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August 10, 2010

TO: Ms. Katherine Puana Kealoha, Director
Office of Environmental Quality Control
Department of Health

FROM: Mr. Theodore A. Peck, Administrator
Hawaii State Energy Office
Department of Business, Economic Development & Tourism

SUBJECT: Final Environmental Assessment (FEA) for
Phycal Algae Pilot Project
Wahiawa and Kapolei (Kalaeloa), Oahu, Hawaii
TMK: (1) 7-1-007:011 por. and 031 por. and TMK (1) 9-1-084: 032 por.

The Department of Business, Economic Development & Tourism, Hawaii State Energy Office, has reviewed the comments received during the 30-day public comment period which began on June 23, 2010. This agency has determined that the project will not have significant environmental effects and has issued a Finding of No Significant Impact (FONSI). Please publish notice in the August 23, 2010 *OEQC Environmental Notice*.

We have enclosed the following items:

1. One (1) hard copies of the Final EA and one (1) electronic copy (PDF) on a compact disk.
2. A completed OEQC Publication Form (on compact disk).

If you have any questions, please have your staff call Mr. Joshua B.Y. Strickler at 587-3837.

Attachments

PHYCAL ALGAE PILOT PROJECT

Final Environmental Assessment

Applicant:
Phycal Hawaii R&D, LLC

Phycal

Prepared by:

GROUP 70 INTERNATIONAL

August 2010

PHYCAL ALGAE PILOT PROJECT

TMK (1) 7-1-001:011, 030, and 031 and TMK (1) 9-1-032:084 por.
Wahiawā and Kalaeloa, Oʻahu, Hawaiʻi

Final Environmental Assessment

This environmental document is prepared in accordance with the requirements of Chapter 343, HRS and Hawaiʻi Administrative Rules, Title 11, Department of Health.

Applicant:
Phycal Hawaii R&D, LLC
Seven Waterfront Plana
500 Ala Moana Blvd., Suite 400
Honolulu, HI 96813

Prepared by:
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Architecture • Planning & Environmental Services • Interior Design • Assets Management
925 Bethel Street, 5th Floor
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August 2010

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1. Poamoho Site
2. Tesoro Site

1.0 Introduction

1.0 INTRODUCTION

This Draft Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, HRS and Hawai'i Administrative Rules, Title 11, Department of Health, which set forth the requirements for the preparation of environmental assessments.

1.1 PROJECT INFORMATION SUMMARY

Project Name:	Phycal Algae Pilot Project
Petitioner:	Phycal Hawaii R&D, LLC
Accepting Authority Ch. 343, HRS:	Department of Business, Economic Development & Tourism
Class of Action Ch 343, HRS:	Use of State Funds
Project Location:	Wahiawā, O'ahu, Hawai'i (Poamoho Site) (*Figure 1-1*) and Kalaeloa, O'ahu, Hawai'i (Tesoro Site) (*Figure 1-2*)
Tax Map Key (TMK):	(1) 7-1-001:011, 030, and 031(Poamoho Site) (*Figure 1-3*) and (1) 9-1-032~~63~~:084 por. (Tesoro Site) (*Figure 1-4*)
Landowner:	HIDC Poamoho Camp, Inc.
Project Area:	34.117 acres (Poamoho Site) and 0.9 acres (Tesoro Site)
State Land Use District:	Agricultural District (Poamoho Site) (*Figure 1-5*) and Urban District (Tesoro Site) (*Figure 1-6*)
City & County of Honolulu Zoning:	AG-1 (Restricted Agricultural) (Poamoho Site) (*Figure 1-7*) I-2 (Intensive Industrial) (Tesoro Site) (*Figure 1-8*)
Central O'ahu Sustainable Communities Plan:	Agriculture Area (Urban Land Use Map - Agriculture and Preservation Areas) (Poamoho Site) (*Figure 1-9)*
'Ewa Development Plan:	Industrial Area (Tesoro Site) (*Figure 1-10*)
Special Design District:	None (Poamoho Site and Tesoro Site)
Special Management Area (SMA):	Not in SMA (Poamoho Site and Tesoro Site)
Flood Zone:	Zone D (Unclassified) (Poamoho Site and Tesoro Site) (*Figure 1-11*)

Anticipated Determination
Ch. 343, HRS: Finding of No Significant Impact (FONSI)

1.2 PROJECT SITE

The Phycal Algae Pilot project will utilize two sites to develop and operate the proposed project. This Draft EA will address the proposed action for development of an algae farm at the Poamoho site in Wahiawā, Oʻahu, and proposed processing facility at the Tesoro site located in James Campbell Industrial Park, Kaleloa, Oʻahu.

The first project site (Poamoho Site) is located on a portion of the existing Poamoho Plantation Camp. The algae farm and facilities will be situated on agricultural lands to the south of the Camp, near the *mauka/ʻewa* corner of Kamehameha Highway and Kaukonahua Road (*Figure 1-1*). The agricultural land is leased from HIDC Poamoho Camp, Inc. The project area is approximately 34.117 acres and encompasses portions of TMK: (1) 7-1-001: 011, 030, and 031. The project site is bounded by Kamehameha Highway on the east, Kaukonahua Road on the south and agricultural lands to the north and west. Poamoho Camp residential area lies beyond the agricultural lands to north.

The second project site (Tesoro Site) is located on vacant industrial lands in James Campbell Industrial Park. The project area encompasses a portion of TMK (1) 9-1-032: 084 and is approximately 0.9 acres (39,204 square feet (sf)). The Tesoro project site is bounded by Kauhi Street on the north, Komohana Street on the west, and light to medium industrial facilities to the north and west. The industrial land is leased from Tesoro Hawaii Corporation.

1.3 OVERVIEW OF THE PLANNED PROJECT

The Phycal Algae Pilot Project seeks to develop an algae farm and processing production facility at Poamoho, on the island of Oʻahu, Hawaiʻi. The project will strengthen the capability of using algae as a biofuel crop, to provide a wide range of energy products and energy security with significant reductions in greenhouse gas emissions. Algal oil can be converted into biodiesel, or refined into drop-in replacements for diesel, jet fuel, and feedstock for other bio-products. The Phycal Algae Pilot Project is Phase II of a pilot project implementation plan, which follows the Phase I laboratory study. Phase II will conduct field testing and validation of the algae-to-energy technology through harvesting integration, process optimization and scaling, and cost model validation.

The pilot project facility at the Poamoho site will include shallow ponds for growth of algae, a processing building for extraction of oil, an anaerobic digester for conversion of biomass to methane gas, and water treatment capability. The refining and processing facility at the Tesoro site will include a small bench scale unit which will convert the algal oil into Hydrotreated Renewable Jet Fuel, Renewable Naphtha, and Renewable Diesel. Commencing operations in 2010, the facility is projected to deliver approximately 100,000 gallons (gal) of algae oil per year. The objective is to complete technical qualifications of these biofuels as a commercial product, and permit system development to confirm the ability of production at acceptable costs. The operation and site restoration is expected to last approximately three years and will generate

approximately 40 jobs to support operations at the Poamoho and Tesoro project sites. The economic benefits to the State are estimated between $5 to 8 million per year.

The Phycal Algae Pilot Project will help to promote new venues for Hawai'i in biofuel and renewable energy production. Use of the vacant agricultural lands at Poamoho Camp will provide a new type of (aquaculture) farming industry for Central O'ahu. The goal of the project is to achieve commercial-scale algal oil production, which can deliver algal oil at competitive price for the Hawai'i market. This will help Hawai'i to move towards achieving the State's Clean Energy Initiative, which establishes targets for both the State and local utilities' development and use of renewable energy.

1.4 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

In accordance with the requirements of Chapter 343, Hawai'i Revised Statutes (HRS), a Draft EA is being prepared as the proposed project utilizes state funds. The Draft EA will be published in the Office of Environmental Quality Control (OEQC) Environmental Notice, which will commence a 30-day public review period.

The Draft EA is presented in eight sections and includes the following: a detailed project description and analysis of alternatives; a list of necessary approvals; a description of the environmental setting; a section that identifies potential impacts and proposed mitigative measures on identified natural, cultural, and socioeconomic resources as well as existing infrastructure; a discussion of the project's relationship to State and County land use designations and regulations; the anticipated determination and reasons for its believed outcome; an updated list of agencies, organizations, and individuals that participated in the pre-consultation phase of the Draft EA; and a list of references cited or used in developing the Draft EA.

After the 30-day review period of the Draft EA has concluded, public comments received will be considered and addressed to the extent feasible within the project scope and evaluation. A Final EA will then be prepared, highlighting key areas of the document that were revised, updated, or modified based upon information received during the public comment period.

Upon acceptance of the Final EA, a Finding of No Significant Impact (FONSI) is anticipated.

Since the Phycal Pilot Algae Project is also supported in part with Federal funding, it is anticipated that a National Environmental Policy Act (NEPA) EA will also be prepared in the future for Phase II of the project.

1.5 OTHER PERMITS AND APPROVALS REQUIRED FOR CONSTRUCTION

In addition to the acceptance of the Final EA/FONSI by the State Department of Business, Economic Development & Tourism, a Federal National Environmental Policy Act (NEPA) EA and a City and County of Honolulu Conditional Use (Major) Permit is needed for the project.

Federal National Environmental Policy Act (NEPA) EA: The project utilizes Federal funding from the United States (U.S.) Department of Energy's (DOE) National Energy Technology Laboratory (NETL). These funds were provided under the American Recovery and Reinvestment Act (ARRA) of 2009 which was enacted to preserve and create jobs and promote economic recovery, assist those

most impacted by the recession, provide investments needed to increase economic efficiency by spurring technological advances in science and health, investment in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits, stabilize Stat and local government budgets, in order to minimize and avoid reductions in essential services and counterproductive State and local tax increases. Recipients of AARA funding are required to use grant funds in a manner that maximizes jobs creation and economic benefits.

Since the project will use Federal funding, it is anticipated that a NEPA EA will also be prepared in the future for Phase II of the project. The NEPA requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. The U.S. DOE must accept the Final EA and issue a Finding of No Significant Impact for the project.

County Conditional Use Permit (CUP) (Major): A City and County of Honolulu CUP (Major) is needed for the project. The purpose of this permit is to allow certain uses in some zoning districts if certain minimum standards and conditions, which are detailed in Article 5 of the LUO, are met. While aquaculture is a permitted activity within the AG-1 district, the agricultural products processing facilities will require review and approval of a CUP (Major) application from the Department of Planning and Permitting for use as "major agricultural products processing".

The Honolulu City Council is currently considering Bill 24 (2010), CD1, which would add "biofuel processing facilities" as a new use category in the LUO. If the bill is enacted into law, "biofuel processing facilities" would be allowed in the AG-1 District with a CUP (Major). A CUP (Major) application could then be submitted and the project's agricultural products processing facilities at the Poamoho site could then be considered as "biofuel processing facilities". However, at this time, the project will proceed with a CUP (Major) for use as "major agricultural products processing".

County Conditional Use Permit (CUP) (Minor): The refining and processing facilities on the Tesoro site will may also require a CUP (Minor) for the project. As discussed above, if Bill 24 (2010), CD1, is enacted into law, the "biofuel processing facilities" category would also be allowed in the I-2 District with a CUP (Minor). If the bill is not enacted into law, the project's operations would be considered as "petroleum processing" which would require a CUP (Major). Future permitting for this site will be determined at a later time depending upon the enactment of Bill 24, (2010) CD1.

1.5.1 Other Agency Permitting

- **<u>Construction Runoff Water Quality – NPDES Permit</u> (Department of Health (DOH), Clean Water Branch (CWB) (Poamoho Site)**
  A National Pollutant Discharge Elimination System (NPDES) Permit will be obtained to carry out grading in excess of 1.0 acres. Under the Federal CWA, the U.S. Environmental Protection Agency (EPA) authorizes the State of Hawai'i to assume this regulatory responsibility, administered under DOH Administrative Rules, Title 11, Chapter 55.

- **<u>Industrial Storm Water Runoff – NPDES Permit</u> (DOH, CWB) (Poamoho and Tesoro Site)**
  An NPDES permit will be obtained for storm water runoff from the processing facilities.

- **Spill Prevention and Control and Countermeasure (SPCC) Plan (EPA ~~DOH, CWB~~) (Poamoho and Tesoro Site)**
  A Spill Prevention and Control Plan will be provided for the processing facilities.

- **Air Pollution Control Permit (U.S. EPA, DOH, CAB)**
  An Air Pollution Control Permit (Covered and Non-major Source) will be obtained prior to construction, reconstructing, modifying or operating stationary air pollution source or air pollution control equipment.

- **Biosolids/Treatment Works - Waste Management Facility Permit (DOH, Wastewater Branch (WB))**
  In compliance with Hawai'i Administrative Rules (HAR) Chapter 11-62, the project will consult with DOH to determine the potential to obtain a Waste Management Facility Permit for the treating organic biosolids generated from the algae processing facility.

- **Water Re-Use Permit (DOH, WB)**
  A Water Re-Use Permit will be obtained for the use of reclaimed water will for the algae ponds and operations of the project. The reclaimed water will be trucked in from Wheeler Army Airfield Wastewater Treatment Facility. Effluent discharge from the processing will also be conditioned for use as reclaimed water. Water reuse will meet DOH, WB's "Guidelines for the Treatment and Use of Recycled Water". Requirements for compliance will be discussed with DOH.

- **Community Noise Control Permit for Construction and/or Industrial Activities (DOH, Indoor and Radiological Health Branch) (Poamoho Site)**
  A Community Noise Permit in compliance with HAR Chapter 11-46 will be obtained for noise generated from the construction activities at the algae pilot facility.

- **Hazardous Materials Use, Storage and Disposal - Hazardous Substance and Volumes Roster (DOH, Office of Hazard Evaluation and Emergency Response (HEER))**
  Hazardous materials for processing of the algae will be conducted in compliance with HAR Chapter 11-451. Information on the process steps involving hazardous materials which could affect the environment (air, water, soils, wildlife) during operations or with effluent/solids disposal or reuse will be provided to DOH, HEER.

- **Liquefied Petroleum Gas (LPG) Above Ground Storage Tank (AST) Permit (County Fire Department)**
  Fuel products stored in above-ground tanks will be regulated at the pilot facility in compliance with HAR Chapter 11-451. The project will ensure that the storage of liquids that pose a potential for environmental hazard if released to the environment in a spill event or leaking storage tank will be handled appropriately. Requirements for compliance will be discussed with the State DOH and the County.

- **Flammable / Combustible AST Permit (County Fire Department)**
  A Flammable / Combustible AST Permit will be obtained for the project. These permits are required to install, modify and operate fuel tanks or containers of combustible or flammable liquid, having a capacity over a certain threshold (e.g. 60 gallons and more).

- **Endangered Species Consultations, Waterbird Protection Plan (U.S. Department of the Interior (DOI), Fish and Wildlife Service (FWS), Department of Land and Natural Resources (DLNR))**
  The algae operation will establish shallow ponds, which are anticipated to create an attractive nuisance for the Hawaiian waterbird species. Consultation with State and Federal wildlife biologists are required, and may potentially include conditions for mitigation programs, if required.

- **Algae Import Permit, Application for Phytosanitary Certificate (PQ-7) (Department of Agriculture (DOA))**
  The Hawai'i State DOA's Plant Quarantine Branch conducts pre-entry, entry, and post-entry inspections of regulated materials entering the State. Plant quarantine prevents the introduction and spread of harmful pests and diseases into the State, as well as certifying plants for export out of the State. An application for Phytosanitary Certificate will be obtained to import materials such as algae into Hawai'i for the operation of the project.

- **Permit to Perform Routine Construction within a State Highway (Department of Transportation (DOT))**
  Routine construction projects within the State highway right-of-way require a permit from the State DOT. The project will obtain this permit prior to any construction on the site.

1.5.2 Construction and Building Permits

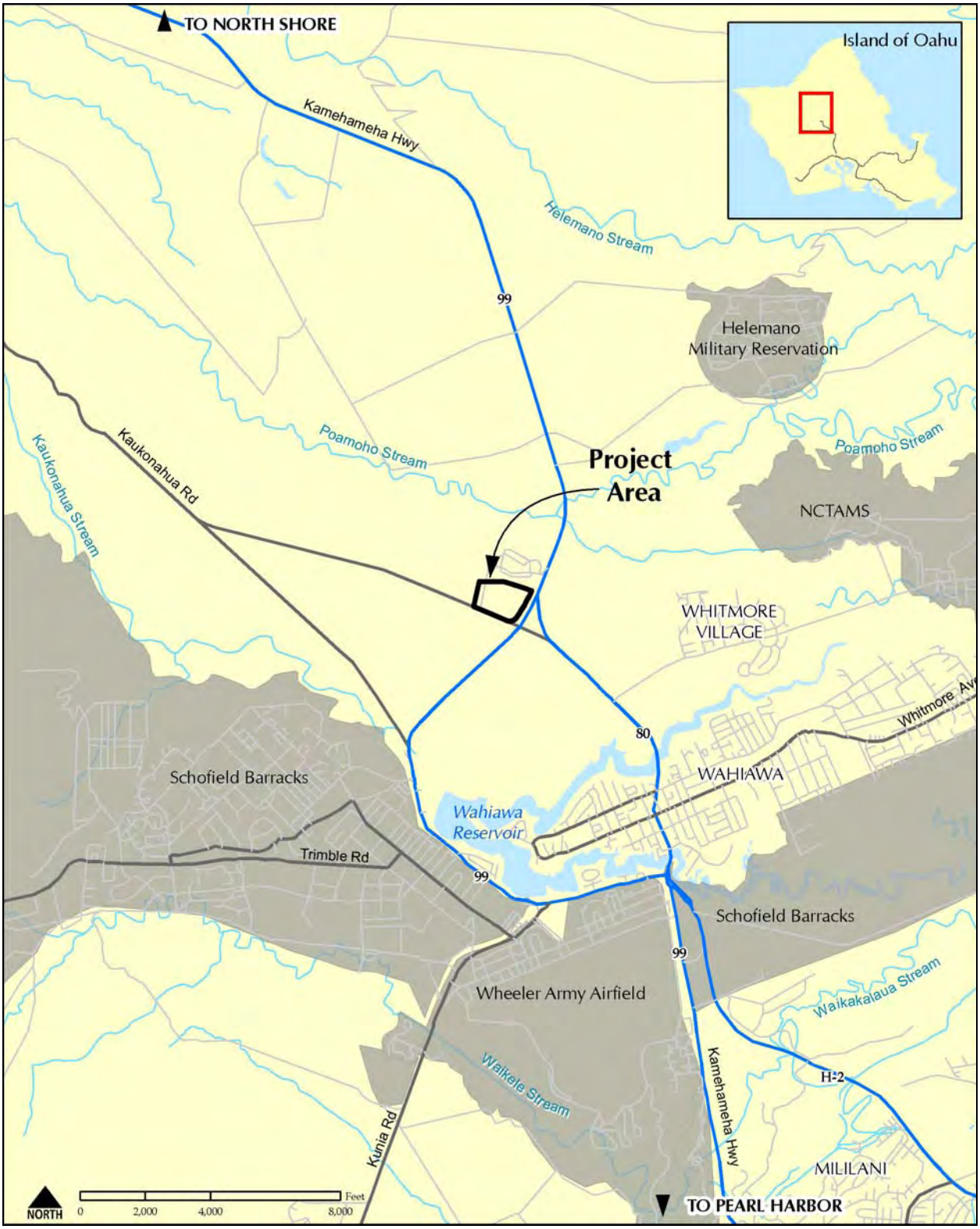
Several construction approvals will be required from the City and County of Honolulu to implement the proposed action. A list of these construction approvals are provided below. Permitting approvals described above in *Section 1.5.1* also apply to construction, and may be required in advance of these County permits.

Building and construction permits anticipated to be required include:

- Building Plan Approval (County DPP)
- Building Permit (County DPP)
- Electrical Permit (County DPP)
- Outdoor Lighting Permit (County DPP)
- Grading, Grubbing and Stockpiling Permit (County DPP)
- Certificate of Occupancy (County DPP)
- Driveway Connection Permits (County DPP, State DOT)

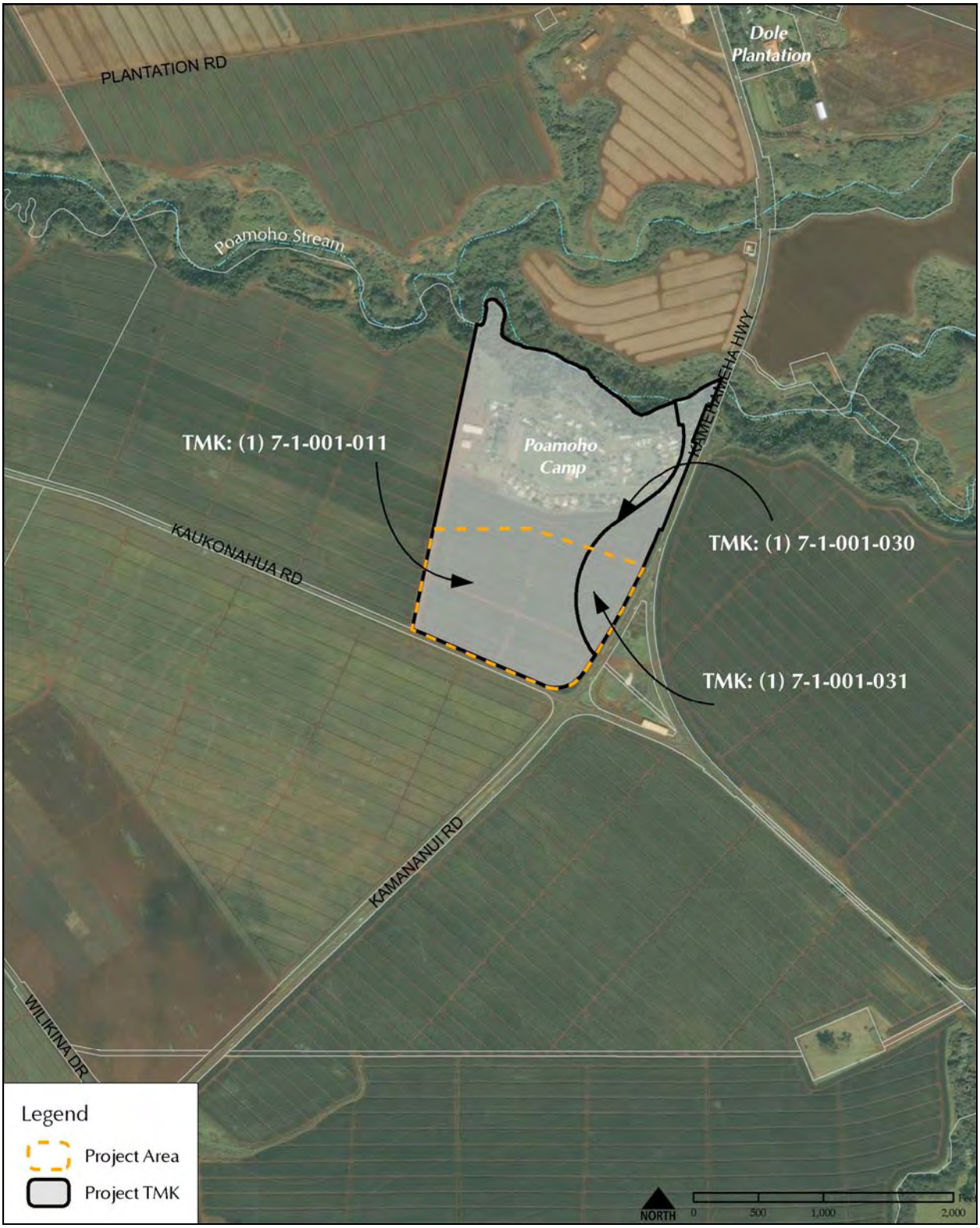
1.6 AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONTACTED DURING THE PRE-CONSULTATION PROCESS

A Pre-Consultation Memo and Participant Letter were sent in January 2010 to initiate the environmental review process. These are included as *Appendix A.* A list of agencies and other parties that were presented notice of the proposed project or were contacted during the pre-consultation period of the Draft EA is provided in *Section 8.0* of this document. Additionally, a listing of those agencies that ~~will be~~ have been provided an opportunity to review the Draft EA and Final EA is also provided in *Section 8.0*.



PROJECT LOCATION – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-1**

PROJECT LOCATION – TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-2**



TAX MAP KEY ((1) 7-1-001:011, 030, AND 031) – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-3**

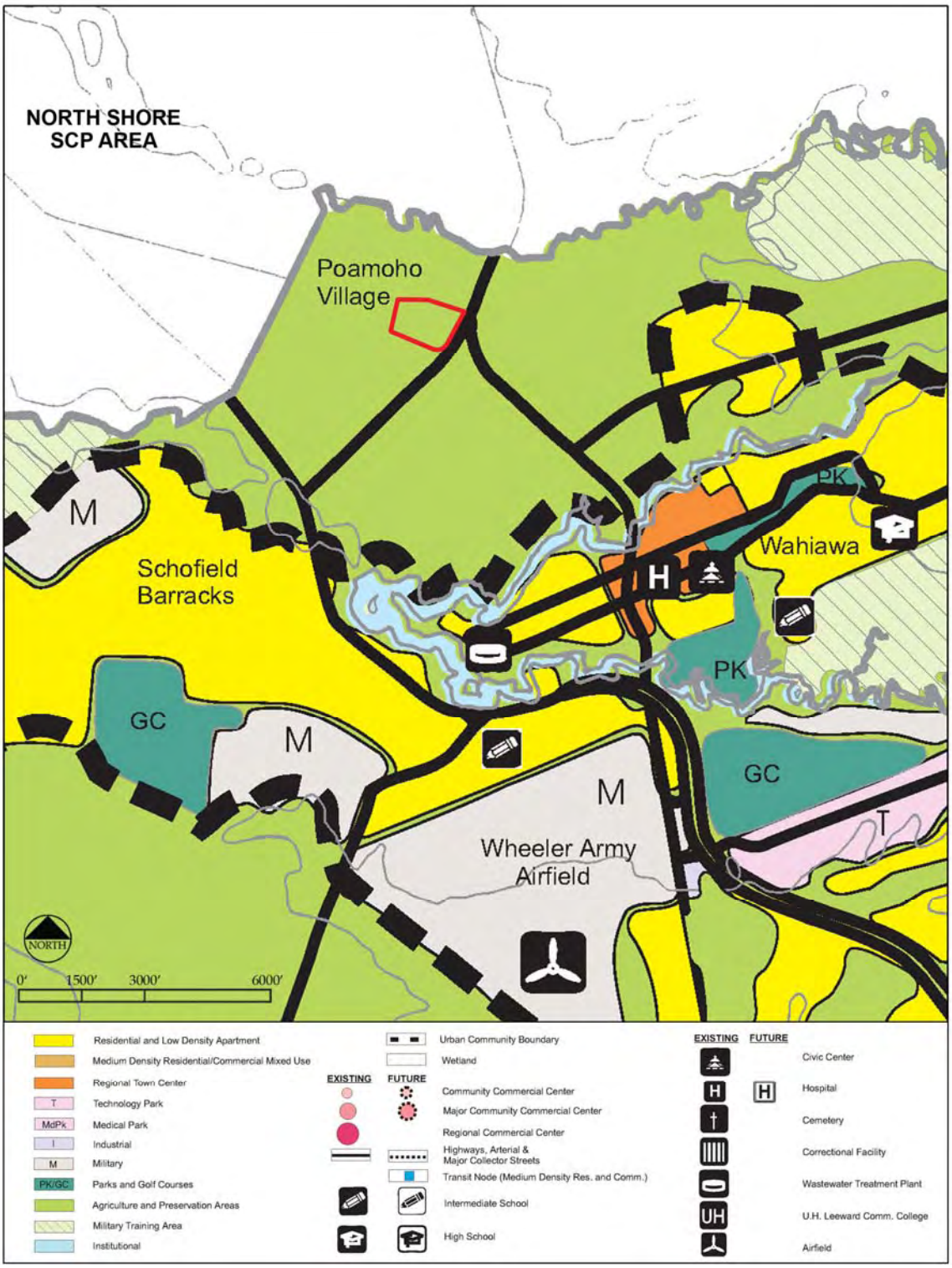
TAX MAP KEY (1) 9-1-032: 084 POR. – TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure1-4**

STATE LAND USE DISTRICT MAP – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-5**

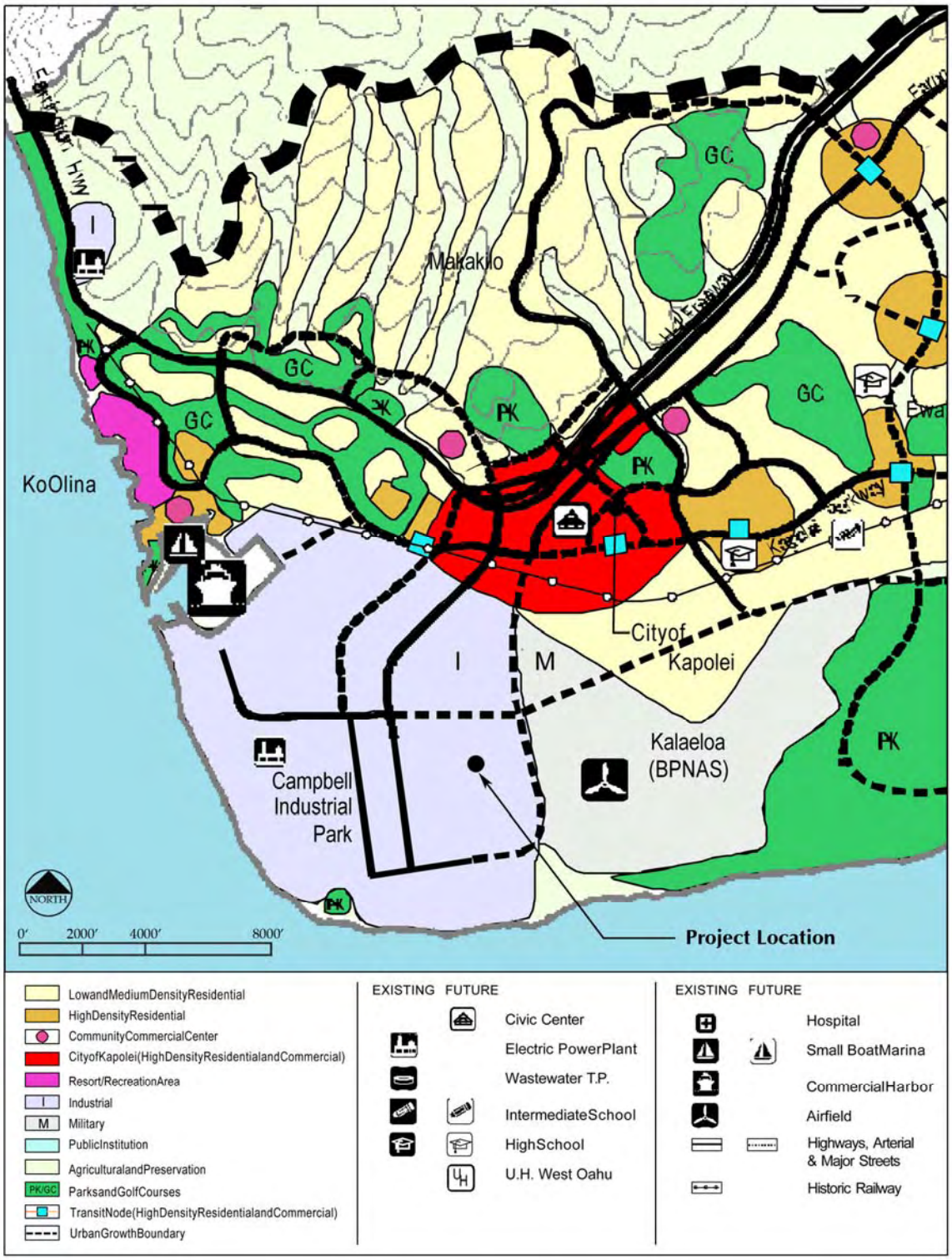
STATE LAND USE DISTRICT MAP - TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-6**

CITY AND COUNTY OF HONOLULU ZONING MAP – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-7**

CITY AND COUNTY OF HONOLULU ZONING MAP - TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-8**



CITY AND COUNTY OF HONOLULU,
CENTRAL O'AHU SUSTAINABLE COMMUNITIES PLAN URBAN LAND USE MAP – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-9**



CITY AND COUNTY OF HONOLULU,
'EWA DEVELOPMENT PLAN URBAN LAND USE MAP - TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-10**

TOPOGRAPHY AND FEMA FLOOD ZONE – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 1-11**

2.0 Description of the Proposed Action

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 PROJECT LOCATION AND CHARACTERISTICS

Location

The Phycal Algae Pilot will require two sites to carry out the project. One site will be used as for an algae farm and processing area, and the second site will be used as a refinery to further process the algae oil into energy products.

The first site (Poamoho site) will be used for the algae farm and processing facility located in Wahiawā, on the island of Oʻahu in the State of Hawaiʻi (*Figure 1-1*). The site lies within the traditional moku of Waialua and the ahupuaʻa of Wahiawā (*Figure 2-1*). The project area is approximately 34.117 acres, and encompasses portions of TMK: (1) 7-1-001: 011, 030 and 031 (*Figure 1-3*). The project site is bounded by Kamananui Road on the east, Kaukonahua Road on the south, and agricultural lands to the north and west. Poamoho Camp residential area lies beyond the agricultural lands to north. The site lies within a portion of the existing Poamoho Plantation Camp as shown in *Figure 2-2* and identified as Agricultural Unit B. The algae farm pilot project will be situated on vacant agricultural lands classified by the State Land Use Commission (LUC) as State Land Use Agricultural District (*Figure 1-5*). The land is zoned AG-1 Restricted Agricultural District by the City and County of Honolulu's (County) Land Use Ordinance (LUO) (*Figure 1-7*). The site is designated for Agriculture on the Central Oʻahu Sustainable Communities Plan (SCP) (*Figure 1-9*). Adjacent areas surrounding the project site to the north, south, east and west are also designated as Agricultural.

The second site (Tesoro site) will be used for a processing facility to refine and convert the purified algae oil into a biofuels. This site is located in Kalaeloa, ʻEwa District on the island of Oʻahu (*Figure 1-2*). The vacant site is within the traditional moku of ʻEwa and the ahupuaʻa of Honouliuli. The project area encompasses a portion of TMK (1) 9-1-032: 084 and is approximately 0.9 acres (39,204 square feet (sf)) (*Figure 1-4*). The Tesoro project site is bounded by Kauhi Street to the north and Komohana Street on the west and light to medium industrial facilities to the north and west. The site is designated as State Land Use Urban District (*Figure 1-6*) and is zoned I-2: Intensive Industrial District (*Figure 1-8*). Adjacent areas surrounding the project site to the north, south, east and west are also designated as Industrial. Located within the ʻEwa District, the project site is designated for Industrial use on the City and County of Honolulu, ʻEwa Development Plan (DP) (*Figure 1-10*).

Ownership

The Poamoho project site is owned by HIDC Poamoho Camp, Inc. The Tesoro project site is owned by Tesoro Hawaii Corporation. Both sites are leased by Phycal Hawaii R&D, LLC.

Adjacent Land Uses

Vacant agricultural land surrounds the subject site in Wahiawā, Central Oʻahu, and particularly areas surrounding the Poamoho project site. The Poamoho site is bordered by agricultural lands owned by Galbraith George Trust to the east, south, and west. To the north, the site is bordered by agricultural lands owned by Dole Food Co. Inc. A small portion of land located in the front of the Galbraith George Trust agricultural lands, directly southwest of the site, is owned by Greenworld

Farms, LLC (*Figure 1-3*). These areas are designated as AG-1 Restricted Agricultural District under the County LUO. The Phycal Algae Pilot project supports the County's plans to preserve the agricultural lands of this area and fits with the surrounding uses of the region.

Immediately to the north of the site is a small portion of vacant agricultural lands owned by HIDC Poamoho Camp, Inc. This area will be leased to another farmer. The residential community of Poamoho Camp lies directly beyond this vacant agricultural parcel. The camp is located within the same tax map parcel (TMK: (1) 7-1-001: 011, 030, and 031) as the proposed project, approximately1,000 ft from the site.

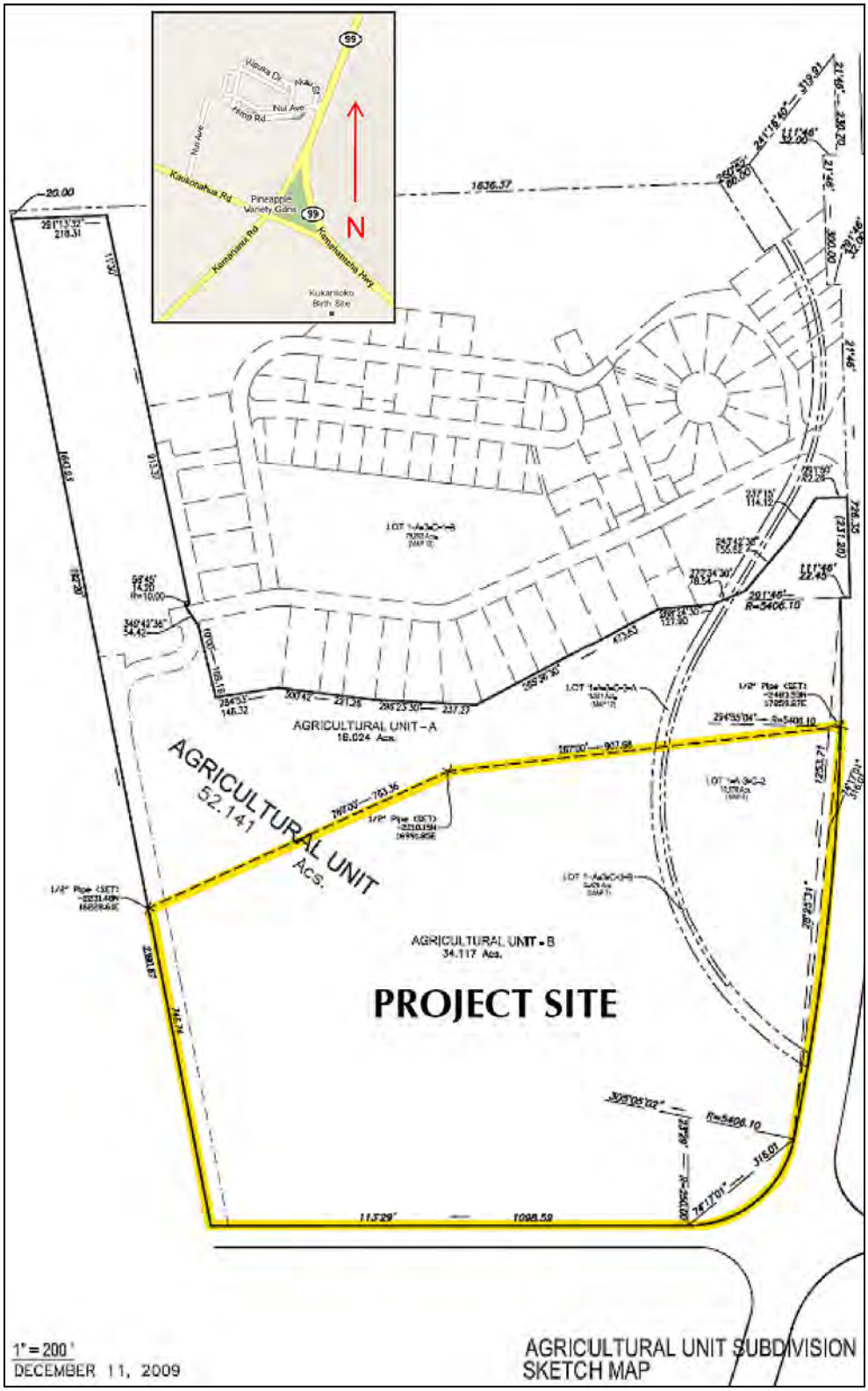
The proposed Tesoro project site is located near the southwestern portion of the Kalaeloa Community Development District, and is undeveloped with overgrown natural vegetation to the north and northeast of the Kalaeloa Community Development District is an urban area with residential, commercial and supporting services, and an industrial support area with maintenance shops, warehouses, and paved areas. The land uses bordering the Tesoro project site include an undeveloped property owned by Tesoro Hawaii to the east, the Tesoro Hawaii refinery to the south, and land owned by the Queen Emma Foundation to the north (leased to the Insurance Auto Auction) (*Figure 1-4*). Land uses to the west of the site include the production of aluminum beverage cans by Ball Corporation, S&M Welding, and a manufacturing plant owned by Bonded Materials Co. Inc. Additionally, in the near future, a portion of the project parcel (TMK: (1) 9-1-032:084 por.) will also be shared by UOP for an Integrated Bio-Refinery (IBR) pilot project. These adjacent land areas are designated as I-2 Intensive Industrial District by the City and County of Honolulu. Phycal's proposed use of the Tesoro site for the conversion of algae oil to biofuels is consistent with the industrial use of the property and surrounding area.

Existing On-Site Land Uses

The proposed Poamoho site was formerly used as agricultural land dating back to 1929. The property was leased to Del Monte Corp (formerly known as California Packing Corp) from 1949 to 2005 for the cultivation pineapple crops. Del Monte was one of the largest producer's of fresh pineapple on O'ahu. However, in 2005, Del Monte closed its doors gave up its lease of the agricultural property. Today, the project site is no longer used to cultivate pineapple. The agricultural area remains as a former pineapple land and continues to be vacant and unused.

Up to 1998, the Tesoro project site was used by Waste Management of Hawaii, Inc. as the Hawaiian Remediation and Recycling Facility for soils bioremediation. The portion of the Tesoro site that is planned for the project is currently vacant. The land is owned by Tesoro Hawaii Corporation. The other portion of the 12-acre site is used by Tesoro as the "North Tank Farm", a part of their overall refinery operation which provides jet and marine fuels, and gasoline to the Hawaiian Islands. The site includes four above-ground petroleum bulk storage tanks.

AHUPUA'A BOUNDARY MAP – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 2-1**



AGRICULTURAL UNIT SUBDIVISION – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 2-2**

2.2 PURPOSE OF THE PROPOSED PROJECT

The purpose of the Phycal Algae Pilot project is to develop a prototype algae farm and processing facility in Hawai'i. The project seeks to strengthen the capability of using algae as a biofuel crop to provide a wide range of energy products and energy security with significant reductions in greenhouse gas emissions. While the demand for biofuels is clear, the challenge is cost. The development of this pilot project will allow Phycal Hawaii R&D, LLC, (Phycal) to complete technical qualifications of algae to energy as a commercial product, permit system development, and confirm the ability to produce products at acceptable cost targets.

Specifically, the pilot project's main objectives will be to:

(1) Demonstrate Phycal's commercial performance targets at a pilot-scale at the proposed algae farm.
(2) Document the impact of the fuels produced on carbon dioxide recycle/reuse and the environment.

To meet these objectives, the project will work towards completion of the following activities:

- Complete the process development at the subpilot-scale facility in Ohio to finalize the pilot-scale design for use at the Hawai'i pilot project site.
- Validate the use of industrial emissions-derived carbon dioxide for algal culture.
- Build a pilot-scale algal farm and off-site processing equipment that demonstrates the flexibility of algal oil to create drop-in renewable diesel fuel, renewable naphtha, hydrotreated renewable jet fuel (HRJ) and algal oil (as a blend stock for generation fuels and as a feedstock for biodiesel).
- Demonstrate the algae farm and off-site processing equipment to test and complete the integration of all unit processes in preparation for the construction of a commercial-scale facility in Hawai'i.
- These activities are essential to validate Phycal's transition to commercial-scale project finance and market entry, as well as to document the ability of the system to capture and reuse carbon dioxide emissions from industrial sources for green energy products that deliver benefit to the environment. These products will have lower carbon footprints relative to the petroleum products they are scheduled to replace.

By developing this algae technology, the future potential of algae oil for biofuels can be realized at a level that results in technical, economic, and environmental advantages. Additionally, in the long-term, the Phycal Algae Pilot project will help to enhance U.S. energy supplies through the responsible development of domestic renewable energy. Success in this project will help support the nation's goals of protecting the U.S. from the serious economic and strategic risks associated with reliance on foreign oil.

2.3 DESCRIPTION OF PROPOSED PROJECT

Phycal has developed an integrated system for growing algae and extracting energy products, primarily algal oil. This oil can be converted to biodiesel, drop-in "green" replacements for diesel and jet fuel, fuel oil blends, and other products. Phycal's strategic approach combines innovative technology and system engineering with a focus on producing oil at a market competitive price. Phycal will construct a pilot facility and commence the Phycal Algae Pilot project in 2010. Phycal

Hawaii R&D, LLC, was created to oversee and implement the proposed project and operations in Hawai'i.

Algae offers well known and documented advantages as a biofuel crop with the potential of providing a wide range of energy products and energy security with significant reductions in greenhouse gas emissions. Through combinations of breakthrough technologies, the Phycal Algae Pilot project will allow for successful demonstration and testing of components, system performance, and products to support deployment of a commercial scale farm as early as 2015.

The project's strategic approach combines innovative technology with an integrated system designed to hit cost targets that will make algal oil a competitive fuel in the market. The project's approach uses three advances in key areas: extraction of oil, lipid production, and integration. These key areas are described in greater detail below.

- Olexal® is a a novel living extraction process that "milks" oil from algae and recycles living algae back to the ponds to grow more oil. This "milking" extraction process saves inputs, energy, and time. The process also it requires minimal dewatering, removes culture contaminants, and increases oil productivity.

- Heteroboost™ is an algae "feedlot" that uses mature algae from the open ponds and increases lipid content by introducing fixed carbon in a closed system, such as inedible sugar and glycerol, which dramatically increases algal productivity.

- Integrated production system in the Phycal design will reduce capital expenditures and operating expenses, and therefore minimize unit output costs. Key innovations include pond design and operations, reductions in internal energy consumption, water management, and reductions in nutrient costs.

Phycal has tested and achieved successful growth rates and oil production using algal strains commonly found in Hawai'i. These strains will be used in the Phycal Algae Pilot project and will support commercial production in Hawai'i.

Commercial-Scale Operations

Phycal is developing a plan for the commercial scale operations in Hawai'i because of its climate, significant public support, and favorable market for algal biofuel. Hawai'i's combination of sunshine and consistent temperature support commercial scale growth of algae in open ponds. Additionally, Hawai'i has the availability of sufficient volumes of carbon dioxide (CO2), reclaimed water, and currently under utilized land to support a commercial scale operation. The State of Hawai'i has announced the "Hawai'i Clean Energy Initiative" and has established a number of mechanisms to assist in the development of renewable energy projects. The State's "Energy Agreement" with the local utility (Hawaiian Electric Companies) establishes targets for the development and use of renewable energy. Most importantly, the State currently pays a substantial premium compared to the continental U.S. for the delivery of petroleum products to the islands. There is increasing evidence that algal oil produced locally can become competitive in the Hawai'i market as a fuel for both a power generation and transportation.

2.3.1 Process Description and Facilities

Algae facilities are essentially high-tech farms that are classified as agricultural use as aquaculture production. These farms consist of a large algae crop cultivation area with relatively small area dedicated to processing and support facilities.

The following is a summary description of the algae strains, pond grow out areas, various process and support facilities requirements, and anticipated process activities for the Phycal Algae Pilot project operation at the Poamoho site in Wahiawā, Oʻahu, Hawaiʻi.

Figure 2-3 and Figure 2-4 shows the overall site plan concept at the Poamoho site for the Phycal Hawaii R&D, LLC, pilot project.

The Poamoho pilot project facility will include the following facility components:

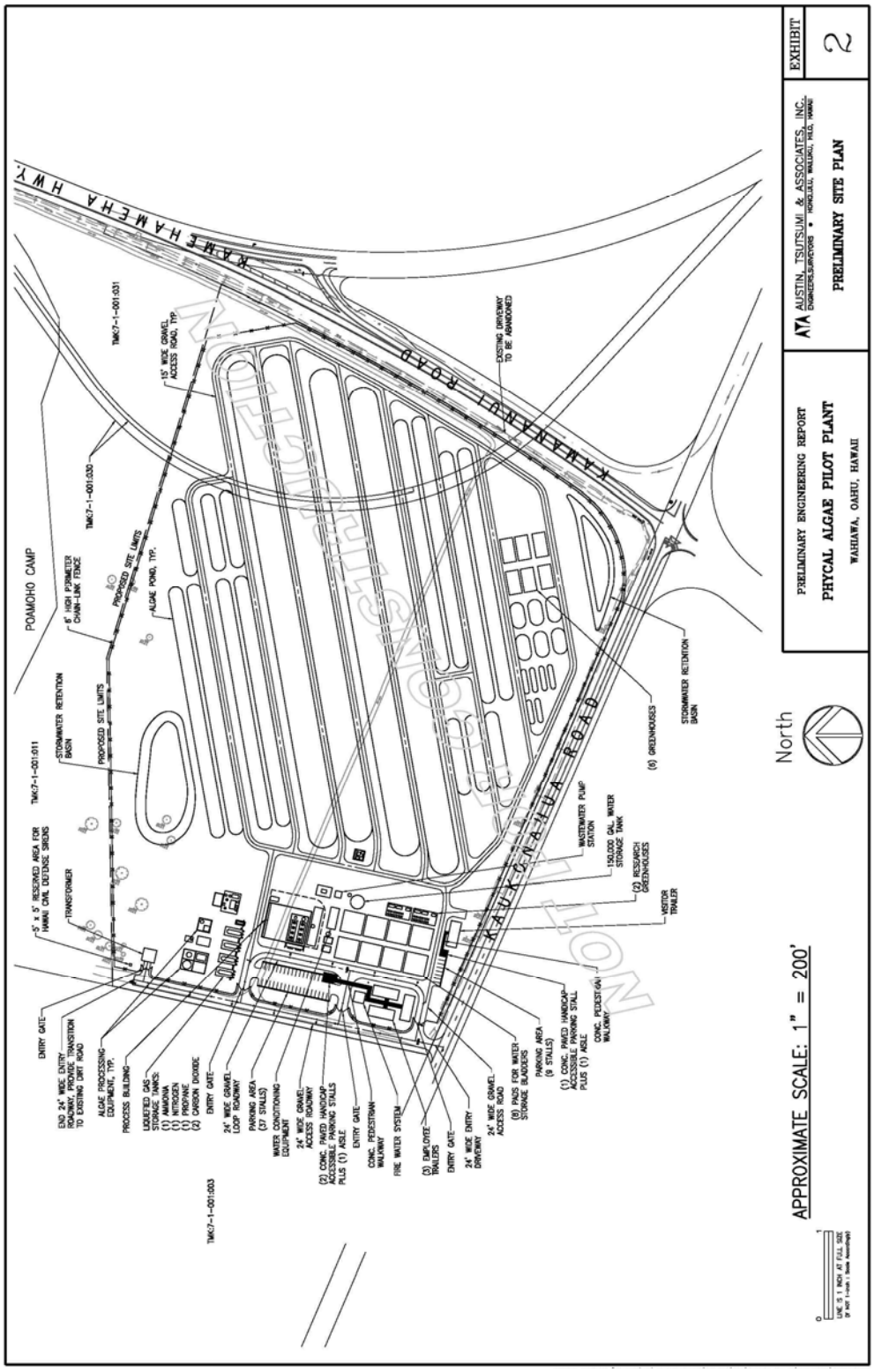
- Approximately ten acres of shallow raceway ponds of various sizes for grow-out of algae crop;
- Six greenhouses for initial phase grow-out of algae strains;
- One visitor trailer and three employee trailers including a building housing indoor algal growing and oil boosting (Heteroboost) as well as raw material storage and a lay down area;
- An outdoor area with various processing equipment facilities and storage tanks to support (1) oil removal and purification equipment, (2) a water conditioning unit for water purity and water recycling, (3) an anaerobic digester (methane captured from the anaerobic digester will be oxidized onsite using a thermal oxidizer), and (4) gas storage (CO2, propane, nitrogen).

The facilities at the Poamoho site will be approximately 5,000 sf and will have a trailer type of design. These facilities will house laboratory and bench scale oil conversion equipment. Areas outside of the facilities will be used to store gases and small quantities of oil product.

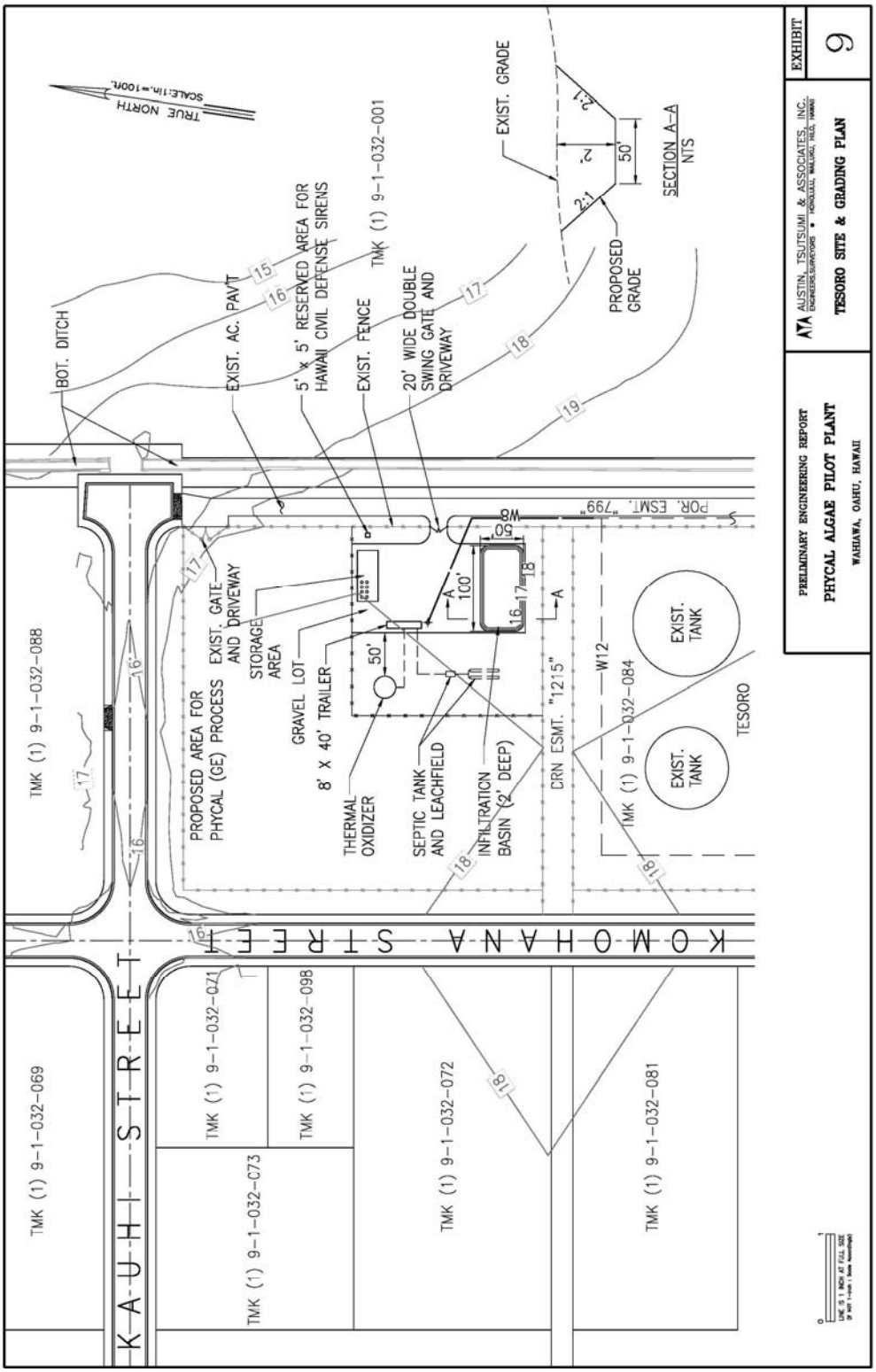
Phycal's algal oil product will be transported off-site for refinement by Tesoro at their existing facility in James Campbell Industrial Park. A site adjacent to the Tesoro refinery will house a small pilot scale General Electric Research Center (GERC) unit which will convert the algal oil into hydrotreated, renewable Jet Fuel, Renewable Naphtha, and Renewable Diesel in small quantities less than 75 gal per day (gpd) maximum throughout (*Figure 2-5*). In this process, algal oil is fed under high pressure into a liquid phase reactor or hydrotreating unit. This unit adds hydrogen to the fuel and coverts higher boiling point fractions into fuels at a normal boiling point range of biodiesel and jet fuel. Intermediate products are fed into a hydrogenation reactor. This process uses a noble metal catalyst to add hydrogen to the fuels to convert them into a direct drop-in replacement for diesel, and jet fuel. The byproducts of this step are naphtha and some light molecular-weight gases. A thermal oxidizer will burn hydrogen-rich waste gases from the process.

CONCEPTUAL SITE PLAN – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT
(Source: Phycal Hawaii R&D, LLC, 2010)

Figure 2-3



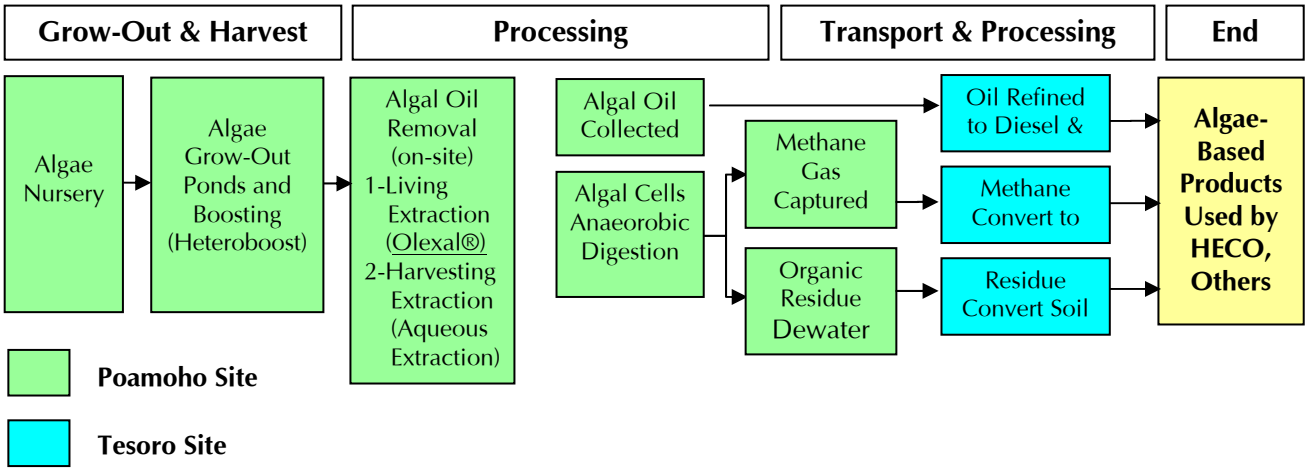
PRELIMINARY SITE PLAN – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 2-4**
(Source: Austin, Tsutsumi & Associates, Inc., 2010)



PRELIMINARY SITE AND GRADING PLAN – TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 2-5**
(Source: Austin, Tsutsumi & Associates, Inc., 2010)

The Tesoro project site will house an equipment trailer with a single office space, and a covered, outdoor chemical, algal oil, and fuel storage area. The covered storage area will have engineered secondary containment and capacity to store sixteen 55-gal algal oil drums, four 55-gal fuel drums, one drum of sulfur, and two 55-gal wastewater drums. No structures built at the Tesoro project site will penetrate the horizontal zone of Kalaeloa's Airport's air space.

The following flow chart provides a simplified depiction of the steps followed in the algae grow out and processing.



Summary descriptions of the project elements and process steps are provided below.

- **Algae Nursery and Greenhouse (Poamoho Site)**
  Algae strains grown at the Phycal facility will only include species of algae that are listed by the State Board of Agriculture (BOA) as permissible for use in Hawai'i. The project will use the native species of algae known as *Chlorella* and will not import or use genetically modified algae. In preparation for the Hawai'i pilot, Phycal has chosen ~~used~~ algae species that meet the State BOA regulations for use in Hawai'I and are safe for use as biofuels.

  A laboratory will house the algae propagation nursery, and a greenhouse will prepare the algae for introduction to ponds.

- **Algae Production Ponds (Poamoho Site)**
  The primary aquaculture operation at the Phycal project will include approximately 10 acres of shallow ponds of various dimensions. The raceway algae production ponds will be lined and shallow (12 to 24 inches deep). Algae grown in the greenhouse will begin grow-out in the smaller ponds, and then transferred into sequentially larger production ponds.

- **Boosting Process (Poamoho Site)**
  Heteroboost™ is an algae "feedlot" for algae that has matured in the open ponds. The matured algae is transferred to the Heteroboost™ process where lipid content is increased through the introduction of fixed carbon, such as inedible sugar or glycerol. After the Heteroboost™ process occurs, the algae are sent to aqueous extraction where the lipid is separated from the biomass.

- **Algal Oil Harvesting (Extraction) Facilities (Poamoho Site)**

  Living Extraction Olexal® is Phycal's novel living extraction process that "milks" oil from algae, and recycles living algae back to the ponds to grow more oil. This process also helps to keep the water clean and free from algae predators.

  Harvesting Extraction is the process that essentially breaks open the algae cell to separate the algal lipid portion ("algal oil") from the remainder of the algae cell biomass. Several valuable proteins and carbohydrates may also be separated from the biomass before the residual biomass is conveyed to the anaerobic digester. Isoparaffinic fluids will be used as a solvent in extraction process to obtain the algal oil. Isopar is a purified component derived from petroleum. Isopar is necessary for washing the oil out of the algae in the initial processing step. Small quantities of this fluid are contained in the extraction system and not exposed to the environment.

- **Anaerobic Digestion (Poamoho Site)**
  A digester unit will be employed in the process system to convert the residual algal biomass into methane. The small volumes of Methane produced from the digested biomass will be thermally oxidized. There is future potential for on-site energy production from biomass methane.

- **Pond and Process Water Recycling (Poamoho Site)**
  Water used in the Poamoho site ponds for algae propagation and the process units will be filtered and conditioned for recycling in the water conditioning system. Water in the ponds will be continuously monitored and recycled to retain the proper living medium for the algae. The process units of Heteroboost™ and aqueous extraction will include dewatering functions, where water will be conditioned to eliminate contaminants that inhibit the growth of algae. The conditioned water will be returned to the algae production ponds.

- **Farm Supplies and Maintenance Storage Facilities (Poamoho and Tesoro Sites)**
  Storage areas will be located in the process building, to provide storage for operational use and storage of supplies, such as nutrients, chemicals, tanks, pumps, hoses, and maintenance equipment. Chemical and fuels on-site will comply with State and Federal requirements.

  The Tesoro site will also include a storage area for equipment and materials operations.

- **Farm Office & Laboratory Facilities (Poamoho and Tesoro Sites)**
  The aquaculture operational facilities will be housed in three temporary employee trailers on the Poamoho site. These facilities will include the farm operation offices, which will provide space for staff and management. The laboratory/testing facilities will be essential to the successful monitoring of aquaculture pond systems and the on-site harvesting and processing steps.

  The Tesoro site will also house a temporary office trailer for staff and management.

- **Algal Oil Storage Transport for Refinement at Tesoro Site (Poamoho Site)**
  Algal oil will be temporarily stored on-site, and then transported off-site using containers or tanker truck to the Phycal processing facility at Tesoro refinery facilities located at the James Campbell Industrial Park in Kalaeloa.

- **Algae Oil Conversion to Biofuels (Tesoro Site)**
  The algae oil produced at the Poamoho site will be brought to the Tesoro site for refining in 55 gallon drums. The chemical reaction of oil to various fuels is done under pressure in small tubular reactors. The oil is heated to 300 to 400 degrees Centigrade, and then water (steam) or hydrogen is added to convert the fuel to various blends of naphtha, diesel and jet fuel.

  The general term for the algae oil-derived product is "diesel" because it is in essence a drop-in replacement for fossil fuels given the added hydrogen to the oil molecules. The jet fuel is the same composition as that derived from fossil fuels. The process is controlled by temperature, pressure and flow rate to shift the type of products made. Typical reaction condition is roughly one third each of naphtha, diesel and jet fuel. Through shifting reaction conditions, the fuels produced can be made up of all diesel as the liquid fraction, and the balance as LPG, including hydrogen, methane and propane. This allows some degree of control over the mix of fuels needed at any given time.

  The processing and conversion unit requires hydrogen which will come from the Tesoro plant. Approximately 100 kilowatts (kW) of power will be required to run the reactors. Once the reactors are heated to temperature, the heat of reaction will sustain the unit. From this point, the process requires electricity for controls, valves and pumps. To manage the excess LPG, methane and hydrogen, there will be a small ground flare employed on the site.

- **Water Supply Source, Storage, Pre-Treatment and Distribution (Poamoho Site)**
  Water system elements are described in detail in the Preliminary Engineering Report (PER) prepared by Austin, Tsutsumi & Associates, Inc. (ATA) (*Appendix B*). At full operation of the pilot plant, it is anticipated that approximately 110,000 gpd of make-up water will be required to maintain the algae production operations at the Poamoho site. Make-up water is required to offset losses predominately due evaporation. The water requirement will peak during drier summer months when evaporation is greatest. There will be pre-treatment of water to ensure appropriate water quality. Pond water will be conditioned with injected CO_2 and nutrients to enhance algae growth. Water supply for the algae pilot facilities will use reclaimed water that will be trucked in daily from the Schofield Barracks Wastewater Treatment Plant (WWTP). At full operation of the Phycal pilot plant, it is anticipated that a maximum of 18-20 water truck round trips will occur daily at the Poamoho site.

- **Domestic Wastewater Treatment and Disposal (Poamoho and Tesoro Sites)**
  Wastewater system elements are described in detail in the PER by ATA (*Appendix B*). There is no municipal wastewater collection system serving the existing Poamoho and Tesoro project sites. Domestic wastewater from the offices and laboratory buildings at the Poamoho site will be managed through an on-site wastewater pump station which will discharge sewage through a new forcemain that will connect to the existing 10-inch forcemain in Kamananui Road. The sewer line will eventually discharge to the Schofield Barracks WWTP. Wastewater

contributions are estimated to be approximately 14,200 ~~45,200~~ gallons per day (gpd) (average daily demand) based on 40 employees plus the process water.

There is no sewer system in the immediate area of the Tesoro project site. The properties in the area use individual wastewater systems, therefore, an onsite disposal system, consisting of a septic tank and leachfield, will be installed ~~a self-contained wastewater collection system (portable toilet) will be used~~ for domestic wastewater. The average daily demand will be approximately 160 gpd based on two employees. Waste from industrial processes will be disposed of off-site.

- **Aquaculture Pond and Process Water Treatment and Disposal (Poamoho Site)**
  The algae farm will condition and recycle water from the ponds during the grow-out phase. The algae processing facilities at the Poamoho site will generate reusable water from (1) the dewatering of collected algae; (2) the separation of lipids from the algae cells; and (3) subsequent digester processing of the algal cell material. Reusable water generated from the various operations of the algae pilot facility will be conditioned on-site for reuse in the ponds. Water used for general cleaning and equipment blow down will be discharged into the sewer at approximately 300 gpd.

  ATA (*Appendix B*) summarizes the process water constituents, water conditioning, and methods for disposal. Water conditioning and reuse will be conducted in compliance with State DOH regulations.

- **Algae Organic Waste By-product Processing/ Anaeorboic Digester (Poamoho Site)**
  The algae oil production process at the Poamoho site will generate organic cellulose residue from the extraction of lipid from the algae cells. The cellulosic material will be collected, dewatered, and placed in an anaerobic digester. The digester using microbial breakdown process yields a valuable by-product in methane gas (CH4) gas. In Phycal's production facility, this methane will be used to produce electricity. At the pilot plant, the methane volumes will be too small for electricity production, so the methane gas will be thermally oxidized.

- **On-Site Roadways and State/County Roadway Access (Poamoho and Tesoro Sites)**
  The existing Poamoho site can be accessed via two agricultural roads off Kaukonahua Road and Kamananui Road. The main access to the site will be from Kaukonahua Road, an existing two lane, 22-foot wide public roadway, near the southwest corner of the site. There is an existing dirt cane-haul road in that location that will be regraded and improved to make the 24-foot wide access drive into the facility. The new entry road and loop road providing access to the central facility buildings will be gravel. The larger width roadway will be provided to facilitate the movement of large semi-trailer trucks. Other smaller 15-foot wide gravel roadways will circulate around the proposed ponds. The secondary access point off of Kamananui Road will be removed and will not be used by project. A gravel parking area will provide 46 spaces for employees and visitors. A portion of the parking area will be paved with asphalt cement (AC) as required by Americans with Disabilities Act (ADA) guidelines. Appropriate driveway connection approvals will be obtained from the City and State for this agricultural property. Worker vehicles and delivery trucks will access the site through these approved driveway connections. Required deliveries to site will require no additional improvements to public highways.

There are two existing accesses for the Tesoro site. The main access is off of a private road owned by Tesoro located along the eastern boundary of the parcel at the end of Kauhi Street. A 24-foot wide gravel access driveway will be constructed off of the private roadway. An entry gate will be added to the existing perimeter fence for access to the site. A gravel parking lot will also be provided on the site with enough room for a large truck to deliver the 55-gallon drums from the Poamoho site. Algae oil truck deliveries from the Poamoho site are expected to occur approximately one time per week. The secondary access to the site is off Komohana Street along the western portion of the site. This existing access point is located outside of the project area and will not be used for the proposed project.

- **Facility Operations and Security (Poamoho and Tesoro Sites)**
  At the Poamoho site, the Phycal Algae Pilot project will have daily operations, with several employees on-site during regular operating hours and evening shifts. Worker vehicles and trucks will access the site on a daily basis. The project site will be secured by fences, entry gates, screens, lighting, and other security measures. A natural vegetation buffer will be retained along the east and south sides of the aquaculture ponds fronting the two roadways.

  At the Tesoro site, the project will have daily operations with two employees on-site during regular day time operating hours. While the perimeter of the entire Tesoro parcel is currently fenced off to the public, Phycal's portion of the property will be furthered secured by fencing around the project area.

- **Hazardous Materials Management (Poamoho and Tesoro Sites)**
  The operations of the pilot processing facility at the Poamoho and Tesoro sites will involve the use of hazardous materials in the facilities maintenance activities, including fuels, lubricants and cleaning products. The laboratory processes and algae oil extraction process will also require the use of chemicals, some of which are classified as hazardous materials.

  A study of hazardous materials was carried out for the project by ARCADIS in May 2010 (*Appendix C*). Storage, use and disposal of hazardous materials will be in compliance with Federal laws administered by the U.S. EPA and the State of Hawai'i DOH, Solid and Hazardous Waste Branch (SHWB). See *Section 3.9* for additional information.

2.4 PROJECT UTILITIES AND INFRASTRUCTURE

Overall existing conditions, impacts, and mitigation measures for utilities are discussed in *Section 3.0* of this document. The existing Poamoho and Tesoro project sites have no water, electric services, sewer connections, or solid waste collection services. A PER was prepared for the Phycal Algae Pilot project by ATA and is provided as *Appendix B*. The following section describes the physical characteristics of the site utilities with the development of the pilot project.

2.4.1 Water

Potable water service for the project will be provided by Poamoho Camp's existing private water service. There is an existing private 4-inch transmission water line in the vicinity of Kamananui Road and Kamehameha Highway that supplies water to Poamoho Camp. This private water line is

connected to the City and County of Honolulu Board of Water Supply (BWS) water system at Whitmore Village. The domestic line will serve the potable water needs of the employees but will not be used for pond operations and processing in the remaining area of the site. The pilot project will use reclaimed water from Schofield Barracks WWTP for pond operations and fire demands which will be stored on-site.

Potable water for the Tesoro site will be trucked in from the Poamoho site and stored on-site in a 55 gallon tank. The fire flow requirements will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks (*Figure 2-5*).

2.4.2 Wastewater

Domestic wastewater at the Poamoho site will be managed through an on-site wastewater pump station which will discharge sewage through a new forcemain that will connect to the existing 10-inch forcemain in Kamananui Road. The sewer line will eventually discharge to the Schofield Barracks WWTP.

An onsite disposal system, consisting of a septic tank and leachfield, will be installed ~~A self-contained wastewater collection system (portable toilet) will be used~~ for domestic wastewater at the Tesoro site. Waste from industrial processes will be disposed of off-site.

2.4.3 Drainage System

The proposed Poamoho site will have four drainage areas. Runoff from Drainage Area 1A (algae production ponds, adjacent roads, parking, and equipment pad areas) will be collected by perimeter grass swales that carry the runoff to Retention Basin A. Stormwater from Drainage Area 1B (remaining undeveloped site area) will flow overland to the north. Drainage Area 2 (entry drive and southwestern corner of the site) will be reduced in size from existing conditions, therefore reducing the amount of runoff. Runoff from Drainage Area 3 (six greenhouses and several algae ponds in the southeastern corner of the site) will be collected in perimeter swales similar to Drainage Area 1A, and will be routed to Retention Basin B.

The drainage system at the Tesoro site will consist of an infiltration basin which constructed adjacent to the facility where runoff can be collected and allowed to infiltrate into the permeable soils.

2.4.4 Solid Waste Disposal

Solid waste from the Poamoho project site will be disposed of at the Waimanalo Gulch Sanitary Landfill by a private contractor once per week. The proposed project will generate some solid waste with the general construction of the project. The operation and use of the site will also generate production waste and biomass residuals, however, significant amounts of new solid waste generation are not anticipated. Reuse and recycling will be implemented on site to the extent practicable. Efforts will be made to reuse residual biomass as a soil amendment for fertilization of agricultural crops.

No solid waste will be generated from the Tesoro site.

2.4.5 Other Utilities

There is no existing electrical service to the project site. The pilot project will require electrical services to power the labs and office spaces on the site at the Poamoho site. Electricity will also be needed to operate the production facility equipment and algae ponds. Electric service will be provided by a connection to the Poamoho Camp's overhead electric lines. Hawaiian Electric Company (HECO) presently serves this area.

Electrical power for the Tesoro site will be supplied by a drop from the Tesoro power line to the equipment trailer. HECO presently serves this area from its Malakole substation located in James Campbell Industrial Park.

2.4.6 Access, Roadways, and Parking

The Poamoho project site is bounded by Kamananui Ro. ad and Kaukonahua Road. Agricultural field roads also exist within the current project site. As described above in *Section 2.3.1*, the existing Poamoho site can be accessed via two existing agricultural roads off Kaukonahua Road and Kamananui Road. The primary access to the site will be from Kaukonahua Road. The existing on-site cane-haul field road will be improved to make a 24-foot wide access gravel driveway into the facility. The existing secondary access will be removed and will not be used by the project. A gravel parking area located at the southwestern portion of the Poamoho site will provide 46 spaces for employees and visitors, some of which will be paved with asphalt concrete.

The Tesoro project site is bounded by Komohana Street and Kauhi Street. There are two existing accesses for the Tesoro site. The main access is off of a private road owned by Tesoro located along the eastern boundary of the parcel at the end of Kauhi Street. A 24-foot wide gravel access driveway will be constructed off of the private roadway. The existing secondary access will not be used by the project. A gravel parking lot will also be provided on the site.

2.5 CONSTRUCTION CHARACTERISTICS

The proposed project will require the development of an algae farm and facilities at the Poamoho site and a biofuels processing facility at the Tesoro site. Both project sites will require some vegetation clearing, grubbing, minor grading, general construction, and landscaping.

2.5.1 Landscape Management

Minor clearing, grubbing and grading will be needed on both of the project sites to level the existing land for placement of the algae farm and production facilities. Most of the existing landscaping surrounding the project areas, which consist of overgrown vegetation, will remain in place. A natural vegetation buffer will be retained at the Poamoho site along the east and south sides of the aquaculture ponds fronting the two roadways. This earthen berm at the Poamoho site will be used for security, privacy, and will make the project less visible from the roadways.

2.5.2 Excavations

The Poamoho project site will require grading and leveling of the land. The site will be graded in terraces to provide level areas for the large algae ponds. There will be a mix of excavation and

embankment, with a net excess of approximately 3,000 cubic yards (cy) of material. Excavation materials will be used within the site to create higher and lower leveled areas.

The Tesoro site is nearly flat and minimum grading will be necessary.

2.5.3 General Construction

The construction of the project will include the formation and placement of concrete foundations, the installation of drainage infrastructure, electrical wiring and equipment, general carpentry work and many other trades and work associated with typical construction activities will also be carried out for the project.

Impacts to the land that occur from the development of the project, including new infrastructure and the laying of concrete on the site, will be removed after the project's completion. Pond areas will be filled and all buildings and equipment will be removed. Concrete areas will be ground up and used as construction materials for other projects. The land within the project area will be leveled to its natural state and grasses will be planted to prevent erosion from occurring. The project design is a low-impact development process and will have no long term impact on the land. Construction work will be performed in accordance with the Federal, State, and City approved design standards.

Construction activity hours will be from 7:00 am to 6:00 pm. Construction will adhere to applicable noise regulations as per Title 11, Chapter 46, of the HAR 11-46. Typical construction vehicles will be used on the jobsite for the development of the aquaculture project. These may include D9 dozers, front-end loaders, scraper, dump trucks, water trucks, etc. A permit from DOT Highways will be obtained for transport of oversize equipment and overweight loads.

The project will comply with NPDES permit requirements for construction activity. A NPDES permit for discharge of stormwater associated with construction activities will be obtained for the Poamoho site. The requirements of the approved NPDES permit and erosion control plan will be adhered to during construction as appropriate. Construction, grading and drainage plans for the project will be submitted to appropriate agencies, such as DOT Highways Division, for review and approval.

2.6 OCCUPANCY AND HOURS OF OPERATION

The Phycal Algae Pilot project will employ approximately 40 workers to support daily operations at the Poamoho and Tesoro project sites.

At the Poamoho site, the Phycal Algae Pilot project will operate 24 hours per day, seven days per week. Several employees will be on-site during each production shift. The production shifts for the Poamoho site are from 6:00 am to 2:00 pm, 2:00 pm to 10:00 pm, and 10:00 pm to 6:00 am.

At the Tesoro site, the project will operate 24 hours per day, seven days per week. There will be two employees on-site for each shift. Production shifts for the Tesoro site are also from 6:00 am to 2:00 pm, 2:00 pm to 10:00 pm, and 10:00 pm to 6:00 am.

2.7 SUMMARY OF PROJECTED COSTS

Costs for the Phycal Algae Pilot project are estimated at $65 million. The costs will be met through Federal, State and private funding.

3.0 Description of the Environmental Setting, Potential Impacts and Mitigation Measures

3.0 DESCRIPTION OF THE ENVIRONMENTAL SETTING, POTENTIAL IMPACTS AND MITIGATION MEASURES

This section describes the existing environmental setting and identifies possible impacts of the proposed project. Strategies to mitigate those potential impacts are also identified.

3.1 TOPOGRAPHY

Existing Conditions

The Poamoho site is undeveloped land formerly used for cultivating pineapples. Today, the site is overgrown with brush, tall grass, and weeds. Other than two dirt cane haul roads that pass through the site, there are no existing structures. The project site consists of approximately 34.117 acres extending northward from Kaukonahua Road. The elevation of the property ranges from 946 to 983 feet mean sea level (msl). The lot contains a high point that slopes away to the north, east, and west. The slopes range from nearly flat to 7 percent with an average gradient of around 4 percent (*Figure 1-11*).

The Tesoro project site is undeveloped land filled with overgrown grasses and weed type vegetation. The project site is a portion (0.9 acres) of the approximately 12-acre parcel owned by Tesoro. There are no existing structures or access areas on the site. The elevation at the site is approximately 18 feet msl (*Figure 3-1*).

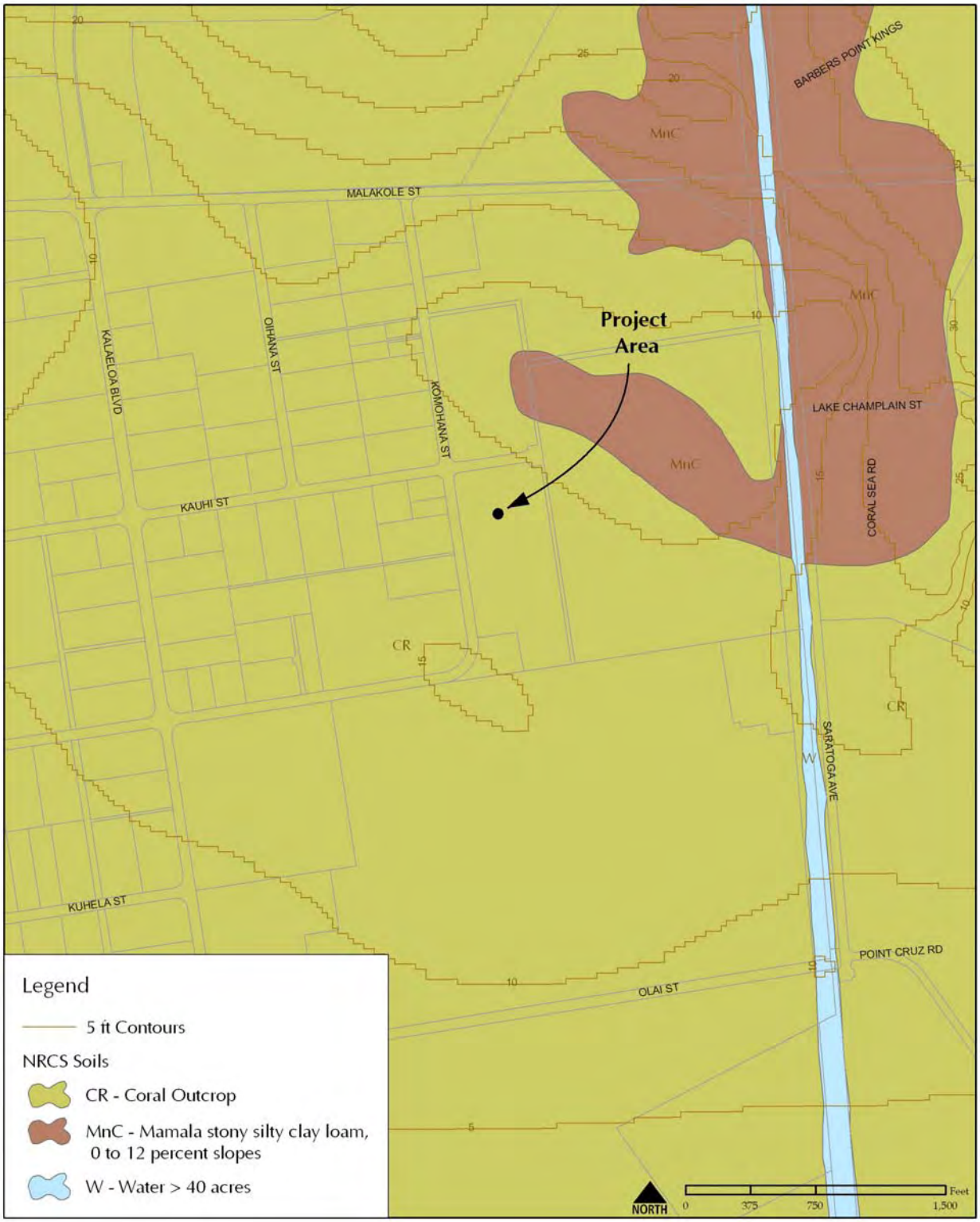
Anticipated Impacts and Mitigation Measures

No substantial changes to the site's topography will be made, although some excavation and minor grading will be required during the construction process to provide level areas for the parking area, ponds and production facilities. Best Management Practices will be implemented pursuant to the required Grading Permit to mitigate any potential impacts of soil erosion and fugitive dust during any grading or excavation.

3.2 SOILS AND GEOLOGIC CONDITIONS

Existing Conditions

According to the *Geology of the State of Hawai'i* (1985), the Poamoho project site is situated within the Schofield Plateau that spans the central part of O'ahu. The Schofield Plateau was formed by the lava flows from the Ko'olau Range to the east banking against the older Wai'anae Range to the west. These lava flows are part of the Ko'olau volcanic series comprising the majority of the Schofield Plateau, however, some of the Ko'olau volcanic series partially overlaps the Wai'anae volcanic series within the plateau. Both the Ko'olau volcanic series and Wai'anae volcanic series emerged during the Tertiary period of the Cenozoic era, with the lavas erupting in the Pliocene time; however, the Ko'olau volcanic series is the younger of the two series. On the west side of the plateau and along the rim of the Kaukonahua Valley, the plateau consists of alluvium from the Wai'anae Range piled against and interweaved with the Ko'olau lavas. These alluvial deposits occurred during the Holocene and Pleistocene ages.



TOPOGRAPHY AND SOILS – TESORO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-1**
(Source: Natural Resource Conservation Service (NRCS), 1972)

The soils on the Poamoho project site consist of two types of Wahiawā silty clay - 0 to 3 percent slopes (WaA) and 3 to 8 percent slopes (WaB). These soil types are of the Wahiawā Series, which consists of well-drained soils that occur within elevation ranges from 500 to 1,200 feet. A representative soil profile consists of about 12 inches of dusky red silty clay followed by about 48 inches of dark reddish-brown silty clay that has a subangular blocky structure. The substratum is weathered basic igneous rock, although this is generally quite deep. Permeability is moderately rapid and the erosion hazard is slight. The Hydrologic Soil Group (HSG) for runoff is Type "B" (*Figure 3-2*).

- **Wahiawā silty clay (WaA).** Wahiawā silty clay, 0 to 3 percent slopes (WaA) surface layer is very dusky red and dusky red silty clay about 12 inches thick. The subsoil, about 48 inches thick, is dark reddish-brown silty clay that has subangular blocky structure. The underlying material is weathered basic igneous rock. The soil is medium acid in the surface layer and medium acid to neutral in the subsoil. Permeability is moderately rapid. Runoff is slow and the erosion hazard is no more than slight. This subsoil is used for sugar cane, pinepapple, pasture and homesites.

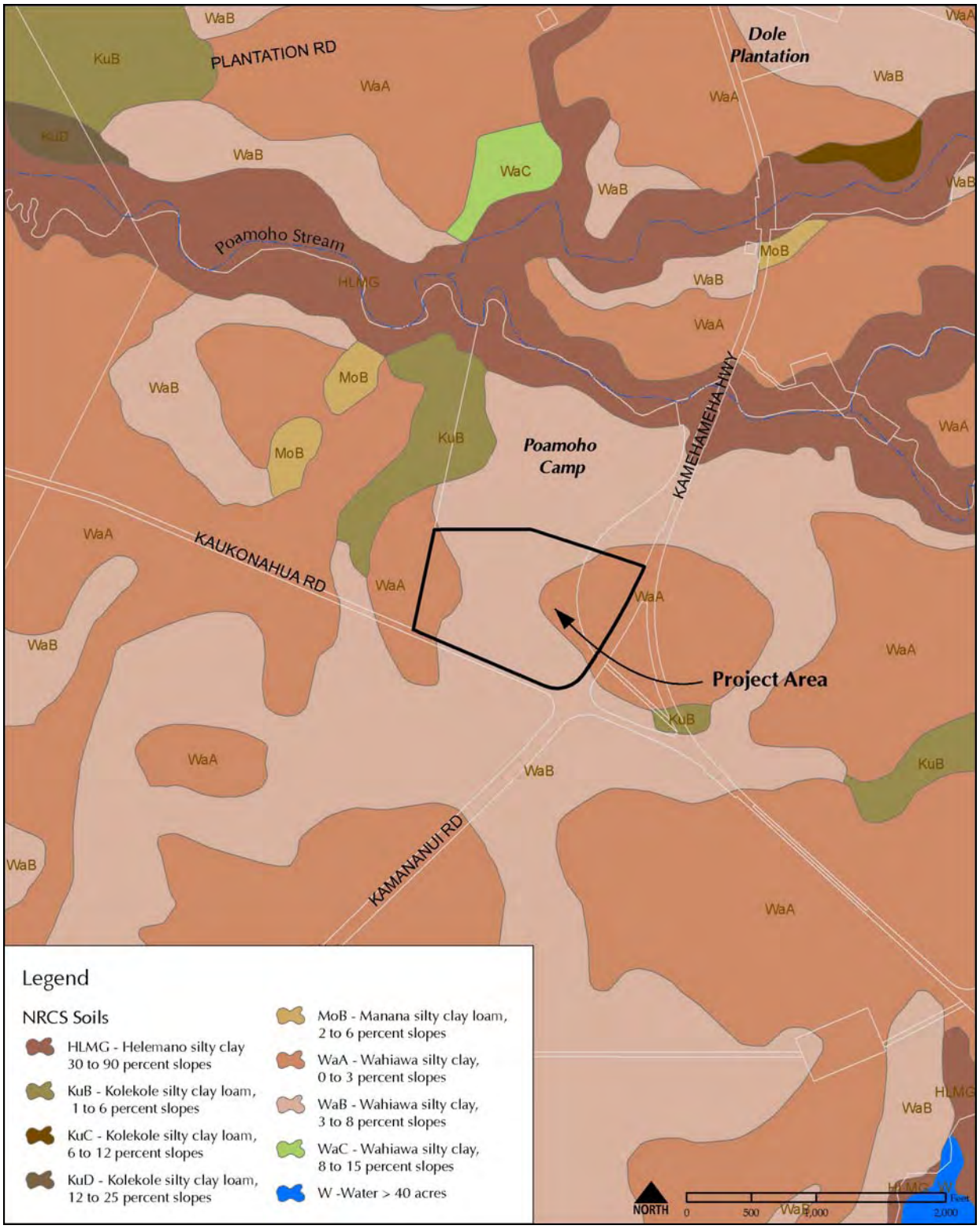
- **Wahiawā silty clay (WaB).** Wahiawā silty clay, 3 to 8 percent slopes (WaB) -- runoff is slow and the erosion hazard is slight. This soil is used for sugar cane, pineapple, and pasture.

The Land Study Bureau (LSB) classifies the Poamoho project area as Class B soils which have the second highest agricultural productivity rating (*Figure 3-3*). The Agricultural Lands of Importance to the State of Hawai'i (ALISH) rating characterized the vast majority of the Poamoho project site as "Unique" agricultural land which is defined as Non-Prime agricultural land used for the production of specific high-value crops (e.g., coffee and taro) (*Figure 3-4*).

