

SEP 8 2002

FILE COPY

FINAL STATE ENVIRONMENTAL ASSESSMENT

For

MAUNA KEA ASTRONOMY EDUCATION CENTER

University Science and Technology Park

University of Hawai'i at Hilo

Waiakea, South Hilo, Hawai'i

TMK: (3) 2-4-01: Por 7

PROPOSING AGENCY:

University of Hawai'i at Hilo (UHH)

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August 2002



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Executive Summary

The University of Hawai'i at Hilo (UHH) proposes the construction of the Mauna Kea Astronomy Education Center (MKAEC). The Center will be an interpretative facility to be constructed on a vacant 9.1- acre (3.7 hectares) area at the University Science and Technology Park in the City of Hilo. This Center will serve as a principal astronomy educational facility in Hawai'i and will be a substantive resource for astronomy programs around the world.

The \$28 million facility will be partially funded by a \$12 million grant from the National Aeronautics and Space Administration (NASA). The UHH is now working to secure additional public and private funds, which together with the \$12 million grant, would be sufficient to cover the basic elements of this \$28 million project.

This Environmental Assessment (EA) addresses the environmental consequences of the proposed action and the following alternatives: (1) construction of the MKAEC at other location; (2) reduction of size and scope of MKAEC; and (c) No Action.

A summary of the project follows:

Project Name:	Mauna Kea Astronomy Education Center
Applicants and Approving Agency:	University of Hawai'i at Hilo (UHH) Ms. Rose Tseng, Chancellor UHH and Principal Investigator, MKAEC Contact: Mr. George Jacob, Project Director and Co- Principal Investigator, MKAEC Ph: (808) 933-3912
Class of Action:	Use of State lands
Status:	Final Environmental Assessment (FEA) and Finding of No Significant Impact (FONSI)
Location:	Corner of Nowelo Place and N. A'ohoku Street in the University Science and Technology Park, UHH, and identified by Tax Map Key: 2-4-01: portion of 7
Property Owner:	The site is "ceded" land which is held in trust by the State of Hawai'i and leased to the UHH
Existing Uses:	Vacant

Proposed Action: Construction of the Mauna Kea Astronomy Education Center

Estimated Cost: \$28 million (estimated design and construction costs)

Project Area: 9.1 acres (3.7 hectares)

State Land Use: Urban District

County General Plan: University Use

County Zoning: RS-10 (Single-family Residence), 10,000 square foot minimum lot size and A-1a (Agriculture), 1-acre minimum lot size

Special Management Area: The subject site is not within the County Special Management Area as outlined in the State Coastal Zone Management Program.

Summary of Potential Environmental Impacts And Their Mitigation: During the construction of the MKAEC, there will be short-term noise and dust impacts. Contractors will be required to comply with the State Department of Health regulations governing noise and dust (Chapters 11-46 and 11-60). There will be additional traffic once the MKAEC is open, and the impact will be most pronounced for traffic exiting Nowelo Street onto Komohana Street. A traffic signal light will be installed. Water and sewer transmission lines are available to the site. Although none of those lines need to be upgraded at this time, if there is a need, they will be done in conjunction with construction phases of this project. An archaeological survey indicated no sites in the area of the proposed improvements. Should there be any inadvertent find, work will immediately cease in the area of the find and consultation and approvals from the State DLNR will be secured before work resumes. To mitigate visual/aesthetic issues, public comment will be solicited prior to final design selection by the MKAEC Selection and Review Committee.

Summary of Comments on Draft Environmental Assessment and Responses: Comments on the Draft Federal EA were received from nine (9) government agencies as well as was a joint letter from two members of the public. These comments and responses thereto are found in Appendix H in their entirety.

Two agencies (County Departments of Fire and Parks and Recreation) had no comments or objections to the project, while the State Historic Preservation Officer noted that "no historic properties will be affected by this (MKAEC) undertaking." The County Police Department noted that the construction of traffic lights at the intersection of Nowelo Street and Komohana Street, as

well as the use of the University campus road, would alleviate their traffic concerns.

