

DRAFT ENVIRONMENTAL ASSESSMENT

KONA CARBON PROJECT

TMKs: (3rd) 6-1-006:007
South Kohala District, Hawai‘i Island, State of Hawai‘i

March 2009

Prepared for:

Department of Hawaiian Home Lands
Hawaiian Homes Commission
P.O. Box 1879
Honolulu, Hawaii 96805

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South Kohala District, Hawai'i Island, State of Hawai'i

APPLICANT:

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CLASS OF ACTION:

Use of State Land

This document is prepared pursuant to:
The Hawai'i Environmental Policy Act,
Chapter 343, Hawai'i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai'i Department of Health Administrative Rules (HAR)

TABLE OF CONTENTS

SUMMARY	ii
PART 1: PROJECT DESCRIPTION, LOCATION AND E.A. PROCESS	1
1.1 Project Description, Location and Property Ownership	1
1.2 Environmental Assessment Process.....	3
1.3 Public Involvement and Agency Coordination	7
PART 2: ALTERNATIVES.....	8
2.1 Proposed Action	8
2.2 No Action.....	8
2.3 Alternate Site	8
PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION	9
3.1 Physical Environment	9
3.1.1 Geology, Soils and Geologic Hazard.....	9
3.1.2 Drainage, Water Features and Water Quality	10
3.1.3 Flora, Fauna, and Ecosystems	11
3.1.4 Noise and Scenic Resources	12
3.1.5 Air Quality	13
3.1.6 Hazardous Substances, Toxic Waste and Hazardous Conditions.....	15
3.2 Socioeconomic and Cultural	15
3.2.1 Socioeconomic Characteristics	15
3.2.2 Cultural and Archaeological Resources	17
3.3 Infrastructure	26
3.3.1 Utilities and Public Services	26
3.3.2 Transportation.....	27
3.4 Secondary and Cumulative Impacts.....	28
3.5 Required Permits and Approvals	29
3.6 Consistency With Government Plans and Policies.....	30
3.6.1 Hawai‘i State Plan.....	30
3.6.2 Hawai‘i County General Plan.....	30
3.6.3 Hawai‘i County Regulations	32
3.6.4 Hawai‘i State Land Use Law	32
PART 4: DETERMINATION	33
PART 5: FINDINGS AND REASONS	33
REFERENCES	35
LIST OF TABLES	
TABLE 1 Plant Species Detected.....	12
TABLE 2 Selected Socioeconomic Characteristics.....	16
TABLE 3 Archaeological Sites	24

LIST OF FIGURES

FIGURE 1	General Location Map	2
FIGURE 2	TMK Map	3
FIGURE 3	Site Plan	4
FIGURE 4a	Regional Site Airphoto	5
FIGURE 4b	Kaei Hana II Subdivision Airphoto	5
FIGURE 4c	Project Site Photos	6
FIGURE 5	DHHL Planning Areas.....	16

APPENDIX 1a	Comments in Response to Pre-Consultation
APPENDIX 2	Archaeological Inventory Survey
APPENDIX 3	Air Quality Permit Material

SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Kona Carbon LLC (aka Big Island Carbon LLC) proposes to lease lands from the Department of Hawaiian Home Lands (DHHL) and construct production facilities on TMK (3rd) 6-1-006:007, a 12.96-acre parcel in the DHHL's Kaei Hana II Industrial Subdivision in Kawaihae. The proposed processing facility would require approximately one acre, with the shell stockpile requiring up to an additional five acres. Another business entity may eventually sublease the remainder of the subject property for other purposes. The parcel is located immediately south of the Hamakua Macadamia Nut Processing Plant, from which Kona Carbon would acquire macadamia nut shells. The shells would be put through a series of processing steps to convert them to activated carbon for sale and shipment to chemical and pharmaceutical processors outside of the Hawaiian Islands. The proposed facility would also generate a biofuel product that would be used to fuel the processing equipment, thereby reducing demand on local energy supplies.

The property's zoning is Industrial and the parcel is part of a developing industrial park containing warehouses, manufacturers, processors, and retail and wholesale operations. The processing would have a minimal impact on local infrastructure, including roads, water supplies and electrical power. No sensitive biological or archaeological resources are present and there are no traditional cultural uses on the industrially zoned property, which has formerly experienced grazing and landscaping uses. Given adherence to conditions related to matters such as landscape buffers and coordination with agencies during the Plan Approval process and construction, no adverse impacts are foreseen. The project includes appropriate plans and facilities to prevent and respond effectively to accidental fires.

PART 1: PROJECT DESCRIPTION, LOCATION AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Description, Location and Property Ownership

Kona Carbon LLC (aka Big Island Carbon LLC) proposes to lease lands from the Department of Hawaiian Home Lands (DHHL) and construct production facilities on TMK (3rd) 6-1-006:007, a 12.96-acre parcel in the DHHL's Kaei Hana II Industrial Subdivision in Kawaihae, located immediately south of the Hamakua Macadamia Nut Processing Plant (Figures 1-4).

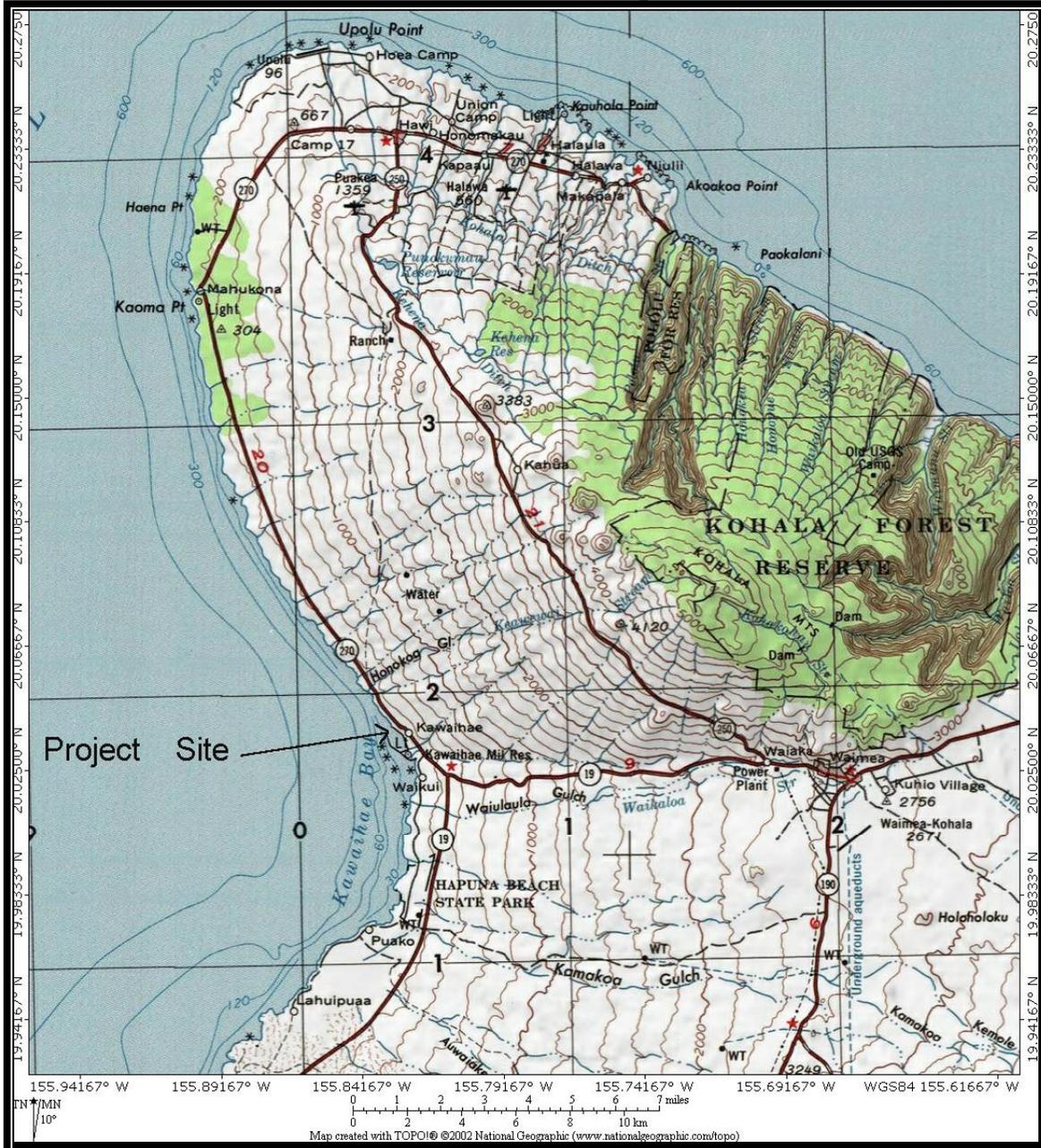
Kona Carbon would acquire macadamia nut shells from the Hamakua Macadamia Nut plant and other macadamia nut processors on Hawai'i Island. The shells would be put through a series of processing steps to convert them to activated carbon for sale and shipment to chemical and pharmaceutical processors outside of the Hawaiian Islands.

The proposed facility would process approximately 10,000 tons of macadamia nut shells annually and employ 20 to 30 workers. Feedstock and product would be transported to and from the site via commercial trucks. Shell processing would also generate a biofuel product which would be used to fuel the processing equipment. The processing would have a minimal impact on local infrastructure, including water supplies and electrical power.

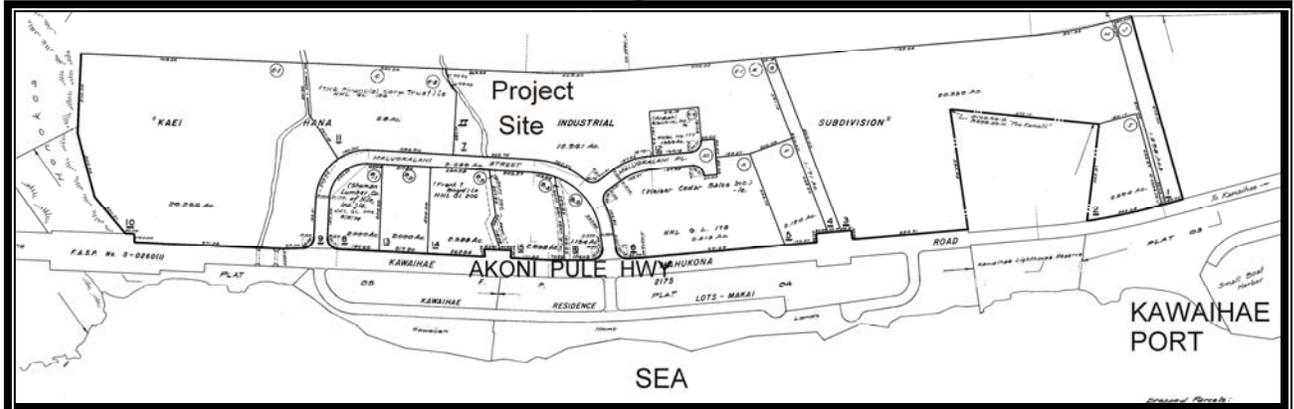
The Kaei Hana II Industrial Subdivision is a 90-acre portion of the 10,000-acre Kawaihae property that belongs to the State Department of Hawaiian Homelands and extends from the shoreline to the Kohala Mountains at an elevation of 4,500 feet. The property has industrial zoning and is part of a developing industrial park containing warehouses, manufacturers, processors, and retail and wholesale operations. The proposed processing facility would require approximately one acre, with the macadamia shell stock pile requiring up to an additional five acres. The fuel stock is macadamia shells, which unlike macadamia nut husks do not spontaneously combust and are difficult to ignite, thereby imposing only a minimal fire risk. The project includes plans to prevent fires and a ring fire main with a series of hydrants to respond effectively to accidental fires. Currently, much of the surrounding land outside of the industrial subdivision is undeveloped and leased to Kahua Ranch, Ltd., for grazing purposes.

Another business entity may eventually sublease the remaining portion of the subject property for other purposes, which may be subject to additional compliance under Chapter 343, HRS, if appropriate.

Figure 1
General Location Map



**Figure 2
TMK Map**



Portion: TMK 6-1-006:

1.2 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the anticipated finding that no significant impacts are expected to occur; Part 5 lists each criterion and presents the preliminary findings for each made by the Department of Hawaiian Home Lands, Hawaiian Homes Commission, the approving agency. If, after considering comments to the Draft EA, the approving agency concludes that, as anticipated, no significant impacts would be expected to occur, then the agency will issue a Finding of No Significant Impact (FONSI), and the action will be permitted to occur. If the agency concludes that significant impacts are expected to occur as a result of the Proposed Action, then an Environmental Impact Statement (EIS) will be prepared.

**Figure 3
Site Plan**

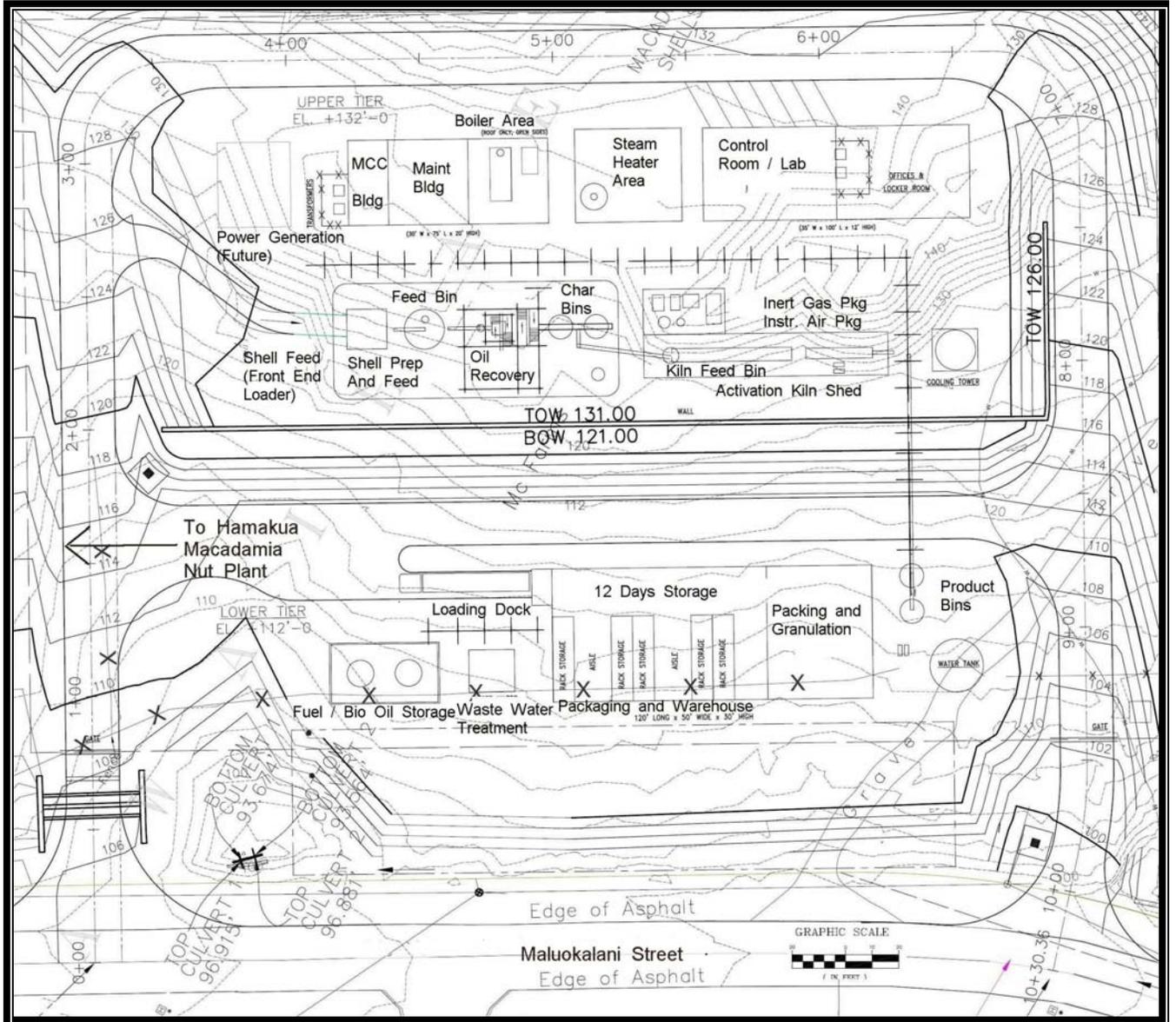


Figure 4a Regional Airphoto



Figure 4b Kaei Hana II Subdivision Airphoto



Source: Microsoft Virtual Earth ©

Figure 4c Project Site Photos



1.3 Public Involvement and Agency Coordination

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

State:

Department of Land and Natural Resources
State Historic Preservation Division
Department of Health
Department of Transportation
Department of Hawaiian Home Lands
Office of Hawaiian Affairs, Honolulu and West Hawai'i

County:

Planning Department
Department of Public Works
Department of Environmental Management
Department of Water Supply
Police Department
County Council

Other:

Kona-Kohala Chamber of Commerce
Sierra Club
Kona Hawaiian Civic Club
Hawai'i Leeward Planning Conference
Pu'ukohola National Historic Site
Kawaihae Puaka'ilima Community Association

Copies of communications received during early consultation are contained in Appendix 1a.

PART 2: ALTERNATIVES

2.1 Action Alternatives

The action under consideration is development of an activated carbon processing plant utilizing DHHL property, which will be called the *Proposed Action* in this document.

2.2 No Action

Under the No Action Alternative, the DHHL land would not be used and the applicant would be denied the use of the property for a plant. DHHL would be obliged to find another industrial tenant for the site or it would not obtain the lease rents that are critical for the development of homes for its beneficiaries.

2.3 Alternate Site

The plant is ideally located with respect to its primary raw material, macadamia nut shells, with the Hamakua Macadamia Nut Company located adjacent. An alternate site in a different industrial subdivision in Kona or Hilo could likely be found and utilized, but it would lack the advantages of synergy with the adjacent macadamia nut processing plant tenant, and it would thus involve more trucking and transportation effects. As the Kaei Hana II Industrial Subdivision was developed for industrial purposes, and the Proposed Action is in conformance with all zoning and permits, there would be little benefit to any alternate site, and it would be an inconvenience and expense to this proposed commercial enterprise.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The property being leased is referred to throughout this EA as the *project site*. The term *project area* is used to describe the general environs in this part of Kawaihae.

The project site is a 12.961-acre parcel located on the eastern side of Maluokalani Street and Maluokalani Place in the 90-acre Kaei Hana II Industrial Subdivision Department of Hawaiian Home Lands in Kawaihae. The vegetation of the project area has been previously disturbed by cattle grazing in the past and in some areas, more recently, by bulldozing. The site was used by the previous tenant for a landscaping business. A portion of the northern portion of the subject property is currently being used to stockpile macadamia nut shells from Hamakua Macadamia Nut Company (see Figure 4c).

Adjacent land use consists of industrial activities, including the Hamakua Macadamia Nut Company to the north, the Kawaihae Trade Center to the southwest, and the Kawaihae Concrete Company and a boat storage warehouse to the west. The property to the east is leased by Kahua Ranch and is vacant except for several stockpiles of scrap metal and large eucalyptus logs. The property is bounded to the south by a four-wheel-drive road heading mauka, and vacant land.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

Environmental Setting

The climate in the area is mild and arid, with an average annual rainfall of less than 10 inches (UH Hilo-Geography 1998:57). Geologically, the project site is located on the flanks of Kohala Volcano. The surface of the property consists of a lava flow that occurred more than 10,000 years before the present (Wolfe and Morris 1996). The project site soil is classified by the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) as Kawaihae very rocky, very fine sandy loam (KOC). The KOC soil is typically found up to 2 inches thick, underlain by up to 31 inches of stony loam, on slopes of 6 to 12 percent. This pH neutral soil typically contains up to 30 percent rock outcroppings. Its permeability is moderate, runoff is medium and the erosion hazard moderate. The capability subclass for KOC is VIIs, which denotes soils that have very severe limitations that make them very unsuited for cultivation and restrict their use to mainly pasture and woodland (U.S. Soil Conservation Service 1973).

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the United States Geological Survey in this area of Kohala is zone 9 on a scale of ascending risk from 9 to 1, although the project site is close to the boundary of lava flows from Mauna Kea in zone 8 (Heliker 1990:23). The low hazard risk is based on the fact that Kohala Volcano, the oldest volcano on the island, has not erupted for 60,000 years and is possibly extinct. Mauna Kea last erupted about 4,500 years ago.

In terms of seismic risk, the entire Island of Hawai'i is rated Zone 4 Seismic Hazard (*Uniform Building Code, 1997 Edition*, Figure 16-2). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 15, 2006, demonstrated. The project site does not appear to be subject to subsidence, landslides or other forms of mass wasting.

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the Proposed Action, and the Proposed Action is not imprudent to implement. Appropriate seismic standards would be followed during any building construction, per building codes.

3.1.2 Drainage, Water Features and Water Quality

Existing Environment

The project area has no perennial surface water bodies. No known areas of local (non-stream related) flooding are present in the project area. The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 1551660137C (9/16/1988) shows that the project site is in Flood Zone X, outside of the 500-year flood plain. Maps printed by the Pacific Tsunami Warning Center and the Hawai'i County Civil Defense Agency show the parcel outside and mauka of the area that should be evacuated during a tsunami warning (<http://www5.hawaii.gov/tsunami/maps.asp>).

Impacts and Mitigation Measures

The industrial project would be required to follow County regulations and policies, among them Chapters 10 and 27 of the Hawai'i County Code. Chapter 27 requires the difference between pre-development and post-development runoff to be contained onsite, limiting impacts. Furthermore, Chapter 10 requires measures to prevent erosion and sedimentation. A grading permit was applied for in January 2009, and it included a number of Best Management Practices to avoid flooding, erosion, and sedimentation.

Because the project will disturb more than one acre of soil, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the Department of Health by the contractor before the project commences. This permit requires the completion of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the emplacement of a number of best management practices (BMPs) for the project. These BMPs may include, but will not be limited to, the following:

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

3.1.3 Flora, Fauna and Ecosystems

Existing Environment

The natural vegetation of this part of coastal South Kohala was most likely coastal shrubland dominated by ‘ilima (*Sida fallax*) (Gagne and Cuddihy 1990). These original communities, however, have been destroyed or heavily degraded by cattle grazing and clearing for residences, and the vegetation of the project area is now a fairly uniform savanna of kiawe (*Prosopis pallida*) and Buffel grass (*Cenchrus ciliaris*), with the remnant ‘ilima indicative of the preexisting ecosystem.

Much of the northern portion of the property (where the proposed action would occur) is covered by large mounds of discarded macadamia nut shells, while the southern portion of the property is largely unmodified except where bulldozing has occurred along a wire

fence running along the western and southern boundaries of the parcel. No trace of the original vegetation remains in the project area. An inspection in January 2009 found only eight species, the majority of which were weed species and the remainder very common native plants that grow in disturbed sites (Table 1). The cleared, sparsely vegetated industrial lot does not serve as habitat for native animals. Common Mynas (*Acroditheres tristis*) and Rock Doves or domestic pigeons (*Columba livia*), probably attracted by the macadamia shells, were observed on the site.

Table 1. Plant Species Detected

Scientific Name	Family	Common Name	Life Form	Status*
<i>Cenchrus ciliaris</i>	Poaceae	Buffel grass	grass	A
<i>Leucaena leucocephala</i>	Fabaceae	Haole koa	Tree	A
<i>Pennisetum setaceum</i>	Poaceae	Fountain grass	grass	A
<i>Portulaca oleracea</i>	Portulacaceae	Pig weed	Herb	A
<i>Prosopis pallida</i>	Fabaceae	Kiawe	tree	A
<i>Ricinus communis</i>	Euphorbiaceae	Castor bean	Shrub	A
<i>Sida fallax</i>	Malvaceae	'Ilima	shrub	I
<i>Waltheria indica</i>	Sterculiaceae	'Uhaloa	shrub	I

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

Impacts and Mitigation Measures

Because of the lack of native ecosystems, or threatened or endangered species, the Proposed Action is not likely to have adverse impacts to biological resources.

3.1.4 Noise and Scenic Resources

Environmental Setting

Noise on the project site is moderate and derived mainly from motor vehicles with occasional noise from residential, commercial and industrial activities, including from Kawaihae Harbor located about one-half mile to the south, and from road maintenance activities.

The project area does not contain any sites that are considered significant for their scenic character in the Hawai'i County General Plan. The area is designated as an industrial area, a land use where scenic considerations are not paramount.

Impacts and Mitigation Measures

The Proposed Action would not measurably affect noise levels or scenic sites recognized in the Hawai'i County General Plan.

3.1.5 Air Quality

Existing Meteorology and Air Quality

The mild temperatures and minimal diurnal temperature variation of the project area are typical of the Hawaiian islands. The area is very arid with annual rainfall less than 10 inches. Local winds demonstrate a typical land-sea breeze regime. Daytime winds are predominantly from the west, i.e., onshore, while nighttime winds are more northeasterly, coming downslope off the land.

While there are no DOH air monitoring stations in the immediate vicinity of the proposed facility, air quality in this relatively remote area can be considered to be in compliance with the State's ambient air quality standards. The nearest DOH monitoring station is at Kealahou, approximately 45 miles south of Kawaihae. Kealahou is a more populated area with more motor vehicle traffic but has consistently demonstrated compliance with ambient standards over the years. With the lack of urbanization and industrialization in the project area, one can safely assume that air quality is currently quite good. Air pollution in West Hawai'i is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic aerosol haze (vog) that persistently blankets North and South Kona. The most noticeable degradation of air quality occurs when occasional southerly winds carry the vog into the area.