The Tesoro project area is on a portion of the 'Ewa Plain which was formed as the lava from the two volcanoes merged. The coastal areas of the 'Ewa Plain consist of sediments from the erosion of the volcanoes and the remains of coral growth. The 'Ewa Coastal Plain comprises an area of approximately 28 square miles and is composed of an exposed emergent reef. The caprock has sequences of relatively flat Pleistocene marine sedimentary deposits and terrestrial alluvium deposits. The marine sedimentary deposits consist of calcareous silts, sands and gravels and reef limestone layers. The terrestrial alluvium deposits consist of silts and clays derived from upslope volcanic material (UH, 1983).

The Tesoro project site and a large part of the surrounding area contains soil classified Coral Outcrop (Cr) (*Figure 3-1*). This soil consists of coral and cemented calcareous sand. Coral reefs were formed in shallow ocean water at a previous time when the ocean level was higher. Coral outcrop can be found exposed at the ocean shore, on the coastal plains, and at the foot of the uplands. 80 to 90 percent of the coral outcrop is made from coral reef. The remaining 10 to 20 percent consists of a thin layer of red soil in cracks, crevices, and depressions within the coral outcrop. Vegetation on this type of soil consists of kiawe, koa haole, and fingergrass. Permeability is rapid and the HSG is Type "A".

No LSB data exists for the proposed Tesoro project site. No ALISH data is available for the Tesoro project site.



SOILS – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-2**
(Source: Natural Resource Conservation Service (NRCS), 1972)

LAND STUDY BUREAU AGRICULTURAL PRODUCTIVITY RATING – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-3**
(Source: Land Study Bureau, 1972)

AGRICULTURAL LANDS OF IMPORTANCE – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-4**
(Source: Agricultural Lands of Importance to the State of Hawai'i (ALISH), 1977)

Anticipated Impacts and Mitigation Measures

The Poamoho project site has been historically used for the agriculture. The land will remain in agricultural use for aquaculture. Development of the project will not change the overall soil composition at the site. Due to grading and leveling, soil will be distributed. During construction of the pilot project, erosion control practices will comply with County, State, and Federal regulations. Best management practices (BMP) will be implemented pursuant to the required Grading Permit to mitigate potential impacts of soil erosion and fugitive dust during grading or excavation. At a minimum, these practices will include: sediment traps, temporary diversion berms and swales, silt fences, dust fences, inlet protection, stabilized construction entrances and truck wash-down areas. The State DOH NPDES permit will be obtained for the project from the State prior to construction.

The Poamoho project site has been historically used for the agriculture. The land will remain in agricultural use for aquaculture. Development of the project will not change the overall soil composition at the site. Due to grading and leveling, soil will be distributed. During construction of the pilot project, erosion control practices will comply with County, State, and Federal regulations. Best Management Practices (BMP) will be implemented pursuant to the required Grading Permit to mitigate potential impacts of soil erosion and fugitive dust during grading or excavation. At a minimum, these practices will include: sediment traps, temporary diversion berms and swales, silt fences, dust fences, inlet protection, stabilized construction entrances and truck wash-down areas. The State DOH NPDES permit will be obtained for the project from the State prior to construction.

The production and processing facilities at the Poamoho site will not adversely affect agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), Hawai'i Revised States (HRS). The primary activity that will take place on the site is aquaculture for algae farming. The site will be largely occupied by algae ponds and greenhouses (approximately 29 acres), with the remaining portion of the site (approximately 5 acres) to be used for the processing of the algae and extraction of algae oil. The processing component will be secondary to growing the algae energy feedstock. Adjoining lands will be available for agricultural use with no limitation due to the Phycal algae farm and processing component.

The algae farm and processing facility is designed to be a low-impact development. The facilities and appurtenances have been selected to appropriately fit the objectives of the pilot project, the selected location on vacant agricultural lands, and the development standards of the LUO AG-1 zoning district. The development of the project will not impact the existing soil class (Class B) or ALISH designation of the site ("Unique" agricultural land). Additionally, the project will not adversely affect agricultural lands and uses in the vicinity, particularly since these agricultural areas are currently vacant and unused. Water to support the project's operations will be supplied by Schofield Barracks WWTP and will not adversely affect water resources in the area designated for other agricultural uses.

As detailed throughout *Section 3.0*, no significant adverse environmental impacts are anticipated to occur as a result of the project. No long-term effect to the existing agricultural land and uses in the vicinity is anticipated.

3.3 CLIMATE

Existing Conditions

The climate at both project sites is typical of the climate that characterizes most of the State of Hawai'i. It is relatively mild with constant temperatures throughout the year, moderate humidity, persistent northeasterly trade winds, and infrequent severe rainstorms. Visibility surrounding the existing sites is typically clear except when vog is present. Vog is a result of erupting volcanoes on the island of Hawai'i. During prolonged periods of southerly Kona winds, the vog can affect islands across the entire State.

The Poamoho project site has an annual average temperature ranging from the high-60s to the mid-80s Fahrenheit (°F), the average monthly low temperature is 65°F in January and February and average monthly high temperature is 88°F in August and September (WRRC, n.d.(b)). On the 'Ewa Plain where the Tesoro project site is located, low temperatures range from about 60°F in the winter to near 70°F in the summer and high temperatures range from 80°F in the winter to almost 90°F in the summer (UH,1983).

Winds from the northeast, known as trade winds, are the most predominant over the Hawaiian Islands. In the winter, there is a shift in the wind patterns characterized by the arrival of the westerly winds and frontal influences from the North Temperate Zone becoming more prevalent. Westerly winds typically are characterized by the presence of strong winds and high wave activity from the southwestern sector of the Pacific. Overall, the annual average wind speed near the Poamoho project site ranges from 9 to 10 miles per hour (WRRC). n.d.(a)). Winds speeds near the Tesoro site and Barbers Point area average 12 mph (State of Hawai'i DOA and State of Hawai'i DOT, 2000).

Hawai'i's heaviest rains come from winter storms that generally occur between October and April. Rainfall in the vicinity of the Poamoho project site is relatively moderate, with an average annual rainfall of approximately 40 to 60 inches. The average annual rainfall in the Barbers Point area and the vicinity of the Tesoro project site is 20 inches (DOA and DOT, 2000).

Anticipated Impacts and Mitigation Measures

The Phycal Algae Pilot project will have no effect on climate conditions, and therefore, no mitigation measures are recommended.

3.4 NATURAL HAZARDS

Existing Conditions

The Poamoho project site is located on a high point and is well above the nearby Poamoho and Kaukonahua Stream floodways. The entire site is within flood Zone D, defined as: "Areas in which flood hazards are undetermined, but possible" (*Figure 1-11*). The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel number for this area is: 15003C0120F. This map panel is a non-printed panel since FEMA has not completed a flood study for this area. The Poamoho project area is located well away from streams and coastal areas; therefore, no unique aquatic habitats are present on the existing site.

The Tesoro project site is also located within flood Zone D. The FEMA FIRM panel number for this area is 15003C0315F. The Tesoro site is located approximately 0.75 miles from the nearest coastal area, therefore no unique aquatic habitats are present on the existing site.

Anticipated Impacts and Mitigation Measures

Because the both of the project areas (Poamoho and Tesoro) are ~~is~~ located away from the coastal area and the stream courses, the ~~project~~ area is secure from stream flooding, as well as coastal inundation. To prevent ponding or localized flooding resulting from storm run-off, existing drainage infrastructure at both sites ~~in affected areas of the project~~ will be improved to meet applicable design and construction standards. All construction for the project will necessarily conform to relevant building codes to mitigate the risk of wind and seismic damage.

~~Zone X includes areas of minimal hazard from the principal source of flood in the area and the Flood Insurance Program does not have any regulations for development within this district. No mitigation measures are required.~~

3.5 FLORA AND FAUNA

A botanical survey for both the Poamoho site and the Tesoro site was conducted for the project by AECOS, Inc in April 2010. The findings of the assessment are included as *Appendix D*.

3.5.1 Flora

Existing Conditions

The Poamoho project site is an abandoned pineapple field. Weedy growth now dominates the parcel, however, evidence of the former agricultural use is present in the farm access roads and planting rows, as well as the occasional groupings of commercial pineapple plants still growing in the field. A majority of the site is covered by grasses, with several other herbaceous plants present and mixed within the grasses. Tall Guinea grass (*Urochloa maxima*) occurs in patches, especially around the margins bordering the paved highways and along the unpaved farm roads. From off the property, these grasses give the impression that the land is more or less impenetrable. Most of the ground previously occupied by pineapple is a mixture of sourgrass (*Digiteria insularis*) and beggars tick (*Bidens spp.*), growth of which tend to be under 0.6 meters (m) high. In addition, shrubs and small trees are scattered over the parcel. The majority of these are pua nana honua (*Solanum mauritianum*) and dog tail (*Buddleia asiatica*). No plant species currently listed, or proposed for listing under either the federal or State of Hawai'i endangered species statutes was detected during the course of the survey, and none would be anticipated given the nature of the vegetation.

The northern end of the Tesoro parcel was completely developed as a bioremediation facility until 1998. This facility was removed and the site completely cleaned of structures and debris. The site is now a graded level lot with the vegetation slowly returning. Presently, this vegetation is mostly open scrub and grassland with a few scattered small trees, mostly kiawe (*Prosopis pallida*). The grass is mostly buffel grass (*Cenchrus ciliaris*), but low-growing (spreading), ruderal herbs are nearly as common as grass across the lot. A total of 28 plant species were recorded in the survey of the empty lot adjacent to the Tesoro Refinery in James Campbell Industrial Park (*Appendix D*). These are mostly weedy species reflecting the relatively recent disturbance of the site. Of the 28 species identified on the lot, three are native (all indigenous; no endemics) or 10.7%. The only

plant observed of potential sensitivity and endangered species concern is the tree tobacco (*Nicotiana glauca*). This plant is an introduced species and not an endangered or threatened plant species. However, this plant is a known food source for the caterpillar (larva) of the endangered Blackburn's Sphinx moth (*Manduca blackburni*). The moth is thought to be extinct on O'ahu, but host plants are inspected for caterpillars, and there were none found on the site (*Appendix D*).

Anticipated Impacts and Mitigation Measures

The development and operation of the pilot project are not expected to result in adverse impacts to plants at either the Poamoho site or the Tesoro site. No plant species currently listed, or proposed for listing under either the federal or State of Hawai'i endangered species statutes, was detected during the course of the survey (*Appendix D*). The vegetation found at the proposed Poamoho project site is entirely one of early succession from a previously used and maintained agricultural field. The vegetation at the proposed Tesoro site is reminiscent of an industrial area having a graded level lot with slowing returning vegetation. There are no areas on the sites that were not previously cleared of natural vegetation. No wetlands, floodplains, or other ecologically sensitive terrain are also present. No mitigation measures relating specifically to flora resources are proposed.

The development of the proposed project will result in the introduction of a new flora species to the Poamoho project site. The algae plant species known as *Chlorella* will be grown on the site processed for oil extraction. *Chlorella* is a genus of single-celled green algae that grows in fresh water and has the highest content of chlorophyll (28.9g/kg) of any known plant on earth. It is spherical in shape, about 2 to 10 microns in diameter. Through photosynthesis it multiplies rapidly requiring only carbon dioxide, water, sunlight, and a small amount of minerals to reproduce. *Chlorella* is native to Hawai'i and can be found in mountains, valleys, ponds, streams and lakes. Particular species and strains of this common algae selected for the project are safe for use as biofuels. No adverse impacts to existing flora at the Poamoho site are anticipated, therefore, no mitigation is proposed.

3.5.2 Fauna

While no avian species currently listed, or proposed for listing under either the Federal or State of Hawai'i endangered species statutes was detected during the course of this survey, a total of 334 individual birds of 15 different species, representing separate 12 families, were recorded during the survey (*Appendix D*).

Although no endangered Hawaiian Waterbirds were detected during the survey, depending on how the aquaculture facility is laid out, and whether open ponds, raceways or other standing water will be present following the build-out of the project, several listed waterbird species may be attracted to the facility. The four extant endangered waterbird species currently known from O'ahu, Hawaiian Duck (*Anas wyvilliana*), the Hawaiian endemic sub-species of the Common Moorhen (*Gallinula chloropus sandvicensis*), Hawaiian Coot (*Fulica alai*), and the Hawaiian endemic sub-species of the Black-necked Stilt (*Himantopus mexicanus knudseni*), are all opportunistic species that are readily attracted to water features. All of these species have been recorded utilizing aquaculture facilities in the Hawaiian Islands.

The Tesoro site was deemed lacking in habitat resources to support avian fauna other than common, introduced species. Some of the avian faunal species recorded during the site survey

were the Spotted Dove (*Streptopelia chinensis*), Zebra Dove (*Geopelia straiata*), Common Myna (*Acridotheres tristis*), and the House Finch (*Carpodacua mexicanus*).

No mammalian species currently listed, or proposed for listing under either the Federal or State of Hawai'i endangered species statutes detected during the course of the Poamoho site or Tesoro site surveys.

Anticipated Impacts and Mitigation Measures

It is not expected that the modification of the habitat currently found within the Poamoho project site and the Tesoro project site will have a negative impact on avian or mammalian species. This includes potential effects to currently listed as endangered, threatened, or any that are currently proposed for listing under either Federal or State of Hawai'i endangered species statutes. Furthermore, the pilot project will not result in modification of any federally designated Critical Habitat, as there is none present on the subject properties.

From a native avian and mammalian perspective there is nothing unique about the habitat present within either of the project sites (Poamoho site or Tesoro site), and none of the habitat are important for any listed avian or mammalian species currently known from the Island of O'ahu.

While there is the potential that the operation of aquaculture ponds at the Poamoho site may attract one or more endangered waterbird species, the project will minimize the potential effects to endangered waterbirds. The water circulation equipment for the raceway ponds and other water holding bodies on the site will be shielded with bird netting, or other materials to prevent the endangered waterbirds from being harmed at the facilities.

There are no anticipated adverse impacts to the area's wildlife or habitat.

3.6 AIR QUALITY

An Air Emissions, Hazardous Materials, and Hazardous Waste Evaluation was performed for the proposed pilot project by ARCADIS (May 2010) (*Appendix C*). This study identified and evaluated the local, State and Federal regulatory requirements pertaining to Air Emissions.

Existing Conditions

As required by the Clean Air Act (last amended in 1990), the U.S. EPA established the National Ambient Air Quality Standards (NAAQS) to protect public health and welfare and prevent the significant deterioration of air quality. These standards cover seven major air pollutants: carbon monoxide (CO), nitrogen oxides (NO_X), ozone (O3), particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), sulfur oxides (SO_X), and lead. The State DOH, Clean Air Branch (CAB) has also established State Ambient Air Quality Standards (SAAQS) for six of these air pollutants to regulate air quality statewide. The SAAQS for carbon monoxide and nitrogen dioxide are more stringent than NAAQS (DOH, 2010). Hawai'i also has a stringent standard for hydrogen sulfide, which is a common odorous pollutant associated with wastewater treatment facilities.

The DOH, CAB regularly samples ambient air quality at monitoring stations throughout the State and annually publishes this information. On O'ahu, there are nine monitoring stations. The closest station to the Poamoho project site is the Pearl City station, which is located at 860 4th

Street, approximately eight miles southeast of Wahiawā. The Pearl City monitoring station currently monitors for the volume of PM_{10}, $PM_{2.5}$, speciation, and air toxics. The Kapolei station is the closest station to the Tesoro project site. The Kapolei station is located at 91-591 Kalaeloa Boulevard at the entrance to James Campbell Industrial Park. This station monitors Nitrogen Dioxide (NO_2), PM_{10}, CO, and Sulfer Dioxide (SO_2).

In general, air quality in the State of Hawai'i continues to be one of the best in the nation, and criteria pollutant levels remain well below NAAQS and SAAQS. According to the *Annual Summary 2008 Hawai'i Air Quality Data,* air quality monitoring data complied by the DOH indicates that the established air quality standards for all monitored parameters are consistently met throughout the State and on the island of O'ahu.

The proposed project sites are located in "attainment areas". Air quality in the vicinity of both sites is considered to be good, and meets the quality standards under NAAQS and SAAQS. Air quality at both project sites is positively influenced by tradewinds that regularly blow from a northeasterly direction moving generated air pollutants on land to the southwest out to the open ocean. No regularly occurring odors are present at these sites. Problems with poor air quality and elevated pollutant levels generally occur when tradewinds diminish or give way to southerly and southwesterly winds (known as Kona wind conditions). It is under stable conditions that the greatest potential for air pollutant buildup from ground level sources exists.

Anticipated Impacts and Mitigation Measures

Construction

There will be two types of short-term air quality impacts that will result from the proposed construction project at both sites: 1) fugitive dust generation dust from vehicle movement and soil excavation and 2) on-site/off-site emissions from moving construction equipment and commuting construction workers. Air quality monitoring will implemented to ensure compliance with NAAQS and SAAQS.

State of Hawai'i Air Pollution Control regulations prohibit visible emissions of fugitive dust from construction activities at the property line. A dust control program will be implemented to control dust from construction activities. Fugitive dust emission will be controlled through the mitigation measures such as watering active work areas, using wind screens, keeping adjacent paved roads clean, covering open-bodied trucks and limiting the area to be disturbed at any given time.

Operations

Daily operations of the project at both the Poamoho site and Tesoro site will result in outputs that will affect air quality. A detailed list of these outputs is provided in *Appendix C*. Outputs will occur daily at specified rates throughout the duration of the pilot project. According to the current design and specifications for the Phycal Algae Pilot project, the potential point source emissions at the Poamoho site include the propane-fired, ten million British Thermal Unit (10 MM BTU) boiler, a propane fired 2 MM BTU thermal oxidizer, and a supplemental 1230 electrical kW Tier II diesel engine generator (Tier II refers to standard level air emissions controls available on new diesel generator equipment) (*Appendix C*). Based on potential aggregate emissions from the above mentioned point sources, the Phycal Algae Pilot project is required to obtain a Covered Source Permit (CSP) with the State DOH, CAB and will be subject to sections of the State and Federal Regulations listed in *Appendix C*.

Operations at the Tesoro processing facility will result in air outputs. These gases, which will be emitted after the combustion flare, include water vapor, carbon dioxide, nitrogen, and sulfur dioxide (*Appendix C*). Emissions resulting from the processing facility are not expected to significantly impact existing air quality levels. Based on the emission estimates, the Upgrading Unit is required to obtain a CSP with the State DOH, CAB, and will also likely be subject to the sections of the State and Federal Regulations listed in *Appendix C.*

The output releases to the air resulting from the project will be managed according to Federal and State air quality standards. Appropriate mitigation measures will be implemented such as the use of thermal oxidizer units and equipment that minimizes output levels. Monitoring of air quality will also be carried out regularly to ensure compliance with NAAQS and SAAQS. Required Federal and State air quality permits will be obtained prior to construction and operations of the project. With permitting requirements in place, emissions will be minimized to avoid potential air quality effects.

Odors are not expected to increase as a result of the pilot project. The project's daily operations at the Poamoho site and Tesoro site will not involve the creation of new odors. Although solid waste will be present on the Poamoho site, it will be contained in storage bins to minimize affects within the site and to other surrounding areas. Regular waste disposal services will also be provided to ensure odorous substances are not contained on the site for prolonged periods of time. Waste from the Tesoro site will also be stored in containers and disposed of off-site using proper disposal methods.

3.7 NOISE

Existing Conditions

Title 11, Chapter 46, of the HAR 11-46 defines maximum permissible sound levels which are intended to protect, control, and abate noise pollution from stationary sources and construction, industrial, and agricultural equipment. As detailed below, maximum permissible sound levels in various zoning districts are set for excessive noise sources during the day (7am to 10 pm) and night (10pm to 7am) at the property line where the activity occurs.

- Class A - Residential, conservation, preservation, public space, open space, or similar type zones – 55 decibel (dBA) (day) and 45 dBA (night)
- Class B - Multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type zones – 60 dBA (day) and 50 dBA (night)
- Class C - Agriculture, country, industrial, or similar type zones – 70 dBA (day) and 70 dBA (night)

Major contributors to the existing background ambient noise levels within the Poamoho project area are largely attributed to motor vehicle traffic along streets bordering the project site. This includes Kamananui Road which turns into Kamehameha Highway, in particular, due to its larger traffic capacity and volume. The predominant source of noise near the Tesoro site is aircraft performing takeoff and landing operations at the nearby airfield. Other noise sources at both sites include wind moving through vegetation, birds, and occasional noises related to construction near the area.

Anticipated Impacts and Mitigation Measures

The proposed pilot project is not likely result in significant increases in ambient noise levels on the Poamoho agricultural site. While noise may be generated during the construction period, the project is not expected to impact the distant neighbors to the north of the site at Poamoho Camp. Construction activities will be monitored by the State to comply with the provisions of the regulation for community noise control. The dominant noise sources during construction will be earth moving equipment. Noise levels associated with construction equipment typically range from 80 to 95 dBA at 50 ft from the source. While significant impacts to neighboring areas are not anticipated, mitigation measures will be implemented to minimize construction noise impacts. These measures include limiting work to daytime hours and reducing truck/equipment idling when not in use.

The ongoing operations at the Poamoho site are not expected to create increases in noise levels. All significant noise producing equipment will be located toward the southern end of the property line - furthest away from the residential areas at Poamoho Camp. Impacts to other noise sensitive areas are not expected to occur since the project site is located well away from schools, hospitals, and nursing homes.

The project's processing facility at the Tesoro site may generate some noise during the conversion process of the algae oil. However, noise levels are expected to be minimal and within the allowable ranges associated with industrial areas. Located in James Campbell Industrial Park, the project is not expected to adversely impact neighboring industrial areas. During construction of the Tesoro project site, noise levels are likely to increase as a result of earth moving equipment, construction vehicles and other construction activities taking place on the site. While significant impacts to neighboring areas are not anticipated to occur, mitigation measures will be implemented to minimize adverse impacts.

3.8 UTILITIES AND INFRASTRUCTURE

Austin, Tsutsumi & Associates prepared a Preliminary Engineering Report for the proposed project sites (Poamoho site and Tesoro site) in April 2010 *(Appendix B)*.

3.8.1 Water System

Existing Conditions

Public water supplies are currently not used at the Poamoho project site. While existing public water supplies are not available, private water sources are available to support the site. There is an existing 4-inch private water line in the vicinity of Kamananui Road and Kamehameha Highway that supplies water to Poamoho Camp. This private water line is connected to the City and County of Honolulu, BWS waster system at Whitmore Village (approximately one mile east of the site). There are also larger public water transmission lines that run near the project, however these are unavailable for supplying this site. No fire hydrants are located in the adjacent public roadways.

The Tesoro project site is currently vacant, therefore, no public water supplies are used at the site. Although existing water sources are available at the site through Tesoro, potable water will be trucked in from the Poamoho project site and stored on-site. There is an existing onsite 10-inch fire water line with fire hydrants adjacent to Tesoro's tanks adjacent to the drainage channel. There is an existing water line along Komohana Street with a fire hydrant fronting the southwest

corner of the site, just north of the drainage channel. In addition, there are two existing water services with water meter boxes, but no water meters.

Probable Impacts and Mitigation Measures

The project's potable water requirements for the Poamoho site are estimated at average daily domestic demand of 928 ~~576~~ gpd (*Appendix B*). Domestic water service will come from the Poamoho Camp's existing private water service. The domestic line will serve the potable water needs of the employees primarily within the building facilities on the site but will not be used for pond operations and processing in the remaining area of the site.

The pilot project will use reclaimed water from Schofield Barracks WWTP for pond operations and fire demands. Since there is not an existing service line in the area, the water will be transported in by a tanker truck. Trucked-in reuse water will be stored on-site in eight separate 100,000 gal water storage bladders. At this time, the State DOH has not certified that the Schofield Barracks WWTP reuse water meets R-1 standards. Therefore an on-site treatment facility will be provided to ensure that the water is treated to sufficient levels. A water conditioning system will be used on site and designed to meet applicable Federal, State, and County regulations. The treated non-potable water will be stored in the on-site bladders where it can be drawn upon for fire or operational use. Average daily demand for project pond and processing operations is estimated to be 110,000 gpd (*Appendix B*). A fire water supply of 30,000 ~~150,000~~ gal must be available for fire suppression needs based on Hawaii Water System ~~National Fire Protection Association (NFPA)~~ Standards. The required fire flow rate is 1,000 gal per minute (GPM). Two on-site standpipes will be added in the vicinity of the employee facility and processing areas. Water to support the project's agricultural operations will not impact other water resources in the area, which could adversely impact agricultural land and other agricultural uses in the vicinity.

Potable water for the Tesoro site will be trucked in from the Poamoho site and stored on-site in a 55 gal tank. Potable water requirements for the Tesoro site are estimated to have an average daily domestic demand of 32 gpd based on a typical commercial/industrial use of 100 g per 1,000 sf of building area (*Appendix B*). The fire flow requirements will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks just south of Drainage Easement "1215" (*Figure 2-5*). A fire hydrant will be installed on site and connect to Tesoro's fire line.

3.8.2 Wastewater

Existing Conditions

No wastewater treatment and/or disposal facilities exist on both the Poamoho and Tesoro project sites. No wastewater is currently being generated from the site since the area consists of unused, vacant agricultural and industrial lands.

Formerly, when the Poamoho site was being used for the cultivation of pineapple by Del Monte Corporation, wastewater generated from the site was disposed of using a cesspool located on the adjacent property, Poamoho Camp. An existing 10-inch sewer forcemain runs along Kamananui Road near the eastern border of the site and eventually discharges to the Schofield Barracks WWTP.

No sewer lines exist at the entire Tesoro property at James Campbell Industrial Park. The properties in this area use individual wastewater systems.

Probable Impacts and Mitigation Measures

Domestic wastewater from the site will be collected in an on-site wastewater pump station (*Appendix B*). The pump station will discharge sewage through a new forcemain that will connect to the existing 10-inch forcemain in Kamananui Road. Wastewater contributions are estimated to be approximately 14,200 ~~45,200~~ gpd (average daily demand) based on the 40 onsite employees, pond operations and processing water contribution. The majority of the wastewater from pond operations and processing at the Poamoho site will be reconditioned in the on-site water treatment facility to allow for reuse in the ponds. A portion of which will be of R-1 quality to be used for wash-down areas. A maximum of 10 percent of the process water will be discharged to the wastewater pump station where it will be pumped to the Schofield Barracks WWTP.

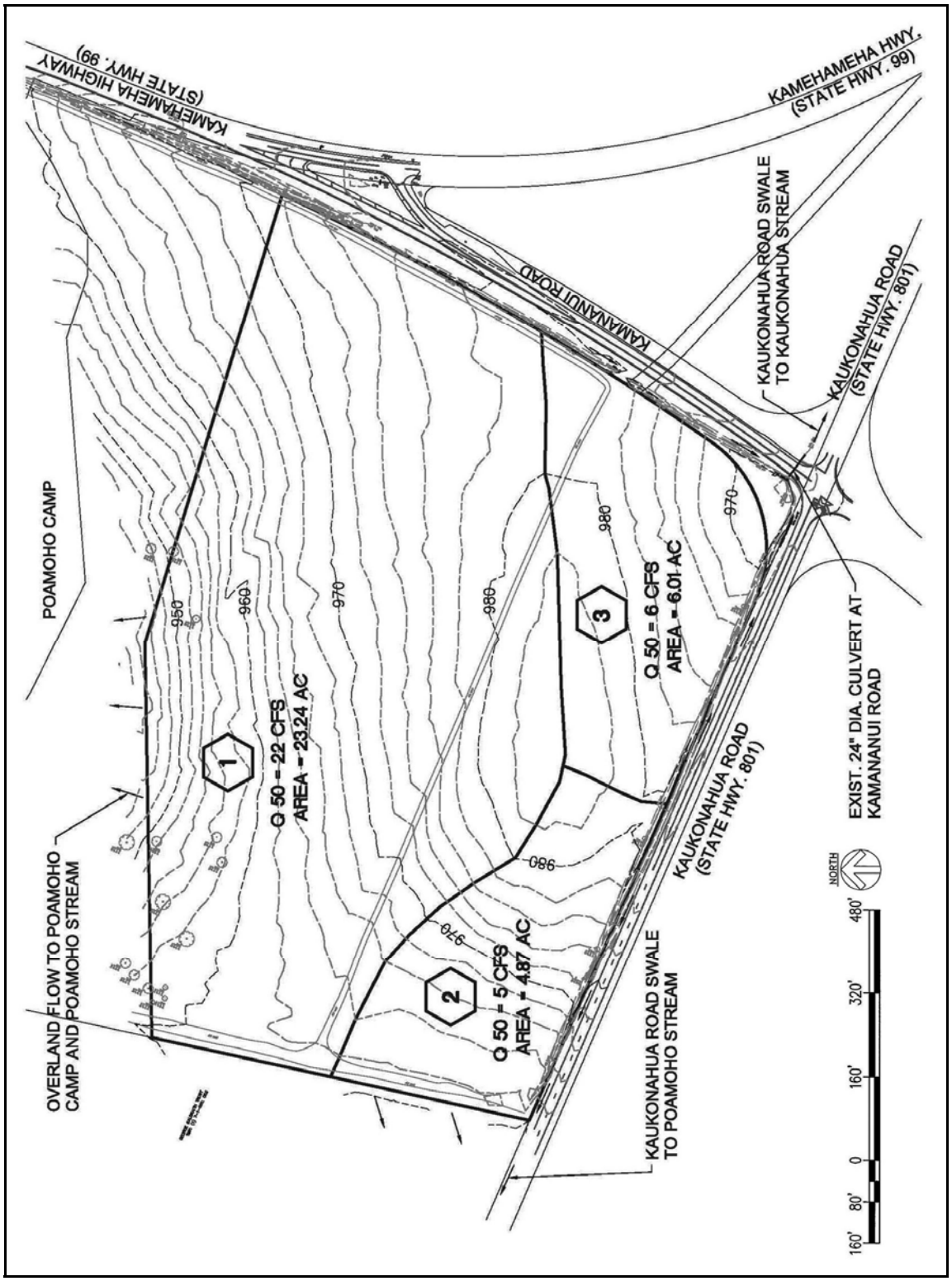
There is no sewer system in the immediate area of the Tesoro project site, therefore, an onsite disposal system, consisting of a septic tank and leachfield, will be installed ~~a self-contained wastewater collection system (portable toilet) will be used for domestic wastewater~~. The average daily demand will be 160 gpd based on two employees, and domestic wastewater will be removed regularly by a private disposal service. Other wastes from industrial processes will also be disposed of off-site.

No direct of indirect discharges of pollutants will occur to State or Federal waters from the operational activities at the Poamoho and Tesoro project sites.

3.8.3 Storm Drainage

Existing Conditions

The Poamoho project site has gentle slopes with runoff directed from the site to the east and the west. The majority of the site designated as Drainage Area 1 on *Figure 3-5* drains north towards the Poamoho Camp community. Runoff flows overland through the Poamoho Camp and eventually reaches the Poamoho Stream roughly 1,300 ft to the north. Since the soils are moderately permeable and there are no concentrated channels, the runoff is likely to be sheet flow and be widely dispersed. An existing 50-year peak runoff of 22 cubic feet per second (cfs) was determined for this area. The southwestern corner of the site designated as Drainage Area 2 drains west onto adjacent open land and eventually reaches the roadside swale on Kaukonahua Road (*Figure 3-5).* The roadside swale runoff eventually drains into Poamoho Stream. This portion of the site is expected to generate an existing 50-year peak runoff of 5 cfs. The southeastern corner of the site designated as Drainage Area 3 on *Figure 3-5* drains east toward the Kaukonahua Road and Kamananui Road intersection. At the intersection low-point, it is drained by a 24-inch culvert under Kamananui Road and a 36-inch culvert under Kaukonahua Road. Runoff continues through the swale drainage systems until it eventually reaches Kaukonahua Stream. The expected 50-year runoff from this portion of the existing site is 6 cfs.



DRAINAGE MAP, EXISTING CONDITIONS – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-5**
(Source: Austin, Tsutsumi & Associates, Inc., 2010)

The Tesoro site drains to the City and County of Honolulu's storm drainage system. The adjacent drainage system includes catch basins along Komohana Street and Kauhi Street, as well as an unlined open channel on the southern boundary of the site. All runoff eventually discharges to a large open channel that runs along the west edge of Barbers Point Naval Air Station. The unnamed open channel first originates near Kapolei Center and flows south to its ocean outlet point near Kalaeloa Regional Park. Since the soils on the Tesoro site have high permeability, the majority of rainfall infiltrates into the ground. Runoff from the site is widely dispersed and no concentrated flows are evident. The overall 50-year runoff from the existing project site is 1 cfs.

Probable Impacts and Mitigation Measures

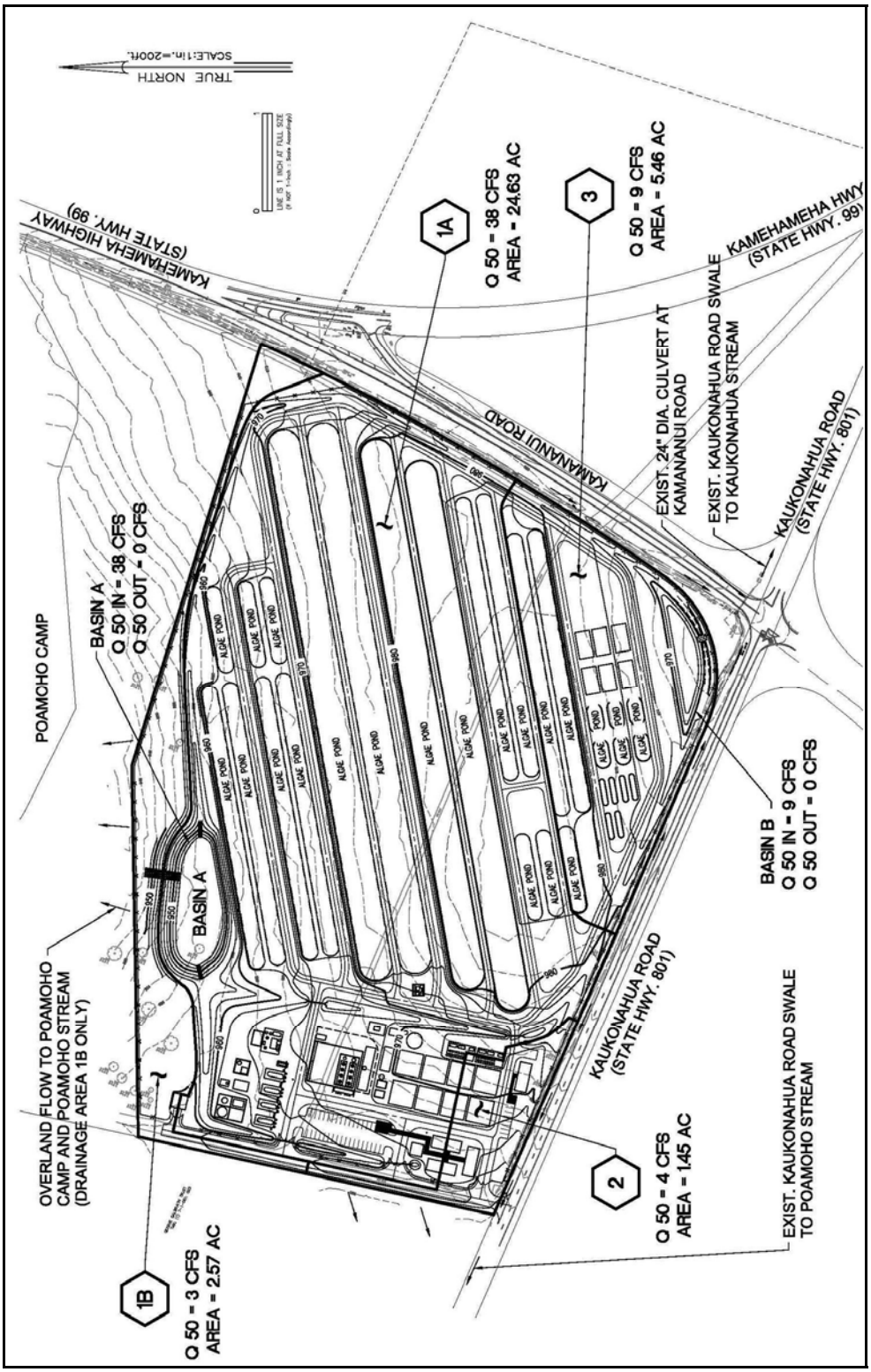
The proposed drainage plan for the pilot project will result in an overall decrease in stormwater runoff from the Poamoho project site due to runoff retention in Basins A and B shown in *Figure 3-6*. The net 50-year runoff from the project site will be 7 cfs, which is a reduction of 26 cfs from existing conditions.

Drainage Area 1A shown in *Figure 3-6* includes most of the algae production ponds, adjacent roads, parking, and equipment pad areas. Runoff from the road and pad areas is collected by perimeter grass swales that carry the runoff to Retention Basin A. The 50-year peak runoff of 38 cfs will be retained in Basin A. The algae ponds will not produce any runoff, since they will retain freeboard above the normal operating level to capture the 50-year 1-hour rainfall that falls there. Basin A will also be oversized to allow for emergency containment of overspill from the algae pond ~~basin~~ facilities. Drainage Area 1B includes the remaining undeveloped site area, where stormwater will flow overland to the north. Runoff rate from this area is 3 cfs. Since runoff from Drainage Area 1A is completely retained, and Drainage Area 1B will contribute stormwater runoff flowing off-site to the north. The runoff rate and volume will be a significant reduction from existing conditions (*Figure 3-6*).

Drainage Area 2 includes the entry drive and southwestern corner of the site, which will be reduced in size from existing conditions, therefore reducing the amount of runoff flowing in this direction to 4 cfs. Drainage Area 3 includes six greenhouses and several algae ponds in the southeastern corner of the site. Runoff from this area will be collected in perimeter swales similar to Drainage Area 1A, and will be routed to Retention Basin B. The 50-year runoff of 9 cfs will be retained in Basin B, which will also be oversized to allow for containment of overspill from the algae basin facilities.

The Tesoro site will require added impervious surfaces which will contribute to a slight increase in runoff. To mitigate the increase, a small infiltration basin will be constructed adjacent to the facility where runoff can be collected and allowed to infiltrate into the permeable soils (*Figure 2-5*).

On-site storm drainage system will be designed in accordance with the "Rules Relating to Strom Drainage Standards" of the Department of Planning and Permitting, City and County of Honolulu, January 2000. No significant storm drainage impacts are anticipated.



DRAINAGE MAP, PROPOSED CONDITIONS – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-6**
(Source: Austin, Tsutsumi & Associates, Inc., 2010)

3.9 HAZARDOUS WASTE

A preliminary Hazardous Material Evaluation for the proposed pilot project was carried out by ARCADIS in May 2010 (*Appendix C*). This study evaluated the on-site processes and various uses of hazardous materials.

Existing Conditions

Hazardous waste is defined as having a chemical composition or containing other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment (EPA, 2005).

No hazardous waste materials are currently used on the existing project site.

Anticipated Impacts and Mitigation Measures

The operations of the pilot processing facility at the Poamoho and Tesoro sites will involve the use of hazardous materials in the facilities maintenance activities, including fuels, lubricants and cleaning products. The laboratory processes and algae oil extraction process will also require the use of chemicals, some of which are classified as hazardous materials.

The proposed use of limited quantities of hazardous materials will require pre-start-up and annual Hawai'i Emergency Planning and Community Right-To-Know Act (HEPCRA) reporting to the State DOH. NPDES Storm water pollution control discharge permits will be required for both the construction and operation of the pilot project. Based on preliminary estimates of the aggregate amount of fuel stored on the Phycal site, a Spill Prevention Control and Countermeasures (SPCC) plan will be required. While project operations at the Poamoho site is not expected to generate hazardous waste materials, hazardous materials will be used as inputs for the growing and processing of algae. A list of the hazardous substances is provided below in *Table 3-1*.

Table 3-1 – Poamoho Site: Hazardous Materials List

• Ammonia or Urea (Fertilizer)	
• Gas	Compressed Propane
• Strong Oxidizing Agents	Bleach
	Sodium Percarbonate
• Strong Reducing Agents	NaOH
	Ammonium Hydroxide
• Acids	Phosphoric Acid
	Sulfuric Acid
• Solvents	Isopropyl Alcohol
	Hexane
	Isopar-H

Project operations at the Tesoro processing facility will require the use of chemicals which are commonly used in the refining and processing industry. A list of theses materials that will be used as inputs in the GERC process are listed in *Table 3-2*. Additionally, the conversion process of the algae oil into biofuels will also generate various forms of fuels including Naptha, Diesel, and Jet (*Appendix C*).

Table 3-2 – Tesoro Site: Materials Input List

Component	Quantity	Unit
Algal Oil	13,700	lbs
Hydrogen	1,900	lbs
Sulfur	30	lbs
Nitrogen	530	lbs

Adverse impacts relating to the hazardous waste are not anticipated as a result of the proposed project. Construction of the project will not involve hazardous waste since there are no existing structures located on the project site that will need to be removed. Some hazardous materials are used in the course of construction such as fuels and lubricants.
Hazardous waste from operations of the project will meet applicable environmental standards and regulations. Hazardous materials kept on site will have proper storage methods and locations within the site. Employees handling toxic or hazardous substances will receive appropriate training for health and safety measures. Coordination of hazardous waste and materials will continue to be carried out with the appropriate governmental agencies such as DOH, SHWB.

3.10 ELECTRICAL AND COMMUNICATIONS

Existing Conditions
There are several overhead electric lines in the vicinity of the Poamoho project site (*Appendix B*). Electrical and communication overhead transmission lines run along Kamehameha Avenue along with street lights on the west side of Kamehameha Avenue. An overhead, 3-phase branch line to the north of the site connects to the transmission lines on Kamehameha Avenue to serve the Poamoho Camp. HECO presently serves this area from its Helemano Substation which is located to the north of Poamoho Camp in the vicinity of the Dole Plantation. In addition, electrical lines run along the east side of Kamananui Road, just south of where it intersects with Kamehameha Highway, to provide power to the street lights. An overhead telephone transmission line runs along Kaukonahua Road along the southern boundary of the property.

The Tesoro project area contains overhead electric lines along each side of the site, including Komohana Street, Kauhi Street, Tesoro's Private Road and along the south side of Drainage Easement "1215". HECO presently serves this area from its Malakole substation located within the James Campbell Industrial Park area (*Appendix B*).

Anticipated Impacts and Mitigation Measures
The pilot project will require energy to power the labs and office spaces on the Poamoho site. Electricity will also be needed to operate the production facility equipment and algae ponds. Peak power demand is estimated at 1.5 megawatts (MW) per day. Electric service will be provided by a connection to the Poamoho Camp's overhead electric lines. New overhead lines will be extended into the site to serve the needs of the project. Telecommunications for the Poamoho site will be extended from existing overhead lines on Kaukonahua Road (*Appendix B*).

Electrical power for the Tesoro site will be supplied by a drop from the Tesoro power line to the equipment trailer. Electrical demand to run the reactors is 100 kW. The total electrical demand is

estimated at 200 kW. Telecommunications will be supplied by lines extended onto the existing HECO joint poles along Kauhi Street (*Appendix B*).

3.11 TRAFFIC AND ROADWAYS

Existing Conditions

The Poamoho project site is bounded by Kamananui Road on the east and Kaukonahua Road on the south. Access to the site will be from Kaukonahua Road, an existing two lane City & County Roadway, approximately 1,300 feet west of its intersection with Kamananui Road. In 2008, traffic counts were conducted by the City and County of Honolulu. The 24-hour volume on Kaukonahua Road fronting the project site was approximately 1,660 vehicles. On Kaukonahua Road, during the AM peak hour of traffic there were 150 vehicles and 136 during the PM peak hour of traffic.

The Tesoro project site is bounded by Kauhi Street on the north and Komohana Street, an existing two lane City & County Roadway with a paved width of 36 feet, on the west. Access to the Tesoro site will be from a private road owned by Tesoro located along the eastern boundary of the parcel at the end of Kauhi Street. These roadways are used by workers vehicles and employees associated with industrial operations at James Campbell Industrial Park. A mid-day site inspection of the areas observed infrequent vehicle use of this portion of Komohana Street.

Existing Bus Service

Bus service is provided to the Poamoho project site by routes mainly along Kamehameha Highway, including Routes 52~~, 72~~ and 83.

Bus service for the Tesoro site in James Campbell Industrial Park is provided by Route ~~41 and~~ 413.

Anticipated Impacts and Mitigation Measures

The proposed Phycal Algae Pilot project will employee 37 workers over three shifts with a maximum of 15 employees working during the day time at the Poamoho site. A single water truck will provide water to the algae plant from the Schofield Barracks WWTP. It is anticipated that the water truck will make 15 round trips a day. Other deliveries will also be made on an as-needed basis to the site to supply other farm operation materials. The proposed project is anticipated to generate less than 50 trips during the AM and PM peak hours of traffic and will not impact the traffic operations on the roadways near the Poamoho project site. The project will have no effect on the military road used for Stryker Brigade Convoy Training, located to the west of the property.

The proposed Tesoro site will have a total of three shifts with a maximum of two employees working during the day time. A single water truck will provide water to the algae plant. It is anticipated that the water truck will make one round trips a week. Algae oil deliveries from the Poamoho site for refining and conversion into biofuel are anticipated to occur two times per month. Other deliveries will also be made on an as-needed basis to the site to supply other operation materials. The proposed project is anticipated to generate less than five total trips during the AM and PM peak hours of traffic and will not affect the traffic operations on the roadways near the project site.

Existing bus service for both the Poamoho and Tesoro project sites will not be affected by the project. The project will not generate any significant increases or decreases in the existing ridership.

While impacts to existing traffic and bus services are not anticipated to occur as a result of the project, prior to construction, the Contractor will notify the City and County of Honolulu, Department of Transportation Services, Public Transit Division and Oahu Transit Services, Inc. (bus operations and para-transit operations) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction.

3.12 PARKING

Existing Conditions

There is no parking stalls provided on the subject properties. The sites are made up of vacant agricultural (Poamoho site) and industrial (Tesoro site) lands which are overgrown with tall brush and shrub vegetation. Parking on the existing sites is informal since there are no paved areas designated specifically for parking purposes.

Probable Impacts and Mitigation Measures

The Phycal Algae Pilot project will require parking for both of the sites (Poamoho site and Tesoro site). Parking areas will be created on the western portion of the Poamoho project site near the main access off of Kaukonahua Road. A 37-stall employee gravel parking area and a 9-stall visitor gravel parking area will be provided. A small portion of the parking areas will be paved with AC as required by ADA guidelines. At the Tesoro site, a gravel parking lot will be provided with enough room for a large truck to deliver the 55-gallon drums from the Wahiawā Site. One delivery is expected about once a week.

The laying of asphalt for parking on the site will be removed upon completion of the pilot project, and the site will be restored to its natural state. No mitigation measures are proposed.

3.13 SOCIO-ECONOMIC CHARACTERISTICS

Existing Conditions

The Poamoho project site is located in the Wahiawā community of Central O'ahu. The site is primarily surrounded by agricultural lands. The residential communities located closest to the site are Poamoho Camp and Whitmore Village. These communities consist of plantation type housing and are typical of small single-story family residences. The scale and feeling of Wahiawā as a small "country town" is evident in the areas surrounding the site with its plantation heritage and multi-cultural roots.

The Tesoro project site is located in Kalaeloa in the City of Kapolei and the community of 'Ewa. The site is immediately surrounded by other industrial lands, particularly within James Campbell Industrial Park. The nearest urban area with residential, commercial, and supporting services is located north and northeast of Kalaeloa Community Development District. Although most of Kalaeloa remains undeveloped, there is a community that consists of diverse uses. Kalaeloa offers the potential to create a dynamic and vibrant community, while creating jobs and promoting an environment that can be integrated with mass transit and is located close to schools, beaches, recreational areas, and cultural and natural resources. This area is planned as part of the City of

Kapolei and the ʻEwa DP, providing a new urban center and residential development areas to support a second city on the island of Oʻahu.

Anticipated Impacts and Mitigation Measures

Development of the pilot project is not expected to result in negative impacts to socioeconomic conditions. The Poamoho site will continue to be used for agricultural activities such as aquaculture and the growing of algae. The Tesoro site will also continue to be used for industrial activities like the processing and refining of algae oil into biofuel.

The pilot project will create additional employment opportunities. Workers will be needed for the initial development of the pilot farm at the Poamoho site and the processing facility at the Tesoro site, including the site work and general construction. To support the operations and day to day activities, approximately 40 jobs will be created for the Poamoho and Tesoro sites for up to a three year duration period. The Phycal Algae Pilot project is not expected to change the general labor mix of the Wahiawā or Kapolei (including Kalaeloa) areas. While the project will require jobs, the overall labor required to support the project at a pilot scale is not large enough to change the area's occupational character.

The Phycal Algae Pilot project will create both short-term and longer-term economic benefits. The project expected to cost approximately $65 million, of which about $50 million will be spent in Hawaiʻi. The economic benefits to the State are estimated between $5 to 8 million per year.

In the long term, the Phycal Algae Pilot Project will help to promote new venues for Hawaiʻi in biofuel and renewable energy production. The project will promote the use of vacant agricultural lands for a new type of farming industry in Central Oʻahu. Additionally, if the project's goals to achieve a commercial-scale algal oil production are met, the system will be able to deliver fuels derived from algae oil at competitive price for the Hawaiʻi market. This will help Hawaiʻi to move towards achieving the State's Clean Energy Initiative, which establishes targets for both the State and local utilities' development and use of renewable energy (70% of energy needs with clean energy by 2030 – State of Hawaiʻi, Department of Business, Economic Development and Tourism (DBEDT)).

No specific socio-economic mitigation actions are recommended.

3.14 PUBLIC FACILITIES AND SERVICES

This section discusses the project's probable impact on public facilities and services of the project sites (Poamoho site and Tesoro site) and surrounding areas.

3.14.1 Educational Facilities

Existing Conditions

Educational facilities located near the Poamoho project site include:

- Helemano Elementary School which is located at 1001 Ihiihi Avenue at approximately 2.2 miles away from the project site and is the closest school educational facility.
- Hale Kula Elementary School located at 1 Ayres Avenue is approximately 2.2 miles away from the project site.

- Major Sheldon Wheeler Elementary School located at 1 Wheeler Army Airfield is approximately 2.5 miles away from the project site.

Educational facilities located near the Tesoro project site include:

- Barbers Point Elementary School located at 3001 Boxer Road is approximately 3.3 miles away from the project site and is the closest educational facility.
- Island Pacific Academy located at 909 Haumea Street is approximately 3.3 miles away from the project site.
- American Renaissance Academy located at Lexington Street is approximately 3.8 miles away from the project site.

Anticipated Impacts and Mitigation Measures

The Phycal Algae Pilot project is not expected to affect existing educational facilities near the Poamoho or Tesoro project sites. No mitigation is proposed.

3.14.2 Recreational Facilities

Existing Conditions

There are no existing recreational areas within the Poamoho site or the Tesoro site. However, the open coastal waters located approximately 0.75 miles south of the Tesoro project site are classified as Class A Open Coastal Waters. Class A waters are designated to be protected for recreational use and aesthetic enjoyment. Uses other than recreational are allowed as long as they are not in conflict with the protection and propagation of fish, shellfish, and wildlife, and with ocean-related recreational activities.

Anticipated Impacts and Mitigation Measures

The proposed project will not affect existing recreational facilities, therefore, no mitigation is recommended.

3.14.3 Police

Existing Conditions

The Poamoho project site in Wahiawā is served by Honolulu Police Department (HPD) District 2 (Sector 2) which is bounded by Kipapa Gulch and Waiahole Stream on the south, the Waianae mountains on the west, the Koolau mountains on the east, and the shoreline from Kaena Point through Sunset Beach on the north.

The Tesoro project site is within the Honolulu Police Department's (HPD) District 8, which encompasses the Leeward Coast and the 'Ewa Plain. There are approximately 100 field officers assigned to this district.

Anticipated Impacts and Mitigation Measures

This project should not impact police department's operations or ability to provide adequate protection services to the surrounding community. District 2 police protection should be adequate for the proposed project operations at the Poamoho site and District 8 police protection should be also be adequate for project operations at the Tesoro site. No adverse impacts or mitigation is proposed.

3.14.4 Fire

Existing Conditions
Primary fire protection of the Poamoho project area is served by the Wahiawá Fire Station (Station 16) located approximately 2 miles away from the project site. Fire protection for the Tesoro site is served by Kapolei Fire Station in Kapolei Business Park located approximately 2.5 miles from the project site.

Anticipated Impacts and Mitigation Measures
This project is not expected impact the Fire Department's operations or ability to provide fire protection services to the project areas and surrounding areas. The planned improvements will be designed to meet fire and building code requirements.

3.14.5 Emergency Medical Services

Existing Conditions
The project areas are serviced by a variety of health care facilities. Wahiawa General Hospital is the nearest emergency hospital to the Poamoho site. Located approximately 1.97 miles from the project site, average response time is approximately three to five minutes. St. Francis Medical Center – West is the nearest hospital to the Tesoro project site. It is located approximately 10.5 miles from the project site.

Anticipated Impacts and Mitigation Measures
The proposed project will not impact the handling of EMS or medical emergencies. The Wahiawa General Hospital and St. Francis Medical Center – West will continue to function in its present locations and will be accessible to the Phycal Algae Pilot project sites in Wahiawā and Kalaeloa. No mitigation is proposed.

3.14.6 Solid Waste Management

Existing Conditions
The existing project sites are vacant; therefore, no solid waste is being generated and no form of solid waste disposal taking place on the sites.

Anticipated Impacts and Mitigation Measures
The Phycal Algae Pilot project will result in the generation of general solid waste and solid waste resulting from production outputs such as biomass, gums, soaps, waxes, bleaching clay, and sulphur. The project will require solid waste management services. A private waste disposal service will be contracted to pick up farm refuse and dispose of it at the Waimanalo Gulch Sanitary Landfill one time per week. The potential new solid waste streams include:

- Typical Facility Refuse - approximately 8 cy per week (standard roll off bin).
- Recycling – approximately 8 cy per week (standard recycling roll off bin).
- Digested Biomass – approximately 0.5 metric tons (MT) per day to be stored in 10,000 gal above ground stainless steel storage containers.

Other forms of solid waste will be generated during the construction of the project. However, construction wastes are expected to be minimal since the site will require no demolition of existing structures. Most of the facilities and equipment will be brought onto the site to provide for low-

impact development. General recycling practices will be carried out on the Poamoho site. Efforts will also be made to reuse residual biomass as a soil amendment for compost and fertilization of agricultural crops. No solid waste will be generated from the Tesoro site. Solid waste management will conform to State DOH and County requirements.

3.15 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Existing Conditions

In March 2010 and May 2010, Archaeological Inventory Surveys (AIS) were completed for the Poamoho project site and the Tesoro project site respectively by Scientific Consultant Services, Inc. (SCS) (*Appendix E*). While Inventory Survey-level investigations were completed, these reports are presented as Archaeological Assessments (AA) because fieldwork did not find cultural material of historic significance.

The primary purpose of the project was to determine the presence or absence of architecture, midden deposits, artifact deposits, cultural material of historic importance—including the possibility of human skeletal remains in a subsurface context. If historic features or archaeological sites were identified, they were evaluated in terms of significance criteria and mitigated accordingly. A review of archival resources and the results of previous archaeological work conducted in the project areas was undertaken prior to fieldwork to assess expectations for the project areas.

Poamoho Site

Although sites exist in the greater area of the Poamoho project site, given the background history of the survey parcels (in relation to agricultural use) as well as present land use, the expectation for finding pre-Contact sites, or post-Contact sites, was considered very low. Nonetheless, there remains a possibility of finding historic material during excavation work, therefore, test trenching via backhoe was conducted.

Fieldwork for the Poamoho project site was directed by SCS archaeologist Jon Wilson, B.A. on March 3rd to 5th, 2010 under the direction of Robert L. Spear, Ph.D. (Principle Investigator). The AIS survey methodology for the Poamoho site included a walk-through of the entire project area via east/west transects spaced 20 meters (m) apart. In addition, 24 backhoe trenches throughout the project area to search for subsurface cultural deposits.

No new sites, surface features, or midden scatters were identified during the pedestrian portion of the AIS, or the subsurface excavation. Trench locations were evenly distributed across the project area and results were extremely uniform. The 24 excavated trenches were each 15.00 m long and 0.6 m wide. Depth varied from approximately 2.20 m to 2.45 m deep. Each trench excavation was halted when a compact layer of silt was reached, estimated to mark the extent of previous agricultural tilling. It was determined that this depth marked the deepest limit of potential cultural material deposit. No single trench profile displayed variation from another trench in terms of matrix qualities, including density, color, moisture, ped size, etc. The single soil Layer found subsurface consisted of a dark reddish brown fine clayey silt, that was compact, semi-moist, and contained a 10 percent pebble content. Aside from some remnant black planting plastic within the first 20 centimeters (cm) below surface, no modern material was present within the trenches.

Tesoro Site

Archival research conducted on background history of the Tesoro site concluded that no previous archaeological studies had been conducted in the project area. However, extensive archaeological research has been conducted at Barber's Point Naval Air Station and properties surrounding the project area. The Western portion of Honouliuli has also undergone numerous studies. Additional information on these studies can be found in *Appendix E*.

Assessment of the Tesoro project area occurred on April 23, 2010 by SCS Archaeologist Elizabeth Pestana, B.A. The assessment consisted of 100% pedestrian survey which focused on an overall area of approximately 4-acres. During the investigation no pre-Contact and or post-Contact sites or features were observed on the project area surface. All extents of the project area were inspected for historic properties and cultural resources, with particular attention paid to the possible presence of sinkholes.

No historic properties were observed on the surface of the parcel during the AA. The property has been subject to subsurface alterations and other such disturbances as recent as within the past 15 years. Subsurface deposits seem unlikely due to modifications to the landscape by possible earlier agriculture and the recent industrial usage. However, portions of the ground surface are paved with asphalt and concrete, and known levels of disturbance in these areas remains limited. Sinkholes may have existed on the property and could have been filled in by previous construction activities and/or earlier geologic processes. These sinkholes occasionally contain archaeological deposits including human remains, hearths, and extinct faunal materials. Numerous sinkholes have been recorded on the 'Ewa Plain. Additionally sinkholes and low-lying areas may have been filled in to create level surfaces for previous developments. Sinkholes and human burials are the most likely site types to be encountered if the parcel were to undergo subterranean excavation. However, surviving subterranean cultural deposits generally seem unlikely at this location.

Anticipated Impacts and Mitigation Measures

No surface or subsurface cultural remains were identified during the AIS fieldwork at both the Poamoho and Tesoro project sites. For the Poamoho site, a 100% pedestrian survey and the excavation of 24 backhoe trenches within the parcel did not lead to the identification of surface features or subsurface sites or layers. Historic and Modern-era clearing and grading in the parcel removed any previously existing surface sites and destroyed or altered subsurface deposits—if they ever existed within the project area.

Based on the AA, the proposed development at the Poamoho site is likely to have a minimal likelihood of affecting historic properties. The work performed for this study confirms the DLNR, State Historic Preservation Division's (SHPD) Feb. 7, 2010 letter stating "no historic properties [would be] affected" by this development (LOG NO. 2010.0327; DOC NO: 1002NM15) (*Appendix E*). Additionally, SHPD accepted the AA report in their letter dated May 18, 2010 (*Appendix E*).

No further archaeological work is necessary for this project area following the SHPD acceptance of this AA report.

For the Tesoro site, a 100% pedestrian sweep of the project area identified no new sites, features or significant cultural properties. The property has been subject to subsurface alterations and other such disturbances. Vast changes in landscapes of the James Campbell Industrial Park area likely

started in 1890 with the re-deposition of alluvial soils to accommodate sugar cane cultivation on formerly arid portions of the coastal plain, and possibly within the current project area. Portions of the ground surface are paved with asphalt and concrete, and known levels of disturbance in these areas remains limited.

Based on the determination of "no findings" during fieldwork, this report is deemed an AA as per SHPD Guidelines. The findings of the AA for the Tesoro site indicate that the proposed development of the project not likely affect historic properties. Therefore, no further work is recommended for the project area as indicated by ~~following the~~ SHPD's acceptance of this AA report in their letter dated June 17, 2010 (*Appendix E*).

While no historic properties were identified during the archeological surveys both the Poamoho site and Tesoro site, there is a remote possibility of discovering cultural deposits and or human burials in either a primary or secondary context. In the event that historic or traditional cultural properties (*i.e.* cultural layers, etc.) are encountered during construction, work in the project area will cease until SHPD is notified, and appropriate protocols are carried out.

3.16 CULTURAL RESOURCES

Existing Conditions

Two Cultural Impact Assessments (CIAs) were completed for the Phycal Algae Pilot project by SCS. One study was prepared in March 2010 for the Poamoho site and another was also prepared in May 2010 for the Tesoro site, both of which are included in *Appendix F*. The following section provides a description of the CIAs and findings for each project area respectively.

The project requires compliance with Act 50 Session Laws of Hawai'i 2000 and the State of Hawai'i environmental review process under Chapter 343, ~~Hawai'i Revised Statutes (~~HRS~~)~~, which requires consideration of a proposed project's effect on traditional cultural practices. Through document research and cultural consultation efforts, the report provided information that was applicable to the assessment of the Phycal Algae Pilot project and its potential impacts to cultural practices. Hawaiian organizations, agencies, and community members have been contacted for both CIA studies in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project areas and their vicinities.

Poamoho Site

The Area of Potential Effect (APE) for the Poamoho site consisted of the project area in the context of the Wahiawā Ahupua'a and other places on O'ahu that may be traditionally associated or connected with Wahiawā and/or the project area.

For the Poamoho site, consultation was sought from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD; the Hawaiian Civic Club of Wahiawā; Maria Orr, a Consulting Archaeologist; Tom Lenchanko of Waha Ōlelo Aha Kukaniloko; and Leimaile Quitevis of the O'ahu Island Burial Council (*Appendix F*).

Two responses acknowledging receipt of the letter of inquiry were sent to SCS (*Appendix F*). One from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD (dated February 25, 2010) suggested several individuals who had already been contacted, as did the second letter

acknowledging receipt of the letter of inquiry from OHA, O`ahu Branch. In addition, two former long-time plantation workers, living in Poamoho Camp were interviewed on March 12, 2010 concerning ongoing cultural activities that might have occurred in the project area or its vicinity. Mr. Vaeleti Tyrell, 75 years old and originally from Swain's Island in the Tokelau Group, arrived in Hawai`i in 1961. He immediately began working for the plantation and stayed until it his retirement in 2004. Mr. Teodoro Agduyeng, 87 years old, arrived from the Philippines in 1946. He also worked for the pineapple plantation in various capacities, until he retired in 1988. Neither of them reported any cultural activities within the project area parcel, or its surroundings, but instead, stated it was always in pineapple.

As pertinent to the Poamoho site of Phycal Algae Pilot project the noteworthy findings from this study include:

1. The lands that form the Wahiawā Ahupuaʻa were associated with illustrious chiefs of Oʻahu. A Lo-lale chief named Kūkaniloko gave his name to one of only two sacred places in Hawaiʻi for the birth of the kapu chiefs. This site, located slightly south of the project area, was where his son, Kapawa, first chief of O`ahu Island, was born. Such was the distinction of Kūkaniloko as a birth place of chiefs, that even in 1797, Kamehameha I encouraged his sacred wife, Keopuolani, to arrive there in time for the birth of their child.

2. The Leilehua Plains, on which Schofield was constructed, served Hawaiian warriors as they learned the art of war. The slope descending from the plateau to Hale`iwa was called Keawawaihie, translated "the valley of spears", appropriate for the many battles that had been fought in the area, and with the ancient school of war at its southern boundary.

3. Settlement patterns are often re-created from archaeological remnants. The population in and around Wahiawā was large during the pre-Contact era based on the number of identified agricultural terraces.

4. With the accidental discovery of sandalwood, the inland regions and forests became of importance to an island nation that had only just been exposed to the material wonders of the Western world. Debts for exotic goods were paid by filling a ship's hold with sandalwood, which was taken to the orient and traded for profits. Under Kamehameha I, the sandalwood trade was a monopoly and kept under his complete control until his death in of 1819.

5. In 1897, Byron Clark, who was the Hawaiian Republic's commissioner agriculture, purchased the Wahiawā Colony Tract, which later became what is now Wahiawā Town. Settlers formed an agricultural cooperative and named it the Hawaiian Fruit and Plant Company. Along with the cooperative, Alfred Eames founded the Hawaiian Island Packing Company, which evolved into the Del Monte Corporation.

6. In 1900, James D. Dole, moved to Wahiawā to develop his 61 acres. Within a year he had formed the Hawaiian Pineapple Company, planting pineapple on 12 acres of land. By 1907, after convincing Dillingham to extend his railroad to Wahiawā, he built a cannery at Iwilei near the harbor for easy shipment. By 1932, the executives of Castle & Cooke took control of the management of the Hawaiian Pineapple Company. Poamoho Camp, abutting

the project area, was a consolidation of three Hawai`i Preserving and California Packing Corporation camps and filled with those working in the pineapple fields.

Tesoro Site

The APE for the Tesoro site consisted of the project area in the context of the Honouliuli Ahupuaʻa, the ʻEwa District and other places on Oʻahu that may be traditionally associated or connected with Honouliuli or ʻEwa and/or the project area. For the Tesoro site, consultation was sought from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD; George Kaeliwai of the Hawaiian Civic Club of `Ewa; and an e-mail was sent to Leimaile Quitevis of the Oʻahu Island Burial Council (*Appendix F*). A response was received from Phyllis Coochie Cayan who recommended seven new contacts who may have cultural, traditional and/or historical knowledge of the area. New letters of inquiry were sent to Senator Will Espero, Representative Rida Cabanilla, The `Ewa Beach Neighborhood Board, `Ewa Hui Aloha Senior Citizens, Mr. Shad Kane, Mrs. Nettie Tiffany, and Mr. Chuck Erhorn on May 18, 2010 (*Appendix F*). ~~Additional time was allotted for these individuals to respond, therefore the findings of the CIA inquiry response will be provided in the Final EA.~~

A response from OHA was received on May 17 with recommendations for two additional contacts that may have some knowledge of on-going cultural practices within and around the site area. One of the individuals had already been contacted (Shad Kane) and the other was sent a letter of inquiry on June 9, 2010.

Shad Kane, member of the O`ahu Burial Council, contacted SCS, inquiring if there would be an opportunity for a field check of the site area. In response to his request, Ms. Tracy Furuya of Group 70, International, emailed him and confirmed he could make a site visit. A date of May 31 was tentatively set for a walk around the perimeter. In a telephone conversation with SCS, Shad stated that he had made the site check and as far as he knew, there were no burials in the vicinity of the project area.

As pertinent to the Tesoro site of Phycal Algae Pilot project the noteworthy findings from this study include:

1. The project area's location on the ʻEwa Plain allies it with important Hawaiian figures, principles, and oral traditions. ʻEwa is known in Hawaiian tradition as a place of powerful and ill-intentioned spirits. Much of this spiritual force is attributed to Kamapuʻa and his grandmother Kamauna-Niho as well as to the sisters of Pele, specifically Hiʻiaka and Kapoʻulakiaʻu. The area is seen as rather mystical and uninviting, local workers describing stories of apparitions appearing on many occasions and unusual occurrence that have taken place in and adjacent to the project area. Of direct relevance to the project area, a strong connection is proposed between Kamapuaʻa and Honouliuli.

2. Kamehameha's successful conquest of Oʻahu in 1795, resulted in a large-scale redistribution of lands which set the stage for an ongoing series of land sales and transfers of ownership. Honouliuli Ahupuaʻa was originally given as punalaʻau (conquered land) to Kalanimoku. Subsequently, Kalanimoku gave this land to his sister Wahinepiʻo, whose daughter Kekau`onohi received the land during the Mahele of the late 1840s.

3. Land claims during the Māhele indicated the presence of a concentration of house lots around the loʻi lands of Honouliuli. Soil suitable for cultivation was rare in the upland portions of Honouliuli where small soil pockets are distributed unevenly. Irregularly located sinkholes and small gulches often served to catch soil deposition appropriate for limited gardening activity.

4. Despite the rapid and widespread changes of land ownership in Hawaiʻi in the late 1800s, Honouliuli Ahupuaʻa retained a semblance of its traditional form. After the death of Kekauʻōnohi in 1851, the title for Honouliuli and other Hawaiian lands was transferred to her husband Haʻalelea. Following Ha`alelea's death in 1864, his extensive lands became fragmented as they were sold or auctioned. The ahupuaʻa of Honouliuli escaped this fate under lease to Captain John Meek for ranching. In 1867, Haʻalelea's survivors regained a clear title to Honouliuli, and the ahupuaʻa was sold in its entirety to John Coney. One decade later, John Coney's wife sold Honouliuli Ahupua`a James Campbell.

5. James Campbell was convinced that the coast of the ʻEwa Plain could be used successfully for sugar plantation land. Campbell hired a well-digger from California to sink a well in Honouliuli in 1879. This well gained recognition as Hawaiʻi's first artesian well, called Wai Aniani ("crystal waters"). The well was productive until 1939 when it was sealed by the City and County of Honolulu. Additional wells found equal success in water flow. James Campbell proceeded to establish profitable cattle ranches and to engage in sugar plantation ventures in Honouliuli.

6. Honouliuli played an important role in the sugar plantation business in Hawaiʻi. In 1889, James Campbell leased land in Honouliuli to Benjamin F. Dillingham. Dillingham subleased the Honouliuli lowlands to Castle and Cooke who were then in a position to organize the ʻEwa Plantation Company. In 1897, Dillingham formed the Oʻahu Sugar Company, Ltd., utilizing the artesian well water to irrigate sugarcane plantations in the Honouliuli uplands. In 1970, the Oʻahu Sugar Company merged with the ʻEwa Plantation Company. The lease to the Honouliuli lands lasted through 1996.

Anticipated Impacts and Mitigation Measures

The information presented in the CIA reports for the Poamoho site and the Tesoro site reveals no notable cultural activities took place at the specific project areas (*Appendix F*). There was no additional information from the contacted organizations, newspapers, and archival research. Therefore, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by the activities of the proposed pilot algae farm and processing facilities. Adverse effects are not anticipated since no cultural activities were identified to occur at the specific Poamoho and Tesoro project areas.

3.17 VISUAL RESOURCES

Existing Conditions

The Poamoho project site is located in Wahiawā, Central O'ahu, bounded by Kamananui Road to the east and Kaukonahua Road south. *Figure 3-7* provides an aerial perspective of the general area. Existing to the east, west, north and south consist primarily of agricultural lands having dense brush and vegetation (*Figure 3-7a through 3-7d*). Beyond the overgrown agricultural lands, particularly looking west, are mauka views of green mountainous landscapes (*Figure 3-7c and 3-7d*).

The Tesoro project site shown in *Figure 3-8* is located in Kalaeloa, 'Ewa, and is bounded by Komohana Street to the west and Kauhi Street to the north. Industrial lands surround the site to the east, west, north and south. The adjacent parcel to the east is currently vacant, having dense brush and vegetation (*Figure 3-8a through 3-8d*). Beyond this industrial land, particularly looking north, are distant views of green mountainous landscapes (*Figure 3-8c*).

Anticipated Impacts and Mitigation Measures

The algae farm will be developed on vacant agricultural lands at the Poamoho site, which are relatively flat and level. The Phycal Algae Pilot project facilities may be partially visible from Kamananui Road and Kaukonahua Road which borders the Poamoho site on the east and south. From vantage points located mauka and makai of the site, the property will generally appear as a continuation of agricultural lands and uses in the Wahiawā area. The project design will maintain the visual resources of the area by meeting agricultural development standards, such as height and setback requirements, established in Section 21-3.50-4 of the LUO. Additionally, a natural vegetation buffer will be located along Kamananui Road and Kaukonahua Road to provide privacy and to make the project less visible from the roadways. The project will blend with the surrounding uses of the area while preserving the natural beauty of Wahaiwā and Central O'ahu. No significant impacts to scenic vistas or existing agricultural landscape are anticipated.

The processing facility at the Tesoro site will be developed on vacant industrial lands. Visual resources surrounding the project site are minimal. While the facility may be visible from Komohana Street and Kauhi Street, the project is located in James Campbell Industrial Park and is surrounded by other large scale industrial development. The project design will meet industrial development standards, such as height and setback requirements, established in Section 21-3.130-1 of the LUO. No impacts to visual resources within this vicinity are anticipated.

SITE PHOTO KEY – POAMOHO SITE
PHYCAL ALGAE PILOT PROJECT **Figure 3-7**

VIEW FROM SOUTHWESTERN PORTION OF THE PROPERTY LOOKING NORTHEAST
(Source: Google Maps, 2009) **Figure 3-7a**

VIEW FROM KAUKONAHUA ROAD LOOKING NORTHEAST TOWARDS THE PROJECT SITE
(Source: Google Maps, 2009) **Figure 3-7b**

VIEW FROM KAMEHAMEHA HIGHWAY LOOKING WEST **Figure 3-7c**
(Source: Google Maps, 2009)

VIEW FROM KAMEHAMEHA HIGHWAY LOOKING WEST TOWARDS THE PROJECT SITE
(Source: Google Maps, 2009) **Figure 3-7d**

SITE PHOTO KEY –TESORO SITE
PHYCAL ALGAE PILOT PROJECT

Figure 3-8

VIEW FROM KAUHI STREET LOOKING SOUTHEAST TOWARDS THE PROJECT SITE **Figure 3-8a**
(Source: Google Maps, 2009)

VIEW FROM KOMOHANA STREET LOOKING EAST TOWARDS THE PROJECT SITE **Figure 3-8b**
(Source: Google Maps, 2009)

VIEW FROM KOMOHANA STREET LOOKING NORTH TOWARDS THE PROJECT SITE
(Source: Google Maps, 2009) **Figure 3-8c**

VIEW FROM KOMOHANA STREET LOOKING SOUTHEAST **Figure 3-8d**
(Source: Google Maps, 2009)

3.18 POTENTIAL CUMULATIVE AND SECONDARY IMPACTS

Cumulative effects are impacts, which result from the incremental effects of an activity when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertake such other actions.

The Phycal Algae Pilot Project will help to promote new venues for Hawai'i in biofuel and renewable energy production. The project will promote the use of vacant agricultural lands for a new type of farming industry in Central O'ahu. The goal of the project is to achieve commercial-scale algal oil production, which can deliver algal oil at competitive price for the Hawai'i market. This will help Hawai'i to move towards achieving the State's Clean Energy Initiative, which establishes targets for both the State and local utilities' development and use of renewable energy with a target of 70% of energy needs with clean energy by 2030 – DBEDT.

Construction activity during the proposed project will generate direct employment as well as indirect and induced employment in construction-related industries. The operation and site restoration is expected to last approximately three years and will generate approximately 40 jobs to support operations at the Poamoho and Tesoro sites. The project expected to cost approximately $65 million, of which about $50 million will be spent in Hawai'i. The economic benefits to the State are estimated between $5 to 8 million per year.

4.0 ALTERNATIVES TO THE PROPOSED PROJECT

4.0 ALTERNATIVES TO THE PROPOSED PROJECT

This Draft Environmental Assessment evaluates alternatives to the proposed project described in *Section 2.0*. The following provides discussion of the alternatives to the proposed project.

4.1 ALTERNATIVE A – NO-ACTION

The No-Action Alternative is the baseline against which other alternatives are measured. "No Action" refers to the future site and program conditions that would likely result should the proposed project not proceed.

This alternative would result in keeping both sites vacant and undeveloped, with no immediate change to the properties. The existing environmental conditions at the sites would remain unchanged. The project's technology, process design configurations, and site specific aspects of the project would also not be needed.

Construction of the Phycal Algae Pilot would not occur and the mission of Phycal to develop commercial scale production of algal oil at a competitive price would not be accomplished. While the selection of this alternative would mean that Federal and State funds would not be expended on the project, and neither would the significant private investment. This alternative would also mean that the need to provide a biofuel crop such as algae would not be developed, foregoing the potential to providing a wide range of energy products and energy security with significant reductions in greenhouse gas emissions would not be met. The No-Action Alternative would not be consistent with Federal, State and County polices, such as the State's Clean Energy Initiative, which focus on the development of renewable energy technologies.

Under the No-Action Alternative, the Poamoho site would remain as unutilized agricultural land, in an area that is surrounded by agricultural land and is designated for agricultural uses by the County's Central Oʻahu SCP Urban land Use map (*Figure 1-8*). The project site is in a key location of Wahiawā where agricultural lands are protected to provide for new and continuing agricultural opportunities. If left vacant, the site would be significantly underutilized in terms of (1) meeting the demand to expand Hawaiʻi's agricultural base by promoting growth and the development of potential enterprises such as aquaculture, and (2) providing the substantial environmental, social and economic benefits expected to accrue from the project. Additionally, under the No-Action Alternative, the Tesoro project area would also remain vacant and unused.

This No-Action Alternative would also not meet the project's main objectives:

- Demonstrate Phycal's commercial performance targets in a pilot-scale algae farm.
- Document the impact of the fuels produced on carbon dioxide recycle/reuse and the environment.

4.2 ALTERNATIVE B – SMALLER SCALE PROGRAM

The long term objective for the Phycal Algae Pilot project is to develop commercial scale production of algal oil at a competitive price. The pilot scale project will demonstrate sustained growth and algal oil production at scale, allowing Phycal to complete technical qualifications as a commercial product, permit system development, and confirm the ability to produce products at

acceptable cost targets. The smaller scale program alternative would not meet the project's objectives of converting the pilot-scale project to a full-scale commercial production using the existing production facilities and site.

While this alternative would require less funding, since only half of the pilot program would be implemented, the facility would be able to deliver only 50,000 gal of algae oil per year compared to 100,000 gal which is expected from the proposed project. The ultimate development of a commercial scale algae farm and production facility would take substantially longer period of time to achieve with the smaller scale program. At a smaller scale, the pilot would not have adequate area to complete the required research and development in the time allocated under the U.S. DOE proposal. The overall technology, process design configurations, and processing equipment would remain the same as for the proposed project. With only three ponds and production equipment, the site would require less land – approximately 26 acres. The associated requirements discussed above for the proposed project, such as energy, water, land, and labor, would be required at a smaller scale.

This alternative is not a viable option to meet the project's general objective of developing biofuel technologies that would result in technical, economic, and environmental advantages. At a smaller scale, the pilot would not provide the same environmental, economic, and social benefits as the proposed project. The project expenditures would be significantly less than the proposed action, which is expected to cost $65 million, with approximately $50 million being spent in Hawai'i. In comparison to the proposed action, the number of jobs required to support both the construction and operation of the project would also be substantially less. Finally, the research and development of the pilot would not fully demonstrate the viability of growing and harvesting algae, extracting the algal oil, and converting algal oil into renewable fuels in a cost-effective process.

4.3 ALTERNATIVE C – ALTERNATE SITE FOR ALGAE FARM (AQUACULTURE)

The proposed project site is surrounded by agricultural lands to the east, west, north, and south. The large agricultural parcels surrounding the site are owned by Dole Food Company, Inc. (north) and Galbraith George Trust (west, south and east). While another agricultural property could have been selected for the development of the project, the proposed site was chosen because it provides a best fit for the project's objectives and overall needs

The proposed 34-acre site was created through the agricultural lease of lands at the Poamoho Camp property. The size of the site is ideal to support the physical requirements of the algae farm and production facility. Other agricultural properties surrounding the site are much larger in size; therefore their use would be practical. Lease for a larger site would be more expensive with no corresponding return. The proposed project site was also chosen for both operational advantages and to ensure compliance with environmental regulations. The site also has access to the reclaimed water that will be needed to support pond operations. Finally, the use of the proposed site will provide income to the residents of Poamoho Camp. As noted in the City and County of Honolulu, Department of Planning and Permitting approved Zoning Variance No. 2007/VAR-62; the 57 acres of agricultural lands at Poamoho will remain in agricultural use and will provide income to families occupying farm dwellings in Poamoho Camp.

The alternative site option would be less desirable for the Phycal Algae Pilot project. The overall technology, process design configurations, and processing equipment would remain the same as for the proposed project. The proposed site would be an exact fit for the objectives and needs of the pilot. Additionally, lease agreement for use of the proposed site at Poamoho has been secured and agreed to by HIDC Poamoho Camp, Inc. and Phycal Hawaii R&D, LLC.

5.0 APPLICABLE LAND USE PLANS AND POLICIES

5.0 APPLICABLE LAND USE PLANS AND POLICIES

In this chapter, the project's consistency with applicable land use policies set forth in the Hawai'i State Plan, State Land Use Law, State Coastal Zone Management Program, State 2050 Sustainable Plan, City and County of Honolulu General Plan, Central O'ahu Sustainable Communities Plan, 'Ewa Development Plan, Land Use Ordinance, and Special Management Area and are discussed.

5.1 HAWAI'I STATE PLAN

The Hawai'i State Plan establishes a statewide planning system that provides goals, objectives, and policies that detail priority directions and concerns of the State of Hawai'i; these will be discussed as they relate to the proposed project.

It is the goal of the State, under the Hawai'i State Planning Act (Chapter 226, HRS), to achieve the following:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai'i present and future generations.
- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
- Physical, social, and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring, and of participation in community life (Chapter 226-4, HRS).

Specific objectives and policies of the State Plan that pertain to the project are as follows:

Section 226-6 Objective and policies for the economy--in general.

(a) Planning for the State's economy in general shall be directed towards achievement of the following objectives:
  (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai'i's people.
  (2) A steady growing and diversified economic base that is not overly dependant on a few industries.
(b) To achieve the general economic objectives, it shall be the policy of this State to:
  (2) Promote Hawai'i as an attractive market for environmentally and socially sound investment activities that benefit Hawai'i's people.
  (14)Promote and protect intangible resources in Hawai',i, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.

<u>Discussion</u>
The Phycal Algae Pilot project will develop an algae farm and algae oil extraction facility. Project operations for the Poamoho and Tesoro site will generate approximately 40 new jobs related to the agriculture and processing, with a focus mostly on aquaculture and the cultivation of algae. Hawai'i was selected for the algae pilot project because of its ideal climate and market and public support for the development of biofuels. The project will support Hawai'i as an attractive market

for environmentally and socially sound investment activities, creating a diversified economic base that benefits Hawai'i's people.

Section 226-7 Objectives and policies for the economy-- agriculture.

(a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:
  (2) Growth and development of diversified agriculture throughout the State.
  (3) An agriculture industry that continues to constitute a dynamic and essential component of Hawai'i's strategic, economic, and social well-being.

(b) To achieve the agriculture objectives, it shall be the policy of this State to:
  (2) Encourage agriculture by making best use of natural resources.
  (8) Support research and development activities that provide greater efficiency and economic productivity in agriculture.
  (12) Expand Hawai'i's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.
  (15) Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.
  (16) Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.

Discussion

The project supports the growth and development of diversified agriculture. As plantation agriculture farming of crops such as pineapple and sugarcane begin to dissipate, new diversified types of agricultural uses such as aquaculture, should be explored and developed in the State. The Phycal Algae Pilot project will grow and harvest of algae for the extraction of algae oil and conversion into renewable fuel. With energy costs in Hawai'i being among the highest in the United States, renewable energy solutions are becoming a focus for the State. The Phycal Algae Pilot project will develop, test, and demonstrate systems for the successful growth of algae and extraction of commercial energy products.

The Poamoho project site is currently vacant agricultural land which was once used for the cultivation of pineapple by Del Monte Corporation. The pilot project will utilize these vacant lands transforming them from economically non-feasible agricultural production to economically viable agricultural uses. In addition, the project will make efforts to hire former agricultural workers of Poamoho Camp who were displaced with the closure of Del Monte Corporation in 2005.

Section 226-9 Objectives and policies for the economy—federal expenditures.

(b) To achieve the federal expenditures objective, it shall be the policy of this State to:
  (3) Promote the development of federally supported activities in Hawai'i that respect state-wide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawai'i's environment.

Discussion
The Phycal Algae Pilot project is partially supported by a grant from the U.S. DOE NETL. The development of the pilot project will demonstrate Hawai'i's ability to support federal activities, particularly those related to the development of biofuels and renewable energy products that provide significant reductions in greenhouse gas emissions.

Section 226-10 Objective and policies for the economy--potential growth activities.

(a) Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawai'i's economic base.

(b) To achieve the potential growth activity objective, it shall be the policy of this State to:

(1) Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production, and energy and marine-related industries.

(4) Accelerate research and development of new energy- related industries based on wind, solar, ocean, and underground resources and solid waste.

Discussion
The Phycal Algae Pilot Project will help to promote new venues for Hawai'i in biofuel and renewable energy production. With energy and environment being a major focus both in Hawai'i and the United States, the production of renewable energy technologies is a potential growth activity that serves to diversify Hawai'i's economic base. Research and development from the algae pilot project will confirm the systems ability to produce commercial-scale renewable energy products at acceptable cost targets to meet future demands.

Section 226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai'i.

Discussion
The Phycal Algae Pilot project will use vacant agricultural lands at Poamoho for the algae farm and processing facility. The lands will continue to be used for agricultural activities, maintaining the open area and natural resources around the site. Vacant industrial lands will also be used for the project's processing and converting of algae oil into biofuel at Tesoro. The project's use of this area for industrial purposes is consistent with County and State land use districts and zoning designations.

The pilot project was designed to provide environmentally-sound practices and will not result in irreparable environmental damage. No rare and endangered plant species and habitats have been found on the sites. While rare and endangered animal species and habitats have not been found on the existing sites, protection measures will be carried to address potential impacts, particularly for the protection of Hawaiian waterbirds.

Section 226-13 Objectives and policies for the physical environment--land, air, and water quality.

(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:
  (1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources.

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:
  (2) Promote the proper management of Hawai'i's land and water resources.
  (4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.

Discussion

The project design was developed to achieve the proper management of Hawai'i's land and water resources. The project team has consulted with many State agencies, including the State DOH to discuss requirements and regulations related to the project. Mitigation measures will be carried out to address potential impacts to the physical environment – land, air, and water – that occur from the project.

Section 226-15 Objectives and policies for facility systems--solid and liquid wastes.

(a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:
  (1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.

(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:
  (2) Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.

Discussion

The treatment of solid and liquid wastes from the project will be carried out in accordance with Federal, State and County requirements and regulations. General recycling practices will be carried out on the sites and efforts will also be made to reuse residual biomass as a soil amendment for compost. To the extent possible, liquid waste generated from the algae farm will be treated and reused onsite as reclaimed water. Liquid waste generated from the Tesoro site will be appropriately disposed off-site.

Section 226-16 Objective and policies for facility systems--water.

(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

(b) To achieve the facility systems water objective, it shall be the policy of this State to:
  (1) Coordinate development of land use activities with existing and potential water supply.
  (3) Reclaim and encourage the productive use of runoff water and wastewater discharges.
  (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Discussion
The pilot project will not require significant amounts of potable water to support the project. Potable water supplies for the Tesoro project site will be trucked in from the Poamoho project site and stored onsite in a 55 gal tank. Potable water supplies for the Poamoho project site will be serviced from the existing supplies at Poamoho Camp. The project's agricultural/aquaculture use of the site for the growing of algae will not require the use of potable water sources. Algae ponds and other water requirements for project operations will use reclaimed water from the Schofield Barracks WWTP.

Section 226-18 Objectives and policies for facility systems--energy.

(c) To further achieve the energy objectives, it shall be the policy of this State to:

(1) Support research and development as well as promote the use of renewable energy sources;

(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications; and

(9) Support actions that reduce, avoid, or sequester Hawai'i's greenhouse gas emissions through agriculture and forestry initiatives.

Discussion
The goal of the Phycal Algae Pilot project is to achieve a commercial-scale algal oil production, which can deliver algal oil at a competitive price for the Hawai'i market. This will help Hawai'i to move towards achieving the State's Clean Energy Initiative, which establishes targets for both the State and local utilities' development and use of renewable energy. The project will strengthen the capability of using algae as a biofuel crop, to provide a wide range of energy products and energy security with a significant reduction in greenhouse gas emission.

5.2 HAWAI'I STATE LAND USE DISTRICT BOUNDARIES

Under the Chapter 205, HRS, all lands of the State are to be classified in one of four categories: urban, rural, agricultural, and conservation lands. The State Land Use Comission (LUC), an agency of the State DBEDT, is responsible for each district's standards and for determining the boundaries of each district (Chapter 205-2(a), HRS). The LUC is also responsible for administering all requests for district reclassifications and/or amendments to district boundaries, pursuant to Chapter 205-4, HRS, and the HAR, Title 15, Chapter 15 as amended. Under this Chapter, all lands in Hawai'i are classified into four land use districts: (1) Conservation, (2) Agricultural; (3) Urban, and (4) Rural.

The Agricultural District includes lands for the cultivation of crops, crops for bioenergy, aquaculture, raising livestock, wind energy facility, timber cultivation, agriculture-support activities (i.e., mills, employee quarters, etc.) and land with significant potential for agriculture uses. Golf courses and golf-related activities may also by included in this district, provided the land is not in the highest productivity categories (A or B) of the Land Study Bureau's detailed classification system. Uses permitted in the highest productivity agricultural categories are governed by statute. Uses in the lower-productivity categories – C, D, E or U - are established by the Commission and include those allowed on A or B lands as well as those stated under Section 205-4.5, HRS.

The Urban District generally includes lands characterized by "city-like" concentrations of people, structures and services. This District also includes vacant areas for future development. Jurisdiction of this district lies primarily with the respective counties. Generally, lot sizes and uses permitted in the district area are established by the respective County through ordinances or rules.

Discussion

As classified by the State of Hawai'i LUC, the Poamoho project site is situated within the State Agricultural District (*Figure 1-5*) and the Tesoro project site is situated within the State Urban District (*Figure 1-6*). The proposed uses within these properties are consistent with permitted uses for the Agricultural and Urban Districts, and will not require district reclassification or boundary amendment.