The County Department of Research and Development recommended the use of concepts and principles of the LEED™ Green Building Rating System. As NASA has already adopted such a policy, the respective design consultants will be advised of this requirement, which would then assure greater economic and environmental efficiencies of the project. **(See Section 5.1.3 Infrastructure)**

The County Department of Water Supply recommended that the water use calculation be determined as soon as possible to facilitate the determination of the facilities charge. Once the design consultants have been selected, discussions with the Department of Water Supply will take place. **(See Section 5.1.3 Infrastructure)**

The Engineering Division of County Department of Public Works commented that the project should comply with appropriate building, drainage, grading/earthwork, road right-of-work, and streetlights/traffic control codes and requirements. The appropriate design and/or engineering consultants will be responsible for the preparation of the required plans and securing the appropriate permits. **(See Section 5.1.3 Infrastructure)**

The University of Hawai'i at Manoa Institute for Astronomy commented that the project could relieve traffic congestion at the summit. **(See Section 2.4 Alternative 3: No Action)** It also noted that adequate on-site parking and turnaround areas should be provided to minimize traffic impacts along A'ohoku Place. Adequate parking and bus turnaround areas, meeting with the requirements of the County Zoning Code, will be provided on-site. **(See Section 4.4 Zoning)**

The State Office of Hawaiian Affairs (OHA) offered comments relating to "ceded" land, adequacy of the discussion on the project's cultural and archaeological impacts, absence of consultation, and the design of the project. The "ceded" land issue is a State issue and UHH will be working with OHA on this matter. **(See Section 3.1.1 Location and Land Ownership)** The archaeological inventory survey concluded, as did the State Historic Preservation Officer, that the project would not have any adverse archaeological impacts. The cultural assessment also arrived at the same conclusion. **(See Section 5.1.12 Cultural and Archaeological Resources)** No comments were received from OHA during the "consultation" process. Finally, OHA expressed

concerns about the concept design. The concept design in the Draft EA is one of many tentative options available. The archaeological inventory survey concluded, as did the State Historic Preservation Officer, that the project would not have any adverse archaeological impacts. The cultural assessment also arrived at the same conclusion. **(See Section 5.1.12 Cultural and Archaeological Resources)** No comments were received from OHA during the "consultation" process. Finally, OHA expressed concerns about the concept design. The concept design in the Draft EA is one of many tentative options available. The architectural firm selected will be advised to solicit public input on the proposed building design concepts. They will be required to take into consideration public comments before submitting final design concepts to the MKAEC Selection and Review Committee. **(See Section 2.5.1 Project Description; Section 3.11 Scenic Resources and Design Considerations; and Section 5.1.13 Scenic Resources and Design Considerations for a more detailed description of the mitigation measures to be undertaken.)**

The County of Hawai'i Department of Public Works commented on the need to comply with appropriate codes relative to the design and construction of all structures, development-generated runoff, earthwork activity, work within the government road right-of-way, and streetlights and traffic control devices. The respective design and engineering consultants will be directed by the MKAEC Project Office to comply with all appropriate regulations and to secure the required permits (such as building, grading, UIC, right-of-way, and the like) prior to commencement of the respective activities. **(See Sections 5.1.4 Traffic; 5.1.9 Floodplains and Drainage)**

Finally, two public individuals jointly expressed some concerns with the tentative design. As noted earlier, the selected consultants will be instructed to take those concerns into consideration. **(See Section 2.5.1 Project Description; Section 3.11 Scenic Resources and Design Considerations; and Section 5.1.13 Scenic Resources and Design Considerations for a more detailed description of the mitigation measures to be undertaken.)**