Impacts and Mitigation Measures

Kona Carbon proposes to construct and operate a 450 lb/hr activated carbon facility. The principal emission units associated with this facility will be a 9.9 million BTU (British thermal units) per hour (MMBTU/hr) oil/gas fired boiler and a 7 MMBTU/hr oil/gas fired kiln. These units will be fired on No. 2 fuel oil, pyrolysis oil or process gas.

The Hawai'i Department of Health (DOH) has an U.S. Environmental Protection Agency (EPA) approved Title V operating permit program under the U.S. Clean Air Act, which is implemented in Chapter 11-60.1 of Hawai'i Administrative Rules (HAR). Air pollution sources subject to the federal Title V requirements are called "covered sources" in Hawai'i's rules. Sources not subject to Title V are called "noncovered sources" and must meet the requirements of Subchapter 4 as well as other general air pollution control provisions in Chapter 11-60.1.

Criteria pollutants include carbon monoxide, sulfur dioxide, oxides of nitrogen, ozone, particulate matter and lead. The proposed facility's projected emissions of criteria pollutants are less than 100 tons per year, its emissions of hazardous air pollutants are less than 10 tons per year individually and 25 tons per year in total. The facility is not subject to any new source performance standards under Section 111 of the Clean Air Act. It is therefore not a covered source under Hawai'i's rules, but is rather considered a noncovered source. As such it has already applied for and received a Noncovered Source Permit. Appendix 3 includes relevant information from the Air Quality Permit.

The facility is also subject to Hawai'i's ambient air quality standards as promulgated in HAR Chapter 11-59.1. In order to obtain the aforementioned permit, the facility had to demonstrate that it would comply with those standards.

The typical local wind regime, with westerly daytime winds and northeasterly winds at night, suggests that emissions from the plant would be transported by those winds in the directions indicated.

Short-term impacts would be primarily associated with construction of the new facility. Given the arid nature of the area, adequate fugitive dust control is warranted during construction activities, especially during initial site preparation. Dust control measures will be required and implemented as part of the best management practices associated with the grading permit.

Long-term air quality impacts would be primarily associated with the exhaust emissions from the boiler and kiln. As noted above, State permitting requires that these units comply with ambient air quality standards at all times. Modeling analysis submitted as part of the Noncovered Source application (see Appendix 3) demonstrated the facility's compliance with those standards.

Based on the foregoing discussion, it is concluded that the proposed facility will have a minimal impact on local air quality both on a short and long-term basis and will comply with existing State and federal ambient air quality standards.

3.1.6 Hazardous Substances, Toxic Waste and Hazardous Conditions

Environmental Setting, Impacts and Mitigation Measures

A Phase I Environmental Site Assessment (ESA) was performed for the project site by Environmental Resources Management. A Phase I Environmental Site Assessment aims to identify *recognized environmental conditions* that exist on the project site and existing *recognized environmental conditions* in the project area that have the potential to impact the subject property. The term *recognized environmental conditions* means the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the property or into the ground, groundwater, or surface water of the property. The ESA found that solid waste materials buried within the northern portion of the subject property by a former tenant presented the only recognized environmental condition. The applicant has reported that the material was subsequently cleaned up and the Department of Health issued a letter stating that no further action is required.

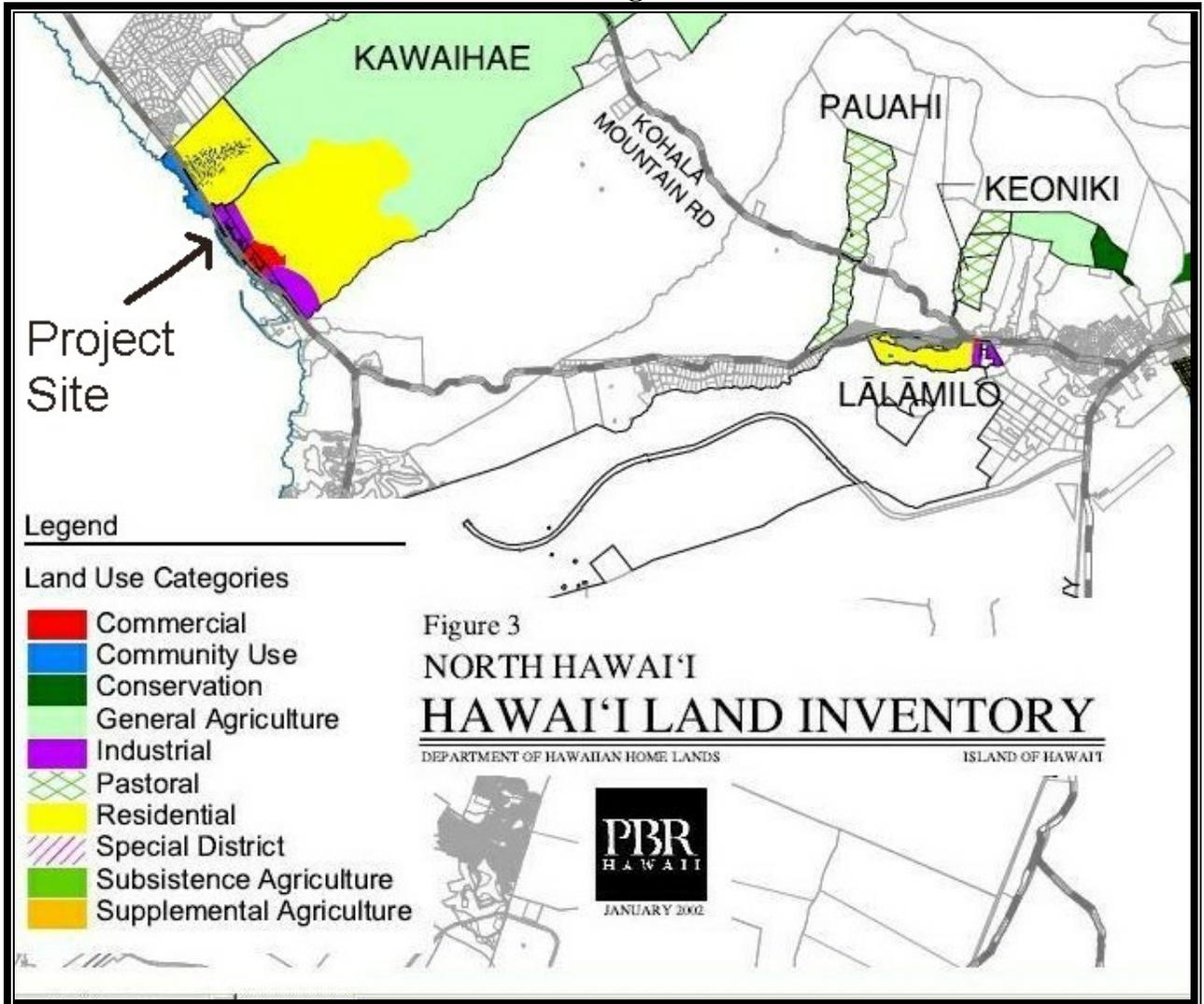
3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics

The project would affect the district of South Kohala and more specifically the town of Kawaihae, which has a small residential population and several commercial centers. Kawaihae also has a deep-draft harbor, one of only two on Hawai'i Island and the only one located on its western or leeward side.

As stated in Section 1, the project site is a 12.961-acre parcel located on the eastern side of Maluokalani Street and Maluokalani Place in the 90-acre Kaei Hana II Industrial Subdivision Department of Hawaiian Home Lands in Kawaihae. The subdivision is located in the southwest corner of a 10,152-acre tract of DHHL land which stretches from sea level to the 4,600-foot elevation. In addition to the industrial area, the 1992 DHHL plan for the tract also includes 675 single-family home lots, a school, park, golf course, town center and a bypass highway. A more recent DHHL plan is more general about the area, with commercial, residential, agricultural and community use components (PBR 2002) (Figure 5). Much of the tract is undeveloped and used for cattle and horse grazing. Constraints limiting immediate development include the high cost of providing water and beneficiary preferences for the Lalamilo and Honokaia DHHL tracts located in the cooler elevations of Waimea.

**Figure 5
DHHL Planning**



Source: PBR Hawaii. 2002. *Hawai'i Island Plan, Final Report*. Hawai'i DHHL.

Table 2 provides information on the socioeconomic characteristics of the district of South Kohala along with those of Hawai'i County as a whole for comparison, from the United States 2000 Census of Population.

Impacts

The Proposed Action would facilitate development of the property in conformance with its designated industrial zoning and provide some level of public benefit through the orderly development of private industrial facilities providing jobs and tax revenues, in keeping with State and County plans.

Table 2: Selected Socioeconomic Characteristics

CHARACTERISTIC	ISLAND OF HAWAI'I	SOUTH KOHALA
Total Population	148,677	13,131
Percent Caucasian	31.5	38.8
Percent Asian	26.7	18.1
Percent Hawaiian	9.7	12.8
Percent Two or More Races	28.4	28.8
Median Age (Years)	38.6	36.2
Percent Under 18 Years	26.1	29.1
Percent 65 Years and Over	13.5	9.0
Percent Households with Children	21.3	34.9
Average Household Size	2.75	2.81
Median Family Income	\$39,805	\$56,905
Percentage of Population Below 100% of Federal Poverty Level	15.7	8.5
Percent Housing Vacant	15.5	19.8

Source: U.S. Bureau of the Census. May 2001. *Profiles of General Demographic Characteristics, 2000 Census of Population and Housing, Hawai'i*. (U.S. Census Bureau Web Page).

Future use of DHHL land mauka of the industrial subdivision will need to consider the industrial land uses occurring in makai areas and adopt appropriate open space buffers for visual and noise impacts, which may serve multiple uses.

3.2.2 Cultural and Archaeological Resources

Cultural and Historical Background

The project site is located in the ahupua'a of Kawaihae 1st in the district of South Kohala. The naming of the ahupua'a may have been influenced by the arid nature of the area's coastline as Kawaihae literally translates as "the water [of] wrath (people are said to have fought for water from a pool in this arid area)" (Pukui et al 1974:97).

An archaeological inventory survey done for the subject parcel by Rechtman Consulting, LLC is included in Appendix 2 and summarized below. Most scholarly references have been removed from the following summary for readability but may be found in Appendix 2.

The concept of the ahupua‘a was established in Hawai‘i during the 15th century, adding a new component to what was already a well-stratified society. Ahupua‘a were usually wedge or pie-shaped, encompassing all of the eco-zones from the mountains to the sea and extending several hundred yards beyond the shoreline, assuring a diverse subsistence resource base. This land unit became the equivalent of a local community with its own social, economic and political significance. In pre-Western contact times, Kawaihae was a single ahupua‘a but was split into two separate divisions during the 1800s.

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

According to the model developed by Kirch (1985), the Settlement or Colonization period of Hawai‘i was between A.D. 300-600, with colonists possibly from the southern Marquesas Islands. Early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Order was kept through adherence to their ancient and ingrained philosophy of life and through the principle of genealogical seniority. According to Fornander (1969), Hawaiians brought from their homeland a variety of Polynesian customs including the major gods of Kane, Ku and Lono; the kapu system of law and order; pu‘uhonua or places of refuge or asylum; the ‘aumakua concept of a family or ancestral spirit and the concept of mana.

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

The Expansion Period from A.D. 1100 to 1650 saw an increase in social stratification and major socioeconomic changes. It also was a time of expansive settling, with the development of the most favorable windward areas as well as more marginal areas on the island’s leeward side. This was the time of the greatest population growth as large

irrigated field systems were developed and expanded into more arid areas. Loko or fishpond aquaculture also flourished during this period.

The second major migration to Hawai‘i also occurred during the Expansion Period, with the settlers for this expansion coming from Tahiti in the Society Islands.

An increase in war marked the Proto-Historic Period (A.D. 1650-1795), both locally and between islands. Some of that warfare involved South Kohala and the Kawaihae area. Shortly before this period, around 1600, Maui chief Kamalalawalu sent spies to areas that included Kawaihae to gauge their population and how many warriors it would take to conquer the areas. According to one account:

The spies sent by Kama-lala-walu went to Hawaii and landed at Kawaihae in the evening. Ka-uhi-o-ka-lani ran about that same evening and returned before the canoes were dismantled and placed in the house. The keepers of the gods at Mailekini were servants of Kama, and so they concealed the canoes of the spies...[Kamakau 1992:56].

However, during the spies’ visit to Kohala, which according to Kamakau was a “thickly-populated land,” they found many empty houses because most of the men were in upland areas taking part in sports competitions. Kamalalawalu’s forces first defeated the residents they found in the northern part of Kohala but when they arrived at Kawaihae they again found empty houses because their residents were attending services at Mailekini Heiau in Waimea. The grassy plains of Waimea soon became the setting for a battle between the Maui warriors and the forces of chiefs from Kohala, Waimea, Kona, Puna and Ka‘u. The combined Hawai‘i Island forces slew Kamalalawalu and many of his chiefs and warriors, with the remainder making their way back to Maui.

North Kohala is also known as the birthplace of Kamehameha I, who was born in the ahupua‘a of Kokoiki during the reign of Kalaniopu‘u. It has been said that when he was born, an army was assembling on the leeward Kohala coast, preparing for an attack on Maui, and his birth occurred on a night filled with rain, thunder and lightning. Also at that time, Maui chief Kekaulike was involved in a battle with Alapa‘i of Kona. During the conflict, Kekaulike’s men cut down trees in Kona and, according to Kamakau, all of the coconut trees in Kawaihae. According to Kamakau, he also “slaughtered the country people of Kohala” before seizing their possessions and returning to Maui, where he soon became ill and surrendered his power to Kamehamehanui.

This period was one of continual wartime strife. Ke‘eaumoku set up a fort at Pololu and Honokane where he was attacked by Kalaniopu‘u, and then relocated to Maui. Kalaniopu‘u also conquered East Maui, defeating Kamehamehanui, who was Kekaulike’s successor and also Kalaiopu‘u’s wife’s brother. Kalaniopu‘u appointed one of his chiefs,

Puna, to be governor of Hana and Kipahulu. When Kamehamehanui died of illness in 1766, he was succeeded as Maui's king by Kahekili. At about that time, Ke'eamoku took Kamehamehanui's widow, Namahana, who was Kamehameha's cousin, as his wife. Their daughter, Ka'ahumanu, who would eventually become the favorite wife of Kamehameha I, was born in a cave at the base of Pu'u Kau'iki in 1768.

In 1775, Kalaniopu'u and his forces from Hana overran the neighboring Kaupo district and raided Molokai, Lanai, Kaho'olawe and parts of West Maui. Kamehameha's efforts at the battle of Kalaeoka'ilio near Kaupo earned him recognition as a great warrior and the name of Pai'ea (meaning hard-shelled crab) from Maui chiefs and warriors. Ka'ahumanu and her parents left Maui for Hawai'i Island during the battles between Kalaniopu'u and Kahekili.

Hawai'i's history took a sharp turn on January 18, 1778 with the arrival of British Capt. James Cook in the islands. On a return trip to Hawai'i 10 months later, with the Maui turmoil still raging, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai'i Island. Cook exchanged gifts with Kalaniopu'u at Kealakekua Bay the following January, and Cook left Hawai'i in February. However, Cook's ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

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

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

By 1796, Kamehameha had conquered every island kingdom except Kauai, but it wasn't until 1810, after Kaumuali'i of Kauai pledged his allegiance to Kamehameha, that all of the Hawaiian Islands were unified under a single ruler.

Kawaihae eventually became one of the royal centers of the island at which Kamehameha resided, and one where he could make use of trade with foreign ships to acquire guns and ammunition. It was also the site of Pu'ukohola Heiau, dedicated to the war god Kuka'ilimoku, which Kamehameha built on the advice of a soothsayer. Subjects came from across Kamehameha's lands by the thousands to help him build the heiau. When it was completed in 1791, Kamehameha sent for Keoua, ruler of Ka'u, who was then killed and placed within the heiau, thus cementing Kamehameha's rule over Hawai'i Island.

When in Kawaihae, Kamehameha stayed at Pelekane, located below Pu'ukohola. After his death in 1819, the royal residence consisted of multiple houses now occupied by his successor, Liholiho, also known as Kamehameha II. The missionary William Ellis observed 100 houses at Kawaihae in 1823, although it was unlikely that the area's dry climate supported enough agriculture to sustain the court and its entourage as well as the commoners living there.

The *Journal of a Trading Voyage Around the World* by an I. Iselin gave the following account of the Kawaihae area ca. 1806:

This bay of Toeigh is very open; an extensive reef runs near it nearly level with the water, and altogether it is no inviting place to anchor at. The country around it looks like a hilly barren desert; nothing grows within ten miles of it, except a few cocconut trees, of which a fine grove stands near the beach. The inhabitants and huts are thinly scattered along the shore, far less numerous than about [Kealakekua], and seem more indigent, indeed, having to go so far for their subsistence, they are not seldom in want of the supports of life.

Kawaihae was described by Handy and Handy as surrounded by an arid countryside:

The terrain immediately around [Kawaihae] is dry and barren but formerly much dry taro was grown beyond in the lower forest zone, which formerly extended from the Kohala Mountains much farther seaward over what is now open pasture land. Wet taro was grown also in small pockets of land wherever streams, even intermittent ones, flowed down from the mountains in the wet seasons.

Ellis said the coast north of Kawaihae was similarly dry, although it appeared that agriculture was taking place upland:

The coast was barren; the rock volcanic. The inhabitants were all fishermen. Mr. Thurston was informed, that the inhabitants of the plantations, about seven miles in the interior, were far more numerous than those of the sea-shore.

The historian John Papa I‘i noted that fishermen traded their wares for poi at Kawaihae:

Soon the fishing canoes from Kawaihae, the Kana lands, and Ooma, drew close to the ship to trade for the pa‘i‘ai (hard poi) carried on board, and shortly a great quantity of aku lay silvery-hued on the deck. The fishes were cut into pieces and mashed; and all those aboard fell to and ate, the women by themselves.

According to Ellis, salt was another product of the Kawaihae area:

The natives of this district manufacture large quantities of salt, by evaporating the sea water. We saw a number of their pans, in the disposition of which they display great ingenuity.

During this period there was a continuation of the trend toward intensification of agriculture, ali‘i-controlled aquaculture, settling of upland areas and development of traditional oral history. The Ku cult, luakini heiau and kapu system were at their peaks, but the influence of western civilization was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier was flourishing. That contributed to the breakdown of the traditional subsistence system, as farmers and fishermen were required to toil at logging which resulted in food shortages and a decline in population.

Following the death of Kamehameha I in 1819, the customary relaxing of kapu took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that heiau structures either be destroyed or left to deteriorate. The family worship of ‘aumakua images was allowed to continue.

The Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions as many of the ali‘i were eager to assimilate western-style dress and culture. But at the same time, the continuing sandalwood trade was becoming a heavier burden on commoners, as Ellis noted:

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

The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of Western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price.

The remainder of the 19th century saw significant changes in Kawaihae as the practice of trade led many to abandon traditional lifestyles. The result was a loss of population and resources, leaving one observer to describe the town as a “small dreary village” entirely lacking foliage except for “a few sickly cocoa-nit trees.”

The Mahele ‘Aina that took place in 1848 placed all land in Hawai‘i into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were “subject to the rights of the native tenants,” or those individuals who lived on the land and worked it for their subsistence and for their chiefs.

During the Mahele, the ahupua‘a of Kawaihae 1st was retained by Kamehameha III as Crown Land. Nine Land Commission Awards were claimed in the ahupua‘a, eight along the coast and the ninth inland. None of the kuleana claims were located in the project area. Testimonies submitted with the claims described house lots and salt pans along the shoreline.

The economy of Kawaihae received a boost from the introduction of cattle ranching in Waimea, which was well underway by 1850. Cattle raised there were brought to Kawaihae via a road built in 1830, and held in pens for the trip to Oahu on cattle boats. The trade in hides and meat also helped turn Kawaihae into a major port. The Pacific Commercial Advertiser reported up to 50 whaling ships making a port call in Kawaihae in 1857. An 1883 map showed Kawaihae with a lighthouse, woolshed, native store, jail, boat house, church and other buildings which were likely houses. Twenty years later, a plant manufacturing soap from cattle tallow had been built.

Kawaihae continued to host harbor activities, and in 1959 a new deep-draft harbor was built by the federal government. However, the dredging of shallow reef resulted in the burying of Kawaihae Village, its salt pans, the Kauhuhue Heiau and the majority of the coastal land commission awards up to 13 feet deep in dredged material. Additional development in 1969 and 1970 further transformed the area into an industrial park, creating the setting in which the subject property is found today.

Archaeological Resources

Because of its arid nature, Kawaihae 1st did not become a well-settled area until visits by trade and whaling ships made the bay a major port of call. There were no regularly flowing streams to support agriculture, which instead took place far inland. However, temporary encampments for fishermen may have spread as far north as Kawaihae 1st.

Two previous archaeological studies were done of areas that included the project site, one conducted by Bishop Museum in 1986 (Allen 1987) and another by Cultural Surveys Hawai'i in 1989 (Hammatt et al. 1991). Those studies identified seven sites within the project parcel (Table 3).

Fieldwork for the current archaeological inventory survey by Rechtman Consulting was conducted on September 5, 2008. Investigators located four of the five sites recorded by Allen and both of the sites in the Hammatt survey. Site 13707, which was located in the northeastern portion of the property where large mounds of macadamia nut shells are now stored, was not found, and may have been destroyed or buried beneath the piles of nutshells. Another site, Site 13907, a deteriorated oval site remnant located in the north-central area of the project parcel, was found partially bulldozed and covered by nutshells. All of the sites consist of a single feature with the exception of sites 13707, which was earlier reported to contain five features but was not found, and 13712, a rectangular enclosure complex which contained three features, one of which is located outside of the project parcel. No new archaeological resources were encountered in the Rechtman survey.

Table 3
Archaeological Sites

SIHP Site No.	Site Type	Condition	Age	Significance	Recommended Treatment
13707	Enclosure complex	Destroyed	Precontact	D	No further work
13712	Enclosure complex	Fair	Precontact	D	No further work
13714	Circular enclosure	Fair	Precontact	D	No further work
13715	C-shape enclosure	Good	Precontact	D	No further work
13716	Alignment	Fair	Modern	Not significant	No further work
13906	C-shape enclosure	Poor	Precontact	D	No further work
13907	Coral scatter	Damaged	Precontact	D	No further work

Cultural Resources

While pre-contact archaeological sites are present on the DHHL industrial lot, such features are relatively common in the area and were not considered significant for preservation by SHPD. There are no burials on the project site and no Hawaiian customary and traditional rights or practices are known to be associated with the property. Most of the project site has been previously disturbed by landclearing, and the only known modern uses are for grazing and, more recently, pre-construction bulldozing by a previous leaseholder and storage of large amounts of macadamia nut shells. No caves, springs, pu‘u, native forest groves, gathering resources or other natural features are present on or near the project site that would support any traditional resource uses. Vegetation is sparse and alien and does not include the quality and quantity of botanical resources that would be important for native gathering. The Office of Hawaiian Affairs in Honolulu and West Hawai‘i and a local Hawaiian Home Lands group were consulted by letter on December 10, 2008, to determine whether they have any information concerning whether cultural resources or practices might nevertheless be present. Response letters have not indicated any specific resources or practices.

Impacts and Mitigation Measures

All five of the archaeological sites recorded by Allen (Sites 13707, 13712, 13714, 13715 and 13716) were assessed as having “low” to “moderate” research potential and none were recommended for preservation. In the Hammatt study, Site 13906 was recommended for no further work while Site 13907 was recommended for data recovery.

With the exception of Site 13707, which was not found and is presumably destroyed, all of the sites were mapped and photographed during the current survey. That survey recommended that all of the archaeological sites recorded be considered significant under Criterion D under the system established and promoted by the Hawai‘i Department of Land and Natural Resources, State Historic Preservation Division (SHPD). Criterion D resources are those that have yielded, or are likely to yield, information important for research on prehistory or history. The survey concludes that the documentation already recovered for all seven sites from the previous two studies, along with that presented in the current survey, has served to adequately mitigate any impacts that may occur as a result of the proposed development. In a letter of November 17, 2008 (see Appendix 1b), SHPD concurred with this finding.

In the unlikely event that archaeological resources or human remains are encountered during future development activities within either the proposed easement or applicant’s property, work in the immediate area of the discovery will be halted and SHPD contacted as outlined in Hawai‘i Administrative Rules 13§13-275-12.

In terms of other cultural resources, as there appear to be no natural resources of a potential traditional cultural nature (i.e., landform, vegetation, etc.), and no evidence of any traditional gathering uses or other cultural practices on this urban lot, and because archaeological sites have been fully documented as required by the State of Hawai‘i historic preservation laws, the proposed construction of a carbon manufacturing plant would not likely impact any historic sites or culturally valued resources or cultural practices.

The Office of Hawaiian Affairs and State Historic Preservation Division will be supplied a copy of the Draft EA for their comment on these findings.

3.3 Infrastructure

3.3.1 Utilities and Public Services

Existing Facilities and Services, Impacts and Mitigation Measures

Electrical power to the industrial parcel would be supplied to the project area by Hawai‘i Electric Light Company (HELCO), a privately owned utility company regulated by the State Public Utilities Commission, via a line on Maluokalani Street that provides service to other businesses in the area. Telephone service is available from Hawaiian Telcom. Fire, police and emergency medical services are available to Kawaihae via the South Kohala Fire Station, which is located about three miles to the south on Queen Ka‘ahumanu Highway, and which contains a police mini-station. The Proposed Action would not have any substantial impact on existing utilities or public services is expected.

Water would be provided via a new meter at the existing 8-inch water line along Maluokalani Street and Maluokalani Place fronting the subject parcel, which is part of the Hawai‘i County Department of Water Supply (DWS) system. The system was boosted recently by the addition of a 1 million gallon water storage tank mauka of the project site, which provides additional pressure and supply for regular use and fire suppression. The project includes plans to prevent fires and a ring fire main with a series of hydrants to respond effectively to accidental fires.

