning peak hour, 86 inbound and 55 outbound. During the afternoon peak hour, the project will

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[10] Transportation Resource Board, NCHRP Report 457, *Evaluating Intersection Improvements: An Engineering Study Guide*, 2001, Washington, D.C. p21-22

[11] PB Americas, Inc., *Traffic Study for Natural Energy Laboratory of Hawaii Authority*, April 2011, p 31.

generate 87 inbound and 33 outbound trips for a total of 54 trips. It is recommended that a morning and afternoon peak hour generation study be performed to confirm the trip generation estimates used in this TIAR.

5. When widening of Queen Kaahumanu Highway is completed in 2015, access to and egress from the school at the intersection of Queen Kaahumanu Highway at OTEC will be limited to right turns into and right turns out of OTEC Road. Traffic from the south will use the intersection of Kaahumanu Highway at Kaiminani Drive. Traffic may make a U-turn or use Roads A and B, which will be new roads connecting the intersection of Queen Kaahumanu Highway at Kaimi Nani Drive with NELHA. However, the construction of Roads A and B may not be completed until after the widening of Queen Kaahumanu Highway is completed, which means that all traffic will use the intersection of Queen Kaahumanu Highway at OTEC Road. Therefore, 2015 traffic projections were prepared for conditions with and without Roads A and B.

6. The level-of-service analysis determined that the traffic movements of the intersection of OTEC Road at Secondary Road A will operate at Level-of-Service A, which implies minimal delays and good operating conditions, with or without Roads A and B.

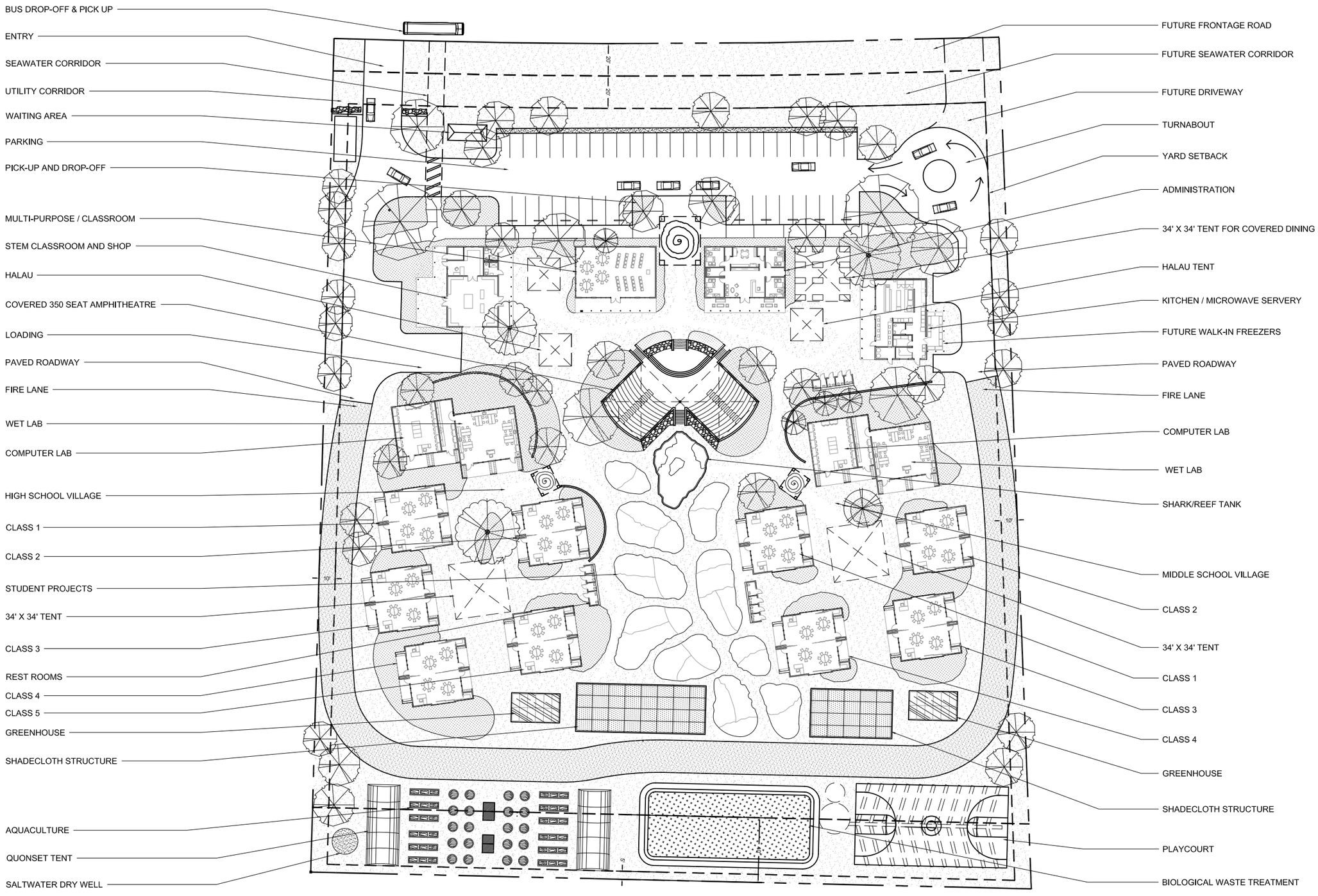
7. An assessment of the need for a separate left turn lane for vehicles turning left into the project from OTEC Road determined that established guidelines for the need are not satisfied for either morning or afternoon peak hour conditions.