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List of Acronyms

AAQS	Ambient Air Quality Standards
ALISH	Agricultural Lands of Importance to the State of Hawai'i
CEQ	Council on Environmental Quality
CZM	Coastal Zone Management
DLNR	Department of Land and Natural Resources
DOA	Department of Agriculture
DOH	Department of Health
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHA	Federal Housing Authority
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawai'i Administrative Rules
HELCO	Hawai'i Electric Light Company
HRS	Hawai'i Revised Statutes
HUD	Housing and Urban Development
KV	Kilovolt
LSB	Land Study Bureau
MKAEC	Mauna Kea Astronomy Education Center
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
SMA	Special Management Area
UBC	Uniform Building Code
UH	University of Hawai'i
UHH	University of Hawai'i at Hilo
UIC	Underground Injection Control
UPST	University Park of Science and Technology

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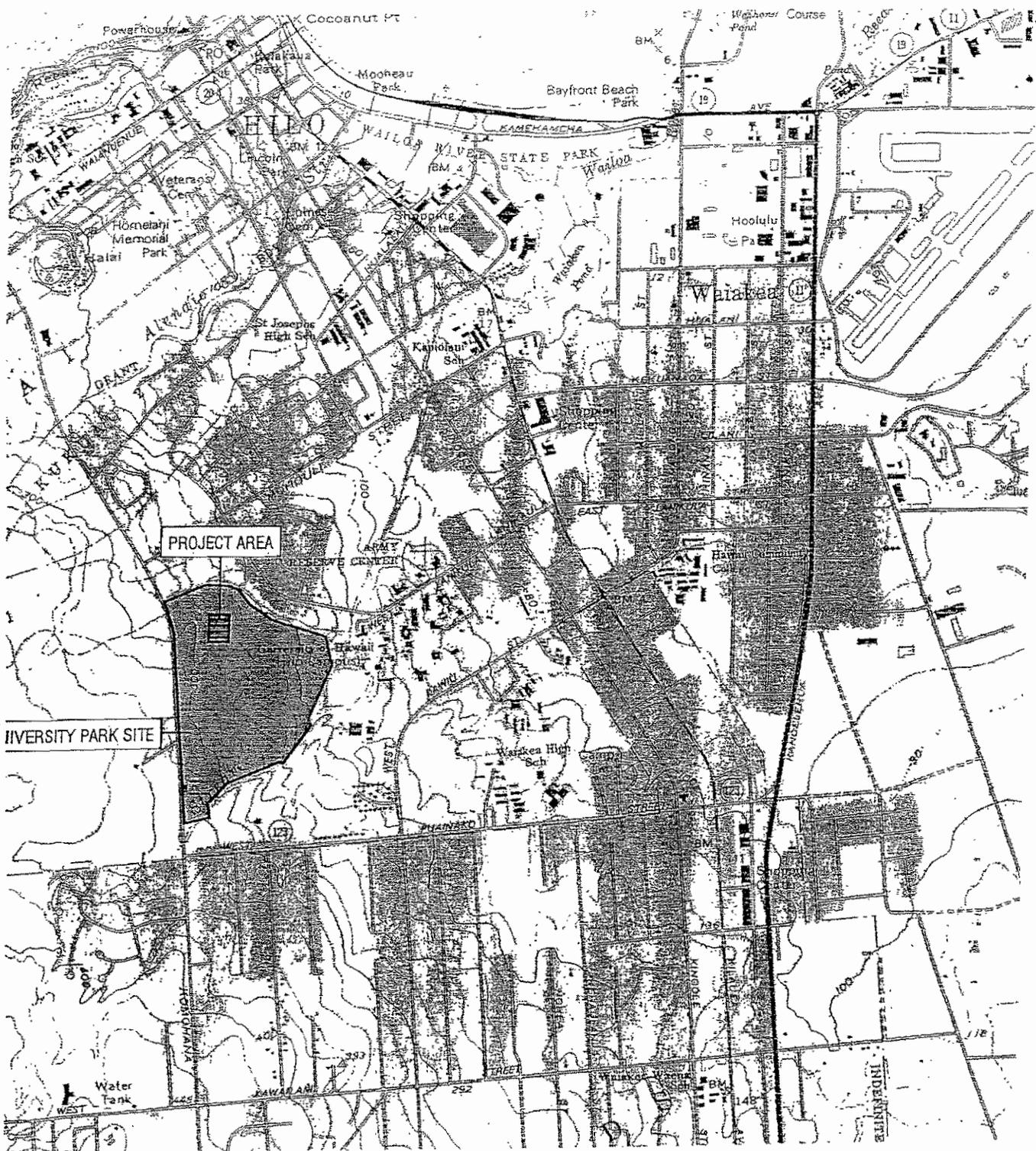
1.0 Purpose and Need