As classified by the State of Hawai'i LUC, the Poamoho project site is situated within the State Agricultural District (*Figure 1-5*) and the Tesoro project site is situated within the State Urban District (*Figure 1-6*). The proposed uses within these properties are consistent with permitted uses for the Agricultural and Urban Districts, and will not require district reclassification or boundary amendment.

Pursuant to Section 205-4.5(15), HRS, the project's processing and production facilities is a permissible use within the agricultural district as biofuel processing facilities. The production and processing facilities at the Poamoho site will not adversely affect agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), Hawai'i Revised States (HRS). The primary activity that will take place on the site is aquaculture for algae farming. The site will be largely occupied by algae ponds and greenhouses (approximately 29 acres), with the remaining portion of the site (approximately 5 acres) to be used for the processing of the algae and extraction of algae oil. The processing component will be secondary to growing the algae energy feedstock. Adjoining lands will be available for agricultural use with no limitation due to the Phycal algae farm and processing component.

The algae farm and processing facility is designed to be a low-impact development. The facilities and appurtenances have been selected to appropriately fit the objectives of the pilot project, the selected location on vacant agricultural lands, and the development standards of the LUO AG-1 zoning district. As detailed throughout *Section 3.0*, no significant adverse environmental impacts are anticipated to occur as a result of the project. No long-term effect to the existing agricultural land and uses in the vicinity is anticipated.

5.3 HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Zone Management (CZM) Act of 1972 (16 United States Code (USC), Section 1451), as amended through Public Law 104-150, created the coastal management program and the National Estuarine Research Reserve system. The coastal states are authorized to develop and implement a State coastal zone management program. The Hawai'i CZM Program received Federal approval in the late 1970's. The objectives of the CZM Program, as defined in Section 205A-2, HRS, are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone. Each County is responsible for designating a Special Management Area (SMA) that extends inland from the shoreline. Development within the SMA is subject to County

approval to ensure the proposal is consistent with the policies and objectives of the Hawai'i CZM Program.

~~**Discussion:**~~
While the project areas of both the Poamoho site and Tesoro site are not within the SMA as delineated by the City and County of Honolulu the relationship of the proposed project to applicable State CZM objectives and policies is discussed below. State CZM objectives and policies address the following 10 subject areas: (1) recreational resources, (2) historic resources, (3) scenic and open space resources, (4) coastal ecosystems, (5) economic uses, (6) coastal hazards, (7) managing development, (8) public participation, (9) beach protection, and (10) marine resources. Virtually all relate to potential development impacts on the shoreline, near shore, and ocean area environments. ~~and as such does not required an additional review under State CZM and County SMA rules.~~

(1) Recreational Resources
Objective: Provide coastal recreational opportunities accessible to the public.

Discussion
The project would have no impact on coordination and funding of coastal recreation planning and management.

The project sites at Poamoho and Tesoro are located well away from coastal and shoreline areas, therefore the project does not directly provide for or directly affect coastal recreation and access to the public. No coastal resources of significant value, such as surf sites or sandy beaches will be impacted by this project. Also, no shoreline improvements are proposed, such as artificial reefs or beaches.

The project will be constructed and operate in accordance with State and federal water quality regulations. Storm water and sewer management systems will be maintained and new infrastructure will be constructed to meet applicable standards. There will be no discharge points into coastal waters.

(2) Historic Resources
Objective: Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Discussion
A Cultural Impact Assessment and Archaeological Assessment (AA) were performed for both the Pomaoho and Tesoro project sites (*Appendix E and Appendix F*). The project does not involve any known loss or destruction of existing natural, cultural, archeological or historical resources SHPD has determined that no historic properties would be affected by the development of the project at the Poamoho site since the area was used for former cultivation. In addition, SHPD has accepted the findings of the AA for the Tesoro site which determined that development of the project would affect existing historic properties in the area.

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

Discussion
As described in *Section 3.17,* the project will not affect vistas and scenic resources. The Phycal Algae Pilot project is consistent with the County General Plan, Central O'ahu Sustainable Communities Plan (Poamoho site) and 'Ewa Development Plan (Tesoro site), and Zoning regulations. While the facilities may be partially visible from the roadways at the Poamoho site, the property will generally appear as a continuation of agricultural lands. A natural vegetation buffer will be placed along the roadways to make the project less visible. At the Tesoro site, the project will be surrounded by other large scale industrial development. Visual resources surrounding this area are minimal. The Phycal Algae Pilot project will meet appropriate agricultural and industrial development standards such as height and setback requirements.
]
The project sites (Poamoho and Tesoro) are located away from coastal areas, therefore, coastal scenic view sheds are not accessible from this area. No impacts on existing ocean views and scenic resources are anticipated.

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

Discussion
The project will not affect coastal ecosystems or natural resource management. The project will minimize potable water use since the majority of water used on the site for operations will be recycled water trucked in from Schofield Barracks WWTP. During construction and operation, all storm water will be retained onsite. Storm water and wastewater infrastructure will not result in pollutant discharge into coastal water. Operations will comply with State and federal water quality standards.

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

Discussion
The project is consistent with State and County plans and land regulations. The location for the Poamoho site is ideal for the pilot project because it will utilize vacant lands and maintain its agricultural use. The location for the Tesoro site at James Campbell Industrial Park, among Tesoro Hawaii Corporation's larger operations, is also suitable for the site's use as a processing facility for biofuels. The project's operations at these two sites will support the State's economy by creating new employment opportunities promoting new venues for Hawai'i in biofuel and renewable energy production

The project sites (Poamoho and Tesoro) are located away from the coastal area and are not considered a coastal dependent development. Therefore, the project will not result in any adverse social, visual, and environmental impacts in the coastal zone management area.

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

Discussion
Both the Poamoho and Tesoro project sites are in flood Zone D *(Figure 1-11)* and is not in the tsunami inundation zone. Because the project areas area located well away from the coastal area and the stream courses, the project areas are secure from stream flooding, as well as coastal inundation. To prevent ponding or localized flooding resulting from storm run-off, existing drainage infrastructure will be maintained and new infrastructure will be constructed to meet applicable standards at both project sites.

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

Discussion
This EA communicates the potential short and long-term impacts of the project on the environment. Procedurally, this EA conforms to HRS Chapter 343. The Office of Environmental Quality Control (OEQC) publishes notice of the EA availability for public review. The public is allowed 30-days to submit comments on the EA. During pre-scoping, agencies, organizations and persons were consulted and will continue to be informed throughout the planning process. In addition, the project development and planning process have included presentations to key community groups such as the Wahiawā – Whitmore Village Neighborhood Board #26 and to the North Shore Neighborhood Board #27. Future presentation will also be made to the Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34.

There are numerous County approvals and permits required and processing will be conducted to facilitate timely processing.

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

Discussion
While the project does not stimulate public awareness, education, and participation in coastal management specifically, it does promote public awareness and education through the environmental review process (HRS Chapter 343) as described above.

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

Discussion
The project sites at Poamoho and Tesoro are located away from public beaches. No structures will be located near the shoreline areas and no construction of public erosion-protection structures seaward of the shoreline will occur. The project will not impact public use and recreation of beaches nearest the sites.

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

Discussion
The Phycal Algae Pilot will not adversely impact marine and coastal resources. While the project not promote research and understanding particular to ocean development activities and impacts upon ocean and coastal resources, it will involve technologies and research associated with natural resources such as algae.

5.4 2050 SUSTAINABILITY PLAN

The Hawai'i 2050 Sustainability Plan as a long-term strategy has as its main goals and objectives respect for culture, character, beauty, and history of the state's island communities; balance among economic, community, and environmental priorities; and an effort to meet the needs of the present without compromising the ability of future generations to meet their own needs.

The 2050 Plan delineates five goals toward a sustainable Hawai'i accompanied by strategic actions for implementation and indicators to measure success or failure. The goals and strategic actions that are pertinent to the No. 1 Capitol District Building project are as follows.

Goal One: Living sustainably is part of our daily practice in Hawai'i.
Strategic Actions:
- *Develop a sustainability ethic.*

Goal Two: Our diversified and globally competitive economy enables us to meaningfully live, work, and play in Hawai'i.
Strategic Actions:
- *Develop a more diverse and resilient economy.*
- *Support the building blocks for economic stability and sustainability.*

Goal Three: Our natural resource are responsibly used, replenished and preserved for future generations.
Strategic Actions:
- *Reduce reliance on fossil (carbon-based) fuels.*
- *Conserve water and ensure adequate water supply.*
- *Increase recycling, reuse and waste reduction strategies.*

Goal Five: Our Kanaka Maoli and island cultures and values are thriving and perpetuated.
Strategic Actions:
- *Celebrate our cultural diversity and island way of life.*

Discussion:
The Phycal Algae Pilot project support Hawai'i's movement towards living sustainably. Energy costs in Hawai'i are the highest in the United States, and its principal source of electricity is oil-fired plants that consume more than 400 million gallons of petroleum-based fuels annually. The project will strengthen the capability of using algae as a biofuel crop, to provide a wide range of energy products and energy security with significant reductions in greenhouse gas emissions.

Additionally, the pilot project will help to diversify Hawai'i's economy by promoting the use of vacant agricultural lands to support new venues for biofuel and renewable energy production.

The Phycal Algae Pilot project supports the responsible use of resources. The project will creating renewable energy products from algae, and thereby reduce reliance on fossil fuels. Water will be conserved through the use of reclaimed water treated to standards for agricultural use for the pond operations. Additionally, the project will minimize waste through general recycling practices and efforts to reuse residual biomass as a soil amendment for compost and fertilization of agricultural crops.

The pilot project supports island cultures and values by supporting agriculture through new methods of farming such as aquaculture. Poamoho plantation lands will once again be utilized for agriculture, continuing the plantation era heritage from Hawai'i's past.

5.5 CITY AND COUNTY OF HONOLULU GENERAL PLAN

Adopted by resolution in 1977, the 1992 revised edition of the General Plan for the City and County of Honolulu sets forth the long-range objectives for the general welfare and prosperity of the people of O'ahu and broad policies to attain those objectives. The General Plan provides objectives and policies intended to guide and coordinate City land use planning and regulation, and budgeting for operations and capital improvements.

The Phycal Algae Pilot project is consistent with the applicable objectives and policies of the City and County of Honolulu General Plan described below.

<u>Economic Activity</u>

Objective A: To promote employment opportunities that will enable all the people of O'ahu decent standard of living.

- *Policy 2: Encourage the development of small businesses and larger industries which will contribute to the economic and social well-being of O'ahu residents.*

Objective C: Maintain the viability of agriculture on O'ahu.

- *Policy 2: Support agricultural diversification in all agricultural areas on O'ahu.*
- *Policy 8: Encourage the more efficient use of non-potable water for agricultural use.*

Objective D: To make full use of the economic resources of the sea.

- *Policy 2: Encourage the development of aquaculture, ocean research, and other ocean-related industries.*

Objective F: To increase the amount of Federal spending on O'ahu.

- *Policy 1: Take full advantage of Federal programs and grants which will contribute to the economic and social well-being of O'ahu residents.*

<u>Natural Environment</u>

Objective A: To protect and preserve the natural environment.

- *Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.*

- *Policy 8: Protect plans, birds, and other animals that are unique to the State of Hawai'i and the Island of O'ahu.*

Energy

Objective A: To maintain an adequate, dependable, and economical supply of energy for O'ahu residents.

- *Policy 3: Support programs and projects which contribute to the attainment of energy self-sufficiency on O'ahu.*

Objective D: To develop and apply new, locally available energy resources.

- *Policy 1: Support and participate in research, development, demonstration, and commercialization programs aimed at producing new, economical, and environmentally sound energy supplies from:*
    a. *Biomass energy conversion*

Discussion:

The Phycal Algae Pilot project promotes the objectives of the General Plan in numerous ways. The project, which is partially supported by Federal funding, will support economic activity through the development of an algae farm and processing facility which may become a larger industry for the State and County that can contribute not only to the economic well-being but also the social well-being of residents. The project is a new type of use in agricultural areas, supporting overall agricultural diversification.

The project's growing and harvesting of algae is considered a form of aquaculture. The oil from the algae will be extracted and converted into renewable fuel at the Tesoro processing site. Algal oil can be converted into biodiesel, or refined into drop-in replacements for diesel, jet fuel, and feedstock for other bioproducts. The research and development of the pilot project will demonstrate the capability of using algae as a biofuel crop, to provide a wide range of energy products and energy security.

5.6 CITY AND COUNTY OF HONOLULU – DEVELOPMENT AND SUSTAINABLE COMMUNITIES PLAN

The Island of O'ahu is divided into eight DP areas; the plans for six of these areas have been designated as SCPs. Each plan implements the objectives and policies of the General Plan and serves as a guide for public policy, investment, and decision-making within each respective region. Together with the General Plan, they guide population and land use growth over a 20- to 25-year time span.

Central O'ahu Sustainable Communities Plan

The project site is located within the region encompassed by the Central O'ahu SCP. The Central O'ahu SCP by the County DPP was last revised in October 2002. The Plan's vision and implementing policies support sustaining Central O'ahu's unique character, lifestyle, and economic activities opportunities by focusing future residential development on master planned suburban communities within an Urban Community Boundary and on redevelopment around two transit centers in Waipahu.

Discussion:
The Poamoho project site is designated within the Agriculture and Preservation Areas on the Central O'ahu SCP Urban Land Use Map *(Figure 1-9)* and within the Agriculture area on the Open Space Map. The project site lies outside of the Urban Community Boundary which protects the highest value prime and unique agricultural lands in Central O'ahu from urban development. The project will maintain the use of the land for agricultural uses, including aquaculture and the growing and harvesting of algae. The Phycal Algae Pilot project is consistent in supporting the applicable objectives and policies of the Central O'ahu SCP described below.

Section 2.2.2. Retention of Agricultural Lands

- The project supports the retention of agricultural lands in Central O'ahu, including those lands north of Wahiawā which include the Poamoho project site. Designated as prime agricultural lands (ALISH) with the second highest agricultural productivity rating (Class B soils) (LSB), the site will remain an agricultural use. The land will remain protected from urban development for long-term retention and development of diversified agriculture.

Section 3.1.4.4 Agricultural Areas

- *Facilities necessary to support intensive cultivation of arable agricultural lands should be permitted.*

- The Poamoho site will have facilities to support the cultivation of algae and aquaculture activities on the site.

- *Facilities to support limited outdoor recreation use, such as camping, horseback riding and hiking, should be permitted in areas where agricultural use is not feasible.*

- Facilities to support recreational use will not be located within the project site.

- *Residential use should be permitted only to the extent that it is accessory to the agricultural use. Where several dwellings are planned as part of an agricultural use, they should be sited and clustered to avoid the use of more productive agricultural lands and to reduce infrastructure costs.*

- While the project site will have office trailers, the project site will not have any residential dwellings or uses.

- *Buildings and other facilities that are accessory to an agricultural operation should be designed and located to minimize impact on nearby urban areas and roadways.*

- The accessory facilities on the Poamoho project site will be designed in accordance with development standards of the LUO 21-3.50-4. Facilities will be located away at the southwestern portion of the site to minimize impact on urban areas and roadways.

Section 3.7.3.5 Central O'ahu Plantation Villages, Adjacent Land Uses

- *Agricultural use should be maintained on adjacent lands.*

- The use of the Poamoho project site will be for agricultural activities such as aquaculture for the growing of algae. Adjacent to Poamoho Plantation Camp, the project area and other adjacent sites will remain in agricultural use.

- *The visibility of any new structures in the vicinity should be minimized by appropriate landscape screening and building siting. If visibility is unavoidable, the new structure should be designed to respect the scale and character of the villages.*

- The project facilities may be partially visible from Kamananui Road and Kaukonahua Road which borders the Poamoho site on the east and south. From vantage points located mauka and makai of the site, the property will generally appear as a continuation of agricultural lands and uses in the Wahiawā area. The project design will maintain the visual resources of the area by meeting agricultural development standards, such as height and setback requirements, established in Section 21-3.50-4 of the LUO. Additionally, a natural vegetation buffer will be located along Kamananui Road and Kaukonahua Road frontages to provide privacy and to make the screen views from the adjoining roadways. New structures will respect the scale and character of the Poamoho Plantation Camp village.

'Ewa Development Plan

The Tesoro project site lies within the 'Ewa DP district. The 'Ewa DP by the County DPP was last revised in May 2000. This Plan protects prime agricultural lands in 'Ewa; strongly supports development of the Secondary Urban Center; establishes a regional open space network and promotes access to the shoreline; protects natural, historical and cultural resources; promotes master planned communities designed to encourage walking, biking, and transit use; and requires provision of adequate infrastructure to meet current and anticipated needs.

Discussion:

The Tesoro project site is within the Industrial Area on the 'Ewa DP Urban Land Use Map *(Figure 1-10)*. The project site lies within the Barbers Point Industrial Area (James Campbell Industrial Park) which should continue to grow as one of O'ahu and the State's most important industrial areas. The project's operations at the Tesoro site will maintain use of the land for intensive industrial uses. The Phycal Algae Pilot project's proposed use of the Tesoro site for the processing of the algae oil into various biofuels is consistent with the DP and existing land use designations. The applicable objectives and policies of the 'Ewa DP are described below.

Section 3.7.3.2 Industrial Centers - Planning Principles

- ***Appropriate Scale.*** *The visibility of large building volumes and tall building or machinery elements from resort areas, residential areas, commercial and civic districts, and parks should be minimized through site planning and landscaping.*

- The Tesoro project site at James Campbell Industrial Park, is located away from resort areas, residential areas, commercial and civic districts, and parks.

- ***Environmental Compatibility.*** *Industries and utilities that discharge air or water pollutants, even when treated, should be located in areas where they would impose the least potential harm on the natural environment in case the treatment process fails to perform adequately. Uses that generate high noise levels should be located and operated in a way that will keep noise to an acceptable level in existing and planned residential areas. The building setback from the shoreline should be a minimum of 60 feet in the Ewa coastal area, as recommended in the Oahu Shoreline Study (1989), and 150 feet where possible.*

- The Tesoro site is located in James Campbell Industrial Park, which is designated for intensive industrial uses and is located away from sensitive natural environments. While operations at site will result in air outputs, no significant impacts on existing air quality levels are anticipated. The project's processing facility at the Tesoro site may generate some noise during construction and the conversion process of the algae oil. However, noise levels are expected to be minimal and within the allowable ranges associated with industrial areas. The project site is located away from coastal areas.

Section 3.7.3.3 Industrial Centers – Guidelines: Barbers Point Industrial Area

- ***Building Height and Mass -*** *Building heights should generally not exceed 60 feet when they consist of large mass.*

- The equipment trailer and facilities located on the Tesoro site will meet the building height and massing guidelines.

- ***Landscape Treatment -*** *The visibility of parking, storage, industrial equipment and operations areas from the street should be minimized through the planting of a landscape screen, consisting of trees and hedges, along street frontages.*

- The operations and industrial equipment, including the small bench-scale unit which will convert the algal oil into various forms of biofuel, will be located on the southeastern portion of the property away from public street views of Komohana Street and Kauhi Street. The site is surrounded by a perimeter fence and landscaping, trees, tall brush and shrub vegetation.

5.7 CITY AND COUNTY OF HONOLULU LAND USE ORDINANCE GUIDELINES

The purpose of the LUO is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the County General Plan and development plans. The LUO is also intended to provide reasonable development and design standards. These standards are applicable to the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes (Revised Ordinance for the City and County of Honolulu (ROH), Chapter 21).

Discussion:
The Poamoho site is designated as AG-1 Restricted Agricultural District by the County LUO *(Figure 1-7)*. The intent of AG-1 zoning is to conserve and protect important agricultural lands for the performance of agricultural functions by permitting only those uses which perpetuate the retention of these lands in the production of food, feed, forage, fiber crops and horticultural plants. Pursuant to Section 21-3.50-4 of the LUO, the use of this zoning district for aquaculture and associated activities, such as the growing of algae for the ultimate production of algal oil, is permitted subject to the submittal and DPP review and approval of a Conditional Use Permit (CUP) (Major) application.

The Tesoro site is designated as I-2 Intensive Industrial District by the by the County LUO *(Figure 1-8).* The intent of the I-2 zoning is to set aside the areas for the full range of industrial uses necessary to support the city. It is located away from residential communities and intended for areas with necessary supporting public infrastructure, near major transportation systems and with other locational characteristics necessary to support industrial centers. Pursuant to LUO Section 21-3.130, the proposed use of the site for refining, processing and storage of materials and products such as biofuel are consistent with permitted uses in the I-2 district subject to the submittal of a CUP (Major) application. Located at Tesoro in James Campbell Industrial Park, these heavy industrial uses of the site are well away from other districts.

The Honolulu City Council is currently considering Bill 24 (2010), CD1, which would add "Biofuel Processing Facilities" as a new use category in the LUO. If the bill is enacted into law, "Biofuel Processing Facilities" would be allowed in the AG-1 District with a CUP (Major) and in the I-2 District with a CUP (Minor). A CUP (Major) application could then be submitted for the Poamoho site's agricultural products processing facilities for use as "Biofuel Processing Facilities". Similarly, a CUP (Minor) application could also be submitted for the Tesoro site's refining and processing facilities for use as "Biofuel Processing Facilities". At this time, the project will proceed under the existing LUO which does not include the new use category of "Biofuel Processing Facilities".

5.8 SPECIAL MANAGEMENT AREA

The project area is not located within the SMA, which was established to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai'i. Special controls on developments within the SMA area are necessary to avoid permanent loss of valuable resources and foreclosure of management options. The review guidelines of Section 25-3.2 of the ROH are used by DPP and the City Council for the review of developments proposed in the SMA. These guidelines are derived from Section 205A-26 HRS.

Discussion:
The entire project areas at both the Poamoho site and the Tesoro site are not within the SMA as delineated by the County and, as such, do not require additional review under State CZM and County SMA rules.

The Hawai'i State Plan establishes a statewide planning system that provides goals, objectives, and policies that detail priority directions and concerns of the State of Hawai'i; these will be discussed as they relate to the proposed project.

6.0 FINDINGS SUPPORTING ANTICIPATED DETERMINATION

6.0 FINDINGS SUPPORTING ANTICIPATED DETERMINATION

6.1 ANTICIPATED DETERMINATION

After reviewing the significance criteria outlined in Chapter 343, HRS, and Section 11-200-12, State Administrative Rules, Contents of EA, the proposed action has been determined to not result in significant adverse effects on the natural or human environment. A Finding of No Significant Impact (FONSI) is anticipated.

6.2 REASONS SUPPORTING THE ANTICIPATED DETERMINATION

The potential impacts of the Phycal Algae Pilot project have been fully examined and discussed in this Draft EA. As stated earlier, there are no significant environmental impacts expected to result from the proposed action. This determination is based on the assessments as presented below for criterion (1) to (13).

(1) Involve an irrevocable loss or destruction of any natural or cultural resources.

The archaeological and cultural landscapes have been documented in studies conducted specifically for the project areas (Poamoho site and Tesoro site). As detailed in *Section 3.15 and 3.16* of this report, the project does not involve any known loss or destruction of existing natural, cultural, archeological or historical resources (*Appendix E and Appendix F*). SHPD has determined that no historic properties would be affected by the development of the project at the Poamoho site since the area was used for former cultivation. In addition, since the Tesoro site has been historically used for industrial purposes, it is also unlikely that the development of the project would affect existing historic properties in this area. Archaeological Assessments conducted for both of the project areas have been reviewed and accepted by SHPD (*Appendix E*). SHPD has concurred with the recommendation that no further work is required for the project areas.

The only specific area of concern is the unknown potential for the inadvertent discovery of subsurface historical or cultural resources, including the unknown possibility of iwi kūpuna (ancestral remains). Given the low potential for an inadvertent find, it is not recommended at this time that specific archaeological mitigation be in place during demolition and construction. However, if cultural or archaeological resources are unearthed or ancestral remains are inadvertently discovered, the DLNR, SHPD, the Oʻahu Island Burial Council representative and participating interests from lineal descendents and individuals will be notified. The treatment of these resources will be conducted in strict compliance with the applicable historic preservation and burial laws.

(2) Curtail the range of beneficial uses of the environment.

The proposed activities will not curtail the range of beneficial uses of the environment. Existing uses conform to existing land use designations. The pilot project will actually increase the beneficial uses of the area by making use of vacant and unused lands designated and protected by the Central Oʻahu SCP for agriculture. The Poamoho site's use as an algae farm is a supported by

the Hawai'i State Plan and its objective to expand Hawai'i's agricultural base by promoting activities such as aquaculture.

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

The proposed project does not conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

(4) Substantially affects the economic or social welfare of the community or State.

Short-term economic benefits anticipated during construction will include direct, indirect, and induced employment opportunities and multiplier effects but not at a level that would generate significant economic expansion. The operation of the three-year pilot project would also create approximately 40 new jobs to support the Poamoho and Tesoro project sites.

The long-term economic benefits from the project include promoting new venues for Hawai'i in biofuel and renewable energy production. The project will promote the use of vacant agricultural lands for a new type of farming industry in Central O'ahu. Additionally, if the project's goals to achieve a commercial-scale algal oil production are met, the system will be able to deliver fuels derived from algae oil at competitive price for the Hawai'i market.

The Phycal Algae Pilot project will create both short-term and longer-term economic benefits. The project expected to cost approximately $65 million, of which about $50 million will be spent in Hawai'i. The economic benefits to the State are estimated between $5 to 8 million per year.

(5) Substantially affects public health.

The project is consistent with existing land uses and is not expected to affect public health. However, there will be temporary short-term impacts to air quality from possible dust emissions and temporary noise in the immediate vicinity of both project sites resulting from construction equipment. Construction and operation-related impacts of noise, dust, and emissions will be mitigated by compliance with the State DOH Administrative Rules and compliance with applicable permits for the project.

(6) Involves substantial secondary impacts, such as population changes or effects on public facilities. --

Although the project will introduce new uses on vacant agricultural lands at the Poamoho site and vacant industrial lands at the Tesoro site, it will not result in population changes in Wahiawā, Central O'ahu or in Kapolei (Kalaeloa), 'Ewa. The project will create a small increase in employment; however, this will have an incidental impact on population.

Public facilities near both project sites will not be adversely impacted by the Phycal Algae Pilot project. Additional uses of public facilities are not anticipated to occur as a result of the project.

(7) Involves a substantial degradation of environmental quality.

The proposed project will not involve a substantial degradation of environmental quality. The project design is a low-impact development with no long-term effect to the land. Federal, State, and County environmental regulations will be met throughout the construction and operation of the project. The use of the land at the Poamoho site for aquaculture activities is consistent with the allowed uses within an agricultural district. Additionally, the use of the Tesoro site for the refining and processing of algae oil into biofuels is consistent with uses within the intensive industrial district.

(8) Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The project's development will not have a considerable effect on the environment or involve a commitment for larger actions. The algae farm at the Poamoho site is only a small part of the overall use of agricultural lands in the region. Additionally, the biofuels processing facility at the Tesoro site is a relatively minor use of the overall industrial area. The proposed project is a pilot scale development that will work towards achieving its objectives of demonstrating commercial performance targets for biofuels. The project's effects upon the environment will not likely be a precursor for other future actions.

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

The existing project areas (Poamoho site and Tesoro site) do not support habitat for identified rare, threatened or endangered species or habitat. However, as discussed in *Section 3.5,* there is the potential that the proposed aquaculture farm at the Poamoho site may attract one or more endangered waterbird species following build-out. To minimize the potential that the project's operation will attract endangered waterbirds, mitigation measures will be implemented to discourage listed birds from landing in and foraging within the facilities. Enclosures around water circulating equipment will also reduce the potential for waterbird impacts.

(10) Detrimentally affects air or water quality or ambient noise levels.

General temporary effects associated with construction and operation of the project has been identified in this EA (*Section 3.0*). Mitigation measures which are outlined in this EA will be applied during the on-going construction and operation activities. No detrimental long-term impacts to air, water, or acoustic quality are anticipated with the pilot project. The project will not detrimentally affect air or water quality or ambient noise levels.

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

Both project sites are located within Zone D (Unclassified) and outside of the designated tsunami zone (*Figure 1-11*). The Poamoho site has long been used for the cultivation of sugar and pineapple, and the development of the pilot project on the property for aquaculture activities will not affect environmentally sensitive areas. The Tesoro site has been historically used for industrial purposes making the site ideal for refinery and processing activities. The Phycal Algae Pilot project

design is a low-impact development process and will have no long-term effect to the land. Construction work will be performed in accordance with the State and County-approved design standards. No significant adverse impacts are anticipated.

(12) Substantially affects scenic vistas and view-planes identified in county or state plans or studies.

The proposed project will not substantially affect scenic vistas and view-planes identified in County or State plans or studies. The Poamoho site is located away from coastal view points and from vantage points located mauka and makai of the site, the property will generally appear as a continuation of agricultural lands and uses in the Wahiawā area. The project design will maintain the visual resources of the area by meeting agricultural development standards established in the Land Use Ordinance. Additionally, a natural vegetation buffer will be located along Kamehameha Highway and Kaukonahua Road of the property to make the project less visible from the roadways. Accordingly, the project will blend with the surrounding agricultural land uses in the area and will not significantly impact existing views (*Figures 3-7a through 3-7d*).

Existing views of the surrounding industrial complex near the Tesoro site will not be affected by the project (*Figures 3-8a through 3-8d)*. The facility will likely be visible from Komohana Street and Kauhi Street, however, the project is located in James Campbell Industrial Park and is surrounded by other large scale industrial facilities.

(13) Require substantial energy consumption.

The Phycal Algae Pilot facilities will increase power consumption from the island's electrical grid. While the project will have some electricity needs, the outcome of the pilot project will result in the development of new technologies that will strengthen the capability of using algae as a biofuel crop, to provide a wide range of energy products and energy security with significant reductions in greenhouse gas emissions. The goal of the project is to achieve a commercial-scale algal oil production, which can deliver algal oil at competitive price for the Hawai'i market. This will help Hawai'i to move towards achieving the State's Clean Energy Initiative, which establishes targets for both the State and local utilities' development and use of renewable energy.

6.3 SUMMARY

Based on the above findings, we think the proposed Phycal Algae Pilot project will not generate significant adverse socio-economic or environmental impacts. The EA recommends mitigation measures to alleviate potential impacts when such impacts are identified.

The Phycal Algae Pilot project is consistent with the Hawai'i State Land Use District Boundaries; the Hawai'i State Plan and Functional Plans; the 2050 Sustainable Plan, the Hawai'i Coastal Zone Management Plan, the City's General Plan and Development Plan; the City's Zoning Ordinance, and Special Management Area.

The proposed project will help to promote new venues for Hawai'i in biofuel and renewable energy production. The use of the vacant agricultural lands at Poamoho Camp will also provide a new type of (aquaculture) farming industry for Central O'ahu. By developing this algae technology, the future potential of algae oil for biofuels can be realized at a level that results in

technical, economic, and environmental advantages. If the project achieves commercial-scale algal oil production, algal oil can be delivered at competitive price for the Hawai'i market, thereby helping Hawai'i to move towards achieving the State's Clean Energy Initiative.

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8.0 List of Agencies, Organizations and Individuals Receiving Copies of the EA

8.0 LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS RECEIVING COPIES OF THE EA

Respondents and Distribution	Pre-Consultation	Pre-Consultation Comments Received	Receiving Draft EA	Comments Received	Receiving Final EA/ FONSI
Federal Agencies					
U.S. Army Corps of Engineers, Honolulu District	X	X	X		X
U.S. DOA, Natural Resources and Conservation Service	X	X	X		X
U.S. DOI, Fish and Wildlife	X	X	X		X
U.S Environmental Protection Agency, Pacific Islands Contact Office	X		X		X
State of Hawai'i Agencies					
Department of Accounting and General Services	X	X	X	X	X
Department of Agriculture	X		X		X
Department of Business, Economic Development & Tourism (DBEDT)	X	X	X		X
DBEDT, Office of Planning	X		X	X	X
DBEDT, Strategic Industries Division	X		X		X
Department of Defense	X	X	X	X	X
Department of Education	X	X	X	X	X
Department of Hawaiian Home Lands	X		X		X
Department of Health (DOH)	X		X		X
DOH, Clean Water Branch				X	X
DOH, Hazard Evaluation and Emergency Response Office				X	X
DOH, Wastewater Branch				X	X
Department of Human Services	X		X		X
Department of Labor and Industrial Relations	X	X	X		X
Department of Land and Natural Resources (DLNR)	X		X		X
DLNR, State Historic Preservation Division	X	X	X	X	X
Department of Transportation	X	X	X	X	X
Hawai'i Housing Finance & Development Corporation	X		X		X

Respondents and Distribution	Pre-Consultation	Pre-Consultation Comments Received	Receiving Draft EA	Comments Received	Receiving Final EA/ FONSI
Office of Environmental Quality Control	X		X		X
Office of Hawaiian Affairs	X	X	X		X
University of Hawai'i, Environmental Center	X		X		X
City and County of Honolulu					
Board of Water Supply	X	X	X	X	X
Department of Community Services	X		X	X	X
Department of Design and Construction	X	X	X	X	X
Department of Environmental Services	X	X	X		X
Department of Facility Maintenance	X	X			
Department of Planning and Permitting	X	X	X	X	X
Department of Parks and Recreation	X	X			
Department of Transportation Services	X	X	X	X	X
Fire Department	X	X	X	X	X
Police Department	X	X	X	X	X
Elected Officials					
U.S. Senator Daniel K. Akaka	X		X		X
U.S Senator Daniel K. Inouye	X		X		X
State Senator Robert Bunda	X		X		X
State House Representative Marcus Oshiro	X		X		X
Councilmember Donavan Dela Cruz	X		X		X
Libraries					
Hawai'i State Library	X		X		X
Kapolei Public Library			X		X
Wahiawā Public Library	X		X		X
Public Utilities					
Hawaiian Electric Company	X		X		X
Citizen Groups, Individuals & Consulted Parties					
Blue Planet Foundation				X	
North Shore Neighborhood Board No. 27					X

Respondents and Distribution	Pre-Consultation	Pre-Consultation Comments Received	Receiving Draft EA	Comments Received	Receiving Final EA/ FONSI
Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34			X		X
O'ahu Island Burial Council	X		X		X
Waha 'ōlelo 'Aha Kukaniloko - Thomas Joseph Lenchanko	X		X	X	X
Wahiawa-Whitmore Village Neighborhood Board No. 26	X		X		X

APPENDIX A COMMENT LETTERS AND RESPONSES

PRE-CONSULTATION SUMMARY

Hi Jeff-

The Corps of Engineers appreciates the opportunity to provide comments regarding your proposal for the Phycal Algae Production Pilot Project in Wahiawa, Island of Oahu, Hawaii. Your project has been assigned reference number POH-2010-00038. Please use this number in all future correspondence with us regarding this project. I have reviewed the information provided and have the following general comments for your consideration:

The Corps regulates any work or structures in or affecting navigable waters of the United States under Section 10 of the Rivers and Harbors Act. Navigable waters are, in general, those waters used for interstate or foreign commerce and/or are subject to the ebb and flow of the tide. Based on the information provided, however, it does not appear that the project will impact such waters as none appear to be in the action area.

The Corps also regulates the discharge of dredge or fill material into waters of the U.S. including wetlands, under Section 404 of the Clean Water Act. Based on our conversation yesterday, you did not believe that wetlands were in the project area since it was recently used for agriculture. Please note, however, wetlands can occur in agricultural fields. We recommend you have a wetland expert delineate the area for the presence or absence of wetlands in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and the 2009 Pacific Regional Supplement. Note that wetland areas in agricultural fields can be particularly challenging to identify due to the generally disturbed nature of those sites. In addition, ephemeral streams, gulches, and drainage ditches may potentially be waters of the U.S. so we recommend that the delineation account for these other aquatic resources as well. If potential wetlands or other aquatic resources are on-site and could be impacted by the proposed project, we recommend you request a jurisdictional determination from the Corps of Engineers to determine if these waterbodies would be considered waters of the U.S., and therefore subject to regulations under Section 404.

We also recommend that any agricultural ponds constructed for this project are done so entirely in uplands and are entirely filled in after project completion. This will ensure that the use, maintenance, and backfill of the ponds do not become subject to regulation under Section 404. For instance, if the ponds are constructed in such a manner as to convert waters of the U.S. into another use (i.e. wetland to a pond), to discharge into waters of the U.S. which may include streams, drainage ditches, or wetlands, or to collect water diverted from such regulated features, you may inadvertently create a waterbody that could be considered a water of the U.S. and would, therefore, be subject to regulations under Section 404 of the Clean Water Act.

If the project proposes to place fill material into waters of the U.S., including wetlands, you will need to submit an application to and receive authorization from our agency prior to commencement of the activity. The Corps is able to provide further guidance regarding the permit process if determined to be applicable to the project. For instance, if authorization is required, you may also be required to provide compensatory mitigation for unavoidable impacts to waters of the U.S., receive Section 401 Water Quality Certification and a Coastal Zone Management consistency determination from the State as well as comply with other federal, state, and local laws. As stated earlier, additional details can be provided as needed.

If you have any questions regarding this e-mail or the Regulatory Program, please do not hesitate to call or e-mail me.

Best Regards,

Amy

Amy Klein
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June 8, 2010

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Reference No. POH-2010-00038

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. Klein:

Thank you for your Pre-Consultation comment letter emailed on February 5, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

Development of the pilot will not result in impacts to wetlands or other aquatic resources. No wetlands, floodplains, or other ecologically sensitive terrain are present in the project sites. The Poamoho project site is located on a high point and is well above the nearby Poamoho and Kaukonahua Stream floodways. The entire site is within flood Zone D, defined as: "Areas in which flood hazards are undetermined, but possible". The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel number for this area is 15003C0120F. The Poamoho project area is located well away from streams and coastal areas; there is no unique aquatic habitat.

The Tesoro project site is also located within flood Zone D. The FEMA FIRM panel number for this area is 15003C0315F. The Tesoro site is located approximately 0.75 miles from the nearest coastal area, and there is no unique aquatic habitat are present.

The agricultural ponds constructed for the project will include approximately 10 acres of shallow ponds of various dimensions. The raceway algae production ponds will be lined and shallow (12 to 24 inches deep). Upon completion of the pilot project, the ponds and facilities will be removed, concrete areas will be demolished, and the site will be restored to its natural state.

No fill materials will be placed into waters of the U.S., including wetlands.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service
P.O. Box 50004 Rm. 4-118
Honolulu, HI 96850
808-541-2600

February 11, 2010

RECEIVED
FEB 12 2010
GROUP 70 INT'L

Jeff Overton, ACIP, LEED AP
Principal, Environmental Planner
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, HI 96813

Dear Mr. Overton,

Thank you for providing the Natural Resources Conservation Service (NRCS) the opportunity to review the Pre-Consultation for Chapter 343, HRS Environmental Assessment Phycal Algae Production Pilot Project, Wahiawa, Oahu, Hawaii. Please find enclosed the NRCS Soil Survey Map, soil reports, and a map indicating areas of Important Farmlands. The important farmlands map has been enclosed for your aid in determining if an AD-1006 Farmland Impact Conversion Rating Form is needed for this project. Typically, this form is required on projects that convert farmlands into non-farmland uses, and have federal dollars attached to the project. See the website link below for more information on the Farmland Protection Policy Act and a copy of the AD-1006 form with instructions. The soil mapping does not identify any hydric soils in this project area. Hydric soils identify potential areas of wetlands. If wetlands do exist, any proposed impacts to these wetlands would need to demonstrate compliance with the "Clean Water Act", and may need an Army Corp of Engineers 404 permit.

The enclosed Soil Survey Map identifies all soil map units in the project area. The soil reports provide selected soil properties and interpretation. The limitation ratings for the selected use "Small Commercial Buildings" are "Slight" and "Moderate" for the soil map units. These ratings do not preclude the intended land use, however they do identify potential limitations for the use, which may require corrective measures, increase costs, and/or require continued maintenance.

The NRCS Soil Survey is a general planning tool and does not eliminate the need for an onsite investigation. If you have any questions concerning the soils or interpretations for this project please call, Tony Rolfes, Assistant State Soil Scientist, (808) 541-2600 x129, or email, Tony.Rolfes@hi.usda.gov.

NRCS - Farmland Protection Policy Act Website: http://www.nrcs.usda.gov/programs/fppa/

Sincerely,

LAWRENCE T. YAMAMOTO
Director
Pacific Islands Area

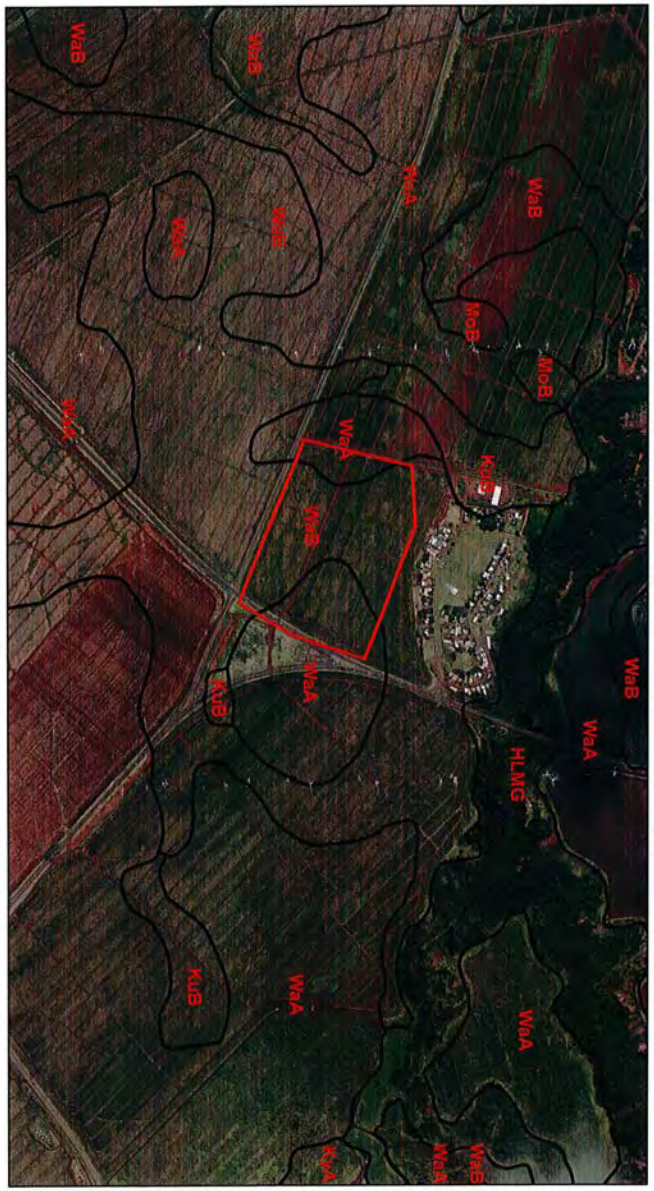
cc: Michael Robotham, Asst. Director for Soil Science and Natural Resource Assessment, Hawaii State Office

Enclosures:

Helping People Help the Land

An Equal Opportunity Provider and Employer

Soils Map for the Phycal Algae Production Pilot Project, Wahiawa, Oahu, Hawaii



Legend

Approx. Project Boundary

Soil Survey Map Units

N

0 445 890 1,780 2,670 3,560 Feet

NRCS 1/2010

Map Unit Legend

Island of Oahu, Hawaii

Map symbol	Map unit name
WaA	Wahiawa silty clay, 0 to 3 percent slopes
WaB	Wahiawa silty clay, 3 to 8 percent slopes

Selected Soil Interpretations

Island of Oahu, Hawaii

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

*This soil interpretation was designed as a "limitation" as opposed to a "suitability". The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation.

Map symbol and soil name	Pct. of map unit	ENG - Small Commercial Buildings (HI) *		ENG - Local Roads and Streets *		URB/REC - Lawn, Landscape, Golf Fairway (HI) *	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WaA:							
Wahiawa	100	Slight		Somewhat limited		Moderate	
				Low strength	0.10	Clay in surface >= 40%	0.50
WaB:							
Wahiawa	100	Moderate		Somewhat limited		Moderate	
		Slopes are from 4 to 8%	0.50	Low strength	0.10	Clay in surface >= 40%	0.50

Important Farmlands Map for the Phycal Algae Production Pilot Project, Wahiawa, Oahu, Hawaii

Legend

Major Roads

Approx. Project Boundary

Important Farmlands

Important Farmlands

TYPE

Prime Farmland

Unique Farmland

Statewide Important Farmland

N

0 1,050 2,100 4,200 6,300 8,400 Feet

NRCS 1/2010

Engineering Properties

Island of Oahu, Hawaii

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
WaA:												
Wahiawa	0-12	Silty clay	MH-K (proposed), ML-K (proposed)	A-7	0	0	100	100	95-100	90-100	45-55	10-20
	12-60	Silty clay	MH-K (proposed), ML-K (proposed)	A-7	0	0	100	100	95-100	90-100	45-55	10-20
WaB:												
Wahiawa	0-12	Silty clay	MH-K (proposed), ML-K (proposed)	A-7	0	0	100	100	95-100	90-100	45-55	10-20
	12-60	Silty clay	MH-K (proposed), ML-K (proposed)	A-7	0	0	100	100	95-100	90-100	45-55	10-20

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June 8, 2010

Mr. Lawrence T. Yamamoto, Director
Pacific Islands Area
U.S. Department of Agriculture
Natural Resource Conservation Service
P.O. Box 50004, Rm. 4-118
Honolulu, HI 96850

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Yamamoto:

Thank you for your Pre-Consultation comment letter dated February 11, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We appreciate you providing the various soil and farmland resources for the Poamoho project site. The majority of the Poamoho project site is considered Unique Agricultural Land, and the land will be retained for farmland uses. The site will be used primarily as an aquaculture farm for the growing of algae. Completion of AD-1006 Farmland Impact Conversion Rating Form is not needed for this project since the land will not be converted into non-farmland uses. Aquaculture is a permitted use within lands zoned Restricted Agricultural (AG-1) by the City and County of Honolulu.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

The Tesoro project site consists of industrial lands which are not ideal for agricultural uses. The site and a large part of the surrounding area contains soil classified Coral Outcrop (Cr) which consists of coral and cemented calcareous sand. While no ALISH data is available for the Tesoro project site, and the area is not considered as "Important Farmland".

No wetlands exist within the project areas at the Poamoho site and Tesoro site. As you have indicated, the soil mapping, particularly for the Poamoho site, does not identify hydric soils.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

RECEIVED
JAN 28 2010
GROUP 70 INT'L

JAN 27 2010

In Reply Refer To:
2010-TA-0139

Mr. Jeffery H. Overton
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Subject: Preparation of Draft Environmental Assessment for Proposed Phycal Algae Production Pilot Project Wahiawa, Oahu

Dear Mr. Overton:

Thank you for your letter of January 18, 2010, received January 21, 2010, requesting our assistance in determining whether the proposed Phycal Algae Production pilot project may affect threatened and endangered species pursuant to section 7 of the Endangered Species Act of 1973, as amended (ESA). You have requested a response by February 8, 2010. You are drafting an Environmental Assessment (EA) for the proposed project which involves developing an algae farm and processing production facility. The project area is approximately 34 acres located in Wahiawa on the island of Oahu.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program as it pertains to listed species and designated critical habitat. To the best of our knowledge, no federally listed species or critical habitat occurs within the proposed project footprint. However, since this action has the potential to become an attractive nuisance if open ponds are used to cultivate algae, we recommended you address in the draft EA the potential impacts to Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), Hawaiian Duck (*Anas* wyvilliana); collectively referred to as Hawaiian waterbirds.

The draft EA should address the potential impacts to federally protected bird species. In particular attraction to open ponds could result in failed nesting attempts and adult mortality. Failed nesting and adult mortality creates what is referred to as a "population sink" and can result in declines of waterbird populations. We recommend coordination with our office to develop avoidance and minimization measures for the protection of federally listed species that maybe impacted by the proposed project. The proposed project if utilizing open shallow water ponds may affect these listed Hawaiian waterbirds. Since the proposed project is funded by a Federal agency, then the Federal agency should consult with us pursuant to section 7(a)(2) of the ESA.

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We are available to assist you in addressing appropriate minimization and avoidance measures for listed waterbirds. If you have questions regarding these comments, please contact Aaron Nadig of my staff (phone: 808-792-9400, fax: 808-792-9581).

Sincerely,

Lorena L. L. Wada
for

Loyal Mehrhoff
Field Supervisor

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June 8, 2010

Mr. Loyal Mehrhoff, Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd., Room 3-122, Box 50088
Honolulu, HI 96850

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Mehrhoff:

Thank you for your Pre-Consultation comment letter dated January 27, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

A Biological Survey was conducted by AECOS, Inc., for the Poamoho site and the Tesoro site and will be included in the Draft EA. No avian species currently listed, or proposed for listing under either the Federal or State of Hawai'i endangered species statutes was detected during the course of the survey. While no endangered Hawaiian Waterbirds were detected during the survey, we are aware that the open raceway ponds at the aquaculture facility have the potential to become an attractive nuisance to several listed waterbird species. To minimize the potential effects to endangered waterbirds, the water circulation equipment for the raceway ponds will be shielded with netting or other materials to exclude birds.

The Draft EA will address potential impacts to Federally-protected bird species. We will also consult with your office to develop avoidance and minimization measures for the protection of federally listed species that may be impacted by the project.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

SANDRA YAHIRO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1032.0

FEB - 2 2010

FEB - 3 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Principal, Environmental Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Request for Comments for Scope of Environmental Assessment for Phycal Algae Production Pilot Project, Wahiawa, Oahu
TMK: (1) 7-1-007: 011, por 030 and 031

Thank you for the opportunity to provide draft environmental assessment comments for the subject project. The proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, please call Ms. Gayle Takasaki of the Planning Branch at 586-0584.

Sincerely,

ERNEST Y. W. LAU
Public Works Administrator

GT:lnn

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Tom Young, MBA AIA

June 8, 2010

Mr. Ernest Y.W. Lau, Public Works Administrator
State of Hawai'i
Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810-0119

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Lau:

Thank you for your Pre-Consultation comment letter dated February 2, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Accounting and General Services has no comments to offer at this time since the project does not impact any of the Department's projects or existing facilities. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
PEARL IMADA IBOSHI
DEPUTY DIRECTOR

No. 1 Capitol District Building, 250 South Hotel Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804
Web site: www.hawaii.gov/dbedt

Telephone: (808) 586-2355
Fax: (808) 586-2377

January 15, 2010

Mr. Jeff H. Overton, AICP, LEED AP
Principal, Environmental Planner
Group 70 International, Inc.
935 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Re: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Production Pilot Project
TMK: (1) 7-1-007:011 por., 030 por., and 031 por.
(Wahiawa, Oahu, Hawaii)

Dear Mr. Overton:

In response to your January 2009 notice, thank you for the opportunity to provide comments on the forthcoming Environmental Assessment (EA) for the proposed Phycal Algae Production Pilot Project (Pilot Project). The Pilot Project seeks to develop an algae farm and processing production facility on 34.117 acres of privately owned land in Wahiawa, Oahu, within an Agricultural District. The facility will include shallow ponds for algae growth, a processing building for oil extraction, an aerobic digester for conversion of biomass to methane gas, and water treatment capability. Group 70 is preparing an HRS, Chapter 343, Environmental Assessment because the Project proposes the use of State funds (HRS §343-5(a)(1)).

We will provide more detailed comments upon receipt of the Draft Environmental Assessment. At this time, would like to provide the following comments in order to assist with the EA process:

1. **Environmental Assessment accepting authority.** Phycal's receipt of funding from the State Hydrogen Program Fund may require the Department of Business, Economic Development & Tourism (DBEDT) to act as the accepting authority for the Pilot Project EA. According to Hawaii Administrative Rules (HAR), Section §11-200-4, *Identification of Accepting Authority,* the Office of Environmental Quality Control (OEQC) shall determine which agency is responsible for accepting the EA the project. In making its determination as to which agency will accept the EA, OEQC shall take into consideration the following factors:

   1. The agency with the greatest responsibility for supervising or approving the action as a whole;
   2. The agency that can most adequately fulfill the requirements of chapter 343, HRS, and this chapter;
   3. The agency that has special expertise or access to information; and
   4. The extent of participation of each agency in the action.

   In this case, because DBEDT is responsible for administering the State Hydrogen Program Fund, DBEDT meets OEQC's first requirement for accepting authority determination. DBEDT still needs to meet with OEQC regarding this issue, so it is possible that another agency may be the accepting authority for the EA.

2. **Permit and approval planning.** DBEDT can assist Phycal with permitting and approving the Pilot Project. Phycal's prospective permitting schedule, "Phycal Hawaii Pilot Facility Permitting Schedule", provides a good outline. DBEDT recommends Phycal consider the following permits in addition to those in the Permitting Schedule:

   - Conditional Use Permit (Major) – Aquaculture, or the production of aquatic plant life for food and water within ponds, is permitted on AG-1 land. This Project could be considered aquaculture. However, Phycal's processing building, anaerobic digester, and water treatment capability could be considered "major agricultural products processing", for which a CUP (Major) would be required. These activities could also be considered "minor agricultural products processing", for which no permit is necessary but location is restricted. Be aware of the possibility that these activities could also be considered "manufacturing, processing, and packaging", which is not permitted on AG-1 lands.
   - Conditional Use Permit (Minor) – This permit would be required should Phycal's activities be considered agribusiness or accessory uses conducted on the same site where agricultural products are cultivated or raised. These generally include those activities such as retail sale, transportation systems for guided tours, or other uses clearly incidental to and customarily found in connection with the principal use. Some accessory agribusiness activities may be permitted without a permit. A CUP (Minor) is not necessary if a CUP (Major) is required for the Project.
   - Sewer Connection Permit – Only if Phycal intends to connect the Project to the City sewer system.

   DBEDT can provide additional comments upon receipt of the Draft Environmental Assessment or upon receipt of additional information on the Pilot Project facilities. The timing and order of permit acquisition should be considered.

3. **National Environmental Policy Act (NEPA) review.** As suggested in the Pre-Assessment Consultation Package, Phycal's use of Federal Funding triggers NEPA review (40 CFR §1508.18(a)). DBEDT can assist with this review by coordinating with the federal lead agency.

4. **LEED certification.** We strongly recommend Phycal consider the cost-saving benefits of LEED certification, which include: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

5. **State energy conservation goals.** Project buildings, activities, and site grounds should be designed and/or retrofit with energy savings considerations, as mandated by HRS, Chapter 344 ("State Environmental Policy") and Chapter 26 ("Hawaii State Planning Act"). In particular, we would like to call your attention to HRS §344-4(7)(A) and HRS §226-18(c), which promote cost-effective energy conservation through the adoption of energy-efficient practices and technologies. In addition, HRS, Chapter 269 ("Renewable Energy Portfolio Standard") provides for the establishment of energy-efficiency portfolio standards that will maximize cost-effective energy-efficiency programs and technologies. The goal is to reduce ratepayer energy consumption by 30% by 2030. Chapter 269 also sets a goal of a 40% increase in the use of renewable energy by 2030.

Our website (http://www.hawaii.gov/dbedt/info/) provides detailed information on guidelines, directives, and statutes, as well as studies and reports on aspects of energy efficiency and renewable energy. Please do not hesitate to contact Carilyn Shon, Energy Efficiency Branch Manager, at (808) 587-3810, for additional information on energy efficiency, and Maria Tome, Renewable Energy Branch Manager, at (808) 587-3809, for information on renewable energy resources.

Sincerely,

Joshua B.Y. Strickler, Esq., P.E.
Facilitator, Renewable Energy Programs

c: Katherine Kealoha, OEQC
Robert Bannister, Honolulu City and County, Department of Planning and Permitting
Maria Tome, DBEDT-SID

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June 8, 2010

Mr. Joshua B.Y. Strickler, Esq., P.E., Facilitator
State of Hawai'i
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Strickler:

Thank you for your Pre-Consultation comment letter dated January 15, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

The following are offered in response to your comments:

1. **Environmental Assessment Accepting Authority** – We agree that the Department of Business, Economic Development & Tourism should be the accepting authority for the Hydrogen Program Fund of which will be a funding source for the project.

2. **Permit and Planning Approval** – We appreciate DBEDT's assistance with permitting and approval of the pilot project. We have met with the City and County of Honolulu, Department of Planning and Permitting to discuss applicable permits for the project. They have determined that a Conditional Use Permit (CUP) (Major) will be necessary for the proposed project. A CUP application will be submitted for the project in the near future.

   A Sewer Connection Permit will not be required since the domestic wastewater from the site will be collected in an on-site wastewater pump station which will eventually discharge to the Schofield Barracks Wastewater Treatment Plant.

3. **National Environmental Policy Act (NEPA) review** – The project is anticipated to require preparation of a NEPA EA. We appreciate DBEDT's assistance with this review process and coordination with the federal lead agency for the project.

4. **LEED certification** – While Phycal supports LEED certification, the project is a pilot scale that will is expected to last approximately three years. In the event that the project expands to a larger scale, LEED certification may be considered.

State energy conservation goals – The proposed project supports the State's energy conservation goals. Energy savings considerations will be made throughout the design and operation of the project to the extent possible.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

February 1, 2010

FEB - 2 2010

Mr. Jeff Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Production Pilot Project
TMK: (1) 7-1-007:011 por., 030 por., and 031por.

Thank you for the opportunity to comment on this proposed project. After review of the documents you have sent for this development, we have no pre-consultation comments to make. We will anticipate reviewing the Environmental Assessment when it is completed and will make any appropriate comments at that time.

If you have any questions, please call Havinne Okamura, Hazard Mitigation Planner, at (808)733-4300, extension 556.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

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Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

June 8, 2010

Mr. Edward T. Teixeira, Vice Director of Civil Defense
State of Hawai'i
Department of Defense
Office of the Director of Civil Defense
3949 Diamond Head Road
Honolulu, HI 96816

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Teixeira:

Thank you for your Pre-Consultation comment letter dated February 2, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Defense has no comments to offer at this time. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR

KATHRYN S. MATAYOSHI
INTERIM SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

RECEIVED
FEB - 4 2010
INT'L

February 2, 2010

Mr. Jeff Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Pre-Consultation for Chapter 343, Hawaii Revised Statutes
Environmental Assessment, Phycal Algae Production Pilot Project,
TMK Numbers (1)7-1-007:011 (por.), 030 (por.), and 031 (por.),
Wahiawa, Oahu, Hawaii

The Department of Education has reviewed your request for pre-consultation relating to the Environmental Assessment (EA) of the project referenced above.

The Project Information Summary and Overview of Proposed Action provided by your office make reference to an algae-to-energy technology which includes the conversion of algae-based biomass to methane gas. We request that the EA provide detailed information on any particle and gaseous emissions that may be generated from the proposed site.

If you have any questions, please call Roy Ikeda of the Facilities Development Branch at 377-8301.

Very truly yours,

Kathryn S. Matayoshi
Interim Superintendent

KSM:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
Sanford Beppu, Planning Section, FDB

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

GROUP 70
INTERNATIONAL

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Tom Young, MBA AIA

June 8, 2010

Ms. Kathryn S. Matayoshi, Interim Superintendent
State of Hawai'i
Department of Education
P.O. Box 2360
Honolulu, HI 96804

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. Matayoshi:

Thank you for your Pre-Consultation comment letter dated February 2, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

The Draft EA will provide additional information on the pilot project and its algae-to-energy technology. Section 3 of the Draft EA will also include a discussion of the environmental setting, potential impacts, and mitigation measures, including the potential impacts to air quality.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

LINDA LINGLE
GOVERNOR

DARWIN L.D. CHING
DIRECTOR

COLLEEN Y. LaCLAIR
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS
830 PUNCHBOWL STREET, ROOM 321
HONOLULU, HAWAII 96813
www.hawaii.gov/labor
Phone: (808) 586-8842 / Fax: (808) 586-9099
Email: dlir.director@hawaii.gov

January 26, 2010

RECEIVED
JAN 28 2010
GROUP 70 INT'L

Mr. Jeff Overton
Principal Planner
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

In accordance with your request dated January 18, 2010, the Department of Labor and Industrial Relations does not have any comments regarding the "Proposed Phycal Algae Production Pilot Project, located in Wahiawa".

Should you or your staff have questions, please contact me 586-8844, or Mr. Patrick Fukuki, our Business Management Officer, at 586-8888.

Sincerely,

DARWIN L.D. CHING

GROUP 70
INTERNATIONAL

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Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

June 8, 2010

Mr. Darwin L.D. Ching, Director
State of Hawai'i
Department of Labor and Industrial Relations
830 Punchbowl Street, Room 321
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Ching:

Thank you for your Pre-Consultation comment letter dated January 26, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Labor and Industrial Relations has no comments to offer at this time. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

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LINDA LINGLE
GOVERNOR OF HAWAII

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FEB 11 2010
GROUP 70 INT'L

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

February 7, 2010

Jeffrey Overton
Group 70
925 Bethel Street Fifth Floor
Honolulu, Hawai'i 96813

LOG NO: 2010.0327
DOC NO: 1002NM15
Archaeology

Dear Mr. Overton:

SUBJECT: Chapter 6E-42 Historic Preservation Review –
Pre- Consultation on DRAFT Environmental Assessment—
Phycal Alage Production Pilot Project
Wahiawa Ahupua'a, Ewa District, Oahu Hawai'i
TMK: (1) 7-1-007: 011

Thank you for providing the opportunity to comment on this consultation which we received on January 21, 2010. We concur that there will be **"no historic properties affected"** by this project since the area was used for former cultivation.

Please contact me at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon (Deputy SHPO)
Archaeology and Historic Preservation Manager

Cc: OEQC, 235 South Beretania St, Room 702 Honolulu, HI 96813

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Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

June 8, 2010

Ms. Nancy A. McMahon, Deputy SHPO
State of Hawai'i
DLNR, State Historic Preservation Division (SHPD)
6001 Kamokila Blvd., Room 555
Kapolei, HI 96707

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. McMahon:

Thank you for your Pre-Consultation comment letter dated February 7, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We appreciate your determination and concurrence that "no historic properties" will be affected by the project since the Poamoho project area was used for former cultivation.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

An Archaeological Assessment (AA) and Cultural Impact Assessment (CIA) was conducted by Scientific Consulting Services, Inc. for the Poamoho site and the Tesoro site and either have been or will be submitted to DLNR, SHPD. Copies of the AA and CIA will also be included in the Draft EA.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:

STP 8.0031

February 8, 2010

RECEIVED
FEB 12 2010
GROUP 70 INT'L

Mr. Jeffrey Overton, AICP, LEED AP
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Phycal Algae Production Pilot Project
Pre-Consultation for Draft Environmental Assessment (DEA)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project, which proposes to develop an algae farm, and processing production facility on 34 acres in Wahiawa at the corner of Kaukonahua Road and Kamehameha Highway.

Given the project location, DOT's State highway facilities, Kamehameha Highway, Kamananui Road and Wilikina Drive will be impacted. DOT offers the following comments:

1. Prior to the development of the site, it is important that the petitioner discuss acceptable highway access requirements with DOT Highways Division. DOT suggests that the petitioner contact the DOT Highways Division, Rights-of-Way Branch at (808) 692-7325 regarding highway access matters.

2. The DEA should discuss and evaluate:

   a. Project impacts on State highway facilities in the area such as, Kamehameha Highway, Kamananui Road and Wilikina Drive;

   b. Short-term and long-term traffic generated by the project;

   c. Construction vehicles and heavy equipment type that will be used on the jobsite. Please note that a permit is required from DOT Highways Division to transport oversized equipment and overweight loads on State highway facilities;

   d. Construction activity hours and business hours for the facility upon completion;

   e. Security of completed facility;

f. Project impacts on the military road for the Schofield Barracks Stryker Brigade Convoy Training;

g. Compliance with the National Pollutant Discharge Elimination System (NPDES) permit requirements for construction activity disturbing one (1) or more acres of land area;

h. The grading and drainage plans/study must be submitted to DOT Highways Division for review and approval; and

i. The requirement that construction plans be submitted to DOT Highways Division for all work done within the State highway rights-of-way.

DOT appreciates the opportunity to provide comments and requests four copies of the DEA when it is available. If there are any questions, including seeking to meet with Highways Division Staff, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

GROUP 70
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Tom Young, MBA AIA

June 8, 2010

Mr. Brennon T. Morioka, Ph.D., P.E.
Director of Transportation
State of Hawai'i
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Morioka:

Thank you for your Pre-Consultation comment letter dated February 8, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

The following are offered in response to your comments:

1. *Prior to the development of the site, it is important that the petitioner discuss acceptable highway access requirements with DOT Highways Division. DOT suggests that the petitioner contact the DOT Highways Division, Right-of-Way Branch.*

We agree with the importance of discussing acceptable highway access requirements. The project team will coordinate with DOT Highways Division to discuss this issue in the near future.

2. *The DEA should discuss and evaluate:*
   a. *Project impacts on State highway facilities in the area such as Kamehameha Highway, Kamananui Road and Wilikina Drive;*

      Access to the site will be from Kaukonahua Road, an existing two-lane City & County Roadway, approximately 1,300 feet west of its intersection with Kamananui Road. In 2008, traffic counts were conducted by the City & County of Honolulu. The 24-hour volume on Kaukonahua Road fronting the project site was approximately 1,660 vehicles. On Kaukonahua Road, during the AM peak

hour of traffic there were 150 vehicles and 136 during the PM peak hour of traffic. The proposed Phycal Algae Pilot Plant will employee 37 workers over three shifts with a maximum of 15 employees working during the day time. A single water truck will provide water to the algae plant from the Wheeler Army Airfield Waste Water Treatment Plant. It is anticipated that the water truck will make up to 15 round trips a day. The proposed project is anticipated to generate less than 50 trips during the AM and PM peak hours of traffic and will not have a significant effect on the traffic operations along roadways near the project site. This information is provided in Section 3.0 of the Draft EA.

b. *Short-term and long-term traffic generated by the project;*

Since the proposed project will generate less than the 50 trips during the AM and PM peak hours of traffic, no significant impacts are anticipated to occur as a result of the project. This information is provided in Section 3.0 of the Draft EA.

c. *Construction vehicles and heavy equipment type that will be used on the jobsite. Please note that a permit is required from DOT Highways Division to transport oversize equipment and overweight loads on State highway facilities;*

Typical construction vehicles will be used on the jobsite for the development of the aquaculture project. These may include D9 dozers, front end loaders, scraper, dump trucks, water trucks, etc. A permit from DOT Highways will be obtained for transport of oversize equipment and overweight loads.

d. *Construction activity hours and business hours for the facility upon completion;*

Construction activity hours will be from 7:00 am to 6:00 pm. Construction will adhere to applicable noise regulations as per Title 11, Chapter 46, of the Hawai'i Administrative Rules (HAR) 11-46.

At the Poamoho site, the Phycal Algae Pilot project will operate 24 hours per day, 7 days per week. Several employees will be on-site during each production shift. The production shifts for the Poamoho site are from 6:00 am to 2:00 pm, 2:00 pm to 10:00 pm, and 10:00 pm to 6:00 am.

At the Tesoro site, the project will operate 24 hours per day, 7 days per week. The production shifts for the Tesoro site are also from 6:00 am to 2:00 pm, 2:00 pm to 10:00 pm, and 10:00 pm to 6:00 am.

e. *Security of completed facility;*

The Poamoho project site will be secured by fences, entry gates, screens, lighting, and other security measures. A natural vegetation buffer will be retained along the east and south sides of the aquaculture ponds fronting the two roadways.

While the perimeter of the Tesoro parcel is currently fenced off to the public, Phycal's portion of the property will be furthered secured by fencing around the project area.

f. *Project impacts on the military road for the Schofield Barracks Stryker Brigade Convoy Training;*

The project will have no effect on the military road used for Stryker Brigade Convoy Training, located approximately 1.0 km to the west of the property.

g. *Compliance with the National Pollutant Discharge Elimination System (NPDES) permit requirements for construction activity disturbing one (1) or more acres of land area;*

The project will comply with NPDES permit requirements for construction activity. A NPDES permit for discharge of stormwater associated with construction activities will be obtained for the Poamoho site. The requirements of the approved NPDES permit and erosion control plan will be adhered to during construction as appropriate.

h. *The grading and drainage plans/study must be submitted to DOT Highways Division for review and approval; and*

Grading and drainage plans for the project will be submitted to DOT Highways Division at the appropriate time for review and approval.

i. *The requirement that construction plans be submitted to DOT Highways Division for all work done within the State highway rights-of-way.*

Construction plans for the Poamoho project site will be submitted to DOT Highways Division at the appropriate time in the development process.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD10/4806

RECEIVED
FEB 19 2010

February 10, 2010

Jeff Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

RE: Request for preliminary comments on environmental assessment (EA), Phycal Algae production pilot project, Wahiawā, O'ahu, TMK: 7-1-001:011.

Aloha e Jeff Overton,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated January 18, 2009. OHA has reviewed the project and offers the following comments.

OHA is supportive of the idea for this algae-to-energy project that will create some 36 jobs and add $5-8 million to the state economy per year. We are eager to review the EA and offer more substantial comments.

For now we offer general concerns that if the project moves forward, and if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division shall be contacted.

Thank you for the opportunity to comment. If you have further questions, please contact Grant Arnold by phone at (808) 594-0263 or e-mail him at granta@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Chief Executive Officer

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June 8, 2010

Mr. Clyda W. Nāmu'o, Chief Executive Officer
State of Hawai'i
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Nāmu'o:

Thank you for your Pre-Consultation comment letter dated February 19, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We appreciate your support for the project. The Department of Land and Natural Resources, State Historic Preservation Division (SHPD) has determined that "no historic properties" will be affected by the project since the Poamoho project area was used for former cultivation. However, the possibility always exists that archaeological or historical remains will be found during the construction phase. As a standard contracting procedure, contractors working in the project area will be advised that should any significant cultural deposits or human skeletal remain area be encountered, work shall stop in the immediate vicinity and the SHPD shall be promptly contacted to determine the appropriate course of action.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts, including Archaeological and Cultural Impact Assessments.

An Archaeological Inventory Survey was conducted by Scientific Consulting Services, Inc. for the Poamoho site (March 2010) and the Tesoro site (May 2010) and will be included in the Draft EA.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

MUFI HANNEMANN, Mayor

RANDALL Y. S. CHUNG, Chairman
SAMUEL T. HATA
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ROBERT K. CUNDIFF
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JEOFFREY S. CUDIAMAT, Ex-Officio
BRENNON T. MORIOKA, Ex-Officio

WAYNE M. HASHIRO, P.E.
Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager and Chief Engineer

January 29, 2010

FEB - 3 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Group 70 International, Incorporated
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Subject: Your Letter Dated January 18, 2010 on the Pre-Consultation for the Environmental Assessment for Phycal Algae Production Pilot Project, TMK: 7-1-7:11, 30, 31

Thank you for the opportunity to comment on the proposed Phycal Algae Production Pilot Project.

Water Service cannot be made available to the proposed algae production facility. Development of the parcel for agricultural use will adversely impact the fire flow to the existing Helemano Elementary School. The improvements necessary to accommodate the proposed agricultural development are quite extensive, and we do not have plans to construct them at this time. We recommend the developer install a private water source to serve the proposed development.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

PAUL S. KIKUCHI
Chief Financial Officer
Customer Care Division

Water for Life . . . Ka Wai Ola

GROUP 70 INTERNATIONAL

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Christine Mendes Ruotola AICP, LEED AP
James L. Stone, Arch.D., AIA, LEED AP
Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

June 8, 2010

Mr. Paul S. Kikuchi, Chief Financial Officer
City and County of Honolulu
Board of Water Supply
Customer Care Division
630 South Beretania Street
Honolulu, HI 96843

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Kikuchi:

Thank you for your Pre-Consultation comment letter dated January 29, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

Domestic water service for the Poamoho site will come from the Poamoho Camp's existing private water service. The domestic line will serve the potable water needs of the employees primarily within the building facilities on the site but will not be used for pond operations and processing in the remaining area of the site. The pilot project will use reclaimed water from Schofield Barracks Wastewater Treatment Plant for pond operations and fire demands, which will be transported in by a tanker truck and stored on-site. The development of the parcel for agricultural use will not adversely impact the fire flow to the existing Helemano Elementary School.

We that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

Potable water for the Tesoro site will be trucked in from the Poamoho site and stored on-site. The fire flow requirements will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks just south of the project site.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

MUFI HANNEMANN
MAYOR

CRAIG I. NISHIMURA, P.E.
DIRECTOR

COLLINS D. LAM, P.E.
DEPUTY DIRECTOR

February 9, 2010

RECEIVED
FEB 11 2010
GROUP 70 INT'L

Mr. Jeffrey H. Overton, AICP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Pre- Consultation for Chapter 343, HRS Environmental Assessment Phycal Algae Production Pilot Project
TMK: (1) 7-1-007:011 por., and 031 por.
(Wahiawa, O'ahu, Hawaii)

Thank you for inviting us to review the above Environmental Assessment. The Department of Design and Construction does not have any comments to offer at this time.

Should you have any questions, please contact me at 768-8480.

Very truly yours,

Craig I. Nishimura, P.E.
Director

CN:pg(350040)

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June 8, 2010

Mr. Craig I. Nishimura, P.E., Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Nishimura:

Thank you for your Pre-Consultation comment letter dated February 9, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Design and Construction has no comments to offer at this time. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA has provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Hi Jack

Thanks for responding. Here's a recap of our discussion today relating to the EA pre-consultation notice you received.
The civil/environmental engineers are Terrance Arashiro and Ivan Nakatsuka at ATA Hawaii, cc'd on this email. They are also coordinating with Aqua Engineers.

Please provide further notes to my summary, as relevant. Also would like your contact info sent as "Reply to All" to the group. Call or email if you have further questions.

Aloha, Jeff

Telephone call held today Feb 4, 2010
Jack Pobuk, CIP Program Coordinator, C/C Honolulu, Dept. of Environmental Services

DES is interested in being informed about the Phycal project. Questions are:

1. Will there be a potential use of City DES facilities for wastewater? I said we are not. Jack stated that the City will not be asking for capacity.

2. Discussed how Phycal is are working with Wheeler Army WWTP via Aqua Engineers to obtain R-1 water for use in the ponds. Jack stated that supplying R-1 water from City is a possibility in the future.

3. Jack asked about potential discharge from the ponds, and how that is being handled. I described our overflow ponds, but couldn't yet confirm potential tie-in to the Wheeler Army wastewater collection system.

No letter is forthcoming from Jack. I noted that we will respond to these issues for the Draft EA.

Submitted:
Jeff Overton

Jeffrey H. Overton, AICP, LEED AP
Principal & Chief Environmental Planner
GROUP 70 INTERNATIONAL, INC.
Sustainable Development * Architecture * Planning
Environmental Services * Interior Design * Assets Management
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-- CONFIDENTIAL EMAIL COMMUNICATION --

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M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

June 8, 2010

Mr. Tim Steinberger, Director
City and County of Honolulu
Department of Environmental Services
1000 Uluohia Street, Suite 308
Kapolei, HI 96707

Attn: Mr. Jack Pobuk, CIP Program Coordinator

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Steinberger:

We appreciate speaking with Mr. Jack Pobuck (CIP Program Coordinator) of your office on February 4, 2010 concerning the Pre-Consultation for the Phycal Algae Pilot Project Draft Environmental Assessment (EA). A summary of our discussion was provided in an email sent to Mr. Pobuk, and is included in this EA.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

Although specific issues regarding the project were previously discussed, we wanted to provide you with an official response for your records. The discussion items and responses are provided below.

1. Will there be a potential use of City Department of Environmental Services (DES) facilities for wastewater?

The project will not require City DES facilities for wastewater. Domestic wastewater from the project operations at the Poamoho site will be collected in an on-site wastewater pump station. The pump station will discharge sewage through a new forcemain that connects to the existing 10-inch forcemain in Kamananui Road. The sewer line eventually discharges to the Schofield Barracks Wastewater Treatment Plant (WWTP). The majority of the wastewater from industrial processes will be reconditioned in the on-site water treatment facility to allow for reuse in the ponds.

There is no sewer system in the immediate area of the Tesoro project site. The properties in the area use individual wastewater systems, therefore, a self-contained wastewater collection system (portable toilet) will be used for domestic wastewater. Wastes from industrial processes will be disposed of off-site.

2. How is the project working with Wheeler Army WWTP to obtain R-1 water for use in the ponds?

The pilot project will use reclaimed water from Schofield Barracks WWTP for pond operations and fire demands. Since there is not an existing service line in the area, the water will be transported in by a tanker truck. Trucked-in reuse water will be stored on-site. At this time, the State DOH has not certified that the Schofield Barracks WWTP reuse water meets R-1 standards. Therefore an on-site treatment facility will be provided to ensure that the water is treated to sufficient levels. A water conditioning system will be used on site and designed to meet applicable Federal, State, and County regulations.

We understand that the City may be able to supply R-1 water in the future. We will coordinate with your Department to discuss this issue further should the need arise.

3. What is the potential discharge from the ponds, and how that is being handled?

The algae farm will condition and recycle water from the ponds during the grow-out phase. Reusable water generated from the various operations of the algae pilot facility will be conditioned on-site for reuse in the ponds. Water used for general cleaning and equipment blow down will be discharged into the sewer line which is conveyed for treatment at the Schofield Barracks WWTP.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF FACILITY MAINTENANCE
CITY AND COUNTY OF HONOLULU
1000 Uluohia Street, Suite 215, Kapolei, Hawaii 96707
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MUFI HANNEMANN
MAYOR

JEOFFREY S. CUDIAMAT, P.E.
DIRECTOR AND CHIEF ENGINEER

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 10-72

FEB - 8 2010

February 2, 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Pre-Consultation for Environmental Assessment
Phycal Algae Production Pilot Project
TMK: (1) 7-1-001: 011 por., 030 por., and 031 por.
Wahiawa, Oahu, Hawaii

Thank you for the opportunity to provide comments on the pre-consultation for the proposed Phycal Algae Production Pilot Project.

We have no comments to offer as the proposed improvements will be within privately-owned property and will have negligible impact on our facilities and operations.

Since the proposed improvements will not affect our facilities or operations, we request the Department of Facility Maintenance be removed from the environmental assessment process for this project.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 768-3697.

Sincerely,

Jeoffrey S. Cudiamat, P.E.
Director and Chief Engineer

GROUP 70
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James L. Stone, Arch.D., AIA, LEED AP
Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

June 8, 2010

Mr. Jeoffrey S. Cudiamat, P.E., Director and Chief Engineer
City and County of Honolulu
Department of Facility Maintenance
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Cudiamat:

Thank you for your Pre-Consultation comment letter dated February 2, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Facility Maintenance has no comments since the proposed improvements will have negligible impacts on your facilities and operations. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

Per your request, we will remove the Department from the list of consulted parties for the remainder of the environmental review process. We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
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MUFI HANNEMANN
MAYOR

DAVID K. TANOUE
DIRECTOR

ROBERT M. SUMITOMO
DEPUTY DIRECTOR

2010/ELOG-216(WA)
2010/ELOG-106

April 5, 2010

RECEIVED
APR - 7 2010
GROUP 70 INT'L

Mr. Jeffrey H. Overton, AICP, LEED AP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Production Pilot Project
Zoning Variance No. 2007/VAR-62
HIDC Poamoho Camp, LLC
71-045 Kamehameha Highway - Wahiawa
Tax Map Key 7-1-1: portions of 11, 30, and 31

This is in response to your two letters, received on January 20 and February 3, 2010, requesting our:

1) Review and comment during the pre-consultation process on the preparation of an Environmental Assessment (EA) for the Phycal Algae Production Pilot Project, pursuant to the requirements of Chapter 343, Hawaii Revised Statutes (HRS); and

2) Determination that the proposed uses are consistent with Condition B in Zoning Variance No. 2007/VAR-62 regarding the requirement for agricultural activity.

The pilot project is to determine the viability of an algae farm and processing/production facility, which includes shallow ponds for the growth of algae, a building to extract and process the algae oil, an anaerobic digester to convert biomass to methane gas, and a water treatment system.

We have the following comments on the proposed project:

1) The site is zoned AG-1 Restricted Agricultural District and is in the State Agricultural District. The growing of algae in ponds is considered aquaculture for the purposes of the Land Use Ordinance (LUO). Provided the processing operation is limited to the algae crop, the activity would be considered "major agricultural products processing" under the LUO and will require a Conditional Use Permit-Major (CUP-M) because of the scale of the activity and potential impacts.

2) The Department of Planning and Permitting has initiated an amendment to the LUO, as part of its housekeeping bill, to add a definition for "biofuel processing facility" in Article 10 that reads as follows:

   "Biofuel processing facility" means a biofuel processing facility as defined under HRS Section 205-4.5(a)(15).

   The LUO Master Use Table would also be amended to require a CUP-M for this use.

   The Planning Commission held a public hearing on the proposed bill on March 10, 2010, and will be transmitting it via the Mayor to the City Council for its consideration. If the proposed LUO amendment is enacted into law, the proposed pilot project would be considered a biofuel processing facility and a CUP-M would be required.

3) If other materials such as petroleum products are added in the processing activities, the use may be considered "light or general manufacturing and processing," which is not permitted in the AG-1 District.

4) The Draft EA should address how the biofuel production and processing facilities and appurtenances would not adversely impact agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), HRS. This information would be useful for determining the need for a Special Use Permit.

5) The Draft EA should also address how the project compares with the following sections of the Central Oahu Sustainable Communities Plan: Section 2.2.2-Retention of Agricultural Lands; Section 3.1.4.4-Agricultural Area; and Section 3.7.3.5-Central Oahu Plantation Villages, Adjacent Land Uses.

6) The Draft EA should describe the wastewater treatment activities, including the source of the wastewater and the "clean" but non-potable water that will be used in the ponds.

7) The project summary and conceptual site layout indicate the project site will encompass portions of Parcels 11, 30, and 31. Please note that Parcel 11 is subject to a Conditional Use Permit No. 2007/CUP-143 for joint development with Parcels 30 and 31; thus, all parcels are treated as a single zoning lot for development purposes.

With regard to your question as to whether the proposed facility would comply with Condition B of Variance No. 2007/VAR-62, we have determined that the growing of algae in ponds and the extraction of the oil in the processing facility are uses that are consistent with that condition, whether the processing activity is considered "major agricultural products processing" or a "biofuel processing facility". The variance was to retain 66 farm dwellings, a clubhouse, and various accessory structures for a plantation subdivision on a portion of Parcel 11. Condition B of the Decision and Order states that:

The remaining 57 acres shall be limited to agricultural activity providing income to the families occupying the farm dwellings on the 34-acre portion of the site.

Please contact William J. Ammons of our staff at 768-8025 if you have any questions.

Very truly yours,

David K. Tanoue, Director
Department of Planning and Permitting

DKT:nt

G:\2010 ELOG-106 Overton

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James L. Stone, Arch.D., AIA, LEED AP
Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

June 8, 2010

Mr. David Tanoue, Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Tanoue:

Thank you for your Pre-Consultation comment letter dated April 5, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. We appreciate the Department of Planning and Permitting (DPP) taking the time to meet with us to discuss the project and Zoning Variance No. 2007/VAR-62.

We would note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts. The following responses are offered to your comments.

1. *The site is zoned AG-1 Restricted Agricultural District and is in the State Agricultural District. The growing of algae in ponds is considered aquaculture for the purposes of the Land Use Ordinance (LUO). Provided the processing operation is limited to the algae crop, the activity would be considered "major agricultural products processing" under the LUO and will require a Conditional Use Permit-Major (CUP-M) because of the scale of the activity and potential impacts.*

The processing operation at the Poamoho site is limited to the algae crop. An application of CUP-M will be submitted to DPP in the near future.

2. *The DPP has initiated an amendment to the LUO, as part of its housekeeping bill, to add a definition for "biofuel processing facility" in Article 10.*

We appreciate DPP moving forward towards amending the LUO to include "biofuel processing facility" as a permitted use on Agricultural lands. We believe this

amendment would help to promote future biofuel projects for appropriate agricultural lands.

3. *If other materials such as petroleum products are added in the processing activities, the use may be considered "light manufacturing and processing," which is not permitted in the AG-1 District.*

Petroleum products are used on the site for a back-up power generator and field equipment operation. Isoparaffinic fluids will also be used as a solvent in extraction process to obtain the algal oil. Isopar is a purified component derived from petroleum. Isopar is necessary for washing the oil out of the algae in the initial processing step. Small quantities of this fluid are contained in the extraction system and not exposed to the environment.

4. *The Draft EA should address how the biofuel production and processing facilities and appurtenances would not adversely impact agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), HRS. This information would be useful for determining the need for a Special Use Permit.*

The biofuel production and processing facilities at the Poamoho site will not adversely impact agricultural land and other agricultural uses in the vicinity of the project. While the property is considered prime agricultural lands (Agricultural Lands of Importance to the State of Hawai'i (ALISH)), the site will be used for aquaculture and the growing of algae which is a permitted agricultural use.

The role of the production and processing facilities at the Poamoho site is mainly for the extraction of the algae oil from the feedstock. This involves harvesting and processing which includes (1) concentrating the algae in a dewatering step; (2) heteroboosting the algae by feeding it fixed carbon in a fermenter; (3) delipidating the algae in an oil removal process; and (4) processing the delipidated biomass in an anaerobic digester. These processes are operational and accessory to aquaculture activities and growing of algae. None of the processes described above involve the refining of biofuels as defined in Section 205-2.5(15) - "biofuels processing facility" - means a facility that produces liquid or gaseous fuels from organic sources such as biomass crops, agricultural residues, and oil crops, including palm, canola, soybean, and waste cooking oils; grease; food wastes; and animal residues and wastes that can be used to generate energy. These types of refinery process for conversion of algae oil into biofuels will take place at the Tesoro refinery.

Although construction for the pilot project will require changes to the existing land to accommodate the algae farm and production facilities, the project will be a low-impact development with site restoration after completion of the pilot project. The ponds and facilities will be removed, concrete areas will be demolished, and the site will be restored to its natural state for continued use as prime agricultural lands. Additionally, the development of the project will not impact other agricultural uses in the vicinity of the Poamoho site. The 34.117-acre project area is a portion of the approximately 90

acre parcel which includes TMK: (1) 7-1-007:011 por., 030 por. and 031 por. Other vacant areas of the parcel adjacent to the project site will be used for agricultural farming by other tenants.

This information is provided in Section 3.0 the Draft EA.

5. *The Draft EA should also address how the project compares with the following sections of the Central O'ahu Sustainable Communities Plan: Section 2.2.2. – Retention of Agricultural Lands; Section 3.1.4.4 – Agricultural Areas; and Section 3.7.3.5 – Central O'ahu Plantation Villages, Adjacent Land Uses.*

Section 2.2.2 - Retention of Agricultural Lands

We support the retention of agricultural lands in Central O'ahu, including those lands north of Wahiawā which include the Poamoho project site. Designated as prime agricultural lands (ALISH) with the second highest agricultural productivity rating (Class B soils) (Land Study Bureau), the site will remain an agricultural use. The land will remain protected from urban development for long-term retention and development of diversified agriculture.

Section 3.1.4.4 - Agricultural Areas

Facilities necessary to support intensive cultivation of arable agricultural lands should be permitted.

- The Poamoho site will have facilities to support the cultivation of algae and aquaculture activities on the site.

Facilities to support limited outdoor recreation use, such as camping, horseback riding and hiking, should be permitted in areas where agricultural use is not feasible.
- Facilities to support recreational use will not be located within the project site.

Residential use should be permitted only to the extent that it is accessory to the agricultural use. Where several dwellings are planned as part of an agricultural use, they should be sited and clustered to avoid the use of more productive agricultural lands and to reduce infrastructure costs.

- While the project site will have office trailers, the project site will not have any residential dwellings or uses.

Buildings and other facilities that are accessory to an agricultural operation should be designed and located to minimize impact on nearby urban areas and roadways.

- The accessory facilities on the Poamoho project site will be designed in accordance with development standards of the LUO, Section 21-3.50-4. Facilities will be located away at the southwestern portion of the site to minimize impact on urban areas and roadways.

Section 3.7.3.5 - Central O'ahu Plantation Villages, Adjacent Land Uses

Agricultural use should be maintained on adjacent lands.

- The use of the Poamoho project site will be for agricultural activities such as aquaculture and the growing of algae. Adjacent to Poamoho Plantation Camp, the project area and other adjacent sites will remain in agricultural use.

The visibility of any new structures in the vicinity should be minimized by appropriate landscape screening and building siting. If visibility is unavoidable, the new structure should be designed to respect the scale and character of the villages.

- The project facilities may be partially visible from Kamananui Road and Kaukonahua Road which borders the Poamoho site on the east and south. From vantage points located mauka and makai of the site, the property will generally appear as a continuation of agricultural lands and uses in the Wahiawā area. The project design will maintain the visual resources of the area by meeting agricultural development standards, such as height and setback requirements, established in Section 21-3.50-4 of the LUO. Additionally, a natural vegetation buffer will be located along Kamananui Road and Kaukonahua Road to provide privacy and to make the project less visible from the roadways. New structures will respect the scale and character of the Poamoho Plantation Camp village.

This information will be provided in Section 5.0 the Draft EA.

6. *The Draft EA should describe the wastewater treatment activities, including the source of wastewater and the "clean" but non-potable water that will be used in the ponds.*

The project will use reclaimed water from Schofield Barracks WWTP for pond operations and fire demands. Since there is not an existing service line in the area, the water will be transported to the site by a tanker truck. Trucked-in reuse water will be stored on-site. At this time, the State DOH has not certified that the Schofield Barracks WWTP reuse water meets R-1 standards. Therefore an on-site treatment facility will be provided to ensure that the water is treated to sufficient levels. A water conditioning system will be used on site and designed to meet applicable Federal, State, and County regulations.

Water from the ponds will be conditioned and recycled during the grow-out phase. Water generated from the various operations of the algae pilot facility will be conditioned on-site for reuse in the ponds. Water used for general cleaning and equipment blow down will be discharged into the sewer line, which is conveys wastewater to the Schofield Barracks WWTP.

This information will be provided in Section 2.0 and 3.0 the Draft EA.

7. *The project summary and conceptual site layout indicate the project site will encompass portions of Parcels 11, 30, and 31. Please note that Parcel 11 is subject to a Conditional Use Permit No. 2007/CUP-143 for joint development with Parcels 30 and 31; thus, all parcels are treated as a single zoning lot for development purposes.*

The development of the pilot project at the Poamoho site will meet the Restricted Agricultural (AG-1) development standards of Section 21-3.50-4 of the Land Use Ordinance. The project meets the minimum lot area and minimum lot width and depth. The project will meet the front, side and rear yards and facilities will meet the maximum height and height setbacks. The project will meet the maximum building area requirements of 10% of the zoning lot. Building area on the lot includes four office trailers and the dwellings, carport, shed, and agricultural accessory uses within the existing Poamoho Plantation Camp which is located at the northern portion of the parcel.