Respectfully submitted,
PHILLIP ROWELL AND ASSOCIATES

Phillip J. Rowell, P.E.
Principal

List of Attachments

Attachment A
Project Site Plan

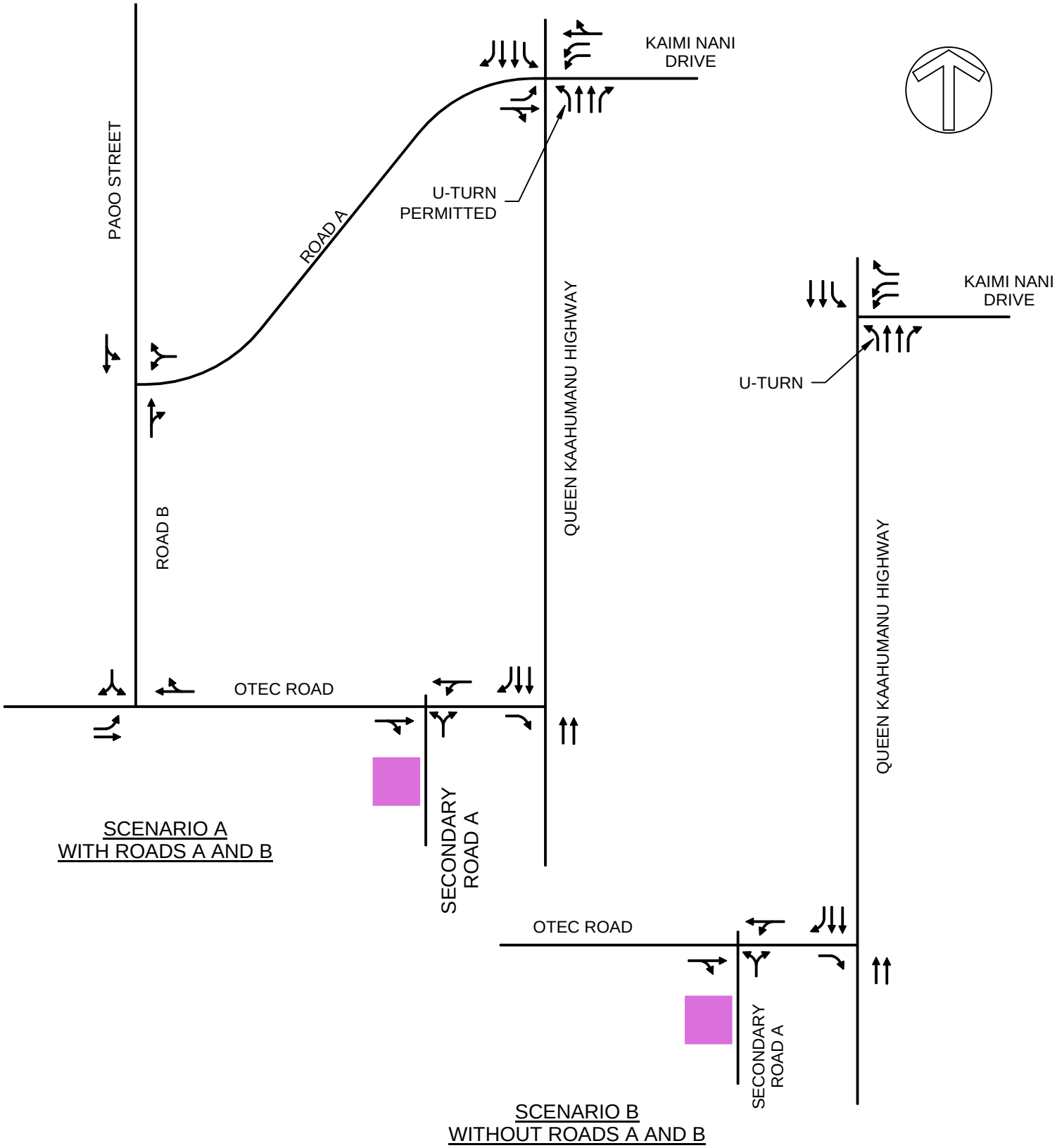


1
G0.03

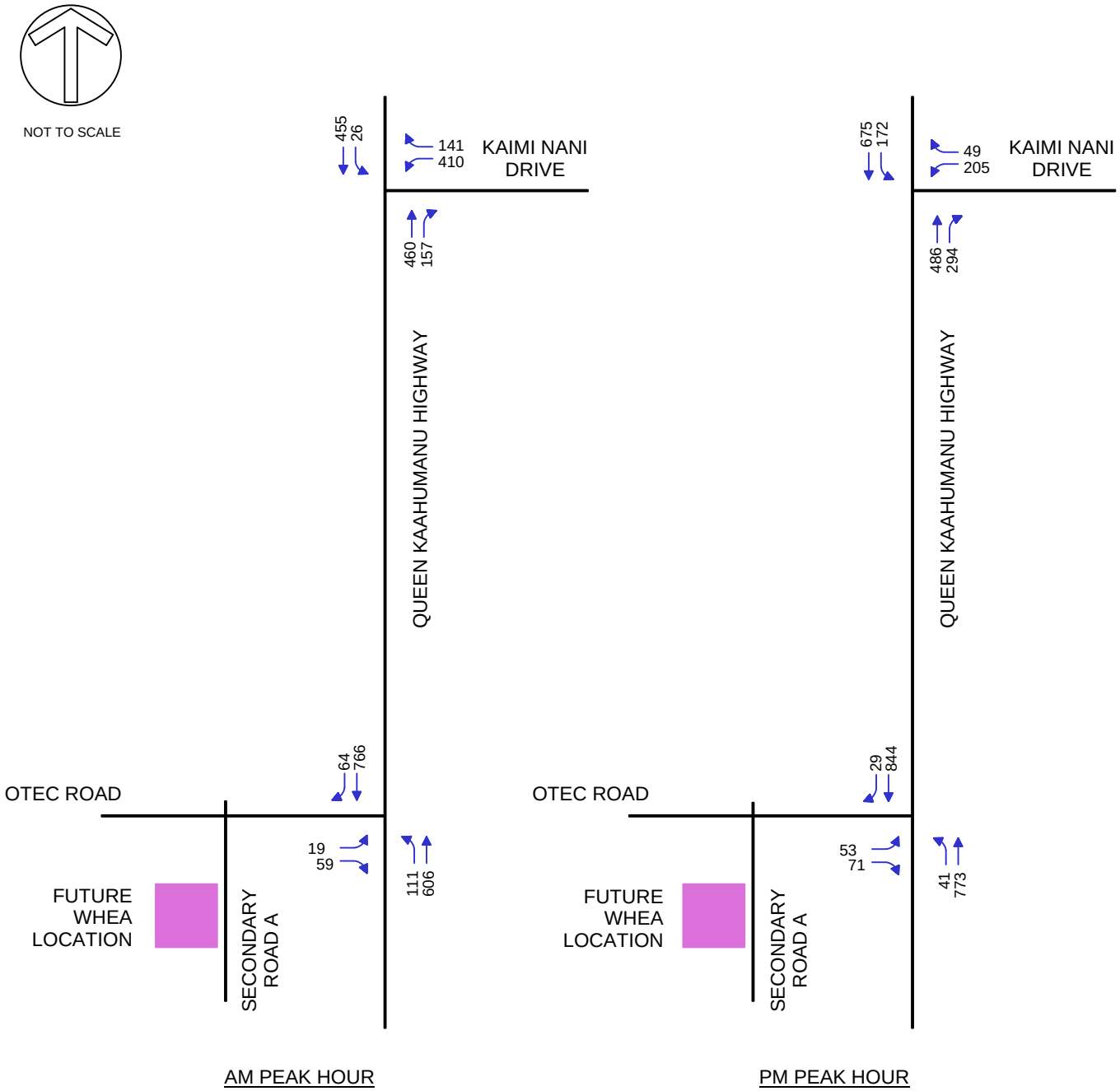