The University of Hawai'i at Hilo (UHH) proposes the construction of the Mauna Kea Astronomy Education Center (MKAEC). The Center will be an interpretive facility to be constructed on a 9.1-acre (3.7 hectares) site at the University Park of Science and Technology (UPST) in the City of Hilo (Figures 1, 2, & 3). It will serve as a principal astronomy educational facility in Hawai'i, reflective of Hawai'i's unique cultural heritage. It will also serve as a substantive resource for astronomy programs around the world.

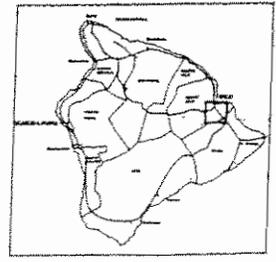
When completed, this 42,000 square foot (3,902 m²) facility will have a gallery space of 26,000 square feet (2,415 m²) of exhibition area. The remaining 16,000 square feet (1,487 m²) will include retail, classroom, storage, office, administration, resource rooms and other affiliated functions. In addition, the Center would include a planetarium and large-format, pano-hemispheric motion picture capabilities.

The goals of the MKAEC are multiple. Very broadly, these include the UHH goals of astronomy education, science-based research, high-technology, and educational industries; and UHH goals of enhancing the growth of the UHH as outlined in the *University of Hawai'i at Hilo Long Range Development Plan*, and, in turn, serving as an added catalyst for the economic diversification of the island and State of Hawai'i. More specifically, the goals of the MKAEC are to:

- Serve as a premier astronomy interpretive center that will accommodate exhibition content to showcase past and current scientific discoveries in astronomy while maintaining a continuum with the rich Polynesian traditions of navigation, exploration, and cosmology that allows for an appreciation of the larger socio-cultural context of Hawaiian heritage.
- Provide education in-line with the institutional mission by exciting, inspiring, and motivating a cross-section of audiences about astronomy, space exploration, and our place in the Universe through creative interactive exhibitory, in a culturally sensitive setting.
- Provide education extension services with content-based programming on-site as well as through public outreach initiation off-site in collaboration with Mauna Kea Observatories.
- Develop teacher training modules, curricular materials, traveling exhibitions and offer real-time access to Mauna Kea Telescopes supported by an electronic repository of archived discoveries unfolding atop Mauna Kea.