- Building area (non-agricultural uses) within Poamoho Plantation Camp - 101,345 sf (per Exhibit D of Zoning Variance No. 2007/VAR-62)
- Building area (non-agricultural uses) within the Poamoho pilot project site – 20,000 sf

Total building area (non-agricultural uses) – 121,345 sf

- Total area of parcel (as a single zoning lot) – approximately 91.26 acres (3,975,286 sf)

10% of total area – 397,529 sf

Finally, we appreciate DPP's determination that the proposed project complies with Condition B of Variance No. 2007/VAR-62. We will continue to coordinate closely with your office as we prepare the CUP-M application.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 309 • KAPOLEI, HAWAII 96707
TELEPHONE: (808) 768-3003 • FAX: (808) 768-3053 • CITY WEB SITE: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LESTER K. C. CHANG
DIRECTOR

RICHARD HARU
DEPUTY DIRECTOR

RECEIVED
FEB - 4 2010

January 27, 2010

Mr. Jeffrey Overton, AICP, LEED AP
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Environmental Assessment Pre-Consultation
Phycal Algae Production Pilot Project

Thank you for the opportunity to review and comment at the Pre-Consultation stage of the Environmental Assessment for the Phycal Algae Production Pilot Project.

The Department of Parks and Recreation has no comment as the proposed project will not impact any program or facility of the department. You may remove us as a consulted party to the balance of the EIS process.

Should you have any questions, please contact Mr. John Reid, Planner, at 768-3017.

Sincerely,

LESTER K. C. CHANG
Director

LKCC:jr
(349999)

GROUP 70
INTERNATIONAL

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M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

June 8, 2010

Mr. Lester K.C. Chang, Director
City and County of Honolulu
Department of Parks and Recreation
1000 Uluohia Street, Suite 309
Kapolei, HI 96707

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Chang:

Thank you for your Pre-Consultation comment letter dated January 27, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Parks and Recreation has no comments to offer since the proposed project will not impact any program or facility of the department. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA has provides a description and analysis of this project component along with an assessment of potential environmental impacts.

Per your request, we will remove you as a consulted party for the remaining process. We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

MUFI HANNEMANN
MAYOR

WAYNE YOSHIOKA
DIRECTOR

SHARON ANN THOM
DEPUTY DIRECTOR

RECEIVED
FEB - 5 2010

TP01/10-349950R

February 4, 2010

Mr. Jeffrey Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Phycal Algae Production Pilot Project EA Pre-Consultation

This responds to your January 18, 2009, letter requesting consultation and comments on an Environmental Assessment (EA) being drafted for the subject project.

The draft EA should discuss potential transportation impacts, including short-term impacts during construction and proposed mitigation measures. The Hawaii State Department of Transportation should be consulted as well, as Kamehameha Highway is under their control and jurisdiction.

This project may affect bus routes, bus stops, and para-transit operations. The DEA should include a paragraph that states: "The Contractor will notify the Department of Transportation Services, Public Transit Division at 768-8396 and Oahu Transit Services, Inc. (bus operations: 848-4578 or 848-6016 and para-transit operations: 454-5041 or 454-5020) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction."

Thank you for the opportunity to review this matter. Should you have any further questions on the matter, you may contact Mr. Brian Suzuki of my staff at 768-8349.

Very truly yours,

WAYNE Y. YOSHIOKA
Director

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Tom Young, MBA AIA

June 8, 2010

Mr. Wayne Y. Yoshioka, Director
City and County of Honolulu
Department of Transportation Services
650 South King Street, 3rd Floor
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Yoshioka:

Thank you for your Pre-Consultation comment letter dated February 4, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

The Draft EA will include a discussion on the environmental setting, potential impacts, and mitigation measures related to transportation. Short-term impacts during construction of the project will also be addressed. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

The Hawai'i State Department of Transportation was included in the pre-consultation and will continue to be consulted throughout the environmental review process.

We do not anticipate that the project will result in significant adverse impacts to bus routes, bus stops, and para-transit operations. The Draft EA will include the language regarding these operations that you have requested.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ROLLAND J. HARVEST
DEPUTY FIRE CHIEF

February 2, 2010

FEB - 8 2010
INT'L

Mr. Jeffrey Overton, AICP, LEED AP
Principal, Environmental Planner
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Preconsultation for Environmental Assessment
Phycal Algae Production Pilot Project
Tax Map Key: 7-1-007: 011 Por., 030 Por., and 031 Por.
Wahiawa, Oahu, Hawaii

In response to your letter dated January 18, 2010, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from a fire apparatus access road as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire

apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2, as amended.)

3. Submit civil drawings to the HFD for review and approval.

Should you have any questions, please call Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/SY:bh

GROUP 70 INTERNATIONAL

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June 8, 2010

Kenneth G. Silva, Fire Chief
City and County of Honolulu Fire Department
636 South Street
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Chief Silva:

Thank you for your Pre-Consultation comment letter dated February 2, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts. The following responses are offered to your comments.

1. **Fire Apparatus Access Road.** An acceptable fire apparatus access road will be constructed or standard accessibility will be provided to each new facility at both the Poamoho and Tesoro project sites, pursuant to the referenced requirements of the 1997 Uniform Fire Code, Section 902.2.1.

2. **Fire Protection Water Supply.** An approved water supply (including on-site fire hydrants and mains, as required) capable of supplying the required fire flow for fire protection will be provided, pursuant to the requirements of the 1997 Uniform Fire Code, Section 903.2, as amended. The pilot project will use reclaimed water from Schofield Barracks Wastewater Treatment Plant for fire demands at the Poamoho site. The non-potable water will be conditioned and treated on-site and stored in the on-site bladders where it can be drawn upon for fire and operational use. Fire flow requirements for the Tesoro site will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks just south of the project site. A fire hydrant will be installed on the Tesoro site and connect to Tesoro's fire line.

3. **Civil Drawings.** At the appropriate time, relevant civil and construction drawings will be submitted to the Honolulu Fire Department for review and approval.

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

MUFI HANNEMANN
MAYOR

LOUIS M. KEALOHA
CHIEF

DELBERT T. TATSUYAMA
RANDAL K. MACADANGDANG
DEPUTY CHIEFS

OUR REFERENCE DAT-DK

January 20, 2010

RECEIVED
JAN 25 2010
GROUP 70 INT'L

Mr. Jeffrey H. Overton, AICP, LEED AP
Principal, Environmental Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

This is in response to your letter of January 18, 2010, requesting comments on a Pre-Consultation, Environmental Assessment, for the Phycal Algae Production Pilot Project in Wahiawa.

The Honolulu Police Department has no comments to offer at this time.

If there are any questions, please call Major Bart Huber of District 2 (Wahiawa) at 621-3725.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
DEBORA A. TANDAL
Assistant Chief of Police
Support Services Bureau

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June 8, 2010

Mr. Louis M. Kealoha, Chief of Police
City and County of Honolulu
Police Department
801 South Beretania Street
Honolulu, HI 96813

Subject: Pre-Consultation for Chapter 343, HRS Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Chief Kealoha:

Thank you for your Pre-Consultation comment letter dated January 20, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Honolulu Police Department has no comments to offer at this time. We note that the scope of the project has expanded to include a second project site located at Tesoro Hawaii in James Campbell Industrial Park. This site will be used for the processing and conversion of the algae oil into biofuels. The Draft EA provides a description and analysis of this project component along with an assessment of potential environmental impacts.

We appreciate your participation in the EA pre-consultation process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

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DRAFT ENVIRONMENTAL ASSESSMENT

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

SANDRA YAHIRO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1193.0

JUL 1 2 2010

MEMORANDUM

TO: Mr. Joshua B.Y. Strickler, Esq., P.E.
Department of Business, Economic Development & Tourism

FROM: Russ K. Saito
State Comptroller

SUBJECT: Draft Environmental Assessment for the
Phycal Algae Pilot Project
TMK: (1) 7-1-007: por 001 and por 031 and (1) 9-1-084: por 032
Wahiawa and Kalaeloa, O'ahu, Hawai'i

Thank you for the opportunity to provide comments for the subject project. The proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, please call me at 586-0400 or have your staff call Ms. Gayle Takasaki of the Public Works Division at 586-0584.

c: Mr. Jeffrey H. Overton, AICP, LEED AP

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August 10, 2010

Mr. Russ K. Saito, State Comptroller
State of Hawai'i
Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810-0119

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Saito:

Thank you for your comment letter dated July 12, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Accounting and General Services has no comments to offer at this time since the project does not impact any of the Department's projects or existing facilities.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
ABBEY SETH MAYER
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-13059

July 13, 2010

Mr. Jeffrey H. Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

We have the following comments on the Draft Environmental Assessment (DEA) for the proposed Phycal Algae Pilot Project which seeks to develop an algae farm and processing production facility on the Island of Oahu, Hawaii.

Section 5.3 on page 5-6, discusses the project's relationship to the Hawaii Coastal Zone Management (CZM) Act. Although the Poamoho and Tesoro sites for the proposed project are not within the Special Management Area, the State's "coastal zone management area" encompasses the entire State. Chapter 205A, Hawaii Revised Statutes (HRS), requires all State and County agencies to enforce the CZM objectives and policies. Therefore, this Section should be revised to include an assessment as to how the project conforms to each of the Chapter 205A, HRS, CZM objectives and their supporting policies.

If there are any other questions about this, please contact Shichao Li of our CZM Program at 587-2841.

Sincerely,

Abbey Seth Mayer
Director

c: Mr. Theodore E. Liu, DBEDT
Ms. Katherine Puana Kealoha, OEQC

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August 10, 2010

Mr. Abbey Seth Meyer, Director
State of Hawai'i
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, HI 96804

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Meyer:

Thank you for your comment letter dated July 13, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

Section 5.3 of the EA has been revised to include the project's conformance to objectives and policies of the Hawaii Coastal Zone Management Act.

The Coastal Zone Management (CZM) Act of 1972 (16 United States Code (USC), Section 1451), as amended through Public Law 104-150, created the coastal management program and the National Estuarine Research Reserve system. The coastal states are authorized to develop and implement a State coastal zone management program. The Hawai'i CZM Program received Federal approval in the late 1970's. The objectives of the CZM Program, as defined in Section 205A-2, HRS, are to protect valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone. Each County is responsible for designating a Special Management Area (SMA) that extends inland from the shoreline. Development within the SMA is subject to County approval to ensure the proposal is consistent with the policies and objectives of the Hawai'i CZM Program.

While the project areas of both the Poamoho site and Tesoro site are not within the SMA as delineated by the City and County of Honolulu the relationship of the proposed project to applicable State CZM objectives and policies is discussed below. State CZM objectives and policies address the following 10 subject areas: (1) recreational resources, (2) historic resources, (3) scenic and open space resources, (4) coastal ecosystems, (5) economic uses, (6) coastal hazards, (7) managing development, (8) public participation, (9) beach protection, and (10) marine resources. Virtually all

relate to potential development impacts on the shoreline, near shore, and ocean area environments.

(1) Recreational Resources
Objective: Provide coastal recreational opportunities accessible to the public.

Discussion
The project would have no impact on coordination and funding of coastal recreation planning and management.

The project sites at Poamoho and Tesoro are located well away from coastal and shoreline areas, therefore the project does not directly provide for or directly affect coastal recreation and access to the public. No coastal resources of significant value, such as surf sites or sandy beaches will be impacted by this project. Also, no shoreline improvements are proposed, such as artificial reefs or beaches.

The project will be constructed and operate in accordance with State and federal water quality regulations. Storm water and sewer management systems will be maintained and new infrastructure will be constructed to meet applicable standards. There will be no discharge into coastal waters.

(2) Historic Resources
Objective: Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Discussion
A Cultural Impact Assessment and Archaeological Assessment (AA) were performed for both the Pomaoho and Tesoro project sites (*Appendix E and Appendix F of the Draft EA*). The project does not involve any known loss or destruction of existing natural, cultural, archeological or historical resources SHPD has determined that no historic properties would be affected by the development of the project at the Poamoho site since the area was used for former cultivation. In addition, SHPD has accepted the findings of the AA for the Tesoro site which determined that development of the project would affect existing historic properties in the area.

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

Discussion
As described in *Section 3.17* of the EA, the project will not affect vistas and scenic resources. The Phycal Algae Pilot project is consistent with the County General Plan, Central O'ahu Sustainable Communities Plan (Poamoho site) and 'Ewa Development Plan (Tesoro site), and Zoning regulations. While the facilities may be partially visible from the roadways at the Poamoho site, the property will generally appear as a continuation of agricultural lands. A natural vegetation buffer will be placed along the

roadways to make the project less visible. At the Tesoro site, the project will be surrounded by other large scale industrial development. Visual resources surrounding this area are minimal. The Phycal Algae Pilot project will meet appropriate agricultural and industrial development standards such as height and setback requirements.

The project sites (Poamoho and Tesoro) are located away from coastal areas, therefore, coastal scenic view sheds are not accessible from this area. No impacts on existing ocean views and scenic resources are anticipated.

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

Discussion
The project will not affect coastal ecosystems or natural resource management. The project will minimize potable water use since the majority of water used on the site for operations will be reclaimed water trucked in from Schofield Barracks WWTP. During construction and operation, all storm water will be retained onsite. Storm water and wastewater infrastructure will not result in pollutant discharge into coastal water. Operations will comply with State and federal water quality standards.

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

Discussion
The project is consistent with State and County plans and land regulations. The location for the Poamoho site is ideal for the pilot project because it will utilize vacant lands and maintain its agricultural use. The location for the Tesoro site at James Campbell Industrial Park, among Tesoro Hawaii Corporation's larger operations, is also suitable for the site's use as a processing facility for biofuels. The project's operations at these two sites will support the State's economy by creating new employment opportunities promoting new venues for Hawai'i in biofuel and renewable energy production

The project sites (Poamoho and Tesoro) are located away from the coastal area and are not considered a coastal dependent development. Therefore, the project will not result in adverse social, visual, and environmental impacts in the coastal zone management area.

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

Discussion
Both the Poamoho and Tesoro project sites are in flood Zone D *(Figure 1-11 of the EA)* and is not in the tsunami inundation zone. Because the project areas area located well

away from the coastal area and the stream courses, the project areas are secure from stream flooding, as well as coastal inundation. To prevent ponding or localized flooding resulting from storm run-off, existing drainage infrastructure will be maintained and new infrastructure will be constructed to meet applicable standards.

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

Discussion
This EA communicates the potential short and long-term impacts of the project on the environment. Procedurally, this EA conforms to HRS Chapter 343. The Office of Environmental Quality Control (OEQC) publishes notice of the EA availability for public review. The public is allowed 30-days to submit comments on the EA. During pre-scoping, agencies, organizations and persons were consulted and will continue to be informed throughout the planning process. In addition, the project development and planning process have included presentations to key community groups such as the Wahiawā – Whitmore Village Neighborhood Board #26 and to the North Shore Neighborhood Board #27. Future presentation will also be made to the Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34.

There are numerous County approvals and permits required and processing will be conducted to facilitate timely processing.

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

Discussion
While the project does not stimulate public awareness, education, and participation in coastal management specifically, it promotes public awareness and education through the environmental review process (HRS Chapter 343) as described above.

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

Discussion
The project sites at Poamoho and Tesoro are located away from public beaches. No structures will be located near the shoreline areas and no construction of public erosion-protection structures seaward of the shoreline will occur. The project will not affect public use and recreation of beaches near the sites.

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

Discussion
The Phycal Algae Pilot will not adversely impact marine and coastal resources. While the project not promote research and understanding particular to ocean development activities and impacts upon ocean and coastal resources, it will involve technologies and research associated with natural resources such as algae.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

July 29, 2010

JUL 30 2010

Mr. Jeff Overton
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Draft Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-001:011, 030, and 031and TMK (1) 9-1-032:084 por.

Thank you for the opportunity to comment on the proposed project. After review of the documents provided, we have concerns regarding the use and storage of any and all hazardous materials, and their short-and long-term potential effects on the surrounding environment. However, we will defer to the agency named in the Draft Environmental Assessment, the Hawaii State Department of Health, Solid and Hazardous Waste Branch in that regard. We anticipate reviewing the Final Environmental Assessment when it is completed.

We also request that a five-by-five foot section be reserved at both the Wahiawa and Kalaeloa locations for potential warning siren locales. If these sites are selected, we will develop the sites to provide the necessary outdoor warning systems.

If you have any questions, please call Havinne Okamura, Hazard Mitigation Planner, at 733-4300, extension 556.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

GROUP 70
INTERNATIONAL

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Tom Young, MBA AIA

August 10, 2010

Mr. Edward T. Teixeira, Vice Director of Civil Defense
State of Hawai'i
Department of Defense
Office of the Director of Civil Defense
3949 Diamond Head Road
Honolulu, HI 96816-4495

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Teixeira:

Thank you for your comment letter dated July 29, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. The following responses are offered to your comments.

We understand your concern regarding the use and storage of hazardous materials and its potential effects on the environment. ARCADIS, a hazardous materials specialist, completed a Hazardous Material Evaluation of the project (*Appendix C* of the EA). The Phycal Algae Pilot Project Draft EA was sent to the State Department of Health (DOH) for public consultation. No comments were received from the DOH, Solid and Hazardous Waste Branch or DOH, Hazard Evaluation and Emergency Response Office. The project will comply with Federal, State and City regulations relating to the use, handling, storing, and generation of hazardous waste.

As you have requested, a five-by-five foot section will be reserved at both the Wahiawā and Kalaeloa locations for potential warning siren locations. *Figure 2-4 (Preliminary Site Plan – Poamoho Site) and 2-5 (Preliminary Site Plan – Tesoro Site)* of the Final EA have been revised to include these areas.

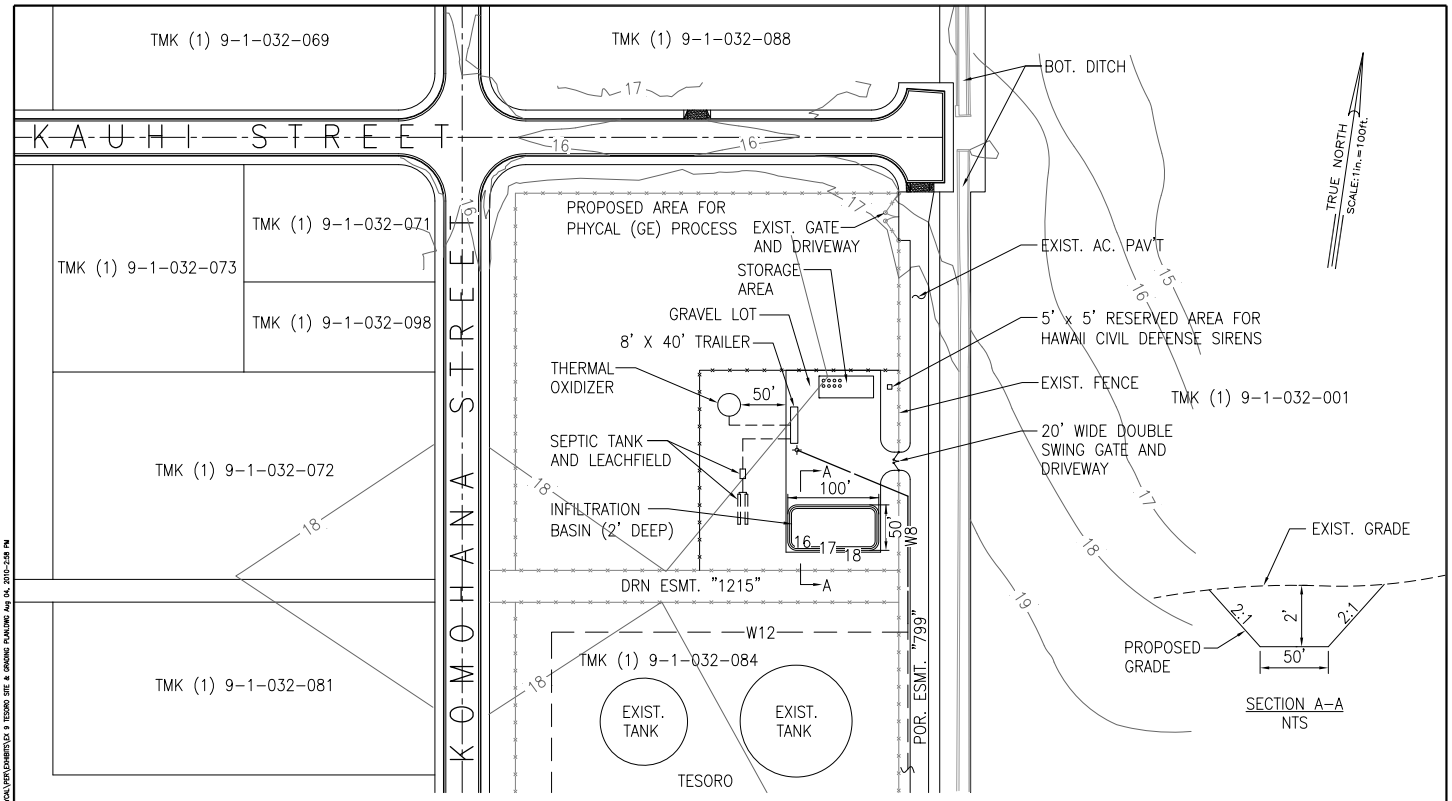
We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Attachments:

1. Figure 2-4: Preliminary Site Plan – Poamoho Site
2. Figure 2-5: Preliminary Site Plan – Tesoro Site



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

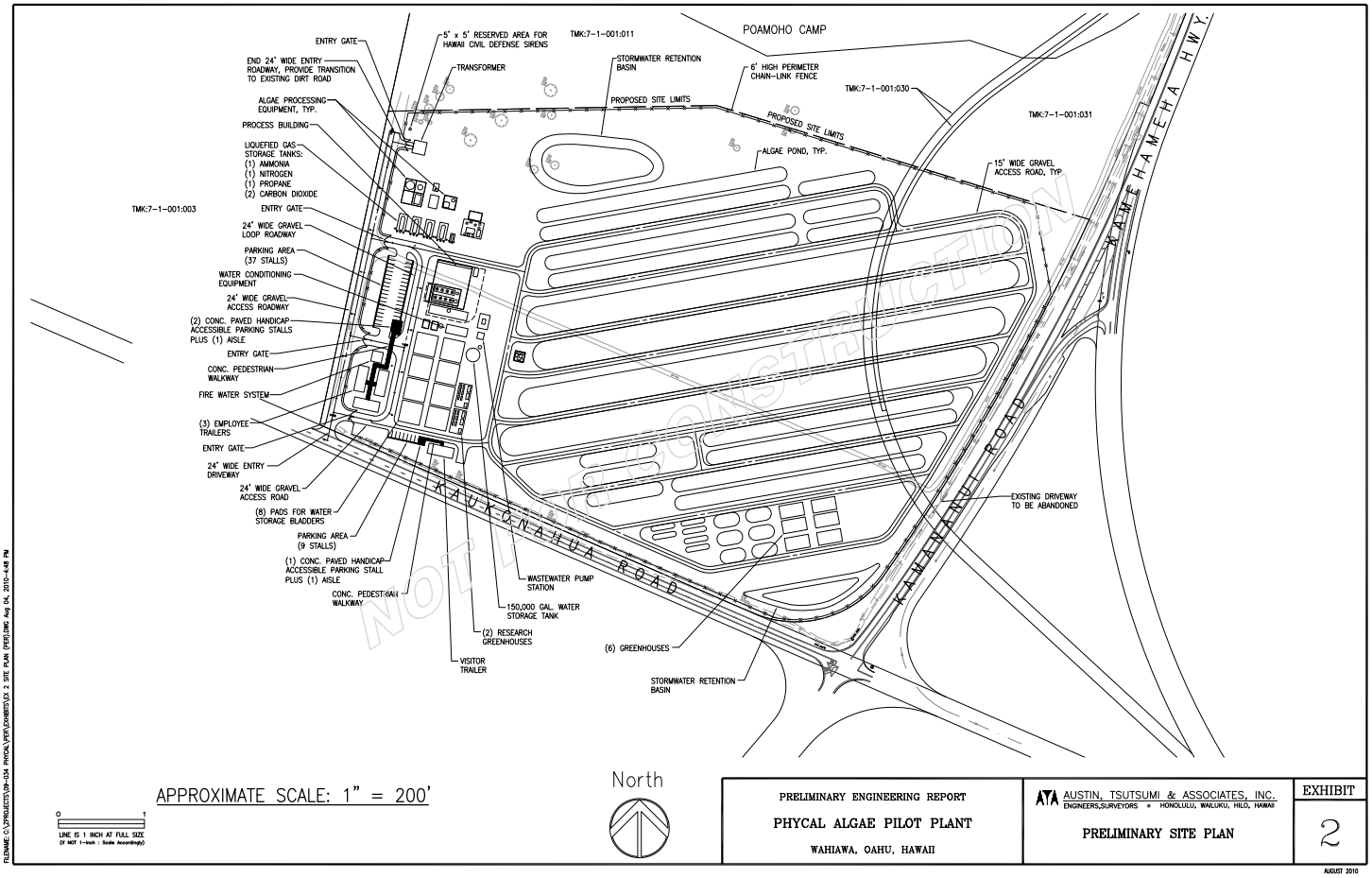
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

TESORO SITE & GRADING PLAN

EXHIBIT 9

AUGUST 2010



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

PRELIMINARY SITE PLAN

EXHIBIT 2

AUGUST 2010

LINDA LINGLE
GOVERNOR

~~PATRICIA HAMAMOTO~~
~~SUPERINTENDENT~~

KATHRYN S. MATAYOSHI
INTERIM SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

July 12, 2010

Mr. Jeffrey H. Overton, Principal
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawai'i 96813

Dear Mr. Overton:

Subject: Draft Environmental Assessment, Phycal Algae Pilot Project, TMKs (1) 7-1-007:011 (por.) and 031 (por.), and (1) 9-1-084:032, Wahiawa and Kalaeloa, Oahu

The Department of Education (DOE) has reviewed the Draft Environmental Assessment (EA) for the phycal algae pilot project.

The DOE has no comment to offer.

Thank you for the opportunity to comment. If you have any questions, please call Jeremy Kwock of the Facilities Development Branch at 377-8301.

Very truly yours,

Kathryn S. Matayoshi
Interim Superintendent

KSM:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
Annette Nishikawa, CAS, Campbell/Kapolei Complex Areas
Patricia Ann Park, CAS, Leilehua/Mililani/Waialua Complex Areas
Joshua B.Y. Strickler, Esq., P.E., DBEDT

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

GROUP 70
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August 10, 2010

Ms. Kathryn S. Matayoshi, Interim Superintendent
State of Hawai'i
Department of Education
P.O. Box 2360
Honolulu, HI 96804

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. Matayoshi:

Thank you for your comment letter dated July 12, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Education has no comments to offer at this time.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

07001PDCL.10

July 1, 2010

RECEIVED
JUL - 2 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Principal
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

SUBJECT: Comments on the Draft Environmental Assessment (DEA) for the Phycal Algae Pilot Project Wahiawa and Kalaeloa, Island of Oahu, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), has reviewed the subject document dated June 21, 2010, and offers these comments on your project. Please note that our review is based solely on the information provided in the subject document and its compliance with Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of one (1) acre or more of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the start of the construction activities.

      Note: Any land disturbance activities from the Poamoho site (algae farm and processing production facility) and the Tesoro site (refining and processing facility) are considered a common plan of development.

   b. Storm water associated with industrial activities.

      Please verify the North American Industrial Classification System (NAICS) United States Structure Code(s) and the corresponding Standard Industrial Classification (SIC) Code(s) for the Tesoro and Poamoho sites. See http://www.census.gov/epcd/www/naicstab.htm to determine the NAICS Code(s) and corresponding SIC Code(s).

      Facilities with SIC Codes categorized in the Code of Federal Regulations, Title 40 (Protection of Environment), Parts 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi) are required to obtain NPDES permit coverage for the discharges of storm water associated with industrial activities.

   c. Hydrotesting effluent.

   You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

3. For types of wastewater not listed in Item 2 above or wastewater discharging into Class 1 or Class AA waters, you may need an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

4. Please specify if there will be any direct or indirect discharges of pollutants to State waters from the operational activities at the Poamoho and Tesoro sites (e.g. algae production ponds, boosting process, algal oil harvesting, process water treatment/recycling, wastewater treatment, etc.).

5. Please verify if 40 CFR, Parts 122.24 (Concentrated Aquatic Animal Production Facilities) and 122.25 (Aquaculture Projects) requirements apply to the proposed project.

6. Page 1-4 of the DEA indicates that a Spill Prevention, Control, and Countermeasure (SPCC) Plan will be submitted to the DOH-CWB. Please do not submit the SPCC Plan to the DOH-CWB. Submit the SPCC Plan to the Environmental Protection Agency (EPA). The DOH-CWB will only review applicable portions of a SPCC Plan that have been submitted to satisfy requirements in a Storm Water Pollution Control Plan (SWPCP).

7. Please note that all discharges related to the project construction or operation activities, whether or not a NPDES permit coverage and/or 401 Water Quality Certification are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

DCL:ml

c: DOH-EPO # I-3233 [via email only]
DOH-OEQC
Mr. Joshua B.Y. Strickler, DBEDT

GROUP 70 INTERNATIONAL

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Tom Young, MBA AIA

August 10, 2010

Mr. Alec Wong, P.E., Chief
State of Hawai'i
Department of Health
Clean Water Branch
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Wong:

Thank you for your comment letter dated July 1, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. The following responses are offered to your comments.

The standard comments provided on the Clean Water Branch and General Department web site have been reviewed. The project will comply with the requirements of the Clean Water Act, including the rules under Hawai'i Administrative Rules, Sections 11-54 and 11-55. Given that the project will include clearing, grading, and excavation of an area greater than one acre, particularly as a common plan of development (Poamoho and Tesoro site). We acknowledge that a National Pollutant Discharge Elimination System (NPDES) permit is required prior to construction.

The project will obtain NPDES permit coverage for the discharges of storm water associated with industrial activities for both the Poamoho and Tesoro project sites.

All applicable discharge requirements will be met as detailed in your letter. There will be no direct or indirect discharges of pollutants to State waters from operational activities at the Poamoho and Tesoro sites. Wastewater from algae production ponds operations and processing activities will be at the Poamoho site will be reconditioned in the on-site water treatment facility to allow for reuse in the ponds. A portion of which will be of R-1 quality to be used for wash-down areas. A maximum of 10 percent of the process water will be discharged to the wastewater pump station where it will be pumped to the Schofield Barracks WWTP. At the Tesoro site, a self-contained wastewater collection system (portable toilet) will be used for domestic wastewater which will be removed regularly by a private disposal service. Other wastes from industrial processes will also be disposed of off-site.

At your request, we have reviewed the requirements of 40 CFR, Parts 122.24 and 122.25 in relation to the proposed project.

The project does not fall under the requirements of 40 CFR, Parts 122.24 because it will not operate within a defined managed water area such as a stream, river, lake, wetlands or other regulated body of water. The project does not intend to discharge water into a receiving body of water as a part of its operations. The pilot project will use reclaimed (R-1 quality) water from Schofield Barracks WWTP for its operations.

The "Concentrated Aquatic Animal Production Facilities" refers to the NPDES requirements for aquaculture facilities requiring the discharge of animal aquaculture (i.e. fish, shrimp, etc.) pond waters to a freshwater receiving body. The Phycal Algae Pilot Project does not fall under the requirements of 40 CFR, Parts 122.25 because no warm water fish will be raised in the operations of the project.

Thank you for the clarification regarding the Spill Prevention, Control, and Countermeasures (SPCC) Plan. *Page 1-4* of the EA has been revised accordingly to note that the SPCC will be submitted to the Environmental Protection Agency.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME LEINAALA FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File: EHA/HEER Office
2010-410 RP

July 15, 2010

Mr. Joshua B. Y. Strickler, Esq., P.E.
State of Hawai`i
Department of Business, Economic Development & Tourism
PO Box 2359
Honolulu, HI 96804

Facility/Site: Phycal Algae Pilot Project, Wahiawā and Kalaeloa, O`ahu, Hawai`i

Subject: Review of Draft Environmental Assessment
Phycal Algae Pilot Project
TMK: (1) 7-1-007:11 por. And 031 por. And TMK (1) 9-1-084:032 por.
Wahiawā and Kalaeloa, O`ahu, Hawai`i

Dear Mr. Strickler:

The Hawaii Department of Health Hazard Evaluation and Emergency Response Office (HEER) has reviewed Draft Environmental Assessment for the proposed Phycal Algae Pilot Project, and has no comments at this time. Should any evidence of on-site contamination occur during construction and operation of the facilities, please notify the HEER Office as soon as possible.

If you have any questions, please contact me at 586-0957.

Sincerely,

Richard Palmer, Ph.D.
Environmental Health Specialist
Hazard Evaluation and Emergency Response Office
State of Hawaii Department of Health
919 Ala Moana Boulevard, Room 206
Honolulu, Hawaii 96814

Cc: Katherine Puana Kealoha, Esq., Office of Environmental Quality Control
Mr. Jeffrey H. Overton, Group 70 International, Inc.

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Christine Mendes Ruotola AICP, LEED AP
James L. Stone, Arch.D., AIA, LEED AP
Katherine M. MacNeil AIA, LEED AP
Tom Young, MBA AIA

August 10, 2010

Richard Palmer, Ph.D.,
Environmental Health Specialist
State of Hawai'i
Department of Health
Hazard Evaluation and Emergency Response Office
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Dr. Palmer:

Thank you for your comment letter dated July 15, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Health, Hazard Evaluation and Emergency Response Office has no comments to offer at this time. In the event that on-site contamination occurs during construction and operation of the project, we will be sure to contact your office.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME LEINAALA FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EMD / WB
DEA Phycal Algae Pilot Project
LUD-1 7 1 001 011 ID# 430

July 9, 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Group 70 International
925 Bethel Street 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Draft Environmental Assessment – Phycal Algae Pilot Project
906 Ihiihi Avenue, Wahiawa and Kalaeloa, Oahu, Hawaii 96786
TMK (1) 7-1-001: 011 portion and 031 and (1) 9-1-084: 032 portion

Thank you for allowing us the opportunity to review the above subject project which will utilize two sites to develop and operate the proposed project – development of an algae farm at the Poamoho site in Wahiawa, Oahu and proposed processing faciliity at the Tesoro site located in James Campbell Industrial Park, Kaleloa, Oahu. We have the following comments and information on the above subject property:

We have no objections to the proposed pilot project. Below are our comments regarding the subject project.

1. It is our understanding that the domestic and process wastewater for the Poamoho site will be managed through an on-site wastewater pump station which will discharge wastewater through a new forcemain that will connect to an existing 10-inch forcemain in Kamananui Road. The sewer line will eventually discharge to the Schofield Barracks WWTP. We have no objections with this proposed method for the management of the wastewater that is generated at this location.

2. For the Tesoro project site located in the James Campbell Industrial Park, a portable toilet is being proposed for the use of the domestic wastewater generation. Please be informed that we will not allow the use of portable toilets to be used for this project site. As a minimum, a septic tank system will be required to be installed in accordance with our Hawaii Administrative Rules, chapter 11-62, "Wastewater Systems."

3. We will need to evaluate and determine whether or not we will allow the use of reclaimed water from Schofield Wastewater Treatment Facility for the algae ponds and operations of the project. We also will need to evaluate whether an individual wastewater permit will be required for the treatment of the organic bio-solids that are generated from the algae processing facility.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules.

Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at 586-4294.

Sincerely,

SINA PRUDER, P.E., ACTING CHIEF
Wastewater Branch

c: DOH's Environmental Planning Office (EPO 1-3233)
DOH-WWB – Reuse/Biosolids Engineer
DBEDT – Mr. Joshua BY Stickler, Esq., P.E.
City & County of Honolulu, Dept. of Planning & Permitting

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Tom Young, MBA AIA

August 10, 2010

Ms. Sina Pruder, P.E., Acting Chief
State of Hawai'i
Department of Health
Wastewater Branch
P.O. Box 3378
Honolulu, HI 96801-3378

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. Pruder:

Thank you for your comment letter dated July 1, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. The following responses are offered to your comments.

1. *It is our understanding that the domestic and process wastewater for the Poamoho site will be managed through an on-site wastewater pump station which will discharge wastewater through a new forcemain that will connect to an exiting 10-inch forcemain in Kamananui Road. The sewer line will eventually discharge to the Schofield Barracks WWTP. We have no objections with this proposed method for the management of wastewater that is generated at this location.*

We appreciate that the Department of Health (DOH) has no objectives to the proposed wastewater management system for the Poamoho site.

2. *For the Tesoro project site located in the James Campbell Industrial Park, a portable toilet is being proposed for the use of the domestic wastewater generation. Please be informed that we will not allow the use of portable toilets to be used for this project site. As a minimum, a septic tank system will be required to be installed in accordance with our Hawaii Administrative Rules, chapter 11-62, "Wastewater Systems."*

The project design has been revised to eliminate the use of a portable toilet for domestic generation at the Tesoro project site. A septic tank system will be used for the project in accordance with HAR, Chapter 11-62. Section 2.4.2 and 3.8.2, and *Appendix B* (Preliminary Engineering Report) of the EA has been revised to reflect this change in the project design.

3. *We will need to evaluate and determine whether or not we will allow the use of reclaimed water from Schofield Wastewater Treatment Facility for the algae ponds and operations of the project. We also will need to evaluate whether an individual wastewater permit will be required for the treatment of the organic bio-solids that are generated from the algae processing facility.*

In July 2010, Austin, Tsutsumi and Associates (ATA) (Ivan Nakatsuka) and ITC Water Management Inc. (ITC) (Elson Gushiken) discussed the proposed project and quality of effluent from Schofield Barracks Wastewater Treatment Plant (WWTP) with DOH (Sina Pruder). Based on this discussion, DOH indicated that the effluent to be transported by tanker truck from the Schofield Barracks WWTP to the Phycal project site will be considered as "R-1 Water", as defined in Chapter 62 of Title 11 HAR. We appreciate this preliminary determination by DOH. A formal Recycled Water Small Project Application Form will be submitted to DOH.

Regarding the evaluation of whether the project will require an individual wastewater permit for treatment of organic solids, this issue was also discussed during the conference with ATA, ITC, and DOH. We look forward to your determination on this issue.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR OF HAWAII

JUN 30 2010

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

LAURA H. THIELEN
CHAIRPERSON
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

June 28, 2010

Jeffrey Overton
Group 70
925 Bethel Street Fifth Floor
Honolulu, Hawai'i 96813

LOG NO: 2010.2403
DOC NO: 1006NM82
Archaeology

Dear Mr. Overton:

SUBJECT: Chapter 6E-42 Historic Preservation Review –
DRAFT Environmental Assessment—
Phycal Alage Production Pilot Project
Wahiawa Ahupua'a, Ewa District, Oahu Hawai'i
TMK: (1) 7-1-007: 011 and 9-1-032: 084

Thank you for providing the opportunity to comment on this DEA which we received on June 23, 2010. Approved archaeological assessments (*An Archaeological Assessment of Approximately 4 Acres for the Physcal Algae Pilot Project in Campbell Industrial Park, O'ahu, Ewa, Honoulili, Oahu, Hawai'i TMK: (1) 9-1-032: 084 [Pestana and Spear, May 2010]*) were conducted on the Campbell Industrial area and the Paomoho area (*An Archaeological Assessment on 34.117 Agricultural Acres for the Phycal Agae Production Pilot Project Wahiawa*). No historic properties were found. We concur that there will be **"no historic properties affected"** by this project since the area was used for former cultivation.

Please contact me at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO)
Archaeology and Historic Preservation Manager

Cc: OEQC, 235 South Beretania St, Room 702 Honolulu, HI 96813

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August 10, 2010

Ms. Nancy A. McMahon, Deputy SHPO
State of Hawai'i
DLNR, State Historic Preservation Division (SHPD)
6001 Kamokila Blvd., Room 555
Kapolei, HI 96707

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. McMahon:

Thank you for your comment letter dated June 28, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

An Archaeological Assessment (AA) and Cultural Impact Assessment (CIA) were conducted by Scientific Consulting Services, Inc. for the Poamoho site and the Tesoro site and have been approved by DLNR, SHPD. We appreciate DLNR, SHPD's determination and concurrence that "no historic properties" will be affected by the project since the Poamoho project area was used for former cultivation.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI
JIRO A. SUMADA

IN REPLY REFER TO:

STP 8.0175

RECEIVED
JUL 30 2010

July 27, 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Phycal Algae Production Pilot Project – Draft Environmental Assessment (DEA)

Thank you for requesting the State Department of Transportation's (DOT) review of the subject project. In its letter STP 8.0031 dated February 8, 2010, DOT previously commented during the pre-consultation period regarding the development of the proposed processing production facility on 34 acres in Wahiawa at the corner of Kaukonahua Road and Kamehameha Highway. DOT notes that the DEA now adds a second site, the Tesoro Site, located on vacant industrial lands in the James Campbell Industrial Park (JCIP).

The Wahiawa project site location impacts DOT's State highway facilities, Kamehameha Highway, Kamananui road and Wilikina Drive.

1. The applicant has satisfactorily addressed and replied to DOT's comments regarding State roadways during the pre-consultation period for the DEA preparation. DOT looks forward to receiving the applicant's future submittal of all required documents, such as but not limited to, project construction plans, grading and drainage plans and permits for transporting overweight/oversized equipment, materials and vehicles and hazardous materials on State roadways.

2. DOT notes that the project site's 24-feet wide access driveway, 46 parking spaces for visitors and employees, 24-feet wide loop roadway and 15-feet wide loop access road to the algae ponds are all graveled surface. As such, the applicant must monitor vehicular activities in and out of the facility to prevent debris, such as gravel or mud, from being tracked on to the near by State roadways; Kamananui Road, Wilikina Drive and Kamehameha Highway.

3. The DEA mentions that the site will require grading and leveling of the land, a vegetation buffer placed along the east and south sides of the pond and an earthen berm at the site. It is important that adequate sight distance requirements must be met and be incorporated

into the planning and design of the project, especially at the intersection of Kaukonahua Road and Kamananui Road.

4. The DEA mentions the hazardous materials list that will be used at the site and states that the storage, use and disposal of these items shall comply with federal and State regulations. The applicant should be informed that transporting hazardous materials within State highway facilities is also subject to compliance with federal and State regulations.

The Tesoro site location will not impact DOT highway facilities; however, given its location at JCIP, it will impact the nearby State airport, Kalaeloa Airport.

1. The Tesoro property is not in any flight path. However, there is a horizontal zone of 180 feet above mean sea level above the property. The DEA should confirm that any structures built at this site will not penetrate this section of Kalaeloa Airport's air space.

2. Because of the close proximity of the facility to Kalaeloa Airfield, DOT recommends that the applicant file Federal Aviation Administration (FAA) Form 7460-1: Notice of Proposed Construction or Alteration. This is the website for filing FAA Form 7460-1: https://www.oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. The applicant and the Final EA should confirm whether the facility will emit any odors that could impact the surrounding area when Kona winds prevail. Pages 3-10 to 3-12 of the DEA discuss certain types of gases, but not odors.

DOT appreciates the opportunity to provide comments and requests four copies of the DEA when it is available. If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at telephone number (808) 587-2356.

Very truly yours,

Francis Paul Keeno

for BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

c: Joshua B.Y. Strickler, Department of Business, Economic Development & Tourism
Katherine Kealoha, Office of Environmental Quality Control

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August 10, 2010

Brennon T. Morioka, Ph.D., P.E.
Director of Transportation
State of Hawai'i
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Morioka:

Thank you for your comment letter dated July 27, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

The following responses are offered to your comments.

1. *Pre-Consultation Comments*

We appreciate knowing that we have satisfactorily addressed the Department of Transportation's (DOT) Pre-Consultation comments. Project plans and permit applications will be submitted as they become available for review.

2. *Debris Prevention to State Roadways*

We acknowledge your concern regarding vehicle activities in and out of the facility. The project design will incorporate methods such as a stabilized construction entrance to keep debris from trucks to be tracked onto State Roadways.

3. *Sight Distance Requirements*

For eastbound Kaukonahua Road, the sight distance to the stop bar at the Kamananui Road intersection is approximately 850 feet. For southbound Kamananui Road, the sight distance to the Kaukonahua Road intersection is approximately 800 feet. In both cases, the roads are straight and the view line to the intersection is not through the lot. Therefore, the lot will not affect these existing sight distances.

The vegetation buffer placed along the roadways will be setback from the curve radius of the intersection corner at Kaukonahua Road and Kamananui Road. It will also be mowed regularly to ensure visual clearance for drivers.

4. *Hazardous Materials Transportation*

We acknowledge that the transporting of hazardous materials within State Highway facilities is subject to compliance with Federal and State regulations. These regulations will be met as appropriate prior to the transport of hazardous materials for the proposed project.

5. *Kalaeloa Airport Space*

None of the proposed structures at the Tesoro site will penetrate the horizontal zone (180 feet above mean sea level above the property) of Kalaeloa Airport's air space. *Section 2.3.1* of the Final EA has been revised to include this information.

6. *Federal Aviation Administration (FAA) Form*

Prior to construction at the Tesoro site, an FAA Form will be completed for the project.

7. *Potential Odors*

Section 3.6 has been expanded to include language regarding potential odors that may result from the project.

"Odors are not expected to increase as a result of the pilot project. The project's daily operations at the Poamoho site and Tesoro site will not involve the creation of new odors. Although solid waste will be present on the Poamoho site, it will be contained in storage bins to minimize affects within the site and to other surrounding areas. Regular waste disposal services will also be provided to ensure odorous substances are not contained on the site for prolonged periods of time. Waste from the Tesoro site will also be stored in containers and disposed of off-site using proper disposal methods."

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

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BOARD OF WATER SUPPLY

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Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager

June 29, 2010

JUL - 2 2010

Mr. Joshua B.Y. Strikler, Esq., P.E.
Department of Business and Economic
Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Subject: Letter Dated June 21, 2010 on the Draft Environmental Assessment for
Phycal Algae Production Pilot Project, TMK: 7-1-1:11,30, 31, 9-1-32:84

Thank you for the opportunity to comment on the proposed Phycal Algae Production Pilot Project.

We have the following comments:

For TMK: 7-1-1:11,30,31:
Water Service cannot be made available to the proposed algae production facility. Development of the parcel for agricultural use will adversely impact the fire flow to the existing Helemano Elementary School. The improvements necessary to accommodate the proposed agricultural development are quite extensive, and we do not have plans to construct them at this time. We recommend the developer install a private water source to serve the proposed development.

For TMK:9-1-32:84:
The existing water system is presently adequate to accommodate the proposed processing facility. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of your building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

PAUL S. KIKUCHI
Chief Financial Officer
Customer Care Division

cc: Office of Environmental Quality Control
Mr. Jeffrey H. Overton, Group 70 International, Inc.

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August 10, 2010

Mr. Paul S. Kikuchi, Chief Financial Officer
City and County of Honolulu
Board of Water Supply
Customer Care Division
630 South Beretania Street
Honolulu, HI 96843

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Kikuchi:

Thank you for your comment letter dated June 29, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. The following responses are offered to your comments.

TMK 7-1-001:011, 030, 031
Domestic water service for the Poamoho site will come from the Poamoho Camp's existing private water service. The domestic line will serve the potable water needs of the employees primarily within the building facilities on the site but will not be used for pond operations and processing in the remaining area of the site. The pilot project will use reclaimed water from Schofield Barracks Wastewater Treatment Plant for pond operations and fire demands, which will be transported in by a tanker truck and stored on-site. The development of the parcel for agricultural use will not adversely affect the fire flow to the existing Helemano Elementary School.

TMK 9-1-032: 084
Potable water for the Tesoro site will be trucked in from the Poamoho site and stored on-site. The fire flow requirements will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks just south of the project site.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
715 SOUTH KING STREET, SUITE 311 • HONOLULU, HAWAII 96813 • AREA CODE 808 • PHONE: 768-7762 • FAX: 768-7792

MUFI HANNEMANN
MAYOR

DEBORAH KIM MORIKAWA
DIRECTOR

ERNEST Y. MARTIN
DEPUTY DIRECTOR

JUN 29 2010

June 24, 2010

Jeffrey H. Overton, ACIP, LEED AP
Principal
Group 70 International, Inc.
925 Bethel Street, 5th floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject Draft Environmental Assessment
Phycal Algae Pilot Project; TMK: 1-7-007:011 and TMK: 1-9-084:032
Wahiawa and Kalaeloa, Oahu, Hawaii

Thank you for the opportunity to review the Draft Environmental Assessment (Draft EA) for the Phycal Algae Pilot Project in Wahiawa and Kalaeloa, Oahu, Hawaii. The proposed Phycal Algae Pilot Project will help to promote new venues for Hawaii in biofuel and renewable energy production, and use vacant agricultural land at Poamoho Camp for a new type of aquaculture farming.

We have reviewed this Draft EA and have determined that the project will have no negative impact on the projects and programs of the Department of Community Services. We were pleased to note that this pilot project will generate 40 jobs in Central Oahu. It will also promote economic recovery, assist those impacted by the recession, spur technological advances, and support the development of clean energy alternatives. Our department supports these outcomes as they are consistent with our Work Hawaii program and activities.

Thank you for providing us the opportunity to comment on this Draft EA.

Sincerely,

Deborah Kim Morikawa
Director

DKM:sk

cc: State of Hawaii
Department of Business, Economic Development & Tourism
P. O. Box 2359
Honolulu, Hawaii 96804
Contact: Joshua B. Y. Strickler, Esquire, P. E.

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August 10, 2010

Ms. Deborah Kim Morikawa, Director
City and County of Honolulu
Department of Community Services
715 South King Street, Suite 311
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Ms. Morikawa:

Thank you for your comment letter dated June 24, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We appreciate your support for the proposed project which will generate approximately 40 jobs while promoting economic recovery through the development of technological advances and clean energy alternatives. In addition, as you have stated in your letter, the project will have no negative impact on the programs of the Department of Community Services.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
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MUFI HANNEMANN
MAYOR

CRAIG I. NISHIMURA, P.E.
DIRECTOR

COLLINS D. LAM, P.E.
DEPUTY DIRECTOR

JUL 23 2010

July 20, 2010

Mr. Jeffrey Overton, AICP, LEED AP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Overton:

Subject: Draft Environmental Assessment Phycal Algae Pilot Project
TMK: (1) 7-1- 007:011 por.and 031 por.and TMK (1) 9-1-084:032por.
(Wahiawa and Kalaeloa, Oahu, Hawaii)

Thank you for inviting us to review the Draft Environmental Assessment (DEA). The Department of Design and Construction does not have any comments to offer at this time.

Should you have any questions, please contact Craig Nishimura, Director at 768-8480.

Very truly yours,

Craig I. Nishimura, P.E.
Director

CN:pg(372037)

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August 10, 2010

Mr. Craig I. Nishimura, P.E., Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Nishimura:

Thank you for your comment letter dated July 20, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Department of Design and Construction has no comments to offer at this time.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
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RECEIVED
JUL 28 2010

KIRK W. CALDWELL
ACTING MAYOR

DAVID K. TANOUE
DIRECTOR

ROBERT M. SUMITOMO
DEPUTY DIRECTOR

2010/ELOG-1291 (WA)

July 26, 2010

Joshua B.Y. Strickler, Esq., P.E.
State of Hawaii
Department of Business, Economic Development & Tourism
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Strickler:

Subject: Draft Environmental Assessment
Phycal Algae Pilot Project
71-045 Kamehameha Highway - Wahiawa (Poamoho site)
91-383 Kauhi Street - Honouliuli (Tesoro site)
Tax Map Key 7-1-1: 11, 30, and 31 (Poamoho site) and
9-1-32: Portion of 84 (Tesoro site)

We have reviewed the Draft Environmental Assessment (EA), received on June 22, 2010, for the above project, and have the following comments:

Section 1.5 Other Permits and Approvals Required For Construction

We concur that a City and County of Honolulu Conditional Use Permit - Major (CUP-M) is needed for the project. At this time, a CUP-M for Major Agricultural Products Processing would be required for the extraction of oil from the algae on the Poamoho site. Bill 24 (2010), CD 1, which would add "biofuel processing facilities" as a new use category in the Land Use Ordinance (LUO), passed Second Reading on July 14, 2010. If the current bill is enacted into law, "biofuel processing facilities" would be allowed in the AG-1 District with a CUP-M, subject to standards in LUO Article 5. Hawaii R & D, LLC would have the option of applying for this new CUP-M for the operation on the Poamoho site. Also, if Bill 24 is adopted, the processing facility at the Tesoro site to refine and convert the purified algae oil into biofuels may be considered a "biofuels processing facility" and allowed with a Conditional Use Permit - minor (CUP-m). Otherwise, depending on operational characteristics and impacts, the use and facility on the Tesoro site may be considered "petroleum processing", which requires a CUP-M in the I-2 Intensive Industrial District.

Section 3.0 Description of the Environmental Setting, Potential Impacts and Mitigative Measures

The Final EA should address how the biofuel production and processing facilities and appurtenances on the Poamoho site would not adversely impact agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), Hawaii Revised Statutes. This information would be useful for determining the need for a Special Use Permit.

Section 3.4 Natural Hazards

Clarify whether the discussion under "Anticipated Impacts and Mitigation Measures" applies to both sites. Clearly identify the two areas in the discussion under "Anticipated Impacts and Mitigation Measures".

Section 3.6 Air Quality

This section should be expanded beyond its current analysis of industrial emissions to cover potential odors.

Section 3.18 Potential Cumulative and Secondary Impacts

This section is misnumbered as Section 3.17.

Section 5.6 City and County of Honolulu - Development and Sustainable Communities Plan (SCP)

This section should indicate that the Poamoho project site is in an Agriculture Area on the SCP Open Space Map. In addition, the summary sheet on page 1-1 should indicate that the project site is in an Agriculture Area within the combined Agriculture and Preservation Areas on the SCP Urban Land Use Map.

Section 5.7 City and County of Honolulu Land Use Ordinance Guidelines

As previously mentioned, Bill 24 (2010), CD 1 (a Bill for an ordinance to amend Chapter 21, Revised Ordinances of Honolulu 1990) passed Second Reading on July 14, 2010. Bill 24 (2010) would allow "Biofuel processing facilities" in the AG-1 District with a CUP-M subject to standards in LUO Article 5, and with a CUP-m in the I-2 District.

Appendix B - Preliminary Engineering Report

This must be stamped and signed by the licensed engineer of record responsible for its contents. With regard to Figure 8, for clarity, provide a colored map that clearly distinguishes the sub-areas and demarcation lines.

Please contact William Ammons of our staff at 768-8025 if you have any questions.

Very truly yours,

David K. Tanoue, Director
Department of Planning and Permitting

DKT:nt

cc: OEQC, Group 70

G:Planning Comments

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August 10, 2010

Mr. David Tanoue, Director
City and County of Honolulu
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Tanoue:

Thank you for your comment letter dated July 26, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. We appreciate the Department of Planning and Permitting (DPP) taking the time to meet with us on July 21, 2010 to discuss the project.

The following responses are offered to your comments.

Section 1.5 Other Permits and Approvals Required for Construction
We appreciate your concurrence that a City and County of Honolulu Conditional Use Permit – Major (CUP-M) will be required for the proposed "major agricultural products processing" activities at the Poamoho site. We anticipate submitting this application to your Department following the completion of the Final EA and a Finding of No Significant Impact (FONSI) determination by the State Department of Business, Economic Development & Tourism.

We appreciate you providing an update on Bill 24 (2010), CD 1, which is intended to add "Biofuel Processing Facilities" as a new use category in the Land Use Ordinance. While we understand that the enactment of this law would allow operations at the Poamoho site to be considered as "Biofuel Processing Facilities" with the completion of a CUP-M, we would like to proceed with a CUP-M for "Major Agricultural Products Processing". At this time, we constrained with the meeting a strict development schedule which accommodates funding for the project.

Relating to the Tesoro site, we understand that with the enactment of Bill 24 (2010), CD1, the proposed uses of the site would be considered a "Biofuel Processing Facility" which would require a Conditional Use Permit-minor (CUP-m). Current plans for the project are focused primarily on the development of the Poamoho site, therefore, we anticipate that Bill 24, (2010), CD1 may be enacted into law at the time that we are ready to proceed with the development of the Tesoro site. An application for a CUP-m

will be submitted to your office at the appropriate time to initiate the permitting process.

Section 1.5 of the Final EA has been revised to include a discussion on Bill 24 (2010) CD1 and future permitting of the Poamoho and Tesoro project sites.

Section 3.0 Description of Environmental Setting, Potential Impacts and Mitigative Measures
Section 3.2 and 5.2 of the Final EA has been expanded to include additional information on how the biofuel production and processing facilities at the Poamoho site will not adversely impact agricultural land and other agricultural uses in the vicinity of the project.

Section 3.2 – Anticipated Impacts and Mitigation Measures
"The Poamoho project site has been historically used for the agriculture. The land will remain in agricultural use for aquaculture. Development of the project will not change the overall soil composition at the site. Due to grading and leveling, soil will be distributed. During construction of the pilot project, erosion control practices will comply with County, State, and Federal regulations. Best Management Practices (BMP) will be implemented pursuant to the required Grading Permit to mitigate potential impacts of soil erosion and fugitive dust during grading or excavation. At a minimum, these practices will include: sediment traps, temporary diversion berms and swales, silt fences, dust fences, inlet protection, stabilized construction entrances and truck wash-down areas. The State DOH NPDES permit will be obtained for the project from the State prior to construction.

The production and processing facilities at the Poamoho site will not adversely affect agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), Hawai'i Revised States (HRS). The primary activity that will take place on the site is aquaculture for algae farming. The site will be largely occupied by algae ponds and greenhouses (approximately 29 acres), with the remaining portion of the site (approximately 5 acres) to be used for the processing of the algae and extraction of algae oil. The processing component will be secondary to growing the algae energy feedstock. Adjoining lands will be available for agricultural use with no limitation due to the Phycal algae farm and processing component.

The algae farm and processing facility is designed to be a low-impact development. The facilities and appurtenances have been selected to appropriately fit the objectives of the pilot project, the selected location on vacant agricultural lands, and the development standards of the LUO AG-1 zoning district. The development of the project will not impact the existing soil class (Class B) or ALISH designation of the site ("Unique" agricultural land). Additionally, the project will not adversely affect agricultural lands and uses in the vicinity, particularly since these agricultural areas are currently vacant and unused. Water to support the project's operations will be supplied by Schofield Barracks WWTP and will not adversely affect water resources in the area designated for other agricultural uses.

As detailed throughout Section 3.0, no significant adverse environmental impacts are anticipated to occur as a result of the project. No long-term effect to the existing agricultural land and uses in the vicinity is anticipated."

Section 5.2 – Anticipated Impacts and Mitigation Measures
"As classified by the State of Hawai'i LUC, the Poamoho project site is situated within the State Agricultural District (Figure 1-5) and the Tesoro project site is situated within the State Urban District (Figure 1-6). The proposed uses within these properties are consistent with permitted uses for the Agricultural and Urban Districts, and will not require district reclassification or boundary amendment.

Pursuant to Section 205-4.5(15), HRS, the project's processing and production facilities is a permissible use within the agricultural district as biofuel processing facilities. The production and processing facilities at the Poamoho site will not adversely affect agricultural land and other agricultural uses in the vicinity pursuant to Section 205-4.5(15), Hawai'i Revised States (HRS). The primary activity that will take place on the site is aquaculture for algae farming. The site will be largely occupied by algae ponds and greenhouses (approximately 29 acres), with the remaining portion of the site (approximately 5 acres) to be used for the processing of the algae and extraction of algae oil. The processing component will be secondary to growing the algae energy feedstock. Adjoining lands will be available for agricultural use with no limitation due to the Phycal algae farm and processing component.

The algae farm and processing facility is designed to be a low-impact development. The facilities and appurtenances have been selected to appropriately fit the objectives of the pilot project, the selected location on vacant agricultural lands, and the development standards of the LUO AG-1 zoning district. As detailed throughout Section 3.0, no significant adverse environmental impacts are anticipated to occur as a result of the project. No long-term effect to the existing agricultural land and uses in the vicinity is anticipated."

Section 3.4 Natural Hazards
Section 3.4 has been revised in the Final EA to provide clarification under the Anticipated Impacts and Mitigation Measures section. The discussion was in reference to both project areas – Poamoho and Tesoro.

"Because the both of the project areas (Poamoho and Tesoro) are located away from the coastal area and the stream courses, the area is secure from stream flooding, as well as coastal inundation. To prevent ponding or localized flooding resulting from storm run-off, existing drainage infrastructure at both sites will be improved to meet applicable design and construction standards. All construction for the project will necessarily conform to relevant building codes to mitigate the risk of wind and seismic damage."

Section 3.6 Air Quality
Section 3.6 has been expanded to include language regarding potential odors that may result from the project.

"Odors are not expected to increase as a result of the pilot project. The project's daily operations at the Poamoho site and Tesoro site will not involve the creation of new odors. Although solid waste will be present on the Poamoho site, it will be contained in storage bins to minimize affects within the site and to other surrounding areas. Regular waste disposal services will also be provided to ensure odorous substances are not contained on the site for prolonged periods of time. Waste from the Tesoro site will also be stored in containers and disposed of off-site using proper disposal methods."

Section 3.18 Potential Cumulative and Secondary Impacts
We appreciate you bring this formatting error to our attention. It has been corrected in the Final EA.

Section 5.6 City and County of Honolulu – Development and Sustainable Communities Plan (SCP)
Section 5.6 of the Final EA has been revised to indicate that the Poamoho project site is in an Agriculture area on the SCP Open Space Map. In addition, page 1-1 has been revised to indicate that the project site is within the Agriculture Area within the combined Agriculture and Preservation Areas on the SCP Urban Land Use Map.

Section 5.7 City and County of Honolulu Land Use Ordinance Guidelines
Section 5.7 has been expanded to include a discussion of Bill 24 (2010), CD1, and future permitting of the Poamoho and Tesoro project sites.

"The Honolulu City Council is currently considering Bill 24 (2010), CD1, which would add "Biofuel Processing Facilities" as a new use category in the LUO. If the bill is enacted into law, "Biofuel Processing Facilities" would be allowed in the AG-1 District with a CUP (Major) and in the I-2 District with a CUP (Minor). A CUP (Major) application could then be submitted for the Poamoho site's agricultural products processing facilities for use as "Biofuel Processing Facilities". Similarly, a CUP (Minor) application could also be submitted for the Tesoro site's refining and processing facilities for use as "Biofuel Processing Facilities". At this time, the project will proceed under the existing LUO which does not include the new use category of "Biofuel Processing Facilities"."

Appendix B- Preliminary Engineering Report
Appendix B (Preliminary Engineering Report – PER) of the Final EA has been revised to address comments received on the Draft EA. The PER is also stamped and signed by a licensed engineer. Figure 8 has also been revised to provide a color map that clearly distinguishes the sub-areas and demarcation lines. A copy of the PER is attached.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Attachment:

1. Appendix B – Preliminary Engineering Report

PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT

WAHIAWA, OAHU, HAWAII
TMK: (1) 7-1-001: 011, 030, 031 (POR) AND
KAPOLEI, OAHU, HAWAII
TMK: (1) 9-1-032: 084 (POR)

July 29, 2010

Prepared for:

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PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

Wahiawa, Oahu, Hawaii

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Kapolei, Oahu Hawaii

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TERRANCE S. ARASHIRO
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HAWAII, U.S.A.

Exp. 4/30/12

This work was prepared by me or under my supervision.

Prepared for

Phycal, LLC
Highland Heights, OH 44143

Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

July 29, 2010

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS · SURVEYORS

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PRELIMINARY ENGINEERING REPORT
FOR
PHYCAL ALGAE PILOT PLANT
WAHIAWA AND KAPOLEI, OAHU, HAWAII

I. INTRODUCTION

The purpose of this report is to review the preliminary engineering design for the proposed Phycal Algae Pilot Plant in Wahiawa and Kapolei, Oahu, Hawaii. This report evaluates the existing site conditions and presents the proposed grading, drainage, roadway, electrical, water and sewer improvements.

II. PROPOSED PROJECT

A. Location

The proposed Phycal Algae Pilot Plant site ("Poamoho Site") is located in Wahiawa Hawaii and has the following Tax Map Keys: (1) 7-1-001: 011, 030, 031 (portions). The site is bounded by Kamananui Road to the east, Kaukonahua Road (State Highway 801) to the south, and vacant agricultural land to the west and north. The Poamoho Camp community is located slightly to the north of the project. The 34-acre lot for the algae plant will be created by subdividing a parcel out of the larger Poamoho Camp property, which is owned by HIDC Poamoho Camp, Inc.

The processing of the algal oil into hydrotreated renewable jet fuel, renewable Naptha, and renewable diesel will be located at the Tesoro site in Kapolei, Hawaii. The proposed site will be on the northern portion of Tax Map Key (1) 9-1-032: 084. The project site is bounded by Komohana Street to the west, Kauhi Street to the north, Tesoro's private access road designated as Easement "799" to the east and Drainage Easement "1215" to the south. The project will use approximately 0.9 acres of the 12 acre parcel.

B. Project Description

The proposed Phycal Algae Pilot Plant is a facility used for growing algae and processing the algae to create bio-fuel. The project will include approximately 10 acres of shallow ponds of various sizes used for algae production. The harvested algae will be processed on-site to remove the lipid oil bio-fuel. The site will contain 46 parking spaces, three employee trailers, one visitor trailer, six greenhouses, various processing equipment facilities and storage tanks. Interior gravel access roads and walkways will circulate around the ponds and to the various equipment areas. Utility infrastructure will include electric, telephone, water and sewer services as well as an on-site water conditioning facility.

The algal oil being produced at the Pilot Plant site in Wahiawa will be transported to the Tesoro refinery site in 55 gallon drums. The Tesoro Site will house a small bench scale unit which will convert the algal oil into hydrotreated renewable jet fuel, renewable Naptha and renewable diesel in small quantities less than 75 gallons per day. It will also include an equipment trailer containing office space, equipment and solvent storage and an outside area for storage of six 55 gallon fuel drums and two 55 gallon waste drums.

III. EXISTING CONDITIONS

A. Topography and Soil Conditions

Poamoho Site:

The site is undeveloped land that was formerly used for cultivating pineapples, but is now overgrown with brush, tall grass, and weeds. Other than two dirt cane haul roads that pass through the site, there are no existing structures or improvements on-site.

The lot contains a high point that slopes away to the north, east, and west. The slopes range from nearly flat to 7 percent with an average gradient of around 4 percent. Elevations at the site range from 946 to 983 feet mean sea level (MSL).

The soil found on-site is classified as Wahiawa silty clay (WaA and WaB). A representative soil profile consists of about 12 inches of dusky red silty clay followed by about 48 inches of dark reddish-brown silty clay that has a subangular blocky structure. The substratum is weathered basic igneous rock, although this is generally quite deep. Permeability is moderately rapid and the erosion hazard is slight. The Hydrologic Soil Group (HSG) for runoff is Type “B”. Classifications are based on the National Resource Conservation Service (formerly Soil Conservation Service) publication, “Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, dated August 1972.

Tesoro Site:

The site is currently vacant with a fenced off area of approximately 420 by 431 feet. Ground cover consists of tall grass, weeds, and low brush. The lot was previously graded as a level pad site. The elevation at the site is approximately 18 feet MSL.

The soil found on the site is classified as Coral Outcrop (Cr). Coral Outcrop soil is the remainder of old coral reefs that formed at a time when the ocean levels were higher. The soil consists of coral or cemented calcareous sand. Permeability is rapid and the HSG is Type “A”.

B. Infrastructure

1. Drainage

Poamoho Site:

As mentioned previously, the site lies on a slight hill that sheds water in several directions. The majority of the site (Drainage Area 1) drains north towards the Poamoho Camp community. Runoff flows overland through the Poamoho Camp and eventually reaches the Poamoho Stream roughly 1,300 feet to the north. Since the soils are moderately permeable and there are no concentrated channels, the runoff is likely to be sheet flow and widely dispersed. An existing 50-year peak runoff of 22 cfs was determined for this area.

The southwestern corner of the site (Drainage Area 2) drains west onto adjacent open land and eventually reaches the roadside swale on Kaukonahua Road. The roadside swale runoff eventually drains into Poamoho Stream. This portion of the site is expected to generate an existing 50-year peak runoff of 5 cfs.

The southeastern corner of the site (Drainage Area 3) drains east toward the Kaukonahua Road and Kamananui Road intersection. At the intersection low-point, it is drained by a 24-inch culvert under Kamananui Road and a 36-inch culvert under Kaukonahua Road. Runoff continues overland until it eventually reaches Kaukonahua Stream. The expected 50-year runoff from this portion of the existing site is 6 cfs.

Since the site area is less than 100 acres, the Rational Method is used for stormwater runoff calculations Refer to Appendix A for calculations and Exhibit 7 for the Existing Conditions Drainage Area Map.

Tesoro Site:

The site drains to the City and County of Honolulu’s storm drainage system. The adjacent drainage system includes catch basins along Komohana Street and Kauhi Street, as well as an unlined open channel on the southern boundary of the site. All runoff eventually discharges to a large open channel that runs along the west edge of Barbers Point Naval Air Station. The unnamed open channel first originates near Kapolei Center and flows south to its ocean outlet point near Kalaeloa Regional Park.

Since the soils on the site have high permeability, the majority of rainfall infiltrates into the ground. Runoff from the site is widely dispersed and no concentrated flows are evident. The overall 50-year runoff from the existing project site is 1 cfs.

Refer to Appendix A for Hydrology Calculations and Exhibit 10 for the Tesoro Site Existing Conditions Drainage Area Map.

2. Water

Poamoho Site:

There is an existing private 4-inch transmission water line in the vicinity of Kamananui Road and Kamehameha Highway that supplies water to Poamoho Camp. This private water line is connected to the City and County of Honolulu Board of Water Supply (BWS) water system at Whitmore Village (approximately one-mile east of the site). Additionally there are larger public water transmission lines that run near the project, but these are unavailable for supplying this site. There are no fire hydrants located in the adjacent public roadways.

Tesoro Site:

There is an existing onsite 12-inch fire water line with fire hydrants adjacent to Tesoro's tanks adjacent to the drainage channel. There is also an existing water line along Komohana Street with a fire hydrant fronting the southwest corner of the site, just north of the drainage channel. In addition, there are two existing water services with water meter boxes, but no water meters.

3. Sewer

Poamoho Site:

An existing 10-inch sewer forcemain runs along Kamananui Road near the eastern border of the site. The sewer line eventually discharges to the Schofield Barracks Wastewater Treatment Plant (WWTP).

Tesoro Site:

There are no existing sewer lines at the Tesoro Site. The properties in this area use individual wastewater systems.

4. Electrical

Poamoho Site:

There are several overhead electric lines in the vicinity of the project. Electrical and communication overhead lines run along Kamehameha Highway. An overhead 3-Phase branch line to the north of the site connects to the overhead lines on Kamehameha Highway to serve the Poamoho Camp. Hawaiian Electric Company presently serves this area from its Helemano Substation which is located to the north of Poamoho Camp in the vicinity of the Dole Plantation. In

addition, electrical lines service the street lights on the east side of Kamananui Road just south of where it intersects with Kamehameha Highway. An overhead telephone line runs along Kaukonahua Road on the southern boundary of the property.

Tesoro Site:

There are overhead electric lines along all sides of the project site, including Komohana Street, Kauhi Street, Tesoro's Private Road and along the south side of Drainage Easement "1215". Hawaiian Electric Company presently serves this area from its Malakole substation located within the Campbell Industrial Park area.

C. Flood Zone

Poamoho Site:

The project is located on a high point and is well above the nearby Poamoho and Kaukonahua Stream floodways. The entire site is within flood zone "D", defined as: "Areas in which flood hazards are undetermined, but possible". The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel number for this area is: 15003C0120F. This map panel is a non-printed panel due to the fact that FEMA has not completed a flood study for this area.

Tesoro Site:

The entire project site is within flood zone "D", defined as: "Areas in which flood hazards are undetermined, but possible". The FEMA FIRM panel number for this area is 15003C0315F.

IV. PROPOSED IMPROVEMENTS

A. Grading and Drainage

Poamoho Site:

The site will be graded in a terrace style to provide level areas for the large algae production ponds. There will be a mix of excavation and embankment with a net excess of approximately 3,000 cubic yards of material. The proposed site will have four drainage areas.

Drainage Area 1A includes most of the algae production ponds, adjacent roads, parking, and equipment pad areas. Runoff from the road and pad areas is collected by perimeter grass swales that carry the runoff to Retention Basin A. The 50-year peak runoff of 38 cfs will be completely retained in Basin A. The algae ponds themselves will not produce any runoff since they will have sufficient freeboard above their normal operating level to capture the 50-year 1-hour rainfall that falls there. Basin

A will also be oversized to allow for emergency containment of any possible overspill from the algae basin facilities.

Drainage Area 1B includes the remaining undeveloped site area that continues to flow overland toward Poamoho Camp. The proposed runoff rate from this area is 3 cfs. Since runoff from Drainage Area 1A is completely retained, only Drainage Area 1B will contribute stormwater runoff flowing off-site to the north and which will be a significant reduction from existing conditions.

Drainage Area 2 includes the entry drive and southwestern corner of the site. This drainage area has been reduced in size from existing conditions and amount of runoff flowing in this direction is in-turn reduced to 4 cfs.

Drainage Area 3 includes six greenhouses and several algae ponds in the southeastern corner of the site. Runoff from this area will be collected in perimeter swales similarly to Drainage Area 1A and will be routed to Retention Basin B. The 50-year runoff of 9 cfs will be completely retained in Basin B. This retention basin will also be oversized to allow for emergency containment of any possible overspill from the algae pond facilities.

Overall there will be a net decrease in stormwater runoff from the proposed project site due to significant retention in Basins A and B. The net 50-year runoff leaving the proposed site will be 7 cfs, which is a reduction of 26 cfs from existing conditions. Refer to Appendix A for Hydrology Calculations and to Exhibit 8 for the Proposed Conditions Drainage Area Map.

Tesoro Site:

The Tesoro Site is nearly flat and only minimum grading will be necessary for the facility. The project area is 40,000 square feet. Approximately 14,000 square feet of the project area will be covered with gravel to allow for vehicular access and for placement of the trailers. The added impervious surfaces will contribute to a slight increase in runoff. To mitigate the increase, a small infiltration basin will be constructed adjacent to the facility where runoff can be collected and allowed to infiltrate into the permeable soils. Refer to Appendix A for Hydrology Calculations and to Exhibit 11 for the Tesoro Site Proposed Conditions Drainage Area Map.

For both sites, water quality treatment of stormwater runoff will be provided by the use of grass swales and stormwater retention. The grass swales will contain native vegetation to filter stormwater runoff and remove pollutants through a natural process. The retention basins will capture all remaining suspended solids and other pollutants since there is no outflow and will prevent them from flowing offsite.

Temporary erosion control measures will be incorporated during the construction period to minimize soil loss and erosion hazards. At a minimum, erosion control BMPs to be used on-site will include: sediment traps, temporary diversion berms and swales, silt fences, dust fences, inlet protection, stabilized construction entrances and truck wash-down areas. NPDES permits for discharge of stormwater associated with construction activities for the Poamoho Site and Tesoro Site will be obtained. The requirements of the approved NPDES permits and erosion control plan will be adhered to during construction.

B. Water

Poamoho Site:

Domestic water service will come from the Poamoho Camp's existing private water service. The domestic line will serve the potable water needs of the employees primarily within the building facilities on the site and will not be used for the industrial processes in the remaining area of the site. Average Daily Domestic Demand is estimated to be 928 gpd based on a typical commercial/ industrial use of 100 gpd per 1,000 sf of building area.

The industrial and fire demands of the project will be provided by non-potable reuse water from the Schofield Barracks WWTP. Since there is not an existing service line in the area, the water will be transported in by a tanker truck. Trucked-in reuse water will be stored on-site in eight separate 100,000 gallon water storage bladders where it can be drawn upon for fire or industrial use. Average Daily Industrial Demand is estimated to be 110,000 gpd.

A fire water supply of 30,000 gallons must be available for fire suppression needs based on the Hawaii Water System Standards. The required fire flow rate is 1,000 gpm. As mentioned above, the fire flow will be provided by reuse water stored in the on-site bladders. Two on-site standpipes will be added in the vicinity of the employee buildings and processing areas.

Refer to Exhibit 4 for the Preliminary Utility Plan. Refer to Appendix B for Preliminary Water Demand Calculations. Refer to Appendix D for Preliminary Fire Flow Calculations.

Tesoro Site:

Potable water will be trucked in from the Poamoho Site and stored onsite in a 55 gallon tank. The Average Daily Domestic Demand is estimated at 32 gpd based on a typical commercial/industrial use of 100 gpd per 1,000 sf of building area.

The fire flow will be provided by Tesoro's 12-inch fire line, which is located adjacent to Tesoro's tanks just south of Drainage Easement

"1215". A fire hydrant will be installed on site and connect to Tesoro's fire line.

C. Sewer

Poamoho Site:

Domestic wastewater from the site will be collected in an on-site wastewater pump station. The pump station will discharge sewage through a new forcemain that will connect to the existing 10-inch forcemain in Kamananui Road. Wastewater contributions are estimated to be approximately 14,200 gpd (average daily flow) based on the 40 employees plus the industrial process water contribution.

The majority of the wastewater from industrial processes will be reconditioned in the on-site water treatment facility to allow for reuse in the ponds. A portion of which will be of R-1 quality will be used for wash-down areas. A maximum of 10 percent of the process water may be discharged to the wastewater pump station where it will be pumped to the Schofield Barracks WWTP on a daily basis.

Refer to Exhibit 4 for the Preliminary Utility Plan. Refer to Appendix C for Preliminary Wastewater Contribution Calculations.

Tesoro Site:

There is no municipal sewer system in the immediate area, therefore, an onsite disposal system, consisting of a septic tank and leachfield, will be installed. The average daily demand will be 160 gpd based on two employees. Any wastes from industrial processes will be disposed of off-site.

D. Roadway

Poamoho Site:

Access to the site will be from Kaukonahua Road, an existing two lane, 22-foot wide public roadway, near the southwest corner of the site. There is an existing dirt cane-haul road in that location that will be re-graded and improved to make the 24-foot wide access drive into the facility.

The new entry road and loop road providing access to the central facility buildings will be gravel. The larger width roadway will be provided to facilitate the movement of large semi-trailer trucks. Other smaller 15-foot wide gravel roadways will circulate around the proposed ponds and equipment areas. A 37-stall employee gravel parking area and a 9-stall visitor gravel parking area will be provided. The handicap accessible portion of the parking areas will be paved as required by A.D.A guidelines.

The site will have a perimeter fence and entry gates to prevent unauthorized access to the facility.

Refer to Exhibit 2 for the Preliminary Site Plan.

Tesoro Site:

The Tesoro Site will be accessed from a 20-foot private road (owned by Tesoro) at the end of Kauhi Street, an existing two lane public roadway. A 24-foot wide gravel access driveway will be constructed off of the private roadway.

An entry gate will be added to the existing perimeter fence for access to the site. On the project site, a gravel parking lot will be provided with enough room for a large truck to deliver the 55-gallon drums from the Wahiawa Site. One delivery is expected about once a week.

Although there is already a perimeter fence around the parcel, there is another entity that leases the site. An additional perimeter fence will be installed around the Phycal site to prevent unauthorized access to the facility.

E. Electrical and Telecommunications

Poamoho Site:

Electric service will be provided by a connection to the Poamoho Camp's overhead electric lines. New overhead lines will be extended into the site to serve the needs of the project. Preliminary electrical demand is estimated to be 1.5 megawatts (MW). Telecommunications will be extended from existing overhead lines on Kaukonahua Road. Refer to Exhibits 5 and 6 for the Preliminary Electric Service Plan.

Tesoro Site:

Electrical power will be supplied by a drop from the Tesoro power line to the equipment trailer. Electrical demand to run the reactors is 100 kilowatts (kW). The total electrical demand is estimated at 200 kW. Telecommunications will be supplied by lines extended onto the existing Hawaiian Electric Company joint poles along Kauhi Street.

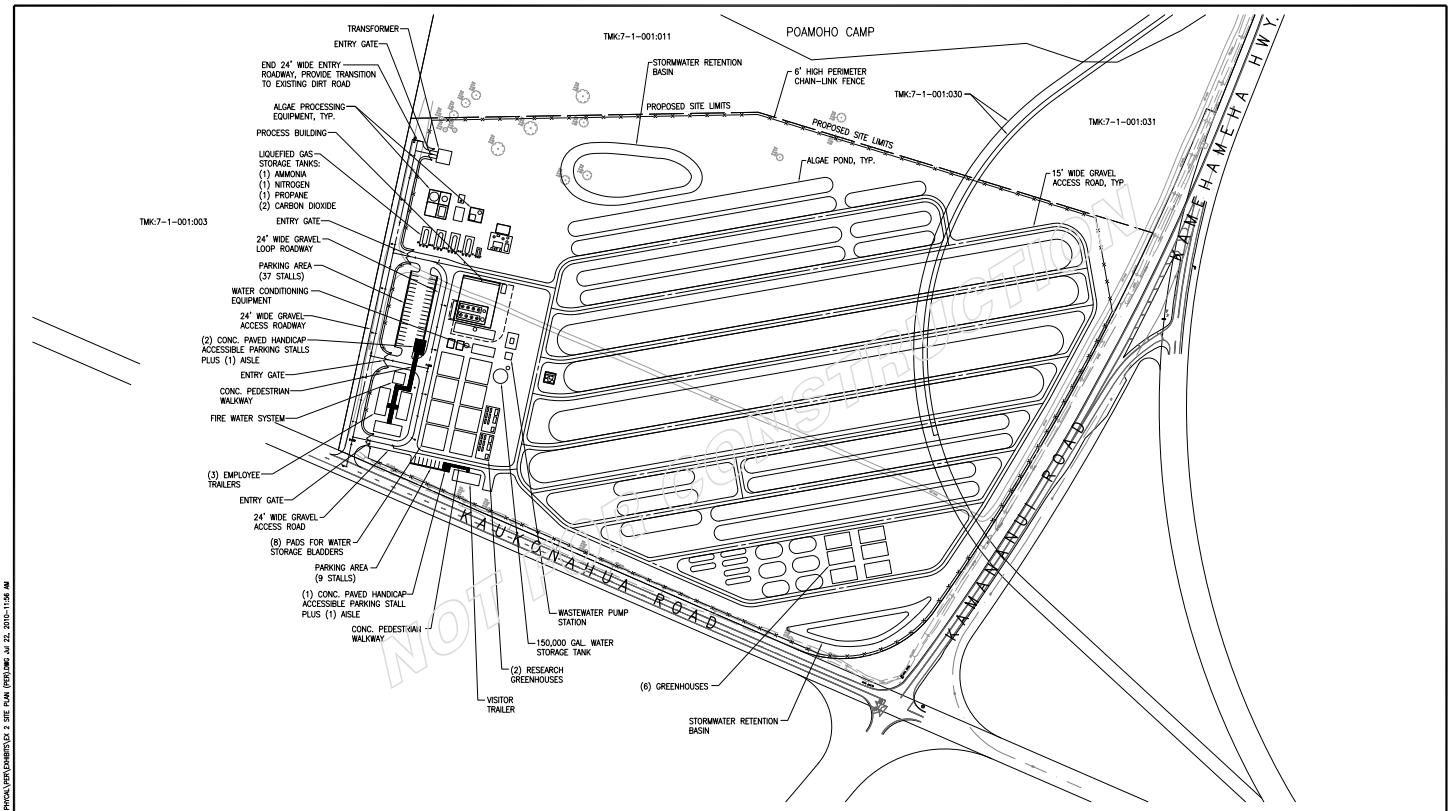
V. CONCLUSION

The proposed improvements for this project will be designed in accordance with the applicable rules and regulations of the City and County of Honolulu (C&C). The Department of Planning and Permitting (DPP) Storm Drainage Standards require retention of the increase in stormwater runoff between the post-development flows and pre-development flows. Since the overall Phycal Pilot Plant stormwater management plan indicates a net decrease in stormwater runoff, the project exceeds C&C requirements. Erosion control and

water quality measures will be provided to minimize pollution during and after construction. Water, Sewer, Roadway, and Electrical designs are sufficient to serve the proposed project and will meet applicable State and C&C standards.

Based on the information presented in this report, this project will have no adverse effects to the existing facilities or to the surrounding environment.