No sanitary sewer system or other wastewater treatment is available on or near the project site. An individual wastewater system (IWS) meeting the requirements of the Department of Health will be installed to serve the workers at the plant.

Solid waste will be minimal and will consist of about one truckload every several months of slag, which would be disposed of by a commercial hauler at the Pu‘uanahulu Landfill. Kona Carbon is investigating the marketing of this product as a fertilizer and it may not require any disposal.

3.3.2 Transportation

Existing Facilities

State Highway 270, also called the Akoni Pule Highway, is a primary, two-lane arterial highway in this area. The property is located along Maluokalani Street and Maluokalani Place which converge at Kalaeolo Street, which provides access to Highway 270. The subject property has adequate space to provide parking.

The area is also home to Kawaihae Harbor, one of two deep-draft harbors operated by the Hawai'i Department of Transportation on Hawai'i Island. The harbor was scheduled to become the Hawai'i Island port for the Hawai'i Superferry in 2009, but as of early 2009 those plans had been postponed until at least 2010. Plans are also underway for an expansion of the harbor's small boat area.

Project Traffic Characteristics, Impacts and Mitigation Measures

The Proposed Action will increase marginally traffic along the local streets described above and Highway 270 through worker travel and material hauling; however, given the nature of the project and its operation, the traffic impact is projected to be minimal. According to observations from Big Island Carbon's principal Rick Vidgen and other commuters familiar with the area, peak hours on the Akoni Pule Highway are 7 to 8 AM and 4 to 5 PM, although traffic in the afternoon lasts from 3:30 to 5:30 PM. Although both AM and PM peak hour congestion exists at the STOP sign on Akoni Pule Highway in Kawaihae, and further away at Queen Ka'ahumanu Highway and Kawaihae Road, traffic at the Kalaeolo Street/Akoni Pule Highway intersection is generally light.

Traffic associated with the Proposed Action will consist of:

- Workers operating the plant. The total employment for the company is projected at 25 people. Sixteen will work on a rotating shift basis, 3 will (normally) be at an office location outside of the project area and will only be at the site a few times per week, and 6 will work during the day. There will be 4 shifts of 4 people each, operating 24 hours a day, 7 days a week. Thus the maximum personnel on site will be 10, with a general maximum of 2 visitors. Shifts will rotate at 7 AM, 3 PM, and 11 PM; day workers will operate from 8 AM to 4 PM. Thus peak worker-related traffic will be the 6 trips associated with workers arriving for the day shift or leaving from the night shift during the AM peak. It should be noted that carpooling will be encouraged and is likely to occur.

- Feedstock Transport will consist of 2-3 trucks per day during the macadamia season from July to March. These trucks will arrive and discharge quickly (15 minutes turnaround) at 7 AM, 11 AM to 12 noon, and at around 3:30 PM. This would contribute a maximum of one round-trip truck trip per day at the AM peak.
- Transport of the finished carbon product will require a maximum of 1-2 trucks per week, which will normally not operate at peak hours.
- Water deliveries will be required during the initial years of operation, with 4 trucks per day, with the first at 5-6 AM and the last in the evening after the PM peak. Truck traffic associated with water delivery would be one round-trip water deliver in either the AM or PM peak hour.

Thus the total worst-case traffic impact at peak hours would be four one-way AM peak hour truck trips (or two one-way AM trips and two one-way PM trips), and twelve one-way AM peak hour passenger vehicle trips. This level of traffic is minimal, and considering the basically good traffic conditions at the Kalaeolo Street/Akoni Pule Highway intersection, well within the capacity of the existing roads.

In a letter in response to early consultation, the Hawai‘i State Department of Transportation (DOT) requested preparation of a Traffic Impact Analysis Report (TIAR) (see Appendix 1a for letter). Given the minor traffic characteristics of the project, along with the fact that the Kaei Hana II Industrial Subdivision was permitted and highway facilities designed with the intention that the lots would be occupied by industrial uses, DHHL has determined that a TIAR is not necessary at this time.

Parking will be accommodated in 15 stalls on the mauka sides of buildings. An overflow paved parking area will also be built on the lower level of the property.

3.4 Secondary and Cumulative Impacts

The Proposed Action is minor and does not appear to have the potential to involve any secondary impacts, such as population changes or effects on public facilities. Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures.

The adverse effects of the project are very limited in severity, nature and geographic scale. At the current time there do not appear to be any roadway, utility or development projects being undertaken in the area that would combine in such a way as to produce adverse cumulative effects or involve a commitment for larger actions. As discussed

above, Kawaihae Harbor is scheduled to become the Hawai‘i Island port for the Hawai‘i Superferry in 2009. Plans are also underway for an expansion of the small boat harbor here. As discussed above, DHHL’s 10,152-acre Kawaihae Tract will eventually be developed with commercial, residential, agricultural and community use components (PBR 2002 - see Figure 5). Industrial uses such as the Proposed Action were specifically planned as part of these larger uses, and infrastructure is being planned accordingly.

3.5 Required Permits and Approvals

The Proposed Action requires granting the following permits and approvals:

- County of Hawai‘i, Department of Public Works, Building Division Approval and Building Permit
- County of Hawai‘i, Department of Public Works, Engineering Division, Grading Permit
- County of Hawai‘i, Planning Department Plan Approval
- State of Hawai‘i, Department of Health, National Pollutant Discharge Elimination System Permit (NPDES)
- State of Hawai‘i, Department of Labor, Boiler Inspection Certification
- State of Hawai‘i, Department of Health, Non-Covered Source Permit

3.6 Consistency With Government Plans and Policies

3.6.1 Hawai‘i State Plan

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the *Hawai‘i State Plan* are individual and family self-sufficiency, social and economic mobility and community or social well-being. The Proposed Action would promote these goals by adding industrial activity to the South Kohala district, thereby enhancing quality-of-life and economic and social well-being.

3.6.2 Hawai‘i County General Plan

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

Land Use Element – In General:

Policies:

- Zone urban–types of uses in areas with ease of access to community services and employment centers and with adequate public utilities and facilities.
- Promote and encourage the rehabilitation and use of urban areas that are serviced by basic community facilities and utilities.
- Allocate appropriate requested zoning in accordance with the existing or projected needs of neighborhood, community, region and County.

Standards:

- Zoning requests shall be reviewed with respect to General Plan designation, district goals, regional plans, State Land Use District, compatibility with adjacent zoned uses, availability of public services and utilities, access, and public need.

Discussion: The Proposed Action supports the Land Use element policies and standard by allowing for diversity and stability by promoting and encouraging urban land use.

Land Use Element – Industrial:

Goals:

- Designate and allocate industrial areas in appropriate proportions and in keeping with the social, cultural and physical environments of the County.
- Promote and encourage the rehabilitation of industrial areas that are serviced by basic community facilities and utilities.

Policies:

- Support the creation of industrial parks in appropriate locations as an alternative to strip development.
- Achieve a broader diversification of local industries by providing opportunities for new industries and strengthening existing industries.
- Locate industrial areas convenient to transportation facilities, and provide a variety of industrial zoned districts and lot sizes, depending on the needs of the industries and the communities.
- Improve the aesthetic quality of industrial sites and protect amenities of adjacent areas by requiring landscaping, open spaces, buffer zones and design guidelines.
- Industrial development should be located in areas adequately served by transportation, utilities and other essential infrastructure.

- Provide flexibility within the Zoning Code to accommodate emerging new industries.
- Industrial-commercial mixed-use districts shall be provided in appropriate locations.
- Require developers to provide basic infrastructure necessary for development.

Standards:

- Industrial development shall maintain or improve the quality of the present environment.
- Topography of industrial land shall be reasonably level.
- Industrial development shall be conveniently located to its labor resource.
- Buffer Zones shall be established between industrial and adjacent incompatible uses of land.
- The direction of wind patterns and the absence of tradewinds shall be considered in the siting of industrial areas.

Discussion: The main industrial development areas in the South Kohala district are the DHHL's Kaei Hana II Industrial Subdivision, where the project site would be located, and the DHHL and State of Hawai'i industrial areas around Kawaihae Harbor. The major advantages of the Kawaihae area are the availability of interisland and intra-island transportation services, utilities and land. Industrial activities in both service and non-service categories are expected to expand in Kawaihae.

The proposed use would be compatible with the above-cited standards, as the topography of the property is reasonably level and the proposed industrial building would be conveniently located with respect to public services and utilities, commercial complexes and transportation facilities.

The *Hawai'i County General Plan Land Use Pattern Allocation Guide (LUPAG) and Facilities Map*. These components of the *General Plan* are graphic representations of the Plan's goals, policies, and standards as well as of the physical relationship between land uses. They also establish the basic urban and non-urban form for areas and the planned public and cultural facilities, public utilities and safety features, and transportation corridors.

The project site is classified as Industrial in the LUPAG. The Proposed Action is consistent with this designation. Industrial uses include manufacturing and processing, wholesaling, large storage and transportation facilities and light industrial and industrial-commercial activities.

3.6.3 Hawai'i County Regulations

The project site is zoned Industrial (MG-1a), as is the surrounding property in the Kaei Hana II Industrial Subdivision. The Industrial zoning designation was created when the Zoning Code was amended in 1996. The land uses in the immediate area are a mix of commercial, industrial and residential uses. Commercial and/or industrial uses nearby include the macadamia nut processing plant, the Kawaihae Trade Center housing a wine and liquor distributor and a theater group, a boat storage warehouse, Kawaihae Concrete Company and Pacific Waste Company, which transports solid waste. The closest residences are located approximately one-quarter of a mile west of the project site. Under Section 25-5-100, Hawai'i County Code, the General Industrial (MG) district applies to areas for uses that are generally considered to be offensive or have some element of danger. Permitted uses include a wide variety of business activities including major and minor processing of agricultural products. As the Proposed Action involves agricultural processing, it is a permitted and intended use within this designation. The project will require Plan Approval from the Planning Department.

A Memorandum of Agreement (MOA) Between the County of Hawaii and the Department of Hawaiian Home Lands was adopted by the County Council by resolution and became effective December 30, 2002. The MOA states that the Hawaiian Homes Commission is responsible for determining land use on Hawaiian Home Lands and that DHHL will determine the appropriate County zoning districts that will apply to each property. Thereafter, DHHL and its lessees will go through normal land use procedures, regulations and standards related to subdivision, Plan Approval, building permits, etc. The County will advise DHHL of violations by its lessees and DHHL will cooperate with the County in enforcing the terms of its leases requiring conformity to applicable laws and regulations. The Proposed Action is consistent with the terms of the MOA.

The property is situated within the County's Special Management Area (SMA), but the by letter of April 11, 2007, the applicant was informed by the Hawai'i County Planning Department that an SMA Permit is not required for this activity in this location (see Planning Department letter of January 7, 2009, in Appendix 1a).

3.6.4 Hawai'i State Land Use Law

All land in the State of Hawai'i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 205, HRS. The property is in the State Land Use Urban District. The proposed use is consistent with intended uses for this land use district.

PART 4: DETERMINATION

Based on the findings below, the Hawai‘i State Hawaiian Homes Commission is expected to determine that the Proposed Action will not significantly alter the environment, as impacts will be minimal, and is expected therefore to issue a Finding of No Significant Impact (FONSI). A final determination will be made upon consideration of comments to the Draft EA.

PART 5: FINDINGS AND REASONS

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

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost. The project site is a disturbed industrial lot formerly used for grazing and by a landscaping business. The surrounding area supports industrial uses and will not be affected by the carbon processing plant. Cultural resources have been inventoried, and no significant resources are present.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed project expands and in no way curtails beneficial uses of the environment.
3. *The proposed project will not conflict with the State's long-term environmental policies.* The State’s long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor and fulfills aspects of these policies calling for an improved economic environment. It is thus consistent with all elements of the State’s long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will not adversely affect the social welfare of the community and will contribute to the economy. The lease rents to DHHL will assist this agency in developing housing for its beneficiaries.
5. *The proposed project does not substantially affect public health in any detrimental way.* The Proposed Action will not affect public health in any way; wastewater and stormwater will be appropriately treated.
6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected to result from the Proposed Action.
7. *The proposed project will not involve a substantial degradation of environmental quality.* The project is minor, and would thus not contribute to environmental degradation.

8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project site supports alien weedy vegetation. Impacts to rare, threatened or endangered species of flora or fauna will not occur.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is not related to other activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.
10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* No adverse effects on these resources would occur; the industrial project matches the industrial zoning. Dust control measures will be required and implemented as part of the best management practices associated with the grading permit. Long-term air quality impacts would be primarily associated with the exhaust emissions from the boiler and kiln, and State permitting requires that these units comply with ambient air quality standards at all times. Modeling analysis submitted as part of the Noncovered Source application demonstrated the facility's compliance with those standards. The proposed facility will have a minimal impact on local air quality both on a short and long-term basis and will comply with existing state and federal ambient air quality standards.
11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the property is located in an area with volcanic and seismic risk, the entire Island of Hawai'i shares this risk, and the project is not imprudent to construct.
12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas and viewplanes identified in the Hawai'i County General Plan will be adversely affected by the project.
13. *The project will not require substantial energy consumption.* The Proposed Action involves only minor energy use, will contribute to its own energy production through the use of a by-product, and no adverse effects are expected.

For the reasons above, the Proposed Action will not have any significant effect in the context of Chapter 343, Hawai'i Revised Statutes and section 11-200-12 of the State Administrative Rules.

REFERENCES

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DRAFT ENVIRONMENTAL ASSESSMENT

KONA CARBON PROJECT

APPENDIX 1a

Comments in Response to Pre-Consultation

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 15, 2008

Geometrician Associates, LLC
Box 396
Hilo, Hawaii 96721

Attention: Mr. Ron Terry

Ladies and Gentlemen:

Subject: Big Island Carbon Project

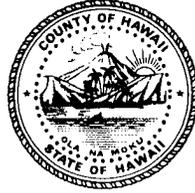
Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Morris M. Atta".

for Morris M. Atta
Administrator

William P. Kenoi
Mayor



Bobby Jean Leithead Todd
Director

County of Hawaii
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
25 Aupuni Street • Hilo, Hawai'i 96720-4252
(808) 961-8083 • Fax (808) 961-8086
http://co.hawaii.hi.us/directory/dir_envmng.htm

December 19, 2008

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

Subject: Early Consultation for Environmental Assessment
Big Island Carbon Project
TMK: 6-1-006:007, South Kohala

Dear Mr. Terry,

We offer the following comments:

Solid Waste Division

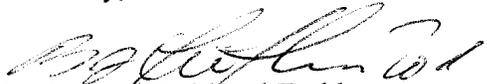
Please provide a copy of the completed EA.

Technical Services Section

No County sewer is planned for this area.

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

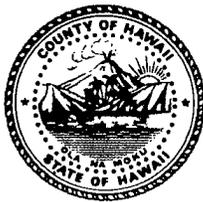
Sincerely,


Bobby Jean Leithead Todd
DIRECTOR

cc: SWD
TSS

1361A

William P. Kenoi
Mayor



Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

County of Hawaii

POLICE DEPARTMENT

349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2389

December 23, 2008

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

Dear Mr. Terry:

RE: Early Consultation for Environmental Assessment for Big Island Carbon
Project, TMK (3rd) 6-1-006:007, South Kohala, Island of Hawaii

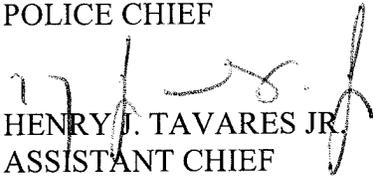
This responds to your December 10, 2008, letter requesting comments on the above-
indicated environmental assessment.

Staff has reviewed the assessment and has no comments or concerns to offer at this time.

Should you have any questions, please contact Captain James Sanborn, Commander of
the South Kohala District, at 887-3080.

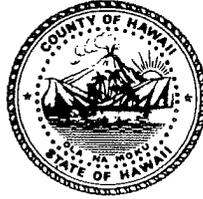
Mahalo,

LAWRENCE K. MAHUNA
POLICE CHIEF


HENRY J. TAVARES JR.
ASSISTANT CHIEF
AREA II OPERATIONS

JS:dmv

William Kenoi
Mayor



Daryn S Arai
Acting Planning Director

County of Hawaii

PLANNING DEPARTMENT

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

January 7, 2009

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

Dear Mr. Terry:

SUBJECT: Pre-Draft Environmental Assessment Consultation
Project: Big Island Carbon
Land Owner: Department of Hawaiian Home Lands
Tax Map Key: 6-1-6:7, Kawaihae, South Kohala, Hawaii

This is in response to your request for comments on the above-referenced project.

Macadamia nut shells would be converted to activated carbon for sale and shipment to chemical and pharmaceutical processors outside of the state. The proposed facility would also generate a biofuel product that would be used to fuel the processing equipment.

We have the following to offer on the subject parcel:

1. This 12.961 acre parcel is designated Urban by the State Land Use Commission.
2. The General Plan's Land Use Pattern Allocation Guide Map designation is Industrial which *"include uses such as manufacturing and processing, wholesaling, large storage and transportation facilities, light industrial and industrial-commercial uses."*
3. The County zoning is General Industrial – 1 acre (MG-1a). In reference to uses in the MG district, the County Zoning Code Section 25-5-152(a)(1) permits "Agricultural products processing, major and minor":
 - a. "Agricultural products processing, major" means activities involving a variety of operations on crops or livestock which may generate dust, noise, odors, pollutants or visual impacts that could adversely affect adjacent properties.

Mr. Ron Terry
Page 2
January 7, 2009

These uses include, but are not limited to, slaughterhouses, mills, refineries, canneries and milk processing plants.

- b. "Agricultural products processing, minor" means activities used for crop production, which are not regulated as major agricultural products processing and which involve a variety of operations on crops after harvest to prepare them for market, or further processing and packaging at a distance from the agricultural area. Included activities are cleaning, milling, pulping, drying, roasting, hulling, storing, packing, honey processing, poi-making, selling and other similar activities. Also included are the facilities or buildings related to such activities.

4. Plan Approval is required prior to construction of any new structure.

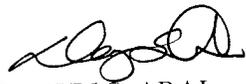
As a reminder, a *Memorandum of Agreement Between the County of Hawaii and the Department of Hawaiian Home Lands* (MOA) was adopted by Resolution No. 19-03 and became effective December 30, 2002. Discussion on the provisions of the MOA should be included in the draft environmental assessment.

Finally, the project site is within the County's Special Management Area (SMA). However, by Planning Department letter dated April 11, 2007, Mr. Rick Vidgen of KonaCarbons, LLC was informed that an SMA permit was not required for a proposed processing of macadamia nut shells on the subject parcel.

Please provide us with a copy of the Draft Environmental Assessment for our review and file.

If you have questions, please feel free to contact Esther Imamura of this office at 961-8288.

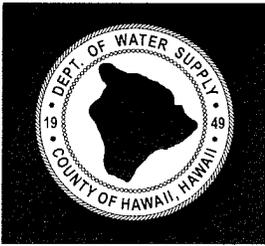
Sincerely,



DARYN S. ARAI
Acting Planning Director

ETI:cs
P:\Public\Wpwin60\ETI\Eadraftpre-Consul\Terry Big Island Carbon 6-1-6-7.Rtf

xc: Planning Department, Kona



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAII 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

January 6, 2009

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

**PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
TAX MAP KEY 6-1-006:007**

This is in response to your Pre-Environmental Assessment consultation letter, dated December 10, 2008.

Please be informed there is an existing 8-inch waterline within Maluokalani Street fronting the subject parcel. The subject parcel does not have an existing service with the Department. Water availability in the area, which is subject to change, allows for only one (1) unit of water, or one (1) 5/8-inch meter, per existing lot of record, which is limited to a maximum daily usage of 600 gallons.

Due to the proposed industrial development of the subject parcel, the Department would request that water usage calculations, prepared by a professional engineer licensed in the State of Hawai'i, be submitted to show the estimated maximum daily water usage for the project. Should the estimated maximum daily water usage exceed 600 gallons per day, extensive improvements to the water system would be required, which may include, but not be limited to, additional source, storage, booster pumps, and transmission facilities.

In addition, a reduced pressure type backflow prevention assembly must be installed on private property within five (5) feet of any meters serving the property. The installation must be inspected and approved by the Department before activation of water service.

For your information, the existing 8-inch waterline within Maluokalani Street is looped, and therefore, adequate to provide the required 2,000 gallons per minute fire flow required for the proposed type of land use, as per our Water System Standards.

Should there be any questions, you may contact Mr. Finn McCall of our Water Resources and Planning Branch at 961-8070, extension 255.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

FM:dfg

... Water brings progress...



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

HRD08/4100

January 13, 2009

Ron Terry
Geometrician Associates
PO Box 396 Hilo, Hawai'i 96721

**RE: Request for comments on the early consultation and environmental assessment (EA)
for the proposed Big Island Carbon project, Kohala, Hawai'i, TMK: 6-1-006:007.**

Aloha e Ron Terry,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated December 10, 2008. OHA has reviewed the project and offers the following comments.

OHA is interested in reviewing a copy of the EA, when completed. We some potential for this project to benefit as well as impact our beneficiaries; therefore, we seek more information in order to better comment and shape this proposal.

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,

A handwritten signature in black ink, appearing to read "Clyde W. Nāmu'o".

Clyde W. Nāmu'o
Administrator

C: OHA Kona CRC

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 8.3100

January 26, 2009

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

Dear Mr. Terry:

Subject: Big Island Carbon Project, South Kohala, Island of Hawaii
Early Consultation (EC)
TMK: 6-1-006: 007

Thank you for providing the subject document for review and comments.

The State Department of Transportation (DOT) understands that the subject project involves a lease of land from the Department of Hawaiian Home Lands (DHHL) and construction of a facility in the Kaei Hana II Industrial Subdivision in Kawaihae to process macadamia nut shells into activated carbon.

Given the project location, DOT anticipates that the project could impact the State highway, Akoni Pule Highway. DOT requests that the following comments be addressed in the Environmental Assessment (EA).

1. A Traffic Impact Analysis Report (TIAR) should be prepared and submitted to the DOT Highways Division, through the Hawaii District Office, for review and approval. The TIAR scope of study should include an operational analysis of the Maluokalani Street and Makuolani Place intersections at the Kaei Hana II industrial subdivision and with Akoni Pule Highway. The analysis should cover the traffic conditions with the types of vehicles and additional traffic generated by the project; full build-out of the subdivision; and the influence at the same intersections from the neighboring subdivision, Kawaihae Residence Lots - Makai, which is located across the highway. The TIAR should also include recommended mitigation measures and roadway/traffic improvements associated with any impacts from the proposed project. The mitigation measures and improvements shall not be limited to channelization of the intersection and/or installation of traffic signals at the intersections.

2. No additional storm water or discharge from the project site will be allowed to flow onto the State highway right-of-way.
3. The applicant must submit construction and drainage plans to DOT Highways Division, through the Hawaii District Office, for review and approval of all work to be done adjoining or within the State highway right-of-way.
4. Required highway improvements shall be provided at no cost to the State and shall conform to the current edition of the following standards.
 - a. AASHTO, A Policy on Geometric Design of Highways and Streets
 - b. Manual on Uniform Traffic Control Devices (MUTCD)
 - c. AASHTO Roadside Design Guide
 - d. Hawaii Statewide Uniform Design Manual for Streets and Highways
 - e. Specifications for Installation of Miscellaneous Improvements within State Highways.
5. The applicant shall comply with the National Pollutant Discharge Elimination System (NPDES) permit requirements for construction activity disturbing one (1) or more acres of total land area.
6. DOT recommends that the applicant contact the DOT Highways Division Planning Branch at (808) 587-1830 and the Hawaii District Office at (808) 933-8866 to ensure proper coordination of the applicant's efforts to analyze and mitigate any impacts to the highway system.
7. As an interested party, DOT requests four (4) copies of the Draft EA for DOT Highways staff review and comments.

If there are any questions, please contact Mr. David Shimokawa of the DOT Statewide Transportation Planning Office at (808) 587-2356.

Very truly yours,



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

DRAFT ENVIRONMENTAL ASSESSMENT

KONA CARBON PROJECT

APPENDIX 2

Archaeological Inventory Survey

LINDA LINGLE
GOVERNOR OF HAWAII



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
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
KAIKOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

November 17, 2008

Robert B. Rechtman, Ph.D.
Rechtman Consulting, LLC
HC 1 Box 4149
Keaau, Hawaii 96749-9710

LOG NO: 2008.4966
DOC NO: 0811MD22
Archaeology

Dear Dr. Rechtman:

**SUBJECT: Chapter 6E-42 Historic Preservation Review –
Archaeological Inventory Survey of 13.9 acres with No New Sites
Kawaihae 1st Ahupua`a, South Kohala District, Island of Hawai`i
TMK: (3) 6-1-006:007**

This letter reviews the revised report we received on November 3, 2008 (*Ketner and Rechtman 2008; An Archaeological Inventory Survey of the Big Island Carbon, LLC Development Parcel [TMK: 3-6-1-06:007] Kawaihae 1st Ahupua`a, South Kohala District, Island of Hawaii; RC-0578*). This report summarizes an archaeological inventory survey in which seven known sites are either relocated or described. Rechtman Consulting determined that all sites are significant under criterion "d". We concur with these determinations. The seven sites are 50-10-05-13707 (an enclosure complex), 13712 (an enclosure complex), 13714 (a circular enclosure), 13715 (a c-shape enclosure), 13716 (a modern alignment), 13906 (a c-shape enclosure) and 13907 (a coral scatter which was originally recorded as an oval site). All sites were previously known; two (13707 and 13907) have been destroyed, although two features remained and were recorded from site 13707. Site 13907 was originally recommended for data recovery by PHRI; unfortunately the site was destroyed before this was possible. We believe that all sites have been adequately documented and we concur that no further work is required.