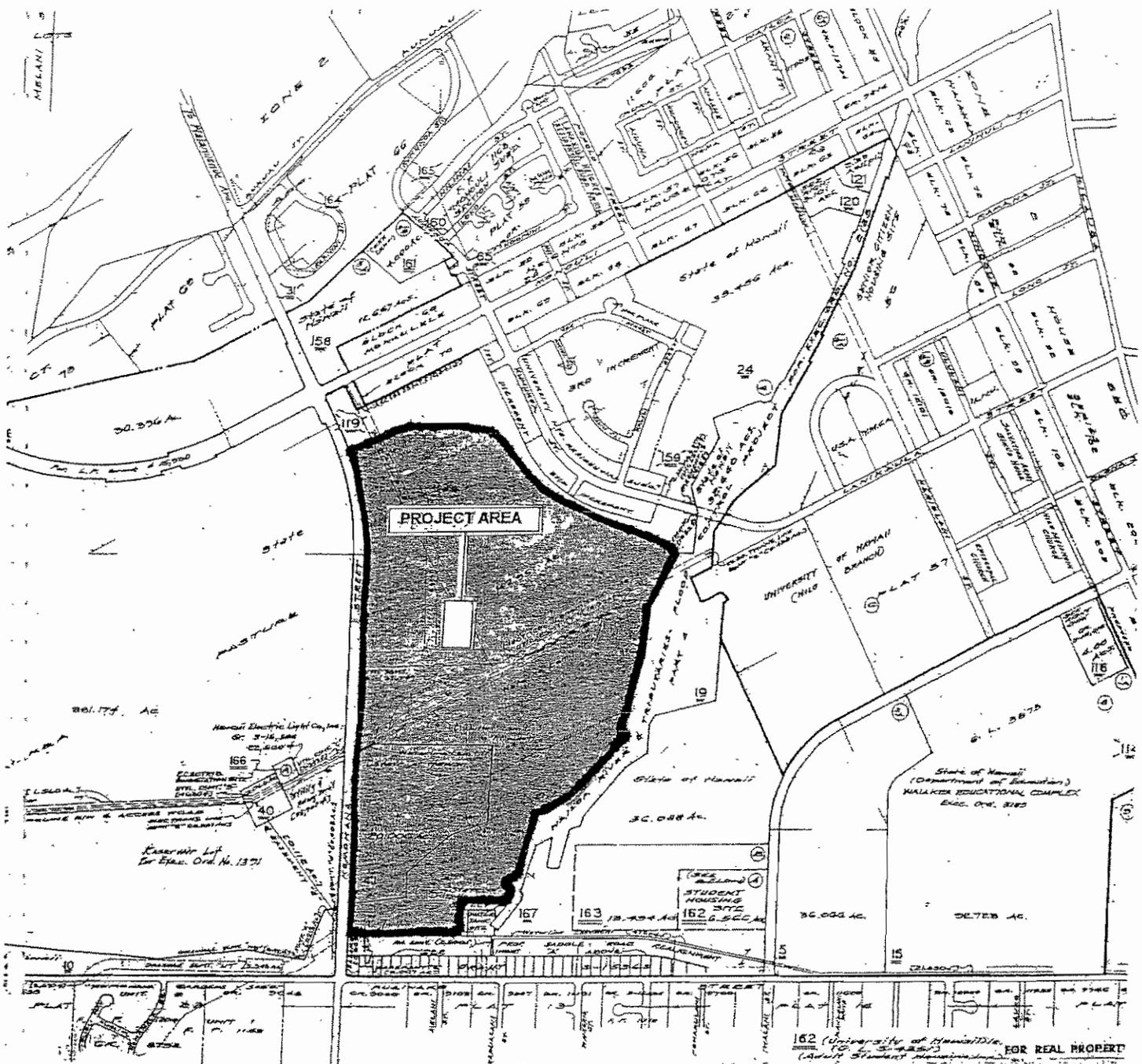


- END
-  Project Area
 -  University Park Site



REGIONAL LOCATION MAP
Figure 1

Source: USGS Topographical Map



DEPARTMENT OF TAXATION
TAXATION MAPS BUREAU
STATE OF HAWAII
TAX MAP

THIRD TAXATION DIVISION		
ZONE	SEC	PLAT
2	4	01

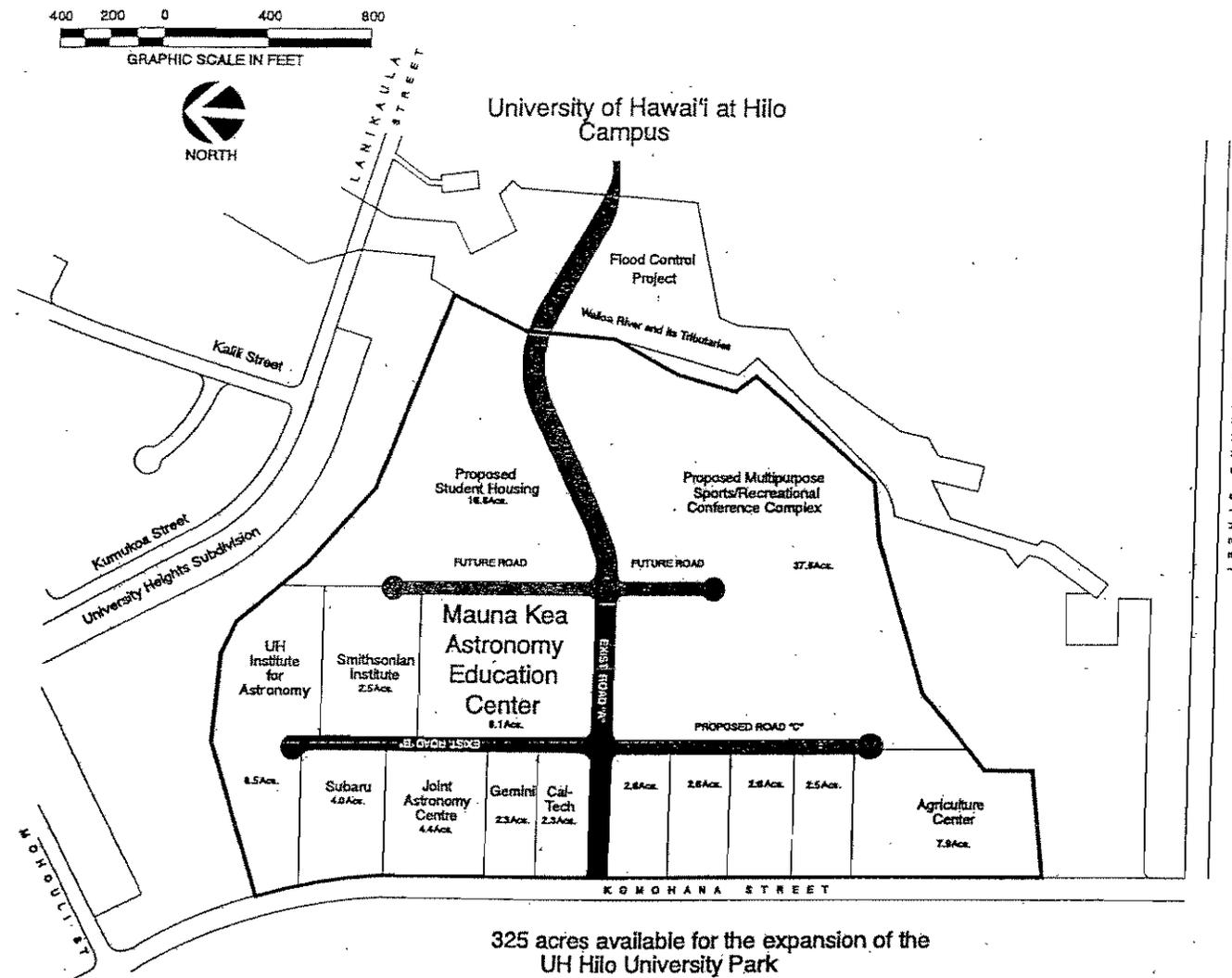
LEGEND

- Project Area
- University Park of Science and Technology

TAX MAP KEY
Figure 2

University Park, University of Hawai'i at Hilo

Mauna Kea Astronomy Education Center



Mauna Kea



This graphic is a plot plan depicting the location of the Mauna Kea Astronomy Education Center in University Park adjacent to the University of Hawai'i at Hilo and across the street from the Observatory Base Facilities.

PLOT PLAN
Figure 3

- Develop and offer distance learning opportunities and internship programs for students and teachers in conjunction with various UHH departments, including Astronomy, Education, Hawaiian Language, Tourism, Business, Anthropology, Communication, and the College of Continuing Education.

There is a strong need to diversify Hawai'i's economy, particularly into science-based research, high technology and educational industries with minimal environmental impacts. This is, in part, attributable to the decline of strong agricultural industry production such as sugar and pineapple and an over-reliance on the fragile tourism industry. As such, this Center, in addition to facilitating astronomy education and raising global scientific literacy, is needed to help diversify the economic base of the island and State of Hawai'i.