EXHIBITS



APPROXIMATE SCALE: 1" = 200'

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

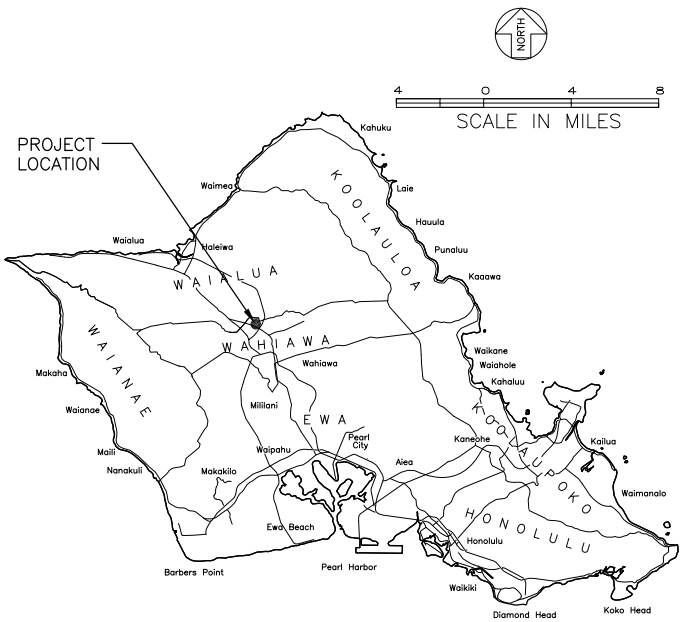
North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY SITE PLAN	EXHIBIT 2

JULY 2010

FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 2 SITE PLAN (PER).DWG Jul 22, 2010-11:56 AM

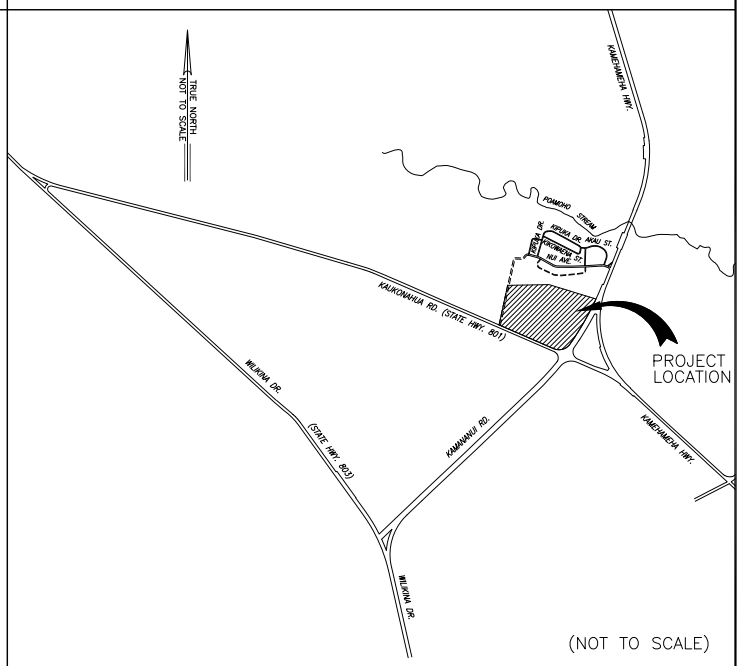
VICINITY PLAN



ISLAND OF OAHU

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

LOCATION PLAN

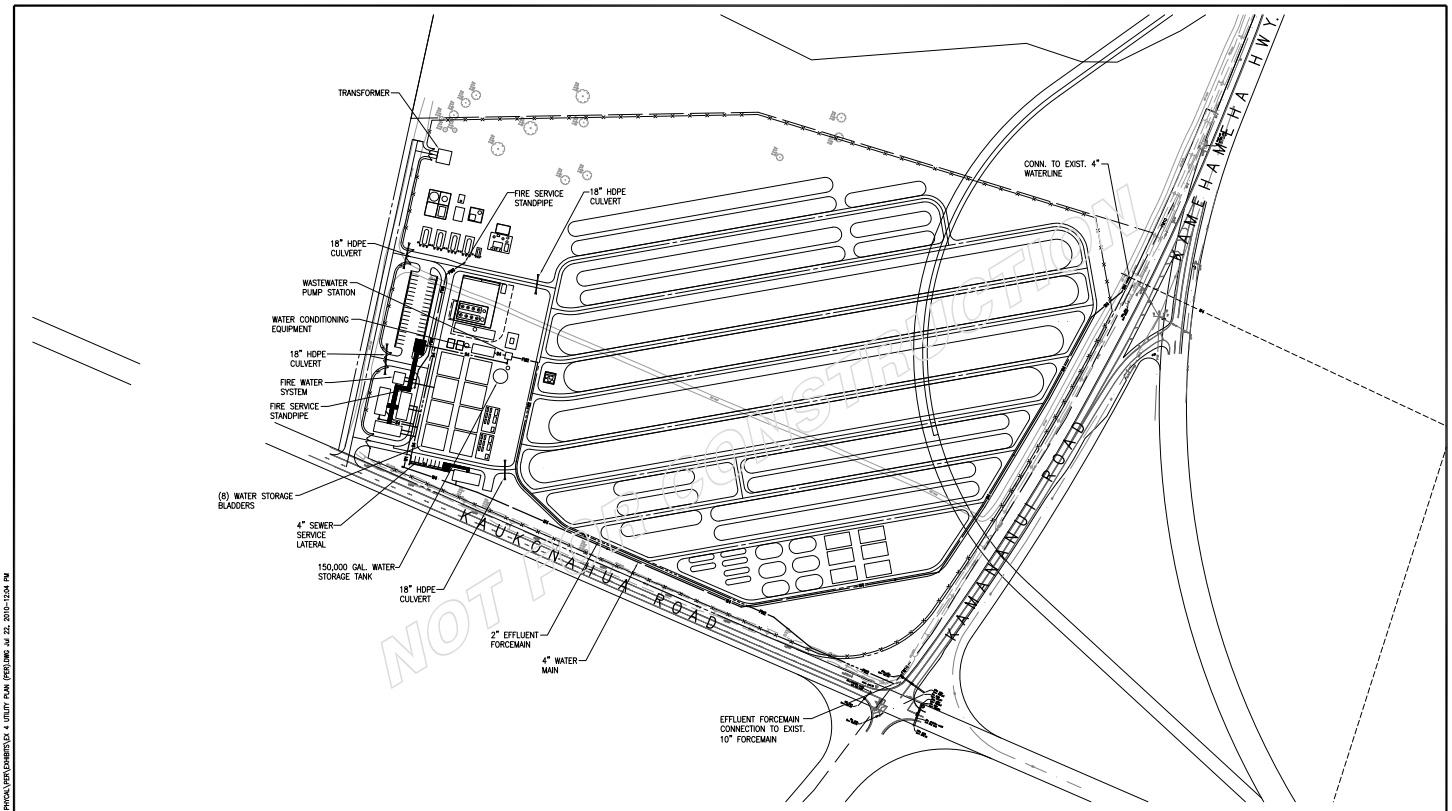


(NOT TO SCALE)

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII LOCATION/ VICINITY MAP	EXHIBIT 1

JULY 2010

FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 1 VICINITY-LOCATION MAP.DWG Jul 22, 2010-11:40 AM



APPROXIMATE SCALE: 1" = 200'

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY UTILITY PLAN	EXHIBIT 4

JULY 2010

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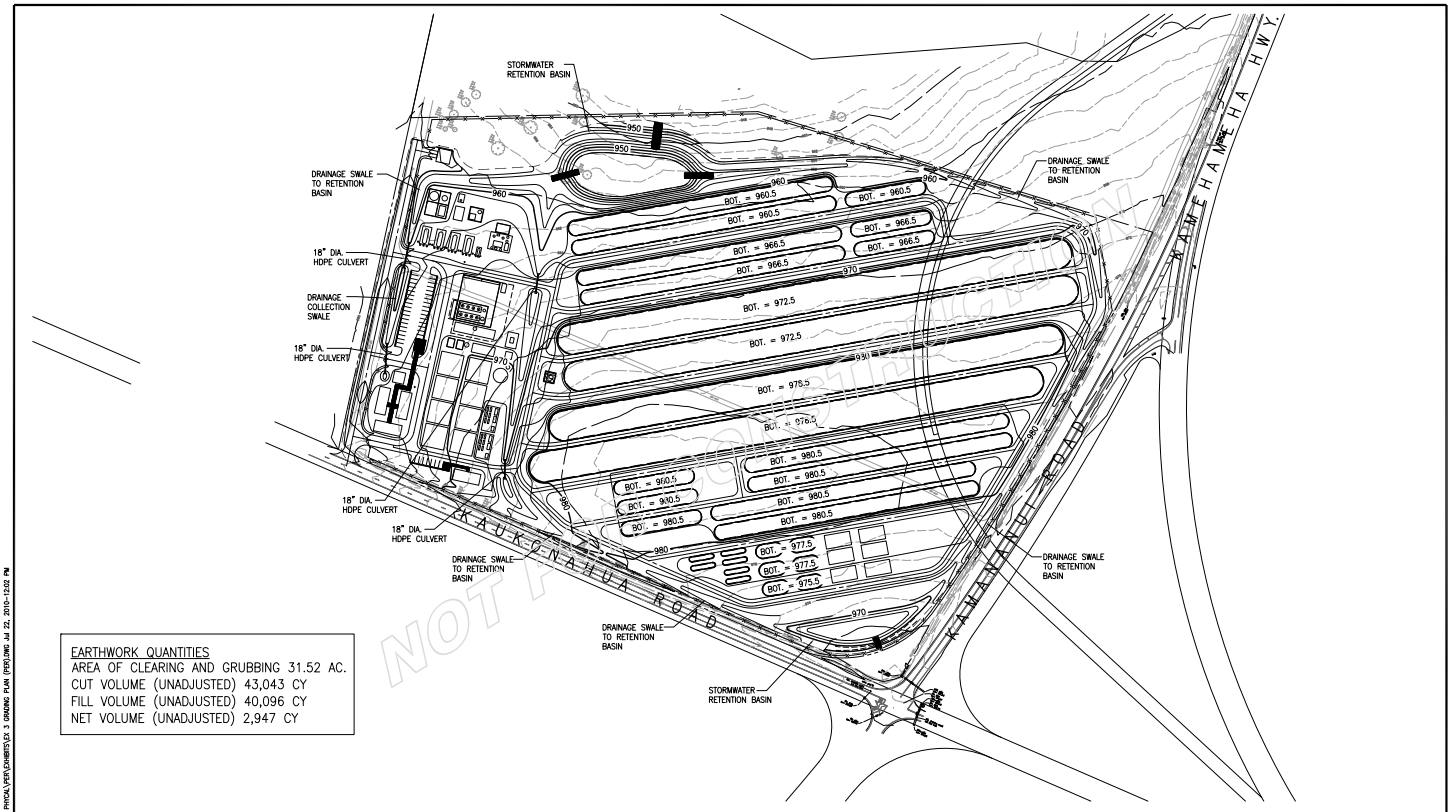


EARTHWORK QUANTITIES
AREA OF CLEARING AND GRUBBING 31.52 AC.
CUT VOLUME (UNADJUSTED) 43,043 CY
FILL VOLUME (UNADJUSTED) 40,096 CY
NET VOLUME (UNADJUSTED) 2,947 CY

APPROXIMATE SCALE: 1" = 200'

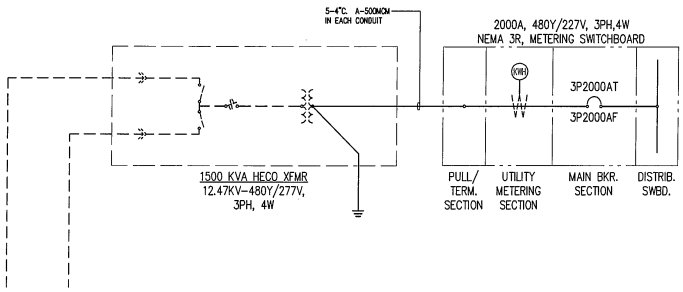
0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY GRADING AND DRAINAGE PLAN	EXHIBIT 3

JULY 2010

FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 3 GRADING PLAN (PER).DWG Jul 22, 2010-12:03 PM



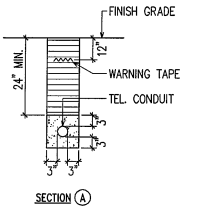
SINGLE-LINE DIAGRAM

NOT TO SCALE

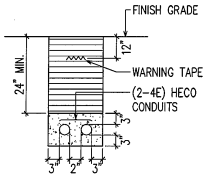
BACKFILL NOTES:

TYPE "A" BACKFILL – EARTH & GRAVEL. ROCK SIZE TO BE 1" MAX. & THE MIXTURE TO CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES. 95% COMPACTION.

CONCRETE – 3" ENCASEMENT, 2500 PSI COMPRESSIVE STRENGTH @ 28 DAYS.



SECTION (A)



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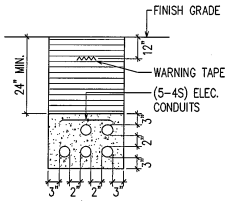

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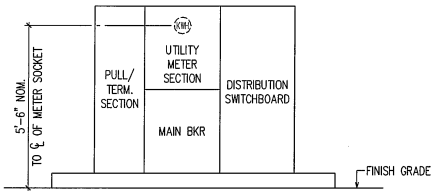

METER ELEVATION

NOT TO SCALE

LINE IS 1 INCH AT FULL SIZE (IF NOT 1-inch : Scale Accordingly)

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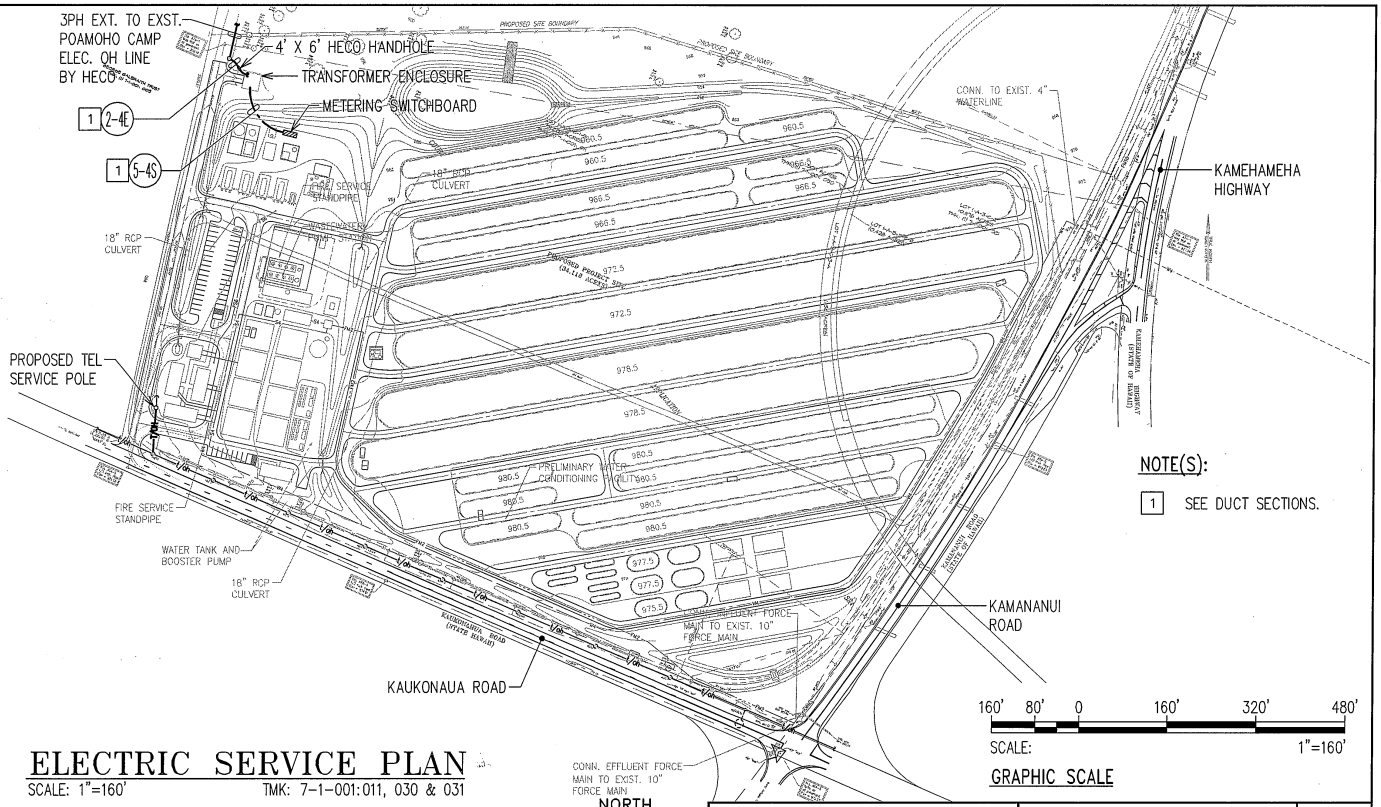
Z:\CAD\PROJECTS\210027\2002_210027_MISC_DETAILS

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII MISCELLANEOUS DETAILS	EXHIBIT 6

APRIL 2010



NOTE(S):

1 SEE DUCT SECTIONS.

ELECTRIC SERVICE PLAN

SCALE: 1"=160' TMK: 7-1-001:011, 030 & 031

LINE IS 1 INCH AT FULL SIZE (IF NOT 1-inch : Scale Accordingly)

LAST SAVE: 04/30/10 @ 09:21:26 BY: GN PLOT SC 1=160.000000
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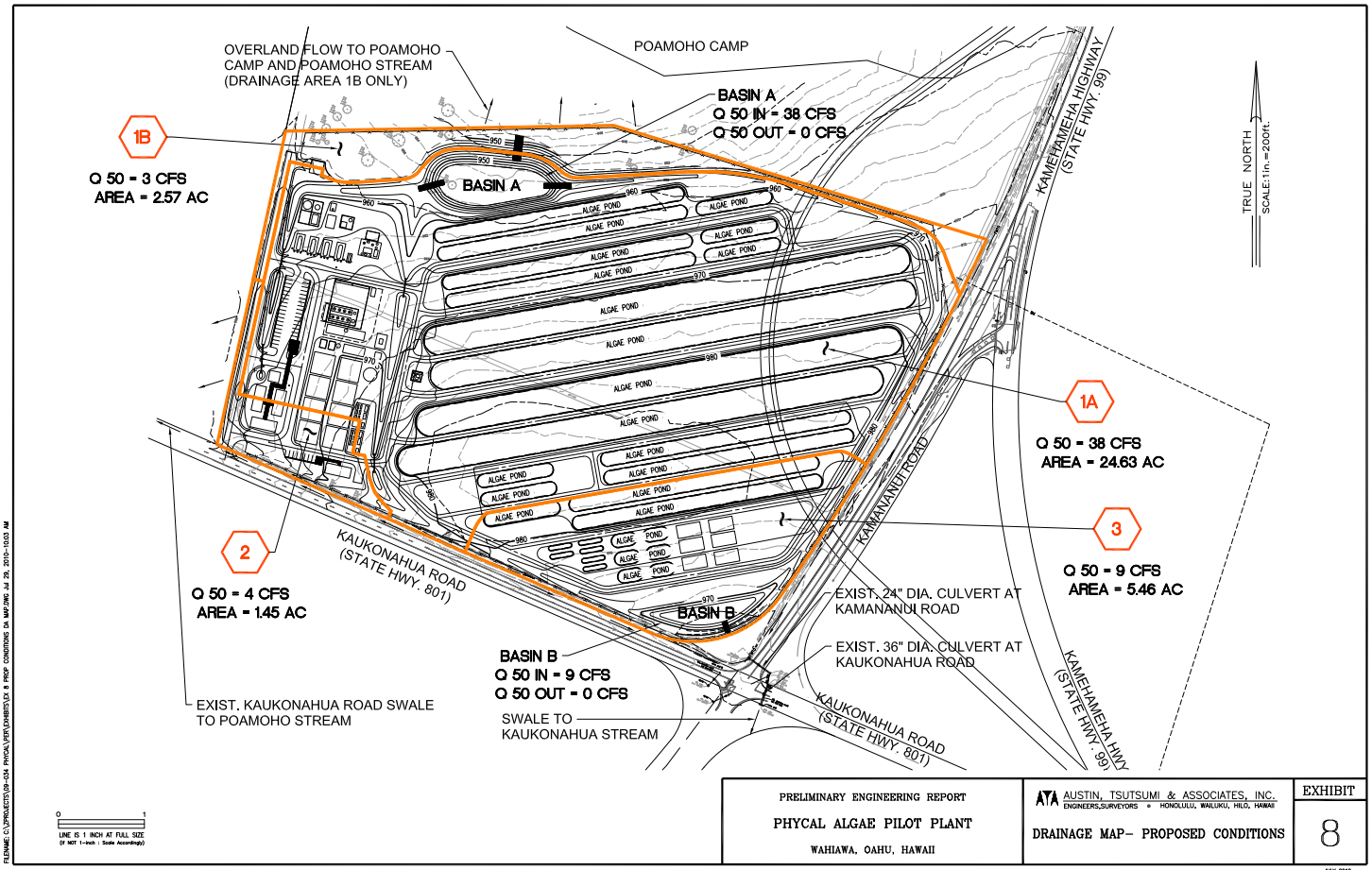
PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII ELECTRIC SERVICE PLAN	EXHIBIT 5

APRIL 2010



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

WAHIAWA, OAHU, HAWAII

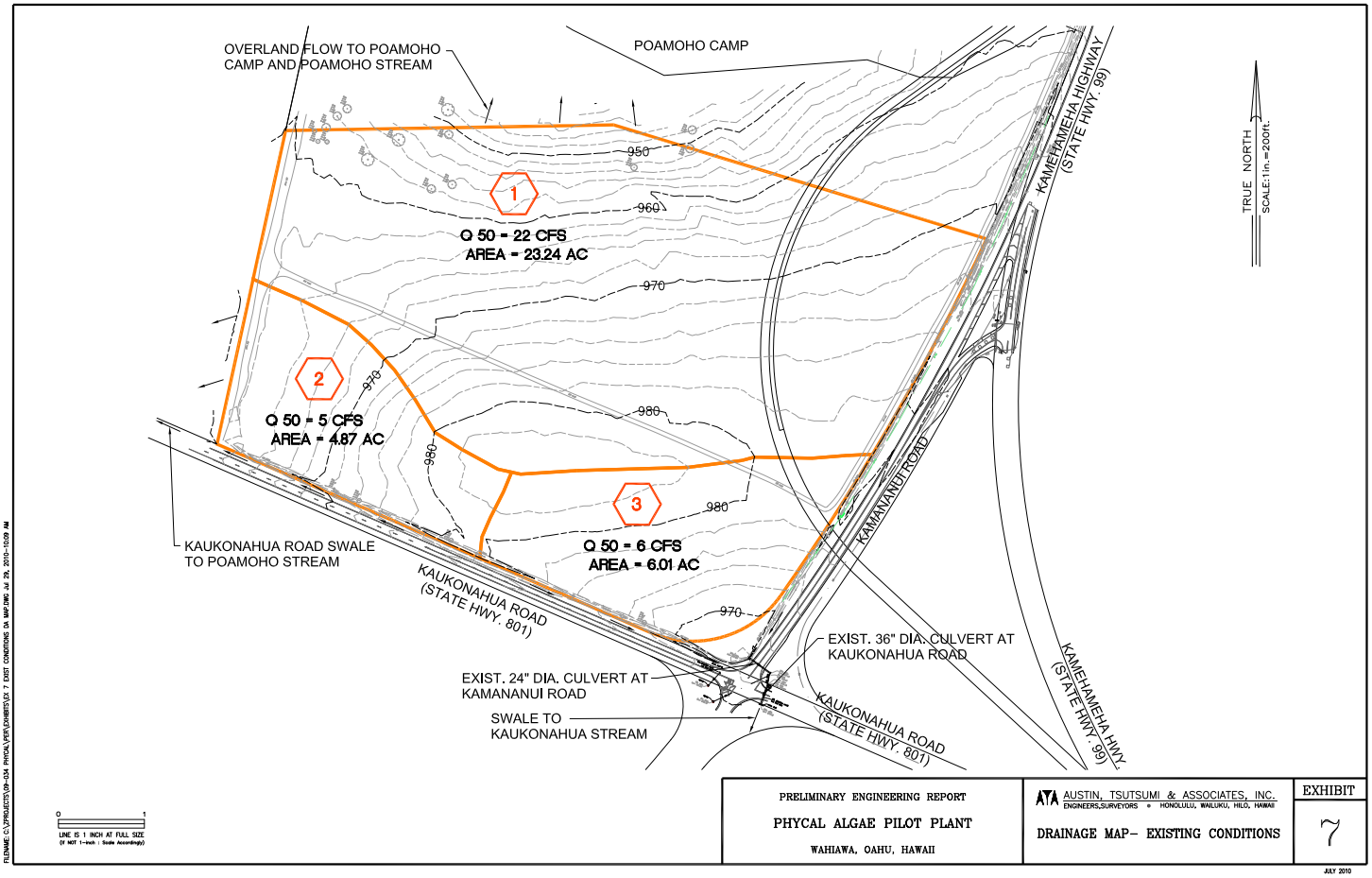
AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP– PROPOSED CONDITIONS

EXHIBIT 8

JULY 2010

FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 8 PROP CONDITIONS DA MAP.DWG Jul 29, 2010-10:03 AM



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP– EXISTING CONDITIONS

EXHIBIT 7

JULY 2010

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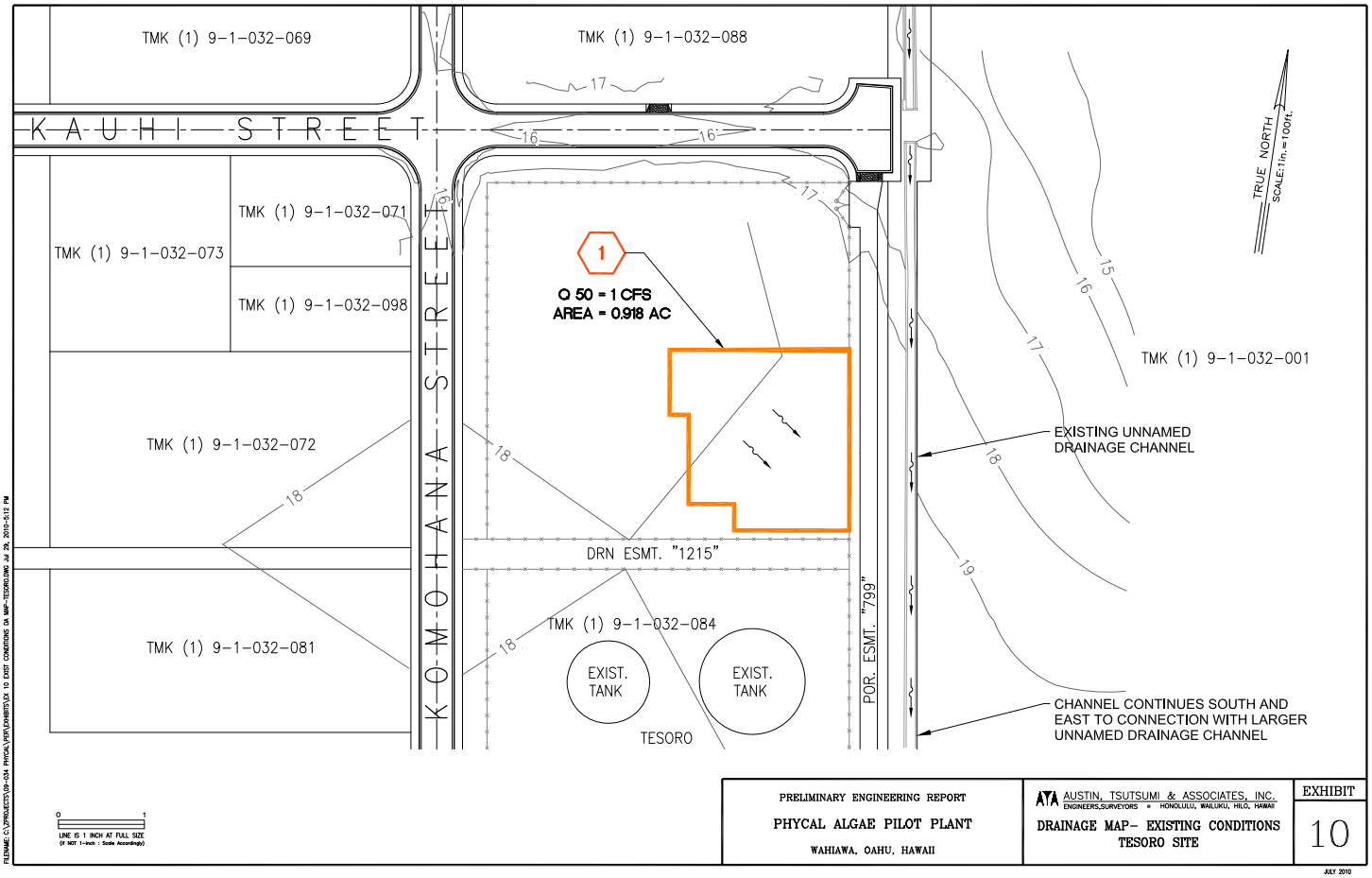


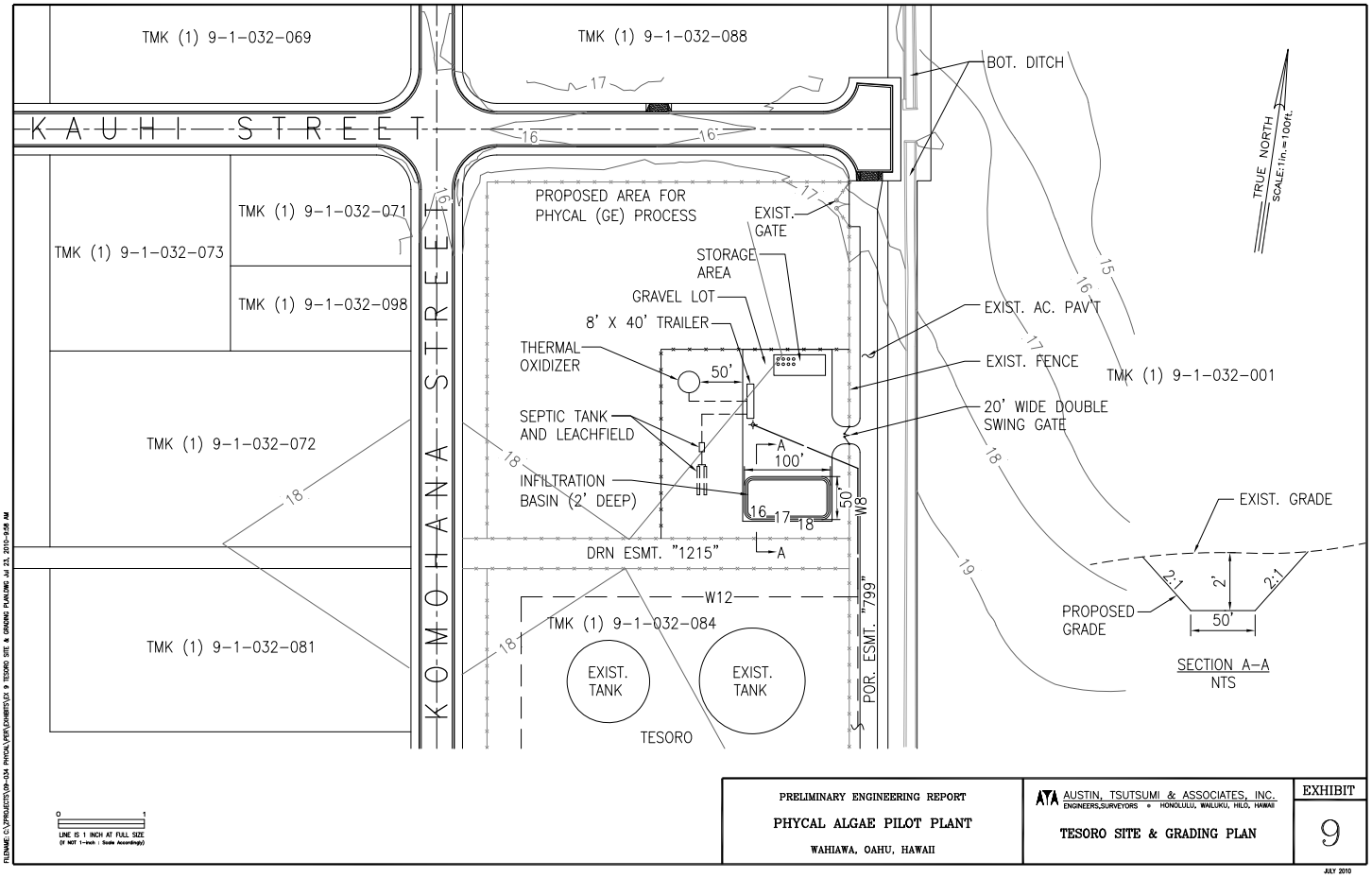
PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP– EXISTING CONDITIONS
TESORO SITE

EXHIBIT 10

JULY 2010



PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

TESORO SITE & GRADING PLAN

EXHIBIT 9

JULY 2010

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX A

Preliminary Hydrology Calculations

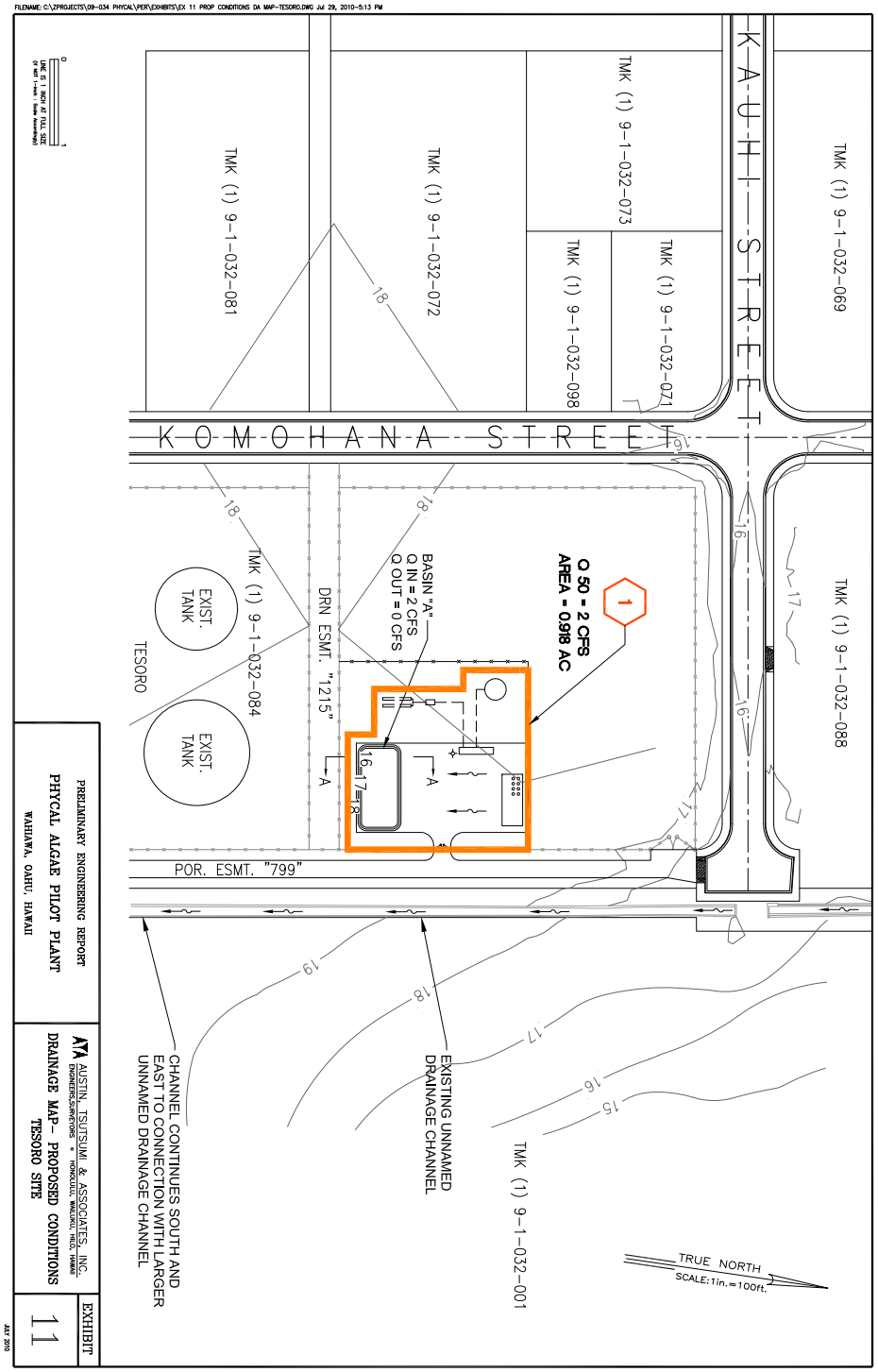


TABLE 3

STORAGE SYSTEM SUMMARY

Storage System	Contributing DAs	Description	Retention Volume (cf)	Inflow Volume (cf)	Meets Req.?	Q in (cfs)	Q out (cfs)
BASIN A	DA-1A	8' Deep Retention Basin	215,000	68,814	√	38.23	0.00
BASIN B	DA-3	3' Deep Retention Basin	29,000	15,714	√	8.73	0.00

Drainage Calcs- Phycal.xls, Tbl 3 Storage Summary
7/22/2010, 3:32 PM

TABLE 1

RUNOFF CALCULATIONS - EXISTING CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Poamoho Camp		To Kaukonahua Rd (West)		To Kaukonahua Rd (East)	
						Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)
DA 1	23.239	24.8	2.9	4.5	0.21	22.14	39,852				
DA 2	4.865	25.0	2.9	4.5	0.23			5.08	9,144		
DA 3	6.012	25.0	2.9	4.5	0.21					5.73	10,314
Totals	**34.116**					**22.14**	**39,852**	**5.08**	**9,144**	**5.73**	**10,314**

TABLE 2

RUNOFF CALCULATIONS - POST DEVELOPMENT CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Poamoho Camp		To Kaukonahua Rd (West)		To Kaukonahua Rd (East)	
						Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)
DA 1A	24.629	16.1	2.9	5.5	0.28	38.23 *	68,814 *				
DA 1B	2.574	15.2	2.9	5.8	0.23	3.46	6,228				
DA 2	1.454	19.2	2.9	5.2	0.53			4.04	7,272		
DA 3	5.459	14.3	2.9	6.1	0.26					8.73 *	15,714 *
Totals	**34.116**					**3.46**	**6,228**	**4.04**	**7,272**	**0.00**	**0**
					Increase From Existing	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**

Notes:
1. 50-Year, 1-Hour Rainfall/ Intensity determined using Honolulu Stds. Plate 2.
2. Adjusted Intensity determined using Honolulu Stds. Plate 4.
3. Refer to Time of Concentration Calculations for determination of Tc value.
4. Refer to Runoff Coefficient Calculations for determination of weighted C value.
5. Runoff rates from Drainage Areas 1A and 3 (marked with "*") are the quantities prior to retention. Runoff from these drainage areas is completely retained and does not contribute to the overall runoff. Refer to Table 3, Storage System Summary.
6. Runoff Volume determined using a triangular Rational Method Hydrograph ending at 1-hour.

Drainage Calcs- Phycal.xls, Tbl 1 & 2 Runoff Calcs
7/22/2010, 3:32 PM

TIME OF CONCENTRATION CALCULATIONS

EXISTING CONDITIONS

Drainage Area	OVERLAND FLOW						CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1	Avg. Grass	810	983.0	946.0	0.0457	24.8	-	-	-	0.0	24.8
DA-2	Avg. Grass	720	983.0	960.0	0.0319	25.0	-	-	-	0.0	25.0
DA-3	Avg. Grass	620	983.0	969.0	0.0226	25.0	-	-	-	0.0	25.0

PROPOSED CONDITIONS

Drainage Area	OVERLAND FLOW						CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1A	Avg. Grass	150	982.0	979.0	0.0200	14.7	Swale	810	10.0	1.4	16.1
DA-1B	Avg. Grass	200	960.0	954.0	0.0300	15.2	-	-	-	0.0	15.2
DA-2	Avg. Grass	400	977.0	962.0	0.0375	19.2	-	-	-	0.0	19.2
DA-3	Avg. Grass	150	982.0	978.0	0.0267	13.9	Swale	230	10.0	0.4	14.3

Notes:
1. Overland Flow time determined using Honolulu Stds. Plate 3.
2. Pipe and Ditch velocity of 10.0 fps is estimated based on appox. slope and predicted channel cross-section.
3. A minimum Tc of 5.0 minutes is used for Rational Method Calculations.

RUNOFF COEFFICIENT CALCULATIONS

LAND USES OR SURFACE TYPES AT SITE:

Unimproved Grass and Heavy Brush	C = 0.20
Dirt Road/ Bare Soil	C = 0.85
Lawn: well drained soil, avg. slope	C = 0.20
Pavement, Roofs and Walks	C = 0.95
Phycal Algae Pond (No Runoff)	C = 0.00

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS:

EXISTING

DA-1		**Percent**	**Area (AC)**
Unimproved Grass and Heavy Brush	C = 0.20	98.1%	22.789
Dirt Road/ Bare Soil	C = 0.85	1.9%	0.450
	C = 0.21	100.0%	**23.239**

DA-2			
Unimproved Grass and Heavy Brush	C = 0.20	95.7%	4.658
Dirt Road/ Bare Soil	C = 0.85	4.3%	0.207
	C = 0.23	100.0%	**4.865**

DA-3			
Unimproved Grass and Heavy Brush	C = 0.20	98.4%	5.918
Dirt Road/ Bare Soil	C = 0.85	1.6%	0.094
	C = 0.21	100.0%	**6.012**

PROPOSED

DA-1A			
Lawn: well drained soil, avg. slope	C = 0.20	50.8%	12.516
Pavement, Roofs and Walks	C = 0.95	4.4%	1.081
Dirt Road/ Bare Soil	C = 0.85	16.5%	4.057
Phycal Algae Pond (No Runoff)	C = 0.00	28.3%	6.975
	C = 0.28	100.0%	**24.629**

DA-1B			
Lawn or Unimproved Grass	C = 0.20	94.7%	2.438
Pavement, Roofs and Walks	C = 0.95	0.4%	0.010
Dirt Road/ Bare Soil	C = 0.85	4.9%	0.126
	C = 0.23	100.0%	**2.574**

DA-2			
Lawn or Unimproved Grass	C = 0.20	51.9%	0.755
Pavement, Roofs and Walks	C = 0.95	21.1%	0.307
Dirt Road/ Bare Soil	C = 0.85	27.0%	0.392
	C = 0.53	100.0%	**1.454**

RUNOFF COEFFICIENT CALCULATIONS (Cont.)

DA-3		Percent	Area (AC)
Lawn: well drained soil, avg. slope	C = 0.20	59.8%	3.266
Pavement, Roofs and Walks	C = 0.95	4.2%	0.232
Dirt Road/ Bare Soil	C = 0.85	11.5%	0.627
Phycal Algae Pond (No Runoff)	C = 0.00	24.4%	1.334
	C = 0.26	100.0%	**5.459**

Notes:

1. The project site contains a mix of existing dirt roads, open space, and impervious surfaces. Runoff coefficients are determined by composite coverage calculations.
2. The Phycal Facility basins primarily only receive rainfall from what falls directly on on them. Since the basins have 6-inches of freeboard above their normal operating level, they will have ample storage volume for the 50-year, 1-hour rainfall amount of 2.9 inches. Therefore the basins themselves are assumed to have no runoff.

TESORO SITE

TABLE 1

RUNOFF CALCULATIONS - EXISTING CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Open Channel Q_{50} (cfs)	To Open Channel Vol_{50} (cf)
DA 1	0.918	22.0	2.2	3.7	0.20	0.68	1,224
Totals	**0.918**					**0.68**	**1,224**

TABLE 2

RUNOFF CALCULATIONS - POST DEVELOPMENT CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Open Channel Q_{50} (cfs)	To Open Channel Vol_{50} (cf)
DA 1	0.918	6.7	2.2	5.8	0.44	2.36 *	4,248 *
Totals	**0.918**					**0.00**	**0**
					Increase From Existing	**0.00**	**0**

Notes:

1. 50-Year, 1-Hour Rainfall/ Intensity determined using Honolulu Stds.Plate 2.
2. Adjusted Intensity determined using Honolulu Stds. Plate 4.
3. Refer to Time of Concentration Calculations for determination of Tc value.
4. Refer to Runoff Coefficient Calculations for determination of weighted C value.
5. Runoff rates from Proposed Drainage Area 1 (marked with "*") are the quantities prior to retention. Runoff from this drainage area is completely retained and does not contribute to the overall runoff. Refer to Table 3, Storage System Summary.
6. Runoff Volume determined using triangular Rational Method Hydrograph ending at 1-hour.

TABLE 3

STORAGE SYSTEM SUMMARY

Storage System	Contributing DAs	Description	Retention Volume (cf)	Inflow Volume (cf)	Meets Req.?	Q in (cfs)	Q out (cfs)
BASIN A	DA-1	2' Deep Infiltration Basin	5,000	4,248	√	2.36	0.00

TESORO SITE

TIME OF CONCENTRATION CALCULATIONS

EXISTING CONDITIONS

Drainage Area	OVERLAND FLOW						CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1	Avg. Grass	200	13.5	12.5	0.0050	22.0	-	-	-	0.0	22.0

PROPOSED CONDITIONS

Drainage Area	OVERLAND FLOW						CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1	Paved	200	13.5	12.5	0.0050	6.7	-	-	-	0.0	6.7

Notes: 1. Overland Flow time determined using Honolulu Stds. Plate 3.
2. A minimum Tc of 5.0 minutes is used for Rational Method Calculations.

TESORO SITE

RUNOFF COEFFICIENT CALCULATIONS

LAND USES OR SURFACE TYPES AT SITE:

Unimproved Grass and Heavy Brush	C = 0.20
Dirt Road/ Bare Soil	C = 0.85
Pavement, Roofs and Walks	C = 0.95

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS:

EXISTING

DA-1		Percent	Area (AC)
Unimproved Grass and Heavy Brush	C = 0.20	100.0%	0.918
	C = 0.20	100.0%	**0.918**

PROPOSED

DA-1			
Unimproved Grass and Heavy Brush	C = 0.20	63.7%	0.585
Pavement, Roofs and Walks	C = 0.95	2.8%	0.026
Dirt Road/ Bare Soil	C = 0.85	33.4%	0.307
	C = 0.44	100.0%	**0.918**

Notes: 1. The project site contains a mix of gravel, open space, and impervious surfaces. Runoff coefficients are determined by composite coverage calculations.

APPENDIX B

Preliminary Water Demand Calculations

PRELIMINARY WATER DEMAND CALCULATIONS

Water Demand Calculations

Project Site Description

Total Project Area = 34.12 acres

Total Supplied Building Area = 9,280 square feet (sf) (4 Trailers +Process Bldg)

Domestic Water to supply Building Areas.

Non-Potable Reuse water to supply Industrial Processes and Fire System.

Average Daily Demand Standards

(Table 100-18 Domestic Consumption Guidelines, Water System Standards)

Commercial/ Industrial Mix 100 gallons per day (gpd) / 1,000 sf

(Note: The Commercial/ Industrial category is used due to the building square-footage basis rather than the site acreage basis from the Light Industrial category. This consumption rate was deemed to be more appropriate for the relatively small building area on the large site.)

Water Demand Calculations

Average Daily Domestic Water Demand
Domestic Demand = 9,280 sf x 100 gpd / 1,000 sf = **928 gpd**

Average Daily Non-Potable Water Demand
Non-Potable Demand (For Industrial Usage) = **110,000 gpd**

Water Demand Calculations for Tesoro Site

Average Daily Domestic Water Demand
Building Area = 8' x 40' = 320 sf for 1 trailer
Domestic Demand = 320 sf x 100 gpd / 1,000 sf = **32 gpd**

Austin, Tsutsumi & Associates, Inc. • Civil Engineers • Surveyors
501 Sumner St. • Suite 521 • Honolulu, HI 96817 • (808) 533-3646

APPENDIX C

Preliminary Wastewater Contribution Calculations

PRELIMINARY WASTEWATER CONTRIBUTION CALCULATIONS

WAHIAWA SITE:

Project Site Description

Total Project Area = 34.12 acres

Sewered Area (Used for Infiltration Calculations) = 5.00 acres

Number of Employees = 20 max. per shift or 40 max. per day

Industrial Process Wastewater to Sewage = 10 percent (%) x 110,000 gpd = 11,000 gpd (Note: remaining Industrial Process Wastewater to be treated on-site and reused.

Wastewater Contribution Standards

Average Daily Per Capita Flow = 80 gallons per day (gpd)

Babbit Flow Factor = 5.00 (From Figure 22.2.4)

Dry Weather Infiltration/ Inflow = 5 gallons per capita per day (gpcd) (Sewer laid above the normal groundwater table)

Wet Weather Infiltration/ Inflow = 1,250 gallons per acre per day (gad) (Sewer laid above the normal groundwater table)

From: "Design Standards of the Department of Wastewater Management, Volume 1, July 1993".

Wastewater Contribution Calculations

Average Daily Flow:
40 employees x 80 gpcd = 3,200 gpd + 11,000 gpd Process Wastewater = **14,200 gpd**

Maximum Wastewater Flow:
3,200 gpd x 5.00 Flow Factor = 16,000 gpd + 11,000 gpd **= 27,000 gpd**

Dry Weather Infiltration/ Inflow:
40 employees x 5 gpcd Dry Inflow = **200 gpd**

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Design Average Flow:
14,200 gpd Avg. WW Flow + 200 gpd Dry Inflow = **14,400 gpd**

Design Maximum Flow:
27,000 gpd Max. WW Flow + 200 gpd Dry Inflow = **27,200 gpd**

Wet Weather Infiltration/ Inflow:
5.00 acres x 1,250 gad Wet Inflow = **6,250 gpd**

Design Peak Flow:
27,200 gpd Design Max. Flow + 6,250 gpd Wet Inflow = **33,450 gpd**

TESORO SITE:

Wastewater Contribution Standards

Average Daily Per Capita Flow = 80 gallons per day (gpd)

From: "Design Standards of the Department of Wastewater Management, Volume 1, July 1993".

Wastewater Contribution Calculations

Average Daily Flow:
2 employees x 80 gpcd = **160 gpd**

Austin, Tsutsumi & Associates, Inc. ● Civil Engineers ● Surveyors
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APPENDIX D

Preliminary Fire Flow Calculations

PRELIMINARY FIRE FLOW CALCULATIONS

WAHIAWA SITE:

Project Site Description

Total Project Area = 34.12 acres

Zoning Designation: AG-1 (Agriculture)

Fire Flow Requirements

Agriculture — Fire Flow = **1,000 gallons per minute (gpm)**
Duration = **30 minutes**

(Table 100-19 Fire Flow Requirements, Water System Standards)

Water Supply Requirements for Fire Suppression

Required Fire Suppression Storage = 1,000 gpm x 30 minutes = **30,000 gallons**

Project:	Phycal Algae Pilot Plant	Job No: 09-034 Computed by: RE
TMK:	(1) 7-1-001: 011, 030, 031 (Por) and (1) 9-1-032: 084 (Por)	Date: 05-26-10 [1 of 1]

Austin, Tsutsumi & Associates, Inc. ● Civil Engineers ● Surveyors
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DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
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HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK W. CALDWELL
ACTING MAYOR

WAYNE Y. YOSHIOKA
DIRECTOR

SHARON ANN THOM
DEPUTY DIRECTOR

KENNETH TORU HAMAYASU P.E.
DEPUTY DIRECTOR

JUL 29 2010

TP6/10-372080R

July 27, 2010

Mr. Jeffrey H. Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

Subject: Phycal Algae Production Pilot Project
Poamoho Site TMK: (1) 7-1-001:011, 030 and 031
Tesoro Site TMK (1) 9-1-032:084

This responds to your June 21, 2010, letter requesting consultation and comments on the Draft Environmental Assessment (DEA) for the subject project.

Our Traffic Engineering Division offers the following comments:

- Please provided us some information on why the pre-EA submitted in January 2010, did not include the Tesoro Site located in the James Campbell Industrial Park.
- Pages 1-1, Project Information Summary, The Tesoro Site tax map key should be TMK (1) 9-1-032:84.
- Page 2-9, Figure 2-4; page 2-10; Figure 2-5: Both the main and the secondary access points for the sites should be clearly indentified in the plans.
- Page 2-14, 5th and 6th paragraphs; page 2-17, 2nd and 3rd paragraphs; page 3-20, 6th paragraph; page 3-24, 1st paragraph: Only the location of the first access point for both sites is described. We recommend the location of the second access point to also be described.

- Adequate site distance must be provided for driveways accessing public streets. Additional information should be provided, as it is unclear if the driveways meet these minimum distances.

- Adequate vehicular storage should be provided outside any access gates such that they do not encroach upon or impede site distances of all roadways.

Our Public Transit Division offers the following comments:

- Section 3.11, *Existing Bus Service*, page 3-21: Please delete reference to Route 72 bus service to Poamoho because the route does not go beyond Whitmore Village, therefore does not serve Poamoho itself. Also, delete reference to Route 41servicing Campbell Industrial Park directly because Route 41 terminates at the Kapolei TC therefore, a transfer to Route 413 is required.

Prior to the start of the project, the affected Neighborhood Board, residents, and businesses should be informed about the scope and duration of the project.

Should you have any questions on the matter, you may contact Ms. Virginia Bisho of my staff at 768-5461.

Very truly yours,

WAYNE Y. YOSHIOKA
Director

GROUP 70
INTERNATIONAL

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Tom Young, MBA AIA

August 10, 2010

Mr. Wayne Y. Yoshioka, Director
City and County of Honolulu
Department of Transportation Services
650 South King Street, 3rd Floor
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Yoshioka:

Thank you for your comment letter dated July 27, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

1. *Inclusion of the Tesoro Site*

At the time of the Pre-Consultation on the Draft EA, Phycal Hawai R&D, LLC, was committed to a process for the processing and refining of algae oil into biofuels at the Poamoho site. Phycal has since explored different options from refining in Hawai'i at either the James Campbell Industrial Park site or at another appropriate location. The current proposal includes a refinery operation at the Tesoro site.

2. *Project Information Summary*

We appreciate you bring this TMK reference error to our attention. It has been corrected in the Final EA.

3. *Secondary Access Points – Identification in Plans*

Figure 2-4 (Preliminary Site Plan – Poamoho Site) and 2-5 (Preliminary Site Plan – Tesoro Site) of the Final EA have been revised to more clearly identify the primary access point to the sites. However, we note that the project will not use secondary access point at either the Poamoho or Tesoro project sites. The secondary access point from Kamananui Road at the Poamoho site will be abandoned. The secondary access point at the Tesoro site is located outside of the project area, and will not be used to support the project's transportation needs. *Figure 2-4 and 2-5* are attached as Attachments 1 and 2 for your reference.

4. Secondary Access Points – Description

As discussed above, the secondary access points for both the Poamoho and Tesoro project sites will not be used to service the project. We understand that the language in Draft EA which highlighted these existing access points may have caused confusion. Additional language has been added to the Final EA to clarify the proposed use and access points for the project areas.

5. Adequate Site Distance

The measured stopping sight distance to/from east of the proposed driveway on Kaukonahua Road is approximately 650 feet. The estimated sight distance to/from the west along Kaukonahua Road is greater than one mile. Kaukonahua Road is posted at 45 mph and can be assumed to have a design speed of 55 mph. AASHTO requires a stopping sight distance of 495 feet for a 55 mph design road (AASHTO, Geometric Design of Highways and Streets, 2004, Exhibit 3-76 – Attachment 3). Therefore, the stopping sight distance is adequate for the proposed driveway at Kaukonahua Road.

6. Adequate Vehicular Storage

The access gate for the Poamoho site has been adjusted to provide adequate storage for two trucks between the gate and the road (Attachment 1). The access gate for the Tesoro site provides adequate vehicular storage Tesoro since the driveway is coming off of Tesoro's private access road.

7. Section 3.11 Existing Bus Service

Section 3.11 of the Final EA has been revised to delete references to Route 72 and Route 41. We appreciate you bringing this clarification to our attention.

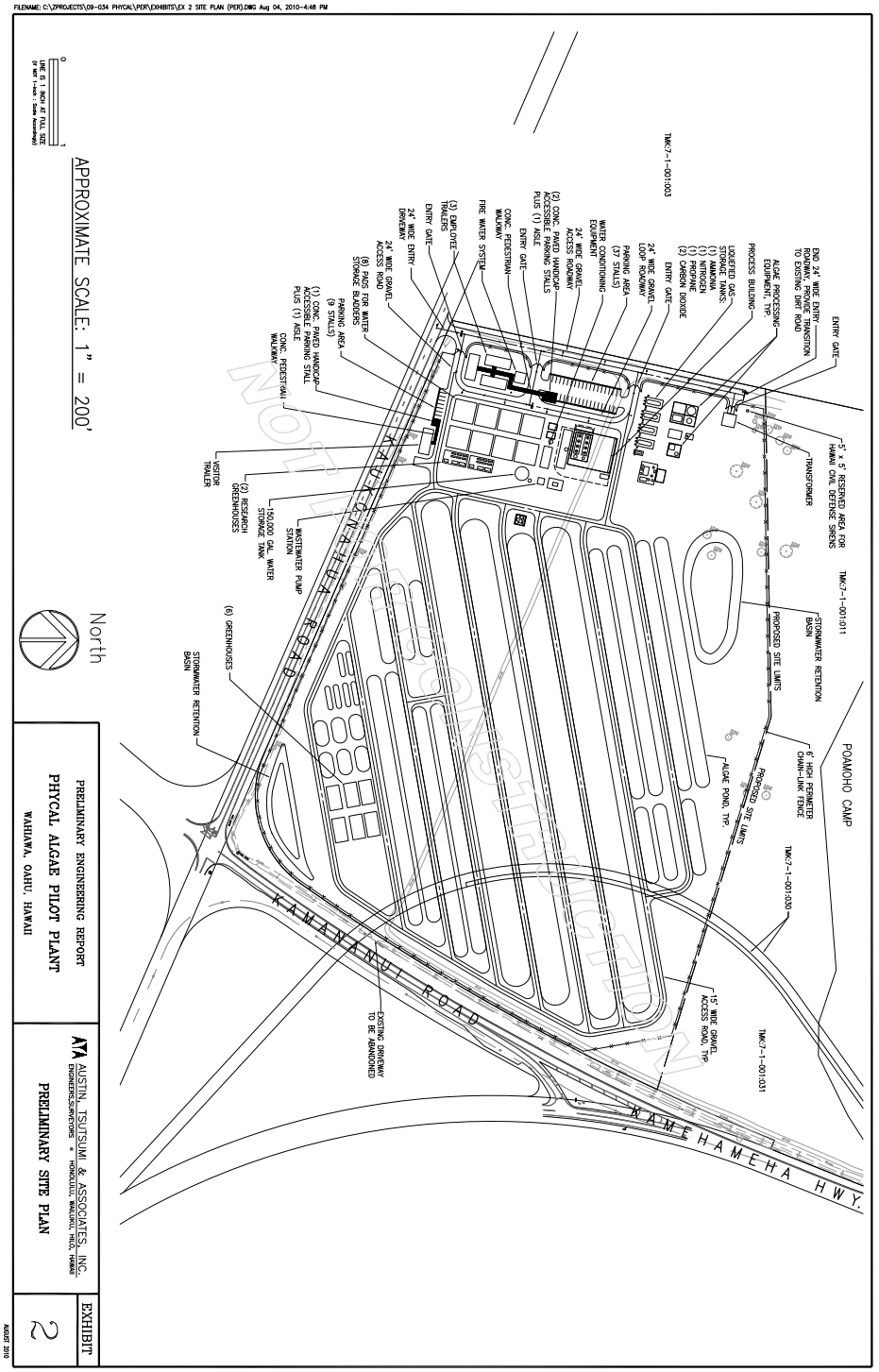
We appreciate your participation in the EA process.

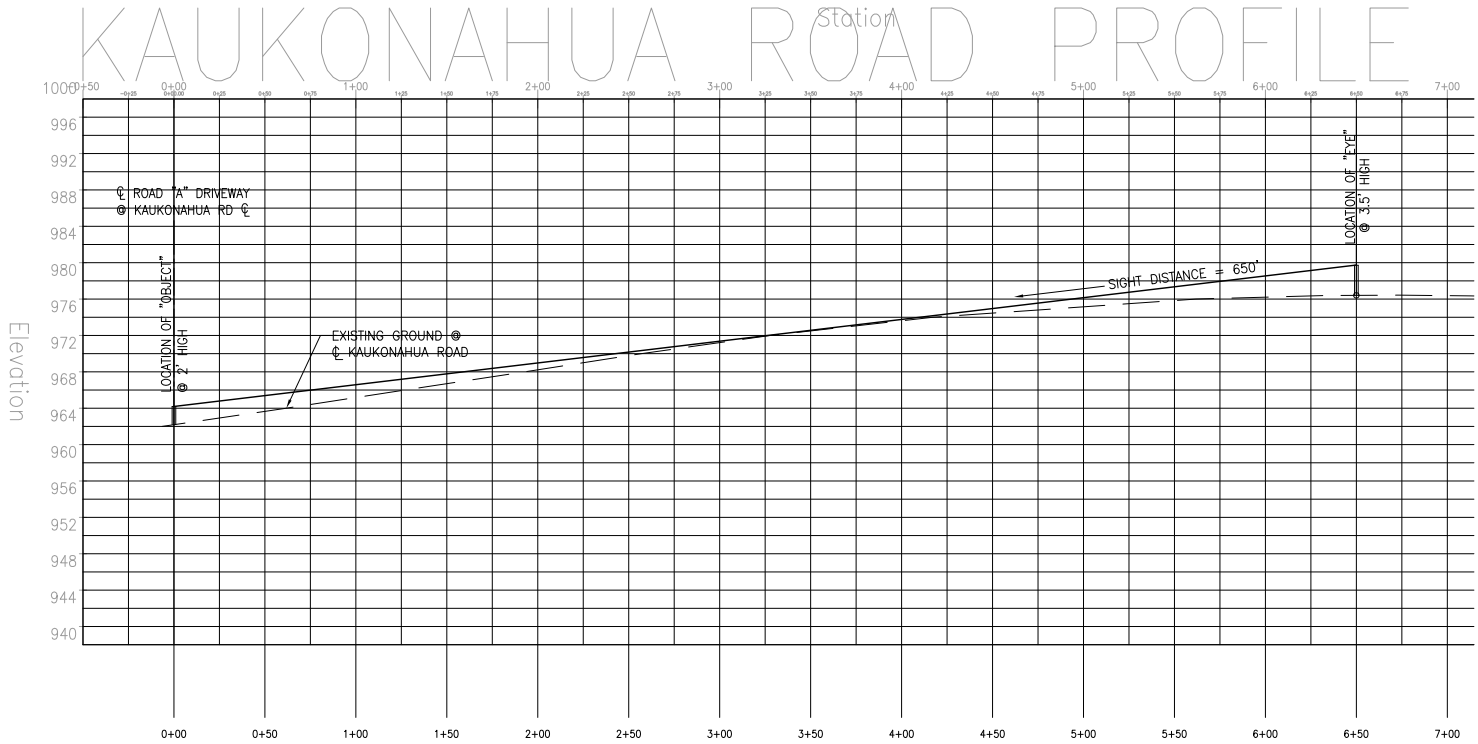
Sincerely,
GROUP 70 INTERNATIONAL, INC.

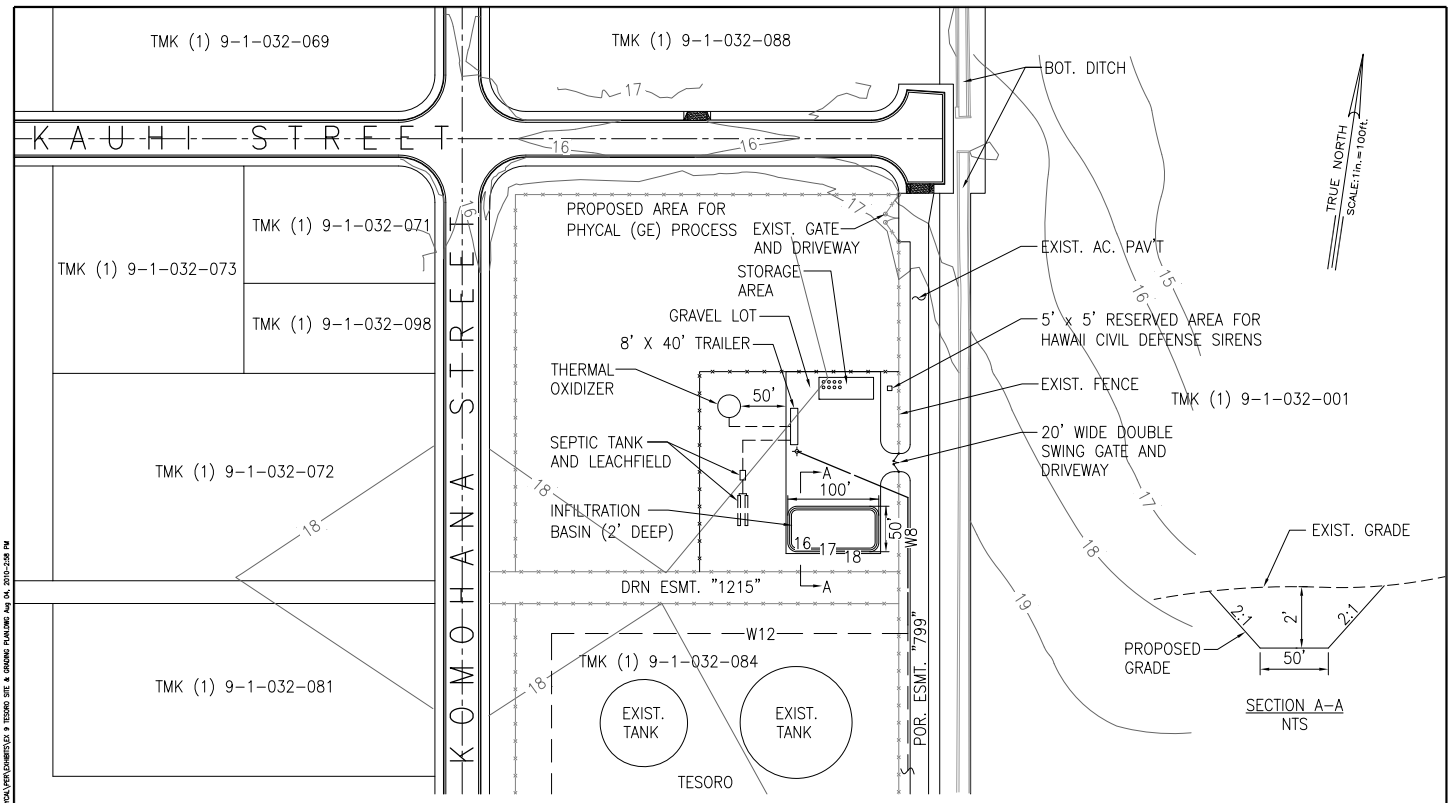
Jeffrey H. Overton, AICP, LEED AP
Principal

Attachments:

1. Figure 2-4: Preliminary Site Plan – Poamoho Site
2. Figure 2-5: Preliminary Site Plan – Tesoro Site
3. AASHTO, Geometric Design of Highways and Streets, 2004, Exhibit 3-76







FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 9 TESORO SITE & GRADING PLAN.DWG Aug 04, 2010-2:08 PM

LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch | Scale Accordingly)

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII TESORO SITE & GRADING PLAN	EXHIBIT 9

AUGUST 2010

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ROLLAND J. HARVEST
DEPUTY FIRE CHIEF

July 8, 2010

Mr. Joshua Strickler, Esq., P.E.
Department of Business, Economic
Development & Tourism
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Strickler:

Subject: Draft Environmental Assessment
Phycal Algae Pilot Project
Tax Map Keys: 7-1-007: 011 (Portion) and 031 (Portion)
9-1-084: 032 (Portion)

In response to a letter from Mr. Jeffrey Overton of Group 70 International, Inc., dated June 21, 2010, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from a fire apparatus access road as measured by an approved route around the exterior of the building or facility. (2006 NFPA 1, Section 18.2.3.2.2)

   A fire department access road shall extend to within 50 ft (15 m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (2006 NFPA 1, Section 18.2.3.2.1)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (2006 NFPA 1, Section 18.3.1, as amended).

3. Submit civil drawings to the HFD for review and approval.

Should you have any questions, please call Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/KM:bh

cc: Jeffrey Overton, Group 70 International, Inc.
Office of Environmental Quality Control

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INTERNATIONAL

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August 10, 2010

Kenneth G. Silva, Fire Chief
City and County of Honolulu
Fire Department
636 South Street
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Chief Silva:

Thank you for your comment letter dated July 8, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. The following responses are offered to your comments.

1. **Fire Apparatus Access Road.** An acceptable fire apparatus access road will be constructed or standard accessibility will be provided to each new facility at both the Poamoho and Tesoro project sites, pursuant to the referenced requirements of the 2006 NFPA 1, Section 18.2.3.2.1 and Section 18.2.3.2.2.

2. **Fire Protection Water Supply.** An approved water supply (including on-site fire hydrants and mains, as required) capable of supplying the required fire flow for fire protection will be provided, pursuant to the requirements of the 2006 NFPA 1, Section 18.3.1, as amended. The pilot project will use reclaimed water from Schofield Barracks Wastewater Treatment Plant for fire demands at the Poamoho site. The non-potable water will be conditioned and treated on-site and stored in the on-site bladders where it can be drawn upon for fire and operational use. Fire flow requirements for the Tesoro site will be provided by Tesoro's 10-inch fire line, which is located adjacent to Tesoro's tanks just south of the project site. A fire hydrant will be installed on the Tesoro site and connect to Tesoro's fire line.

3. **Civil Drawings.** At the appropriate time, relevant civil and construction drawings will be submitted to the Honolulu Fire Department for review and approval.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
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MUFI HANNEMANN
MAYOR

LOUIS M. KEALOHA
CHIEF

DELBERT T. TATSUYAMA
RANDAL K. MACADANGDANG
DEPUTY CHIEFS

OUR REFERENCE DMK-DK

July 1, 2010

GROUP 70 INT'L
JUL - 8 2010

Mr. Jeffrey H. Overton, AICP, LEED AP
Principal, Chief Environmental Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Overton:

This is in response to your letter of June 21, 2010, requesting comments on a Draft Environmental Assessment for the Phycal Algae Pilot Project in Wahiawa and Kalaeloa.

This project should have no significant impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Major Kenneth Simmons of District 2 (Wahiawa) at 621-3725.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By
DAVE M. KAJIHIRO
Assistant Chief of Police
Support Services Bureau

cc: OEQC
Joshua B. Y. Strickler, Esq., P.E.
Department of Business, Economic Development & Tourism

Serving and Protecting With Aloha

GROUP 70
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August 10, 2010

Mr. Louis M. Kealoha, Chief of Police
City and County of Honolulu
Police Department
801 South Beretania Street
Honolulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Chief Kealoha:

Thank you for your comment letter dated July 1, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

We acknowledge that the Honolulu Police Department has no comments to offer since the project should have no significant impact on the department's facilities or operations.

We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

blue planet FOUNDATION

23 July 2010

RECEIVED
JUL 26 2010
GROUP 70 INT'L

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Seven Waterfront Plana
500 Ala Moana Blvd., Suite 400
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Department of Business, Economic Development & Tourism
Energy Office
P.O. Box 2359
Honolulu, HI 96804

Office of Environmental Quality Control
235 S. Beretania St. #702
Honolulu, HI 96813

To all concerned:

Blue Planet Foundation, a Hawai'i-based non-profit whose mission is to make Hawai'i a role model for energy independence, appreciates the opportunity to provide the following comments on the Phycal Algae Pilot Project Draft Environmental Assessment.

Blue Planet is excited about the potential of Hawai'i-produced, sustainably grown biofuels to serve as a substitute for imported petroleum. Algae offers well known and documented advantages—such as high yield and relatively positive energy balance—as a biofuel crop with the potential of providing a wide range of energy products and energy security with significant reductions in greenhouse gas emissions. We are encouraged that a pilot project is being developed on O'ahu to better understand the possibility of algae biofuel as a sustainable energy solution for Hawai'i and elsewhere.

We appreciate that the proposed Phycal Pilot Project will have the following features:

- The pilot project will use reclaimed water from Schofield Barracks wastewater treatment plant for pond operations and fire demands (3-14). The use of treated wastewater will

Jeff Mikulina, executive director • jeff@blueplanetfoundation.org
55 Merchant Street 17th Floor • Honolulu, Hawai'i 96813 • 808-954-6142 • blueplanetfoundation.org

reduce the project's demands on limited freshwater sources and potentially provide opportunities to research the use of algae biofuel production in wastewater treatment.

- The pilot project will only include species of algae that are listed by the State Board of Agriculture (BOA) as permissible for use in Hawai'i (2-11). The project will not import or use genetically modified algae. We appreciate that Phycal recognizes Hawaii's sensitive ecology and will not introduce new forms of algae for this pilot project that is open to Hawaii's environment.

- The Phycal project will utilize a novel living extraction process (Olexal®) that "milks" oil from algae and recycles living algae back to the ponds to grow more oil (2-6). This "milking" extraction process saves inputs, energy, and time. The process also it requires minimal dewatering, removes culture contaminants, and increases oil productivity.

Blue Planet has the following questions about the Phycal Pilot Project:

1. Has Phycal explored the possibility of using wastewater from the Wahiawa wastewater treatment facility? Is the use of untreated or partially treated wastewater being considered for the pilot project or the full-scale commercialized project?

2. The combined electricity use of for the Phycal Pilot Project is approximately 1.7 megawatts (3-20). Has an estimate of total annual energy use for the project been calculated? Blue Planet recognizes that this is a pilot research project, but has the overall energy balance (energy inputs versus energy outputs) been calculated?

3. Beyond project development job creation, approximately 40 jobs will be created to support the operations and day-to-day activities for the Poamoho and Tesoro sites for up to a three year duration period (3-23). Has there been an effort to employ local workers and local talent for this project? Will an effort be made for workforce development around algae or biofuel crops?

4. Since much of this project is funded from federal sources (Department of Defense, etc.), will the relevant research findings of the pilot project be made available to the biofuel community to accelerate development of algae as a biofuel crop?

Thank you for the opportunity to provide these comments on the Phycal Algae Pilot Project Draft Environmental Assessment.

Respectfully,

Jeff Mikulina
Executive Director

GROUP 70
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August 10, 2010

Mr. Jeff Mikulina, Executive Director
Blue Planet Foundation
55 Merchant Street, 17th Floor
Honoulu, HI 96813

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Mikulina:

Thank you for your comment letter dated July 23, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project. We appreciate Blue Planet's excitement and support for the project. There is great excitement about the development of locally-produced, sustainably grown biofuels. In consultation with Dr. Glenn Richards of Phycal, the following responses are offered to your comments.

1. *Wastewater*

Phycal has explored the possibility of using wastewater from a number of wastewater facilities on the island, including Wahiawa Wastewater Treatment Facility. Phycal is currently working with Aqua Engineers on the potential use of treated wastewater (reclaimed water) on O'ahu and on other islands.

Phycal has considered the use of untreated and partially treated wastewater for the project. They have determined that untreated wastewater would not be compatible with the processes and technologies of the pilot project. Phycal is concerned that the contaminants in untreated wastewater may affect the Hetroboost™ polishing step of their production operation. Additionally, it seems that having untreated wastewater in an open pond operation system would result in other environmental impacts and could be viewed as an open sewer. Untreated wastewater will not be used at this project.

The use of partially- treated wastewater for the growing of algae has been evaluated for the project, with the implementation of a microfiltration system to remove bacteria and an ultraviolet treatment. The use of partially-treated wastewater has the potential supplying nitrogen and phosphorous for the project which would otherwise have to be purchased. However, future testing and evaluation of the various levels of process water and reuse for the project's production operations is still required. Phycal is coordinating with Aqua Engineers to evaluate the potential for using partially-treated wastewater. The Phycal pilot project has no other plans except to use reclaimed water as approved by the State Department of Health, Wastewater Branch.

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2. *Energy Use and Balance*

Calculating the total annual energy use must take into consideration that the proposed project is a "pilot" research and development facility, and is not an optimized production plant. The pilot facility will have excess production capacity, and run at higher energy input per unit oil produced than the final optimized production plant. During the first year, the duty cycle or percent of which all equipment is activated will be about 25% given the time needed to excavate the site and prepare ponds. By the end of 2012, the plant should be operating at closer to 75% of total capacity. Phycal believes that one of the main scale-up factors is the fine tuning of the total, which can only be achieved once the project is completed and running. As a part of the project's operations, running times and schedules for the pumps and equipment are recorded. Adjustments are then made to minimize the total required power.

Regarding energy balance calculations, a detailed mass and energy balance is provided for each unit operation and for the entire plant. As part of the U.S. Department of Energy (DOE) submittal, Phycal provided a calculation of the total plant Life Cycle Analysis (LCA), which amounts to the overall reduction in CO2 compared to fossil fuels. The predicted overall energy balance compares very favorably to production of energy from oil seed crops.

3. *Workforce*

Phycal will employ local workers to support the proposed project. Phycal has visited with the residents of Poamoho Camp who once worked on the subject property when Del Monte occupied the site. The existing lease agreement with HIDC Poamoho Camp, Inc. requires that efforts be made to provide employment to people living in the camp. As the project progresses, Phycal will meet with Poamoho Camp residents to review future plans for the project,, and describe the types of jobs they will be hiring for and the time frames for those positions. Phycal believes it is mutually advantageous to have Poamoho Camp residents involved directly in the project.

During Phase 1 of the project, Phycal has contracted with local companies to carry out a variety of tasks. It is expected that these same local companies will be maintained for the Phase 2 construction of the project. This includes companies such as: ITC Water Management, who is located in Haleiwa, for pond construction and site management, Austin, Tsutsumi & Associates, Inc., from Honolulu, for survey and civil engineering, and a variety of local contractors for excavation, concrete foundations, pipe fitting, welding and other tasks. Efforts will be made to hire high quality local workers for available positions.

4. *Research Findings*

The reports and documents submitted to the U.S. DOE will be made public within five years of submission. However, some of these reports will be made available immediately.

While competitive advantages in the form of patents and trade secrets are important to supporting private interest and funding sources in the biofuels industry, Phycal believes that it is in the interests of the larger biofuels industry to form local and regional groups to share non-proprietary information. Phycal has approached several companies about forming a Hawai'i "Algae Users Group" which would share information to prevent and avoid unnecessary mistakes while helping to advance the overall industry.

We appreciate your participation in the EA process, and look forward to ongoing communication on this project.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

Thomas Joseph Lenchanko, Hawaiian National Citizen
Spokesperson for Hawaiian Lineal Descendants
931 Uakanikoo Street
Wahiawa, Island of O'ahu
Ko Hawaii Pae Aina

July 06, 2010

TO: STATE OF HAWAII, et al
All Public Citizens

Department of Business, Economic Development and Tourism
PO Box 2359
Honolulu, HI 96804

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawai'i 96813

ATTENTION: Joshua B. Y. Strickler; and Jeffrey H. Overton

REGARDING: PROPOSED PHYCAL ALGAE PILOT PROJECT AT WAHIAWA AND KALAELOA, ISLAND OF O'AHU, HAWAII NEI

LAWFUL NOTICE: LAWFUL NOTICE TO THE DE FACTO STATE OF HAWAII AND ITS AGENTS TO CEASE AND DESIST UNLAWFUL, OUTRIGHT DEFIANCE OF HAWAIIAN CULTURAL RIGHTS AND PRACTICES AGAINST HAWAIIAN NATIONALS ON HAWAIIAN NATIONAL LAND

Dear Joshua B. Y. Strickler and Jeffrey H. Overton:

This letter is to demand that you cease the improper, disrespectful and unlawful manner in which your agencies and the de facto **STATE OF HAWAII** have been dealing with our ***Hawaiian National Lands and National Treasures.***

LAWFUL NOTICE: Please be informed that the de facto Puppet STATE OF HAWAII has affirmed by lawful actions, their inability to prove lawful possession and ownership of any lands here in Hawaii Nei. That fact can be easily and readily affirmed by ***STATE OF HAWAII, Department of Land and Natural Resources (DLNR)*** **Case Number MA 09-03** filed with the *United States Court for the Hawaii District* under ***Filling Number MC09 00270 of October 30, 2009*** and as reaffirmed by a second filing under the same filing number on ***November 21, 2009.***

Please obtain copies of the two filings ***(Filing Number MC09 00270)*** made in the ***United States Court for the Hawaii District***, supra, which affirms the statements, rights and jurisdiction of the matters stated herein.

oia ua 'ike a 'aia la

Thomas Joseph Lenchanko 07/06/2010

Thomas Joseph Lenchanko, Hawaiian National
kahuaka'i ola ko laila waha olelo 'Aha Kukaniloko/Koa Mana mea ola kanaka mauli
808-349-9949

GROUP 70
INTERNATIONAL

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August 10, 2010

Mr. Thomas Joseph Lenchanko, Hawaiian National
Spokesperson for Hawaiian Lineal Descendants
Waha 'ōlelo 'Aha Kukaniloko
931 Uakaniko'o Street
Wahiawā, HI 96786

Subject: Draft Environmental Assessment (Chapter 343, HRS)
Phycal Algae Pilot Project
TMK: (1) 7-1-007:011 por., 030 por. and 031 por. and
TMK (1) 9-1-084: 032 por.
(Wahiawā and Kalaeloa, O'ahu, Hawai'i)

Dear Mr. Lenchanko:

Thank you for your comment letter dated July 6, 2010 concerning the Draft Environmental Assessment (EA) for the Phycal Algae Pilot Project.

The Phycal Algae Pilot Project seeks to grow algae and extract algae oil at the Poamoho site in an effort to improve energy security for people living in Hawai'i. The land will remain active in agriculture use and will operations will respect the Hawaiian cultural rights and practices at this property.

We appreciate you providing us with references regarding land ownership records.

A Cultural Impact Assessment and Archaeological Inventory Survey were prepared for the project sites as part of the EA. We would be glad to discuss the project if you have questions or require additional information. We appreciate your participation in the EA process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal

APPENDIX B PRELIMINARY ENGINEERING REPORT (AUSTIN, TSUTSUMI & ASSOCIATES, INC.)

PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT

WAHIAWA, OAHU, HAWAII
TMK: (1) 7-1-001: 011, 030, 031 (POR) AND
KAPOLEI, OAHU, HAWAII
TMK: (1) 9-1-032: 084 (POR)

August 4, 2010

Prepared for:

Phycal, LLC
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PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

Wahiawa, Oahu, Hawaii

TMK: (1) 7-1-001: 011, 030, 031 (POR) and

Kapolei, Oahu Hawaii

TMK: (1) 9-1-032: 084 (POR)

TERRANCE S. ARASHIRO
LICENSED PROFESSIONAL ENGINEER
No. 6998-C
HAWAII, U.S.A.

Exp. 4/30/12

This work was prepared by me or under my supervision.

Prepared for

Phycal, LLC
Highland Heights, OH 44143

Prepared by

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

August 4, 2010

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AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS · SURVEYORS

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PRELIMINARY ENGINEERING REPORT
FOR
PHYCAL ALGAE PILOT PLANT
WAHIAWA AND KAPOLEI, OAHU, HAWAII

I. INTRODUCTION

The purpose of this report is to review the preliminary engineering design for the proposed Phycal Algae Pilot Plant in Wahiawa and Kapolei, Oahu, Hawaii. This report evaluates the existing site conditions and presents the proposed grading, drainage, roadway, electrical, water and sewer improvements.

II. PROPOSED PROJECT

A. Location

The proposed Phycal Algae Pilot Plant site ("Poamoho Site") is located in Wahiawa Hawaii and has the following Tax Map Keys: (1) 7-1-001: 011, 030, 031 (portions). The site is bounded by Kamananui Road to the east, Kaukonahua Road (State Highway 801) to the south, and vacant agricultural land to the west and north. The Poamoho Camp community is located slightly to the north of the project. The 34-acre lot for the algae plant will be created by subdividing a parcel out of the larger Poamoho Camp property, which is owned by HIDC Poamoho Camp, Inc.

The processing of the algal oil into hydrotreated renewable jet fuel, renewable Naptha, and renewable diesel will be located at the Tesoro site in Kapolei, Hawaii. The proposed site will be on the northern portion of Tax Map Key (1) 9-1-032: 084. The project site is bounded by Komohana Street to the west, Kauhi Street to the north, Tesoro's private access road designated as Easement "799" to the east and Drainage Easement "1215" to the south. The project will use approximately 0.9 acres of the 12 acre parcel.

B. Project Description

The proposed Phycal Algae Pilot Plant is a facility used for growing algae and processing the algae to create bio-fuel. The project will include approximately 10 acres of shallow ponds of various sizes used for algae production. The harvested algae will be processed on-site to remove the lipid oil bio-fuel. The site will contain 46 parking spaces, three employee trailers, one visitor trailer, six greenhouses, various processing equipment facilities and storage tanks. Interior gravel access roads and walkways will circulate around the ponds and to the various equipment areas. Utility infrastructure will include electric, telephone, water and sewer services as well as an on-site water conditioning facility.

The algal oil being produced at the Pilot Plant site in Wahiawa will be transported to the Tesoro refinery site in 55 gallon drums. The Tesoro Site will house a small bench scale unit which will convert the algal oil into hydrotreated renewable jet fuel, renewable Naptha and renewable diesel in small quantities less than 75 gallons per day. It will also include an equipment trailer containing office space, equipment and solvent storage and an outside area for storage of six 55 gallon fuel drums and two 55 gallon waste drums.

III. EXISTING CONDITIONS

A. Topography and Soil Conditions

Poamoho Site:

The site is undeveloped land that was formerly used for cultivating pineapples, but is now overgrown with brush, tall grass, and weeds. Other than two dirt cane haul roads that pass through the site, there are no existing structures or improvements on-site.

The lot contains a high point that slopes away to the north, east, and west. The slopes range from nearly flat to 7 percent with an average gradient of around 4 percent. Elevations at the site range from 946 to 983 feet mean sea level (MSL).

The soil found on-site is classified as Wahiawa silty clay (WaA and WaB). A representative soil profile consists of about 12 inches of dusky red silty clay followed by about 48 inches of dark reddish-brown silty clay that has a subangular blocky structure. The substratum is weathered basic igneous rock, although this is generally quite deep. Permeability is moderately rapid and the erosion hazard is slight. The Hydrologic Soil Group (HSG) for runoff is Type "B". Classifications are based on the National Resource Conservation Service (formerly Soil Conservation Service) publication, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, dated August 1972.

Tesoro Site:

The site is currently vacant with a fenced off area of approximately 420 by 431 feet. Ground cover consists of tall grass, weeds, and low brush. The lot was previously graded as a level pad site. The elevation at the site is approximately 18 feet MSL.

The soil found on the site is classified as Coral Outcrop (Cr). Coral Outcrop soil is the remainder of old coral reefs that formed at a time when the ocean levels were higher. The soil consists of coral or cemented calcareous sand. Permeability is rapid and the HSG is Type "A".

B. Infrastructure

1. Drainage

Poamoho Site:

As mentioned previously, the site lies on a slight hill that sheds water in several directions. The majority of the site (Drainage Area 1) drains north towards the Poamoho Camp community. Runoff flows overland through the Poamoho Camp and eventually reaches the Poamoho Stream roughly 1,300 feet to the north. Since the soils are moderately permeable and there are no concentrated channels, the runoff is likely to be sheet flow and widely dispersed. An existing 50-year peak runoff of 22 cfs was determined for this area.

The southwestern corner of the site (Drainage Area 2) drains west onto adjacent open land and eventually reaches the roadside swale on Kaukonahua Road. The roadside swale runoff eventually drains into Poamoho Stream. This portion of the site is expected to generate an existing 50-year peak runoff of 5 cfs.

The southeastern corner of the site (Drainage Area 3) drains east toward the Kaukonahua Road and Kamananui Road intersection. At the intersection low-point, it is drained by a 24-inch culvert under Kamananui Road and a 36-inch culvert under Kaukonahua Road. Runoff continues overland until it eventually reaches Kaukonahua Stream. The expected 50-year runoff from this portion of the existing site is 6 cfs.

Since the site area is less than 100 acres, the Rational Method is used for stormwater runoff calculations Refer to Appendix A for calculations and Exhibit 7 for the Existing Conditions Drainage Area Map.

Tesoro Site:

The site drains to the City and County of Honolulu's storm drainage system. The adjacent drainage system includes catch basins along Komohana Street and Kauhi Street, as well as an unlined open channel on the southern boundary of the site. All runoff eventually discharges to a large open channel that runs along the west edge of Barbers Point Naval Air Station. The unnamed open channel first originates near Kapolei Center and flows south to its ocean outlet point near Kalaeloa Regional Park.

Since the soils on the site have high permeability, the majority of rainfall infiltrates into the ground. Runoff from the site is widely dispersed and no concentrated flows are evident. The overall 50-year runoff from the existing project site is 1 cfs.

Refer to Appendix A for Hydrology Calculations and Exhibit 10 for the Tesoro Site Existing Conditions Drainage Area Map.

2. Water

Poamoho Site:

There is an existing private 4-inch transmission water line in the vicinity of Kamananui Road and Kamehameha Highway that supplies water to Poamoho Camp. This private water line is connected to the City and County of Honolulu Board of Water Supply (BWS) water system at Whitmore Village (approximately one-mile east of the site). Additionally there are larger public water transmission lines that run near the project, but these are unavailable for supplying this site. There are no fire hydrants located in the adjacent public roadways.

Tesoro Site:

There is an existing onsite 12-inch fire water line with fire hydrants adjacent to Tesoro's tanks adjacent to the drainage channel. There is also an existing water line along Komohana Street with a fire hydrant fronting the southwest corner of the site, just north of the drainage channel. In addition, there are two existing water services with water meter boxes, but no water meters.

3. Sewer

Poamoho Site:

An existing 10-inch sewer forcemain runs along Kamananui Road near the eastern border of the site. The sewer line eventually discharges to the Schofield Barracks Wastewater Treatment Plant (WWTP).

Tesoro Site:

There are no existing sewer lines at the Tesoro Site. The properties in this area use individual wastewater systems.

4. Electrical

Poamoho Site:

There are several overhead electric lines in the vicinity of the project. Electrical and communication overhead lines run along Kamehameha Highway. An overhead 3-Phase branch line to the north of the site connects to the overhead lines on Kamehameha Highway to serve the Poamoho Camp. Hawaiian Electric Company presently serves this area from its Helemano Substation which is located to the north of Poamoho Camp in the vicinity of the Dole Plantation. In

addition, electrical lines service the street lights on the east side of Kamananui Road just south of where it intersects with Kamehameha Highway. An overhead telephone line runs along Kaukonahua Road on the southern boundary of the property.

Tesoro Site:

There are overhead electric lines along all sides of the project site, including Komohana Street, Kauhi Street, Tesoro's Private Road and along the south side of Drainage Easement "1215". Hawaiian Electric Company presently serves this area from its Malakole substation located within the Campbell Industrial Park area.

C. Flood Zone

Poamoho Site:

The project is located on a high point and is well above the nearby Poamoho and Kaukonahua Stream floodways. The entire site is within flood zone "D", defined as: "Areas in which flood hazards are undetermined, but possible". The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel number for this area is: 15003C0120F. This map panel is a non-printed panel due to the fact that FEMA has not completed a flood study for this area.

Tesoro Site:

The entire project site is within flood zone "D", defined as: "Areas in which flood hazards are undetermined, but possible". The FEMA FIRM panel number for this area is 15003C0315F.

IV. PROPOSED IMPROVEMENTS

A. Grading and Drainage

Poamoho Site:

The site will be graded in a terrace style to provide level areas for the large algae production ponds. There will be a mix of excavation and embankment with a net excess of approximately 3,000 cubic yards of material. The proposed site will have four drainage areas.

Drainage Area 1A includes most of the algae production ponds, adjacent roads, parking, and equipment pad areas. Runoff from the road and pad areas is collected by perimeter grass swales that carry the runoff to Retention Basin A. The 50-year peak runoff of 38 cfs will be completely retained in Basin A. The algae ponds themselves will not produce any runoff since they will have sufficient freeboard above their normal operating level to capture the 50-year 1-hour rainfall that falls there. Basin

A will also be oversized to allow for emergency containment of any possible overspill from the algae basin facilities.

Drainage Area 1B includes the remaining undeveloped site area that continues to flow overland toward Poamoho Camp. The proposed runoff rate from this area is 3 cfs. Since runoff from Drainage Area 1A is completely retained, only Drainage Area 1B will contribute stormwater runoff flowing off-site to the north and which will be a significant reduction from existing conditions.

Drainage Area 2 includes the entry drive and southwestern corner of the site. This drainage area has been reduced in size from existing conditions and amount of runoff flowing in this direction is in-turn reduced to 4 cfs.

Drainage Area 3 includes six greenhouses and several algae ponds in the southeastern corner of the site. Runoff from this area will be collected in perimeter swales similarly to Drainage Area 1A and will be routed to Retention Basin B. The 50-year runoff of 9 cfs will be completely retained in Basin B. This retention basin will also be oversized to allow for emergency containment of any possible overspill from the algae pond facilities.

Overall there will be a net decrease in stormwater runoff from the proposed project site due to significant retention in Basins A and B. The net 50-year runoff leaving the proposed site will be 7 cfs, which is a reduction of 26 cfs from existing conditions. Refer to Appendix A for Hydrology Calculations and to Exhibit 8 for the Proposed Conditions Drainage Area Map.

Tesoro Site:

The Tesoro Site is nearly flat and only minimum grading will be necessary for the facility. The project area is 40,000 square feet. Approximately 14,000 square feet of the project area will be covered with gravel to allow for vehicular access and for placement of the trailers. The added impervious surfaces will contribute to a slight increase in runoff. To mitigate the increase, a small infiltration basin will be constructed adjacent to the facility where runoff can be collected and allowed to infiltrate into the permeable soils. Refer to Appendix A for Hydrology Calculations and to Exhibit 11 for the Tesoro Site Proposed Conditions Drainage Area Map.

For both sites, water quality treatment of stormwater runoff will be provided by the use of grass swales and stormwater retention. The grass swales will contain native vegetation to filter stormwater runoff and remove pollutants through a natural process. The retention basins will capture all remaining suspended solids and other pollutants since there is no outflow and will prevent them from flowing offsite.

Temporary erosion control measures will be incorporated during the construction period to minimize soil loss and erosion hazards. At a minimum, erosion control BMPs to be used on-site will include: sediment traps, temporary diversion berms and swales, silt fences, dust fences, inlet protection, stabilized construction entrances and truck wash-down areas. NPDES permits for discharge of stormwater associated with construction activities for the Poamoho Site and Tesoro Site will be obtained. The requirements of the approved NPDES permits and erosion control plan will be adhered to during construction.

B. Water

Poamoho Site:

Domestic water service will come from the Poamoho Camp's existing private water service. The domestic line will serve the potable water needs of the employees primarily within the building facilities on the site and will not be used for the industrial processes in the remaining area of the site. Average Daily Domestic Demand is estimated to be 928 gpd based on a typical commercial/ industrial use of 100 gpd per 1,000 sf of building area.