Our only question regards the acreage of this survey. The report cites 13.9 acres, the county TMK maps 12.961. Please confirm the 13.9 acre measurement and/or correct the cover page and page 1 accordingly in your final submission. We accept this report as final pursuant to HAR §13-276.

Upon receipt of this letter please submit one paper copy of your report marked "Final" to our Kapolei office along with a CD containing a searchable pdf version of the final report and a copy of this approval letter, marked to the attention of the "Kapolei Library." If you have questions about this letter please contact Morgan Davis of our Hawaii Island Section at (808) 933-7650.

Aloha,

Handwritten signature of Nancy A. McMahon in cursive.

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

An Archaeological Inventory Survey of the Big Island Carbon, LLC Development Parcel

(TMK: 3-6-1-06:007)

Kawaihae 1st Ahupua‘a
South Kohala District
Island of Hawai‘i



FINAL VERSION

PREPARED BY:

Amy L. Ketner, B.A.
and
Robert B. Rechtman, Ph.D.

PREPARED FOR:

Rick Vidgen
Big Island Carbon, LLC
75-5722 Kuakini Hwy, Suite 202
Kailua-Kona, HI 96740

October 2008

RECHTMAN CONSULTING, LLC

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

An Archaeological Inventory Survey of the
Big Island Carbon, LLC Development Parcel
(TMK: 3-6-1-06:007)

Kawaihae 1st Ahupua‘a
South Kohala District
Island of Hawai‘i

EXECUTIVE SUMMARY

At the request of Rick Vidgen of Big Island Carbon, LLC, Rechtman Consulting, LLC conducted an archaeological inventory survey of Tax Map Key: 3-6-1-06:007, a roughly 12.9 acre parcel in Kawaihae 1st Ahupua'a, South Kohala District, Island of Hawai'i. The parcel is located within the Kaei Hana Industrial Subdivision and is adjacent to the Hamakua Macadamia Nut Factory. Big Island Carbon, LLC plans to build a production facility that utilizes the discarded macadamia nut shells to produce activated carbon for filters. The project area is bounded to the east by Hawaiian Homelands, to the west by Maluokalani Street, to the north by the Hamakua Macadamia Nut Factory, and to the south by a paved easement road. The northern portion of the study parcel is currently used by the Hamakua Macadamia Nut Factory for dumping macadamia nutshells. This area is completely covered in large mounds of discarded nutshells. The southern portion of the project area is largely unmodified, except where bulldozing has occurred immediately adjacent to a wire fence that runs along the western and southern edges of the parcel.

This area was previously studied as part of two larger archaeological inventory surveys conducted by Allen (1987) and Hammatt et al. (1991). Allen (1987) recorded five archeological sites within the project area, and Hammatt et al. (1991) identified two additional sites. The sites recorded by Allen (1987) included an enclosure complex (Site 13707), a terrace, C-shape, and rectangular enclosure complex (Site 13712), a circular enclosure (Site 13714), a C-shape (Site 13715), and an alignment (Site 13716). The sites previously recorded by Hammatt et al. (1991) included a C-shape (Site 13906), and an oval site remnant in a deteriorated state (Site 13907).

Fieldwork for the current project was conducted on September 5th, 2008 by Matthew R. Clark, B.A. and Olivier M. Bautista, B.A., under the direction of Robert B. Rechtman, Ph.D. The project area was thoroughly inspected by fieldworkers walking north/south pedestrian transects spaced at 10-meter intervals. During the survey, an intensive effort was made to relocate the five sites previously recorded by Allen (1987) and the two additional sites recorded by Hammatt et al. (1991). When located, these sites were plotted on a map of the proposed development area using Garmin 76s handheld Global Positioning System (GPS) technology. They were then cleared of vegetation, mapped in detail using a tape and compass, photographed, and described using standardized feature record forms.

As a result of the fieldwork, four of the five sites previously recorded by Allen (1987) (Sites 13712, 13714, 13715, and 13716), and both of the sites previously recorded by Hammatt et al. (1991) (Sites 13906 and 13907) were relocated. Site 13707 was not relocated. It is likely that Site 13707 has either been destroyed, or is completely obscured beneath the nutshell piles. Another site (Site 13907) was relocated, but it was found to have been significantly bulldozed and covered by macadamia nutshells.

All of the archaeological sites recorded during the current inventory survey are considered significant under Criterion D for information they have yielded relative to the past use of the study parcel. With respect to all of these sites, except for SIHP Site 13907, we concur with the previous "no further work" treatment recommendations. For Site 13907, Hammatt et al. (1991) recommended data recovery; however, since the time when this site was originally recorded it has been impacted as the result of bulldozer activity, and no longer retains excavation potential. Therefore we recommend that no further work is necessary for this site. It is concluded that the documentation already recovered concerning all seven of these sites, which is contained in the Allen (1987) and Hammatt et al. (1991) studies, coupled with that which is presented in the current study, has served to adequately mitigate any impacts that may occur as a result of the proposed development.

Contents

INTRODUCTION.....	1
Project Area Description	1
BACKGROUND.....	5
Culture-Historical Context	5
Previous Archaeological Research	15
PROJECT AREA EXPECTATIONS.....	18
FIELDWORK	18
Methods.....	18
Findings.....	18
SIGNIFICANCE EVALUATION AND TREATMENT RECOMMENDATIONS	30
REFERENCES CITED	31

Figures

1. Project area location.....	2
2. Tax Map Key (TMK): 3-6-1-06 showing the current study parcel (007).....	3
3. Mounds of macadamia nutshells within the project area, view to the north.	4
4. Vegetation within the project area, view to the east.....	4
5. TMK: 3-6-1, showing the LCAw. awarded within Kawaihae 1 st Ahupua‘a.	11
6. Portion of Jackson’s map of Kawaihae, July 1883.....	13
7. Portion of Loebenstein’s map of Kawaihae, 1903.	14
8. Previous archaeology in Kawaihae 1 st Ahupua‘a, adapted from Hammatt et al. (1991).....	16
9. Map showing the current project area and the sites identified by Allen (1987) and Hammatt et al. (1991).....	17
10. Project area plan view.	19
11. SIHP Site 13712 plan view.....	21
12. Photographs of SIHP Site 13712.....	22
13. SIHP Site 13714 plan view and photograph.....	24
14. SIHP Site 13715 plan view and photograph.....	25
15. SIHP Site 13716 plan view and photograph.....	26
16. SIHP Site 13906 plan view and photograph.....	28

17. SIHP Site 13907 remnant coral scatter..... 29

Tables

1. Archaeological sites recorded within the current project area. 20

2. Site significance and treatment recommendations. 30

INTRODUCTION

At the request of Rick Vidgen of Big Island Carbon, LLC, Rechtman Consulting, LLC conducted an archaeological inventory survey of Tax Map Key (TMK): 3-6-1-06:007, a roughly 12.9 acre parcel in Kawaihae 1st Ahupua'a, South Kohala District, Island of Hawai'i (Figures 1 and 2). The parcel is located within the Kaei Hana Industrial Subdivision and is adjacent to the Hamakua Macadamia Nut Factory. Big Island Carbon, LLC plans to build a production facility that utilizes the discarded macadamia nut shells to produce activated carbon for filters. This area was previously included as part of two larger archaeological inventory surveys conducted by Allen (1987) and Hammatt et al. (1991). Allen (1987) recorded five archeological features within the project area, which were all noted as possessing moderate to low excavation and interpretation potential. Hammatt et al. (1991) located each of these features in their survey as well as two additional features. The previously recorded sites were relocated during the current fieldwork. The current project was undertaken in compliance with both the historic preservation review process requirements (HAR 13§13-275-5) of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) and the County of Hawai'i Planning Department.

This report contains summary background information concerning the project area's physical setting, cultural contexts, previous archaeological work, and current survey expectations based on the previous work. Also presented are an explanation of the survey methods and a discussion of the findings of the current study.

Project Area Description

The current project area consists of roughly 12.9 acres (TMK: 3-6-1-06:007) located within Kawaihae 1st Ahupua'a, South Kohala District, Island of Hawai'i (see Figures 1 and 2). The project area is bounded to the east by state land (Department of Hawaiian Home Lands), to the west by Maluokalani Street, to the north by the Hamakua Macadamia Nut Factory, and to the south by a paved easement road. At the time of the current fieldwork, the eastern boundary of the project area was marked with fagging tape. The northern portion of the study parcel is currently used by the Hamakua Macadamia Nut Factory for dumping macadamia nutshells. This area is completely covered in large mounds of discarded nutshells (Figure 3). A dirt road originating from Maluokalani Street with a gate at its western end winds through the macadamia nutshell area. The southern portion of the project area is largely unmodified, except where bulldozing has occurred immediately adjacent to a wire fence that runs along the western and southern edges of the parcel. This unmodified portion of the project area consists of rock outcrops and rocky soil, covered by fountain grass (*Pennisetum setaceum*) interspersed with the occasional *kiawe* (*Prosopis pallida*) (Figure 4).

Terrain within the project area slopes mildly to the west and consists of lava flows that originated from Kohala Volcano, Pololu Volcanic series, during the Pleistocene era (Wolfe and Morris 1996). Soils that have accumulated over the lava are Kawaihae very rocky very fine sandy loam with 10-20 percent of the ground surface occupied by rock outcrops (Sato et al. 1973). Elevation within the project area ranges from 110-160 feet above sea level. The area receives between 10 and 20 inches of rainfall yearly, mostly during the winter months (Sato et al. 1973). Burned tree limbs within the study parcel indicate that wildfires occasionally occur in the area.

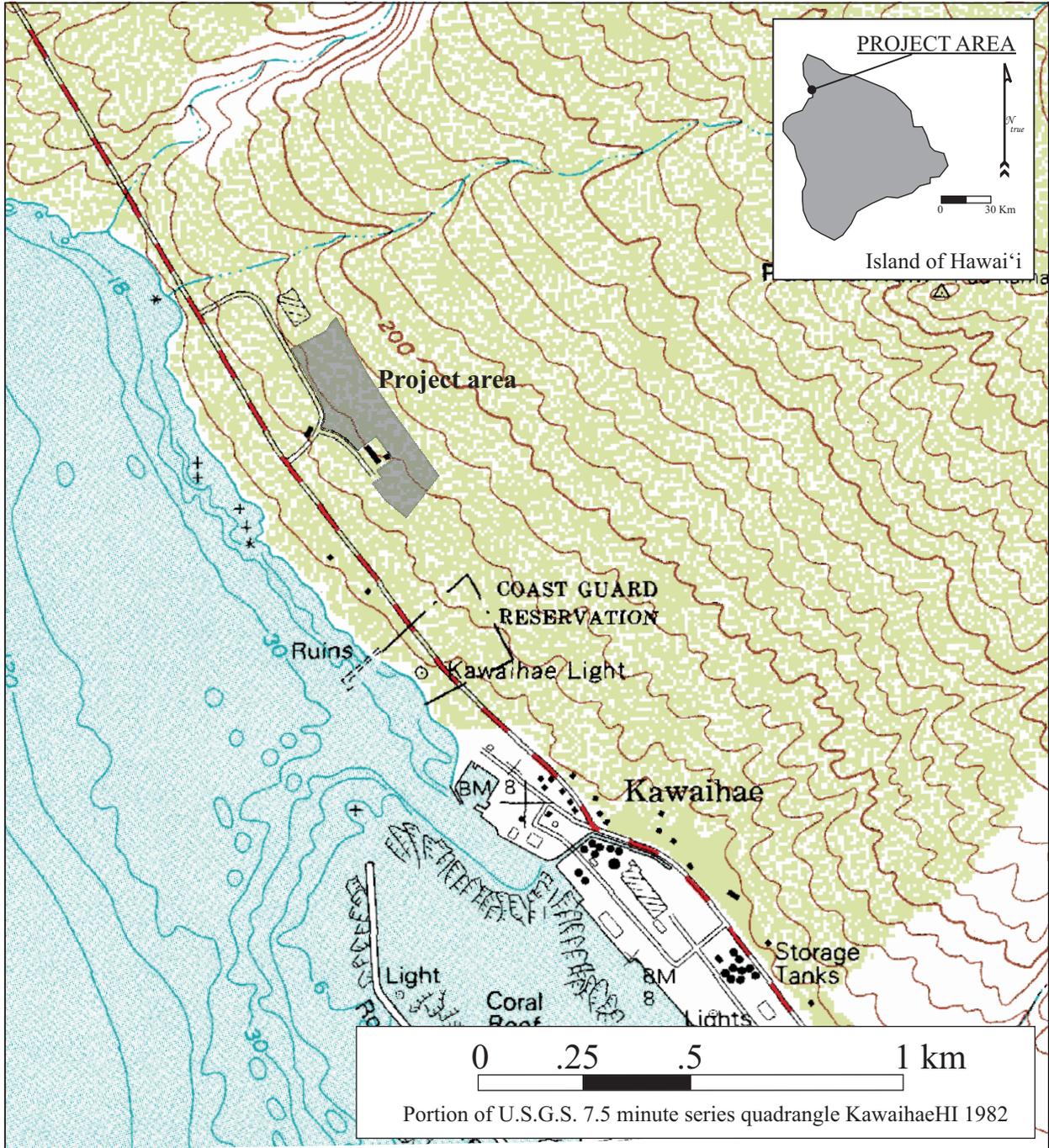


Figure 1. Project area location.

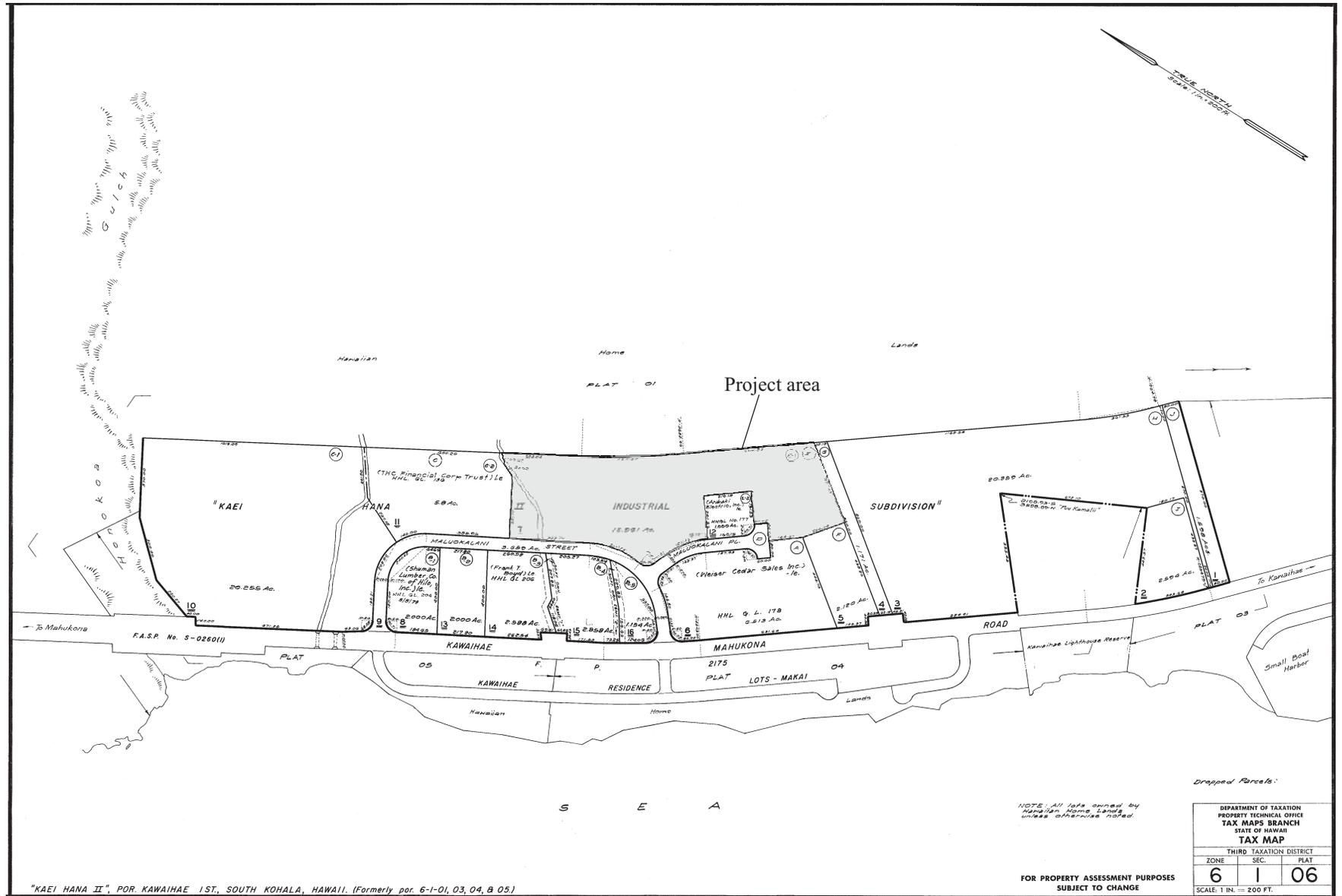


Figure 2. Tax Map key (TMK): 3-6-1-06 showing the current study parcel (007).



Figure 3. Mounds of macadamia nutshells within the project area, view to the north.



Figure 4. Vegetation within the project area, view to the east.

BACKGROUND

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

Culture-Historical Context

A generalized culture-historical context for Hawai'i Island, South Kohala District, and the specific study *ahupua'a*, along with the expected settlement patterns for the area are presented in order to assess the current project area expectations. There has been much written about Kawaihae (Barrere in Clark and Kirch 1983; Kelly 1974, Haun et al. 2003, McGuire and Hammatt 2001, and Hammatt et al. 1991) and the following information is not exhaustive, but is presented as a frame of reference for understanding land use, culture practices, and use of the area during Precontact and Historic times.

A Generalized Model of Hawaiian Prehistory

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

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

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

It was during the Expansion Period that a second major migration settled in Hawai'i, this time from Tahiti in the Society Islands. According to Kamakau (1976), the *kahuna* Pā'ao settled in the islands during the 13th century. Pā'ao was the keeper of the god Ku'ka'ilimoku, who had fought bitterly with his older brother, the high priest Lonopele. After much tragedy on both sides, Pā'ao escaped Lonopele's wrath by fleeing in a canoe. Kamakau (1991:100–102) told the following story in 1866:

Puna on Hawai'i Island was the first land reached by Pā'ao, and here in Puna he built his first *heiau* for his god Aha'ula and named it Aha'ula [Waha'ula]. It was a *luakini*. From Puna, Pā'ao went on to land in Kohala, at Pu'uepa. He built a *heiau* there called Mo'okini, a *luakini*. It is thought that Pā'ao came to Hawai'i in the time of the *ali'i* La'au because Pili ruled as *mo'i* after La'au. You will see Pili there in the line of succession, the *mo'o kū'auhau*, of Hanala'anui. It was said that Hawai'i Island was without a chief, and

so a chief was brought from Kahiki; this is according to chiefly genealogies. Hawai'i Island had been without a chief for a long time, and the chiefs of Hawai'i were *ali'i maka'āinana* or just commoners. There were seventeen generations during which Hawai'i Island was without chiefs—some eight hundred years.

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

The concept of the *ahupua'a* was established during the A.D. 1400s (Kirch 1985), adding another component to a then well-stratified society. This land unit became the equivalent of a local community, with its own social, economic, and political significance. *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or lesser chiefs; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land, which was managed by a *konohiki*. *Ahupua'a* were usually wedge or pie-shaped, incorporating all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986). Kawaihae was in Precontact times a single *ahupua'a*, but was split into two during the 1800's (Cordy 2000).

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

The Proto-Historic Period (A.D. 1650–1795) is marked by both intensification and stress. Wars occurred between intra-island and inter-island polities. Shortly before this time period, around 1600, Maui chief Kamalalawalu sent spies to Kawaihae to determine how many people lived there, therefore judging the amount of warfare it would take to overcome the inhabitants.

The spies sent by Kama-lala-walu went to Hawaii and landed at Kawaihae in the evening. Ka-uhi-o-ka-lani ran about that same evening and returned before the canoes were dismantled and placed in the house. The keepers of the gods at Mailekini were servants of Kama, and so they concealed the canoes of the spies...[Kamakau 1992:56].

The spies went around the island of Hawai'i taking note of the population, and when they returned to Maui they reported to Kamalalawalu that in Kohala they “found the men only on the shores” and that there were “many houses, but few men” (Kamakau 1992:56). The spies had been mistaken about the amount of people in Kohala, because at that time they were all inland playing sports. Kohala was actually “a thickly-populated land” (Kamakau 1992:57). But, nonetheless, Kamalalawalu set out with his warriors to Hawai'i and landed at Kohala. Here occurred the “destruction of the Kohala people” (Kamakau 1992:58). Afterwards, Kamalalawalu set out for Kawaihae. Here he found no one, for they were all in Waimea attending services at Mailekini Heiau. Kamalalawalu and his warriors went to the grassy plains of Waimea, and a battle ensued with forces from Waimea, Kona, Puna, Ka'u, and Kohala. Kamalalawalu was eventually slain, as were many of his chiefs and warriors. Some of his warriors “escaped by way of Kohala, found canoes, and returned to Maui” (Kamakau 1992:60).

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

It was during the time of Kamehameha's birth that Maui chief Kekaulike began fighting with Alapa'i, at Kona. Kekaulike “cut down the trees throughout the land of Kona” and then “[A]t Kawaihae he cut down

all the coconut trees. He slaughtered the country people of Kohala, seized their possessions, and returned to Maui” (Kamakau 1992:66). After his raid on Kohala, Kekaulike returned to Maui, but soon became ill and relinquished his power to Kamehamehanui.

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

History After Contact

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

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

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

Kamehameha rotated his residence between the royal centers of Hawai'i Island. One of his royal centers was at Kawaihae. At Kawaihae he could take advantage of trade with foreign ships, acquiring guns and ammunition. It was at Kawaihae that he oversaw the construction of Pu'ukoholā Heiau. Kamehameha was told by a soothsayer from Kaua'i that he needed to build a *heiau* (Pu'ukoholā) for the war god Ku'ka'ilimoku (Kuykendall 1938:36). People came from all over Kamehameha's land to help build the *heiau*. People are said to have camped “by the thousands on the neighboring hillsides” (Kuykendall 1938:37). Even Kamehameha himself helped in the building of the *heiau*, but not his younger brother Keliimaikai, who was a high *tabu* chief.

It was said of Keliimaikai that whatever he dedicated became very kapu. If it was a bathing pool, it became so kapu that men were not allowed to bathe there with malos on. Because of this rule, a bathing pool in the upland of Kawaihae was called

Keliialalahoolaawai (The chief who roused to dedicate the water). Also in Kawaihae was a kapu bathing pool called Alawai. [I'i 1963:59].

Water was scarce along the arid coastline of Kawaihae, which may have influenced the naming of this *ahupua'a*. Kawaihae literally translates as “the water [of] wrath (people are said to have fought for water from a pool in this arid area)” (Pukui et al 1974:97).

When Pu'ukoholā was finished in 1791 Kamehameha sent for Keoua, the then ruler of Ka'ū. When Keoua arrived at Kawaihae he was killed and placed within the *heiau*. After this, all of Hawai'i fell under the rule of Kamehameha.

Kamehameha stayed at Pelekane, below Pu'ukoholā while he was in Kawaihae. After Kamehameha's death in 1819, the royal residence consisted of multiple houses of which Kamehameha's successor Liholiho (Kamehameha II) occupied. Other houses extended north along the beach, *mauka* of the *ala nui*. In 1823 there were 100 houses observed by Ellis at Kawaihae (Cordy 2000:347). Although the royal court took up residence along the coast of Kawaihae, there is little evidence to suggest that sufficient agriculture was produced there to sustain the court and their entourage, as well as commoners living there. Lieutenant King made the following observations at Kawaihae in 1779:

Although the northeastern part of the Bay which (the whole or part) is called Toe-yah-ya looks green and pleasant, yet as it is neither wooded or hardly any signs of culture, and a few houses, it has certainly some defect, and does not answer the purposes of what the natives cultivate. [Beaglehole 1967:525]

In the *Journal of a Trading Voyage Around the World* we get another description of Kawaihae that describes the bay and the lack of nearby agriculture:

This bay of Toeigh is very open; an extensive reef runs near it nearly level with the water, and altogether it is no inviting place to anchor at. The country around it looks like a hilly barren desert; nothing grows within ten miles of it, except a few coconut trees, of which a fine grove stands near the beach. The inhabitants and huts are thinly scattered along the shore, far less numerous than about [Kealakekua], and seem more indigent, indeed, having to go so far for their subsistence, they are not seldom in want of the supports of life. [Iselin, n.d.:72; in ca. 1806 in Hammatt et al 1991]

Handy and Handy describe Kawaihae as a:

...broad shallow bay on the west coast of Kohala which is and was the district's chief seaport. The terrain immediately around it is dry and barren but formerly much dry taro was grown beyond in the lower forest zone, which formerly extended from the Kohala Mountains much farther seaward over what is now open pasture land. Wet taro was grown also in small pockets of land wherever streams, even intermittent ones, flowed down from the mountains in the wet seasons. [1972:531]

There is evidence to suggest that vast dry-land agricultural fields were located further inland. Describing the west coast of Kohala, north of Kawaihae, as it appeared in 1823 William Ellis wrote:

The coast was barren; the rock volcanic. The inhabitants were all fishermen. Mr. Thurston was informed, that the inhabitant of the plantations, about seven miles in the interior, were far more numerous than those of the sea-shore. [2004:408]

John Papa I'i recalled fishermen at Kawaihae trading fish for *poi*. He wrote:

Soon the fishing canoes from Kawaihae, the Kaha lands, and Ooma, drew close to the ship to trade for the *pa'i'ai* (hard poi) carried on board, and shortly a great quantity of *aku* lay silvery-hued on the deck. The fishes were cut into pieces and mashed; and all those aboard fell to and ate, the women by themselves (I'i 1963:109, 110).