The educational and development goals outlined in the *University of Hawai'i at Hilo Long-Range Development Plan* visualized the UPST as an integral part of the campus. It would accommodate the UHH's future needs of academic and ancillary programs. At the same time, the research and technology activities at the UPST would increase the visibility and role of the UHH and, in turn, serve as a significant source of attraction for students and scholars worldwide. Relatedly, the growth and expansion of the UHH would offer community-wide benefits not only in terms of the island's economy but its education and cultural diversity and stimulation.

This Center would have another important use within the UPST. While capable of operating independently, it does have a symbiotic relationship with the UHH and the entire science and technology community in the State and especially the Big Island. It is intended to showcase science and technology as well as their relationship to culture not only in a general way but specifically as they may relate to Hawai'i.

Accordingly, in pursuit of this \$28 million project, the UHH sought and received a \$12 million grant from NASA. The UHH is now working to secure an additional \$2.81 million of "local" public and private funds, which together with the \$12 million grant, would be sufficient to cover the basic elements of this \$28 million project. The UHH will actively seek the remaining \$14 million through federal, state, corporate and private sources and other developmental channels for restricted and un-restricted grants.

Since the project involves the use of State lands, the environmental review and approval requirements must be in compliance with Hawai'i, Revised Statutes, Chapter 343 and Hawai'i Administrative Rules, Chapter 11-200. Furthermore, Federal funds through NASA are also involved. Accordingly, compliance with National Environmental Policy Act (NEPA) regulations (40 CFR) and NASA NEPA Regulations (14 CFR) must also be demonstrated. A Final Federal Environmental Assessment was prepared and a Finding of No Significant Impact (FONSI) was issued. This document is intended to satisfy State Environmental Assessment requirements only.

2.0 Description of Proposed Action and Alternatives

2.1 Proposed Action: Construction of the Mauna Kea Astronomy Education Center

The UHH proposes to construct the MKAEC, a 42,000 square foot (3,902 m²) interpretive facility on a 9.1 acre (3.7 hectares) site within the UPST in the City of Hilo, Hawai`i.

2.2 Alternative 1: Construction of the MKAEC at other locations

Alternative sites consisting of 9 acres (3.7 hectares) were considered. These were State-owned lands in the City of Hilo or at the mid-level facility on Mauna Kea or other parts of the island. These alternatives, however, would be more costly to develop due to infrastructure considerations, may have specific environmental issues, and would be inconsistent with the UHH Long Range Development Plan. While some privately owned lands were considered, they were dismissed due to the initial acquisition cost and possible infrastructure costs.

2.3 Alternative 2: Reduction of size and scope of MKAEC

The basic structure and/or features of this facility could be reduced (with similar environmental impacts as the proposed action) and that would result in some measure of fiscal savings. However, such a reduction may compromise the educational and economic goals sought to be achieved by this facility and thus have potentially adverse socioeconomic effects.

2.4 Alternative 3: No Action

Under the No Action Alternative, the existing 9.1-acre (38,826 m²) site would continue to remain undeveloped, and UHH must continue its search for another user. During the interim, the UHH will have to maintain and pay the costs of the infrastructure that currently services the UPST.

In addition, astronomy education of the public would continue to be limited to conventional settings and mostly in a classroom. As there would be limited sea level opportunity for learning about the Mauna Kea Observatories, there would be potentially increased vehicular traffic and visitations at the summit. The higher level of visitor traffic poses traffic safety risks, as well as potential health risks. This alternative would potentially have adverse socioeconomic and environmental impacts through loss of visitors and increased traffic to the summit of Mauna Kea.

2.5 Nature and Components of Proposed Action

2.5.1 Project Description

As noted earlier, the MKAEC hopes to achieve goals of UHH relating to astronomy education, science-based research, high-technology, and educational industries, the growth of the UHH and in turn, diversification of the state and island's economy.

In that regard, the UHH selected a 9.1 acre (3.7 hectares) area, identified by Tax Map Key: (3) 2-4-01: portion of 007, located in the UHH's UPST in the City of Hilo (See Figure 2). The site is located on the northeast corner of Nowelo Street and N. A'ohoku Place. Other existing and planned facilities are adjacent and/or proximate to the subject site (See Figure 3).