The industrial and fire demands of the project will be provided by non-potable reuse water from the Schofield Barracks WWTP. Since there is not an existing service line in the area, the water will be transported in by a tanker truck. Trucked-in reuse water will be stored on-site in eight separate 100,000 gallon water storage bladders where it can be drawn upon for fire or industrial use. Average Daily Industrial Demand is estimated to be 110,000 gpd.

A fire water supply of 30,000 gallons must be available for fire suppression needs based on the Hawaii Water System Standards. The required fire flow rate is 1,000 gpm. As mentioned above, the fire flow will be provided by reuse water stored in the on-site bladders. Two on-site standpipes will be added in the vicinity of the employee buildings and processing areas.

Refer to Exhibit 4 for the Preliminary Utility Plan. Refer to Appendix B for Preliminary Water Demand Calculations. Refer to Appendix D for Preliminary Fire Flow Calculations.

Tesoro Site:

Potable water will be trucked in from the Poamoho Site and stored onsite in a 55 gallon tank. The Average Daily Domestic Demand is estimated at 32 gpd based on a typical commercial/industrial use of 100 gpd per 1,000 sf of building area.

The fire flow will be provided by Tesoro's 12-inch fire line, which is located adjacent to Tesoro's tanks just south of Drainage Easement

"1215". A fire hydrant will be installed on site and connect to Tesoro's fire line.

C. Sewer

Poamoho Site:

Domestic wastewater from the site will be collected in an on-site wastewater pump station. The pump station will discharge sewage through a new forcemain that will connect to the existing 10-inch forcemain in Kamananui Road. Wastewater contributions are estimated to be approximately 14,200 gpd (average daily flow) based on the 40 employees plus the industrial process water contribution.

The majority of the wastewater from industrial processes will be reconditioned in the on-site water treatment facility to allow for reuse in the ponds. A portion of which will be of R-1 quality will be used for wash-down areas. A maximum of 10 percent of the process water may be discharged to the wastewater pump station where it will be pumped to the Schofield Barracks WWTP on a daily basis.

Refer to Exhibit 4 for the Preliminary Utility Plan. Refer to Appendix C for Preliminary Wastewater Contribution Calculations.

Tesoro Site:

There is no municipal sewer system in the immediate area, therefore, an onsite disposal system, consisting of a septic tank and leachfield, will be installed. The average daily demand will be 160 gpd based on two employees. Any wastes from industrial processes will be disposed of off-site.

D. Roadway

Poamoho Site:

Access to the site will be from Kaukonahua Road, an existing two lane, 22-foot wide public roadway, near the southwest corner of the site. There is an existing dirt cane-haul road in that location that will be re-graded and improved to make the 24-foot wide access drive into the facility.

The new entry road and loop road providing access to the central facility buildings will be gravel. The larger width roadway will be provided to facilitate the movement of large semi-trailer trucks. Other smaller 15-foot wide gravel roadways will circulate around the proposed ponds and equipment areas. A 37-stall employee gravel parking area and a 9-stall visitor gravel parking area will be provided. The handicap accessible portion of the parking areas will be paved as required by A.D.A guidelines.

The site will have a perimeter fence and entry gates to prevent unauthorized access to the facility.

Refer to Exhibit 2 for the Preliminary Site Plan.

Tesoro Site:

The Tesoro Site will be accessed from a 20-foot private road (owned by Tesoro) at the end of Kauhi Street, an existing two lane public roadway. A 24-foot wide gravel access driveway will be constructed off of the private roadway.

An entry gate will be added to the existing perimeter fence for access to the site. On the project site, a gravel parking lot will be provided with enough room for a large truck to deliver the 55-gallon drums from the Wahiawa Site. One delivery is expected about once a week.

Although there is already a perimeter fence around the parcel, there is another entity that leases the site. An additional perimeter fence will be installed around the Phycal site to prevent unauthorized access to the facility.

E. Electrical and Telecommunications

Poamoho Site:

Electric service will be provided by a connection to the Poamoho Camp's overhead electric lines. New overhead lines will be extended into the site to serve the needs of the project. Preliminary electrical demand is estimated to be 1.5 megawatts (MW). Telecommunications will be extended from existing overhead lines on Kaukonahua Road. Refer to Exhibits 5 and 6 for the Preliminary Electric Service Plan.

Tesoro Site:

Electrical power will be supplied by a drop from the Tesoro power line to the equipment trailer. Electrical demand to run the reactors is 100 kilowatts (kW). The total electrical demand is estimated at 200 kW. Telecommunications will be supplied by lines extended onto the existing Hawaiian Electric Company joint poles along Kauhi Street.

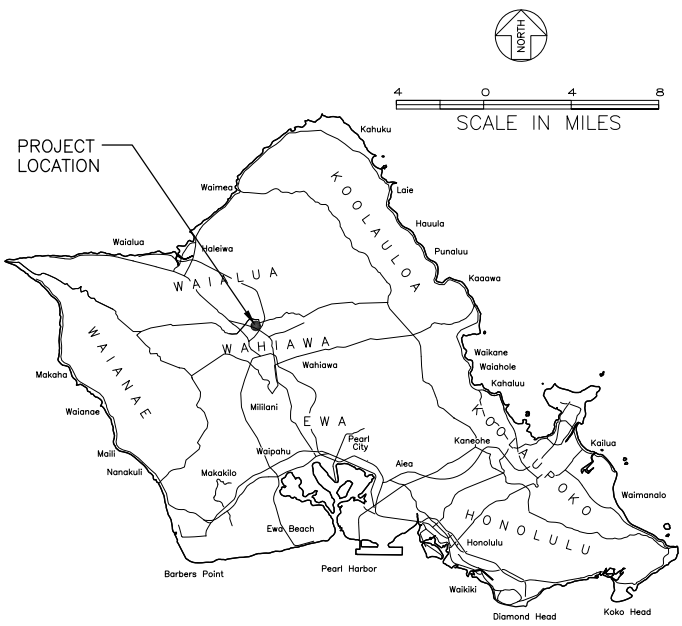
V. CONCLUSION

The proposed improvements for this project will be designed in accordance with the applicable rules and regulations of the City and County of Honolulu (C&C). The Department of Planning and Permitting (DPP) Storm Drainage Standards require retention of the increase in stormwater runoff between the post-development flows and pre-development flows. Since the overall Phycal Pilot Plant stormwater management plan indicates a net decrease in stormwater runoff, the project exceeds C&C requirements. Erosion control and

water quality measures will be provided to minimize pollution during and after construction. Water, Sewer, Roadway, and Electrical designs are sufficient to serve the proposed project and will meet applicable State and C&C standards.

Based on the information presented in this report, this project will have no adverse effects to the existing facilities or to the surrounding environment.

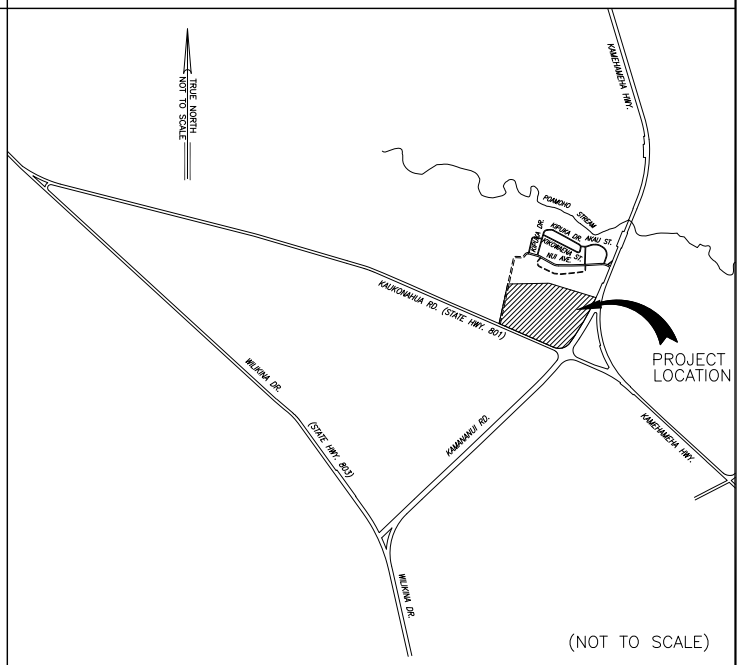
VICINITY PLAN



ISLAND OF OAHU

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

LOCATION PLAN



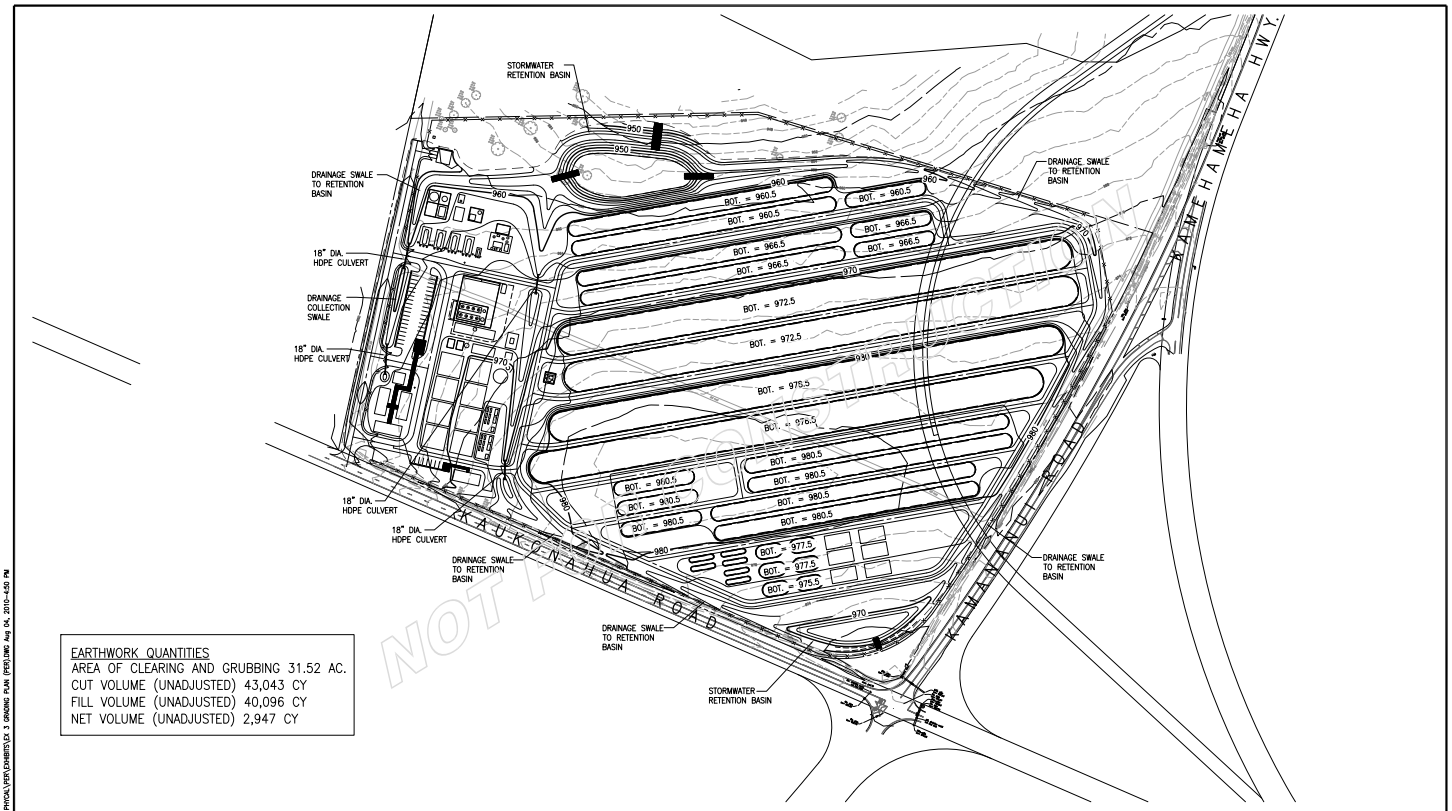
PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII LOCATION/ VICINITY MAP	EXHIBIT 1

JULY 2010

FILENAME: C:\PROJECTS\09-034 PHYCAL\PER\EXHIBITS\EX 1 VICINITY-LOCATION MAP.DWG Jul 22, 2010-11:40 AM

EXHIBITS

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS



EARTHWORK QUANTITIES
AREA OF CLEARING AND GRUBBING 31.52 AC.
CUT VOLUME (UNADJUSTED) 43,043 CY
FILL VOLUME (UNADJUSTED) 40,096 CY
NET VOLUME (UNADJUSTED) 2,947 CY

APPROXIMATE SCALE: 1" = 200'

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY GRADING AND DRAINAGE PLAN	EXHIBIT 3

AUGUST 2010

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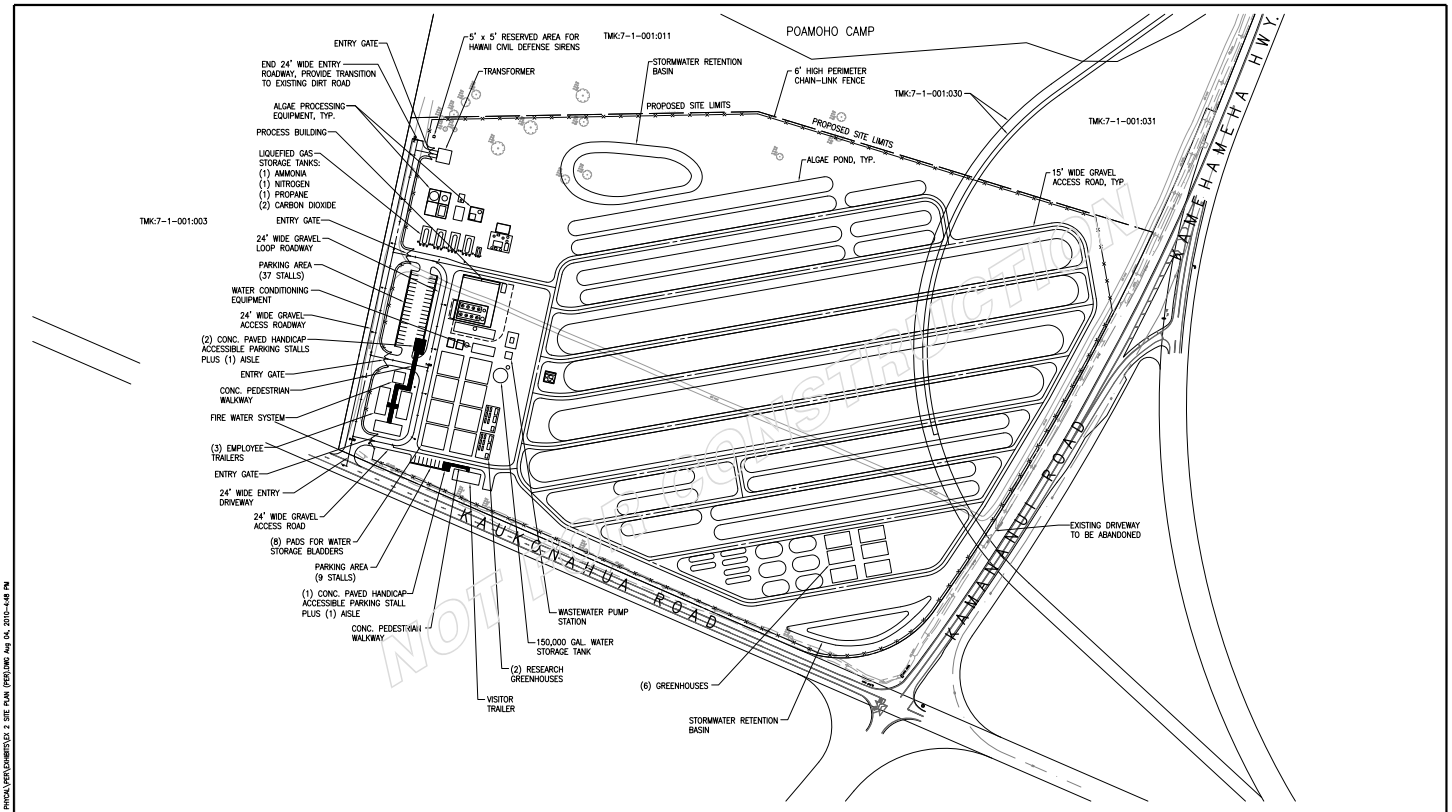

APPROXIMATE SCALE: 1" = 200'

0 1
LINE IS 1 INCH AT FULL SIZE
(IF NOT 1-inch : Scale Accordingly)

North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY SITE PLAN	EXHIBIT 2

AUGUST 2010

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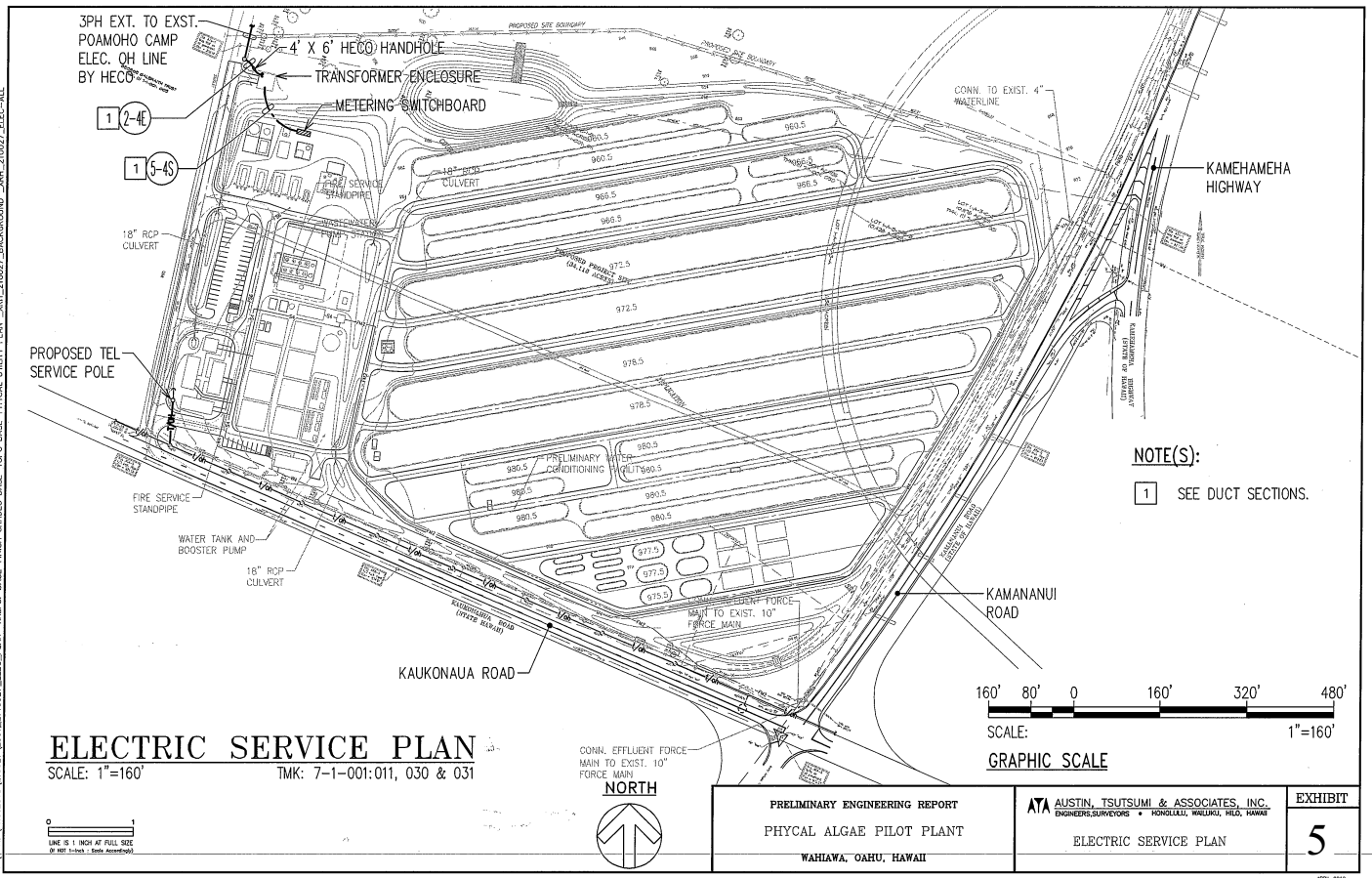

ELECTRIC SERVICE PLAN

SCALE: 1"=160' TMK: 7-1-001:011, 030 & 031

LINE IS 1 INCH AT FULL SIZE (IF NOT 1-inch : Scale Accordingly)

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII ELECTRIC SERVICE PLAN	EXHIBIT 5

APRIL 2010

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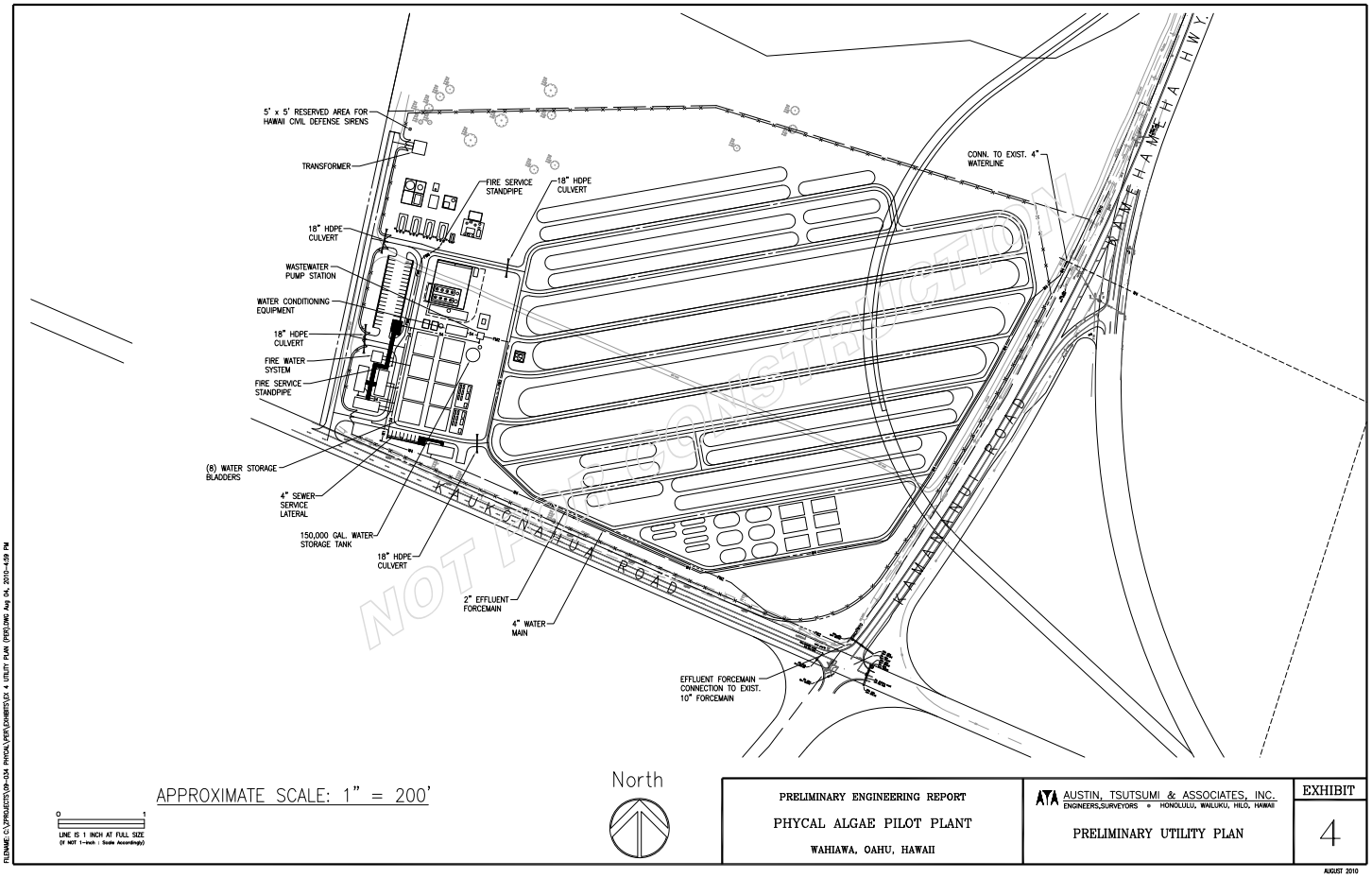

APPROXIMATE SCALE: 1" = 200'

LINE IS 1 INCH AT FULL SIZE (IF NOT 1-inch : Scale Accordingly)

North

PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII PRELIMINARY UTILITY PLAN	EXHIBIT 4

AUGUST 2010

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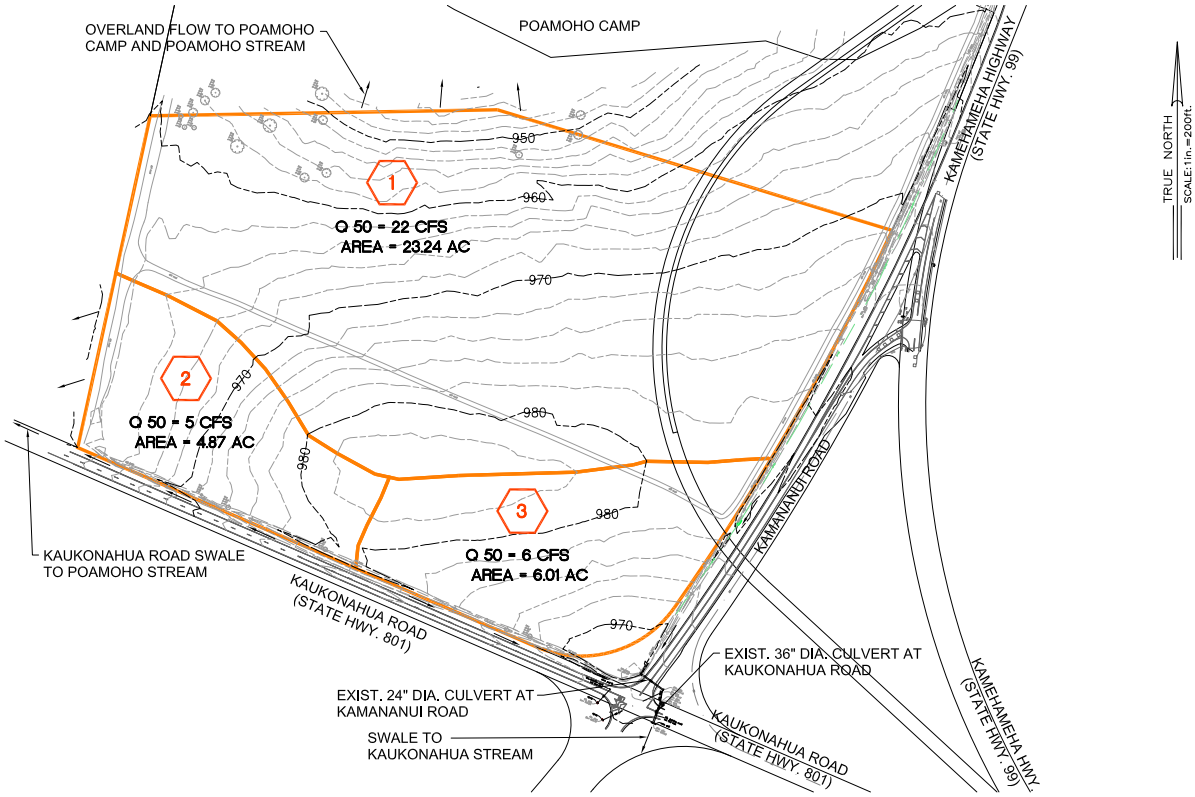

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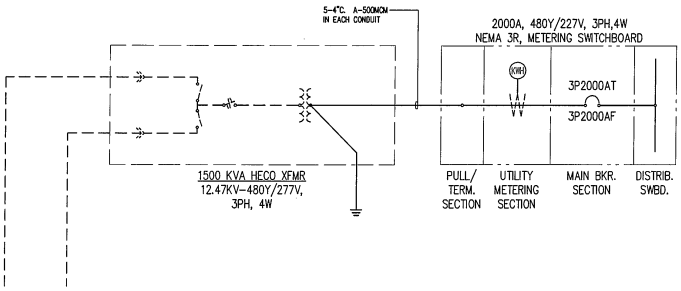
PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII DRAINAGE MAP– EXISTING CONDITIONS	EXHIBIT 7

JULY 2010

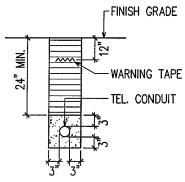


SINGLE-LINE DIAGRAM

NOT TO SCALE

BACKFILL NOTES:

- TYPE "A" BACKFILL – EARTH & GRAVEL. ROCK SIZE TO BE 1" MAX. & THE MIXTURE TO CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES. 95% COMPACTION.
- CONCRETE – 3" ENCASEMENT, 2500 PSI COMPRESSIVE STRENGTH @ 28 DAYS.



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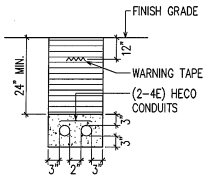

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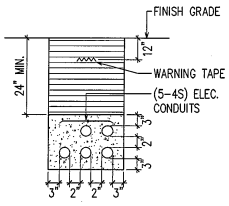

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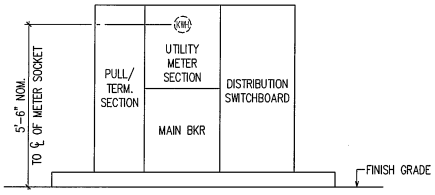

METER ELEVATION

NOT TO SCALE

LINE IS 1 INCH AT FULL SIZE (IF NOT 1-inch : State Accordingly)

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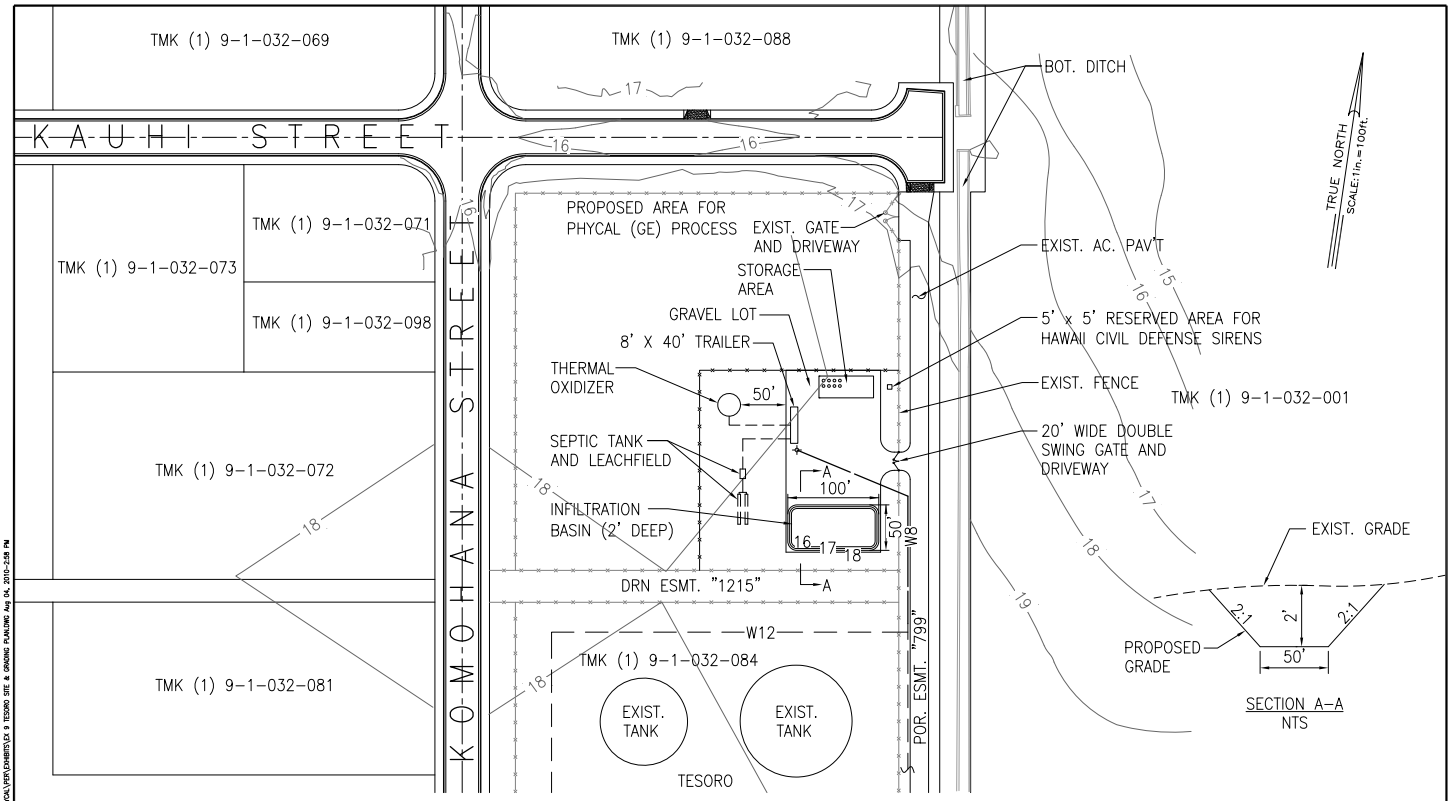
PRELIMINARY ENGINEERING REPORT PHYCAL ALGAE PILOT PLANT WAHIAWA, OAHU, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII MISCELLANEOUS DETAILS	EXHIBIT 6

APRIL 2010



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

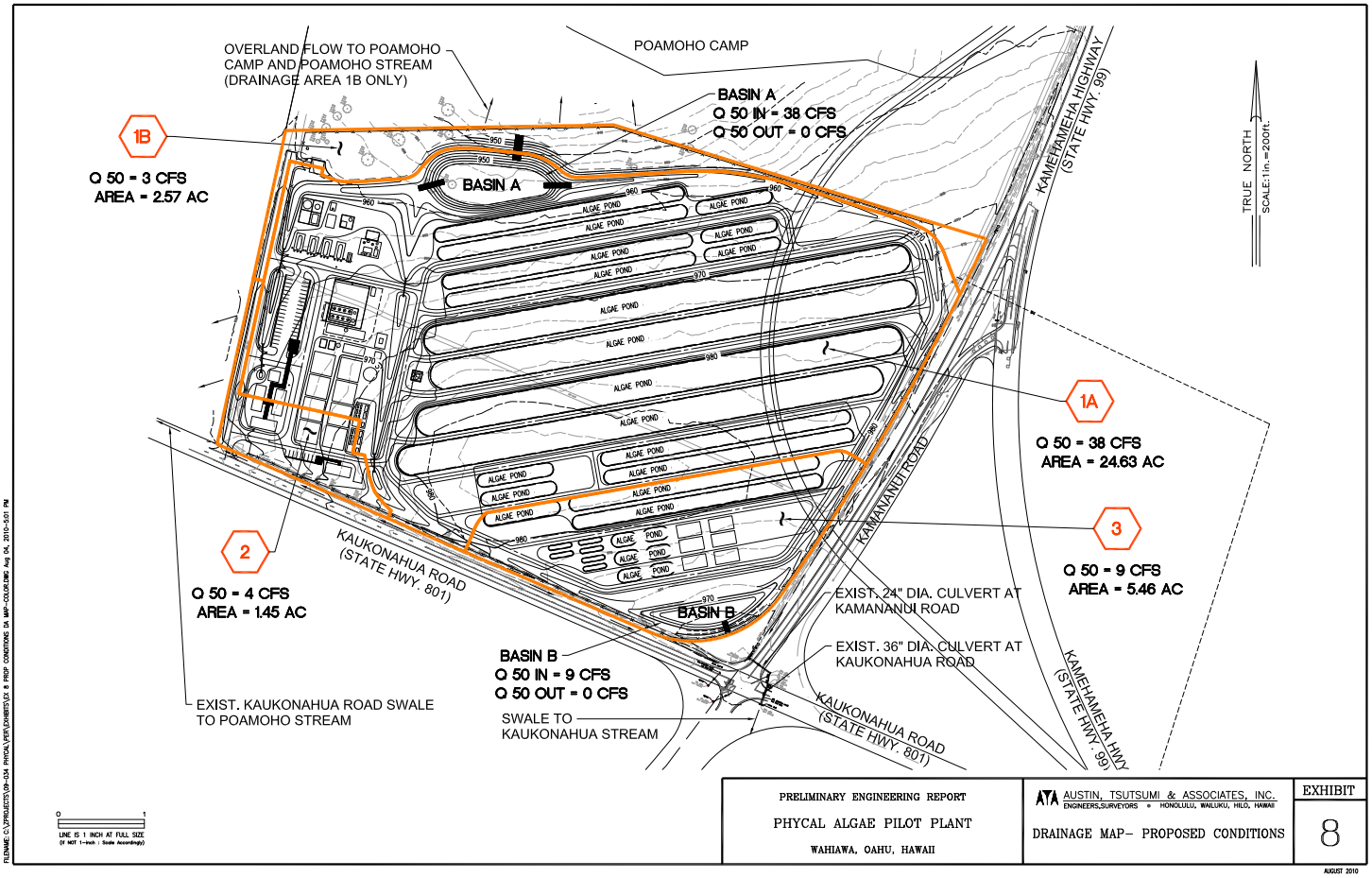
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

TESORO SITE & GRADING PLAN

EXHIBIT 9

AUGUST 2010



PRELIMINARY ENGINEERING REPORT

PHYCAL ALGAE PILOT PLANT

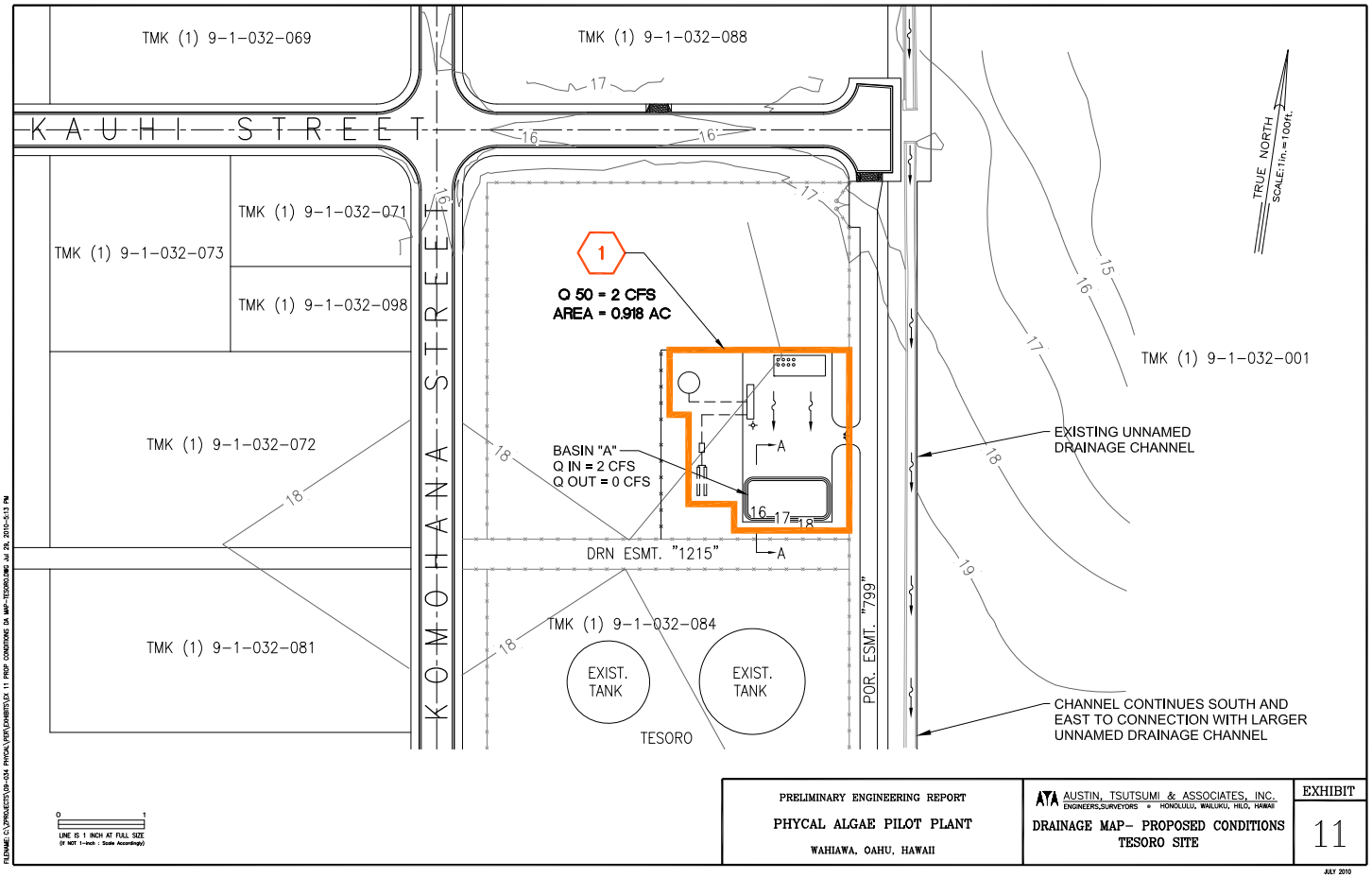
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP- PROPOSED CONDITIONS

EXHIBIT 8

AUGUST 2010



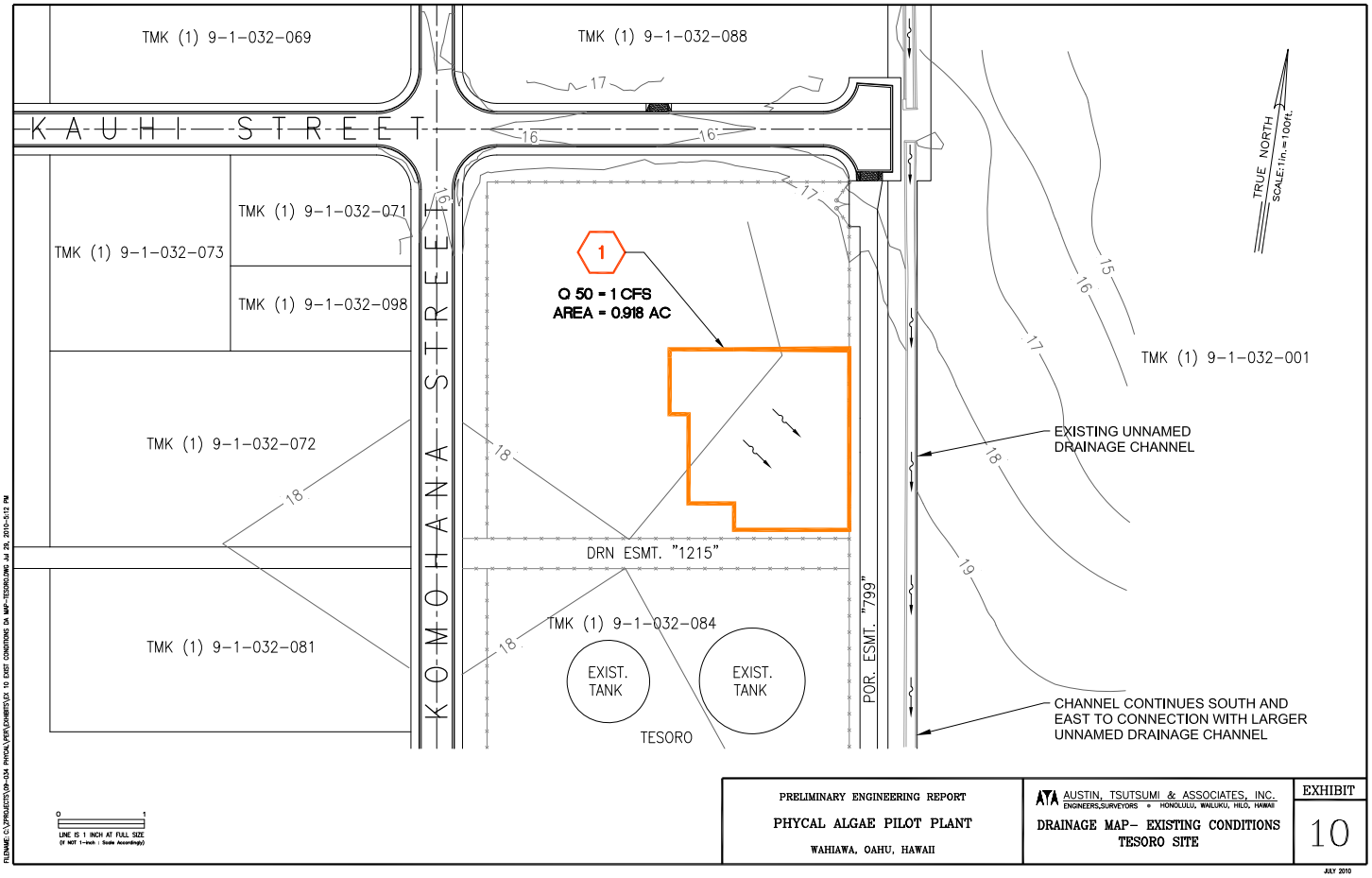
PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP- PROPOSED CONDITIONS
TESORO SITE

EXHIBIT 11

JULY 2010



PRELIMINARY ENGINEERING REPORT
PHYCAL ALGAE PILOT PLANT
WAHIAWA, OAHU, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, WAILUKU, HILO, HAWAII

DRAINAGE MAP- EXISTING CONDITIONS
TESORO SITE

EXHIBIT 10

JULY 2010

TABLE 1

RUNOFF CALCULATIONS - EXISTING CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Poamoho Camp		To Kaukonahua Rd (West)		To Kaukonahua Rd (East)	
						Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)
DA 1	23.239	24.8	2.9	4.5	0.21	22.14	39,852				
DA 2	4.865	25.0	2.9	4.5	0.23			5.08	9,144		
DA 3	6.012	25.0	2.9	4.5	0.21					5.73	10,314
Totals	**34.116**					**22.14**	**39,852**	**5.08**	**9,144**	**5.73**	**10,314**

TABLE 2

RUNOFF CALCULATIONS - POST DEVELOPMENT CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Poamoho Camp		To Kaukonahua Rd (West)		To Kaukonahua Rd (East)	
						Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)	Q_{50} (cfs)	Vol_{50} (cf)
DA 1A	24.629	16.1	2.9	5.5	0.28	38.23 *	68,814 *				
DA 1B	2.574	15.2	2.9	5.8	0.23	3.46	6,228				
DA 2	1.454	19.2	2.9	5.2	0.53			4.04	7,272		
DA 3	5.459	14.3	2.9	6.1	0.26					8.73 *	15,714 *
Totals	**34.116**					**3.46**	**6,228**	**4.04**	**7,272**	**0.00**	**0**
					Increase From Existing	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**

Notes:
1. 50-Year, 1-Hour Rainfall/ Intensity determined using Honolulu Stds. Plate 2.
2. Adjusted Intensity determined using Honolulu Stds. Plate 4.
3. Refer to Time of Concentration Calculations for determination of Tc value.
4. Refer to Runoff Coefficient Calculations for determination of weighted C value.
5. Runoff rates from Drainage Areas 1A and 3 (marked with "*") are the quantities prior to retention. Runoff from these drainage areas is completely retained and does not contribute to the overall runoff. Refer to Table 3, Storage System Summary.
6. Runoff Volume determined using a triangular Rational Method Hydrograph ending at 1-hour.

Drainage Calcs- Phycal.xls, Tbl 1 & 2 Runoff Calcs
7/22/2010, 3:32 PM

APPENDIX A

Preliminary Hydrology Calculations

TIME OF CONCENTRATION CALCULATIONS

EXISTING CONDITIONS

Drainage Area	OVERLAND FLOW							CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1	Avg. Grass	810	983.0	946.0	0.0457	24.8	-	-	-	0.0	24.8
DA-2	Avg. Grass	720	983.0	960.0	0.0319	25.0	-	-	-	0.0	25.0
DA-3	Avg. Grass	620	983.0	969.0	0.0226	25.0	-	-	-	0.0	25.0

PROPOSED CONDITIONS

Drainage Area	OVERLAND FLOW							CHANNELIZED FLOW				TOTAL
	Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	Tc Tot. (min)
DA-1A	Avg. Grass	150	982.0	979.0	0.0200	14.7	Swale	810	10.0	1.4	16.1
DA-1B	Avg. Grass	200	960.0	954.0	0.0300	15.2	-	-	-	0.0	15.2
DA-2	Avg. Grass	400	977.0	962.0	0.0375	19.2	-	-	-	0.0	19.2
DA-3	Avg. Grass	150	982.0	978.0	0.0267	13.9	Swale	230	10.0	0.4	14.3

Notes:
1. Overland Flow time determined using Honolulu Stds. Plate 3.
2. Pipe and Ditch velocity of 10.0 fps is estimated based on appox. slope and predicted channel cross-section.
3. A minimum Tc of 5.0 minutes is used for Rational Method Calculations.

TABLE 3

STORAGE SYSTEM SUMMARY

Storage System	Contributing DAs	Description	Retention Volume (cf)	Inflow Volume (cf)	Meets Req.?	Q in (cfs)	Q out (cfs)
BASIN A	DA-1A	8' Deep Retention Basin	215,000	68,814	√	38.23	0.00
BASIN B	DA-3	3' Deep Retention Basin	29,000	15,714	√	8.73	0.00

RUNOFF COEFFICIENT CALCULATIONS

LAND USES OR SURFACE TYPES AT SITE:

Unimproved Grass and Heavy Brush	C = 0.20
Dirt Road/ Bare Soil	C = 0.85
Lawn: well drained soil, avg. slope	C = 0.20
Pavement, Roofs and Walks	C = 0.95
Phycal Algae Pond (No Runoff)	C = 0.00

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS:

EXISTING

DA-1		**Percent**	**Area (AC)**
Unimproved Grass and Heavy Brush	C = 0.20	98.1%	22.789
Dirt Road/ Bare Soil	C = 0.85	1.9%	0.450
	C = 0.21	100.0%	**23.239**

DA-2			
Unimproved Grass and Heavy Brush	C = 0.20	95.7%	4.658
Dirt Road/ Bare Soil	C = 0.85	4.3%	0.207
	C = 0.23	100.0%	**4.865**

DA-3			
Unimproved Grass and Heavy Brush	C = 0.20	98.4%	5.918
Dirt Road/ Bare Soil	C = 0.85	1.6%	0.094
	C = 0.21	100.0%	**6.012**

PROPOSED

DA-1A			
Lawn: well drained soil, avg. slope	C = 0.20	50.8%	12.516
Pavement, Roofs and Walks	C = 0.95	4.4%	1.081
Dirt Road/ Bare Soil	C = 0.85	16.5%	4.057
Phycal Algae Pond (No Runoff)	C = 0.00	28.3%	6.975
	C = 0.28	100.0%	**24.629**

DA-1B			
Lawn or Unimproved Grass	C = 0.20	94.7%	2.438
Pavement, Roofs and Walks	C = 0.95	0.4%	0.010
Dirt Road/ Bare Soil	C = 0.85	4.9%	0.126
	C = 0.23	100.0%	**2.574**

DA-2			
Lawn or Unimproved Grass	C = 0.20	51.9%	0.755
Pavement, Roofs and Walks	C = 0.95	21.1%	0.307
Dirt Road/ Bare Soil	C = 0.85	27.0%	0.392
	C = 0.53	100.0%	**1.454**

RUNOFF COEFFICIENT CALCULATIONS (Cont.)

DA-3		**Percent**	**Area (AC)**
Lawn: well drained soil, avg. slope	C = 0.20	59.8%	3.266
Pavement, Roofs and Walks	C = 0.95	4.2%	0.232
Dirt Road/ Bare Soil	C = 0.85	11.5%	0.627
Phycal Algae Pond (No Runoff)	C = 0.00	24.4%	1.334
	C = 0.26	100.0%	**5.459**

Notes:

1. The project site contains a mix of existing dirt roads, open space, and impervious surfaces. Runoff coefficients are determined by composite coverage calculations.
2. The Phycal Facility basins primarily only receive rainfall from what falls directly on on them. Since the basins have 6-inches of freeboard above their normal operating level, they will have ample storage volume for the 50-year, 1-hour rainfall amount of 2.9 inches. Therefore the basins themselves are assumed to have no runoff.

TESORO SITE

TABLE 1

RUNOFF CALCULATIONS - EXISTING CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Open Channel Q_{50} (cfs)	To Open Channel Vol_{50} (cf)
DA 1	0.918	22.0	2.2	3.7	0.20	0.68	1,224
Totals	**0.918**					**0.68**	**1,224**

TABLE 2

RUNOFF CALCULATIONS - POST DEVELOPMENT CONDITIONS

Drainage Area	Area (ac)	Tc (min)	I_{50} 1-Hour (in/hr)	I_{50} Adjusted (in/hr)	C	To Open Channel Q_{50} (cfs)	To Open Channel Vol_{50} (cf)
DA 1	0.918	6.7	2.2	5.8	0.44	2.36 *	4,248 *
Totals	**0.918**					**0.00**	**0**
					Increase From Existing	**0.00**	**0**

Notes:
1. 50-Year, 1-Hour Rainfall/ Intensity determined using Honolulu Stds.Plate 2.
2. Adjusted Intensity determined using Honolulu Stds. Plate 4.
3. Refer to Time of Concentration Calculations for determination of Tc value.
4. Refer to Runoff Coefficient Calculations for determination of weighted C value.
5. Runoff rates from Proposed Drainage Area 1 (marked with "*") are the quantities prior to retention. Runoff from this drainage area is completely retained and does not contribute to the overall runoff. Refer to Table 3, Storage System Summary.
6. Runoff Volume determined using triangular Rational Method Hydrograph ending at 1-hour.

TABLE 3

STORAGE SYSTEM SUMMARY

Storage System	Contributing DAs	Description	Retention Volume (cf)	Inflow Volume (cf)	Meets Req.?	Q in (cfs)	Q out (cfs)
BASIN A	DA-1	2' Deep Infiltration Basin	5,000	4,248	√	2.36	0.00

TESORO SITE

TIME OF CONCENTRATION CALCULATIONS

EXISTING CONDITIONS

Drainage Area	OVERLAND FLOW Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	CHANNELIZED FLOW Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	TOTAL Tc Tot. (min)
DA-1	Avg. Grass	200	13.5	12.5	0.0050	22.0	-	-	-	0.0	22.0

PROPOSED CONDITIONS

Drainage Area	OVERLAND FLOW Cover	Len. (ft)	Elev. Top (ft)	Elev. Bot (ft)	Avg. Slope (ft/ft)	Tc O.F. (min)	CHANNELIZED FLOW Type	Pipe Len. (ft)	Vel. (fps)	Tc C.F. (min)	TOTAL Tc Tot. (min)
DA-1	Paved	200	13.5	12.5	0.0050	6.7	-	-	-	0.0	6.7

Notes:
1. Overland Flow time determined using Honolulu Stds. Plate 3.
2. A minimum Tc of 5.0 minutes is used for Rational Method Calculations.

TESORO SITE

RUNOFF COEFFICIENT CALCULATIONS

LAND USES OR SURFACE TYPES AT SITE:

Unimproved Grass and Heavy Brush	C = 0.20
Dirt Road/ Bare Soil	C = 0.85
Pavement, Roofs and Walks	C = 0.95

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS:

EXISTING

DA-1		**Percent**	**Area (AC)**
Unimproved Grass and Heavy Brush	C = 0.20	100.0%	0.918
	C = 0.20	100.0%	**0.918**

PROPOSED

DA-1			
Unimproved Grass and Heavy Brush	C = 0.20	63.7%	0.585
Pavement, Roofs and Walks	C = 0.95	2.8%	0.026
Dirt Road/ Bare Soil	C = 0.85	33.4%	0.307
	C = 0.44	100.0%	**0.918**

Notes: 1. The project site contains a mix of gravel, open space, and impervious surfaces. Runoff coefficients are determined by composite coverage calculations.

APPENDIX B

Preliminary Water Demand Calculations

PRELIMINARY WATER DEMAND CALCULATIONS

Water Demand Calculations

Project Site Description

Total Project Area = 34.12 acres

Total Supplied Building Area = 9,280 square feet (sf) (4 Trailers +Process Bldg)

Domestic Water to supply Building Areas.

Non-Potable Reuse water to supply Industrial Processes and Fire System.

Average Daily Demand Standards

(Table 100-18 Domestic Consumption Guidelines, Water System Standards)

Commercial/ Industrial Mix 100 gallons per day (gpd) / 1,000 sf

(Note: The Commercial/ Industrial category is used due to the building square-footage basis rather than the site acreage basis from the Light Industrial category. This consumption rate was deemed to be more appropriate for the relatively small building area on the large site.)

Water Demand Calculations

Average Daily Domestic Water Demand
Domestic Demand = 9,280 sf x 100 gpd / 1,000 sf = **928 gpd**

Average Daily Non-Potable Water Demand
Non-Potable Demand (For Industrial Usage) = **110,000 gpd**

Water Demand Calculations for Tesoro Site

Average Daily Domestic Water Demand
Building Area = 8' x 40' = 320 sf for 1 trailer
Domestic Demand = 320 sf x 100 gpd / 1,000 sf = **32 gpd**

Austin, Tsutsumi & Associates, Inc. ● Civil Engineers ● Surveyors
501 Sumner St. ● Suite 521 ● Honolulu, HI 96817 ● (808) 533-3646

APPENDIX C

Preliminary Wastewater Contribution Calculations

PRELIMINARY WASTEWATER CONTRIBUTION CALCULATIONS

WAHIAWA SITE:

Project Site Description

Total Project Area = 34.12 acres

Sewered Area (Used for Infiltration Calculations) = 5.00 acres

Number of Employees = 20 max. per shift or 40 max. per day

Industrial Process Wastewater to Sewage = 10 percent (%) x 110,000 gpd = 11,000 gpd
(Note: remaining Industrial Process Wastewater to be treated on-site and reused.

Wastewater Contribution Standards

Average Daily Per Capita Flow = 80 gallons per day (gpd)

Babbit Flow Factor = 5.00 (From Figure 22.2.4)

Dry Weather Infiltration/ Inflow = 5 gallons per capita per day (gpcd) (Sewer laid above the normal groundwater table)

Wet Weather Infiltration/ Inflow = 1,250 gallons per acre per day (gad) (Sewer laid above the normal groundwater table)

From: "Design Standards of the Department of Wastewater Management, Volume 1, July 1993".

Wastewater Contribution Calculations

Average Daily Flow:
40 employees x 80 gpcd = 3,200 gpd + 11,000 gpd Process Wastewater = **14,200 gpd**

Maximum Wastewater Flow:
3,200 gpd x 5.00 Flow Factor = 16,000 gpd + 11,000 gpd **= 27,000 gpd**

Dry Weather Infiltration/ Inflow:
40 employees x 5 gpcd Dry Inflow = **200 gpd**

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Design Average Flow:
14,200 gpd Avg. WW Flow + 200 gpd Dry Inflow = **14,400 gpd**

Design Maximum Flow:
27,000 gpd Max. WW Flow + 200 gpd Dry Inflow = **27,200 gpd**

Wet Weather Infiltration/ Inflow:
5.00 acres x 1,250 gad Wet Inflow = **6,250 gpd**

Design Peak Flow:
27,200 gpd Design Max. Flow + 6,250 gpd Wet Inflow = **33,450 gpd**

TESORO SITE:

Wastewater Contribution Standards

Average Daily Per Capita Flow = 80 gallons per day (gpd)

From: "Design Standards of the Department of Wastewater Management, Volume 1, July 1993".

Wastewater Contribution Calculations

Average Daily Flow:
2 employees x 80 gpcd = **160 gpd**

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APPENDIX D

Preliminary Fire Flow Calculations

PRELIMINARY FIRE FLOW CALCULATIONS

WAHIAWA SITE:

Project Site Description

Total Project Area = 34.12 acres

Zoning Designation: AG-1 (Agriculture)

Fire Flow Requirements

Agriculture — Fire Flow = **1,000 gallons per minute (gpm)**
Duration = **30 minutes**

(Table 100-19 Fire Flow Requirements, Water System Standards)

Water Supply Requirements for Fire Suppression

Required Fire Suppression Storage = 1,000 gpm x 30 minutes = **30,000 gallons**

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APPENDIX C AIR EMISSIONS AND HAZARDOUS MATERIALS EVALUATION (ARCADIS)

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Air Emission and Hazardous Material Evaluation

Phycal Algae Production Pilot Plant

May 13, 2010

ARCADIS

Jeffrey C. Morrell
Principal Engineer

Bill Ruddiman
Senior Geologist

Air Emissions and Hazardous Material Evaluation

Phycal Algae Production Pilot Project

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May 13, 2010

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D Applicable Hazardous Materials Regulations Summary for Phycal

E Applicable Hazardous Materials Regulations Summary for GE

Executive Summary

ARCADIS performed a review of applicable federal, state and local regulations relating to the construction and operation of the proposed Phycal Algae Production Pilot project to be located near Wahiawa, Hawaii. Based on the information provided by Phycal, ARCADIS determined that a Covered Source Permit will be required for air emissions from processing equipment at the central Oahu site. The projected emissions will not exceed the thresholds required to trigger Prevention of Significant Deterioration (PSD) requirements.

The proposed use of limited quantities of hazardous materials will require pre-start-up and annual HEPCRA reporting to the Hawaii Department of Health. NPDES Storm water pollution control discharge permits will be required for both the construction and operation of the pilot project. Based on preliminary estimates of the aggregate amount of fuel stored on the Phycal site, a Spill Prevention Control and Countermeasures (SPCC) plan will be required.

Information for the associated GE Upgrading Unit located in Kapolei, Hawaii was also reviewed by ARCADIS. Based on the information provided, the GE facility will require a Covered Source Permit but will not trigger PSD review. Initial and annual HEPCRA reporting and NPDES storm water permits will be required for construction and operations. An SPCC Plan will be required for the GE facility.

1. Introduction

The purpose of the Air Emission and Hazardous Materials Evaluation was to identify the local, state and federal regulatory requirements pertaining to Air Emissions and Hazardous Material Storage and Disposal for the proposed Phycal Algae Production Pilot Project (project). ARCADIS performed a regulatory review of Hawaii Administrative Rules Title 11 Chapters 60.1, 260, 451, and 453, and Code of Federal Regulations 40CFR52.21, 40CFR60, and 40CFR63.

2. Background Information

Phycal has developed an integrated production system for growing algae and extracting energy products, primarily algal oil. This oil can be converted to biodiesel, drop-in “green” replacements for diesel and jet fuel, fuel oil blends, and other products. Phycal’s strategic approach combines innovative technology and system engineering with a focus on producing oil at a market competitive price. The project seeks to strengthen the capability of using algae as a biofuel crop to provide a wide range of energy products and energy security.

The purpose of the project is to develop an algae farm and processing production facility in the optimal climate of Hawaii. This pilot project will allow Phycal to demonstrate the proof of concept of algae to energy as a commercial product.

2.1 Proposed Plant Location

The Phycal Algae Production Pilot project site is located in Wahiawa, on the island of Oahu in the State of Hawaii. The site lies within the traditional moku of Ewa and the ahupuaa of Wahiawa. The project area is approximately 34.117 acres and encompasses portions of TMK: (1) 7-1-001: 011, 030 and 031. The project site is bounded by Kamananui Road on the east, Kaukonahua Road on the south and agricultural lands to the north and west. Poamoho Camp residential area lies beyond the agricultural lands to north. The site lies within a portion of the existing Poamoho Plantation Camp and is leased from HIDC Poamoho Camp, Inc.

The pilot project will be situated on former pineapple agricultural lands which are currently vacant. The project site is located in lands classified by the State Land Use Commission as an Agricultural District, and is zoned AG-1: Agricultural by the City and County of Honolulu as part of the Central Oahu Sustainable Communities Plan. All properties adjacent to the project site are also designated as Agricultural.

2.2 Process Description

Phycal's Hawaii production facility will be an aquaculture operation dedicated to the production of algae' and will consist of a large algae crop cultivation area with relatively small area dedicated to processing and support facilities. Phycal's algal oil product will be transported off-site for refinement at the GE Upgrading Unit located in James Campbell Industrial Park at Kapolei, Oahu. The algal oil will be used as a feedstock at the Tesoro Refinery adjacent to the GE facility to produce diesel, jet fuel, and naphtha.

The pilot project facility will include approximately 10 acres of shallow ponds of various sizes used for algae production and the following facility components:

- a greenhouse for initial phase grow-out of algae strains
- outdoor processing facilities for algal oil extraction and distillation
- a biomass fermentation tanks and anaerobic digester to convert biomass to methane gas
- water conditioning tanks and equipment for treatment of pond and process water for recycling
- storage tanks for water, nutrients, chemicals, and gas storage
- an office and laboratory trailers.

The operations of the pilot production facility will involve the use of hazardous materials in the facilities maintenance activities, including fuels, lubricants and cleaning products. The laboratory processes and

algae oil extraction process will also require the use of chemicals, some of which are classified as hazardous materials (e.g. solvents such as Isopar-H, Isopropanol, and hexane). The primary processing of the algae will include (1) concentrating the algae in a dewatering step; (2) heteroboosting the algae by feeding it sugars; (3) delipidating the algae using the Olexal process, which removes the lipids without damaging the algal cell and (4) processing the lean biomass in an anaerobic digester. A petroleum gas fired boiler will be used to vaporize and distill the solvents used during the Olexal process for reuse. A thermal oxidizer will be used to destroy off-gasses (primarily methane) produced during anaerobic digestion and any vapors accumulated in the solvent recirculation system. Process flow diagrams and mass balance data for the process are presented in Appendix A.

2.3 General Electric Upgrading Unit

Phycal's algal oil product will be transported off-site for refinement by Tesoro at their existing facility in James Campbell Industrial Park. A site adjacent to the Tesoro refinery will house a small pilot scale General Electric Research Center (GERC) unit which will convert the algal oil into hydrotreated, renewable Jet Fuel, Renewable Naphtha, and Renewable Diesel in small quantities less than 75 gallons per day (GPD) maximum throughout. In this process, algal oil is fed under high pressure into a liquid phase reactor or hydrotreating unit. This unit adds hydrogen to the fuel and coverts higher boiling point fractions into fuels at a normal boiling point range of biodiesel and jet fuel. Intermediate products are fed into a hydrogenation reactor. This process uses a noble metal catalyst to add hydrogen to the fuels to convert them into a direct drop-in replacement for diesel, and jet fuel. The byproducts of this step are naphtha and some light molecular-weight gases. A thermal oxidizer will burn hydrogen-rich waste gases from the process.

The GE/Tesoro project site will house an equipment trailer with a single office space, and a covered, outdoor chemical, algal oil, and fuel storage area. The covered storage area will have engineered secondary containment and capacity to store sixteen 55-gallon algal oil drums, four 55-gallon fuel drums, one drum of sulfur, and two 55-gallon waste water drums.

3. Air Emission Evaluation

3.1 Ambient Air Quality Standards

The proposed project and associated GE Upgrading Unit are located in an "attainment area", where the ambient air concentrations for all designated pollutants are in compliance with the National Ambient Air Quality Standards (NAAQS). The emissions from the project and the associated GE Upgrading Unit are required to comply with Federal and State Ambient Air Quality Standards for the following designated pollutants:

Ambient Air Quality Standards

Air Pollutant	Hawaii Standard	Federal Primary Standard	Federal Secondary Standard
Carbon Monoxide 1-hour average 8-hour block average	9 ppm 4.4 ppm	35 ppm 9ppm	None
Lead 3-month average	1.5 µg/m^3 (calendar quarter)	0.15 µg/m^3 (rolling 3-month)	Same as Primary
Nitrogen Dioxide Annual average	0.04 ppm	0.053 ppm	Same as Primary
Particulate Matter (PM_{10}) 24-hour block average Annual average	150 µg/m^3 50 µg/m3	150 µg/m^3 None	Same as Primary None
Particulate Matter ($PM_{2.5}$) 24-hour block average Annual average	None None	35 µg/m^3 15 µg/m^3	Same as Primary Same as Primary
Ozone 8-hpour rolling average	0.08 ppm	0.075 ppm	Same as Primary
Sulfur Dioxide 3-hour block average 24-hour block average Annual average	0.5 ppm 0.14 ppm 0.03 ppm	- 0.14 ppm 0.03 ppm	0.5 ppm - -
Hydrogen Sulfide 1-hour average	0.025 ppm	None	None

Ppm = parts per million by volume
µg/m^3 = micrograms per cubic meter of air

3.2 Phycal Plant Air Emission Evaluation

In consultation with Phycal, ARCADIS obtained the following preliminary specifications for the Phycal Algae Production Pilot project. The operating equipment may include a propane fired, ten million British Thermal Unit (10 MMBTU) boiler, a propane fired 2 MM BTU thermal oxidizer, and a supplemental 1230 kilowatt (ekW) Tier II diesel engine generator. (Tier II refers to standard level air emissions controls available on new diesel generator equipment.) ARCADIS estimated the air emissions from the boiler, the thermal oxidizer, and the diesel engine generator (Appendix B). Key assumptions in our analysis included the following: The diesel generator will operate as needed in power outages. We assumed 800

hours per year for the purposes of this analysis. The boiler will operate 3744 hours/year (24 hours per day for 3 days per week), and the thermal oxidizer will operate 24 hours/day, seven days per week. We conservatively assumed that the destruction efficiency of the thermal oxidizer will be at least 98%. Consequently, the emissions of isopar or another solvent used in the extraction process will be less than two tons per year.

Based on potential aggregate emissions from proposed equipment, the project will be required to obtain a Covered Source Permit (CSP) with the Department of Health (HDOH) Clean Air Branch and will be subject to the following sections of the State and Federal Regulations:

Applicable Regulations	State	Federal	Requirements
Covered Source Permit/Minor NSR Permit	Yes HAR 11-60.1 Subchapter 5	Authority delegated to State of Hawaii	AAQA using screening model, Propose to use existing SLAMs data for comparison. Compliance Plan and Certification. BACT measures include - thermal oxidizer and natural gas with low NOx
New Source Performance Standards (NSPS)	Yes HAR11-60.1 Subchapter 8	Yes 40CFR60 Subpart A Subpart Dc Subpart K Subpart IIII	Comply with General Provisions, Small Industrial Steam Generating Unit, Storage Vessels of Petroleum Liquids, and Stationary Compression Ignition Internal Combustion Engines
MACT & National Emission Standards for Hazardous Air Pollutants (NESHAP)	Yes HAR11-60.1 Subchapter 9	Yes 40CFR63 Subpart ZZZZ	emission limits, control, operational, and maintenance requirements, compliance dates, and associated recordkeeping, monitoring, testing, notification, and reporting requirements

The Prevention of Significant Deterioration (PSD) regulations will not apply because the project processes are not included within the 27 regulated industrial processes and the evaluation of the potential emissions indicates that less than the PSD threshold of 250 tons per year of regulated air pollutants will be produced.

3.3 GE Unit Air Emission Evaluation

Based on the emission estimates provided by GE (Appendix C), the Upgrading Unit will also be required to obtain a Covered Source Permit (CSP) with the HDOH Clean Air Branch. Depending on the equipment and processes, the Upgrading Unit will be subject to the following sections of the State and Federal Regulations:

Applicable Regulations	State	Federal	Requirements
Covered Source Permit/Minor NSR Permit	Yes HAR 11-60.1 Subchapter 5	Authority delegated to State of Hawaii	AAQA using screening model, Propose to use existing SLAMs data for comparison. Compliance Plan and Certification.
Prevention of Significant Deterioration (PSD)	No, the evaluation indicates that the potential to emit from the proposed unit is not a major source of criteria pollutants		The unit may be considered a Fuel Conversion Plant. Therefore, the PSD threshold is 100 tpy of any regulated air pollutant including fugitive emissions.
New Source Performance Standards (NSPS)	Yes HAR11-60.1 Subchapter 8	Yes 40CFR60 Subpart A Subpart Dc Subpart K	Comply with General Provisions, Small Industrial Steam Generating Unit, and Storage Vessels of Petroleum Liquids
MACT & National Emission Standards for Hazardous Air Pollutants (NESHAP)	Yes HAR11-60.1 Subchapter 9	Yes 40CFR63	emission limits, control, operational, and maintenance requirements, compliance dates, and associated recordkeeping, monitoring, testing, notification, and reporting requirements

3.4 Air Permitting Considerations

The State of Hawaii Department of Health Clean Air Branch (CAB) is the permitting authority for the Phycal Algae Production Pilot project and the associated GE Upgrading Unit. The Phycal Algae Production Pilot project and the associated GE Upgrading Unit will be required to submit independent Initial Covered Source Permit (CSP) applications using the CAB provided forms, and a $1,000 filing fee per application. Each of the applications will include an Ambient Air Quality Analysis (AAQA), using the most recent and pertinent State and Local Air Monitoring Stations (SLAMS) data to evaluate the ambient concentrations of criteria pollutants and include a summary of the potential pollutants and an initial screening model that indicates that the proposed emissions will not exceed the NAAQS.

Based on a review of State and Federal Regulations and preliminary emission calculations using equipment specifications and provided process descriptions (Appendix B and C), there do not appear to be any significant emissions that would delay the CSP application reviews for the Phycal plant or GE Unit. If any changes to the proposed equipment or processes alter the potential to emit, or if the DOH imparts additional restrictions, the Phycal plant and/or GE Unit may be required to perform ambient air quality monitoring, limit operation of equipment hours, use low NOx natural gas, and/or implement additional control technology to obtain or maintain compliance with the conditions of the CSP.

In the event that the potential to emit ten tons per year (tpy) or greater for any single hazardous air pollutant (HAP) or twenty-five tpy or greater for the aggregate of all HAPs from either the Phycal plant or the GE Unit, then the subject facility would be required to comply with additional requirements covered under the National Emission Standards for Hazardous Air Pollutants (NESHAP) and maximum achievable control technology (MACT) standards.

4. Hazardous Material Evaluation

Hazardous materials and hazardous waste regulations that are applicable to the Phycal plant are summarized in Appendix D, and regulations applicable to the GE unit are summarized in Appendix E. General provisions of the regulations and potentially applicable permits for both facilities are discussed below.

4.1 Hazardous Waste Generation and Disposal

The federal regulations governing the generation, identification, transportation, and disposal of hazardous waste are contained in the Resource Conservation and Recovery Act (RCRA) in 40 CFR Part 260 and Part 261. The EPA has delegated responsibility for managing the program in Hawaii to the HDOH Solid and Hazardous Waste Branch. All generators of solid waste are required to characterize the waste streams to determine if they meet the definition of a hazardous waste. Generally, hazardous

wastes are either "listed" based on the process that produced the waste or "characteristic" based on hazardous properties such as flammability, corrosivity, or toxicity. Generators must rely on either in-depth knowledge of the process that generated the waste or a one-time analysis of the waste to establish whether or not a waste stream is hazardous and must be disposed in accordance with regulations.

Hawaii solid waste disposal facilities require generators to complete a waste profile certifying that the waste stream is not a hazardous waste. The facilities require an inventory of the chemical make-up of the waste stream and request analytical reports to document the concentrations of any regulated chemicals such as heavy metals or organic solvents that may be present in the waste.

Based on process information provided by Phycal, the digester sludge and the evaporated salts from wastewater treatment are potential waste streams which may need to be characterized and profiled prior to disposal. There is no information that has been provided to ARCADIS which indicates that either facility is likely to generate hazardous waste or that a RCRA transfer, storage and disposal facility (TSDF) permit will be required for either facility.

Phycal should allow at least 14 days for sampling and laboratory analysis of any solid waste stream and conservatively an additional 60 days for review and approval of the waste disposal profile by the solid waste disposal facility prior to disposal. Phycal should be aware that any off-specification solvent, sodium hydroxide, phosphoric acid or urea that is generated as a waste must be transported and disposed as hazardous waste.

4.2 Community Right to Know/Hazardous Materials Release Reporting

ARCADIS did not identify any permits that are required under these regulations prior to the start-up of the Phycal plant or the GE Upgrading Unit. However, once the facilities are operating they will need to comply with provisions of these laws.

The federal Emergency Planning and Community Right-To-Know Act (EPCRA) established requirements for state and local governments to prepare programs to prevent and respond to releases of extremely toxic or hazardous chemicals. EPCRA's primary purpose is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires EPA and the states to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory (TRI).

Under Hawaii state regulations (HEPCRA) Title 11, Chapter 451, there are two types of annual reporting which may be required for both the Phycal and GE facilities. The first reporting requirement is the Tier II report under Sections 311 and 312. Tier II reports must be submitted to the HDOH Hazard Evaluation and Emergency Response (HEER) group by March 30th of the year following the start-up of the facility if at any time during the previous year the facility stored more than the threshold planning quantity (TPQ) of a listed chemical. Annual reports are required by March 1st of every year thereafter for which the facility exceeded a chemicals' on-site TPQ. The TPQ for most hazardous chemicals for which a Material Safety Data Sheet (MSDS) is required is 10,000 pounds. Certain chemicals however have more stringent TPQs which can trigger Tier II submittal requirements.

The second type of HEPCRA reporting which may be required is the Toxic Release Inventory (TRI) under section 313. Annual TRI reporting is required for facilities which are 1) included in a covered Standard Industrial Classification (SIC) code; 2) have 10 or more full-time employees (or the equivalent of 20,000 work hours per year); and 3) manufacture, import, process, or otherwise use any of the section 313 chemicals at quantities exceeding the TPQs.

In-depth evaluation of the HEPCRA requirements for specific chemicals used at the facilities is beyond the scope of the Environmental Assessment, but will be completed during the next phase of planning and permitting for the project.

4.3 Hazardous Materials Release Response

The federal regulations for hazardous chemical release reporting and response are contained in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC Section 103. The State of Hawaii Hazardous Materials Contingency Plan (128D) is contained in HAR Title 11, Chapter 451. These regulations govern the reporting requirements for hazardous chemicals, and in Hawaii, petroleum products. Hawaii requires reporting of petroleum releases which are greater than 25 gallons in volume or petroleum releases of any quantity which are not cleaned up within 72 hours after the release occurs. Other chemical releases must be reported if the volume exceeds the reportable quantity (RQ). A chemical release is defined as the liquid (or gas) leaving the engineered primary and secondary containment and entering the environment.

Isopar H and Isopropyl Alcohol do not have reportable quantities according to CERCLA regulations. Isopar H releases are reportable as a petroleum product (>25 gallons) under Hawaii regulations.

4.4 Hazardous Chemical Storage and Handling

The design of hazardous chemical storage facilities is influenced by the regulations presented in Section 4. However, specific design standards in most localities are established by local authorities such as county building and fire departments. In Hawaii, the fire departments have design requirements and permitting requirements of combustible and flammable liquids and gases as described in Section 4.7 below. County building codes refer to industry best practices and rely on construction standards published by the National Fire Protection Association (NFPA), the American Petroleum Institute (API), and the American Society of Testing and Materials (ASTM).

Design standards for storage of hazardous liquids require that all containment vessels are constructed of compatible materials including valves, seals, gaskets, gages, primary tanks and piping. All valves and fittings that would allow releases from the tanks must be locked or otherwise secured. Secondary containment must be capable of holding 110% of the aggregate volume stored or 150% of the single largest container. Double-walled tanks and piping systems are acceptable, provided that the interstitial space can be inspected or leak detection is provided. For liquids, secondary containment must be engineered to resist the corrosive or solubility properties of the contained chemical so that the chemical does not escape the containment before the release is discovered (typically 72 hours or the duration from Friday afternoon to Monday morning.)

The threshold for transportation of DOT Hazardous Materials is 1001 lbs for regulated chemical shipments (corrosive, flammable, mild oxidizer) which are initiated by Phycal or GE. If Phycal or GE initiate such shipments they are required to complete an annual registration of the site with USDOT by July 1st of each applicable year. This registration requirement doesn't apply if the pilot plant site is solely on the receiving end of shipments of placarded amounts of hazardous materials.

4.5 Storm Water Pollution Control

Any storm water affected by an industrial activity that is discharged to a water body belonging to the State of Hawaii is regulated by the Clean Water Act (CWA) in 40 CFR Part 122. Industrial activities that are exposed to rainfall and/or storm water runoff include, but are not limited to: clearing, grading, grubbing, or exposing bare soil; material transfer, storage, and waste handling sites; product and by-product storage and/or disposal areas; and maintenance areas. All storm water discharges associated with industrial activities (as defined in 40 CFR 122 subpart B, section 26(b)(14)) are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit with the appropriate regulatory authority.

The EPA has delegated responsibility for managing the NPDES program in Hawaii to the HDOH Clean Water Branch. The Hawaii Administrative Rules Chapters 11-54 and 11-55 establishes standards and

monitoring requirements to control the discharge of potential pollutants to the State of Hawaii waters from storm water associated with industrial activities. Subject facilities are required to comply with the terms and conditions of the NPDES permit.

Before beginning construction activities that disturb one or more acres of land, Phycal will be required to obtain an NPDES permit for the construction phase under HAR Chapter 11-55 Appendix C. The permit application must be submitted no later than thirty days prior to the proposed starting date of the construction.

Based on the industrial activities exposed to rainfall and storm water runoff, both the Phycal Algae Production Pilot project and the GE Upgrading Unit will also be required to obtain an NPDES permit under HAR Chapter 11-55 Appendix B for industrial storm water pollution control. Potential dischargers subject to NPDES Appendix B regulations are required to submit a complete application for each permit no later than thirty days prior to the proposed startup date of industrial operations.

To comply with the NPDES regulations, Phycal and GE must complete NPDES Appendix B applications, prepare a Storm Water Pollution Control Plan (SWPCP); have a working knowledge of Hawaii water quality standards; comply with effluent limitations; implement best management practices (BMPs) to control and/or eliminate the discharge of pollutants; and monitor, sample, and report the results for samples of storm water discharge. The SWPCP must include: a strategy to control pollutants; procedures for spill prevention and response; a schedule for periodic inspections, review, and training; and records of releases and storm water monitoring and discharge events. Approximately three months lead time will be required to prepare and obtain regulatory approval of SWPCPs for the Phycal Algae Production Pilot project and the associated GE Upgrading Unit.

4.6 Petroleum and Oil Storage

The federal Oil Pollution Act of 1990 (OPA 90), 40 CFR Part 112, is the regulatory framework that governs the use, storage, and transportation of petroleum products. Facilities that store an aggregate volume of 1,320 gallons of liquid petroleum products such as diesel, gasoline, fuel oil, or transformer fluid in containers which hold a volume of 55 gallons or more are subject to the regulations. Facilities are required to prepare a Spill Prevention Control and Countermeasures (SPCC) plan prior to start-up of the facility. SPCC plans document the engineering controls including secondary containment, overflow prevention, tank level monitoring, and periodic integrity testing required for stationary petroleum storage tanks. Spill detection, reporting and response procedures are also included in the plan along with a discussion of security measures at the facility.

The Phycal facility will require an SPCC plan if the fuel storage tank for the diesel engine generator exceeds or the aggregate petroleum storage at the facility exceeds 1,320 gallon capacity. The GE plant

will also require an SPCC plan if petroleum storage at the facility exceeds the threshold volume. Typically an SPCC plan can be prepared and regulatory approval obtained in three months or less.

4.7 Flammable/Combustible and Liquefied Petroleum Gas (LPG) Above-Ground Storage

In conjunction with the above mentioned requirements for petroleum and hazardous material storage, above-ground storage tanks (ASTs) for flammable or combustible liquids and liquefied petroleum gases are required to comply with the 1997 Uniform Fire Code (UFC), Article 79 and 82, respectively. Prior to installation of an above ground storage tank for flammable or combustible liquids and liquefied petroleum gases, the Phycal facility and the associated GE Upgrading Unit will be required to separately complete and submit an application and obtain a permit for tank installation with the City and County of Honolulu Fire Prevention Bureau (FPB). The FPB will perform a site inspection to verify that the installation of the AST and associated fueling equipment is in accordance with the UFC.

Requirements for AST installations of flammable or combustible liquids and liquefied petroleum gases include:

- Proper set-backs of AST from property boundaries and structures according to volume and pressure rating of the AST
- Posted identification and warning labels and/or signs
- Records of installation and pressure testing
- Suitable fire extinguisher or firefighting equipment
- Leak detection equipment
- Piping valve, fittings, and related components should be designed and fabricated with suitable materials
- Manual control and check valves for normal and emergency operation

The gas company typically obtains the permits for propane tanks which they supply, and the reported lead time required by the gas company is three months or less.

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Appendix A

Phycal Process Flow Diagrams

Biomass Input			
Stream Makeup:		**MTY (Max)**	**%**
1.	**Biomass**	718	13.83%
2.	**Oil**	561	10.79%
3.	**Water**	3,872	74.54%
4.	**Other**	44	0.84%
	Total	5,195	100.00%

Chemical Storage	
Acid	1000 gallons
Base	700gallons
Solvent Storage	
Hexane	2000 gallons

SRS Energy Fractionation Process

Vent to Atmosphere	**MTY**
Hexane release, metric ton per year	61.56

Oil, Evaporation Loss	**MTY**
Hexane, metric ton per year	2.5
Oil, metric ton per year	504.4

Spent Biomass, Evaporation Loss	**MTY**
Hexane release, metric ton per year	13.4
Water	3,664.8
Biomass	818.4

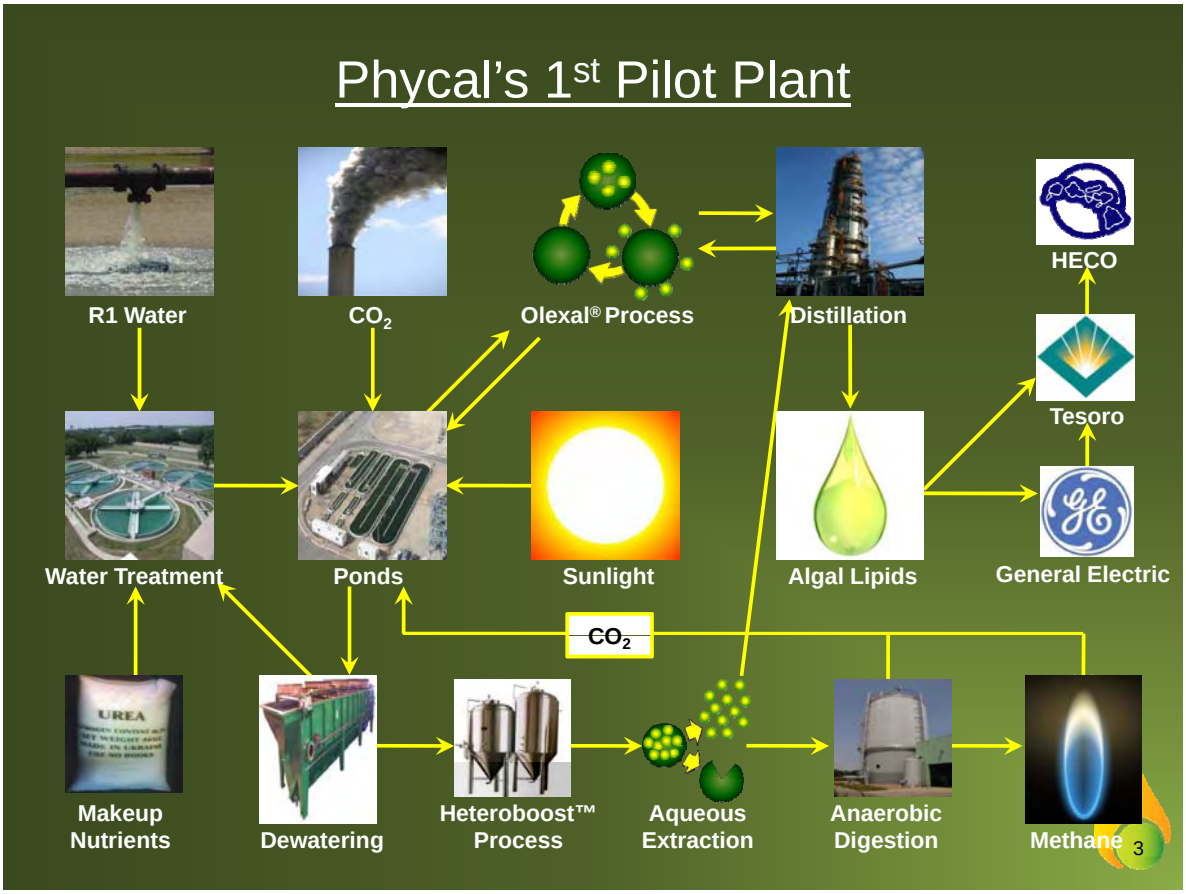
Water Recycle to Ponds	**MTY**
Water	207.1

Notes:

1. Acid can be a combination of any of the following: Hydrochloric, Phosphoric, Sulfuric,
2. Base can be a combination of any of the following: sodium hydroxide, potasium hydroxide, calicum carbonate, ammonia
3. Solvent can be one or a combination of the following: propane, butane, pentane, n-hexane (commercial grade), iso-hexane, or heptane

In addition, the above solvents could be combined with any one or combinations of methanol, ethanol, butanol

Solvent storage does not consider delivery system (i.e. tanker truck loads)



State	Item	Monthly Usage	Units	Transportation Frequency
Solids	Cationic Polymer	0.46	MT	<1 truck per month
	Hemicellulosic Sugar	120.48	MT	6 trucks per month
	Sodium Hydroxide	6.06	MT	1 truck per month
	Super Phosphate	0.64	MT	<1 truck per month
	Waste Paper	1.87	MT	<1 truck per month
	Sodium Acetate/Formate	120	Kg	<1 truck per month
Liquid Gas	Carb. Dioxide	189.85	MT	4 trucks per month
	Nitrogen	200	Kg	4 trucks per month
	Ammonium Hydroxide (30%)	3	MT	<1 truck per month
Liquids	Diesel	6	Kgal	2 trucks per month
	Propane	50	Kgal	6 trucks per month
	Urea / Nitrates	6.12	MT	<1 truck per month
	Isopar	0.29	Kgal	<1 truck per month
	Isopropyl Alcohol	0.29	Kgal	<1 truck per month
	Phosphorus source	5.17	MT	1 truck per month
Water Liquid	Potable water	20	Kgal	Pipeline
	Water	3000	Kgal (Evap + make up)	500 trucks per month

*MT – metric tons, Kgal – thousand gallons

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Appendix B

Phycal Air Emissions Calculations

Potential Emissions from Diesel Engine Generator
1230 ekW (1650 HP) Diesel Engine Generator

Parameters	Value	Unit	Source
Maximum Diesel Consumption	89.1	gallons/hour	Caterpillar Specs Sheet, see Appendix A
Operating Hours	800.0	hours/year	
Annual Diesel Max Consumption	71,280.0	gallons/year	Diesel consumption x Operating hours
Diesel No. 2 Heat Value	137,000	BTU/gal	AP42 Volume 1, 5th edition, Appendix A
Diesel No. 2 Annual Heat Capacity	9,765	MMBtu/yr	Diesel consumption x Diesel heat value

Contaminants	Emission Factor		Potential Annual Emission		Source
	Value	Unit	lb/hr	tons/yr	
NOx uncontrolled	3.69	g/hp-hr	13.42	5.37	Caterpilliar Spec Sheet
CO	0.38	g/hp-hr	1.38	0.55	
PM	0.035	g/hp-hr	0.13	0.05	
HC	0.14	g/hp-hr	0.51	0.20	
SOx(1)	0.0505	lb/MMBtu	0.62	0.25	AP-42, Table 3.4-1 (10/96)
Benzene	7.76E-04	lb/MMBtu	0.0095	0.0038	AP-42, Table 3.4-3 (10/96)
Toluene	2.81E-04	lb/MMBtu	0.0034	0.0014	
Xylenes	1.93E-04	lb/MMBtu	0.0024	0.0009	
Propylene	2.79E-03	lb/MMBtu	0.0341	0.0136	
Formaldehyde	7.89E-05	lb/MMBtu	0.0010	0.0004	
Acetaldehyde	2.52E-05	lb/MMBtu	0.0003	0.0001	
Acrolein	7.88E-06	lb/MMBtu	0.0001	0.0000	
PAHs					
Naphthalene	1.30E-04	lb/MMBtu	0.001587	0.0566	AP-42, Table 3.4-4 (10/96)
Acenaphthylene	9.23E-06	lb/MMBtu	0.000113	0.0040	
Acenaphthene	4.68E-06	lb/MMBtu	0.000057	0.0020	
Fluorene	1.28E-05	lb/MMBtu	0.000156	0.0056	
Phenanthrene	4.08E-05	lb/MMBtu	0.000498	0.0177	
Anthracene	1.23E-06	lb/MMBtu	0.000015	0.0005	
Fluoranthene	4.03E-06	lb/MMBtu	0.000049	0.0018	
Pyrene	3.71E-06	lb/MMBtu	0.000045	0.0016	
Benz(a)anthracene	6.22E-07	lb/MMBtu	0.000008	0.0003	
Chrysene	1.53E-06	lb/MMBtu	0.000019	0.0007	
Benzo(b)fluoranthene	1.11E-06	lb/MMBtu	0.000014	0.0005	
Benzo(k)fluoranthene	2.18E-07	lb/MMBtu	0.000003	0.0001	
Benzo(a)pyrene	2.57E-07	lb/MMBtu	0.000003	0.0001	
Indeno(1,2,3-cd)pyrene	4.14E-07	lb/MMBtu	0.000005	0.0002	
Dibenz(a,h)anthracene	3.46E-07	lb/MMBtu	0.000004	0.0002	
Benzo(g,h,l)perylene	5.56E-07	lb/MMBtu	0.000007	0.0002	
Total PAH	2.12E-04	lb/MMBtu	0.002588	0.0922	

Note:
(1) SOx emission factor = $1.01S_1$ (AP-42, Table 3.4-1 10/96 edition) with S_1 =0.05 for maximum of 0.05% sulfur in fuel.