Along with fishing it seems that salt was produced at Kawaihae. Ellis wrote:

The natives of this district manufacture large quantities of salt, by evaporating the sea water. We saw a number of their pans, in the disposition of which they display great ingenuity. [2004:406]

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

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

Kamehameha I died on May 8, 1819 in Kailua-Kona, and with his passing, his heir Liholiho was given the name of Kamehameha II. Ka'ahumanu, the favorite wife of Kamehameha, announced the last commands of Kamehameha I:

O heavenly one! I speak to you the commands of your grandfather. Here are the chiefs; here are the people of your ancestors; here are your guns; here are your lands. But we two shall share the rule over the land. Liholiho consented and became ruling chief over the government (Kamakau 1992: 220):

Following the death of a prominent chief, it was customary to remove all of the regular *kapu* that maintained social order and the separation of men and women and elite and commoner. Thus, following the death of Kamehameha, a period of *'ai noa* (free eating) was observed, along with the relaxation of other traditional *kapu*. It was for the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history traditional customs saw a change. With an indefinite period of free-eating and the lack of the reinstatement of other *kapu* extending from Hawai'i to Kaua'i, and the arrival of the Christian missionaries shortly thereafter, the traditional religion had been officially replaced by Christianity within a year following the death of Kamehameha I.

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

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

About eleven at night we reached Towaihae [Kawaihae], where we were kindly received by Mr. Young. . . . Before daylight on the 22nd, we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on

the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts. [Ellis 2004:405, 406]

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

Accounts of Kawaihae between 1820 and 1899 show the results of a changing demography. During the Precontact and Proto-Historic Periods Kawaihae was a royal center with houses scattered along the coast and inland farms that supported the population. Following the arrival of foreign trade, namely sandalwood, many people abandoned their traditional lifestyles. In doing so, not only did the land suffer, but the people became reliant on foreign material culture and monetary means of providing for themselves. This left Kawaihae and the people living there in bad condition, as the following examples written between 1820 and 1868 (In Hammatt et al. 1991) show:

...that small uninviting village...[Bingham, 1969:84;in 1820].

Kawaihae is a barren, cheerless place, containing but few houses and a store...[Jarves 1840:July5].

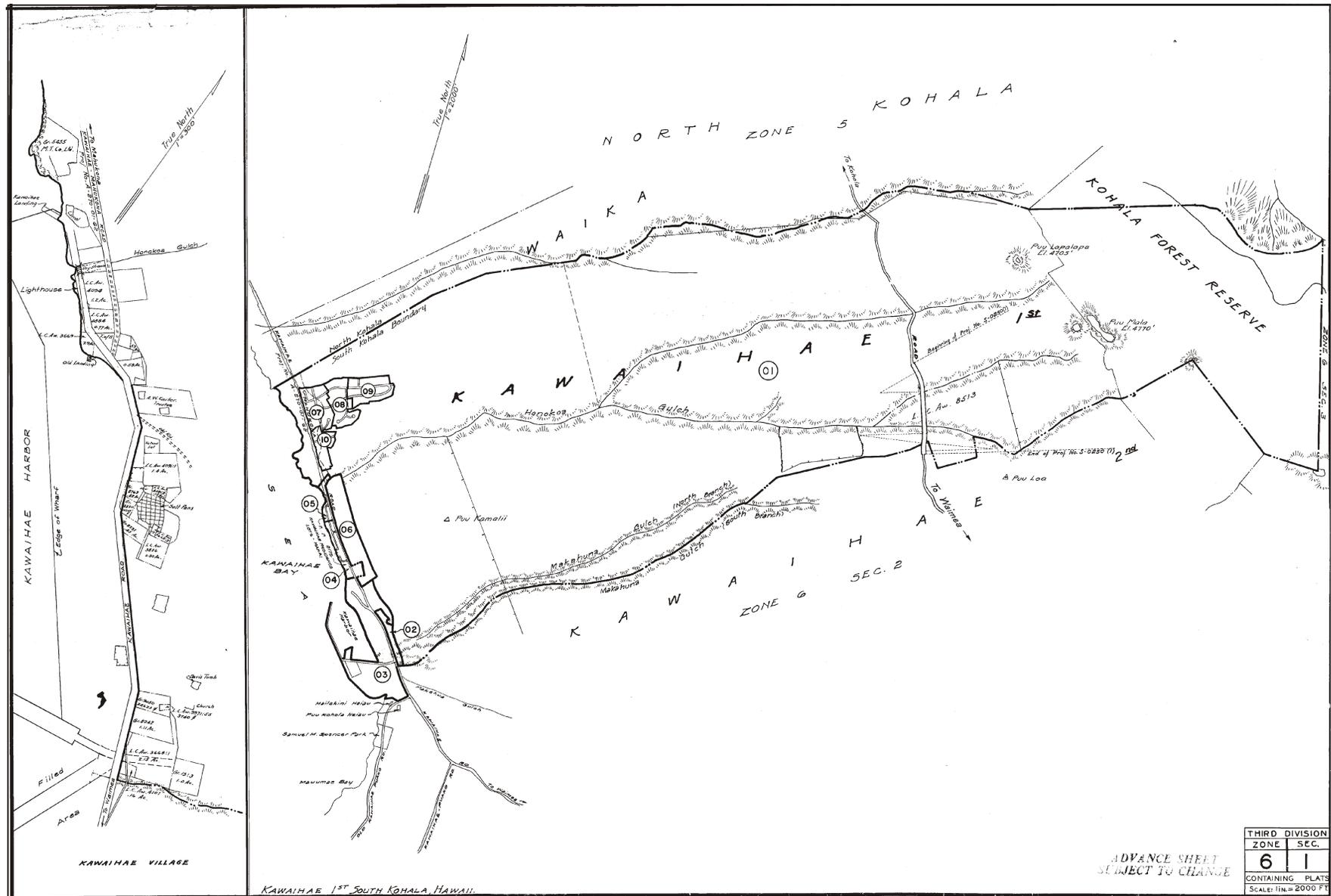
...barren and almost destitute of inhabitants...A well built store and a few houses constituted the only appearance of a town. There was no vegetation to be seen [Jarves 1844:218-219; in 1840].

Kawaihae is a small dreary village, on the shores of Kawaihae Bay, without the least object to attract a resident. Excepting a few sickly cocoa-nut trees, which stood near the tide-mark, I found scarcely a piece of foliage in the entire region [Bates 1854:391; in 1853].

The village consists of a single large wooden structure which serves as a country store and warehouse for the products of the district. Around the shop are clustered several make-shift buildings providing annexes for further storage. Scattered along the seashore are a few *kanaka* grass houses, about twenty. The setting is desolate; not a blade of grass, not a tree, except for the infrequent coconut palms, nor a stream...A small wharf serves for the departure and landing of travelers [Varigny 1981:72; in 1868].

In 1848, the *Māhele ‘Āina* radically altered the Hawaiian system of land tenure. The *Māhele* (division) defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *konohiki*. As a result of the *Māhele*, all land in the Kingdom of Hawai‘i came to be placed in one of three categories: (a) Crown Lands (for the occupant of the throne); (b) Government Lands; and (c) Konohiki Lands. Laws in the period of the *Māhele* record that ownership rights to all lands in the kingdom were “subject to the rights of the native tenants;” those individuals who lived on the land and worked it for their subsistence and the welfare of the chiefs.

As a result of the *Māhele*, Kawaihae 1st Ahupua‘a was retained by Kamehameha III as Crown Land. A total of nine Land Commission Awards (LCAw.) were claimed in Kawaihae 1st Ahupua‘a. Eight of these LCAw. were located along the coast, *makai* of the current project area, and the ninth was located much farther inland, *mauka* of the current project area (Figure 5). There were no *kuleana* claimed within the current project area. The testimonies for the Kawaihae LCAws. mention house lots and salt pans along the coast.



THIRD DIVISION	ZONE	SEC.
	6	1
CONTAINING PLATS		
SCALE: 1 IN. = 2000 FT.		

Figure 5. TMK:3-6-1, showing the LCAw. awarded within Kawaihae 1st Ahupua'a.

The Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i in 1862 to legally set the boundaries of all the *ahupua'a* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of which had also been claimants for *kuleana* during the *Māhele*. This information was collected primarily between 1873 and 1885 and was usually given in Hawaiian and transcribed in English as it was spoken. Bird catching in the mountains was recorded during the boundary testimony for Kawaihae 1st Ahupua'a.

Kawaihae grew and benefited economically when cattle ranching was introduced to Waimea. Ranching boomed in this area in 1850, and a large number of cattle were shipped to O'ahu from Kawaihae. A road was built in 1830 from Kawaihae to Waimea, and it was by way of this road that cattle were driven to the harbor at Kawaihae. Once at Kawaihae the cattle were held in pens until the arrival of an inter-island cattle boat. In 1931 Bernice Judd related that:

Before the Kawaihae road was made possible for carts, the natives were ordered by the chiefs to carry the hides to the seashore in the same way that they had to carry logs of sandalwood. On the return trip to Waimea they were compelled to take bags of salt.
[1931:19]

Kawaihae was changing into a major port at this time. In an 1857 the Pacific Commercial Advertiser reported that 40-50 whaling ships had stopped at Kawaihae during the year and that exports included 1,500 barrels of salt beef, 5,000 barrels of sweet potatoes, fresh beef, pork, fowl, and beans, 1,200 bullock hides, 5,000 goat skins, 35,000 lbs of tallow, and 22,000 lbs of wool. Earlier accounts of Kawaihae only mentioned a few houses and a store (see Varigny 1981:72), but as the port at Kawaihae grew, so did the town. An 1883 map by George Jackson shows a light house, woolshed, native store, jail, boat house, church, a number of unidentified buildings (likely houses), and two graves; that of George Hueu Davis and that of Sea Captain merchant George Macy (Figure 6). Another industry, related to the cattle industry, was the use of cattle tallow to make soap. A soap manufacturing plant which sprang up in Kawaihae at this time is shown on a Loebenstein 1903 map (Figure 7).

Events at Kawaihae continued as discussed above until the construction of a new Federal deep-draft harbor that was authorized in 1950 and dedicated in 1959. Although the drafted area was shallow reef, the "filled area for terminal facilities" obliterated what existed of the Kawaihae village. The salt pans, the Kauhuhue Heiau site, and majority of the coastal land commission awards are now buried under up to 13 feet of dredged material. None of the cultural resources that were impacted by the construction of the harbor were mitigated. The 1969 and 1970 work on the small boat harbor at Kawaihae transformed the area from a Hawaiian village to an industrial park. It is in this setting that one finds the current project area.

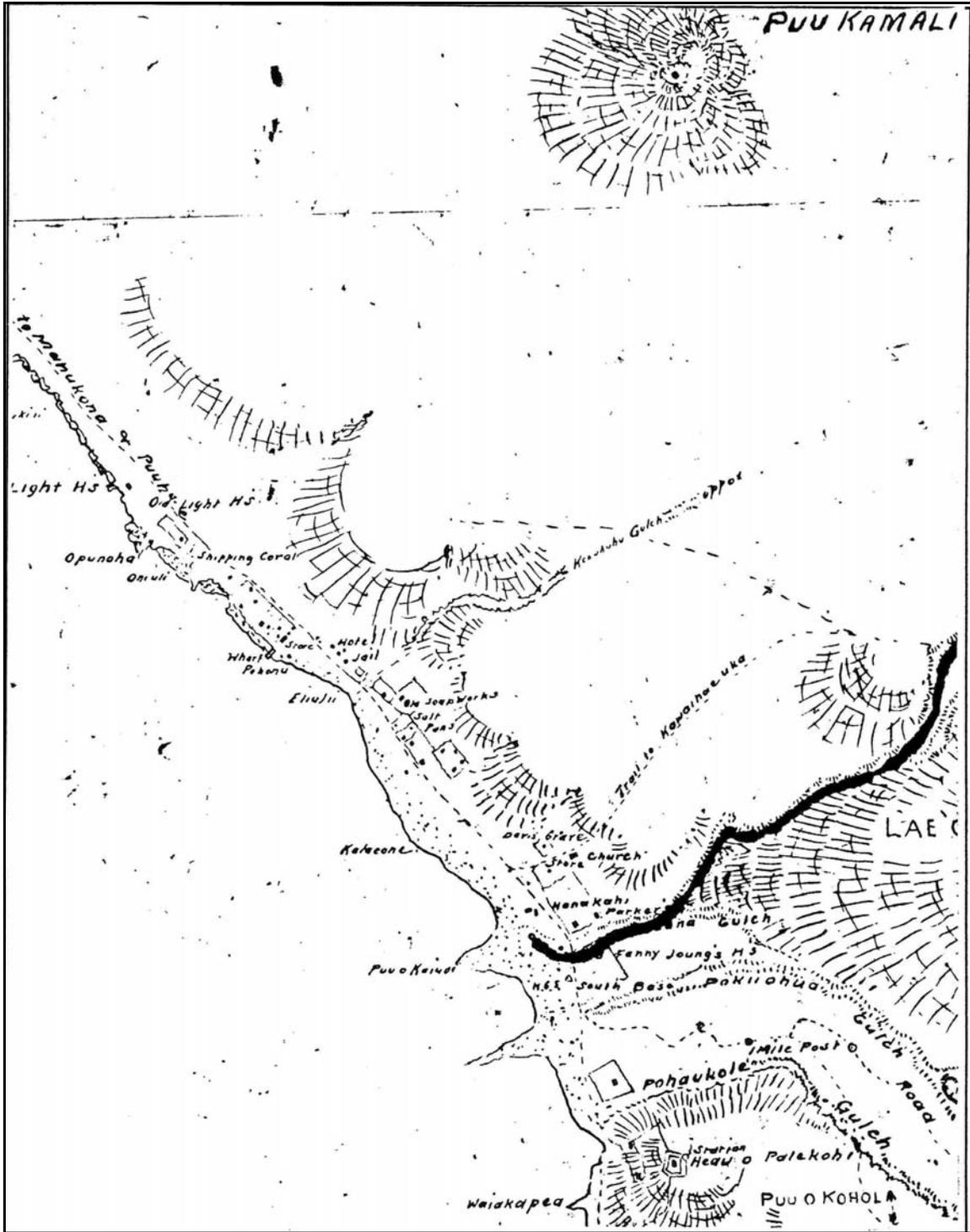


Figure 7. Portion of Loebenstein's map of Kawaihae, 1903 (Hammatt et al. 1991).

Previous Archaeological Research

Two previously conducted archaeological studies have encompassed the current project area. These studies included an archaeological inventory survey conducted by Bishop Museum (Allen 1987) in 1986 and an archaeological inventory survey conducted by Cultural Surveys Hawaii (Hammatt et al. 1991) in 1989. Numerous other studies have been conducted along the coast of Kawaihae 1st Ahupua'a, but are not discussed in detail here (see Soehren 1964; Bonk 1968; Barrera 1974; Clark 1983; McGuire and Hammatt 2001; and Haun et al 2003). These studies recorded numerous archaeological feature types utilized for Precontact and Historic habitation, agricultural, ceremonial, burial, ranching and travel purposes. Figure 8 shows the locations of previous studies conducted in Kawaihae 1st Ahupua'a. The findings of the Allen (1987) and Hammatt et al. (1991) studies are discussed in detail below.

In 1986, the Bishop Museum conducted archaeological investigations of twenty-three Department of Hawaiian Home Land lots totaling roughly 1,600 acres at Kawaihae 1st Ahupua'a (Allen 1987) (see Figure 8). Due to staffing problems and budget constraints, only twelve lots, or approximately 213 acres, were systematically surveyed, approximately 35 percent of another 205 acres was inventoried at a reconnaissance level, and the remaining acreage was investigated through a nonsystematic walk-through assessment. As a result of the study, 111 sites comprised of 381 features were identified. Allen (1987) concluded that archaeological sites were primarily concentrated along the coast, and that their frequency generally decreased with elevation. The sites were also more numerous around (and upslope of) Kawaihae Bay than they were northward towards the North Kohala/South Kohala boundary. The current project area is a portion of what was Lot 10 of the Bishop Museum survey. This area was systematically surveyed, and a total of 28 sites containing 81 features were recorded. Temporary site numbers were assigned to each of the recorded sites. The recorded feature types included mounds, C and U-shaped enclosures, an alignment, a trail, a terrace, a recent campsite, a wall section, a trash pit, a midden/artifact area, and a possible shrine comprised of what appeared to be recently placed upright stones. Five of these sites including an enclosure complex (Site A-32), a terrace, C-shape, and rectangular enclosure complex (Site A-37), a circular enclosure (Site A-39), a C-shape (Site A-40), and an alignment (Site A-41) were located within the boundaries of the current project area. Sites A-32, A-37, and A-40 were interpreted as being used for Precontact habitation and agricultural purposes. Site A-39 was interpreted as a Precontact shelter, and Site A-41 was of an undetermined function. Allen (1987) assessed each of these five sites as having "low" to "moderate" research potential.

In 1989, Cultural Surveys Hawaii (Hammatt et al. 1991) conducted an archaeological inventory survey with limited subsurface testing of selected parcels of Hawaiian Home Lands (see Figure 8). A portion of their survey included the area previously investigated by the above referenced Bishop Museum survey (Allen 1987). Once again Lot 10 was surveyed. In addition to the previously recorded sites and feature types recorded by Allen (1987), thirteen additional sites were recorded that contained the same representation of feature types that Allen recorded, with the addition of *ahu* and a hearth. Within the confines of the current project area, Hammatt et al. (1991) relocated the five sites previously recorded by Allen (1987), which by this time had SIHP Site numbers assigned to them (Sites 13707, 13712, 13714, 13715, and 13716), and they also identified two additional sites (Sites 13906 and 13907) (Figure 9). The two newly recorded sites included a C-shape (Site 13906) interpreted as a Precontact shelter, and an oval site remnant in a deteriorated state (Site 13907) that was interpreted as a possible shrine. As a result of the study Hammatt et al. (1991) recommended Site 13906 for no further work, and Site 13907 for data recovery.

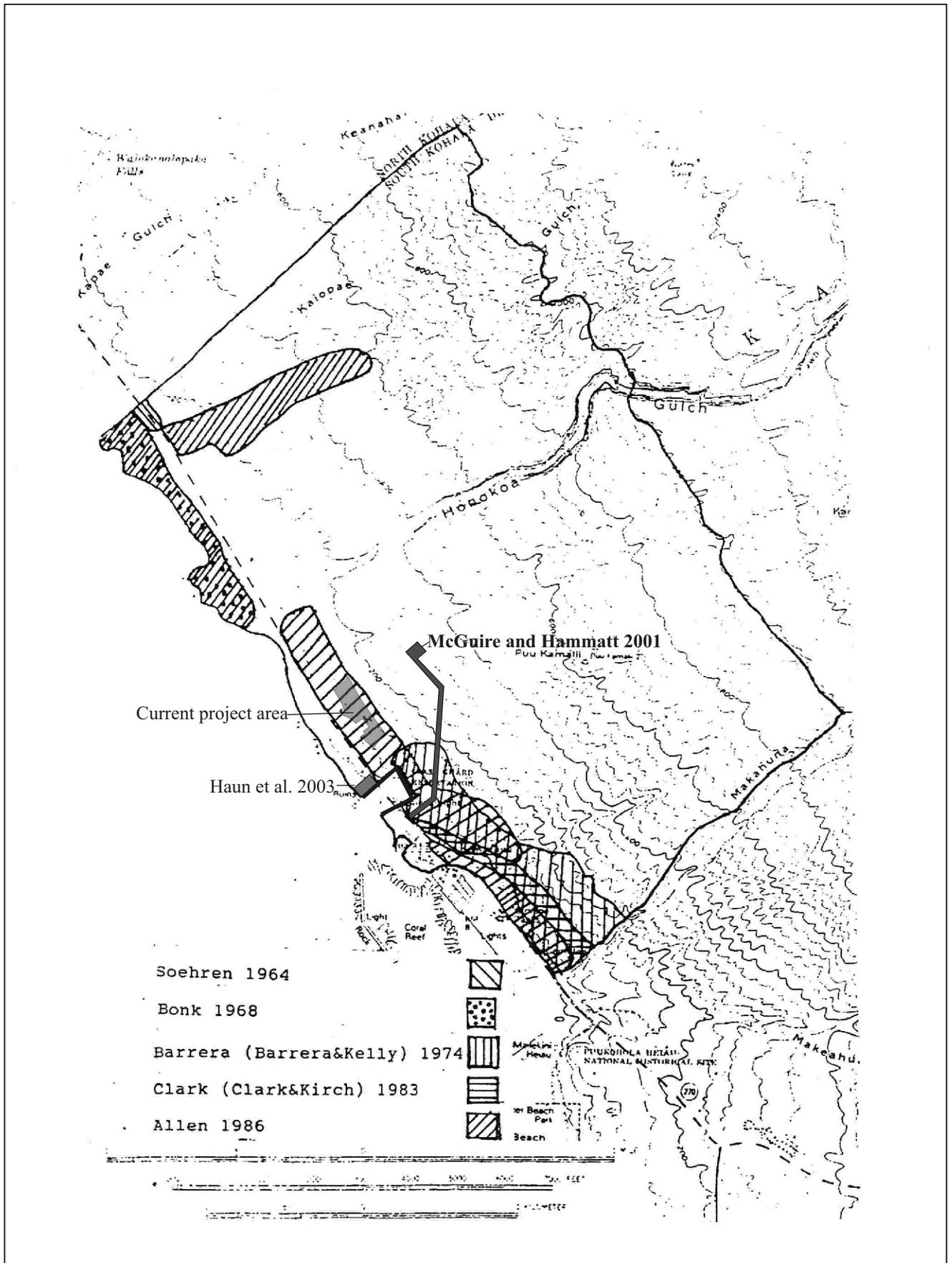


Figure 8. Previous archaeology in Kawaihae 1st Ahupua'a, adapted from Hammatt et al. (1991).

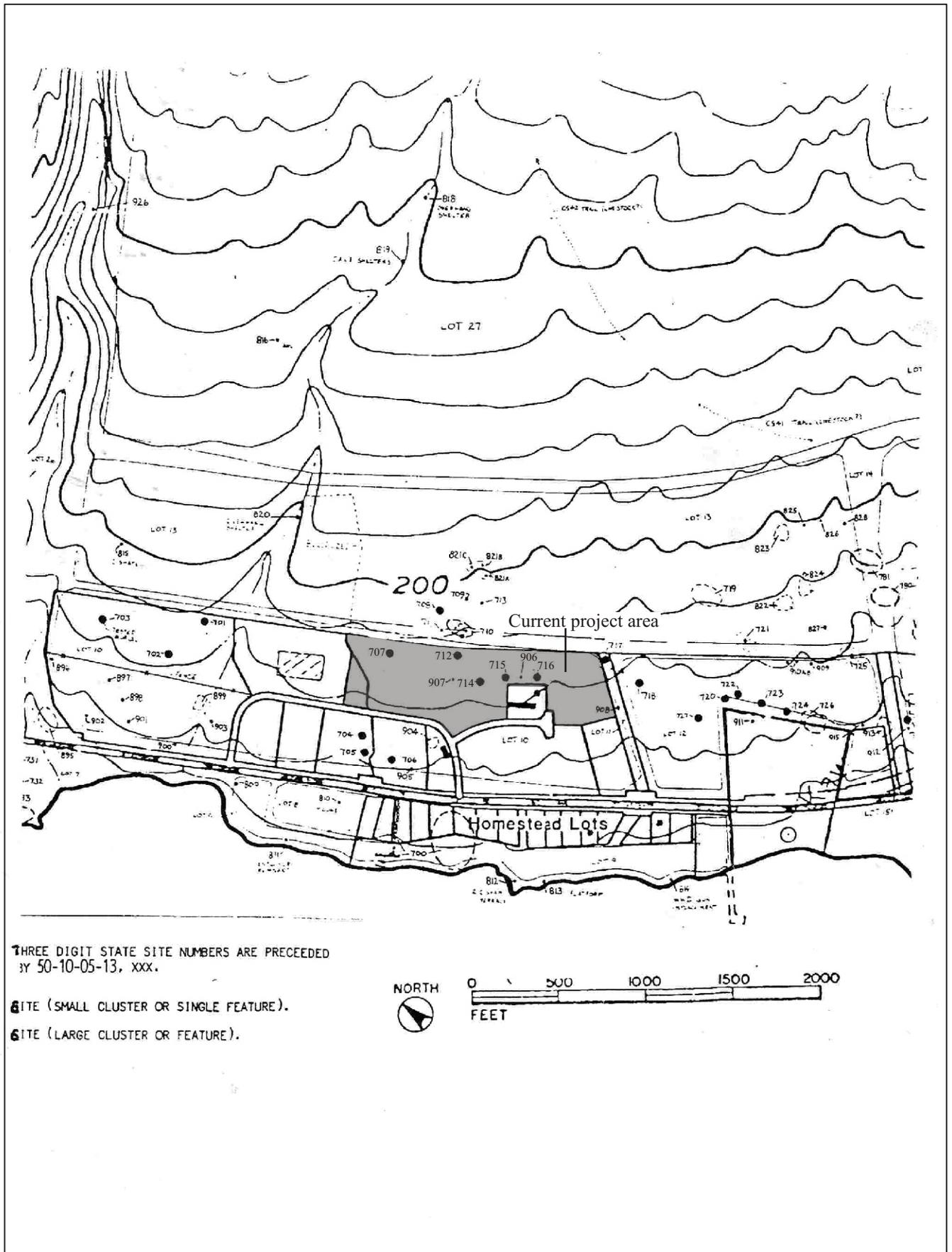


Figure 9. Map showing the current project area and the sites identified by Allen (1987) and Hammatt et al (1991) (adapted from Hammatt et al. 1991).