WEST HAWAII EXPLORATIONS ACADEMY SITE PLAN - FULL BUILD-OUT

1" = 30'-0"

0 10 20 40 60 100



Attachment B
SCHEMATIC DRAWING OF FUTURE TRAFFIC
CURCULATION PLANS

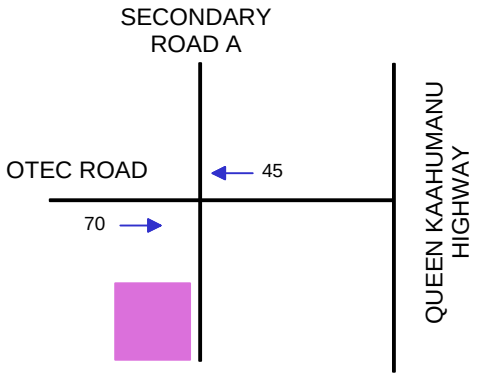


AM PEAK HOUR

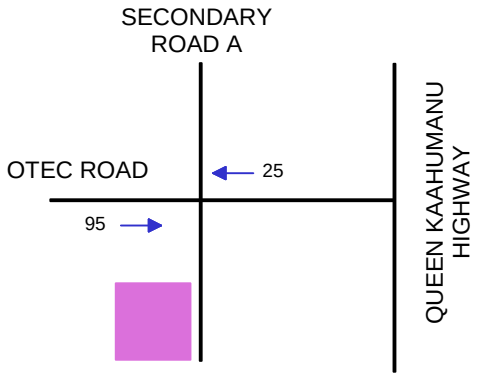
PM PEAK HOUR

Attachment C
EXISTING PEAK HOUR TRAFFIC VOLUMES

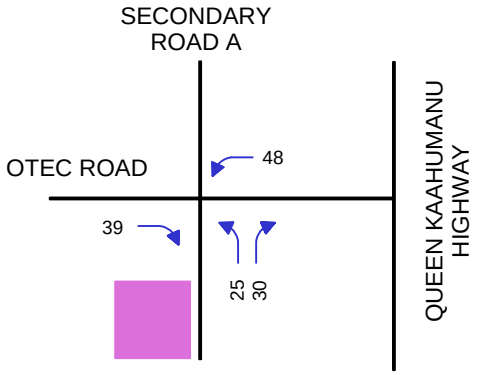
NOT TO SCALE



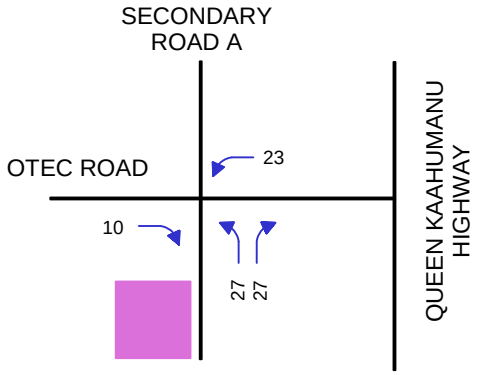
2015 AM PEAK HOUR
BACKGROUND PROJECTIONS