Emission Calculations For 10 MMBTU/Hr Boiler

INPUT

Boiler Capacity	10,000,000 BTU/hour	
Propane Heat Content	91,500,000 BTU/10^3 gallons	AP42 Table 1.5-1 (07/08)
Propane Consumption	109.29 gallons/hour	
Operating Hrs / Year:	3744 hours/year	
Average Sulfur Content	15 gr/100 ft^3	

Pollutant	Emission Factor	Emissions		Source
	lb/10^3 gal	lb/hour	ton(1)/year	
total PM	0.7	0.08	0.14	AP42 Table 1.5-1 (07/08)
SO_2	0.10S(2)	0.0164	0.0307	AP42 Table 1.5-1 (07/08)
NOx	13	1.42	2.66	AP42 Table 1.5-1 (07/08)
N_2O	0.9	0.10	0.18	AP42 Table 1.5-1 (07/08)
CO_2	12,500	1,366	2,557	AP42 Table 1.5-1 (07/08)
CO	7.5	0.82	1.53	AP42 Table 1.5-1 (07/08)
TOC	1.0	0.11	0.20	AP42 Table 1.5-1 (07/08)
CH_4	0.2	0.02	0.04	AP42 Table 1.5-1 (07/08)

Notes
(1) ton = US ton (2000 lbs/ton)
(2) S = sulfur content in gr/100 ft^3

Sulfur concentration based on Gas Processors Association Engineering Data Book (Ninth Edition, 1972), Figure 15-50 (GPA Liquefied Petroleum Gas Specifications, rev. 1979), Commercial Propane = 15 gr/100 scf

Emission Calculations For 2 MMBTU/Hr RTO Thermal Oxidizer

INPUT			
Propane Heat Content	91,500,000 BTU/10^3 gallons		AP42 Table 1.5-1 (07/08)
Average Sulfur Content	15 gr/100 ft^3		
During Operation			
RTO Capacity	2,000,000 BTU/hour	at 1400 deg F	
Propane Consumption	21.86 gallons/hour		
Operating Hrs / Year:	7760 hours/year		
During Preheat Conditions:			
RTO Capacity	500,000 BTU/hour	at 350 deg F	
Propane Consumption	5.46 gallons/hour		
Operating Hrs / Year:	1000 hours/year		

Pollutant	Emission Factor	Emissions			Source
	lb/10^3 gal	lb/hour (operation)	lb/hour (preheat)	ton(1)/year	
total PM	0.7	0.02	0.0038	0.06	AP42 Table 1.5-1 (07/08)
SO_2	0.10S(2)	0.003279	0.000820	0.0131	AP42 Table 1.5-1 (07/08)
NOx	13	0.28	0.07	1.14	AP42 Table 1.5-1 (07/08)
NO2	0.9	0.02	0.00	0.08	AP42 Table 1.5-1 (07/08)
CO_2	12,500	273	68	1,094	AP42 Table 1.5-1 (07/08)
CO	7.5	0.16	0.04	0.66	AP42 Table 1.5-1 (07/08)
TOC	1.0	0.02	0.01	0.09	AP42 Table 1.5-1 (07/08)
CH_4	0.2	0.00	0.00	0.02	AP42 Table 1.5-1 (07/08)

Notes
(1) ton = US ton (2000 lbs/ton)
(2) S = sulfur content in gr/100 ft^3

Sulfur concentration based on Gas Processors Association Engineering Data Book (Ninth Edition, 1972), Figure 15-50 (GPA Liquefied Petroleum Gas Specifications, rev. 1979), Commercial Propane = 15 gr/100 scf

Projected solvent process losses: (captured and vented to thermal oxidizer)	86 tons/year	Destruction efficiency of thermal oxidizer:	98%
Projected solvent emissions:	1.7 tons/year		

DIESEL GENERATOR SET

CATERPILLAR®

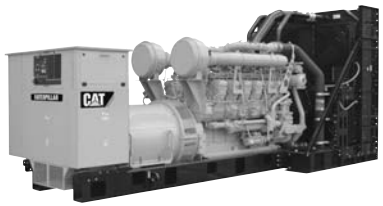

Image shown may not reflect actual package.

CONTINUOUS
1230 ekW 1538 kVA
60 Hz 1800 rpm 480 Volts

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FEATURES

FUEL/EMISSIONS STRATEGY
- EPA Tier 2

DESIGN CRITERIA
- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200
- UL 2200 listed packages available. Certain restrictions may apply. Consult with your Cat® Dealer.

FULL RANGE OF ATTACHMENTS
- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER
- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT
- Cat dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,600 dealer branch stores operating in 200 countries
- The Cat® S•O•S℠ program cost effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products

CAT 3512C DIESEL ENGINE
- Reliable, rugged, durable design
- Four-stroke-cycle diesel engine combines consistent performance and excellent fuel economy with minimum weight

CAT GENERATOR
- Designed to match the performance and output characteristics of Cat diesel engines
- Single point access to accessory connections
- UL 1446 recognized Class H insulation

CAT EMCP 3 SERIES CONTROL PANELS
- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
Air Inlet	• Single element canister type air cleaner with service indicator	[ ] Dual element & heavy duty air cleaners (with pre-cleaners) [ ] Air inlet adapters & shutoff
Cooling	• Radiator fan and fan drive • Fan and belt guards • Coolant drain line with valve • Coolant level sensors* • Caterpillar Extended Life Coolant*	[ ] Radiator removal [ ] Coolant level switch gauge [ ] Heat exchanger and expansion tank
Exhaust	• Exhaust manifold - dry - dual - 8 in • 203 mm (8 in) ID round flanged outlet	[ ] Mufflers [ ] Stainless steel exhaust flex fittings [ ] Elbows, flanges, expanders & Y adapters
Fuel	• Secondary fuel filters • Fuel cooler* • Fuel priming pump • Flexible fuel lines-shipped loose	[ ] Duplex secondary fuel filter [ ] Primary fuel filter with fuel water separator
Generator	• Class H insulation • Cat digital voltage regulator (CDVR) with KVAR/PF control, 3-phase sensing • Winding temperature detectors • Anti-condensation heaters • Reactive droop	[ ] Oversize & premium generators
Power Termination	• Bus bar (NEMA or IEC mechanical lug holes)- right side standard • Top and bottom cable entry	[ ] Circuit breakers, UL listed, 3 pole with shunt trip,100% rated, choice of trip units, manual or electrically operated (low voltage only) [ ] Circuit breakers, IEC compliant, 3 or 4 pole with shunt trip (low voltage only), choice of trip units, manual or electrically operated [ ] Shroud cover for bottom cable entry [ ] Power terminations can be located on the left and/or rear as an option. Multiple circuit breakers can be ordered (up to 2)
Governor	• ADEM™ 3	[ ] Load share module
Control Panel	• User interface panel (UIP) - rear mount • EMCP 3.1 Genset Controller • AC & DC customer wiring area (right side) • Emergency Stop Pushbutton	[ ] EMCP 3.3 [ ] Option for right or left mount UIP [ ] Option for rear or left mount Customer wiring area [ ] Local & remote annunciator modules [ ] Discrete I/O Module [ ] Generator temperature monitoring & protection
Lube	• Lubricating oil • Gear type lube oil pump • Integral lube oil cooler • Oil filter, filler and dipstick • Oil drain line and valve • Fumes disposal	[ ] Oil level regulator [ ] Deep sump oil pan [ ] Electric & air prelube pumps [ ] Manual prelube with sump pump [ ] Duplex oil filter
Mounting	• Rails - engine / generator / radiator mounting • Anti-vibration mounts (shipped loose)	[ ] Isolator removal [ ] Spring type vibration isolator
Starting/Charging	• 24 volt starting motor(s) • Batteries with rack and cables • Battery disconnect switch	[ ] Battery chargers (10 &20 Amp) [ ] 45 amp charging alternator [ ] Oversize batteries [ ] Ether starting aids [ ] Heavy duty starting motors [ ] Barring device (manual) [ ] Air starting motor with control & silencer
Note	Standard and optional equipment may vary for UL 2200 Listed Packages. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics.	*Not included with packages without radiator

SPECIFICATIONS

CAT GENERATOR

SR4B Generator
Frame Size.....697
Excitation.....Permanent Magnet
Pitch.....0.7333
Number of poles.....4
Number of bearings..... Single Bearing
Number of Leads..... 6
Insulation..... UL 1446 Recognized Class H with tropicalization and antiabrasion
IP Rating.....Drip Proof IP22
Alignment.....Pilot Shaft
Overspeed capability- % of rated..... 150
Wave form.....003.00
Paralleling kit/Droop transformer.....Standard
Voltage Regulator3 Phase sensing with selectible volts/Hz
Telephone influence factor.....Less than 50

CAT DIESEL ENGINE

3512C ATAAC, V-12, 4 stroke, water-cooled diesel
Bore..... 170.00 mm (6.69 in)
Stroke..... 190.00 mm (7.48 in)
Displacement.....51.80 L (3161.03 in^3)
Compression Ratio..... 14.7:1
Aspiration.....TA
Fuel System..... Electronic unit injection
Governor Type..... ADEM3

CAT EMCP SERIES CONTROLS

- EMCP 3.1 (Standard)
- EMCP 3.2 / EMCP 3.3 (Option)
- Single location customer connector point
- True RMS AC metering, 3-phase
- Controls
  - Run / Auto / Stop control
  - Speed Adjust
  - Voltage Adjust
  - Emergency Stop Pushbutton
  - Engine cycle crank
- Digital Indication for:
  - RPM
  - Operating hours
  - Oil pressure
  - Coolant temperature
  - System DC volts
  - L-L volts, L-N volts, phase amps, Hz
  - ekW, kVA, kVAR, kW-hr, %kW, PF (EMCP 3.2 / 3.3)
- Shutdowns with common indicating light for:
  - Low oil pressure
  - High coolant temperature
  - Low coolant level
  - Overspeed
  - Emergency stop
  - Failure to start (overcrank)
- Programmable protective relaying functions: (EMCP 3.2 & 3.3)
  - Under and over voltage
  - Under and over frequency
  - Overcurrent (time and inverse time)
  - Reverse power (EMCP 3.3)
- MODBUS isolated data link, RS-485 half-duplex (EMCP 3.2 & 3.3)
- Options
  - Vandal door
  - Local annunciator module
  - Remote annunciator module
  - Input / Output module
  - RTD / Thermocouple modules
  - Monitoring software

TECHNICAL DATA

Open Generator Set - - 1800 rpm/60 Hz/480 Volts	DM8262	
EPA Tier 2		
Generator Set Package Performance		
Genset Power rating @ 0.8 pf	1537.5 kVA	
Genset Power rating with fan	1230 ekW	
Coolant to aftercooler		
Coolant to aftercooler temp max	46 ° C	115 ° F
Fuel Consumption		
100% load with fan	337.3 L/hr	89.1 Gal/hr
75% load with fan	262.5 L/hr	69.3 Gal/hr
50% load with fan	185.0 L/hr	48.9 Gal/hr
Cooling System[1]		
Air flow restriction (system)	0.12 kPa	0.48 in. water
Air flow (max @ rated speed for radiator arrangement)	2075 m^3/min	73278 cfm
Engine Coolant capacity with radiator/exp. tank	390.8 L	103.2 gal
Engine coolant capacity	156.8 L	41.4 gal
Radiator coolant capacity	234.0 L	61.8 gal
Inlet Air		
Combustion air inlet flow rate	120.2 m^3/min	4244.8 cfm
Exhaust System		
Exhaust stack gas temperature	379.4 ° C	714.9 ° F
Exhaust gas flow rate	278.8 m^3/min	9845.7 cfm
Exhaust flange size (internal diameter)	203.2 mm	8.0 in
Exhaust system backpressure (maximum allowable)	6.7 kPa	26.9 in. water
Heat Rejection		
Heat rejection to coolant (total)	550 kW	31278 Btu/min
Heat rejection to exhaust (total)	1133 kW	64434 Btu/min
Heat rejection to aftercooler	409 kW	23260 Btu/min
Heat rejection to atmosphere from engine	113 kW	6426 Btu/min
Heat rejection to atmosphere from generator	52.6 kW	2991.4 Btu/min
Alternator[2]		
Motor starting capability @ 30% voltage dip	2670 skVA	
Frame	697	
Temperature Rise	105 ° C	189 ° F
Lube System		
Sump refill with filter	310.4 L	82.0 gal
Emissions (Nominal)[3]		
NOx g/hp-hr	3.69 g/hp-hr	
CO g/hp-hr	.38 g/hp-hr	
HC g/hp-hr	.14 g/hp-hr	
PM g/hp-hr	.035 g/hp-hr	

[1] For ambient and altitude capabilities consult your Caterpillar dealer. Air flow restriction (system) is added to existing restriction from factory.
[2] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40 degree C ambient per NEMA MG1-32.
[3] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

RATING DEFINITIONS AND CONDITIONS

Meets or Exceeds International Specifications: AS1359, CSA, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33, UL508A, 72/23/EEC, 98/37/EC, 2004/108/EC
Continuous - Output available with non-varying load for an unlimited time. Average power output is 70-100% of the continuous power rating. Typical peak demand is 100% of continuous rated ekW for 100% of operating hours. Continuous power in accordance with ISO3046. Continuous ambients shown indicate ambient temperature at 100% load which results in a coolant top tank temperature below the alarm temperature.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.
Fuel rates are based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Caterpillar dealer.

CONTINUOUS 1230 ekW 1538 kVA

60 Hz 1800 rpm 480 Volts

CATERPILLAR®

DIMENSIONS

Package Dimensions		
Length	**5895.0 mm**	**232.09 in**
Width	**2537.5 mm**	**99.9 in**
Height	**2749.5 mm**	**108.25 in**
Weight	**14 035 kg**	**30,942 lb**

NOTE: For reference only - do not use for installation design. Please contact your local dealer for exact weight and dimensions. (General Dimension Drawing #2846048).

Performance No.: DM8262

Feature Code: 512DE6C

Gen. Arr. Number: 2628100

Source: U.S. Sourced

February 22 2010 16022367

www.CAT-ElectricPower.com

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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Appendix C

GE Air Emissions Calculations and Process Information

Potential Emissions from GE Upgrading Unit
Source: GE spreadsheet (May 2010)

INPUT

Max Flow Rate	4.75	lb/hr	3470	lb/month
Hours of Operation	8760	hrs/yr		

Parameter	Moles	lb/hr	lbs/day	lbs/mo	Tons/Yr
Carbon Dioxide	2.16	10.27	246.6	7500	45.00
Carbon Monoxide	0.05	0.24	5.7	174	1.04
Nitrogen	0.15	0.73	17.4	530	3.18
Sulfer Dioxide	0.03	0.15	3.6	110	0.66
Water Vapor	5.73	27.23	653.6	19880	119.28
Hydrogen Sulfide	0.01	0.05	1.1	35	0.21

Notes:

Criteria Pollutants included above are Carbon Monoxide and Sulfer Dioxide.
Hazardous Air Pollutant included above is Hydrogen Sulfide.

Monthly Input/Outputs Tesoro Site

Reactants = Inputs

Component	Quantity	Unit	Storage	Storage size	Transportation	Transportation Freq.
Oil	13,700	lbs	Drum	55 gal	Truck	2/month
Hydrogen	1,900	lbs	None	None	Pipeline	On-Line
Sulfur	30	lbs	Drum	55 gal	Truck	1/month
Nitrogen	530	lbs	Canister	1K Tank	Truck	4/month

Products = Outputs

Component	Quantity	Unit	Storage	Storage size	Transportation	Transportation Freq.
Fuel*	11,700	lbs	Drum	55 gal	Truck	2/month
Gas**	3,470	lbs	None	None	Flare	Vent
Water	990	lbs	Drum	55 gal	Truck	3/month

***Fuel Produced**

Products	Quantity	Units	Storage	Storage size	Transportation	Transportation Freq.
Naptha	3,900	lbs	Drum	55 gal	Truck	8/month
Diesel	3,900	lbs	Drum	55 gal	Truck	8/month
Jet	3,900	lbs	Drum	55 gal	Truck	8/month

****Gases Emitted (After Combustion Flare)**

Gas	Quantity	Unit	Storage	Storage size	Transportation	Transportation Freq.
Water Vapor	19,880	lbs	NA	NA	Flare	NA
Carbon dioxide	7,500	lbs	NA	NA	Flare	NA
Nitrogen	530	lbs	NA	NA	Flare	NA
Sulfur Dioxide	110	lbs	NA	NA	Flare	NA

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Appendix D

Applicable Hazardous Materials Regulations Summary for Phycal

Table D-1

Hazardous Materials Evaluation

Phycal Algae Production Pilot Project

	Applicable Regulations				
Regulated Area	State or Local	Federal	Requirements	Applicability	Comments
Hazardous Waste Generation /Disposal	HAR Title 11, Chapter 261	RCRA; 40 CFR 261	Facility owner must characterize each waste stream based on Generator Knowledge and/or Sampling and Analysis for potential hazardous constituents.	One-time determination required for solid waste streams such as digester sludge and wastewater evaporated salts.	Allow 14 days for analytical results and 60 days for non-hazardous waste disposal profile approval from Waste Management, Inc.
Community Right-to-Know/Hazardous Materials Release Reporting	HEPCRA; HAR Title 11, Chapter 451	EPCRA; 42 USC 116	Must report hazardous chemicals where amount of chemical stored exceeds threshold quantities.	Ammonium Hydroxide (30%), Isopar H and Isopropyl Alcohol; Threshold quantity: 10,000 pounds	First Annual report due to DOH HEER by March 30 of year following facility start-up.
Hazardous Materials Release Response	HAR Title 11, Chapter 451	CERCLA; 42 USC 103	Regulates reporting, investigation, and clean-up of hazardous chemical releases exceeding threshold quantities.	Ammonium Hydroxide: CERCLA TPQ= 1,000 pounds (Source:40 CFR 302 Table 302.4); ISOPAR H - 25 gal in HI	Ammonium Hydroxide SARA 302 - NR SARA 313 - NR SARA 311, 312 - Acute Toxicity
Hazardous Chemical Storage and Handling	See Storm water and SPCC (below)	N/A	Industry best practices (NFPA, ASTM, API) provide guidance for tank standards and secondary containment requirements.	Required if SWPCP is required; otherwise recommended best practice.	Secondary Containment: 110% of aggregate storage volume or 150% of largest single container. Containment able to resist migration for minimum of 72 hours. Piping in concrete raceway or trenches sloping to detection sump
Stormwater Pollution Control Plan	HAR Title 11, Chapter 55	SWPCP	Regulated facilities must store hazardous chemicals under roof and within Secondary Containment	Regulated based on NAIC code for facility. SWPCP required prior to commencement of operations.	Allow 3 months for preparation of SWPCP.
Petroleum and Oil Storage	DOH CWB	SPCC; 40 CFR 112	Spill Prevention Contingency and Countermeasures Plan required for facilities storing more than 1320 gallons of petroleum and potential for a release to affect navigable waters.	SPCC plan required for diesel storage for generator. After November 2010, SPCC Plan must be written prior to facility start-up.	Allow 3 months for preparation of SPCC.
Liquified Petroleum Gas (LPG) Above-Ground Storage	Honolulu Fire Department; Ordinance Chapter 20	40 CFR 112; 1997 Unified Fire Code	Permit required prior to construction of LPG AST. 50 foot setback from buildings and property line boundaries.	Permit required for estimated 6,000 gallons of propane storage.	Gas Company typically obtains required permits. 3 months or less typical.
Flammable /Combustible Aboveground Storage Tank (AST)	Honolulu Fire Department; Ordinance Chapter 20	40 CFR 112; 1997 Unified Fire Code	Permit required prior to construction of flammable/combustible liquid storage AST	Permits for storage tanks for Hexane, Isopar H and Isopropyl Alcohol;	

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Appendix E

Applicable Hazardous Materials Regulations Summary for GE

Table E-1
Hazardous Materials Evaluation
GE Upgrading Unit

	Applicable Regulations				
Regulated Area	State or Local	Federal	Requirements	Applicability	Comments
Hazardous Waste Generation /Disposal	HAR Title 11, Chapter 261	RCRA; 40 CFR 261	Facility owner must characterize each waste stream based on Generator Knowledge and/or Sampling and Analysis for potential hazardous constituents.	One-time determination required for solid waste streams such as off-specification product, sulfer or process wastewater.	Allow 14 days for analytical results and 60 days for non-hazardous waste disposal profile approval from Waste Management, Inc.
Community Right-to-Know/Hazardous Materials Release Reporting	HEPCRA; HAR Title 11, Chapter 451	EPCRA; 42 USC 116	Must report hazardous chemicals where amount of chemical stored exceeds threshold quantities.	Hydrogen gas; solid sulfur; Threshold quantity: 10,000 pounds	First Annual report due to DOH HEER by March 30 of year following facility start-up.
Hazardous Materials Release Response	HAR Title 11, Chapter 451	CERCLA; 42 USC 103	Regulates reporting, investigation, and clean-up of hazardous chemical releases exceeding threshold quantities.	CERCLA TPQs (Source:40 CFR 302 Table 302.4);	
Hazardous Chemical Storage and Handling	See SWPCP	N/A	Industry best practices (NFPA, ASTM, API) provide guidance for tank standards and secondary containment requirements.	Required if SWPCP is required; otherwise recommended best practice.	
Stormwater Pollution Control Plan	HAR Title 11, Chapter 55	SWPCP	Regulated facilities must store hazardous chemicals under roof and within Secondary Containment	Regulated based on NAIC code for facility. SWPCP required prior to commencement of operations.	Allow 3 months for preparation of SWPCP.
Petroleum and Oil Storage	DOH CWB	SPCC; 40 CFR 112	Spill Prevention Contingency and Countermeasures Plan required for facilities storing more than 1320 gallons of petroleum and potential for a release to affect navigable waters.	SPCC plan required for drum storage of algal oil, naptha, diesel, and jet fuel. After November 2010, SPCC Plan must be written prior to facility start-up.	Allow 3 months for preparation of SPCC.
Flammable /Combustible Aboveground Storage Tank (AST)	Honolulu Fire Department; Ordinance Chapter 20	40 CFR 112; 1997 Unified Fire Code	Permit required prior to construction of flammable/combustible liquid storage AST	Permits for fixed storage tanks for algal oil, naptha, diesel or jet fuel; Not required for drum storage area.	

APPENDIX D BIOLOGICAL SURVEY (AECOS, INC.)

Biological survey for a proposed aquaculture facility in central O'ahu[1]

April 27, 2010 *AECOS* Consultants No. AC095

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Introduction

The Phycal LLC Algae Project is an aquaculture project proposed for a 34.117 ac (ha) site located north of Wahiawa in central O'ahu (Fig. 1). The property (TMK: (1) 7-1-001: 011, 030, and 031) is former pineapple land zoned AG-1 (Restricted Agriculture District), bounded by Kamananui Road and Kamehameha Highway on the east and Kaukonahua Road on the south. The project will be a pilot algal production and processing facility, with shallow ponds for growth of algae, a processing building for extraction of oil, an anaerobic digester for conversion of biomass to methane gas, and water treatment capability. A processing site will also be required close to a source of industrial gases for final processing of the biofuel. A site on a lot (TMK: (1) 9-1-032: 084) owned by Tesoro Petroleum in Campbell Industrial Park has been selected for this aspect of the project. Operations are scheduled to commence in 2010.

This document presents the results of vertebrate and botanical surveys conducted on January 6, 2010 of the Wahiawa project property. A botanical survey was undertaken for the Tesoro parcel on April 13, 2010. The primary purpose of the surveys was to determine if there were any botanical, avian or mammalian species currently listed as endangered, threatened, or proposed for listing under either the federal or state endangered species programs on, or

[1] Prepared for Group 70, Honolulu, Hawai`i for use in permitting for the Phycal LLC Project. This document will become part of the public record.
[2] Rana Biological Consultants, Inc.

within the immediate vicinity of the proposed project. Federal and State of Hawai'i listed species status follows species identified in the following referenced documents: Department of Land and Natural Resources (DLNR, 1998) and U. S. Fish & Wildlife Service (USFWS, 2005, 2010).

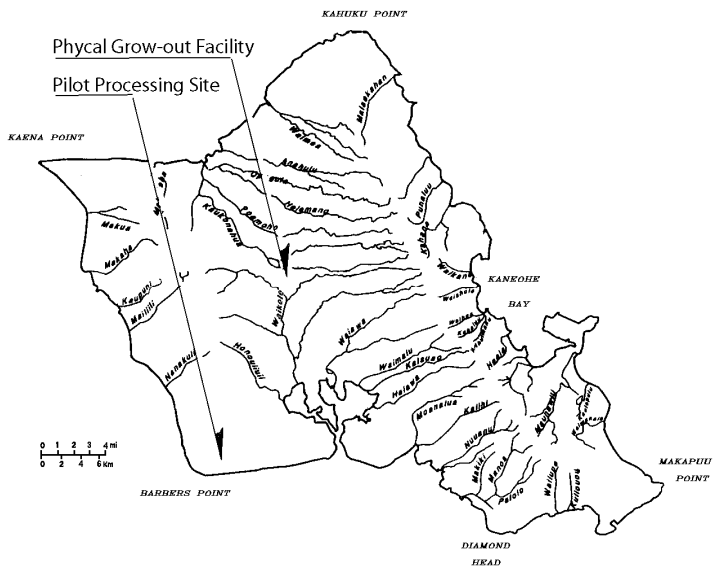

Figure 1. Location map of project facilities on the Island of O'ahu.

Survey Methods

A pedestrian botanical survey was conducted on January 6, 2010 with the botanist noting the occurrence and relative abundance of all species of plants encountered during a wandering "transect." This survey was conducted following a moderately wet period on central O'ahu. Consequently, the plants

encountered were growing well, with sufficient live growth and flowers to identify in most cases. A separate botanical reconnaissance was made on lot TMK: (1) 9-1-032: 084 in Campbell Industrial Park on April 23, 2010. Because placement of the Phycal Pilot Facility on the lot has yet to be determined, the entire ~5 ac vacant area of the parcel (within a fenced perimeter) was surveyed. Although conducted near the end of a rather dry "wet season," conditions were deemed satisfactory given the nature of the property being surveyed.

A one-time survey cannot expect to encounter every plant species growing on a subject property or survey area, some of which may have distinctly seasonal growth patterns. These surveys were undertaken at time that should produce the greatest abundance and diversity of species at the survey locations.

An avian survey at the main site (Wahiawa) involved five count stations sited roughly equidistant from each other within the project boundaries. Eight-minute point counts were made at each of the five count stations. Each station was counted once. Field observations were made with the aid of Leica 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated during early morning hours, the peak of daily bird activity. Additionally, the zoologist walked the site in a similar fashion as the botanist, to ensure that no additional bird species or habitats not encountered during the time dependant avian counts were present on the site. The Tesoro site was deemed lacking in habitat resources to support other than common, introduced urban bird species.

Observations of mammalian species were of an incidental nature. With the exception of the endangered Hawaiian hoary bat (*'ōpe'ape'a* or *Lasiurus cinereus semotus*), all terrestrial mammals currently found on the Island of O'ahu are alien species, and most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species seen or heard while the biologists were within the project areas.

For this report, flowering plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner et al., 1990, 1999). Ornamental plant names follow *A Tropical Garden Flora: Plants Cultivated in the Hawaiian Islands and Other Tropical Places* (Staples and Herbst, 2005). Avian phylogenetic order and nomenclature follows *The American Ornithologists' Union Check-list of North American Birds 7th Edition* (American Ornithologists' Union, 1998), and the 42nd through the 50th supplements to *Check-list of North American Birds* (American Ornithologists' Union 2000; Banks et al. 2002, 2003, 2004, 2005, 2006, 2007, 2008, Chesser et

al., 2009). Mammal scientific names follow *Mammals in Hawaii* (Tomich, 1986). Place names follow *Place Names of Hawaii* (Pukui et al., 1974). Hawaiian place names and species names are italicized in the text.

Vegetation

The project property north of Wahiawa is an abandoned pineapple field. Weedy growth now dominates the parcel (Fig. 2), but evidence of the former agricultural use is present in the farm access roads and planting rows, as well as occasional groupings of commercial pineapple plants still growing in the field. A majority of the site is covered by grasses, with several other herbaceous plants present and mixed with the grasses. Tall Guinea grass (*Urochloa maxima*) occurs in patches and especially around the margins bordering the paved highways and along the unpaved farm roads, giving the impression frfom off the property that the land is more or less impenetrable. However, most of the ground previously occupied by pineapple is a mixture of sourgrass (*Digiteria insularis*) and beggars tick (*Bidens* spp.), growth of which tend to be under 0.6 m high. In addition, shrubs and small trees are scattered over the parcel. The majority of these are *pua nana honua* (*Solanum mauritianum*) and dog tail (*Buddleia asiatica*).

The northern end of the Tesoro parcel was completely developed as a bioremediation facility until 1998. This facility was removed and the site completely cleaned of structures and debris. Thus, the site is now a graded level lot with the vegetation slowly returning. Presently, this vegetation is mostly open scrub and grassland with a few scattered small trees, mostly *kiawe* (*Prosopis pallida*; Fig. 3). The grass is mostly buffel grass (*Cenchrus ciliaris*), but low-growing (spreading), ruderal herbs are nearly as common as grass across the lot.

Flora

Wahiawa Site — A plant checklist was compiled from the field observations (Table 1), with entries (plants observed during the survey) arranged alphabetically under family names. Included in the list are scientific name, common name, and status (whether native or non-native) of each species. In addition to identifying the plants present within the study site, qualitative estimates of plant abundance were made. These estimates are coded in the table

Figure 2. Former agriculture land now supporting weedy herbs (mostly sourgrass and beggartick) and shrubs on Phycal site near Wahiawa.

Figure 3. View of grass and shrub vegetation on Tesoro lot looking to the southwest from near middle of parcel.

Table 1. Floral listing for the Phycal Site near Wahiawa in Central Oahu.

Species listed by family	Common name	Status	Occurrence	Notes
Ferns				
NEPHROLEPIDACEAE				
Nephrolepis multiflora (Roxb.) F. M. Jarrett ex C.V. Morton	swordfern	Nat	U2	
Flowering Plants				
DICOTYLEDONES				
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	O3	<2>
ANACARDIACEAE				
Schinus terebinthefolius Raddi	Christmas berry	Nat	O	
indet. tree	---	Orn?	R	<3>
ARALIACEAE				
Schefflera actinophylla (Endl.) Harms	octopus tree	Nat	R	
ASTERACEAE (COMPOSITAE)				
Bidens alba (L.) DC	---	Nat	AA	
Calyptocarpus vialis Less.	---	Nat	U	<1>
Conyza sp.	horseweed	Nat	O	
Sonchus oleraceus L.	sow thistle	Nat	R	<2>
BIGNONIACEAE				
Spathodea campanulata P. Beauv.	African-tulip tree	Nat	O	
BUDDLEIACEAE				
Buddleia asiatica Lour.	dog tail	Nat	C	
BRASSICACEAE				
Lepidium virginicum L.	pepperwort	Nat	R1	<1>
Raphanus sativus L.	wild radish	Nat	R	<2>
CONVOLVULACEAE				
Ipomoea obscura (L.) Ker-Gawl.	---	Nat	C2	
FABACEAE				
Falcataria moluccana (Miq.) Barneby & Grimes	albizia	Nat	U	
Indigofera suffruticosa Mill.	indigo	Nat	U	<2>
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat	U	
Macroptilium atropurpureum (DC) Urb.	---	Nat	R	
Melilotis indica (L.) All.	yellow sweet clover	Nat	R	<1>

Table 1 (continued).

Species listed by family	Common name	Status	Occurrence	Notes
MALVACEAE				
Sida spinosa L.	prickly sida	Nat	R	<2>
MELASTOMATACEAE				
Clidemia hirta (L.) D. Don	Koster's curse	Nat	R	
MORACEAE				
Ficus microcarpa L. fil.	Chinese banyan	Nat	R	
MYRTACEAE				
Psidium guajava L.	common guava	Nat	R	
NYCTAGINACEAE				
Boerhavia coccinea Mill.	false *alena*	Nat	R1	<1>
PLANTAGINACEAE				
Plantago lanceolata L.	nrw-lvd. plantain	Nat	A	<2>
PORTULACACEAE				
Portulaca oleracea L.	pigweed	Nat	R	<2>
PROTEACEAE				
Grevillea robusta A. Cunn. Ex R. Br.	silk oak	Nat	R	
SOLANACEAE				
Solanum mauritianum Scop.	*pua nana honua*	Nat	C	
STERCULIACEAE				
Waltheria indica L.	*'uhaloa*	**Ind**	U2	<2>
ULMACEAE				
Trema orientalis (L.) Blume	gunpowder tree	Nat	R	
VERBENACEAE				
Lantana camara L.	lantana	Nat	R	
Verbena litoralis Kunth	*owi*	Nat	R	<2>
MONOCOTYLEDONES				
BROMELIACEAE				
Anas comosus (L.) Merr.	pineapple	Orn	O2	
POACEAE				
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	Nat	A	<1>
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	U	<2>
Chloris virgata Sw.	feather fingergrass	Nat	R	<2>
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	U1	
Digitaria insularis (L.) Mez ex Ekman	sourgrass	Nat	AA	
Eleusine indica (L.) Gaertn.	wiregrass	Nat	O	<1>
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	A	<1>

Table 1 (continued)

Species listed by family	Common name	Status	Occurrence	Notes
POACEAE (cont.)				
Melinus repens (Willd.) Zizka	Natal redtop	Nat	O2	
Paspalum dilatatum Poir.	Dallis grass	Nat	U	<1>
Sporobolus cf. *indicus* (L.) R. Br.	West Indian dropseed	Nat	A	<1>
Stenotaphrum secundatum (Walter) Kuntze	St. Augustine grass	Nat	R1	<2>
Urochloa maxima (Jacq.) Webster	Guinea grass	Nat	AA	

Legend to Table 1

STATUS = distributional status for the Hawaiian Islands:
ind. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

OCCURRENCE = abundance ratings for plants in survey area:
-- - With note <1> or <2> indicates a plant not seen in 2009 survey.
R – Rare — seen in only one or perhaps two locations.
U - Uncommon- — seen at most in several locations
O - Occasional — seen with some regularity
C - Common — observed numerous times during the survey
A - Abundant — found in large numbers; may be locally dominant.
AA - Very abundant — abundant and dominant; defining vegetation type.
Numbers following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this where abundance, where encountered, tends to be greater than the occurrence rating:
1 – several plants present
2 - many plants present
3 – locally abundant

NOTES: <1> – A species associated almost exclusively with the highway verge.
<2> - A species associated with margins of agricultural access roads and highway verge.
<3> – Plant(s) lacking fruit or flower and identification therefore uncertain.

as explained in the legend at the end and apply to observations from the present survey. In all, 43 species of flowering plants and 1 fern were recorded from the Phycal Wahiawa site survey (Table 1). Of this number, only 1 species (2%) is a plant native to Hawai'i. The indigenous *'uhaloa* (*Waltheria indica*) is a very common plant in the Islands, often associated with disturbed sites.

A somewhat unusual plant observed is a small tree that closely resembles our native *neleau* (*Rhus sandwicensis*), a small tree with a proclivity for appearing in recently disturbed ground. The nearest population of *neleau* is probably in Moanalua Valley (Wagner et al., 1999). However, despite the basic resemblance, the leaves and bark in the tree on the project property are subtly different from those of *neleau*: the leaflets are more numerous (over a dozen pairs instead of up to 6), the leaflets have smooth margins instead of being serrate to crenate, and the bark is multicolored with a predominance of red.

The specimen here had no flowers or fruit and could not be identified with any of the ornamental species described in Staples and Herbst (2005).

No plant species currently listed, or proposed for listing under either the federal or State of Hawai'i endangered species statutes was detected during the course of this survey, and none would be anticipated given the nature of the vegetation.

Tesoro Site — A total of 28 plant species were recorded in the survey of the empty lot adjacent to the Tesoro Refinery in Campbell Industrial Park (Table 2). These are mostly weedy species reflecting the relatively recent disturbance of the site.

Table 2. Flora listing for the Tesoro Site, Campbell Industrial Park, O'ahu, Hawai'i

Species listed by family	Common name	Status	Abundance	Notes
FLOWERING PLANTS				
DICOTYLEDONES				
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	U	
AIZOACEAE				
Sesuvium portulacastrum (L.) L.	*'ākulikuli*	Nat	R	
APOCYNACEAE				
Nerium oleander L.	oleander	Orn	U	
ANACARDIACEAE				
Schinus terebinthifolius Raddi	Christmas berry	Nat	U	
ASTERACEAE (COMPOSITAE)				
Lactuca serriola L.	prickly lettuce	Nat	R	<2>
Pluchia carolinensis (Jacq.) G. Don	sourbush	Nat	A	
Pluchea indica (L.) Less.	Indian fleabane	Nat	O	
Pluchea x *fosbergii* Cooperr. & Galang	---	Nat	O	
Verbesina encelioides (Cav.) Benth.	golden crownbeard	Nat	R	
BORAGINACEAE				
Cordia sebestena L.	Geiger tree	**Pol**	R	
Heliotropium currasavicum L.	*kīpūkai*	**Ind**	C	
Heliotropium procumbens Mill.	---	Nat	U	
CHENOPODIACEAE				
Atriplex semibaccata R. Br.	Australian saltbush	Nat	C	
Atriplex muelleri Verdoorn	---	Nat	U	<1>

Table 2 (continued).

Species listed by family	Common name	Status	Abundance	Notes
CONVOLVULACEAE				
Ipomoea cairica (L.) Sweet	*koali 'ai*	**Ind**	U	
Ipomoea obscura (L.) Ker-Gawl.	field bindweed	Nat	U	
EUPHORBIACEAE				
Ricinus communis L.	castor bean	Nat	R	
FABACEAE				
Acacia farnesiana (L.) Willd.	*klu*	Nat	O	
Desmanthus pernambucanus (L.) Thellung	virgate mimosa	Nat	O	
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat	A	
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	*kiawe*	Nat	C	
MALVACEAE				
Sida ciliaris L.	---	Nat	O	
Sida fallax Walp.	*'ilima*	**Ind**	O	
PASSIFLORACEAE				
Passiflora foetida L.	love-in-a-mist	Nat	C	
SOLANACEAE				
Nicotiana glauca R.C. Graham	tree tobacco	Nat	U2	
STERCULIACEAE				
Waltheria indica L.	*'uhaloa*	Nat	C	
MONOCOTYLEDONES				
POACEAE				
Cenchrus ciliaris L.	buffelgrass	Nat	AA	
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	U	

Legend to Table 2

STATUS and ABUNDANCE as given in Table 1.

NOTES: <1> - Identified as such from collected specimen in AECOS (2010).
<2> – Plant lacking key diagnostic characteristics (flower, fruit).

A plant survey of the Tesoro lot was deemed desirable because rare native plant species have been reported from sites nearby (Char and Balakrishnan, 1979; TNC, 1996; *AECOS*, 1997; David & Guinther, 2005); and most recently a small population of *maiapilo* (*Capparis sandwichiana*) was reconfirmed by Guinther in a lot directly adjacent to the east (*AECOS*, 2010). None of the native plants of potential concern were found on the lot during the April survey and none is

likely given the conditions on the property (graded and in industrial use up until 1998). If the 28 species identified on the lot, three are native (all indigenous; no endemics) or 10.7%. This tally can be compared with the results of the survey on the much larger (and less disturbed) adjacent lot with 11.4% native of 78 species of flowering plants identified (*AECOS*, 2010).

The only plant observed of any interest is the tree tobacco (*Nicotiana glauca*). A total of 18 individual plants were counted on the lot, most located close to the margins (3 to 4 m in from the security fence). This plant is an introduced species and of no real concern by itself. However, it is a known food source for the caterpillar (larva) of the endangered Blackburn's Sphinx moth (*Manduca blackburni*). The moth is thought to be extinct on O'ahu (USFWS, 2003; DLNR, 2005), but host plants should be checked for caterpillars (as all the tree tobacco plants were during the April 26 survey).

Avian Fauna

A total of 334 individual birds of 15 different species, representing separate 12 families, were recorded during station counts (Table 3). One avian species detected, Pacific-Golden Plover (*Pluvialis fulva*), is an indigenous migratory shorebird. The remaining 14 species recorded are considered to be alien to the Hawaiian Islands. No avian species currently listed, or proposed for listing under either the federal or State of Hawai'i endangered species statutes was detected during the course of this survey.

Avian diversity and densities were in keeping with the habitat present within the project site. Two species: Common Waxbill (*Estrilda astrild*) and Chestnut Munia (*Lonchura atricapilla*), accounted for slightly more than 56% of the total number of birds recorded during station counts. The most frequently recorded species was Common Waxbill, which accounted for 29% of the total number of birds recorded during station counts. An average of 67 individual birds was recorded per station count.

Mammalian Fauna

Only one mammalian species was detected during the course of the time spent on the Wahiawa project site. Several dogs (*Canis f. familiaris*) were heard barking from the housing development located to the north of the project site, and dog tracks and scat were seen at several locations within the site. No mammalian species currently listed, or proposed for listing under either the

federal or State of Hawai'i endangered species statutes was detected during the course of the surveys.

Table 3. Avian Species detected during station counts on the Phycal Farm Site

Common Name	Scientific Name	ST	RA
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	Phasianinae - Pheasants & Allies		
Red Junglefowl	*Gallus gallus*	D	0.60
	CICONIIFORMES		
	ARDEIDAE - Herons, Bitterns & Allies		
Cattle Egret	*Bubulcus ibis*	A	0.80
	CHARADRIIFORMES		
	CHARADRIIDAE - Lapwings & Plovers		
	Charadriinae - Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	0.60
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Spotted Dove	*Streptopelia chinensis*	A	0.60
Zebra Dove	*Geopelia striata*	A	7.40
	PASSERIFORMES		
	PYCNONOTIDAE - Bulbuls		
Red-vented Bulbul	*Pycnonotus cafer*	A	4.60
	SYLVIIDAE - Old World Warblers & Gnatcatchers		
	Sylviinae - Old World Warblers		
Japanese Bush-Warbler	*Cettia diphone*	A	0.40
	ZOSTEROPIDAE - White-eyes		
Japanese White-eye	*Zosterops japonicus*	A	4.80
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*	A	2.00
	EMBERIZIDAE - Emberizids		
Red-crested Cardinal	*Paroaria coronata*	A	1.20
	CARDINALIDAE - Cardinals Saltators & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	1.20

Table 3 (continued).

Common Name	Scientific Name	ST	RA
	FRINGILLIDAE - Fringilline and Carduleline Finches & Allies		
	Carduelinae - Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	3.80
	ESTRILDIDAE - Estrildid Finches		
	Estrildinae - Estrildine Finches		
Common Waxbill	*Estrilda astrild*	A	19.40
Red Avadavat	*Amandava amandava*	A	1.20
Chestnut Munia	*Lonchura atricapilla*	A	18.20

Key to Table 3

ST	Status
D	Domesticated – Not considered to be established in the wild on the island of O'ahu
A	Alien – Introduced to the Hawaiian Islands by humans
IM	Indigenous Migratory – Native migratory species, non-breeding in Hawai'i
RA	Relative Abundance –Number of birds detected divided by the number of count stations (15)

Discussion

The vegetation at the proposed Phycal Wahiawa site is entirely one of early succession from a previously used and maintained agricultural field and no areas that were not previously completely cleared of natural vegetation are evident anywhere on the parcel. The Tesora lot has a similar history of complete use (in this case, light industrial).

All but one of the 15 avian species detected during the course of the survey are considered to be alien to the Hawaiian Islands. The lone native species detected, Pacific-Golden Plover, is an indigenous migratory species, which nests in the high Arctic during the late spring and summer months, returning to wintering grounds in Hawai'i, Japan, Okinawa, Polynesia, Micronesia, Melanesia, New Zealand, Australia, Indonesia, Philippines, southern China, southeast Asia, Bangladesh, Nepal, India, Sri Lanka, Pakistan, Iran, Bahrain, and northeast and southern Africa (Johnson and Conners, 1996). Wintering Pacific-Golden Plover usually leave Hawai'i for the trip back to the Arctic in late April or the very early

part of May, and return to the wintering grounds in early August. Some individuals overwinter in Hawai'i and thus are present all year.

One species, Red Junglefowl (*Gallus gallus*), is currently not considered to be established in the wild on the Island of O'ahu; thus the three birds that we recorded during station counts were probably domesticated chickens or fighting cocks present on properties located to the north of the project site. Avian diversity was relatively low, though in keeping with the location of the site, and the vegetation present on the property. Densities of *estrildid* finches were high, but in keeping with the rank seeding grass present on the property.

Although not detected during this survey, it is likely that the Hawaiian endemic sub-species of the Short-eared Owl *(Asio flammeus sandwichensis*) or *pueo* uses resources within the general project area on occasion. Currently there is no habitat suitable for nesting or foraging on the property. This species is regularly seen along the Wai'anae coast from the Lualualei Naval Reservation to Waimānalo Gulch (Guinther and David, 2000, 2002). The O'ahu population of the Short-eared Owl is listed as an endangered species under the state endangered species program, though it is not protected under the federal endangered species statutes (DLNR, 1998; USFWS, 2010).

Depending on how the aquaculture facility is laid out, and whether open ponds, raceways, or other standing water will be present once the project is operational, several listed waterbird species may be attracted to the facility. All of the four extant endangered waterbird species currently known from O'ahu—Hawaiian Duck (*Anas wyvilliana*), the Hawaiian endemic sub-species of the Common Moorhen (*Gallinula chloropus sandvicensis*), Hawaiian Coot (*Fulica alai*), and the Hawaiian endemic sub-species of the Black-necked Stilt (*Himantopus mexicanus knudseni*)—are opportunistic species readily attracted to water features of all kinds. All of these species have been recorded utilizing aquaculture facilities in the Hawaiian Islands.

The findings of the mammalian survey are consistent with the location of the site and the dense vegetation currently present on the property. As previously mentioned we did not detect the endangered Hawaiian hoary bat during the course of the survey, but this is not particularly surprising. Native bats have rarely been documented from the Island of O'ahu (Tomich, 1986; USFWS, 1998). Additionally, there is currently no suitable roosting habitat for this species present on the site. The authors have never recorded a bat of any species on the island of O'ahu in the course of over 25 years of fieldwork conducted on the island.

Although none of the four established alien rodents known from the Island of O'ahu were detected during the course of this survey, it is probable that roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), Polynesian rat (*Rattus exulans hawaiiensis*), and European house mouse (*Mus musculus domesticus*), use resources within the general project area on a seasonal basis.

Conclusions

From a botanical resources perspective there are no reasons or constraints on development of any part of the property. It is not expected that the modification of the habitat currently found within the project site will have a negative impact on any avian or mammalian species currently listed as endangered, threatened, or any that are currently proposed for listing under either federal or state endangered species statutes. Furthermore, the proposed action will not result in modification of any federally designated Critical Habitat, as there is none present on the subject property.

From a native avian and mammalian perspective there is nothing unique about the environment present within the project site, and none of the environment is important habitat for any listed avian or mammalian species currently known from the Island of O'ahu.

As discussed earlier in this document, there is the potential that the proposed aquaculture farm may attract one or more endangered waterbird species following build-out. To minimize the potential that the operation will attract endangered waterbirds, it is recommended that the raceways, ponds or other water holding bodies constructed on the site be covered with bird netting, or other materials to prevent listed birds from landing in and foraging within the facilities.

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APPENDIX E ARCHAEOLOGICAL ASSESSMENT (SCIENTIFIC CONSULTANT SERVICES, INC.)

1. Archaeological Assessment: Poamoho Site
(SHPD Approval Letter – May 18, 2010)

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

May 18, 2010

LOG NO: 2010.0752
DOC NO: 1005MV07
Archaeology

Dr. Robert Spear
Scientific Consulting Services Inc.
711 Kapiolani Blvd Suite 975
Honolulu, HI 96813

Dear Dr. Spear:

SUBJECT: HAR § 13-13-276 Review –
An Archaeological Assessment on 34.117 Agricultural Acres for the Phycal Agae Production Pilot Project Wahiawa,
Paomoho Ahupua'a, Wahiawa District, Island of Oahu
TMK: (1)-7-1-001:011 por., 030 Por., and 031 por. (DRAFT)

Thank you for the opportunity to review this draft of an Archaeological Assessment that was received by our office on March 25, 2010. We believe that the 100% pedestrian survey combined with the 24 test excavation trenches adequately covered the 34.117 acre project area and revealed no surface or sub-surface archaeological features. Therefore, we accept the archaeological assessment and agree with your recommendation that no further archeological work is required for the project area.

It appears that the word algae is spelled "agea" in the title of your report. If this is a typo you may wish to correct it when you resubmit a copy of this report, marked "**FINAL**," along with a copy of this review letter and a text-searchable PDF version on CD to the attention of the "**SHPD Library**" at the Kapolei SHPD office. We apologize for the delayed review, and thank you for your patience.

Please call Mike Vitousek at (808) 692-8024 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

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

Project Number 1103-AA-1

AN ARCHAEOLOGICAL ASSESSMENT ON 34.117 AGRICULTURAL ACRES FOR THE PHYCAL AGAE PRODUCTION PILOT PROJECT WAHIAWA, POAMOHO AHUPUA`A, WAHIAWA DISTRICT ISLAND OF OAHU, HAWAI`I [TMK (1) 7-1-001:011 por., 030 por., and 031 por.]

Prepared by:
Jon Wilson, B.A.
and
Robert L. Spear, Ph.D.
March 2010

Prepared for:
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307

ABSTRACT

An Archaeological Inventory Survey on 34.117 acres of former agricultural land produced no findings. The land is owned by HIDC Poamoho Camp, Inc. The project area is located in Wahiawa, Poamoho Ahupua`a, Wahiawa District, Island of Oahu, Hawai`i [TMK (1) 7-1-001:011 por., 030 por., and 031 por.].

Fieldwork was conducted March 3rd to 5th, 2010 in the form of a pedestrian survey and 24 backhoe-excavated trenches. No archaeological sites were identified either during the surface reconnaissance or subsurface testing. No additional archaeological work is recommended for this project area.

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INTRODUCTION

At the request of Group 70 International (environmental planners), Scientific Consultant Services, Inc. (SCS) (archaeological consultants) conducted an Archaeological Inventory Survey (AIS) on 34.117 acres of former agricultural land. The land is owned by HIDC Poamoho Camp, Inc., and is located in Wahiawa, Poamoho Ahupua`a, Wahiawa District, Island of Oahu, Hawai`i [TMK (1) 7-1-001:011 por., 030 por., and 031 por.] (Figures 1, 2, and 3).

Fieldwork was directed by SCS archaeologist Jon Wilson, B.A. on March 3rd to 5th, 2010 under the direction of Robert L. Spear, Ph.D (Principle Investigator). While Inventory Survey-level investigations were completed, this report is presented as an Archaeological Assessment (AA) because fieldwork did not find any cultural material of historic significance.

The primary purpose of the project was to determine the presence or absence of architecture, midden deposits, artifact deposits, any cultural material of historic importance—including the possibility of human skeletal remains in a subsurface context. If historic features or archaeological sites were identified, they were to be evaluated in terms of significance criteria and mitigated accordingly.

The Phycal Algae Pilot Project intends to create an algae farm and processing facility. The algal oil produced will have the goal of providing sustainable biofuel energy to a Hawaii market. Planned development is under a Restricted Agricultural District.

ENVIRONMENTAL SETTING

PROJECT AREA LOCATION

The project area is located on a portion of the existing Poamoho Plantation Camp in Wahiawa Oahu (Figure 4). The development project will be situated on agricultural lands to the south of Poamoho Camp (the current project area for this AIS). The project site is bounded by Kamehameha Highway on the east, Kaukonahua Road on the south, and similar agricultural lands to the north and west. The northeast corner of the project area has the following GPS coordinates: N 21. 30.822. W 158. 02.489.

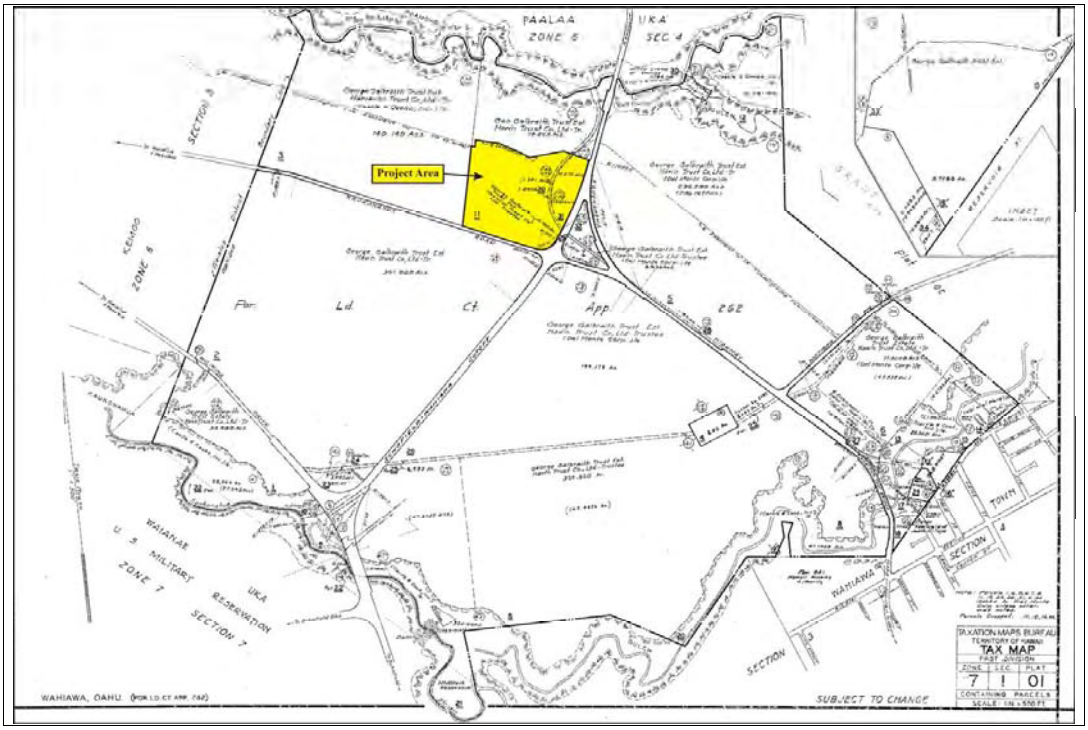

Figure 2: Tax Map Key with Highlighted Project Area.

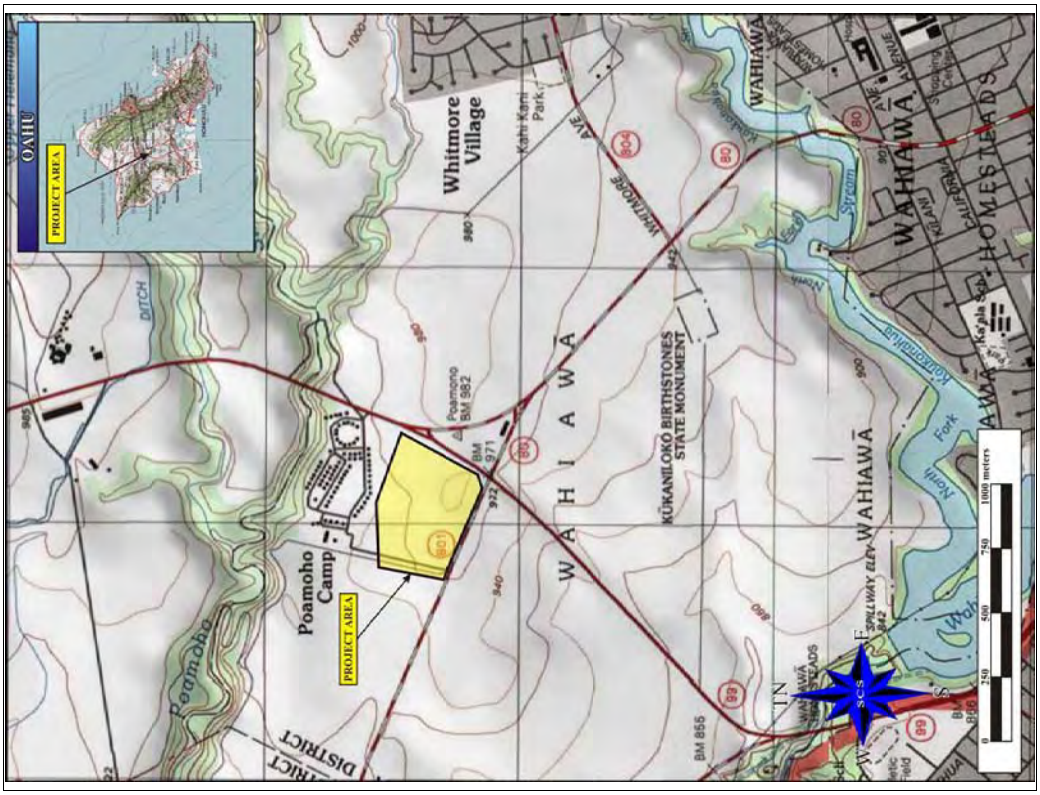

Figure 1: USGS Topographic Map Showing Location of Project Area.

Figure 4: Project Area Overview Photo; View to West.

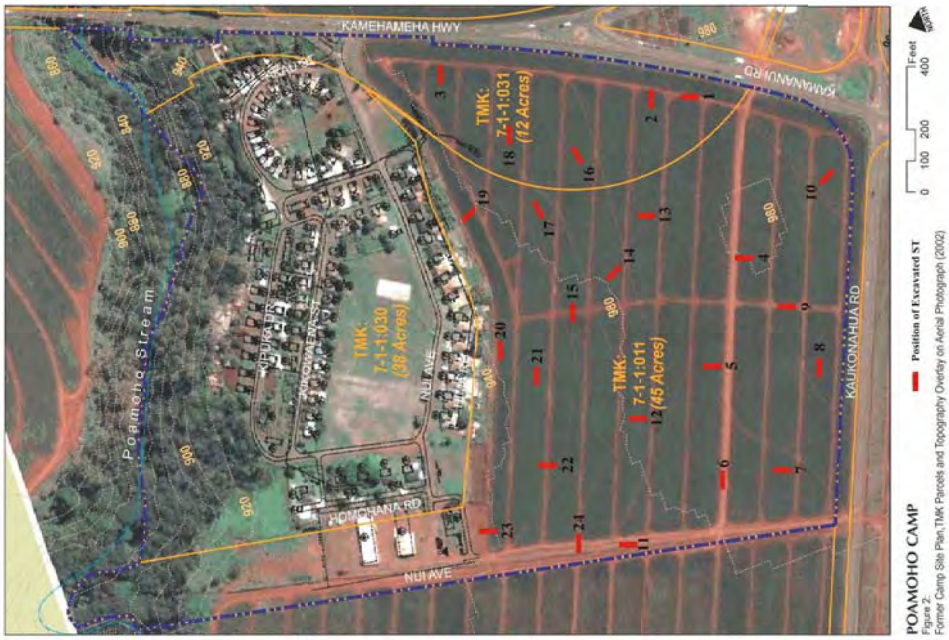

Figure 3: Project Area Trench Location Map.

SOILS

Soils found within the project area are a part of the Wahiawa Series and are defined as Wahiawa silty clay, 3 to 8 percent slopes (WaB). These well drained soils were generally utilized for pineapple, sugarcane, and pasture (Foote *et al.* 1972:125).

RAINFALL AND VEGETATION

The area is subject to an average annual rainfall of 40 to 60 inches (Armstrong 1983: 62). The wettest months fall between October and April. The project area is situated on fallow historic, then modern, agricultural fields. As a result, only introduced, invasive species are present. The vegetation is dominated by bermudagrass (*Melinus minutiflora*), castor bean (*Ricinus communis*), and *koa haole* (*Leucaena leucocephala*). No native or endemic species were observed.

SURVEY EXPECTATIONS

A review of archival resources and the results of previous archaeological work conducted in the area were undertaken prior to fieldwork to assess expectations for the project area. Although sites do exist in the greater area, given the background history of the survey parcels (in relation to agricultural use) as well as present land use, the expectations for finding pre-Contact sites, or post-Contact sites, were considered very low. A surface survey of the project area confirmed that it had been extensively tilled for agricultural purposes. Furthermore, Group 70 International, SCS' client, received a Feb. 7, 2010 letter from SHPD stating "no historic properties [would be] affected" by the development (LOG NO. 2010.0327; DOC NO: 1002NM15).

Nonetheless, there always remains a possibility of finding historic material during excavation work—however slim that probability may be given past land use. Based on the request of Group 70 International, SCS therefore, conducted two days of test trenching via backhoe.

METHODOLOGY

To address the potential for any surface sites, one SCS fieldworker took one day to walk the entire project area via east/west transects spaced 20 meters apart. No surface sites were found. Following that, a backhoe was used to dig 24 trenches throughout the project area to search for subsurface cultural deposits. None were found. The trenches were plotted on a

project area map (see Figure 3). All project records (maps, files, photos, etc.) are on file at the SCS Honolulu office.

FIELD RESULTS

No new sites, surface features, or midden scatters were identified during the pedestrian portion of the AIS, or the subsurface excavation. Trench location was evenly distributed across the project area. Results were extremely uniform.

The 24 excavated trenches were each 15.00 meters long and 0.60 meters wide. Depth varied from 2.20 meters to 2.45 meters deep. Each trench excavation was halted when a compact layer of silt was reached, estimated to mark the extent of previous agricultural tilling. SCS determined that this depth marked the deepest limit of potential cultural material deposit, as the matrix became extremely compact. No single trench profile displayed any variation from another trench in terms of matrix qualities, including density, color, moisture, ped size, etc.

The single soil Layer found subsurface consisted of a dark reddish brown (2.5 YR 2.5/3) fine clayey silt, that was compact, semi-moist, and contained a 10 per cent pebble content. Aside from some remnant black planting plastic within the first 20 cm below surface, no modern material was present within the trenches (Figures 5, 6, 7).

CONCLUSIONS

No surface or subsurface cultural remains were identified during this AIS fieldwork. A 100% pedestrian survey and the excavation of 24 backhoe trenches within the parcel did not lead to the identification of surface features or subsurface sites or layers. Historic and Modern-era clearing and grading in the parcel removed any previously existing surface sites and destroyed or altered subsurface deposits—if they ever existed within the project area.

SCS estimates, based on this Archaeological Assessment, that the proposed development has a near-zero likelihood of adversely impacting any historic properties. This work confirms SHPD's Feb. 7, 2010 letter stating "no historic properties [would be] affected" by this development (LOG NO. 2010.0327; DOC NO: 1002NM15).

SCS believes that no further archaeological work is necessary for this project area following the SHPD acceptance of this Archaeological Assessment report.

Figure 6: ST-1 West Wall Profile Photo.

Figure 5: ST-1 Overview Photo, post-excavation; View to Southwest.

Figure 7: ST-1 Stratigraphy Profile Graph.

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2. Archaeological Assessment: Tesoro Site
(SHPD Approval Letter – June 17, 2010)

LINDA LINGLE
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STATE OF HAWAII
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CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

June 17, 2010

Bob Spear, Ph.D.
Scientific Consulting Services, Inc.
711 Kapi'olani Blvd, Suite 975
Honolulu, Hawai'i 96813

LOG NO: 2010.2010
DOC NO: 1006NM60
Archaeology

Dear Dr. Spear:

SUBJECT: Chapter 6E-42 Historic Preservation Review-
An Archaeological Assessment of Approximately 4 Acres For The Phycal Algae Pilot Project in Campbell Industrial Park
Ewa, Honouliuli, O'ahu
TMK: (1) 9-1-032: 084

Thank you for providing us the opportunity to review this Assessment Report *An Archaeological Assessment of Approximately 4 Acres for the Physcal Algae Pilot Project in Campbell Industrial Park, O'ahu, Ewa, Honoulili, Oahu, Hawai'i TMK: (1) 9-1-032: 084 [Pestana and Spear, May 2010])* which we received on May 11, 2010.

This report is accepted and it meets the minimum requirements for compliance with the Hawaii Administrative Rules (HAR) §13-13-276 *Rules Governing Standards for Archaeological Inventory Studies and Reports.*

Please send a text-searchable CD of this report accompanying this submittal addressed to the "**SHPD Library**" at the Kapolei SHPD office.

Please contact me at (808) 692-8015 if you have any questions or concerns regarding this letter.SCS

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO),
Archaeology and Historic Preservation Manager

SCS Project Number 1139-AA-1

AN ARCHAEOLOGICAL ASSESSMENT OF APPROXIMATELY 0.9-ACRES FOR THE PHYCAL ALGAE PILOT PROJECT IN CAMPBELL INDUSTRIAL PARK, HONOULIULI AHUPUA`A, `EWA DISTRICT, ISLAND OF O`AHU [TMK (1) 9-1-032: 084 por.]

Prepared by:
Elizabeth Pestana, B.A.
and
Robert L. Spear, Ph.D.
May 2010

Prepared for:
Group 70 International, Inc.
925 Bethel St., Fifth Floor
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ABSTACT

Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey study at the request of Group 70 International, Inc., on 0.9-acres of a 12-acre parcel located in Campbell Industrial Park in the *ahupua`a* of Honouliuli, `Ewa District, O`ahu Hawai`i [TMK:9-1-032: 084 por.]. The property, owned by Tesoro Hawaii Corporation, is the proposed location of the sustainable development Phycal Algae Pilot Project. Archival research conducted on background history of the parcel concluded that no previous archaeological studies had been conducted in the project area. Archaeological survey of the project area identified no historic properties; therefore the data presented herein constitutes an Archaeological Assessment. No further work is recommended for the project area.

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INTRODUCTION

At the request of Group 70 International, Inc., Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey (AIS) in the proposed site of sustainable development, Phycal Algae Pilot Project in Campbell Industrial Park Ewa District, Honouliuli Ahupua`a, Island of O`ahu [TMK (1) 9-001-032: 084 por.] (Figures 1 and 2). The proposed plans for the project area parcel involve development of a sustainable bio-fuels processing plant.

Archaeological survey of the subject property consisted of visual inspection of the ground surface and limited archival research on the background of the environs of the project area. The main objectives of this work was to determine the presence or absence of artifacts, midden deposits, architecture and historic properties on the surface of the project area, as well as assess the potential for the presence of subsurface cultural deposits. Historical background research included a study of archival sources and maps and a limited review of past archaeological research in the vicinity of the project area. The background section gives a general idea of both pre-Contact and post-Contact settlement patterns in the Kalaeloa (Barber's Point) area within the *ahupua`a* of Honouliuli in O`ahu.

In sum, no new sites, features or significant cultural properties were observed or documented during archaeological assessment of the project area parcel. Formerly the site of a bioremediation facility and soil decontamination activities, the parcel has been previously subject to land alterations at and below the surface. No archaeological investigations have been conducted in the project area parcel previously, but numerous historic features have been documented throughout the Ewa District, and just north of the project area.

Based on the determination of "no findings" during fieldwork, this report is deemed an Archaeological Assessment as per the State of Hawai`i Historic Preservation Division (SHPD) Guidelines for Archaeological Assessment (HAR §13-276).

This report includes a review and summary of general settlement patterns and, mythological accounts within Ewa District, historical background research, including Land Commission Award (LCA) documentation, previous archaeological research near the project area, and a summary of findings.

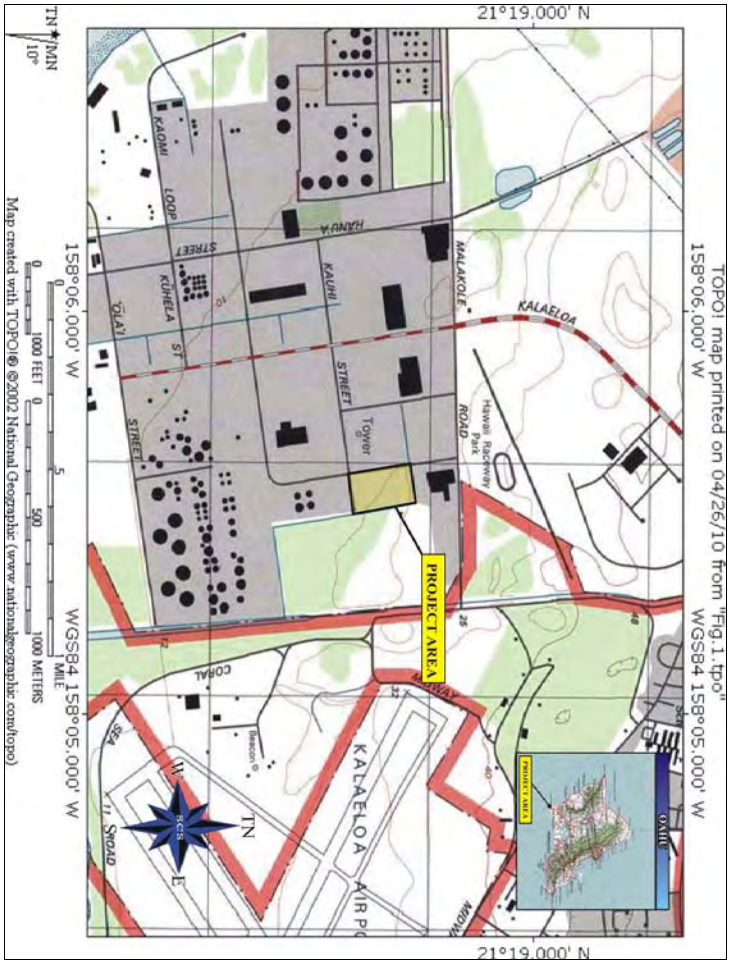

Figure 1: USGS Ewa Quadrangle Map of the Project Area

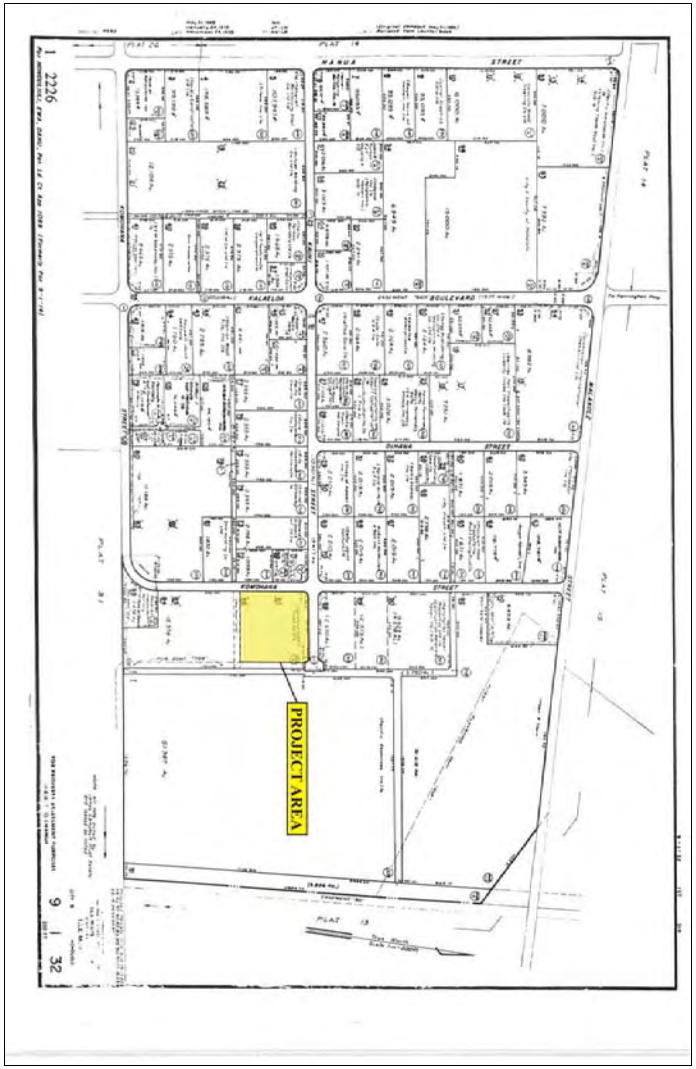

Figure 2: Tax Map Key [TMK] of the Project Area.

PROJECT AREA

Located in the Campbell Industrial Park within one mile of the coastline, ca. 12 feet (amsl.), the project area parcel comprises an approximately 0.9-acre vacant portion of an overall 12-acre parcel occupied by Tesoro Refinery Plant owned by Tesoro Hawaii Corporation. The project area is bounded by a drainage easement at the south, Kauhi Street to the north, Hanua Street to the west and a private road on the east. The surrounding areas primarily consist of industrial facilities and warehouses (Figure 3).

The Phycal Algae Pilot Project will occupy a small portion of the project area for the proposed GE conversion processing facility, for the production of renewable fuels. Plans for the project area involve minimal foundation work for placement of a trailer station, and other component equipment in a location within the southeast quadrant of the project area parcel. Overall the proposed project area modifications will require minimal ground disturbing activities.

ENVIRONMENTAL SETTING

Honouliuli is the western most *ahupua`a* of the `Ewa District and borders the Wai`anae Dictrict. This *ahupua`a* includes the `Ewa Plain and a portion of the West Loch of Pearl Harbor. The West Loch area, formerly known as the `*ili* of Honouliuli, was renown for taro production. Large terraced areas appeared on the 1917 USGS indicating that even at this late date taro systems continued to dominate the landscape.

Topographic features on the `Ewa Plain are generally limited to sinkholes which vary in size and several prominent volcanic cones. Pu`u o Kapolei located one and a half miles to the northeast being the most prominent in the region. Sinkholes, discussed by Tuggle and Tuggle (1997), varied in size from a few centimeters in width and depth to 30 m width and 5 m depth. No sinkholes were observed within the confines of the project area during the survey. One sinkhole is located just to the east of the eastern boundary of the project, on land possessed by the NAS Barbers Point, and is shown on the USGS map.

RAINFALL

The project area's leeward locale is among the driest regions of O`ahu. The annual rainfall for the coastal region where the project area is located averages approximately 15 inches (Armstrong 1983:56). Rainfall tends to increase during the winter months and is accompanied by lower air temperatures, while in the summer months rainfall tends to decrease and is accompanied by higher temperatures.

Figure 3: Aerial Photograph Showing Project Area Portion of Parcel Location in Campbell Industrial Park.

SOILS

The `Ewa Plain consists of a karstic flats which were formed by the emerged limestone reef that slopes slightly upward, about 24-25 m above sea level, from the high tide mark of the ocean to the base of the Wai`anae Mountains. Lower portions of the `Ewa Plain are dominated by coral outcrops with little or no soil cover (Foote 1972:29,93). Alluvium soils of the Mamala Series partly cover the `Ewa Plain. The project area lies generally within the Coral Outcrop (CR) with inclusions of Mamala Series (MnC) on the surface. However agricultural activities related to sugar cane production have resulted in the redeposition of alluvial soils over broader areas on the `Ewa Plain and drastically altered the original vegetative cover. This activity would likely have deforested any endemic and or indigenous plant species.

VEGETATION

Vegetation in the project area generally includes thick short to medium grasses including kiawe (*Prosopis pallida)*, haole koa (*Leucaena glauca)*, lantana, and other introduced bush and weedy plants. Vegetation covered the majority of the project area with few dense patches of haole koaand kiawe trees, and lantana.

CULTURAL HISTORICAL CONTEXT

TRADITIONAL SETTLEMENT PATTERNS

`Ewa District was famous for its *`awa*, *māmaki*, and for a variety of *kalo* called *kāi`i*. In wet lowlands, it was planted in mounds, a method called *pu`epu`e* (Handy and Handy 1972). As one went upland, bananas (*mai`a, Musa* sp.) and yams (*uhi, Dioscorea alata*) were grown on the *kula* land and in the lower sections of the valleys. *`Awa* (*Piper methysticum*) would have been cultivated deeper in the valleys along with *olonā* for cordage. Birds, valued as food (Malo 1951:38-40) and for their feathers, would have covered the extensive lowland forest. A large area was set aside for growing *wauke* and *māmaki* (Handy and Handy 1972). So productive was this *moku`aina* that the *ali`i* established their residence on the point of Waipi`o peninsula giving rise to some of the most powerful chiefs on O`ahu (Fornander 1980, Vol 2).

The project area occupies the flat `Ewa Plain, a region much neglected by historians and pre-historians, this presumably owed to the fact that comparatively, no major population centers occurred there and land utilization was likely minimal until sugarcane production began in earnest during the c. 1920's. Likewise, Hawaiian oral traditions do not offer more than scant, fragmentary, and contradictory pieces of information regarding past traditional use of the project

area. The general opinion regarding this area is that it has always been, in an ecological sense, an impoverished land. Given these hardships, traditional Hawaiian settlement of the area would likely have related to people "on the edge of survival" if they did not have regular and abundant access to resources outside of this area (Tuggle 1997).

In 1793, Vancouver anchored off the entrance to West Loch and recorded:

> ...The part of the island opposite to us was low, or rather only moderately elevated, forming a level country between the mountains that compose the east [Ko`olau] and west [Wai`anae] ends of the island. This tract of land was of some extent but did not seem to be populous, or to possess any great degree of natural fertility; although we were told that at a little distance from the sea, the soil is rich and all necessities of life are abundantly produced [Vancouver 1984:884].

Early settlement of the area was, most likely, made possible by a subsistence strategy aimed at both marine and avifauna resources. Handy reported (1940:82) that the *ahupua`a* of Honouliuli supported large agricultural terraces bordering West Loch, out of the project area, that were still being cultivated in the 1930s. In addition, McAllister suggests that in the coral plains of Honouliuli:

> ...It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. [1933]

However, occupation of the area would have been temporary rather then permanent, owing simply to the lack of reliable water resources in the area and the difficulty in obtaining these resources. As these faunal resources became depleted and as population density increased, a shift towards domestic and terrestrial resources (i.e., animal husbandry, horticulture, and agriculture) became prevalent.

Although the project area itself does not occupy a coastal location, inhabitants of this area could have exploited the bounty of nearby coastal ecological zones, particularly in Pu`uloa (Pearl Harbor). In fact, Pu`uloa's marine resources are considered the primary "blessings" of the occupants of the `Ewa Plain (Kamakau 1964: 83-84). In particular, pearl oysters, shrimp, and coastal fish were targeted. Pu`uloa's West Loch was identified as a productive location for acquisition of *`o`io* (*Albula vulpes*) and also *lipoa* (*Dictyopteris* sp.). *Lipoa* is considered one of the most favored of all Hawaiian seaweeds (Pukui and Elbert 1986: 208). Archaeological investigations of `Ewa District settlements (including inland areas) have shown that local

subsistence included reef fish and shellfish available from nearby coastal waters (Charvet-Pond and Davis 1992; Davis 1990: 136; Tuggle and Tomonari-Tuggle 1997: 93; Wickler and Tuggle 1996: 131-141).

Early settlement of the `Ewa region, in general, is thought to have involved significant attention to avifauna resources (Davis 1990: 136; James *et al.* 1987; Olson and James 1982). Thus far, only minimal evidence has been found to support this claim (Hammatt and Shideler 1995; Tuggle and Tomonari-Tuggle 1997). The lack of evidence may relate in part to incomplete archaeological survey of inland areas where bird predation was more prevalent. Also, bird bones may have been deposited elsewhere, having been acquired by the residents of other areas. In this view, visiting bird hunters may have been the first people to carry on traditional use of the project area, contributing to the utilization of temporary task-specific bird hunting sites. Sinkholes on the coast full of the bones of extinct bird species indicate that the general area witnessed large-scale depletion of avifauna (Sinoto 1976). However, sinkholes containing avifaunal remains were not documented within the present project area. Humans are thought to have played a major role in the depletion of bird life throughout the Pacific Islands (Steadman 1989, 1995, 1997).

The production and cultivation of plants, particularly cash crops such as sugarcane and more recently, corn, and pumpkin was certainly a difficult endeavor due to the landscape exhibiting shallow soils and sparse rainfall. In the lower, southern portion of the project area, a thin layer of soil occurs across the moderately sloping lands. This area most likely supported horticulture, small-scale agriculture, and later, more intensive sugarcane cultivation during the early 20th century through more recent times.

Overall, the environmental setting of the project area provides a set of limiting factors to traditional settlement. The dry `Ewa Plain may be considered similar to other extremely dry regions of leeward Hawaii where the remains of small communities have been found in agriculturally-impoverished lands (Tuggle and Tomonari-Tuggle 1997). Some of these dry leeward areas witnessed the development of complex dryland agricultural field systems as along the western coast of Hawai`i Island (Kirch 1985: 228-230). In contrast, the `Ewa Plain more closely fits the model proposed for dry areas of Moloka`i (Weisler and Kirch 1985) and for lower Makaha Valley on O`ahu, where settlements represented "gardening families on the edge of survival" (Green 1980; Tuggle and Tomonari-Tuggle 1997).

PRE-CONTACT PERIOD

The `Ewa District was one of the largest of the six districts on the Island of O`ahu. According to Fornander (1920: Vol 2: 47), in the early to middle part of the eleventh century, Maweke, a direct lineal descendant of the illustrious Nanaulu (the founder of Hawaiian royalty (*ibid*: 168 Vol I]), was a chief on O`ahu. The second of his three sons, Kainui, became the head of the powerful `Ewa chiefs and tradition reports his cutting of a navigable channel allowing access to the Pu`uloa River by canoe (*ibid*: 48). His son, Lakona, became the progenitor of the `Ewa chiefs. The line continues to Elani, a powerful `Ewa chief at the time of Kahekili, and his nephew Kahahana, the ruler of O`ahu in the late 1700's (*Ibid*: 217). Kahekili's treachery toward Kahahana provoked a rebellion of O`ahu chiefs, resulting ultimately in the almost complete annihilation of the island's aristocracy. Oral tradition records that the stream of Hoaiai in `Ewa was choked with the bodies of slain men, women and children (*Ibid*: 224-226, Kamakau 1961:138). With the demise of the Island's *ali`i* went much of our knowledge of the history of the District's individual *ahupua`a*. The past significance of `Ewa is not easily seen today as one drives in view of the `Ewa Plain. However, parts of this *moku`aina* provided ideal circumstances for traditional food production. At least twenty-six fishponds and many fish traps were established by the *ali`i* at various points around Pu`uloa providing much needed protein to the rulers of `Ewa (McAllister 1933:101-109). Stocked with mullet and other varieties of fish, these ponds were not the only marine resource. Edible shellfish, the Hawaiian pearl oyster (*pipi*), and other bivalves, eaten both raw and cooked, were found extensively (Handy and Handy 1972: 469 - 471).

The project area's location on the `Ewa Plain allies it with important Hawaiian figures, principles, and Hawaiian oral traditions. `Ewa is known in Hawaiian tradition as a place of powerful and ill-intentioned spirits (I`i 1963: 27, 29; Nakuina 1990: 54; Pukui 1943: 60). Much of this spiritual force is attributed, in one way or another, to Kamapua`a and his grandmother Kamaunuaniho as well as to the sisters of Pele, specifically Hi`iaka and Kapoulakinau (Tuggle and Tomonari-Tuggle 1997). In addition, the area is seen as rather mystical and uninviting, local workers describing stories of apparitions appearing on many occasions and unusual occurrence that have taken place in and adjacent to the project area. Of direct relevance to the project area, a strong connection is proposed between Kamapua`a and Honouliuli (the project area *ahupua`a*) (Pukui *et al*. 1974), but the exact nature of this connection cannot be reconstructed from the fragmentary preservation of known oral traditions of the subject.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169–70, 176; Kelly 1983:45; Daws 1968:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

Kamehameha's successful conquest of O`ahu had resulted in a large-scale redistribution of lands which set the stage for an ongoing series of land sales and transfers of ownership. Honouliuli Ahupua`a was originally given as *punala`au* (conquered land) to Kalanimoku (Kame`eleihiwa 1992: 58, 112). Subsequently, Kalanimoku gave this land to his sister Wahinepi`o, whose daughter Kekau`onohi in turn received the land during the Māhele of the late 1840s (LCA 11,216; Royal Patent 6971).

Thus, at the time of the Māhele (1848), the entire 43,250 acres of the Honouliuli Ahupua`a were deeded to M.W. Kekau`ōnohi, a chiefess (one of Liholiho's five wives), great-granddaughter of Kekaulike, and granddaughter of Kamehameha I. Upon her death (1851), these lands were passed on to Levi Haalelea. Documents associated with these transactions indicate that taro was cultivated in some places, but the records are not specific as to precisely where in this large *ahupua`a* this took place. After Haalelea's death, the land passed to his wife, Anadelia Amoe, who rented it to cattle ranchers starting in 1871. Amoe eventually deeded the land to her brother-in-law, John C. Coney, who sold it to James Campbell in 1877.

James Campbell (1826-1900), a Scottish-Irishman, settled in the Hawaiian Islands after working on whaling vessels (Wilcox 2000:19). He started in the sugar business on Maui (in 1860 or 1861), eventually moving to Honolulu in 1877 and buying up Honouliuli Ahupua`a, a

total of some 43,640 acres (which had apparently increased by 400 acres from the original deed to Kekauonohi). This land, which includes the two parcels covered in this study, was considered to be commercially worthless at the time. By 1879, however, Campbell had an artesian well drilled near his ranch house in Honouliuli—the first of its kind in Hawai`i—and the sugar industry entered a new phase of commercial expansion in the region. Over the next several decades, upwards of 70 deep wells were operating and supplying the region with over 100 million gallons of water per day (Wilcox 1996: 107; Dorrance and Morgan 2000: 49). The `Ewa Sugar Mill continued to produce Sugar into relatively recent times (1970s), and the area—especially the uplands north of Barbers Point, which have never been extensively settled even in modern times—is criss-crossed with water flumes, ditches, and rock walls from these activities (Dorrance and Morgan 2000: 43 - 46, 49).

Although no lands were awarded within the project area, land claims during the Māhele indicated the presence of a concentration of house lots around the *lo`i* lands of Honouliuli (Silva 1987; Tuggle and Tomonari-Tuggle 1997, Appendix G). Soil suitable for cultivation was rare in the upland portions of Honouliuli where small soil pockets are distributed unevenly. Irregularly located sinkholes and small gulches often served to catch soil deposition appropriate for limited gardening activity (McAllister 1933: 109). Stone mounds were also prepared for the cultivation of sweet potato in dryer areas.

HISTORIC PERIOD

Despite the rapid and widespread changes of land ownership in Hawaii in the late 1800s, Honouliuli Ahupua`a retained a semblance of its traditional form. After the death of Kekau`ōnohi in 1851, the title for Honouliuli and other Hawaiian lands was transferred to her husband Ha`alelea, bringing some degree of unity to these lands (including the *ahupua`a* of Honouliuli) at least during his lifetime. In the few decades following Ha`alelea's death in 1864, his extensive lands became fragmented as they were sold or auctioned. Over subsequent decades, land parcels became increasingly fragmented and subdivided with further sales. The *ahupua`a* of Honouliuli fortunately escaped this fate, as it was under lease to Captain John Meek for ranching at the time when Ha`alelea's lands were auctioned. Three years later (in 1867), Ha`alelea's survivors regained a clear title to Honouliuli, and the *ahupua`a* was immediately sold in its entirety to John Coney. One decade later, in 1877, John Coney's wife sold Honouliuli Ahupua`a (again in its entirety) to James Campbell for a sum of US $95,000.