PROJECT AREA EXPECTATIONS

The South Kohala coast was a dry and barren region as witnessed by early foreign visitors to Hawai‘i, and remains as such today. There were no regularly flowing streams to support sufficient amounts of agriculture needed to sustain a coastal population. From the ethnographic and historical literature it seems that large-scale agriculture was taking place at higher elevations. This resource may have been used to trade with coastal populations for salt and fish. Ellis (2004:408) noted in 1823, that “[T]he inhabitants were all fishermen”. During Kamehameha’s building of Pu‘u Koholā Heiau in Kawaihae 2nd, people came from all over the island to provide labor. Their temporary encampments may have spread as far north as Kawaihae 1st.

Kawaihae 1st did not become a well-settled area until the bay became a major port of call, servicing trade and whaling ships. The construction of the Federal deep-draft harbor obliterated many of the coastal archaeological resources by covering them with materials dredged out of the bay. Kawaihae 1st changed drastically from Precontact to Historic times and with this change, many Precontact archaeological features were either abandoned and left to disrepair, or were demolished in the pursuit of industrialization and modern amenities.

The current project area has been included in two previous archaeological inventory surveys. As a result of those studies seven sites were identified within the study parcel (Sites 13707, 13712, 13714, 13715, 13716, 13906, and 13907). The features recorded at these sites included C-shapes, enclosures, a possible modern alignment, and a terrace. It is expected that unless destroyed by modern impacts to the property, these seven previously identified sites should still be present. It is unlikely that any additional archaeological resources will be encountered during the current survey given the previous scope of work, but if additional features are identified, they will likely embody similar characteristics as those already recorded.

FIELDWORK

Fieldwork for the current project was conducted on September 5th, 2008 by Matthew R. Clark, B.A. and Olivier M. Bautista, B.A., under the direction of Robert B. Rechtman, Ph.D.

Methods

The project area was thoroughly inspected by fieldworkers walking north/south pedestrian transects spaced at 10-meter intervals. During the pedestrian survey, an intensive effort was made to relocate the five sites previously recorded by Allen (1987) and the two additional sites recorded by Hammatt et al. (1991). When located, these sites were plotted on a map of the proposed development area using Garmin 76s handheld Global Positioning System (GPS) technology. They were then cleared of vegetation, mapped in detail using a tape and compass, photographed, and described using standardized feature record forms.

Findings

As a result of the current survey, no new archaeological resources were encountered (Table 1). Four of the five sites previously recorded by the Bishop Museum (Allen 1987) were relocated (Sites 13712, 13714, 13715, and 13716), as were the two sites previously recorded by Cultural Surveys Hawaii (Hammatt et al. 1991) (Sites 13906 and 13907). Site 13707 was not relocated. The location of this site (see Figure 9) places it beneath the area of discarded macadamia nutshells discussed in the project area description above. It is likely that Site 13707 has either been destroyed, or is completely obscured beneath the nutshell piles. Another site (Site 13907) was relocated, but it was found partially bulldozed and covered by macadamia nutshells. All seven previously recorded sites are discussed in detail below. The description includes their original text (from either Allen 1987 or Hammatt et al. 1991) updated with a discussion of their current condition. The location of each of the relocated sites relative to the current study parcel boundaries is shown in Figure 10.

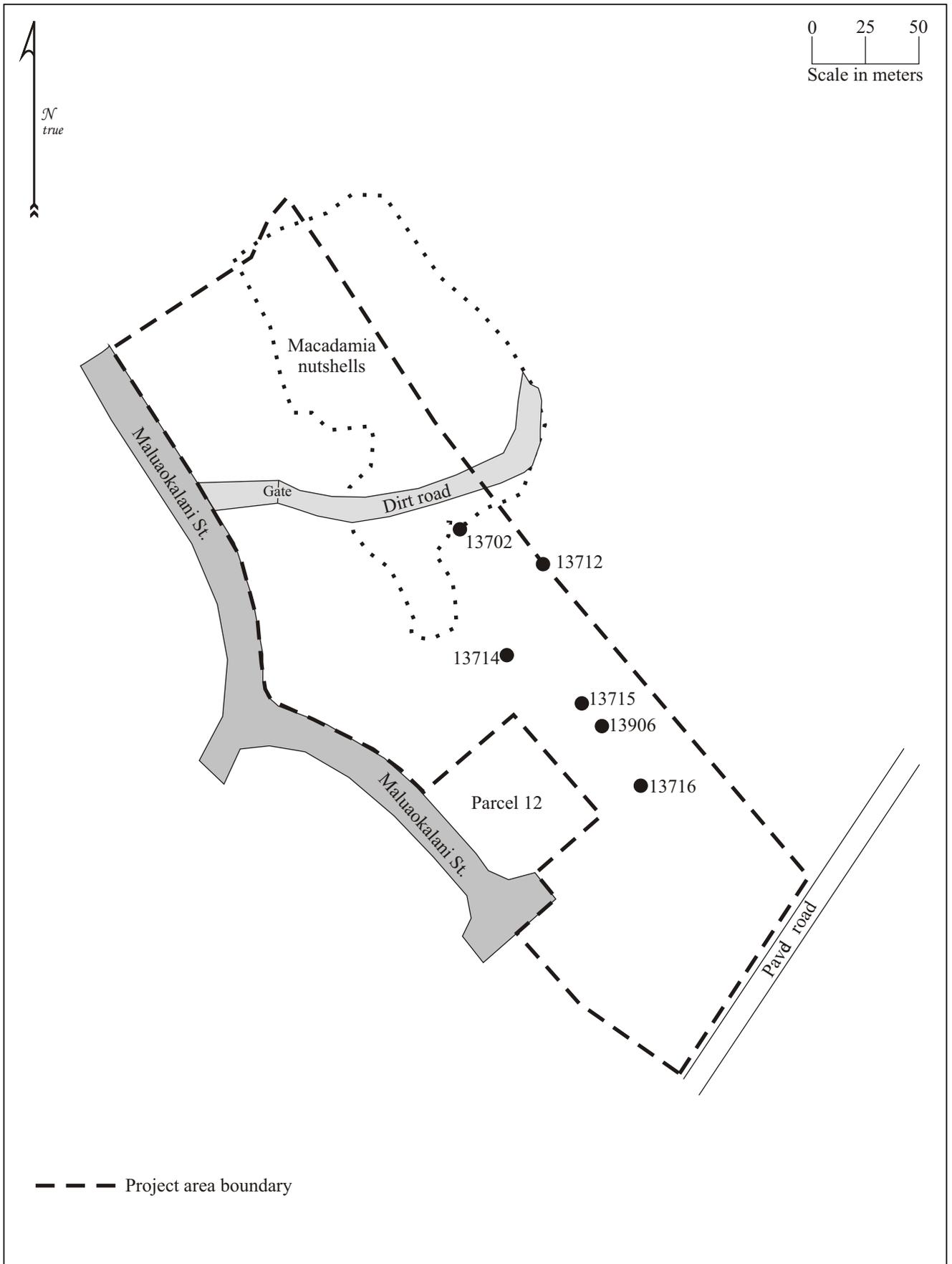


Figure 10. Project area plan view.

Table 1. Archaeological sites recorded within the current project area.

<i>SIHP Site #**</i>	<i>Temp #</i>	<i>Site Type**</i>	<i>Current Condition</i>
13707	A-32	Shelter/agricultural complex containing five features	Completely destroyed
13712	A-37	Agricultural/shelter complex containing three features	Fair (Feat. C outside of project area)
13714	A-39	Circular enclosure shelter	Fair
13715	A-40	Possible shelter or agricultural C-shape	Good
13716	A-41	Rough alignment/recent activity area	Fair
13906	CSH130	C-shape shelter	Poor
13907	CSH131	Oval site remnant/possible shrine	Mostly destroyed

*All SIHP site numbers within the project area are preceded by the state, island, and quad prefix 50-10-05.

**As provided by Allen (1987) or Hammatt et al. (1991).

SIHP Site 13707

Site 13707 was originally recorded by Allen (1987) as temporary site A-32. This site was interpreted as a shelter/agricultural complex containing five features: one independent C-shape (Feature A), two contiguous C-shapes (Features B and C), and two contiguous enclosures (Features D and E). This site was located in what is now the northeast corner of the current project area (see Figure 10). Allen described Site 13707 as follows:

Site A-32 is located southeast of the Pioneer Lumber building and upslope of Highway 270 at ca. 150-ft elevation. Bulldozing is evident to the north and west of the site. A total of five features were recorded: one independent C-shape (Feature A), two contiguous C-shapes (Features B and C), and two contiguous enclosures (Features D and E). All are of stacked stone construction. Both Features D and E have small openings on the ocean side. A shelter function is postulated for Features A through C, while Features D and E may have been used for agricultural purposes since they are smaller. The site tag was placed on the middle interior wall of Feature A. [1987:87-88]

The approximate location that Site 13707 once occupied was closely inspected during the current survey, but the site was not relocated, as large mounds of macadamia nutshells currently cover the entire ground surface. Site 13707 is presumed destroyed.

SIHP Site 13712

Site 13712 was originally recorded by Allen (1987) as temporary site A-37. This site was interpreted an agricultural/shelter complex containing three features: a terrace (Feature A) a C-shape (Feature B), and a rectangular enclosure (Feature C). This site was located in what is now the east-central portion of the current project area (see Figure 10). Allen described Site 13712 as follows:

Located to the southeast of Site A-36 at ca. 140-ft elevation are three features that comprise Site A-37. Feature A is a terrace with stacked boulder facings. It is actively retaining soil and may have had an agricultural function.

Feature B is a C-shape, open on the downslope side, which abuts Feature A on its north end. The C-shape is constructed from single, large boulders and stacked, smaller boulders. This structure may have been used for agriculture or for shelter. Some possible boulder alignments were noted to the west of Feature B in an area of dense grass.

Feature C is a rectangular enclosure of stacked stone construction, 9 m upslope from Features A and B. This is the most likely of the three to have been used for shelter. The site tag was placed on the eastern corner of Feature A. [1987:91-92]

Site 13712 was relocated during the current survey. The A-37 site tag was identified at Feature A. Features A and B are within the boundaries of the current study parcel, and are consistent with their description above. Feature C is located east of the current study parcel boundary. It was identified, but not recorded. Features A and B were mapped (Figure 11) and photographed (Figure 12) as part of the current fieldwork.

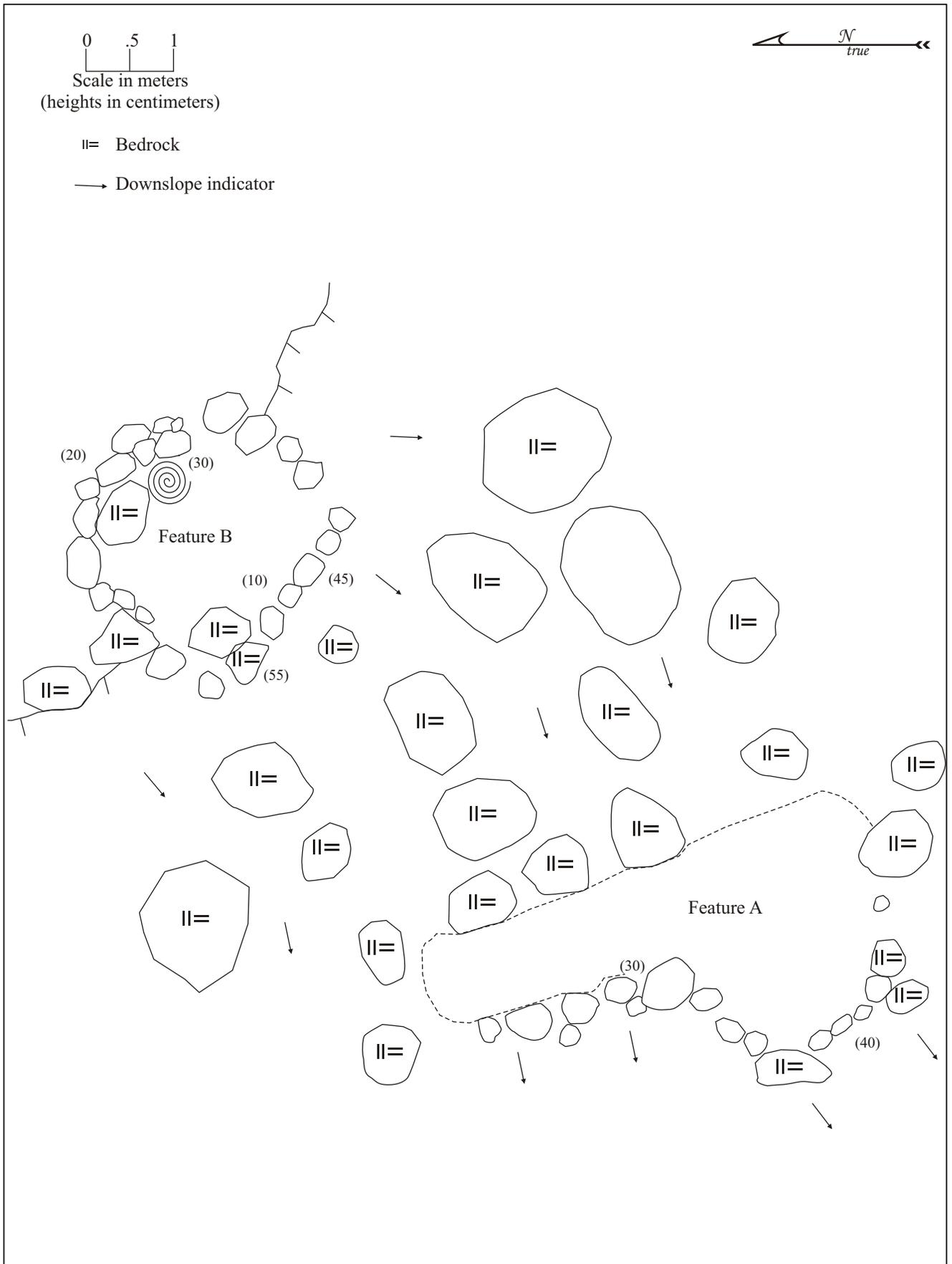


Figure 11. SIHP Site 13712 plan view.



Feature A, view to the east.



Feature B, view to the south.

Figure 12. Photographs of SIHP Site 13712.

SIHP Site 13714

SIHP Site 13714 was originally recorded by Allen (1987) as temporary site A-39. This site was interpreted as a shelter that consisted of a circular enclosure. Site 13714 was located in what is now the central portion of the current project area (see Figure 10). Allen described Site 13714 as follows:

This circular enclosure is located at ca. 130-ft elevation and southeast of a shallow wash. It is constructed of stacked stone, and boulders in single and in double alignment. A few uprights are found in the northeast wall. The structure measures 4.0 m in diameter and has walls 50 cm high. The condition is fair. Within the feature is approximately 10 cm to 40 cm of soil. No midden or artifacts were noted. A shelter function is hypothesized. The site tag was placed adjacent to the aforementioned uprights. [1987:92]

Site 13714 was relocated during the current survey and is consistent with the description above. The A-39 site tag was found at the feature. During the current fieldwork, Site 13714 was mapped and photographed (Figure 13).

SIHP Site 13715

Site 13715 was originally recorded by Allen (1987) as temporary site A-40. This site was interpreted as a possible shelter or agricultural feature that consisted of a single C-shape. Site 13715 was located in what is now the central portion of the project area (see Figure 10). Allen described Site 13715 as follows:

This C-shape is located at ca. 130-ft elevation. It is of stacked stone construction and in good condition. The structure measures 3.8 m in diameter, and the wall varies from 30 cm to 60 cm high. A large upright boulder forms the southwest end. An interior deposit of 15 cm was noted, but no midden or artifacts were seen. A shelter or agricultural function is most probable. The site tag is located on the north end of the feature, on the interior side of the wall. [1987:92]

Site 13715 was relocated during the current survey and is consistent with the description above. The A-40 site tag was found at the feature. As part of the current survey, Site 13715 was mapped and photographed (Figure 14).

SIHP Site 13716

Site 13716 was originally recorded by Allen (1987) as temporary site A-41. This site was interpreted as a recent activity area containing a rough alignment. Site 13716 was located in what is now the southern portion of the current project area (see Figure 10). Allen described Site 13716 as follows:

Located at ca. 125-ft elevation, Site A-41 is a 2.0-m-long north-south-trending alignment that abuts a bedrock outcrop and creates a small protected area (150 cm by 80 cm). Within this protected area is a wire screen. The alignment is composed primarily of large boulders and measures 60 cm high. The area is under dense grass and no charcoal was observed; the screen and associated wall suggest there may be a recent hearth present. The site tag was placed on the boulder alignment near the north end. [1987:94]

Site 13716 was relocated during the current survey and is consistent with the description above. The A-41 site tag was found at the feature, but the wire screen was no longer present. During the current fieldwork Site 13716 was mapped and photographed (Figure 15).

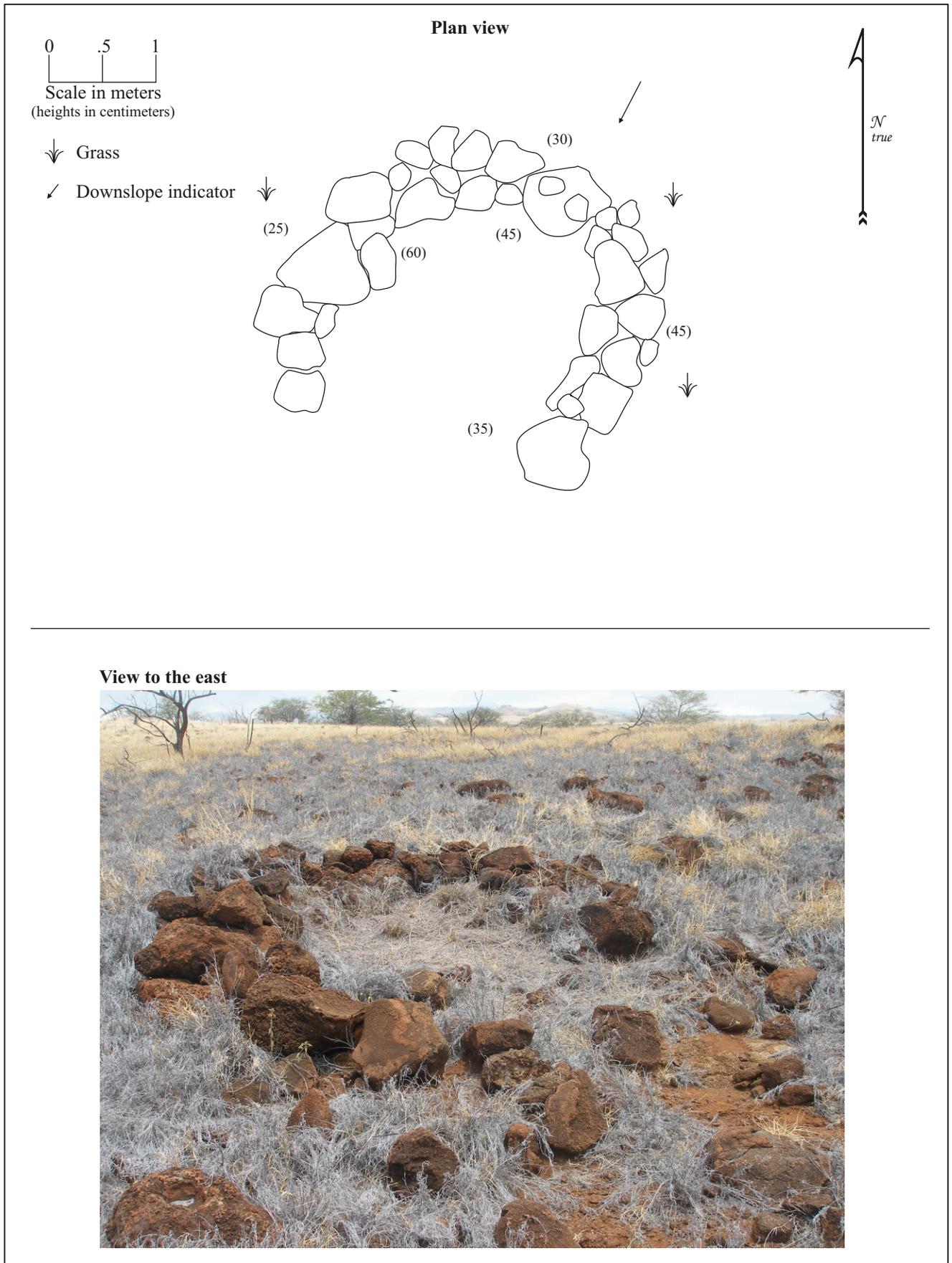
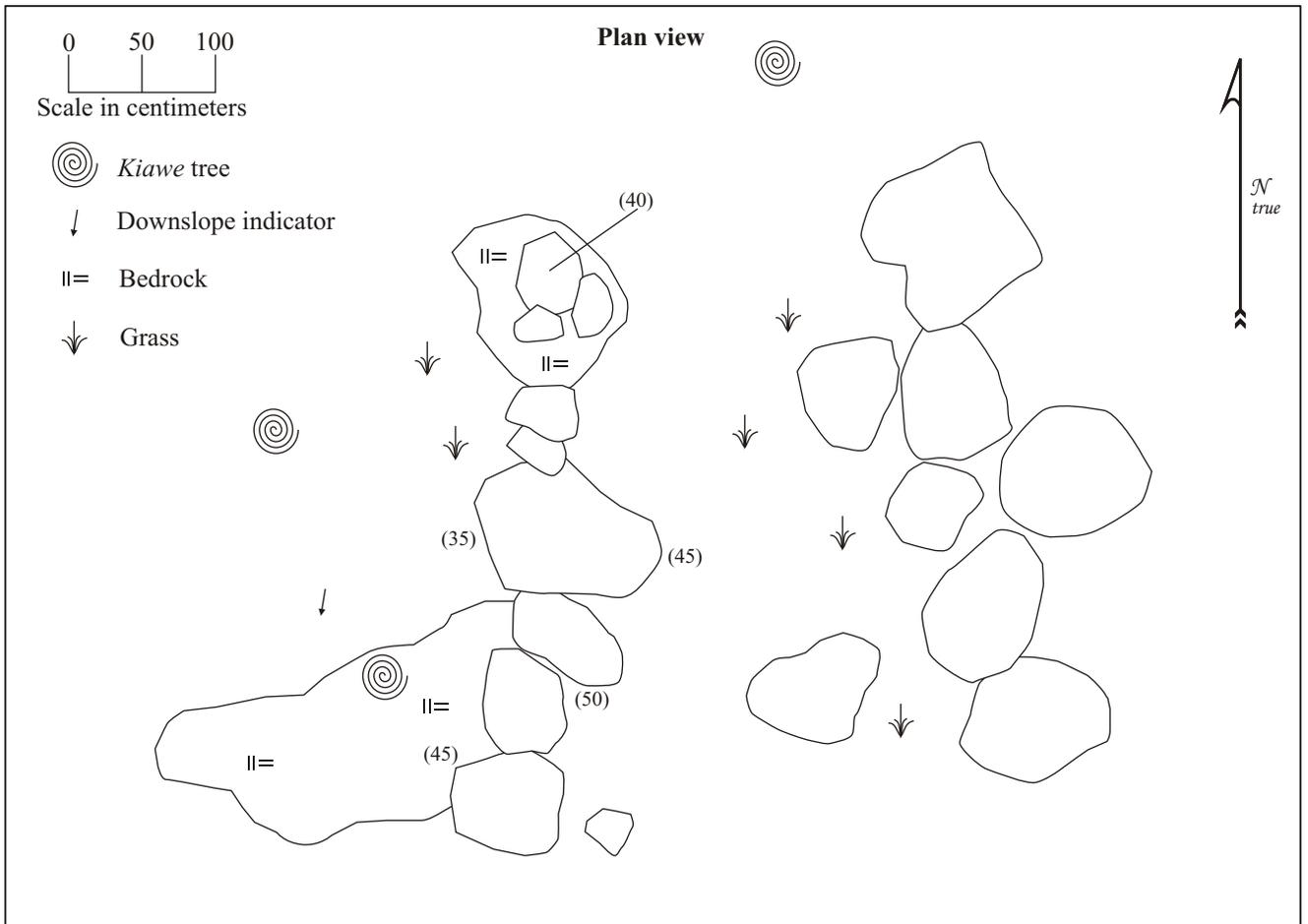


Figure 14. SIHP Site 13715 plan view and photograph.



View to the south



Figure 15. SIHP Site 13716 plan view and photograph.

SIHP Site 13906

SIHP Site 13906 was originally recorded by Hammatt (1991) as temporary site CSH130. This site was interpreted a single use site consisting of a C-shape. Site 13906 was located in what is now the southern portion of the current project area and is between Sites 13715 and 13716 (see Figure 10). Hammatt et al. described Site 13906 as follows:

Located 21.3 m NW of Site 13,716 (BM A41) in the east corner of Lot 10 at approximately 140 ft elevation, this site consists of one C-shaped feature. The structure opens *makai* and is constructed of boulders and cobbles. This C-shape measures NW/SE 2.1 m. along the exterior, 1.2 m. on the interior and NE/SW 1.2 m. on the exterior and 1.2 m. on the interior. Two large boulder uprights make up the east side of the structure and the walls average 0.6 m. wide and 0.5 m. high. The floor of the structure consists of soil with a few cobbles and no midden or artifacts were observed. This single use shelter site is in poor condition with very low research potential. [1991:VIII-130]

Site 13906 was relocated during the current survey and in its current condition is consistent with the description above. The CSH131 sit tag was found at the feature. This C-shape is very crude, and barely discernable as an enclosure. The two boulder uprights mentioned by Hammatt et al. (1991) appeared incidental to the construction of the feature (naturally occurring large stones) rather than placed at the site. As part of the current survey, Site 13906 was mapped and photographed (Figure 16).