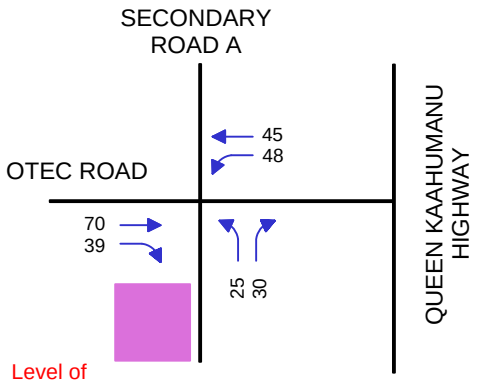
2015 PM PEAK HOUR
BACKGROUND PROJECTIONS



AM PEAK HOUR
TRIP ASSIGNMENTS

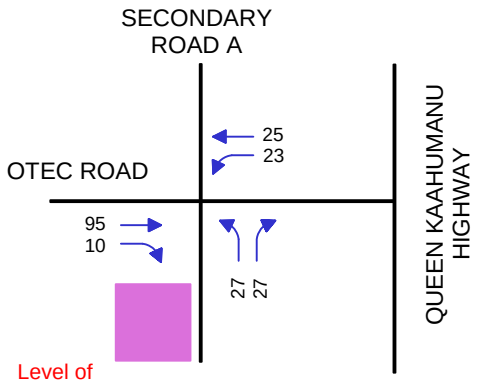


PM PEAK HOUR
TRIP ASSIGNMENTS



Approach & Mvt.	Delay	Level of Service
WB Lt & Th	4.0	A
NB Lt & Rt	9.7	A

2015 AM PEAK HOUR
BACKGROUND PLUS
PROJECT PROJECTIONS

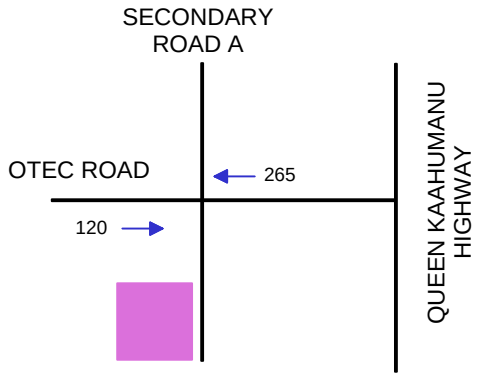


Approach & Mvt.	Delay	Level of Service
WB Lt & Th	3.7	A
NB Lt & Rt	9.5	A

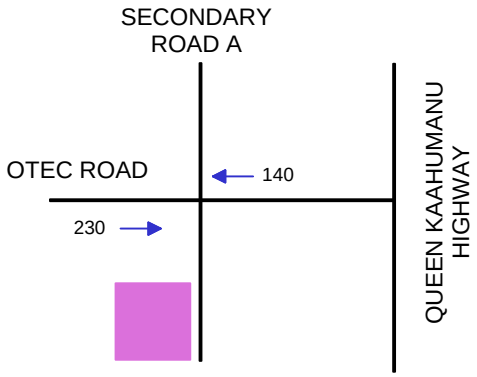
2015 PM PEAK HOUR
BACKGROUND PLUS
PROJECT PROJECTIONS

Attachment D-1
PROJECT TRIP ASSIGNMENTS AND
2015 PROJECTIONS WITH ROADS A AND B

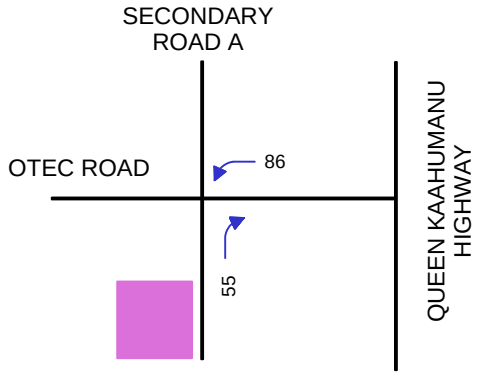
NOT TO SCALE



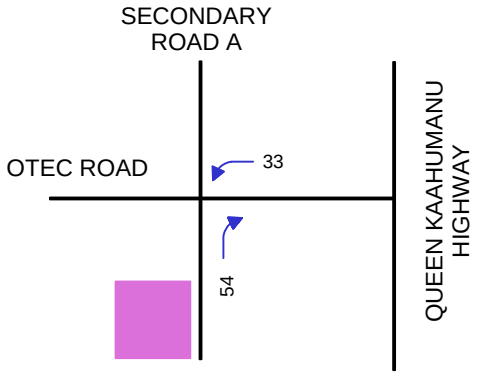
2015 AM PEAK HOUR
BACKGROUND PROJECTIONS



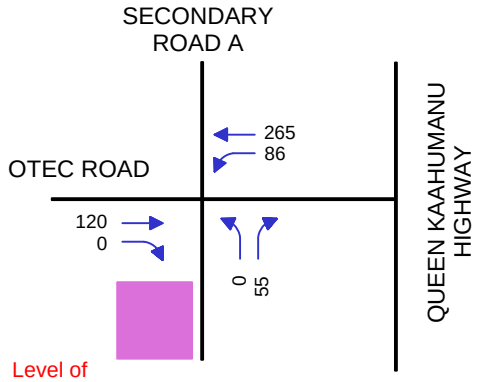
2015 PM PEAK HOUR
BACKGROUND PROJECTIONS



AM PEAK HOUR
TRIP ASSIGNMENTS

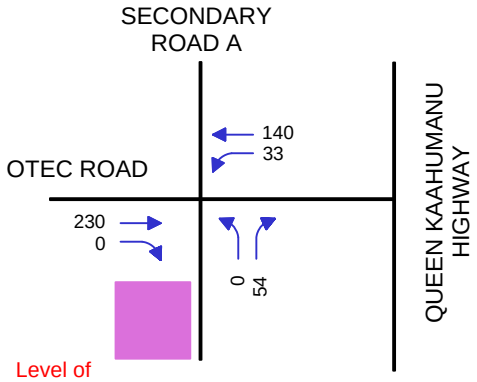


PM PEAK HOUR
TRIP ASSIGNMENTS



Approach & Mvt.	Delay	Level of Service
WB Lt & Th	2.3	A
NB Lt & Rt	9.2	A

2015 AM PEAK HOUR
BACKGROUND PLUS
PROJECT PROJECTIONS



Approach & Mvt.	Delay	Level of Service
WB Lt & Th	1.7	A
NB Lt & Rt	9.9	A

2015 PM PEAK HOUR
BACKGROUND PLUS
PROJECT PROJECTIONS

Attachment D-2
PROJECT TRIP ASSIGNMENTS AND
2015 PROJECTIONS WITHOUT ROADS A AND B

Attachment E
Level-of-Service Calculation Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	70	39	47	45	24	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	42	51	49	26	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				796		
pX, platoon unblocked						
vC, conflicting volume			118		248	97
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			118		248	97
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		96	97
cM capacity (veh/h)			1470		714	959

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	118	100	58
Volume Left	0	51	26
Volume Right	42	0	32
cSH	1700	1470	830
Volume to Capacity	0.07	0.03	0.07
Queue Length 95th (ft)	0	3	6
Control Delay (s)	0.0	4.0	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	4.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	95	10	23	25	27	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	11	25	27	29	29
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				796		
pX, platoon unblocked						
vC, conflicting volume			114		186	109
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			114		186	109
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	97
cM capacity (veh/h)			1475		790	945

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	114	52	59
Volume Left	0	25	29
Volume Right	11	0	29
cSH	1700	1475	860
Volume to Capacity	0.07	0.02	0.07
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	3.7	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	3.7	9.5
Approach LOS			A

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	120	0	86	265	0	53
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	0	93	288	0	58
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				796		
pX, platoon unblocked						
vC, conflicting volume			130		605	130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		605	130
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		100	94
cM capacity (veh/h)			1455		431	919