James Campbell was convinced that the coast of the `Ewa Plain could be used successfully for sugar plantation land, despite the overwhelming public opinion at the time that

`Ewa was a barren wasteland best utilized for cattle ranching. Campbell hired an expert well-digger from California to sink a well in Honouliuli in 1879. At a depth of 240 feet (ca. 71 m), water commenced to flow. This well gained recognition as Hawaii's first artesian well, called *Wai Aniani* ("crystal waters"). This well was productive until it was sealed 60 years later (in 1939) by the City and County of Honolulu. Additional wells found equal success in water flow. James Campbell proceeded to establish profitable cattle ranches and to engage in sugar plantation ventures in Honouliuli (James Campbell Estate n.d.).

Honouliuli played an important role in the sugar plantation business in Hawaii. In 1889, James Campbell leased land in Honouliuli to Benjamin F. Dillingham. Dillingham subleased the Honouliuli lowlands to W.R. Castle. Castle and Cooke then were in a position to organize the `Ewa Plantation Company. A few years later, in 1897, Dillingham formed the O`ahu Sugar Company, Ltd., utilizing the artesian well water to irrigate sugarcane plantations in the Honouliuli uplands (Figure 4). In 1970, the O`ahu Sugar Company merged with the `Ewa Plantation Company. The lease to the Honouliuli lands lasted through 1996.

PREVIOUS ARCHAEOLOGICAL STUDIES

Extensive archaeological research has been conducted at Barber's Point Naval Air Station and numerous surrounding properties near the present project area that have revealed a consistent land use pattern in the area relating to habitation and fishing and agricultural activities for *maka`āinana* and various *Ali`i* families in addition to being renown for it's association with the prominent legendary figures Kamapua`a and Hi`iaka. The *heiau* at Pu`u o Kapolei was recorded by Thrum in 1907. The Western portion of Honouliuli has undergone numerous studies. Due to the time constraints of this particular project, these studies will be presented in chronological order in Table 1. A brief discussion of archaeological sites follows Table 1. The reader is referred to Tuggle and Tuggle 1997 for a complete synthesis of cultural resources recorded on the `Ewa Plain prior to 1995. Table 1 was adapted from Cordy and Hammatt 2003 Archaeological and Related Studies in Western Honouliuli Ahupua`a. Figure 5 further references several locations of previous archaeological investigations conducted in nearby vicinities and neighboring upland properties of the current project area.

Prior to Tuggle and Tuggle's 1997 synthesis, Davis (1990) has produced the definitive synthesis of pre-Contact human settlement in Southwestern O`ahu and this section relies heavily on that work.

Table 1: Archaeological Studies in the Vicinity of the Project Area.

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Thrum 1907	Heiau Study	Hawaiian Islands
McAllister 1933	Island Wide Survey	O`ahu
Kikuchi 1959	Site Letter Report	Barbers Point
Lewis 1970	Reconnaissance Survey	Barbers Point Harbor Area
Frierson 1972	Geologic Change in Honouliuli	Honouliuli
Barrera 1975	Reconnaissance Survey	Barbers Point Harbor Area
Clark and Connolly 1975	Reconnaissance Survey	Barbers Point Harbor Area
Oshima 1975	Reconnaissance Survey	Barbers Point
Sinoto 1976	Cultural Resources Survey	Barbers Point Harbor Area
Bordner 1977	Reconnaissance Survey	Kalo`i Gulch
Davis 1978	Scholarly Paper	Barbers Point Harbor Area
Davis and Griffin 1978	Archaeological Survey	Barbers Point Harbor Area
Hawai`i Marine Research Inc.	Reconnaissance Survey 1978	Barbers Point Harbor Area
Kirch 1978	Land Snail Study	Barbers Point Harbor Area
Sinoto 1978	Archaeological and Paleontological Salvage	Barbers Point Harbor Area
Barrera 1979b	Archaeological Study	West Beach
Clark 1979	Reconnaissance Survey	Barbers Point Harbor Area
Cleghorn 1979	Reconnaissance Survey	Barbers Point
Davis 1979a	Emergency Excavations	Barbers Point Harbor Area
Davis 1979b	Emergency Excavations	Barbers Point Harbor Area
Davis 1979c	Emergency Excavations	Barbers Point Harbor Area
Komori and Dye 1979	Archaeological Testing	West Beach
Sinoto 1979	Cultural Resources Inventory	Barbers Point Harbor Area
Davis 1980	Research Design	Barbers Point
Kirch and Christensen 1980	Land Snail Study	Barbers Point Harbor Area
Kirch and Christensen 1981	Land Snail Study	Barbers Point Harbor Area
Hammatt and Folk 1981	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Davis 1982	Academic Paper	Barbers Point
McCoy et al. 1982	Proposal for Investigations	Barbers Point Harbor Area
Neller 1982	Scholarly Study	Barbers Point
Ahlo and Hommon 1984	Reconnaissance Survey	Barbers Point Harbor Area
Bordner and Silva 1983	Reconnaissance Survey	Waimānalo gulch
Ahlo and Hommon 1984	Test Excavations	Barbers Point Harbor Area
Hammatt 1984	Reconnaissance Survey	Kahe Point
Haun and Kelly 1984	Research Design	Naval Air Station

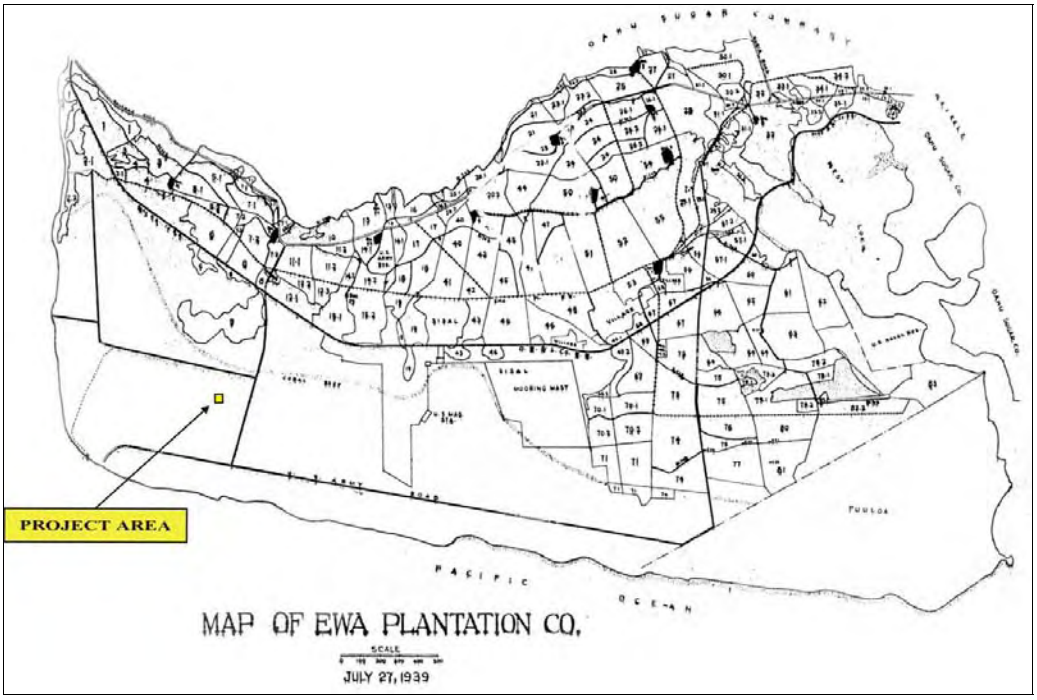

Figure 4: Map of Ewa Plantation Co., 1939 Depicting Sugar Cane Fields by Number; Showing Project Area Location Within an Undeveloped Portion of Plantation Lands in the Zone of Coral Reef (from Condé and Best 1973).

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Jones 1993	Fossil Coral Reef Study	Hawaiian Islands
Landrum 1993	Reconnaissance and Subsurface Testing	Naval Air Station
Miller 1993	Data Recovery	Barbers Point Harbor Area
Hammatt and Shideler 1994	Archaeological assessment	Barbers Point Harbor Area
Hammatt et al. 1994	Inventory Survey	Barbers Point Harbor Area
Davis	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Erkelens 1992	Archaeological Survey	Naval Air Station
Hammatt and Shideler 1995	Data Recovery Plan	Barbers Point Harbor Area
Jourdane 1995	Burial Documentation	Paradise Cove
O'Hare et al. 1996	Intensive Survey and Testing	Naval Air Station
Wulzen and Rosendahl 1996	Subsurface Testing and Data Recovery	Naval Air Station
Athens et al. 1997	Cultural Resource Inventory, Paleoenvironmental Investigations	`Ewa Plain:Naval Air Station
Denfield 1994	History	Naval Air Station
Tuggle 1997a	Cultural Resource Inventory	Naval Air Station
Tuggle 1997b	Synthesis	`Ewa Plain
Tuggle and Tuggle 1997a	Cultural Resource Inventory Survey	Naval Air Station
Wickler and Tuggle 1997	Cultural Resource Inventory, Inventory Survey	Naval Air Station
Hammatt and Shideler 1999	Inventory Survey	Waimānalo Gulch
McIntosh and Cleghorn 1999	Archaeological Archival Research	Honouliuli
McDermott et al. 2000	Data Recovery	Barbers Point Harbor Area
Monahan 2003	Archaeological Inventory Survey	Palailai Gulch Area
Cordy and Hammatt 2003	Archaeological Assessment	Kapolei
Tulchin *et al.* 2007	Archaeological Assessment	Campbell Industrial Park Area

REFERENCE	DESCRIPTION OF STUDY	LOCATION OF STUDY
Tuggle 1984	Survey Report	Naval Air Station
Neller 1985	Review and Evaluation	West Beach
Barrera 1986	Archaeological Investigations	West Beach
Davis and Haun 1986	Intensive Survey & Test Excavations	West Beach
Davis et al. 1986 a&b	Research Design	West Beach
Haun 1986a	Reconnaissance Survey	Kapolei
Haun 1986b	Reconnaissance Survey	Kapolei
Davis and Haun 1987	Intensive Survey & Test Excavations	West Beach
Rosendahl 1987a	Reconnaissance Survey	Kapolei
Rosendahl 1987b	Survey Report	Kapolei
Welch 1987	Reconnaissance Survey	Naval Air Station
Bath 1989a	Petroglyph Study	Waimānalo gulch
Bath 1989b	Burial Documentation	Kahe
Burgett and Rosendahl 1989	Sub-Surface Archaeological Testing	S. of Farrington Hwy.OR&L, W. of Kalaeloa Blvd.
Hammatt and Shideler 1989a	Archaeological Assessment	Barbers Point Harbor Area
Hammatt and Shideler 1989	Reconnaissance Survey	Kahe
Kawachi 1990	Burial Documentation	Campbell Industrial Park Area
Carlson and Rosendahl 1990	Inventory Survey	Kaomi Loop Subdivision
Cleghorn and Davis 1990	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Davis 1990a	Archaeological and Paleontological Investigation	Barbers Point HECO Area
Davis 1990b	Archaeological and Paleontological Investigation	Barbers Point Harbor Area
Rosendahl 1990	Letter Report	Kapolei
Kennedy 1991	Subsurface Testing	Pu`u o Kapolei
Hammatt et al. 1991	Inventory Survey	Makaiwa Hills
Hammatt and Shideler 1991	Archaeological Assessment	Barbers Point Harbor Area
Haun 1991	Survey Report	Naval Air Station
Burgett and Rosendahl 1992	Inventory Survey	Barbers Point Harbor Area
Pond and Davis 1992	Data Recovery Excavations	West Beach
Hammatt and Folk 1992	Subsurface Testing	Barbers Point Harbor Area
Glidden et al. 1993	Data Recovery Excavations	Paradise Cove

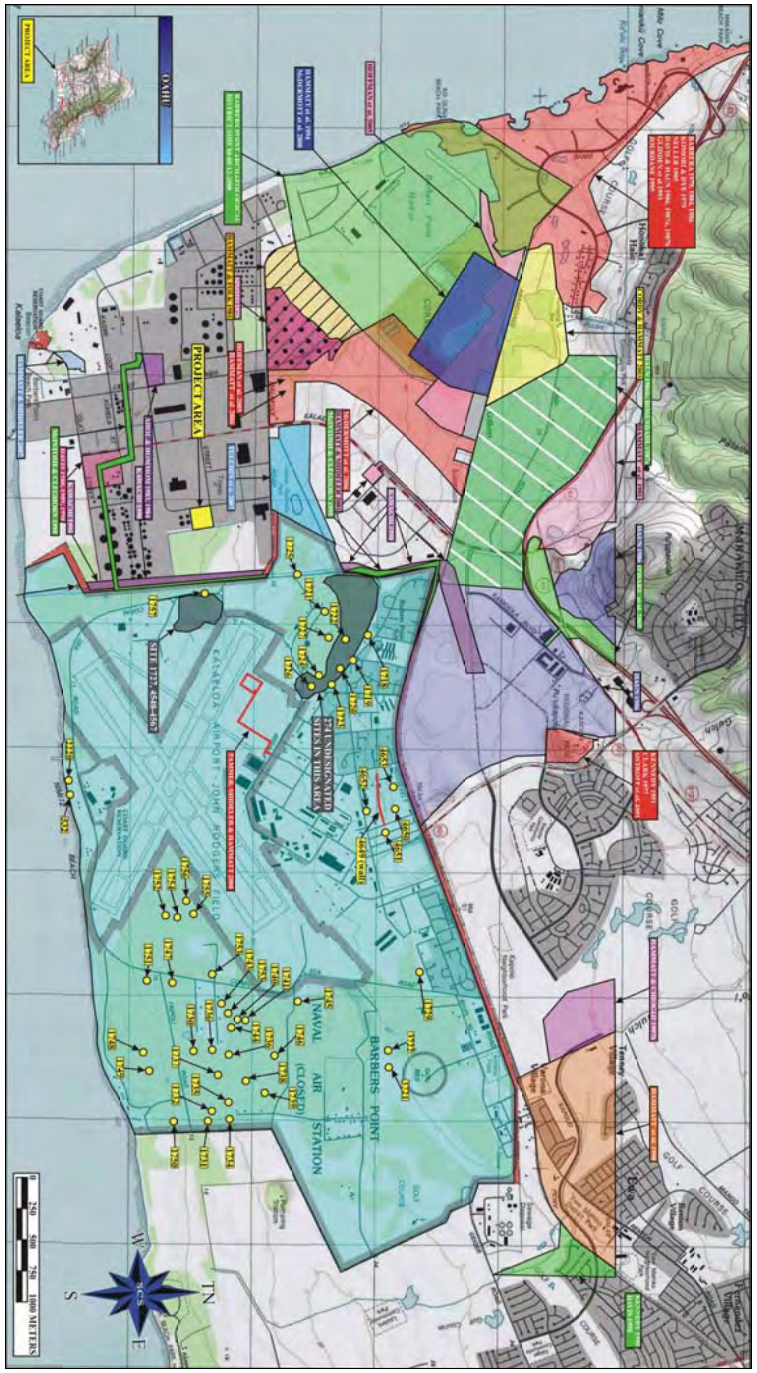

Figure 5: USGS 7.5-Minute Series Topographic Map, `Ewa Quadrangle (TOPO 2002® Version 3.2.0), Showing Locations of Previous Archaeological Studies in the Vicinity of the Project Area.

Davis (1990:39) lists a total of 32 separate archaeological studies of southwestern O`ahu between 1907 and 1986, the vast majority taking place since the 1970s. Most of these 32 studies are "surface reconnaissance" or "surface survey", meaning no excavation was carried out, but at least a dozen involved some subsurface testing (excavation). Nearly all of the attention has been focused on the `Ewa Plain and coastal settings, rather than the upland areas, which have practically been ignored thus far by archaeologists.

Davis (2000) presents the following general picture of human settlement in the Barbers Point area, especially on the `Ewa coastal Plain. The earliest occupation dates to *c.* A.D. 200, with ample evidence of relatively small camps and temporary sites along the coastal beaches and around small scattered wetlands inland. These settlers were primarily fishers and bird-hunters, and the "settlement period" lasted from *c.* A.D. 200 to *c.* A.D. 1100-1200. After *c.* A.D. 1100-1200, the density of human settlement appears to increase with more sites presumably reflecting greater local populations. These sites, however, are still relatively undifferentiated with no evidence of different functions or activities taking place at different places. Finally, from about the end of the 16th century on, the region witnessed further population increases and, for the first time, the emergence of special-function sites such as "men's houses" and religious shrines, in addition to habitation sites.

Davis (1990) investigated a portion of the uplands immediately west of the present project area, and reports at least eleven archaeological sites related to pre-contact Native Hawaiians. These include temporary habitation sites—including rockshelter occupations, religious shrines—including a *ko`a* (fishing shrine), and a petroglyph (rock engraving) site. The most significant of these is Site Complex 2893, a temporary habitation site reoccupied on numerous occasions over a period of some 250 years. Radiocarbon dates from excavated matrix at this site complex suggest occupation between A.D. 1396 and 1671. Excavations here revealed a hearth, midden deposits containing marine shells, and several hundred traditional artifacts used in fishing activities or in maintaining fishing gear. The rocky cliff faces at the site preserve dozens of petroglyphs, or rock engravings, of human forms, animals, and other signs and symbols. All indications are that this site was occupied on a temporary basis by fishermen repairing their gear, rather than by entire families in long-term settlements.

Hammatt *et al.* (1991) conducted an archaeological site inventory survey of approximately 1,915 acres of the proposed Makaiwa Hills development project (TMK: 9-1-15: 5, 11, 17; 9-1-16: Portion 9; 9-2-03: Portion 2), an area that includes, and completely subsumes, the present project area. Hammatt *et al.* (1991) identified 34 sites, including temporary and permanent habitation structures, agricultural features (terraces and mounds), rock shelters, a

possible rock shelter quarry, petroglyphs, *ahu* (*i.e.,* stone markers), and various other structures associated with sugarcane cultivation and cattle ranching. Most of these sites were located some distance from the present project area. The only site located within the present project area was an historic flume designated State Site No. 4341. A rockshelter complex, interpreted as representing a traditional permanent habitation, was recorded approximately 200 meters north-northwest of the present project area. Other nearby sites included: a modern era enclosure (Site 4329) some 350 meters west of the present project area; a platform associated with sugarcane cultivation (Site 4330) some 400 meters east of the present project area.

Two reconnaissance-level studies (Spear 1996; Magnuson 1999) located at elevations similar to, and lower than, the present project area documented no traditional Native Hawaiian sites. Spear (1996) assessed several hundred acres (TMK: 9-1-16) just northeast of Kapolei Town center, from the H-1 highway down (*makai*) to the Barbers Point Airport. The upper portions include landforms and elevations similar to the present project area. The entire area was observed to have been in sugarcane cultivation, resulting in no significant cultural finds. Magnusun (1999) conducted a reconnaissance of a narrow corridor associated with the expansion of Farrington Highway, just northwest of `Ewa Town Center. Upper portions of the project area studied by Magnusun reach 160 to 175 ft above mean annual sea level, slightly lower than the present project area. Several historic sites dating from the early 20th century, including bridges and railroad features (which may date to the late 19th century), were identified.

Two studies (Hammatt and Chiogioji 1997; Tulchin *et al.* 2001) located north towards the uplands of Honouliuli Ahupua`a also documented no significant cultural finds. Hammatt and Chiogioji (1997) conducted an Archaeological Reconnaissance Survey of a 4.5 km (14,730 ft) long corridor northeast of the present project area. The entire area was observed to have been in sugarcane cultivation, resulting in no significant cultural finds. Tulchin *et al.* (2001) conducted an Archaeological Inventory Survey of an approximately 1.0-acre area just above the H-1 highway near `Ewa. One historic stone wall (State Site 50-80-08-6370) was recorded.

In more direct proximity to the current project area, McDermott *et al*. (2006) conducted Archaeological Inventory Survey of a tract of land in Kalaeloa (TMK 9-1-014: 027, 034, 035, and 9-1-015: 001) south of Oahu Railway and Land Company (O.R. & L). The study identified and documented a total of six historic properties including previously identified drainage channel (50-80-12-6679), Barber's Point Harbor Archaeological District (50-80-12-2888), O.R. & L. right-of-way (50-80-12-9714). Newly documented sites included Temporary Sites CSH 1 and CSH 2 described as stacked stone, prehistoric or early historic enclosures, and Temporary Site

CSH 3 consisting of multiple sinkhole features (*ibid.*). Temporary Sites CSH 1, 2, and 3 were located within or near areas of proposed development and recommended for passive preservation.

More recently, Tulchin *et al*. (2007) conducted Archaeological Assessment at the 65.8-acre former Hawaii Raceway Park property, immediately north of the present project area. Overall, investigations of the property identified a limestone sinkhole determined to be a natural geologic feature absent of any cultural or paleoenvironmental deposits. No other archaeological properties or features were recorded in the property.

Southeast of the current project area, Kawachi (1990) documented human remains after SHPD responded to a report of an inadvertent discovery of human remains. Campbell Estate personnel encountered the remains during maintenance/excavation work on a storm drain in the Campbell Industrial Park area. The skeletal remains were observed behind a deteriorated portion of the concreted bank of the drainage canal in an adjacent sinkhole within a burial cavity abutting the drainage canal. The remains were left *in situ* and the burial cavity capped.

Two additional studies (Dega *et al.* 1998; Hammatt and Shideler 1999) located upland of the present project area complete this brief review of nearby archaeological projects. Dega *et al.* (1998) conducted an Archaeological Inventory Survey of approximately 1,000 acres just northeast of Makakilo City (TMK 9-2-02: 01, 03, and 05). No traditional sites were documented during the survey. Two separate irrigation systems (*i.e.,* large-scale flume networks) dating from the late 19th century to the early 20th century were identified. Elements of the previously-identified Waiahole Ditch System (50-80-09-2268) and the newly designated Site 5593, including flumes, aqueducts, ditches, pumps, and other irrigation features, were recorded. Hammatt and Shideler (1999) conducted an Archaeological Inventory Survey of approximately 122.75 acres, and noted the presence of a petroglyph site (4110) at elevations similar to the present project area. Other than this, no significant cultural finds were located in the lower portion of the project area described by Hammatt and Shideler (1999).

PROJECT AREA ASSESSMENT AND METHODOLOGY

Assessment of the project area occurred on April 23, 2010 by SCS Archaeologist Elizabeth Pestana, B.A. The assessment consisted of 100% pedestrian survey which focused on an overall area of ca. 0.9-acres. During the investigation no pre-Contact and or post-Contact sites or features were observed on the project area surface. Field recording was conducted by digital camera, and field notes were recorded on standard archaeological forms and field

notebook; photographs taken of various portions of the project area attests to past land disturbance. All extents of the project area were inspected for historic properties and cultural resources, with particular attention paid to the possible presence of sinkholes.

The project area was a vacant, somewhat overgrown portion of the property that consisted of the open area of the interior, and the thickly vegetated areas along boundaries within the fence-line (Figures 6 and 7). These areas were predominantly covered in thick, short to medium grasses, scattered trees and bushy plants particularly kiawe and haole koa. This type of vegetation, often occurring in contexts of mechanical subsurface disturbances, is likely the result of recent limited grubbing or grading by previous developments in the current project area. The overall project area topography is level with few areas of mounded soil and gravel (Figure 8; see Figures 6 and 7).

Observations of the interior portions of the project area included modern construction materials/debris and structure remnants consisting of sections of large steel building frame, concrete block mounted electric utility posts, and a large cylindrical tank (Figure 9)

Figure 6: Photographic Overview of Project Area, Western Portion of Interior. View to West.

Figure 7: Photographic Overview of South Portion of Project Area Interior. View to South

Figure 8: Photograph of Southwest Corner of Project Area Showing Berms (Background) and Mounded Gravel Piles. View to Southwest.

Figure 9: Photographic Overview of Project Area Interior Showing Modern Debris. View to East.

The southern perimeter of the project area is especially thickly vegetated in haole koa and lantana that appeared to originate from a soil-berm lining the southern limits, likely the result of dozing associated with prior industrial land use (Figures 10 and 11). Immediately adjacent the berm is a steep drainage easement that runs through the parcel and separates the project area portion of the parcel from the Tesoro Refinery Plant facilities. Pedestrian access directly from the Tesoro plant across the drainage easement to the project area is indicated by a wooden foot bridge located approximately at the center of the south project area boundary (Figure 12).

Observed at the project area boundaries along the fence-line were additional remnants of previous occupants' properties consisting of paved asphalt, concrete mounted utility posts and a large concrete foundation pad (see Figures 7 and 12). Driveway accesses located at the east and west sides of the project area appeared to be partially paved just within the driveway perimeters.

No historic properties were observed during the pedestrian sweep of the parcel. The project area has been subject to considerable subsurface disturbances. Subsurface deposits seem

Figure 10: Photograph Depicting Thick Vegetation Along the South Boundary of the Project Area. View to South.

Figure 11: Photograph of Earthen Berm Beneath Thicket of Vegetation. View to South.

Figure 12: Photograph Showing Wooden Foot Bridge Extending Over Drainage Easement from Project Area to Tesoro Refinery Plant. View to East.

unlikely due to modifications to the landscape by possible earlier agriculture and the recent industrial usage. However, portions of the ground surface are paved with asphalt and concrete, and known levels of disturbance in these areas remains limited. Sinkholes may have existed on the property and could have been filled in by previous construction activities and/or earlier geologic processes. These sinkholes often contain archaeological deposits including human remains, hearths, and extinct faunal materials. Numerous sinkholes have been recorded on the `Ewa Plain. Additionally sinkholes and low-lying areas may have been filled in to create level surfaces for previous developments. Sinkholes and human burials are the most likely site types to be encountered if the parcel were to undergo subterranean excavation. In summation however, surviving subterranean cultural deposits generally seem unlikely at this locus.

CONCLUSIONS AND RECOMMENDATIONS

No historic properties were observed on the surface of the parcel during Archaeological Assessment. The property has been subject to subsurface alterations and other such disturbances as recent as within the past 15 years. Vast changes in landscapes of the Campbell Industrial Park

area likely started in 1890 with the re-deposition of alluvial soils to accommodate sugar cane cultivation on formerly arid portions of the coastal plain, and possibly within the current project area. The possibility that isolated subterranean cultural deposits and or human burials in either a primary or secondary context, however minimal exists in limited portions of the parcel. In the event that significant excavation does occur and historic or traditional cultural properties (*i.e.* cultural layers, etc.) are encountered, all work in the project area should cease until SHPD is notified of the discovery to ensure the lawful and appropriate protocols concerning the inadvertent discovery of historic properties, and/or human remains will be followed (pursuant to §13-280-3 a, b c; §13-300 a, b, c HAR 2002).

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APPENDIX F CULTURAL IMPACT ANALYSIS (SCIENTIFIC CONSULTANT SERVICES, INC.)

1. Cultural Impact Analysis: Poamoho Site

SCS Project Number 1114-CIA-2

AN INTERIM CULTURAL IMPACT ASSESSMENT OF THE PHYCAL ALGAE PRODUCTION PILOT PROJECT, WAHIAWĀ AHUPUA`A, O`AHU SLAND, HAWAI`I [TMK 7-1-007:011 por. 030 por., and 031 por.]

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct an Interim Cultural Impact Assessment on a parcel of land for the Phycal Algae Production Pilot Project, Wahiawā Ahupua`a, O`ahu Island [TMK: 7-1-007:011 por., 030 por., and 031 por.] (Figures 1 and 2). The project proposes to develop an algae farm and processing production facility and will be situated on agricultural lands to the south or Poamoho Plantation Camp.

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kauikeaouli (Kamehameha III) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`*a tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights…may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

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

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

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

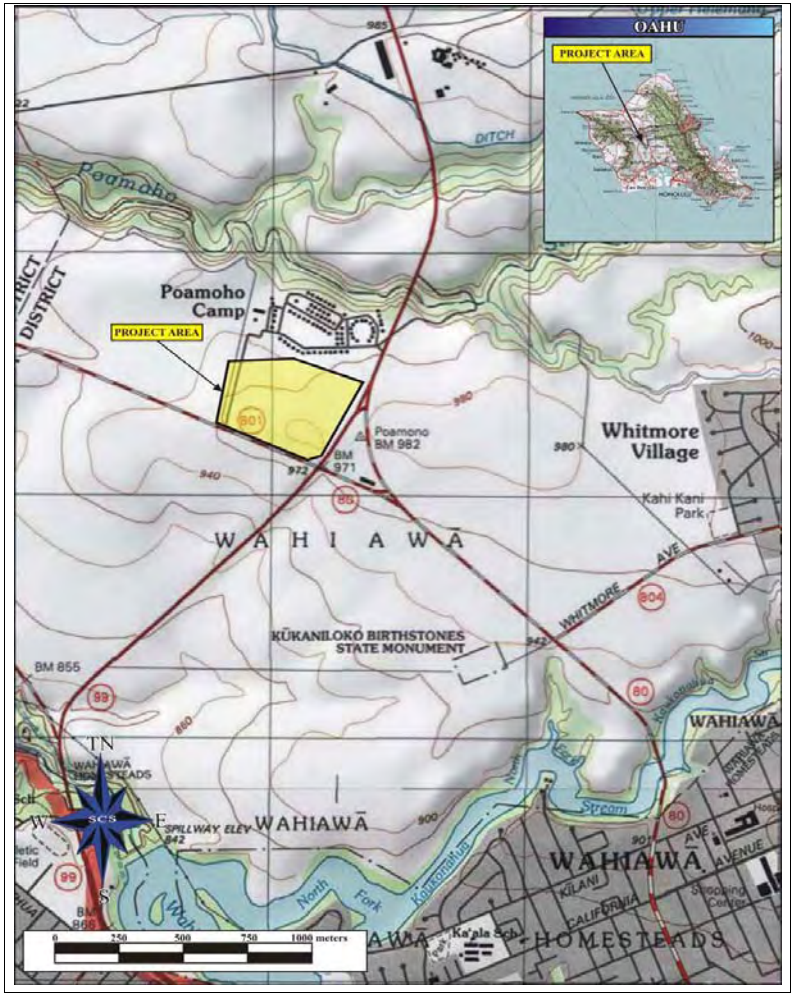

Figure 1: USGS Quadrangle Map Showing Project Area.

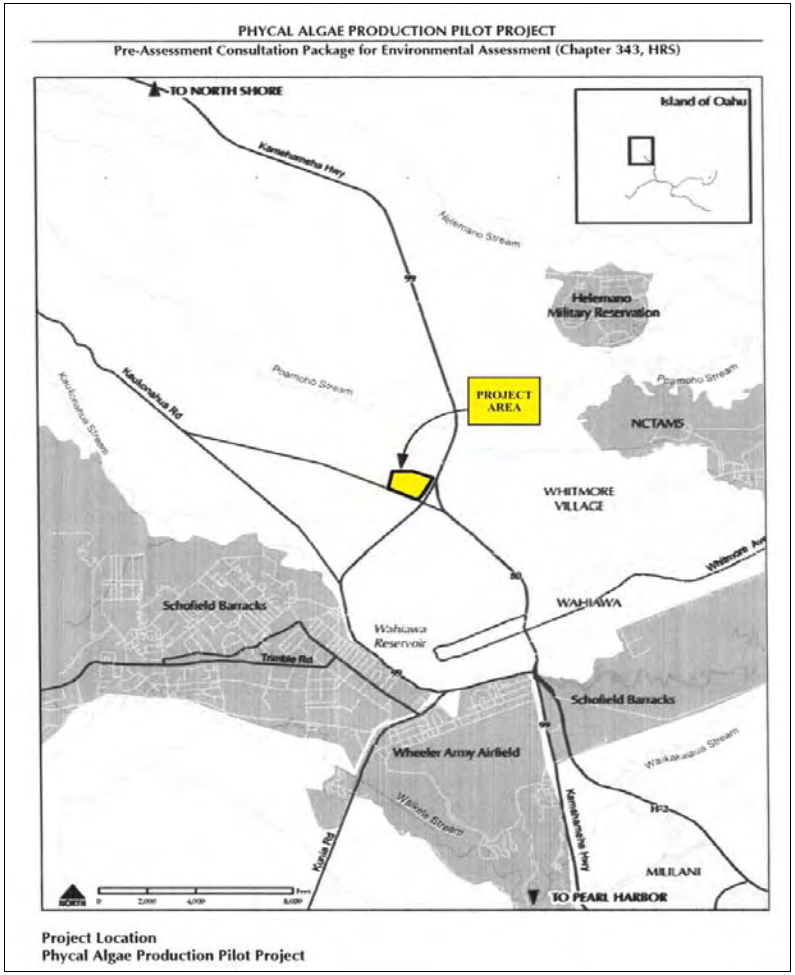

Figure 2: Project Area Location Map.

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

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

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

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

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

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

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

METHODOLOGY

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

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

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

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

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

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

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or being interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

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

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

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

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

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

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

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

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

ARCHIVAL RESEARCH

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

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

INTERVIEW METHODOLOGY

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

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

Letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD; the Hawaiian Civic Club of Wahiawā; Maria Orr, a Consulting Archaeologist; Tom Lenchanko of Waha Ōlelo Aha Kukaniloko; and Leimaile Quitevis of the O`ahu Island Burial Council (Appendix A). The letter sent to Ms. Quitevis was returned, so an e-mail containing

project information was sent to her by Group 70 international, Inc (personal communication Tracy Furuya, February 16, 2010).

In addition, a Cultural Impact Assessment Notice was published on January 31, February 3, and 4, 2010 in *The Honolulu Advertise*r and in the February issue if the OHA newspaper, *Na Wai Ola* (Appendix B). These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

PROJECT AREA AND VICINITY

The project area is located on a portion of the existing Poamoho Plantation Camp parcel, in the *ahupua`a* of Wahiawā, island of O`ahu. The actual project location will be south of the plantation camp, near the *mauka/`ewa* corner of Kamehameha Highway and Kaukonahua Road.

CULTURAL HISTORICAL CONTEXT

The island of O`ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai`anae and Ko`olau Mountain ranges were formed by two volcanoes. Through the millennia the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970). The lava flows from the Ko`olau volcano extended to and banked against the slope of the eroded Wai`anae volcano and formed the gently sloping surface of the Schofield Plateau on which the project area is located (*ibid.*).

PAST POLITICAL BOUNDARIES

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

land. It is said that Mā`ilikukahi gave land to *maka`āinana* (commoners) all over the island of O`ahu (*ibid*).

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili `āina* or *`ili* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa `āina* residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61). The present project area was located in the *ahupua`a* of Wahiawā, which literally means "place of noise" and refers to the sound of ocean being heard here (Pukui *et al.*1974:218).

TRADITIONAL SETTLEMENT PATTERNS

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

***NĀ WAHI PANA* LEGENDARY PLACES**

The lands that forms the Wahiawā Ahupua`a were associated with some of the most illustrious chiefs of O`ahu (Kūkaniloko, Kalaimanuia (a chiefess), Kākūhihewa, Mā`ilikūkahi, Lo-lale and Kelea chiefs; Cordy 2002). According to Handy and Handy:

> Wahiawa was from very ancient times, identified with the ruling *ali`i* of Oahu. The name analyzed is *Wahi* (place), *a* (belonging to), *wa* (noise). Perhaps the name goes back to the time when Hi`iaka was in this general area and could see waves dashing against the coast afar off and hear the ocean's ceaseless roar (1972:465).

Emerson (1978:99) confirms this interpretation when he quoted Hi`iaka chanting:

> Waialua, land of the sounding sea
> With audience in upland Lihu`e
> A voice that reaches Wahi-a-wa:
> Our ears are stunned by this voice
> The voice, I say, of old Ocean!

Unfortunately, much of the history of O`ahu was lost as a result of several pre- and early-Contact wars between various chiefs, resettlement of conquering armies and their families from other islands that replaced the local inhabitants, and, most disastrously, by diseases introduced from the West that disseminated native populations throughout the Pacific. However, it is known that inter-marriage with the ancient Nana`ulu lineage of O`ahu (and Kaua`i) was coveted, throughout the islands, as it enhanced the *mana* of the newcomers. Ultimately, the *mana* of the great chiefs was reflected by his achievements as well as the productivity of his lands (Kamakau 1961). O`ahu was fertile and rich in history, and contained places considered extremely sacred by the people of Hawai`i.

Ali`i holding to the chiefly laws that surrounded their daily activities were held in especially high esteem. The Lo-lale and Kelea chiefs were of this discipline. Kamakau said:

> The chiefs of Lihue, Wahiawa, and Halemano on Oahu were called *Lo* chiefs. *Po`e Lo Ali`i*, ["people from whom to obtain a chief"] because they preserved their chiefly kapus… The men had kapus, and the women had kapus, and when they joined their kapus and children were born, the children preserved their kapus. They lived in the mountains (*I kuahiwi*) and if the kingdom was without a chief, there in the mountains could be found a high chief (*ali`i nui*) for the kingdom. Or if a chief was without a wife, there one could be found-one from chiefly ancestors. (Kamakau 1964:5)

Although its exact location has been lost, those living in the uplands of Lihue became experts in club wielding and spear throwing, using the skills of striking, thrusting and parrying (Kamakau 1991). A Lo-lale chief named Kūkaniloko, who was said to have made the first *lo`i* nearby, gave his name to one of only two sacred places in Hawai`i for the birth of the kapu chiefs (Handy and Handy 1972). This site, located slightly south of the project area, was where his son,

Kapawa, first chief of O`ahu Island, was born. Such was the distinction of Kūkaniloko as a birth place of chiefs, that even in 1797, Kamehameha I encouraged his sacred wife, Keopuolani, to arrive there in time for the birth of their child, however this was not meant to be (Fornander Vol. II:1969, McAllister 1933).

With the birth of each new chiefly child who could be only of the highest rank, the sacred drum of Hawea, said to come originally from Tahiti, was sounded to announce the arrival to the populace (Kamakau in Sterling and Summers 1978). The drum was kept at other times at the Ho`olonopahu Heiau. Thrum (1912) stated that: "on such occasions the common people assembled on the east side of the stream [Kua`ikua Stream]—a thousand of them" (1912:101). Kua`ikua Stream was said to have a sacred spring, made by the gods, and only those who were related to them, were allowed to bathe there (Sterling and Summers 1978). It extended down to slope near Kūkaniloko.

Immediately after the chiefly child was born at Kūkaniloko, he/she was taken to the Ho`olonopahu Heiau where 48 chiefs were present and the naval cord was cut. It was said this *heiau* fell into a classification known as *waihau*, but whether this was an architectural or functional class is not known (Valeri 1985). Whatever its shape or original function, we are told by Kamakau that it was located ". . . a furlong and a half (2,330 yards) south of Kūkaniloko" (1991).

The Leilehua Plains, on which Schofield was constructed, served Hawaiian warriors as they learned the art of war (Stokes in Sterling and Summers 1978). *Lua* included the dislocation of joints in the body and replacing them. The slope descending from the plateau to Hale`iwa was called Keawawaihie, translated "the valley of spears", appropriate for the many battles that had been fought in the area, and with the ancient school of war at its southern boundary

Although travel around the island by canoe was preferred, the wide expanse of the Schofield Plateau allowed for a system of trails that extended from one side of the island to another and was readily used for the transport of commerce and access to the plants and animals inland. Based on `I`i's description of these trails in 1810, it would appear that several settlements were connected and often visited by travelers and residents. Possibly, competitors from the surrounding villages would gather for contests at the *maika* field. `I`i noted;

> This trail [from Waialua] went on to meet the creeks of Opaeula and Halemano, the sources of the stream of Paalaa, and down to the stream of Poo a Moho [Poamoho Stream], and on to the junction where the Mokuleia trail branched off to Kamananui and Keawawaihie, to Kukaniloko, the birthplace of chiefs. Just below the main trail was the descent to the stream of Kuaikua, where there was a diving place and a place for travelers to rest. Beyond was Paka stream and the maika field of Kapalauauai, which lay beyond the pond belonging to the village. There the trail met with the one from Kolekole, and continued to the stream of Waikakalaua, Piliamoo, the plain of Punaluu, to rise, then down to Kipapa, and to Kehualele. A trail ran from this main trail to Kalakoa, Oahunui, and other places much visited, such as Kukaniloko. . . All of these places mentioned had large populations. The land was rich, and there were many trees in olden times. Who has "closed" these places today? We do not know enough to say "It was so and so". [1959:98-99]

Kamakau confirmed the population expanse even into the 1850s:

> At this time the country was filled with people, two or three times four hundred on each large estate, up to five times four hundred. Schools were built in the mountains and in the crowded settlements. . . At Kahalepo`ai, Hauone, Kalakoa, Wahiawa, Halemano, and Kanewai there were large villages with teachers and schoolhouses; so at Lihu`e, Kalena, Maunauna, Kake, Pu`uku`u there were several school houses and teachers for each district. . . Oahu was then thickly populated. It is sad to see how in so short a time whole villages have vanished without leaving a man. [1961:424-425]

Settlement patterns are often re-created from archaeological remnants. Handy and Handy suggested the population in and around Wahiawā was large during the pre-Contact era based on the number of identified agricultural terraces:

> There were extensive terraces that drew water from Wahiawa Stream, both above and below the present town. There were many small terrace areas along the sides of the valleys of all the streams of this general area. These streams tap the southwest slopes of the Ko`olau range where it begins to loose altitude but it is still very wet in the hinterland. The peculiarity of this area, apart from distance from the sea, is that it is the only extensive area on this island that is quite high (1972:465).

In addition to many taro *lo`i*, Wahiawā grew sweet potato (*`uala*) and yam (*`uhi* ) and was one of the few places where sweet potato was known to have been irrigated (*ibid.*). Helemano Stream brought water to the northern *lo`i*. Kioea and Waikoloa Streams watered

terraces and Kaiakoa Stream was thought to contain more agricultural features, based on its configuration (Handy 1942).

HISTORIC LAND USE

With the accidental discovery of sandalwood, the inland regions and forests became of primary importance to an island nation that had only just been exposed to the material wonders of the Western world. The *ali`i* desired ships, guns, cannons, and other things that would establish them as equals in the stories they were told about the European monarchs. Debts for exotic goods were paid by filling a ship's hold with sandalwood, which was then taken to the orient and traded for huge prophets (Daws 1962, Kuykendall 1938). Under Kamehameha I, the sandalwood trade was a monopoly and kept under his complete control. But after his death in 1819, there was no one to keep exploitation by the *ali`i* in check, and the unfortunate *maka`āinana* were expected to cut and transport the wood from the forest to the sea with no recompence.

> …Ka-lani-moku and all the chiefs went to work cutting sandalwood at Wahiawa, Halemano, Pu`u Kapu, Kanewai, and the two Ko`olaus. The largest Trees were at Wahiawa, and it was hard work dragging them to the beach. [Kamakau 1961:207]

The constant exposure to the wet and cold without proper clothes or food and unable to plant their crops, only added to their general demise. The king's (Liholiho) favorite companions had little regard for others and plotted, saying "Let us run up the debt and make the chiefs and commoners work . . . . " (Kamakau 1961:252). Men, women, and children were sent into the mountains causing great hardship to the people and great damage to the forest. Kamakau added,

> The chiefs, old and young, went into the mountains with their retainers, accompanied by the king [Liholiho] and his officials, to take charge of the cutting, and some of the commoners cut while others carried the wood to the ships at the various landings; none was allowed to remain behind. Many of them suffered from food; because of the green herbs they were obliged to eat they were called "Excreters of green herbs" (*Hilalele*), and many died and were buried there. The land was denuded of sandalwood by this means. (1961:252)

By the 1830s, little was left to export and the market fell opening the way for the whalers.

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). The government retained a large portion of land that they would later sell.

At the end of the 19th century, government lands to the north of Wahiawā Town, between the north and south forks of Kaukonahua Stream, were available for homesteads. Byron Clark from California was the Hawaiian Republic's commissioner of agriculture and in 1897 purchased the Wahiawā Tract that had previously been used for ranching by James Robinson. According to the Land Act of 1895, each settler had to live on and cultivate a portion of the land for three years, if he was to receive ownership title (Nedbalek 1984). With the help of a group of settlers from California, the entire tract of 1300 acres was obtained and became known as the Wahiawā Colony Tract, which later became what is now Wahiawā Town. They formed an agricultural cooperative and named it the Hawaiian Fruit and Plant Company. Along with the cooperative, one member, Alfred Eames founded the Hawaiian Island Packing Company, which evolved into the Del Monte Corporation (*ibid.*).

In 1900, a new homesteader, 22 year old James D. Dole, moved to Wahiawā to develop his 61 acres. Within a year he had formed the Hawaiian Pineapple Company, planting pineapple on 12 acres of land. This was so successful that by 1907, after convincing Dillingham to extend his railroad to Wahiawā, he built a cannery at Iwilei near the harbor for easy shipment (*ibid.*). Castle & Cooke and the Waialua Agricultural Company bought more than half of the stock of the

Hawaiian Pineapple Company during the depression to keep it in the hands of Hawaii's business men. By 1932, the executives of Castle & Cooke took control of the management of the Hawaiian Pineapple Company. Poamoho Camp, abutting the project area, was a consolidation of three Hawai`i Preserving and California Packing Corporation camps and filled with those working in the pineapple fields (*ibid.*). The *Honolulu Advertiser* referred to it saying: "Poamoho Camp is Little Community in Wahiawa Area" (Nov. 2, 1949). The project area and the old Camp area are now owned by HIDC Poamoho Camp, Inc.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who know of cultural resources and activities that may be affected by the project or who know its history, conducting research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort". However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD; the Hawaiian Civic Club of Wahiawā; Maria Orr, a Consulting archaeologist; Tom Lenchanko of Waha Ōlelo Aha Kukaniloko; and Leimaile Quitevis of the O`ahu Island Burial Council. The letter sent to Ms. Quitevis was returned, so an e-mail containing project information was sent to her by Group 70 international, Inc (personal communication Tracy Furuya, February 16, 2010).

In addition, a Cultural Impact Assessment Notice was published on January 31, February 3, and 4, 2010 in *The Honolulu Advertise*r and in the February issue if the OHA newspaper, *Na Wai Ola*. These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information.

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

The Project area has been associated with pineapple agriculture since the early 19th century. No archaeological reports have been located specific to the project area. However, a inventory survey on the project parcel is to be conducted in March 2010 by Scientific Consultant Services, Inc., at which time subsurface excavation will take place.

Archaeology deals with material remains, and although cultural beliefs are often reflected through some sort of architecture, like *heiau*, or *ko`a,* there are many examples of cultural associations still important to the community with no physical structures to mark their significance. One such place, *Ulukukui O Lanikāula*, located on Moloka`i, is considered an extremely sacred spot. Another might be Kīlauea and Halema`uma`u, home of Pele. These places have become important sites supporting a traditional belief system still held by the many peoples of Hawai`i. They contain no identified archaeological features, however they are highly meaningful "…because of [their] association with cultural practices or beliefs of a living community . . ." (King 2003:3).

CIA INQUIRY RESPONSE

Two responses acknowledging receipt of the letter of inquiry were sent to SCS (Appendix C). One from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD (dated February 25, 2010) suggested several individuals who had already been contacted, as did the second letter acknowledging receipt of the letter of inquiry from OHA, O`ahu Branch. In addition, two former long-time plantation workers, living in Poamoho Camp were interviewed on March 12, 2010 concerning ongoing cultural activities that might have occurred in the project area or its vicinity. Mr. Vaeleti Tyrell, 75 years old and originally from Swain's Island in the Tokelau Group, arrived in Hawai`i in 1961. He immediately began working for the plantation and stayed until it his retirement in 2004. Mr. Teodoro Agduyeng, 87 years old, arrived from the Philippines in 1946. He, also worked for the pineapple plantation in various capacities, until he

retired in 1988. Neither of them reported any cultural activities within the project area parcel, or its surroundings, but instead, stated it was always in pineapple.

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). The project area has been associated with pineapple agriculture since the early 1900s. To our knowledge, the project area has not been used for traditional cultural purposes within recent times.

CULTURAL ASSESSMEMNT

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

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APPENDIX A: CIA INQUIRY LETTERS

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Ms. Maria Orr
95-230 Hokuloa Loop
Mililani, HI 96789

January 26, 2010

Dear Ms. Orr:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International to conduct a Cultural Impact Assessment (CIA) of land parcel consisting of 34.117 acres in the Wahiawa District, O'ahu Island [TMK:7-1-001:011 por., 030 por., and 031 por.] According to documents supplied by Group 70 International, the project proposes to develop an algae farm and processing production facility and will be situated on agricultural lands to the south of Poamoho Plantation Camp. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (2)

Ph: 808-597-1182 SCS... SERVING ALL YOUR *ARCHAEOLOGICAL* NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

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

January 26, 2010

Dear Ms. Cayan:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International to conduct a Cultural Impact Assessment (CIA) of land parcel consisting of 34.117 acres in the Wahiawa District, O'ahu Island [TMK:7-1-001:011 por., 030 por., and 031 por.] According to documents supplied by Group 70 International, the project proposes to develop an algae farm and processing production facility and will be situated on agricultural lands to the south of Poamoho Plantation Camp. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (2)

A2

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Hawaiian Civic Club of Wahiawa
931 Peach St.
Wahiawa, HI 96786

January 26, 2010

Dear Members:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International to conduct a Cultural Impact Assessment (CIA) of land parcel consisting of 34.117 acres in the Wahiawa District, O'ahu Island [TMK:7-1-001:011 por., 030 por., and 031 por.] According to documents supplied by Group 70 International, the project proposes to develop an algae farm and processing production facility and will be situated on agricultural lands to the south of Poamoho Plantation Camp. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (2)

Ph: 808-597-1182 SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

A1

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Clyde Nāmu'o, Director
C/o Office of Hawaiian Affairs
711 Kapi'olani Blvd, Suite 500
Honolulu, HI 96813

January 26, 2010

Dear Mr. Nāmu'o:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International to conduct a Cultural Impact Assessment (CIA) of land parcel consisting of 34.117 acres in the Wahiawa District, O'ahu Island [TMK:7-1-001:011 por., 030 por., and 031 por.] According to documents supplied by Group 70 International, the project proposes to develop an algae farm and processing production facility and will be situated on agricultural lands to the south of Poamoho Plantation Camp. SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

We are asking you for any information that might assist us in gathering knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The results of our assessments rely greatly on the assistance and response of individuals and organizations such as yours. We are also contacting, Phyllis Cayan, History and Culture Branch Chief for DLNR, the Wahiawa Hawaiian Civic Club, and an Anthropologist long familiar with the area, Maria Orr. It is not known if an Archaeological Survey is being conducted.

Ph: 808-597-1182 SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (2)

APPENDIX B: LEGAL NOTICE

IN THE MATTER OF

CULTURAL IMPACT ASSESSMENT NOTICE

CULTURAL IMPACT ASSESSMENT NOTICE:

Information requested by SCS of cultural resources or ongoing cultural activities on or near these parcels in Waiawa Ahupua'a, O'ahu Island TMK: 9-1-001:011 por., 030 por., and 031 por. Please respond within 30 days to SCS at (808) 597-1182. (Hon. Adv.: Jan. 31; Feb. 3, 4, 2010) (778065)

1103

STATE OF HAWAII
City and County of Honolulu

AFFIDAVIT OF PUBLICATION

ss.

Jane Kawasaki, being duly sworn deposes and says that she is a clerk, duly authorized to execute this affidavit of THE HONOLULU ADVERTISER, a division of GANNETT PACIFIC CORPORATION, that said newspaper is a newspaper of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspaper as follows

01/31/2010 The Honolulu Advertiser
02/03/2010 The Honolulu Advertiser
02/04/2010 The Honolulu Advertiser

and that affiant is not a party to or in any way interested in the above entitled matter.

Jane Kawasaki

Subscribed and sworn to before me this 4th day of February A.D. 2010

Elsie A. Maruyama
Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires March 7, 2012

NOTARY PUBLIC CERTIFICATION

Elsie A. Maruyama First Judicial Circuit

Document Description: Affidavit of Publication

No. of Pages: 1 Date of Doc. 2/4/2010

Elsie A. Maruyama 2/6/2010
Notary Signature Date

778065

Please respond within 30 days to SCS

at (808) 597-1182

Aloha,
Leann McGerty, SCS

Print

Subject: **Re: Cultural Assessment Impact Notice**
From: **Lisa E. Asato <lisaa@oha.org>**
Sent: **Tuesday, January 26, 2010 1:49:21 PM**
To: **leann@scshawaii.com**

Aloha e Leann,

Will do.

Mahalo, Lisa

On 1/26/10 1:39 PM, "leann@scshawaii.com" <leann@scshawaii.com> wrote:

Dear Ms. Asato:

Would you please insert the Cultural Impact Assessment Notice below in the next edition of the Ka Wai Ola?
Thank you.

CULTURAL IMPACT ASSESSMENT NOTICE:

Information requested by SCS

Of cultural resources or on-going cultural

activities on or near these parcels in Wahiawa Ahupua`a,

O`ahu Island TMK:7-1-001:011 por., 030 por., and 031 por.

APPENDIX C: PROJECT CORRESPONDENCE

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

February 25, 2010

LOG NO: 2010.0375
DOC. NO: 1002PC012

MEMORANDUM

TO: Leann McGerty, Senior Archaeologist
Scientific Consultant Services, Inc. 711 Kapiolani Blvd., Suite 975, Honolulu, HI 96813

FROM: Phyllis Coochie Cayan, SHPD History and Culture Branch Chief

Subject: WAHIAWA: A Cultural Impact Assessment (CIA) for a land parcel consisting of 34.177 acres in the Wahiawa District, O'ahu Island.
TMK: 7-1-001:011 por., 030 por., and 031 por.

This memo is in response to your request to help assess potential impacts to cultural practices as a result of the proposed project for a land parcel (34.117 acres) in the Wahiawa district to develop an algae farm and processing production facility in the agricultural lands south of Poamoho Camp.

As you know, these lands were agricultural in current and historic uses including but not limited to pineapple and sugar cultivation. In the Hawaiian lore these lands were known as Lihue in hula and chant do refer to cultural events such as Pele's visit to the Ka'ena area, to the training of the warriors in the art of lua and other martial arts, to the birthing stones at Kukaniloko and the alignment of certain features and rocks during the solstices.

Some studies done recently at Schofield and its environs (also part of Lihue) noted cultural interpretation with archaeology sites that illustrate the differences in interpretation and the importance of culture and science working together.

That said the department is concerns are but not limited to any ground disturbances which may reveal burials and/or related burial sites as well as any religious significant features that may still exist in the parcel despite its historic uses. Even 'push piles' in former ag lands have revealed cultural features and/or burials.

Some resource folks/groups of the area you may find helpful to contact as you begin this planning process are:

1. Thomas Lenchanko, cultural practitioner — no current contact info
2. Wahiawa Hawaiian Civic Club — check website for Association of Hawaiian Civic Clubs
3. Neighborhood Board of Wahiawa — check County website for contact info
4. Richard Paglinawan regarding Lua and Warriors — check with Bishop Museum for contact info
5. Leimaile Quiteves, OIBC regional rep — email: leimaile.q@gmail.com

Any questions, please call me at 808-692-8015 or via email Phyllis.L.Cayan@hawaii.gov. Mahalo.

C: Nancy McMahon, Deputy SHPO/State Archaeologist

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD10/4819

February 18, 2010

Leann McGerty, Senior Archaeologist
Scientific Consultant Services, Inc.
711 Kapi'olani Boulevard, Suite 975
Honolulu, Hawai'i 96813

Re: Cultural Impact Assessment consultation
Algae Farm and Processing Facility
Wahiawa, O'ahu
Tax Map Key: 7-1-001:011 por., 030 por. And 031 por.

Aloha e Ms. McGerty,

The Office of Hawaiian Affairs (OHA) is in receipt of your January 26, 2010 letter initiating consultation ahead of a cultural impact assessment (assessment) for the proposed development of an algae farm and processing production facility on 34.117 acres within the above mentioned tax map key parcels.

Your letter details your intention to initiate consultation with the Department of Land and Natural Resources- Historic Preservation Division, the Wahiawa Hawaiian Civic Club and Ms. Maria Orr. We also strongly recommend consultation with Mr. Thomas Lenchanko, who acts in the capacity as kahu of Kūkaniloko and Ms. Leimaile Quitevis of the O'ahu island Burial Council who may be willing to share their knowledge of the assessment area with you. Your letter also states that "*...it is not known if an archaeological inventory survey is being conducted*". The existence or probability of cultural sites being situated within or immediately adjacent to the project area is critical to our ability to provide comments on this proposed undertaking. OHA advocates that a comprehensive review of historical and archaeological literature related to the assessment area be conducted and provided as a part of your consultation request. The current and previous land use of the project area should also be provided.

It is difficult for us to completely assess the possible impacts of this proposed development on traditional and cultural practices without knowing additional details of this proposed algae farm and production facility and methods which will be employed to prevent impacts to the natural environment. When considering the potentially devastating impacts introduced and alien species of algae can have on natural resources in Hawai'i, *Kappaphycus spp.* immediately comes to mind. This species of red algae was introduced to the reef systems within Kāne'ohe Bay in the 1970's to study its potential for aquaculture production. When experimental trial plantings were completed, they were abandoned as it was believed it could not spread from the site if introduction. Today, *Kappaphycus spp.* dominates Kāne'ohe Bay, smothering coral reef ecosystems.

While we are in no way implying that the proprietor of this development has any malicious intents towards our natural resources, we do strongly advocate that careful consideration be afforded to the potentially devastating impacts this farmed algae could have should it be accidently released into our environment.

As we have stated in previous correspondence to you, OHA respectfully maintains that your firm bears a responsibility to work towards building successful working relationships with individuals, organizations and communities throughout Hawai'i which will result in a true understanding of what resources and practices are important to the Hawaiian people.

Thank you for seeking input at this early stage in the assessment process. We look forward to continuing to work with you and all other parties in developing a successful paradigm for assessments and we request the opportunity to review the completed assessment. Should you have any questions, please contact Keola Lindsey at (808) 594-1904 or keolal@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Chief Executive Officer

2. Cultural Impact Analysis: Tesoro Site

SCS Project Number 1140-CIA-1

AN INTERIM CULTURAL IMPACT ASSESSMENT OF APPROXIMATELY 0.9 ACRES, CAMPBELL INDUSTRIAL PARK, HONOULIULI AHUPUA`A, `EWA DISTRICT, O`AHU SLAND, HAWAI`I [TMK 9-1-032:084 por.]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.
August 2010

Prepared for:
Group 70 International, Inc.
925 Bethal Street, Fifth Floor
Honolulu, Hawai`i 96813

SCIENTIFIC CONSULTANT SERVICES Inc.

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

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Figure 1: USGS Quadrangle Map Showing General Project Area 2
Figure 2: TMK Showing General Project Area 3

INTRODUCTION

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International Inc., to conduct a Cultural Impact Assessment of approximately 0.9 acres in Campbell Industrial Park, Honouliuli Ahupua`a, `Ewa District, O`ahu Island [TMK: 9-1-032:084] for the Phycal Algae Pilot Project (Figures 1 and 2).

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights…may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

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

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

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

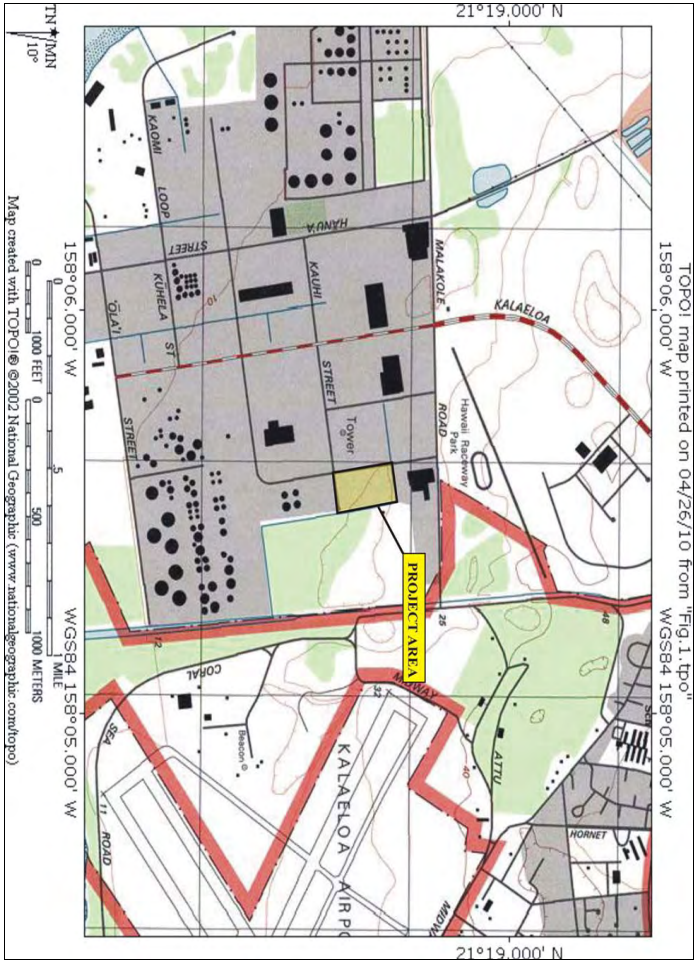

Figure 1: USGS Quadrangle Map Showing General Project Area

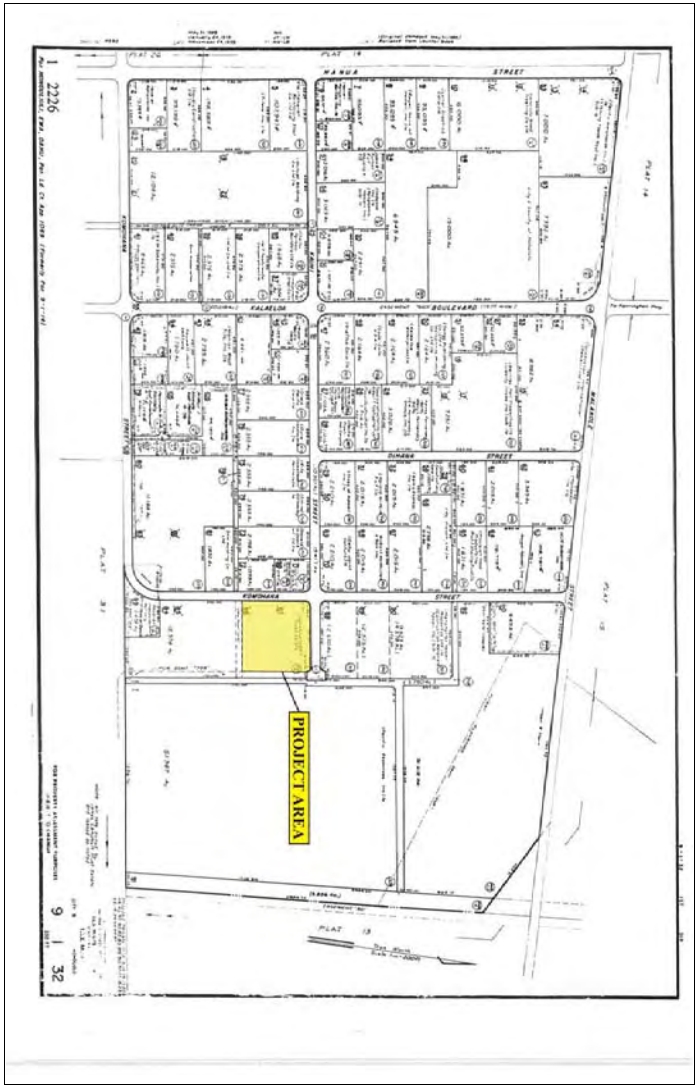

Figure 2: TMK Showing General Project Area

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

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

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

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

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

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

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

METHODOLOGY

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

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

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

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

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

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

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or being interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

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

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

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

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

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

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

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

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

ARCHIVAL RESEARCH

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

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

INTERVIEW METHODOLOGY

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

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

Letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phyllis (Coochie) Cayan, History and Culture Branch Chief with SHPD; George Kaeliwai of the Hawaiian Civic Club of `Ewa; and an e-mail was sent to Leimaile Quitevis of the O`ahu Burial Council (Appendix A). In addition, a Cultural Impact Assessment Notice was published on April 28, 29 and May 2, 2010 in *The Honolulu Advertise*r and in the May issue if the OHA newspaper, *Na Wai Ola* (Appendix B). These notices requested

information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

PROJECT AREA AND VICINITY

The project area is located within Campbell Industrial Park and is bordered by Saratoga Street to the east, Komohana on the west and developed parcels to the north and south in the *ahupua`a* of Honouliuli.

Honouliuli Ahupua`a is a primary component of the `Ewa Plain. The `Ewa Plain was known by at least three different names, including Kaupe`a, Pu`ukapolei, and Kai`ona (Kamakau 1964: 29, 47). Various other names have also been recorded, these possibly referring to particular portions of `Ewa (Maly 1996: 1-10; Sterling and Summers 1978: 39). Honouliuli was, "a land of contrasts" (Tuggle 1997), encompassing the scorched plain, parts of the central O`ahu plateau, the more productive lowlands of Honouliuli Stream, and a portion of the bounteous Pearl Harbor. The project area occupies a section of the lower plain in this varied region. Land used for agriculture extended to the north and to Pu`uloa and the ocean in the south, all of which supported sugar cane for many years.

CULTURAL HISTORICAL CONTEXT

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

PAST POLITICAL BOUNDARIES

Traditionally, the division of Oahu's land into districts (*moku*) and sub-districts was said to be performed by a *Mā`ilikukahi* who was chosen by the chiefs to be the *mō`īho`oponopono o ke aupuni* (administrator of the government; Kamakau 1991). Cordy places Mā`ilikukahi at the beginning of the 16th century (2002). Mā`ilikukahi created six districts and six district chiefs (*ali`i `ai moku*). Land was considered the property of the king or *ali`i `ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i `ai moku* ensured

rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land. It is said that Mā`ilikukahi gave land to *maka`āinana* (commoners) all over the island of O`ahu (*ibid*).

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

PRE-CONTACT HISTORY

The `Ewa District was one of the largest of the six districts on the Island of O`ahu. According to Fornander (1980,Vol 2: 47), in the early to middle part of the eleventh century, Maweke, a direct lineal descendant of the illustrious Nanaulu (the founder of Hawaiian royalty (*Ibid*:168 Vol I]), was a chief on O`ahu. The second of his three sons, Keaunui, became the head of the powerful `Ewa chiefs and tradition reports his cutting of a navigable channel allowing access to the Pu`u Loa River by canoe (*ibid*:48). His son, Lakona, became the progenitor of the `Ewa chiefs. The line continues to Elani, a powerful `Ewa chief at the time of Kahekili, and his nephew Kahahana, the ruler of O`ahu in the late 1700's (*Ibid*:217). Kahekili's treachery toward Kahahana provoked a rebellion of O`ahu chiefs, resulting ultimately in the almost complete annihilation of the island's aristocracy. Oral tradition records that the stream of Hoaiai in `Ewa was choked with the bodies of slain men, women and children (*Ibid*:224-226, Kamakau 1961:138). With the demise of the Island's *ali`i* went much of our knowledge of the history of the District's individual *ahupua`a*. The past significance of `Ewa is not easily seen today as one drives in view of the `Ewa plain. However, parts of this *moku`aina* provided ideal circumstances for traditional food production. At least twenty-six fishponds and many fish traps were established by the *ali`i* at various points around Pu`u Loa providing much needed protein to the rulers of `Ewa (McAllister 1933:101-109). Stocked with mullet and other varieties of fish, these

ponds were not the only marine resource. Edible shellfish, the Hawaiian pearl oyster, *pipi*, and other bivalves, eaten both raw and cooked, were found extensively (Handy and Handy 1972).

TRADITIONAL SETTLEMENT PATTERNS

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

`Ewa was famous for its *`awa*, *māmaki*, and for a variety of *kalo* called *kāi`i*. In wet lowlands, it was planted in mounds, a method called *pu`epu`e* (Handy and Handy 1972). As one went upland, bananas (*mai`a, Musa* sp.) and yams (*uhi, Dioscorea alata*) were grown on the *kula* land and in the lower sections of the valleys. *`Awa* (*Piper methysticum*) would have been cultivated deeper in the valleys along with *olonā* for cordage. Birds, valued as food (Malo 1951:38-40) and for their feathers, would have covered the extensive lowland forest. A large area was set aside for growing *wauke* and *māmaki* (Handy and Handy 1978). So productive was this *moku`aina* that the *ali`i* established there residence on the point of Waipi`o peninsula giving rise to some of the most powerful chiefs on O`ahu (Fornander 1980, Vol 2).

The project area occupies a small section of the flat `Ewa plain, a region much neglected by historians and pre-historians, this presumably owed to the fact that comparatively, no major population centers occurred there and land utilization was likely minimal until sugarcane production began in earnest during the c. 1920's. Likewise, Hawaiian oral traditions do not offer more than scant, fragmentary, and contradictory pieces of information regarding past traditional use of the project area. The general opinion regarding this area is that it has always been, in an ecological sense, an impoverished land. Given these hardships, traditional Hawaiian settlement of the area would likely have related to people "on the edge of survival" if they did not have regular and abundant access to resources outside of this area (Tuggle 1997).

Early settlement of the area was most likely, made possible by a subsistence strategy aimed at both marine and avifauna resources. Handy reported (1940:82) that the *ahupua`a* of Honouliuli supported large agricultural terraces boarding West Loch, out of the project area, that were still being cultivated in the 1930s. In addition, McAllister suggests that in the coral plains of Honouliuli:

> . . . It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. [1933]

However, occupation of the area would have been temporary rather then permanent, owing simply to the lack of reliable water resources in the area and the difficulty in obtaining these resources. As these faunal resources became depleted and as population density increased, a shift towards domestic and terrestrial resources (i.e., animal husbandry, horticulture, and agriculture) became prevalent.

Although the project area itself does not occupy a coastal location, inhabitants of this area, if any, could have exploited the bounty of nearby coastal ecological zones, particularly in Pu`u Loa (Pearl Harbor). In fact, Pu`u Loa's marine resources are considered the primary "blessings" of the occupants of the `Ewa Plain (Kamakau 1964: 83-84). In particular, pearl oysters, shrimp, and coastal fish were targeted. Pu`u Loa's West Loch was identified as a productive location for acquisition of *`o`io* (*Albula vulpes*) and also *lipoa* (*Dictyopteris* sp.). *Lipoa* is considered one of the most favored of all Hawaiian seaweeds (Pukui and Elbert 1986: 208). Archaeological investigation of `Ewa settlements (including inland areas) has shown that local subsistence included reef fish and shellfish available from nearby coastal waters (Charvet-Pond and Davis 1992; Davis 1990a: 136; Tuggle and Tomonari-Tuggle 1994: 93).

Early settlement of the `Ewa region, in general, is thought to have involved significant attention to avifauna resources (Davis 1990a: 136; James *et al*. 1987; Olson and James 1982). Thus far, only minimal evidence has been found to support this claim (Tuggle and Tomonari-Tuggle 1994). The lack of evidence may relate in part to incomplete archaeological survey of inland areas where bird predation was more prevalent. Also, bird bones may have been deposited elsewhere, having been acquired by the residents of other areas. In this view, visiting bird hunters may have been the first people to carry on traditional use of the project area,

contributing to the utilization of temporary task-specific bird hunting sites. Sinkholes on the coast full of the bones of extinct bird species indicate that the general area witnessed large-scale depletion of avifauna (Sinoto 1976). Humans are thought to have played a major role in the depletion of bird life throughout the Pacific Islands (Steadman 1989, 1995, 1997). In`Ewa, however, the subsistence relationship has not yet been made clear between human and bird populations.

The production and cultivation of plants, particularly cash crops such as sugarcane and more recently, corn, and pumpkin was certainly a difficult endeavor due to the landscape exhibiting shallow soils and sparse rainfall. In the lower, southern portion of the `Ewa plain, a thin layer of soil occurred across the moderately sloping lands. This area most likely supported horticulture, small-scale agriculture, and later, more intensive sugarcane cultivation during the early 20th century through more recent times.

Overall, the environmental setting of the project area provides a set of limiting factors to traditional settlement. The dry `Ewa Plain may be considered similar to other extremely dry regions of leeward Hawaii where the remains of small communities have been found in agriculturally-impoverished lands (Tuggle 1997). Some of these dry leeward areas witnessed the development of complex dryland agricultural field systems as along the western coast of Hawai`i Island (Kirch 1985: 228-230; Rosendahl 1994). In contrast, the `Ewa Plain more closely fits the model proposed for dry areas of Moloka`i (Weisler and Kirch 1985) and for lower Makaha Valley on O`ahu (Green 1980), where settlements represented "gardening families on the edge of survival" (Tuggle 1997).

NĀ WAHI PANA/LEGENDARY PLACES

The project area's location on the `Ewa Plain allies it with important Hawaiian figures, principles, and Hawaiian oral traditions. `Ewa is known in Hawaiian tradition as a place of powerful and ill-intentioned spirits (I`i 1963: 27, 29; Nakuina 1990: 54; Pukui 1943: 60). Much of this spiritual force is attributed in one way or another to Kamapu`a and his grandmother Kamauna-Niho as well as to the sisters of Pele, specifically Hi`iaka and Kapo`ulakia`u (Tuggle 1997). In addition, the area is seen as rather mystical and uninviting, local workers describing stories of apparitions appearing on many occasions and unusual occurrence that have taken place in and adjacent to the project area. Of direct relevance to the project area, a strong connection is proposed between Kamapua`a and Honouliuli (the project area *ahupua`a*) (Pukui *et al*. 1974),

but the exact nature of this connection cannot be reconstructed from the fragmentary preservation of known oral traditions of the subject.

HISTORIC PERIOD

One of the earliest descriptions of this region was recorded in 1793, by Vancouver, who anchored off the entrance to West Loch:

> . . . The part of the island opposite to us was low, or rather only moderately elevated, forming a level country between the mountains that compose the east [Ko`olau] and west [Wai`anae] ends of the island. This tract of land was of some extent but did not seem to be populous, nor to possess any great degree of natural fertility; although we were told that at a little distance from the sea, the soil is rich and all necessities of life are abundantly produced [Vancouver 1984:884].

Kamehameha's successful conquest of O`ahu in 1795, resulted in a large-scale redistribution of lands which set the stage for an ongoing series of land sales and transfers of ownership. Honouliuli Ahupua`a was originally given as *punala`au* (conquered land) to Kalanimoku (Kame`eleihiwa 1992: 58, 112). Subsequently, Kalanimoku gave this land to his sister Wahinepi`o, whose daughter Kekau`onohi in turn received the land during the Māhele of the late 1840s (LCA 11,216; Royal Patent 6971).

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

Land claims during the Māhele indicated the presence of a concentration of house lots around the *lo`i* lands of Honouliuli (Silva 1987; Tuggle and Tomonari-Tuggle 1994). Soil suitable for cultivation was rare in the upland portions of Honouliuli where small soil pockets are distributed unevenly. Irregularly located sinkholes and small gulches often served to catch soil deposition appropriate for limited gardening activity (McAllister 1933: 109). Stone mounds were also prepared for the cultivation of sweet potato in dryer areas.

Despite the rapid and widespread changes of land ownership in Hawaii in the late 1800s, Honouliuli Ahupua`a retained a semblance of its traditional form. After the death of Kekau`ōnohi in 1851, the title for Honouliuli and other Hawaiian lands was transferred to her husband Ha`alelea, bringing some degree of unity to these lands (including the *ahupua`a* of Honouliuli) at least during his lifetime. In the few decades following Ha`alelea's death in 1864, his extensive lands became fragmented as they were sold or auctioned. Over subsequent decades, land parcels became increasingly fragmented and subdivided with further sales. The *ahupua`a* of Honouliuli fortunately escaped this fate, as it was under lease to Captain John Meek for ranching at the time when Ha`alelea's lands were auctioned. Three years later (in 1867), Ha`alelea's survivors regained a clear title to Honouliuli, and the *ahupua`a* was immediately sold in its entirety to John Coney. One decade later, in 1877, John Coney's wife sold Honouliuli Ahupua`a (again in its entirety) to James Campbell for a sum of US$95,000.

James Campbell was convinced that the coast of the `Ewa Plain could be used successfully for sugar plantation land, despite the overwhelming public opinion at the time that `Ewa was a barren wasteland best utilized for cattle ranching. Campbell hired an expert well-digger from California to sink a well in Honouliuli in 1879. At a depth of 240 feet (ca. 71 m), water began to flow. This well gained recognition as Hawaii's first artesian well, called *Wai Aniani* ("crystal waters"). This well was productive until it was sealed 60 years later (in 1939) by the City and County of Honolulu. Additional wells found equal success in water flow. James Campbell proceeded to establish profitable cattle ranches and to engage in sugar plantation ventures in Honouliuli (James Campbell Estate n.d.).

Honouliuli played an important role in the sugar plantation business in Hawaii. In 1889, James Campbell leased land in Honouliuli to Benjamin F. Dillingham. Dillingham subleased the Honouliuli lowlands to W.R. Castle. Castle and Cooke then were in a position to organize the `Ewa Plantation Company. A few years later, in 1897, Dillingham formed the O`ahu Sugar

Company, Ltd., utilizing the artesian well water to irrigate sugarcane plantations in the Honouliuli uplands. In 1970, the O`ahu Sugar Company merged with the `Ewa Plantation Company. The lease to the Honouliuli lands lasted through 1996.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who know of cultural resources and activities that may be affected by the project or who know its history, conducting research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort". However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters were sent to organizations whose jurisdiction included knowledge of the area. Consultation was sought from Phillis (Coochie) Cayan, History and Culture Branch Chief with SHPD; George Kaeliwai of the Hawaiian Civic Club of `Ewa; and an e-mail was sent to Leimaile Quitevis of the O`ahu Burial Council. In addition, a Cultural Impact Assessment Notice was published on April 28, 29 and May 2, 2010 in *The Honolulu Advertise*r and in the May issue if the OHA newspaper, *Na Wai Ola.* These notices requested information of cultural resources or activities in the area of the proposed project, gave the TMK number and where to respond with information.

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

In addition, archaeological reports specific to the project vicinity were reviewed. The most recent Assessment of the project area was conducted by SCS in April 2010 (Pestana and Spear n.d.). This report should be referred to for more in depth information concerning archaeological projects completed in the area.

Archaeology deals with material remains, and although cultural beliefs are often reflected through some sort of architecture, like *heiau*, or *ko`a,* there are many examples of cultural associations still important to the community with no physical structures to mark their significance. One such place, *Ulukukui O Lanikāula*, located on Moloka`i, is considered an extremely sacred spot. Another might be Kīlauea and Halema`uma`u, home of Pele. These places have become important sites supporting a traditional belief system still held by the many peoples of Hawai`i. They contain no identified archaeological features, however they are highly meaningful "…because of [their] association with cultural practices or beliefs of a living community . . ." (King 2003:3).

CIA INQUIRY RESPONSE

A response was received from Phyllis Coochie Cayan, History and Culture Branch Chief for SHPD (Appendix C). She recommended seven new contacts who may have cultural, traditional and/or historical knowledge of the area. New letters of inquiry were sent to Senator Will Espero, Representative Rida Cabanilla, The `Ewa Beach Neighborhood Board, `Ewa Hui Aloha Senior Citizens, Mr. Shad Kane on the O`ahu Island Burial Council, Mrs. Nettie Tiffany, and Mr. Chuck Erhorn on May 18, 2010 (Appendix D).

A response from OHA was received on May 17 with recommendations for two additional contacts that may have some knowledge of on-going cultural practices within and around the site area (see Appendix D). One of the individuals had already been contacted (Shad Kane) and the other was sent a letter of inquiry on June 9, 2010.

A Shad Kane, member of the O`ahu Burial Council, contacted SCS, inquiring if there would be an opportunity for a field check of the site area. In response to his request, Ms. Tracy Furuya of Group 70, International, emailed him and confirmed he could make a site visit. A date of May 31 was tentatively set for a walk around the perimeter. In a telephone conversation with SCS, Shad stated that he had made the site check and as far as he knew, there were no burials in the vicinity of the project area.

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

CULTURAL ASSESSMEMNT

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

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APPENDIX A: INITIAL INQUIREY LETTERS

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 23, 2010

Clyde Nāmu'o, Director
C/o Office of Hawaiian Affairs
711 Kapi'olani Blvd, Suite 500
Honolulu, HI 96813

Dear Mr. Nāmu'o:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. Archaeological reports conducted in the area can be found on file at the SHPD office. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)
Cc: Phyllis Cayan, SHPD; George Kaeliwai, Hawaiian Civic Club of 'Ewa; Leimaile Quitevis, O'ahu Burial Council.

Ph: 808-597-1182 SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 23, 2010

George Kaeliwai, Jr.
Hawaiian Civic Club of 'Ewa
2460-A Na'ai Street
Honolulu, HI 96819

Dear Sir:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)

Ph: 808-597-1182 SCS... SERVING ALL YOUR *ARCHAEOLOGICAL* NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

A2

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 23, 2010

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

Dear Ms. Cayan:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)

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A3

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

April 22, 2010

Ms. Leimaile Quitevis
O'ahu Island Burial Council
leimaile.q@gmail.com

Dear Ms. Quitevis:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)

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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

APPENDIX B: BURIAL NOYICES

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII, }
County of Maui. } ss.

Rhonda M. Kurohara being duly sworn deposes and says,that she is in Advertising Sales of the Maui Publishing Co., Ltd., publishers of THE MAUI NEWS, a newspaper published in Wailuku, County of Maui, State of Hawaii; that the ordered publication as to

CULTURAL IMPACT ASSESSMENT NOTICE

of which the annexed is a true and correct printed notice, was published 3 times in THE MAUI NEWS, aforesaid, commencing on the 28th day of April, 2010, and ending on the 2nd day of May, 2010, (both days inclusive), to-wit: on

April 28, 29; May 2, 2010

and that affiant is not a party to or in any way interested in the above entitled matter.

This 1 page Cultural Impact, dated April 28, 29; May 2, 2010, was subscribed and sworn to before me this 3rd day of May, 2010, in the Second Circuit of the State of Hawaii, by Rhonda M. Kurohara

Notary Public, Second Judicial Circuit, State of Hawaii

BETTY E. UEHARA
My commission expires 09-26-11

BETTY E. UEHARA NOTARY PUBLIC No. 93-344 STATE OF HAWAII

1140

CULTURAL IMPACT ASSESSMENT NOTICE

Information requested by SCS of cultural resources or on-going cultural activities on or near this parcel in Campbell Industrial Park TMK: 9-1-32:084 por.

Please respond within 30 days to SCS at (808) 597-1182.

(MN: Apr. 28., 29; May 2, 2010)

B1

IN THE MATTER OF

CULTURAL IMPACT ASSESSMENT NOTICE

CULTURAL IMPACT ASSESSMENT NOTICE: Information requested by SCS of cultural resources or on-going cultural activities on or near this parcel in Campbell Industrial Park TMK: 9-1-32:084 por. Please respond within 30 days to SCS at (808) 597-1182. (Hon. Adv.: Apr. 28, 29; May. 2, 2010) (A-810878)

1140

STATE OF HAWAII
City and County of Honolulu

AFFIDAVIT OF PUBLICATION

ss.

Grace Santos being duly sworn deposes and says that she is a clerk, duly authorized to execute this affidavit of THE HONOLULU ADVERTISER, a division of GANNETT PACIFIC CORPORATION, that said newspaper is a newspaper of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspaper as follows

04/28/2010 The Honolulu Advertiser
04/29/2010 The Honolulu Advertiser
05/02/2010 The Honolulu Advertiser

and that affiant is not a party to or in any way interested in the above entitled matter.

Grace Santos

Subscribed and sworn to before me this 2nd day of May A.D. 2010

JEANETTE T. CHING NOTARY PUBLIC No. 98-321 STATE OF HAWAII

Notary Public of the First Judicial Circuit
State of Hawaii
My commission expires June 14, 2010

This one (1) - page Affidavit of Publication dated May 2, 2010, was subscribed and sworn to before me this 4th day of May, 20 10, in the First Circuit of the State of Hawaii, by

Jeanette T. Ching
Notary Public

JEANETTE T. CHING NOTARY PUBLIC No. 98-321 STATE OF HAWAII

810878

B2

APPENDIX C: STATE CORRESPONDENCE

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD10/4974

May 17, 2010

Leanne McGerty
Senior Archaeologist
711 Kapi'olani Blvd., Suite 975
Honolulu, HI 96813

RE: Cultural Impact Assessment Consultation
Phycal Algae Pilot Project
Campbell Industrial Park, O'ahu
Tax Map Key: (1) 9-1-032:084

Aloha e Ms. McGerty:

The Office of Hawaiian Affairs (OHA) is in receipt of your April 23, 2010 letter initiating consultation and seeking comments ahead of a cultural impact assessment for the proposed project to develop a Phycal Algae Pilot Project in the Campbell Industrial Park area.

To help us better provide you with a more thorough consultation; please assist us with additional information such as an overview of the project, the physical layout of the project and any other details you think might help us.

OHA recommends consultation be initiated with the following organizations who may be willing to share their mana'o regarding this assessment: Shad Kane, Hawaiian culture expert and member of Ahahui Siwila Hawai'i O Kapolei Hawaiian Civic Club, and Michael K. Lee, cultural practitioner.

Finally, we request the applicant's assurances that should iwi kūpuna or Native Hawaiian cultural or traditional deposits be found during the construction of the project, work will cease, and the State Historic Preservation Department (SHPD/DLNR) will be contacted pursuant to applicable law. OHA would also like to be notified and consulted if burials are found.

Thank you for the opportunity to comment. Should you have any questions, please contact Kathryn Keala at 594-1848 or kathyk@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Chief Executive Officer

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

May 10, 2010

LOG NO: 2010.1873
DOC. NO: 1005PC003

MEMORANDUM

TO: Leann McGerty, Senior Archaeologist @ SCS Inc. pwc
711 Kapiolani Blvd., Suite 975, Honolulu, HI 96813

FROM: Phyllis Coochie Cayan, History and Culture Branch Chief P. Coochie Cayan

Subject: Cultural Impact Assessment (CIA) of approximately 5,000 ft. in Campbell Industrial Park, 'Ewa District, Honouliuli Ahupua'a, O'ahu Island. TMK: [1] 9-1-032:084 por.

This memo is in response to your request to help assess potential impacts to cultural practices, beliefs and resources as a result of the proposed development of approximately 5,000 ft. in the Campbell Industrial Park for a Phycal Algae Pilot Project. Your map indicates that the project area has been heavily disturbed by current industrial use for many years and/or is open 'scrub' land.

The department recommends you contact the following folks who may have cultural, traditional and/or historical knowledge of this area. Also, they may be able to refer you to others with the knowledge you seek of the project area:

1. Senator Will Espero — Hawaii State Capitol #207 — Phone: 808-586-6360
2. Rep. Rida Cabanilla — Hawaii State Capitol #442 — Phone: 808-586-6080
3. Ewa-Ewa Beach Neighborhood Board — see City & County website for contact information
4. Na Kupuna at Ewa Senior Citizens, the Catholic Church, etc.
5. Mr. Shad Kane — 92-1309 Uahanai Street, Kapolei, HI 96707
6. Mrs. Nettie Tiffany — c/o Ko Olina Resort, Kapolei, HI 96707
7. Mr. Chuck Erhorn — 507 Koko Isle Circle, Honolulu, HI 96825 ehrhorn@lava.net

Any questions, please call me at 808-692-8015 or via email Phyllis.L.Cayan@hawaii.gov

APPENDIX D: FOLLOW-UP INQUIREY LETTERS

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Senato Will Expero
c/o Hawai'i State Capitol, Rm. 207
Honolulu, HawaiiI 96813

May 18, 2010

Dear Senator Espero:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. Archaeological reports conducted in the area can be found on file at the SHPD office. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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

Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)

D1

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

'Ewa Hui Aloha Senior Citizens
e/o PaulKelly
94-249 Ihumoe Place
Mililani, HI 96789

May 18, 2010

Dear Sir/Madam:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. Archaeological reports conducted in the area can be found on file at the SHPD office. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Senior Archaeologist
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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

D2

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Mr. Shad Kane
92-1309Uahanai Street
Kapolei, HI 96707

May 18, 2010

Dear Mr. Kane:

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Leann McGerty

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Senior Archaeologist
Enclosures (1)

Ph: 808-597-1182 / SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS / Fax: 808-597-1183
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Mrs Nettie Tiffany
c/o Ko Olina Resort
Kapolei, HI 96707

May 18, 2010

Dear Mrs. Tiffany:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. Archaeological reports conducted in the area can be found on file at the SHPD office. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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Senior Archaeologist
Enclosures (1)

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SCIENTIFIC CONSULTANT SERVICES, INC.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Mr. Chuck Erhorn
507 Koko Osle Circle
Honolulu, HI 96825

May 18, 2010

Dear Mr. Erhorn:

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Sincerely yours,

Leann McGerty

Leann McGerty,
Senior Archaeologist
Enclosures (1)

D5

SCIENTIFIC CONSULTANT SERVICES, INC.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

'Ewa Beach Neighborhood Board
c/o 'Ewa Beach Library
91-950 North Road
'Ewa Beach, HI 96706

May 18, 2010

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Enclosures (1)

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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

D6

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd. Suite 975 Honolulu, Hawai'i 96813

Rep. Rida Cabanilla
c/o Hawai'i State Capitol, Rm. 442
Honolulu, HawaiiI 96813

May 18, 2010

Dear Representative Cabanilla:

Scientific Consultant Services, Inc. (SCS) has been contracted by Group 70 International, Inc., to conduct a Cultural Impact Assessment (CIA) of approximately 5,000 ft.^{2}in Campbell Industrial Park,'Ewa District, Honouliuli Ahupua'a, O'ahu Island [TMK:9-1-032:084 por.]. According to documents supplied by Group 70 International, Inc., the project proposes to develop a Phycal Algae Pilot Project SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. Archaeological reports conducted in the area can be found on file at the SHPD office. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

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