SIHP Site 13907

SIHP Site 13907 was originally recorded by Hammatt et al. (1991) as temporary site CSH131. This site was interpreted as a possible shrine consisting a roughly oval site remnant. Site 13907 was located in what is now the central portion of the current project area and is north of Site 13714) (see Figure 10). Hammatt et al. described Site 13906 as follows:

Located 30.5 m. *makai* of Site A37 in Lot 10 at approximately the 130 ft elevation, this site consists of a roughly oval site remnant which is presently in a very deteriorated state. The site included a scatter of coral boulders and cobbles, including both porites and branch coral. The site measures 3.7 m NW/SE and 3 m. NE/SW and the walls consist of stacked boulders and cobbles. The floor of the structure is bedrock with a few cobbles. This site does not appear to be a burial but it could be a shrine. Excavation potential is poor. The marker for the site is placed at the eastern edge of the site. [1991:VIII-130]

The remnants of what was likely once Site 13907 were relocated during the current survey. The identification of this site was based on its distance from Site 13712 and the presence of scattered coral (including branch coral). The CSH site tag was not relocated as the eastern edge of Site 13907 has been impacted by bulldozing and the dumping of macadamia nutshells since the time of the previous study. No stacking or architecture of any kind was observed at Site 13907. All that remains of the site is a scattering of branch and waterworn coral on ground surface within an area that measures 6.0 meters by 2.0 meters (Figure 17). One waterworn stone and a single piece of *Cypraea* sp. were also observed. This scatter is downslope of where the site most likely originally stood.

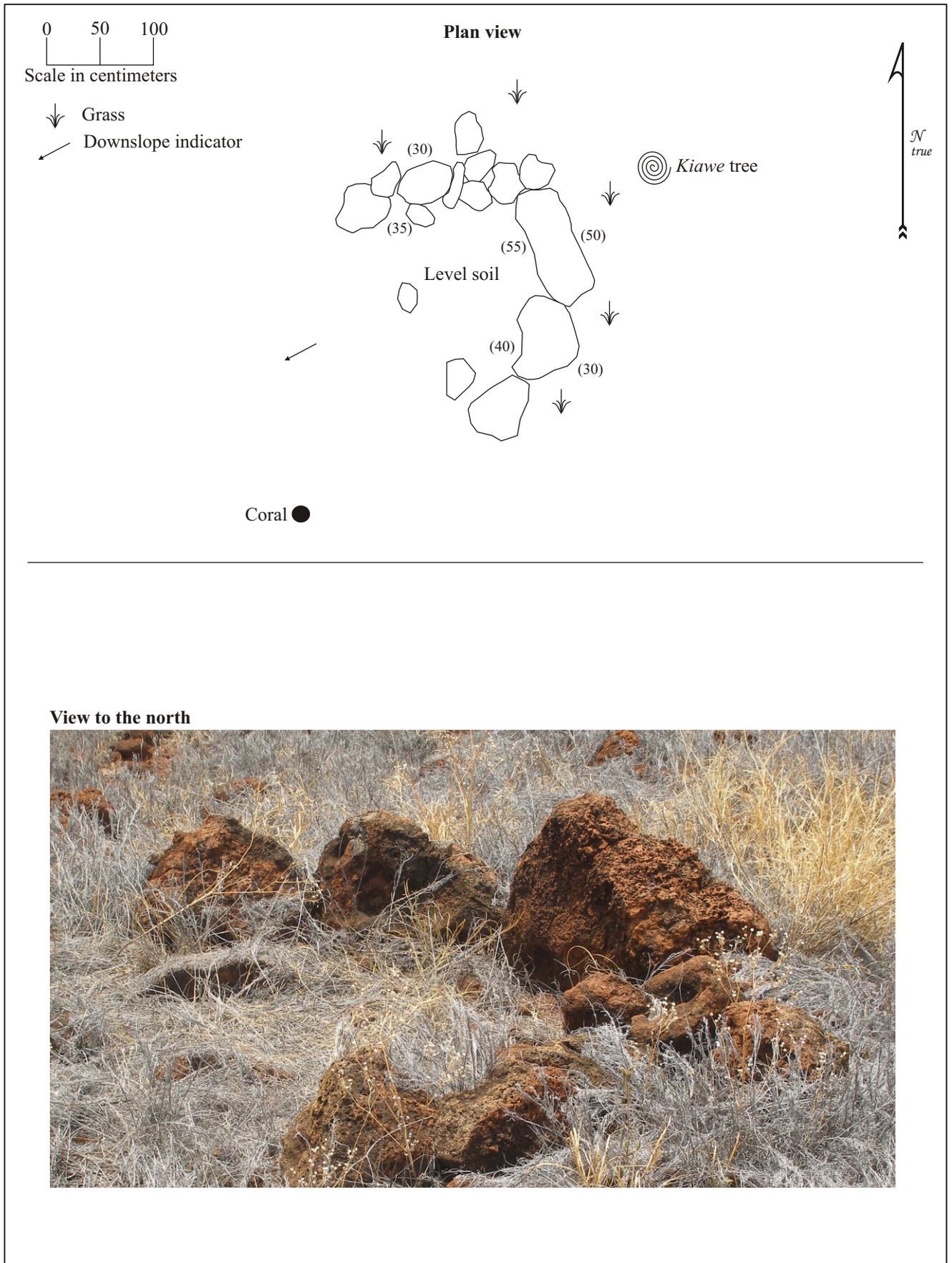


Figure 16. SIHP Site 13906 plan view and photograph.



Figure 17. SIHP Site 13907 remnant coral scatter.

SIGNIFICANCE EVALUATION AND TREATMENT RECOMMENDATIONS

The above-described archaeological resources are re-assessed for their significance based on criteria established and promoted by the DLNR-SHPD and contained in the Hawai‘i Administrative Rules 13§13-284-6. These significance evaluations should be considered as preliminary until DLNR-SHPD provides concurrence. For resources to be considered significant they must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

- A. Be associated with events that have made an important contribution to the broad patterns of our history;
- B. Be associated with the lives of persons important in our past;
- C. Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- D. Have yielded, or is likely to yield, information important for research on prehistory or history;
- E. Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity.

The significance and recommended treatments for the sites are discussed below and are presented in Table 2.

Table 2. Site significance and treatment recommendations.

<i>Site #</i>	<i>Type</i>	<i>Age</i>	<i>Significance</i>	<i>Recommended Treatment</i>
13707*	Enclosure complex	Precontact	D	No further work
13712	Enclosure complex	Precontact	D	No further work
13714	Circular enclosure	Precontact	D	No further work
13715	C-Shape enclosure	Precontact	D	No further work
13716	Alignment	Modern	Not significant	No further work
13906	C-Shape enclosure	Precontact	D	No further work
13907*	Coral scatter	Precontact	D	No further work

* Currently these sites are mostly or totally destroyed.

All of the archaeological sites recorded during the current inventory survey are considered significant under Criterion D for information they have yielded relative to the past use of the study parcel. With respect to all of these sites, except for SIHP Site 13907, we concur with the previous “no further work” treatment recommendations. For Site 13907, Hammatt et al. (1991) recommended data recovery; however, since the time when this site was originally recorded it has been impacted as the result of bulldozer activity, and no longer retains excavation potential. Therefore we recommend that no further work is necessary for this site. It is concluded that the documentation already recovered concerning all seven of these sites, which is contained in the Allen (1987) and Hammatt et al. (1991) studies, coupled with that which is presented in the current study, has served to adequately mitigate any impacts that may occur as a result of the proposed development.

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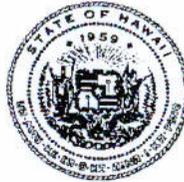
DRAFT ENVIRONMENTAL ASSESSMENT

KONA CARBON PROJECT

APPENDIX 3

Air Quality Permit Material

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:
File:

April 4, 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
(7004 1350 0003 2875 8625)

07-279E CAB
File No. 0641

Mr. Bennett Miller
CEO
Kona Carbon, LLC
1050 17th Street NW
Suite 1000
Washington, DC 20036

Dear Mr. Miller:

Subject: Noncovered Source Permit (NSP) No. 0641-01-N
Initial Application No. 0641-01
Kona Carbon, LLC
450 lb/hr Activated Carbon Facility
Location: Maluokalani Street, Kawaihae, Hawaii
UTM: Zone 5; 203,408m E; 2,219,481m N (NAD-83)
Date of Expiration: April 3, 2012

The subject noncovered source permit is issued in accordance with Hawaii Administrative Rules (HAR), Title 11, Chapter 60.1. The issuance of this permit is based on the plans, specifications, and information that you submitted as part of your application received on December 7, 2006; and revisions dated January 3, 8, 31, 2007. The receipt for \$150.00 for the application filing fee is enclosed.

The noncovered source permit is issued subject to the conditions/requirements set forth in the following Attachments:

- Attachment I: Standard Conditions
- Attachment II: Special Conditions
- Attachment III: Annual Fee Requirements
- Attachment IV: Annual Emissions Reporting Requirements

The following forms are enclosed for your use and submittal as required:

- Annual Fee Form
- Annual Emissions Report Form: Fuel Consumption
- Monitoring Report Form: Fuel Certification

Mr. Bennett Miller
April 4, 2007
Page 2

This permit: (a) shall not in any manner affect the title of the premises upon which the equipment is to be located; (b) does not release the permittee from any liability for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the equipment; and (c) in no manner implies or suggests that the Department of Health, or its officers, agents, or employees, assumes any liability, directly or indirectly, for any loss due to personal injury or property damage caused by, resulting from or arising out of the design, installation, maintenance, or operation of the equipment.

Sincerely,



THOMAS E. ARIZUMI, P.E., CHIEF
Environmental Management Division

CBS:nn

Enclosures

c: Wendell Sano, EHS - Kona
CAB Monitoring Section

INITIAL NONCOVERED SOURCE PERMIT APPLICATION

*450 lb/hr Activated Carbon Facility
Kawaihae, Hawaii*

SUBMITTED TO:

**State of Hawaii
Department of Health
Clean Air Branch**

SUBMITTED BY:

**Kona Carbon, LLC
Suite 1000, 1050 17th Street NW
Washington, DC 20036**

December 2006

CONTENTS

TAB

1	Form S-1 -	Standard Permit Application
2	Form S-8 -	Initial Noncovered Source Permit Application
3	Form C-1 -	Compliance Plan
4	Appendix A -	Calculations
5	Appendix B -	Equipment Specifications

File No. ____

FORM S-1

11. Proposed Equipment/Plant Location (e.g. street address): Makualani Street
City: Kawaihae State: HI Zip Code: 96743
UTM Coordinates (meters): East: 203,408 North: 2,219,481
UTM Zone: 5 UTM Horizontal Datum: Old Hawaiian NAD-27 NAD-83

12. General Nature of Business: activated carbon production

13. Date of Planned Commencement of Construction or Modification: May 07

14. Is **any** of the equipment to be leased to another individual or entity? Yes No

15. Type of Organization: Corporation Individual Owner Partnership
 Government Agency (Government Facility Code: _____)
 Other: LLC

Any applicant for a permit who fails to submit any relevant facts or who has submitted incorrect information in any permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. In addition, an applicant shall provide additional information as necessary to address any requirements that become applicable to the source after the date it filed a complete application, but prior to the issuance of the noncovered source permit or release of a draft covered source permit. (HAR §11-60.1-64 & 11-60.1-84)

RESPONSIBLE OFFICIAL (as defined in HAR §11-60.1-1)

Name (Last): Miller (First): Bennett (MI): _____

Title: CEO Phone: (301) 299-2884

Mailing Address: Suite 1000, 1050 17th Street NW

City: Washington State: DC Zip Code: 20036

Certification by Responsible Official (pursuant to HAR §11-60.1-4)

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record. I further state that I will assume responsibility for the construction, modification, or operation of the source in accordance with the Hawaii Administrative Rules (HAR), Title 11, Chapter 60.1, Air Pollution Control, and any permit issued thereof.

NAME (Print/Type): Bennett Miller
(Signature):  Date: 12/1/06

FOR AGENCY USE ONLY:
File/Application No.: _____
Island: _____
Date Received: _____

1. INTRODUCTION

Kona Carbon, LLC. (the "Applicant") is proposing to construct an activated carbon production facility at Kawaihae on the Big Island. The facility's principal emission units are a 9.9 MMBTU/hr boiler, and a 7 MMBTU/hr kiln.

As part of the regulatory requirements to install and operate these boilers, the Applicant is submitting herein a Noncovered Source Permit Application pursuant to Hawaii Administrative Rules (HAR) Chapter 11-60.1. The application begins with a brief summary of the method used in determining the applicability followed by sections providing all other information specified in the Department of Health (DOH) rules and application Forms S-1, S-8, and C-1.

2. APPLICABILITY

The first step in the Chapter 11-60.1 permitting process is to determine which provisions of the rules apply and which type of permit, if any, is required for a given "source." This "applicability" analysis is based on a calculation of estimated annual emissions from the proposed "source" or modification to a source. These calculations must be based on the "potential to emit" (PTE) of the individual source or modification in question. Federal new source performance standards (CAA §111) and national emissions standards for hazardous air pollutants (NESHAPs) (CAA §112) are also criteria for determining applicability of Chapter 11-60.1.

In this instance, the proposed facility will not exceed either the 100 TPY "Covered Source" threshold nor the 40 TPY "significant" emissions threshold. Furthermore, it is not subject to NSPS or NESHAPs; thus, it is subject to Noncovered Source permitting without a BACT requirement.

3. FORM S-1 INFORMATION

a. Emissions Units Table. The required Emissions Units Table information is provided in Table S-1.1.

b. Process Flow Diagram. See Process Description and accompanying Figure 1 in Appendix B, Manufacturer's Literature.

c. Description of Emissions Points. Two 50-foot exhaust stacks serve the boiler and kiln, and another 50-foot stack serves the baghouse unit at the product storage and handling building.

d. Emission Calculations. The emissions shown in Tables S-1.1 were based on the calculations provided in Appendix A and manufacturer design data.

c. Facility Location Map. See Figures S-1.1 and S-1.2 for property location and adjacent buildings.

LOCATION: Kawaihae, HI

TABLE S-1.1

EMISSIONS UNITS TABLE

REVIEW OF APPLICATIONS AND ISSUANCE OF PERMITS WILL BE EXPEDITED BY SUPPLYING ALL NECESSARY INFORMATION ON THIS TABLE.

Stack No.	Unit No.	Equipment Name/Description and SIC Code	Equip. Date (1)	Regulated/Hazardous Air Pollutant Name (CAS#)	#/hr	Tons /yr	Zone	East (m)	North (m)	Height Above Ground (m)	Direct. (2)	Inside Diam. (m)	Vel. (m/s)	Actual Flow Rate (m3/s)	Temp (°K)
S-1	U-1	9.9 MMBTU/hr Boiler CAS 2819	May 07	SO ₂	5.02	22.0	5	203,408	2,219,481	15.24	U	0.305	19.5	1.42	422
				NOX	4.50	19.7									
				CO	0.90	3.9									
				TSP	0.14	0.62									
				PM ₁₀	0.14	0.62									
				VOC	0.20	0.88									
				Pb	8.91E-05	3.90E-04									
				Formaldehyde 50-00-0	4.31E-03	1.89E-02									
				As	3.96E-05	1.73E-04									
				Be	2.97E-05	1.30E-04									
				Cd	2.97E-05	1.30E-04									
				Cr	2.97E-05	1.30E-04									
				Mn	5.94E-05	2.60E-04									

(1) Date of Equipment Construction, Reconstruction, or Modification. Provide supporting documentation.

(2) Exit direction of stack emissions: up, down, or horizontal

LOCATION: Kawaihae, HI

TABLE S-1.1

EMISSIONS UNITS TABLE

REVIEW OF APPLICATIONS AND ISSUANCE OF PERMITS WILL BE EXPEDITED BY SUPPLYING ALL NECESSARY INFORMATION ON THIS TABLE.

Stack No.	Unit No.	Equipment Name/Description and SIC Code	Equip. Date (1)	Regulated/ Hazardous Air Pollutant Name (CAS#)	#/hr	Tons /yr	Zone	East (m)	North (m)	Height Above Ground (m)	Direct. (2)	Inside Diam. (m)	Vel. (m/s)	Actual Flow Rate (m3/s)	Temp (°K)	
S-1	U-1	9.9 MMBTU/hr Boiler CAS 2819	May 07	Hg	2.97E-05	1.30E-04										
				Ni	2.97E-05	1.30E-04										
				Se	1.48E-01	4.60E+01										

(1) Date of Equipment Construction, Reconstruction, or Modification. Provide supporting documentation.

(2) Exit direction of stack emissions: up, down, or horizontal

LOCATION: Kawaihae, HI

TABLE S-1.1

EMISSIONS UNITS TABLE

REVIEW OF APPLICATIONS AND ISSUANCE OF PERMITS WILL BE EXPEDITED BY SUPPLYING ALL NECESSARY INFORMATION ON THIS TABLE.

Stack No.	Unit No.	Equipment Name/Description and SIC Code	Equip. Date (1)	Regulated/Hazardous Air Pollutant Name (CAS#)	#/hr	Tons /yr	Zone	East (m)	North (m)	Height Above Ground (m)	Direct. (2)	Inside Diam. (m)	Vel. (m/s)	Actual Flow Rate (m3/s)	Temp (°K)
S-2	U-2	7 MMBTU/hr Kiln CAS 2819	May 07	SO ₂	3.55	15.5	5	203,419	2,219,443	15.24	U	0.254	22.4	1.13	477
				NOx	3.20	14.0									
				CO	1.80	7.9									
				TSP	0.14	0.44									
				PM ₁₀	0.100	0.44									
				VOC	0.50	2.19									
				Pb	6.30E-05	2.76E-04									
				Formaldehyde 50-00-0	3.05E-03	1.34E-02									
				As	2.80E-05	1.23E-04									
				Be	2.10E-05	9.20E-05									
				Cd	2.10E-05	9.20E-05									
				Cr	2.10E-05	9.20E-05									
				Mn	4.20E-05	1.84E-04									

(1) Date of Equipment Construction, Reconstruction, or Modification. Provide supporting documentation.

(2) Exit direction of stack emissions: up, down, or horizontal

LOCATION: Kawaihae, HI

TABLE S-1.1

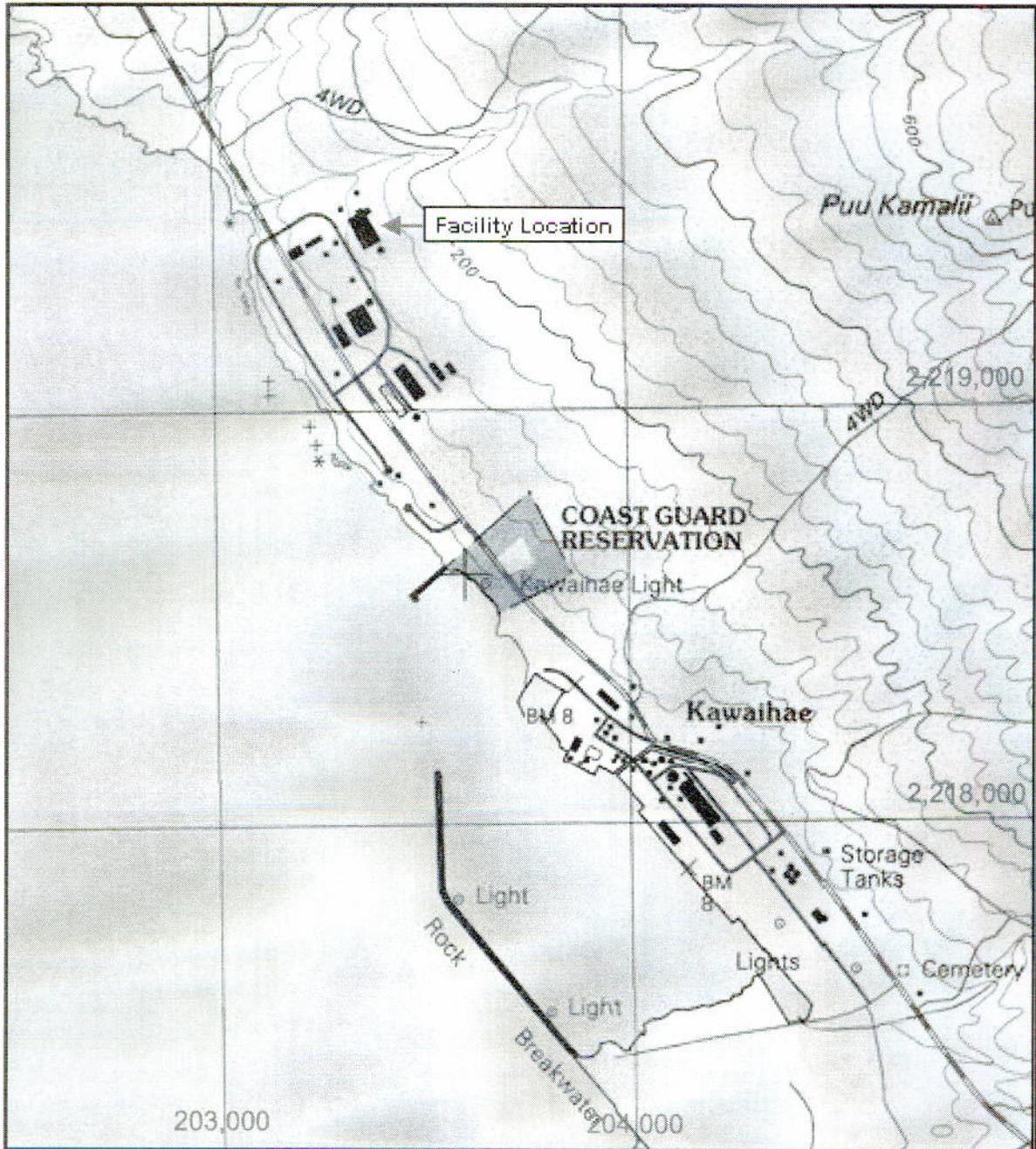
EMISSIONS UNITS TABLE

REVIEW OF APPLICATIONS AND ISSUANCE OF PERMITS WILL BE EXPEDITED BY SUPPLYING ALL NECESSARY INFORMATION ON THIS TABLE.

Stack No.	Unit No.	Equipment Name/Description and SIC Code	Equip. Date (1)	Regulated/ Hazardous Air Pollutant Name (CAS#)	#/hr	Tons /yr	Zone	East (m)	North (m)	Height Above Ground (m)	Direct. (2)	Inside Diam. (m)	Vel. (m/s)	Actual Flow Rate (m3/s)	Temp (°K)	
S-2	U-2	7 MMBTU/hr Kiln CAS 2819	May 07	Hg	2.10E-05	9.20E-05										
				Ni	2.10E-05	9.20E-05										
				Se	1.05E-01	2.30E+01										
S-3		Product Storage Baghouse	May 07	PM	9.75E-05	4.27E-04	5	203,436	2,219,425	15.24	U	0.508	11.6	2.36	339	
		Fugitive PM emissions														
		Front ending receiving & storage		PM	7.31E-02	3.20E-01										
		Metering bin		PM	4.87E-04	2.13E-03										

(1) Date of Equipment Construction, Reconstruction, or Modification. Provide supporting documentation.
 (2) Exit direction of stack emissions: up, down, or horizontal

FIGURE S-1.1
FACILITY LOCATION



USGS Kawaihae (1995)
1:24,000 (NAD-83)

File No. _____

FORM S-8

I. §11-60.1-63 REQUIREMENTS

A. Equipment Specifications. See Table S-8.1.

TABLE S-8.1
EQUIPMENT SPECIFICATIONS

Parameter	9.9 MMBTU/hr Oil/Gas Fired Boiler	7 MMBTU/hr Oil/Gas Fired Kiln
Maximum design capacity	9.9 MMBTU/hr	450 lb/hr carbon
Fuel type	No. 2 oil, pyrolysis oil, process gas	No. 2 oil, pyrolysis oil, process gas
Fuel use	70.7 gal/hr	50 gal/hr
Production capacity	9.9 MMBTU/hr	450 lb/hr carbon
Production rate	9.9 MMBTU/hr	450 lb/hr carbon
Raw materials	water, fuel oil & gas	char, fuel oil & gas

B. Process Description. See description in Appendix B, Manufacturer's Literature.

C. Air Pollution Control/Compliance Monitoring/Emissions

1. Air Pollution Control

a. SO₂ control is achieved by use of liquid and gaseous fuels with a sulfur content not exceeding 0.5% by weight.

b. NO_x control is achieved by good combustion conditions and low excess air, e.g., <20%. The boiler will also employ "low-NO_x" burners.

c. CO and VOC control is achieved by proper maintenance and operation of the boiler and kiln within their design specifications to assure maximum oxidation of the hydrocarbon fuel to CO₂ and H₂O. Adequate excess air assures complete combustion of the carbonaceous fuels.

d. PM control in the boiler and kiln is achieved by use of low sulfur fuels with inherently low ash contents and proper maintenance and operation of the boiler and kiln within their design specifications to assure complete combustion and conversion of carbon compounds to gaseous CO₂.

PM control in the material handling areas is accomplished in a number of ways. The nut shells will have been washed and screened prior to arrival onsite to assure clean and debris free feedstock. Received shells are coarse screened and stored in a covered shed. Shells are moved by front-end loader from the storage shed to a dump hopper from which they are conveyed to a metering bin for controlled feed into the system. The metering bin and conveying system are equipped with a baghouse for PM control. Due to the hard nature of the shells and their prior washing, negligible dust generation is expected from this initial handling.

The pyrolysis reactor and activation kiln are enclosed and once produced the activated carbon is kept in a closed system to assure product quality. The product bins and activated carbon granulator are controlled by a 5,000 cfm baghouse.