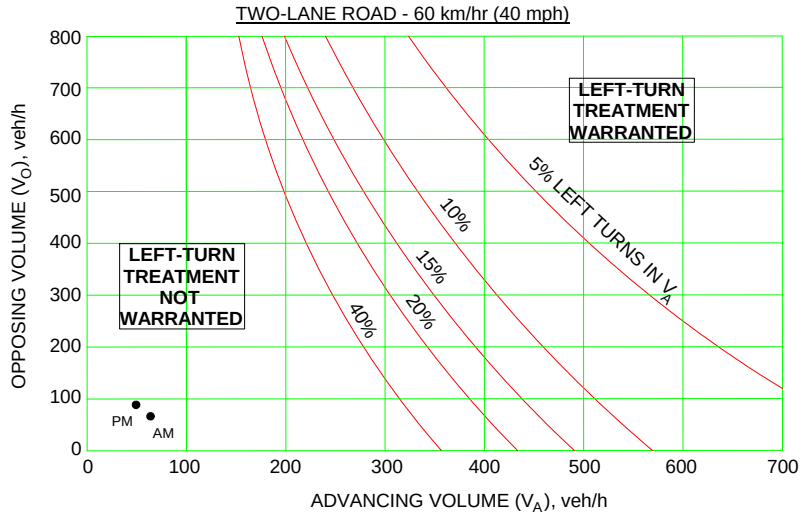
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	130	382	58
Volume Left	0	93	0
Volume Right	0	0	58
cSH	1700	1455	919
Volume to Capacity	0.08	0.06	0.06
Queue Length 95th (ft)	0	5	5
Control Delay (s)	0.0	2.3	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	2.3	9.2
Approach LOS			A

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

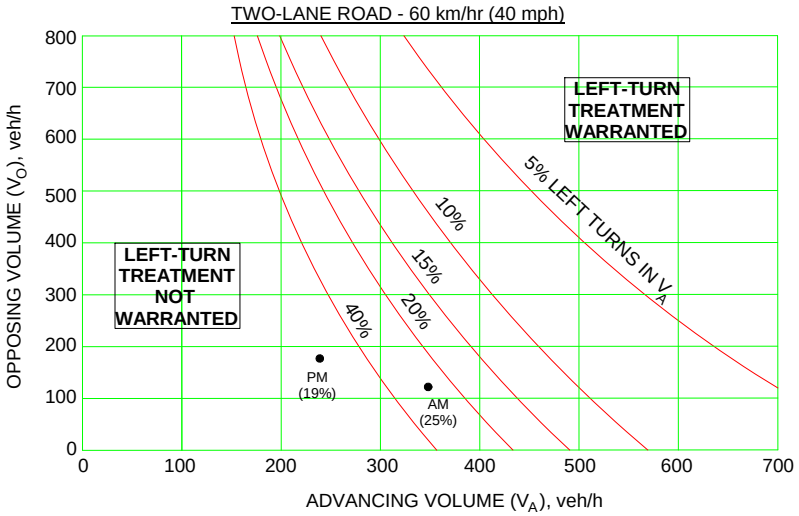
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	230	0	33	140	0	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	0	36	152	0	59
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				796		
pX, platoon unblocked						
vC, conflicting volume			250		474	250
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			250		474	250
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	93
cM capacity (veh/h)			1316		534	789

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	250	188	59
Volume Left	0	36	0
Volume Right	0	0	59
cSH	1700	1316	789
Volume to Capacity	0.15	0.03	0.07
Queue Length 95th (ft)	0	2	6
Control Delay (s)	0.0	1.7	9.9
Lane LOS		A	A
Approach Delay (s)	0.0	1.7	9.9
Approach LOS			A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		



SCENARIO A
WITH ROAD A AND ROAD B



SCENARIO B
WITHOUT ROAD A AND ROAD B

Source: NCHRP Report 457
Evaluating Intersection Improvements: An Engineering Study Guide
2001, page 22

Attachment F
GUIDELINES FOR DETERMINING THE NEED FOR
A MAJOR ROAD LEFT-TURN BAY AT A TWO-WAY STOP CONTROLLED INTERSECTION