2. Monitoring. Monitoring of No. 2 fuel sulfur content will be accomplished by obtaining from the fuel supplier and maintaining on file, copies of fuel analysis certificates indicating sulfur content of 0.5% or less. The pyrolysis oil and process gas are inherently low in sulfur content.

3. Emissions. Emissions calculations are presented in Appendix A. Emissions presented represent the maximum emission rates expected from any of the three fuels to be used.

D. Operational Limits. None.

E. Construction Schedule. Construction of the facility is estimated to commence in May 2007.

F. Exemptions. None.

G. Compliance Plan. Form C-1 is included at Tab 3

II. APPLICATION FEE

The required \$150 Initial Noncovered Source Permit Application fee is enclosed with this application.

III. OTHER INFORMATION

Air Quality Impact Assessment. A detailed air quality impact analysis was performed using the ISCST3 model. One year of meteorological data from a previous proposed Kawaihae power plant site was used in the model. USGS DEM data for the Kawaihae quadrangle were processed to produce an array of 1,156 receptor locations with 30-meter spacing. Due to the height of proposed buildings and tanks and the proximity of other buildings in the project area, the building downwash option was activated and the BPIP model was used to generate appropriate building dimensions for input to ISCST3. The results were combined with CY 2004 DOH monitoring data to produce final estimates for comparison with ambient air quality standards (see Table S-8.2). Model I/O files will be submitted upon request.

TABLE S-8.2

ISCST3 MODELING RESULTS

Pollutant	Averaging Period	Pollutant Concentration (ug/m ³)		
		Facility Impact	Background	Total
NO ₂	annual	48.6	6	55.6
SO ₂	annual	54.1	8	62.1
	24-hr	317	21	338
	3-hr	547	55	602
PM ₁₀	annual	1.52	13	14.5
	24-hr	7.0	29	36.0
CO	8-hr	161	983	1,144
	1-hr	590	2,394	2,984

DOH CY 2004 Monitoring Data: NO₂ West Beach
 SO₂ Kona
 PM₁₀ Hilo
 CO Kapolei

File No. ____

FORM C-1

COMPLIANCE PLAN

The Responsible Official shall submit a Compliance Plan with the following permit applications, and at such other times as requested by the director.

- Initial Noncovered Source Permit Application
- Temporary Noncovered Source Permit Application
- General Noncovered Source Permit Application
- Application for a Noncovered Source Permit Renewal
- Application for a Modification to a Noncovered Source
- Initial Covered Source Permit Application
- Temporary Covered Source Permit Application
- General Covered Source Permit Application
- Application for a Covered Source Permit Renewal
- Application for a Significant Modification to a Covered Source.

1. Compliance status with respect to all Applicable Requirements:

Will your facility be in compliance, or is your facility in compliance, with all applicable requirements in effect at the time of your permit application submittal?

- YES {If YES, complete items a and c below}
- NO {If NO, complete items a-c below}

a. Identify all applicable requirement(s) for which compliance is achieved:

<u>HAR, Chapt. 11-59, HAAQS</u>	<u>40 CFR 50, NAAQS</u>
<u>HAR §11-60.1-2 prohibition of air pollution</u>	<u>HAR §11-60.1-11 sampling, testing & reporting</u>
<u>HAR §11-60.1-32(b), visible emissions</u>	<u>HAR Chapt. 11-60.1, Subchapt. 4, Noncovered Sources</u>
<u>HAR Chapt. 11-60.1, Subchapt. 6, Fees</u>	<u>HAR Chapt. 11-60.1, Subchapt. 10, Field Citations</u>

Provide a statement that the source is in compliance and will continue to comply with all such requirements.

To the best of my knowledge and belief, the proposed Kona Carbon Facility will be designed and
operated to assure compliance with the aforementioned applicable requirements.

b. Identify all applicable requirement(s) for which compliance is NOT achieved:

N/A

Provide a detailed Schedule of Compliance and a description of how the source will achieve compliance with all applicable requirements. Use separate sheets of paper, if necessary.

Description of Remedial Action

Expected Date of Completion

N/A

- c. Identify any other applicable requirements with a future compliance date that your source is subject to. These applicable requirements may be in effect AFTER permit issuance:

Applicable Requirement

Effective Date

Currently in Compliance?

N/A

If the source is not currently in compliance, submit a Schedule of Compliance and a description of how the source will achieve compliance with all such applicable requirements:

Description of Proposed Action/Steps
to Achieve Compliance

Expected Date of Achieving
Compliance

N/A

Provide a statement that the source on a timely basis will meet all these applicable requirements.

N/A

If the expected date of achieving compliance will NOT meet the applicable requirement's effective date, provide a more detailed description of all remedial actions and the expected dates of completion.

Description of Remedial Action

Expected Date of Completion

N/A

APPENDIX A
CALCULATIONS

**EMISSIONS CALCULATIONS
9.9 MMBTU/HR BOILER
(OIL/GAS FIRED)**

Pollutant	AP42 EF (lb/kgal)	Opns Rate (gal/hr)	Emiss. (lb/hr)	Annual Opns (gal/yr)	Emiss. (T/yr)
NOx ¹	n/a	70.7	4.50	619,332	19.71
CO ¹	n/a	70.7	0.90	619,332	3.94
SO ₂	71	70.7	5.02	619,332	21.99
VOC ¹	n/a	70.7	0.20	619,332	0.88
PM	2	70.7	0.14	619,332	0.62
Formaldehyde	6.10E-02	70.7	4.31E-03	619,332	1.89E-02
Arsenic	5.60E-04	70.7	3.96E-05	619,332	1.73E-04
Beryllium	4.20E-04	70.7	2.97E-05	619,332	1.30E-04
Cadmium	4.20E-04	70.7	2.97E-05	619,332	1.30E-04
Chromium	4.20E-04	70.7	2.97E-05	619,332	1.30E-04
Mercury	4.20E-04	70.7	2.97E-05	619,332	1.30E-04
Manganese	8.40E-04	70.7	5.94E-05	619,332	2.60E-04
Nickel	4.20E-04	70.7	2.97E-05	619,332	1.30E-04
Lead	1.26E-03	70.7	8.91E-05	619,332	3.90E-04
Selenium	2.10E-03	70.7	1.48E-01	619,332	4.60E+01

Sample Calculations:

NOx: $TPY = \text{manuf. EF}(\text{lb/hr}) \times 8760 \text{ hr/yr} / 2000$
 $4.5 \times 8760 / 2000 = 19.7 \text{ TPY}$

- Notes:
1. Maximum emission rate for No. 2 oil, pyrolysis oil or process gas based on vendor specs.
 2. All others based on AP-42 Tables 1.3-1, 1.3-6, 1.3-8, and 1.3

**EMISSIONS CALCULATIONS
7 MMBTU/HR KILN
(OIL/GAS FIRED)**

Pollutant	AP42 EF (lb/kgal)	Opns Rate (gal/hr)	Emiss. (lb/hr)	Annual Opns (gal/yr)	Emiss. (T/yr)
NOx ¹	n/a	50.0	3.20	438,000	14.02
CO ¹	n/a	50.0	1.80	438,000	7.88
SO ₂	71.0	50.0	3.55	438,000	15.55
VOC ¹	n/a	50.0	0.50	438,000	2.19
PM	2	50.0	0.10	438,000	0.44
Formaldehyde	6.10E-02	50.0	3.05E-03	438,000	1.34E-02
Arsenic	5.60E-04	50.0	2.80E-05	438,000	1.23E-04
Beryllium	4.20E-04	50.0	2.10E-05	438,000	9.20E-05
Cadmium	4.20E-04	50.0	2.10E-05	438,000	9.20E-05
Chromium	4.20E-04	50.0	2.10E-05	438,000	9.20E-05
Mercury	4.20E-04	50.0	2.10E-05	438,000	9.20E-05
Manganese	8.40E-04	50.0	4.20E-05	438,000	1.84E-04
Nickel	4.20E-04	50.0	2.10E-05	438,000	9.20E-05
Lead	1.26E-03	50.0	6.30E-05	438,000	2.76E-04
Selenium	2.10E-03	50.0	1.05E-01	438,000	2.30E+01

Sample Calculations:

NOx: $TPY = \text{manuf. EF(lb/hr)} \times 8760 \text{ hr/yr} / 2000$
 $3.2 \times 8760 / 2000 = 14.0 \text{ TPY}$

- Notes:
1. Maximum emission rate for No. 2 oil, pyrolysis oil or process gas based on vendor specs.
 2. All others based on AP-42 Tables 1.3-1, 1.3-6, 1.3-8, and 1.3

CALCULATIONS
MATERIAL HANDLING FUGITIVE PM

Ref: AP-42, Sec. 13.2.4

$EF = k(0.0032) \cdot (U/5)^{1.3} / (M/2)^{1.4} = \text{lb/T material handled}$	0.0390
k (particle size multiplier) (worst case <30u) =	0.74
U (mean wind speed) (worst case) =	15
M (material moisture content) (worst case) =	0.75

FRONT-END MATERIAL HANDLING & STORAGE

Material handled (lb/hr) (See Process Description):	2500
Extra handling factor:	1.5
Material handling (adjusted) (T/hr) - $1.5 \times 2500 / 2000 =$	1.88
Material handling (TPY) - $1.9 \times 8760 =$	16,425
Emissions (lb/hr) - $1.9 \times 0184 =$	7.31E-02
Emissions (TPY) - $16,425 \times .0184 / 2000 =$	3.20E-01

METERING BIN

Material handled (lb/hr):	2500
Material handling (T/hr) - $2500 / 2000 =$	1.25
Material handling (TPY) - $1.25 \times 8760 =$	10,950
Uncontrolled emissions (lb/hr) - $1.25 \times 0390 =$	4.87E-02
Uncontrolled emissions (TPY) - $10,950 \times .0390 / 2000 =$	2.13E-01
Baghouse controlled emissions (lb/hr) - $0.01 \times 1.25 \times 0390 =$	4.87E-04
Baghouse controlled emissions (TPY) - $0.01 \times 10,950 \times .0390 / 2000 =$	2.13E-03

PRODUCT HANDLING & STORAGE

Material handled (lb/hr):	500
Material handling (T/hr) - $500 / 2000 =$	0.25
Material handling (TPY) - $0.25 \times 8760 =$	2,190
Uncontrolled emissions (lb/hr) - $0.25 \times 0390 =$	9.75E-03
Uncontrolled emissions (TPY) - $2,190 \times .0390 / 2000 =$	4.27E-02
Baghouse controlled emissions (lb/hr) - $0.01 \times 0.25 \times 0390 =$	9.75E-05
Baghouse controlled emissions (TPY) - $0.01 \times 2,190 \times .0390 / 2000 =$	4.27E-04

APPENDIX B

MANUFACTURER'S LITERATURE

KONA CARBON, LLC

PROCESS DESCRIPTION

1.0 INTRODUCTION

The Facility will use a raw feedstock of macadamia nut shells to produce activated carbon media. This technology has been developed, designed, and successfully pilot tested by American Carbon, Inc. The facility primarily consists of two known and proven individual treatment technologies, a fixed bed updraft biomass gasifier (reactor) and a rotary kiln activation system. The combination of these technologies is known as the Kona Technology and is protected by current and pending patents.

The Facility is anticipated to process at least 2,500 pounds per hour of macadamia nut shells to produce approximately 450 pounds per hour of activated carbon (18% yield rate) with an Iodine value of approximately 1,200. A by-product of the updraft biomass gasifier is a biomass liquid fuel. On an annual basis, the activated carbon production rate is 1,800 tons, assuming an operational time of at least 7,884 hours per year. The plant is designed for continuous operation. A 90 percent on-stream factor is estimated based upon scheduled and unscheduled maintenance requirements.

2.0 DESCRIPTION OF PROCESS FLOW

The unit allows for the production of activated carbon from macadamia nut shells in a two-step process. The process has been proven to produce carbon from a variety of biomass materials. The Facility is based on a pyrolysis system for production of a char suitable for activation to a very high quality carbon product. This system is illustrated in Figure 1 and is discussed below.

2.1 FEED STORAGE AND HANDLING

Macadamia nut shells are transported to the Facility via Dump Trucks or by conveyor from the adjacent Hamakea nut processing facility. The nut shells will have been washed and screened prior to arrival onsite to ensure clean and debris free feed stock. The feed material is screened using a coarse material screen and is stored in a covered shed. The raw nut shells are re-claimed using a front end loader into a dump hopper. Approximately two months of feed can be stored at the facility.

The raw macadamia nut shells are transferred from the dump hopper via a conveyor to the Metering Bin. The Metering Bin is used to control the flow of shells to the reactor. The metering bin contains a bag filter vent to control particulate emissions from the conveyor and storage operation. Due to the very hard nature of the macadamia nut shells that minimize the production of fines, very little particulate is generated in the storage and transfer operations.

2.2 REACTOR

Following is a brief description of the major elements of the pyrolysis system and its function. First, raw feedstock is supplied to the pyrolysis reactor. Fuel for the activation process may be supplied by the excess gas and oil produced in the initial pyrolysis process.

The feedstock enters a feed bucket elevator wherein the feed is elevated and discharged to a feed chute. A rotary valve located at the bottom of the feed chute discharges to a feed screw conveyor which transports the raw feed into the top of the pyrolysis reactor bed. The feed is

KONA CARBON, LLC PROCESS DESCRIPTION

distributed across the top of the bed by a reactor stirrer. This rotating device is periodically run in reverse. During its reverse rotation the feed is pushed down while it is being distributed, thereby placing a downward force on the entire bed of solids. The stirrer may be raised or lowered to control the flow of solids down to the first level of gas injection tubes. The solids pass through the reactor primarily via gravity.

The pyrolysis reactor consists of a composite wall insulation package with a refractory shaft. A mechanical output feed device is mounted on the bottom of the shaft. This device supports the vertical packed bed of solids and, via the reactor output drive, meters carbon chips from the reactor to maintain the top of the bed at a specified level within the circular portion of the shaft.

Either low-pressure steam, or a portion of the cooled off gases from the activation kiln may be used for the energy recovery gas, which is injected at multiple locations into the packed bed. Minimum energy is required to drive the process. The feed material in the reactor is completely dried and heated to approximately 450°F in the upper portion of the reactor, at which point it undergoes an exothermic reaction, or destructive distillation, which produces char, gases, and vapors at approximately 700°F. Typically, the char will contain 25% volatiles. The char is then cooled by the energy recovery gases. This extracts the sensible heat from the char and delivers it to upper regions of the bed. The energy to drive the process, including losses, is normally less than 200 Btu per pound of feed. Once the feed becomes char, it is free flowing and does not require mechanical agitation.

The char produced in the reactor flows into the char output screw conveyor. This conveyor discharges the char to the char output rotary valve, which, in turn, discharges to the char storage bins.

The injected process gases, and the gases and vapors produced by the thermo-chemical conversion process in the pyrolysis reactor, are drafted from the pyrolysis reactor by the reactor gas blower. This fan is controlled to maintain pressure in the reactor and char bins just slightly sub-atmospheric. In this manner the pyrolysis reactor is automatically drafted.

2.3 ACTIVATION KILN

Char from the char bins is conveyed to the activation kiln feed hopper via a covered screw conveyor. The char is then fed into a rotating cylinder that is externally heated to produce the required time versus temperature required to sufficiently activate the char. Steam is injected into the rotating cylinder to facilitate the activation process. The activation kiln is heated by a burner system fired with either reactor gas, pyrolysis oil and/or No.2 fuel oil. The activation kiln process also includes a heat exchanger to preheat the activation steam required in the kiln and a heat recovery system on the combustion products from the externally heated jacket of the rotary kiln.

2.4 PRODUCT HANDLING

The activated carbon from the kiln is transported to product storage bins where it is cooled using a recirculated inert gas stream. To maintain product quality, all of the product handling is completed within a closed system.

KONA CARBON, LLC PROCESS DESCRIPTION

The activated carbon is sized using a granulator and loaded into lined drums for storage. The granulator, product storage bins and the drum loading operation are all vented to a bag filter collection system for particulate emission control

2.5 OFF-GAS TREATMENT SYSTEM

As the off-gas stream leaves the pyrolysis reactor it enters the off-gas ductwork, which connects the pyrolysis reactor to a cyclone. Pyrolysis-oil sprays may be used to “scrub” entrained solid particulate from the off-gas stream. This oil also is used to periodically cleanse the duct walls. The off-gas stream and the scrubbing oil enter the wet scrubber cyclone where the scrubbing oil and particulate, are separated from the off-gas stream. This stream exits the cyclone through a cyclone outlet cap. The oil exits the cyclone through an oil trap and an oil rotary valve, which isolates the cyclone from the oil handling and preparation system.

The off-gas stream flows directly from the cyclone into a condenser where the organic vapors, together with some water vapor, condense to produce pyrolysis oil with specific moisture content. The cooled off-gas stream and pyrolysis oil droplets are condensed in an oil collector, which is a part of the condenser unit. The separated oil exits the collector and enters an oil trap where it is isolated from the oil handling and preparation system.

The scrubbed and cooled off-gas stream is drawn from the condensed oil collector by a pyrolysis reactor gas blower. This gas contains hydrogen, carbon monoxide and some light organic oils. The reactor gas is used to generate heat required in the boiler or to externally heat the activation kiln.

2.6 OIL HANDLING AND PREPARATION SYSTEM

The oil handling and preparation system begins with oil discharge from the oil rotary valve on the cyclone and condenser. The oil streams are combined and pumped through an oil filter for recovery of the particulates. The particulates separated from the oil filter are backwashed to the reactor for further processing.

The oil filtrate flows from the oil filter an oil cooler and then to the pyrolysis oil tank. Pyrolysis oil exits the tank through piping to an oil circulation pump which, in turn, pressurizes oil supply piping.

The pyrolysis oil is used as fuel in the boiler and the activation kiln. Excess oil produced is sold as a byproduct for energy recovery.

2.7 BOILER SYSTEM

The Boiler system consists of a combustion air blower, a burner system capable of firing reactor gas, pyrolysis oil and/or No. 2 fuel oil. The boiler system produces steam for the reactor and activation kiln. The boiler system also consists of a deaerator for removing dissolved gases in the make-up water, an economizer for preheating boiler feed water, a combustion air preheater and stack. The boiler is rated for a maximum combustion firing rate of 9.9 million BTU/hr.

**KONA CARBON, LLC
PROCESS DESCRIPTION**

2.8 UTILITIES

2.8.1 COOLING TOWER

Make-up water is supplied to an induced-draft type water cooling tower to maintain its water level. Cooled water is pumped from the tower by a cooling water circulation pump. After being used to condense oil in the condenser and cool the pyrolysis oil, it returns to the cooling tower. Water lost by evaporation in the tower is automatically made up with make-up water.

2.8.2 FUEL OIL

No. 2 fuel oil is used as a supplemental fuel in the boiler and the activation kiln during normal facility operation and during start-up. No.2 fuel oil is delivered via tank truck and is stored in a 5000 gallon Fuel Oil Storage Tank. The storage tank is located within a secondary containment curbed area.

SUMMARY OF PROPOSED EMISSION SOURCES

Combustion Sources	Boiler	Activation kiln
Rated Capacity, Million BTU/Hr	9.9	7
Fuel Consumption		
Reactor Gas (scf/h)	53,000	37,000
Pyrolysis Oil, gal/hr	117.7	83.2
No.2 Fuel Oil gal/hr	70.7	50
Boiler (Economizer)	300	400
Exhaust Temp, deg F	3,018	2,415
Exhaust Vol, acfm		
Emission rates, lb/hr		
(Vendor) NOX	4.5	3.2
(AP-42) SO2	5.0	3.6
(Vendor) CO	0.9	1.8
(Vendor) VOC	0.2	0.5
(AP-42) PM	0.14	0.1
Stack Height, ft	50	50
Stack Diameter, in	12	10

Solids Handling Equipment Emission Controls

Bin Filter Location	Feed Handling (open air shed)	Metering Bin	Product Bin (transferred to baghouse)	Product Handling (to bag house)
Exhaust Temp, deg F	ambient	ambient	300	150
Exhaust Vol, acfm	ambient	15	30	5,000
Emission rates, lb/hr (PM)	1.03	.0023	.0051	0.01
Stack Height, ft	--	50	50	50
Stack Diameter, in	--	4	--	20

DESIGN CALCULATIONS OIL COMBUSTION

Kiln Combustion Calculation

Duty is 7 million BTU/Hr at 11,340/BTU/lb (per Kaiser drawing)

Pyrolysis Oil	Assume 615 lb/hr fuel	MW	lbmol/hr	O2 Required	Combustion Products	O2	
Pyrolysis Oil WT %	lb/hr				CO2	H2O	
C	56.8	349.32	12.01	29.08576	29.08576	0	
H	5.42	33.333	1.008	33.06845	0	16.53423	
O	22.7	139.605	16	8.725313	0	0	
H2O	15.08	92.742	18.016	5.147758	0	5.147758	
N2, H2O in air Stoichiometric							124.1061
N2, O2, H2O in XS air		615		76.02728	29.08576	30.53773	29
total	100			32.99022	9.04%	9.49%	72.46%

Per MACK assume 9% O2 required in combustion products to reduce flame temperature

SCF/Mol	379.5
Combustion Products	122132.5 SCF/Hr
	2035.542 SCF/Min

No. 2 Fuel Oil	Duty	Heating value	140000 Btu/gal	19480 BTU/lb
	gal/hr	lb/hr	359.3429	
C	86.2	309.7536	12.01	25.79131
H	13.3	47.79261	1.008	47.4133
S	0.5	1.796715	32.064	0.056035
H2O	0	0	18.016	0
N2, H2O in air Stoichiometric				
N2, O2, H2O in XS air		359.3429	73.26064	37.70067
total	100			

SCF/Mol	379.5				
Combustion Products	87571.95 SCF/Hr				
	1459.532 SCF/Min				
F	C	K	CF	acfm =	2,415
60	15.55556	288.5556			
400	204.4444	477.4444	1.654601		

DESIGN CALCULATIONS OIL COMBUSTION

Boiler Calculation

Pyrolysis Oil		Assume 870 lb/hr fuel		O2 Required		Combustion Products			
Pyrolysis Oil WT %		lb/hr	MW	lbmol/hr		CO2	H2O	N2	O2
C	56.8	494.16	12.01	41.14571	41.14571	41.14571	0		
H	5.42	47.154	1.008	46.77976	11.69494	0	23.38988		
O	22.7	197.49	16	12.34313	-6.171563	0	0		
H2O	15.08	131.196	18.016	7.282194	0	0	7.282194		
N2, H2O in air Stoichiometric							6.667013	175.5647	
N2, O2, H2O in XS air							5.857143	154.2381	41
total	100	870		107.5508	46.66909	41.14571	43.19623	329.8028	41
						9.04%	9.49%	72.46%	9.01%

Per MACK assume 9% O2 required in combustion products to reduce flame temperature

SCF/Mol	379.5
Combustion Products	172727.4 SCF/Hr
	2878.79 SCF/Min

No. 2 Fuel Oil		Duty		Heating value		140000 Btu/gal		19480 BTU/lb			
		gal/hr	Lb/hr	lb/hr	lbmol/hr	O2 required	CO2	H2O	N2	O2	SO2
C	86.2	9.90E+06	438.0801	12.01	36.47628	36.47628	36.47628	0			
H	13.3	70.71429	67.5924	1.008	67.05595	16.76399	0	33.52798			
S	0.5		2.541068	32.064	0.07925	0.07925	0	0			0.07925
H2O	0		0	18.016	0	0	0	0			
N2, H2O in air Stoichiometric								7.617074	200.5829		
N2, O2, H2O in XS air								1.4	36.86667	9.8	
total	100	508.2136	508.2136	103.6115	53.31952	36.47628	42.54505	237.4496	9.8	0.07925	
						11.18%	13.04%	72.76%	3.00%		

SCF/Mol	379.5			
Combustion Products	123849.9 SCF/Hr			
	2064.165 SCF/Min			
F	C	K	CF	acfm =
60	15.55556	288.5556		3,018
300	148.8889	421.8889	1.462072	

DESIGN CALCULATIONS GAS COMBUSTION

Reactor Off Gas Heat of Combustion						
Compd	Hc, kcal/kg	Hc, BTU/lb	lb mol/hr	MW	BTU/hr	Vol %
CO	2411	4340	41.05	28.01	4989947.61	24.42
H2	28555	51399	37.71	2.016	3907524.68	22.43
H2O	0	0	79.69	18.016	0	47.41
CO2	0	0	6.29	44.01	0	3.74
CH4	11946	21503	1.79	16.04	617379.792	1.06
Organics	10800	19440	1.53	86	2557915.2	0.91
Heavy Oil	10800	19440	0.03	86	50155.2	0.02
			168.09		12,122,922	100

Reactor Off gas Heat Value: 190.04 Btu/scf

Combustion Calculation for Entire Off Gas Stream

Compd	lb mol/hr	Combustion Products				Excess O2
		CO2	H2O	O2 Require	N2	
CO	41.05	41.05		20.525		
H2	37.71		37.71	18.855		
H2O	79.69		79.69	0		
CO2	6.29	6.29		0		
CH4	1.79	1.79	3.58	3.58		
Organics	1.53	9.18	10.71	14.535		
Heavy Oil	0.03	0.18	0.21	0.285		
N2, H2O in Stoich Air			8.254286		217.362857	
N2, O2, H2O in XS air	0		2.378571	0	62.6357143	16.65
		58.49	142.5329	57.78	279.998571	16.65
		10.53%	25.66%	10.40%	50.41%	3.00%

SCF/Mol 379.5
 Combustion Products 210793.8 SCF/Hr
 3513.23 SCF/Min for entire stream at 12,122,922 BTU/Hr

Prorate kiln and boiler flow on duty

boiler	2,869.03	SCF/Min
kiln	2,028.60	SCF/Min