The Center will be an interactive, interpretive facility that is set in the cultural context of Hawai'i's unique heritage. The 42,000 square foot (3,902 m²) facility will house a planetarium, an Object Theatre, Multi-media/3-D projection facility, exhibits and displays on Polynesian culture and astronomy, among others. Under one tentative design option, the structure would be approximately 79 feet (24 m) tall, inclusive of the planetarium/dome (Figure 4). However, the concept design is one of the many tentative options available. The architectural firm selected will be required to solicit public input on the proposed building design concepts. They will be required to take into consideration public comments before submitting final design concepts to the MKAEC Selection and Review Committee. (See Section 5.1.13 *Scenic Resources and Design Considerations* for a more detailed description of the mitigation measures to be undertaken.)

Public parking and as much native landscaping meeting with the requirements of the County Zoning Code will be constructed on-site (Figure 5). NASA policy requires the use of native landscaping to the maximum extent possible.

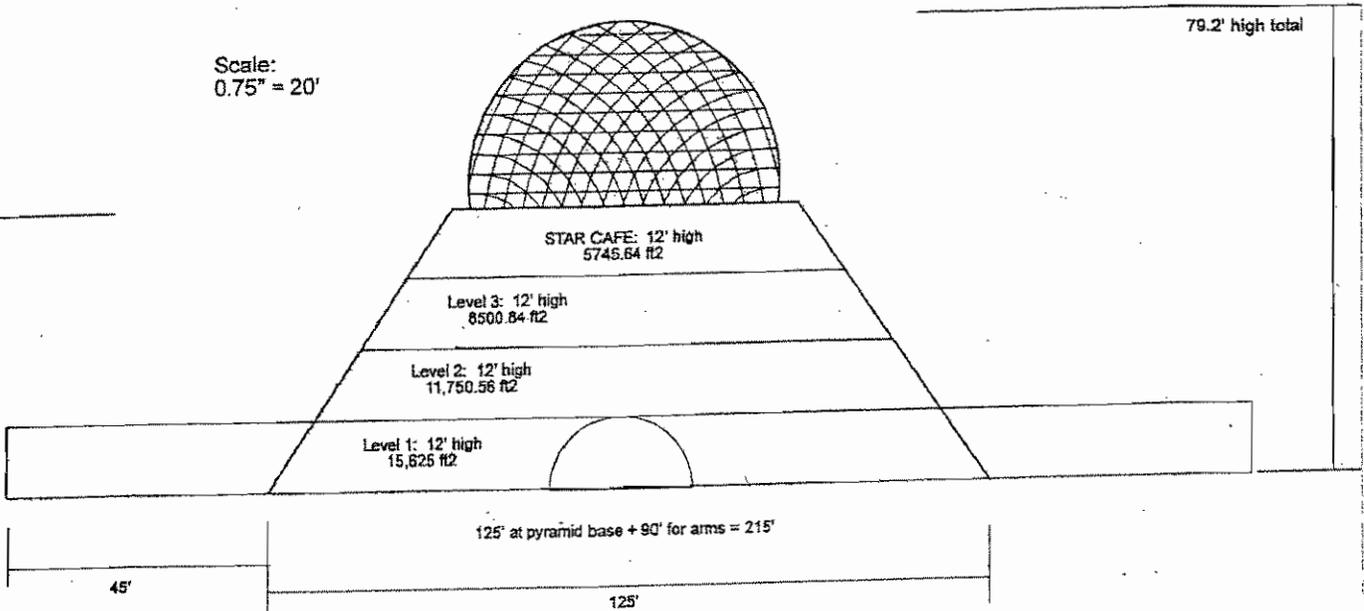
The facility is expected to attract approximately 250,000 visitors annually, most of them students.

2.5.2 Timetable and Cost

Construction is anticipated to begin immediately upon securing all necessary construction permits, which is anticipated to be in the summer of 2003. The project is estimated to be completed by June 2005.

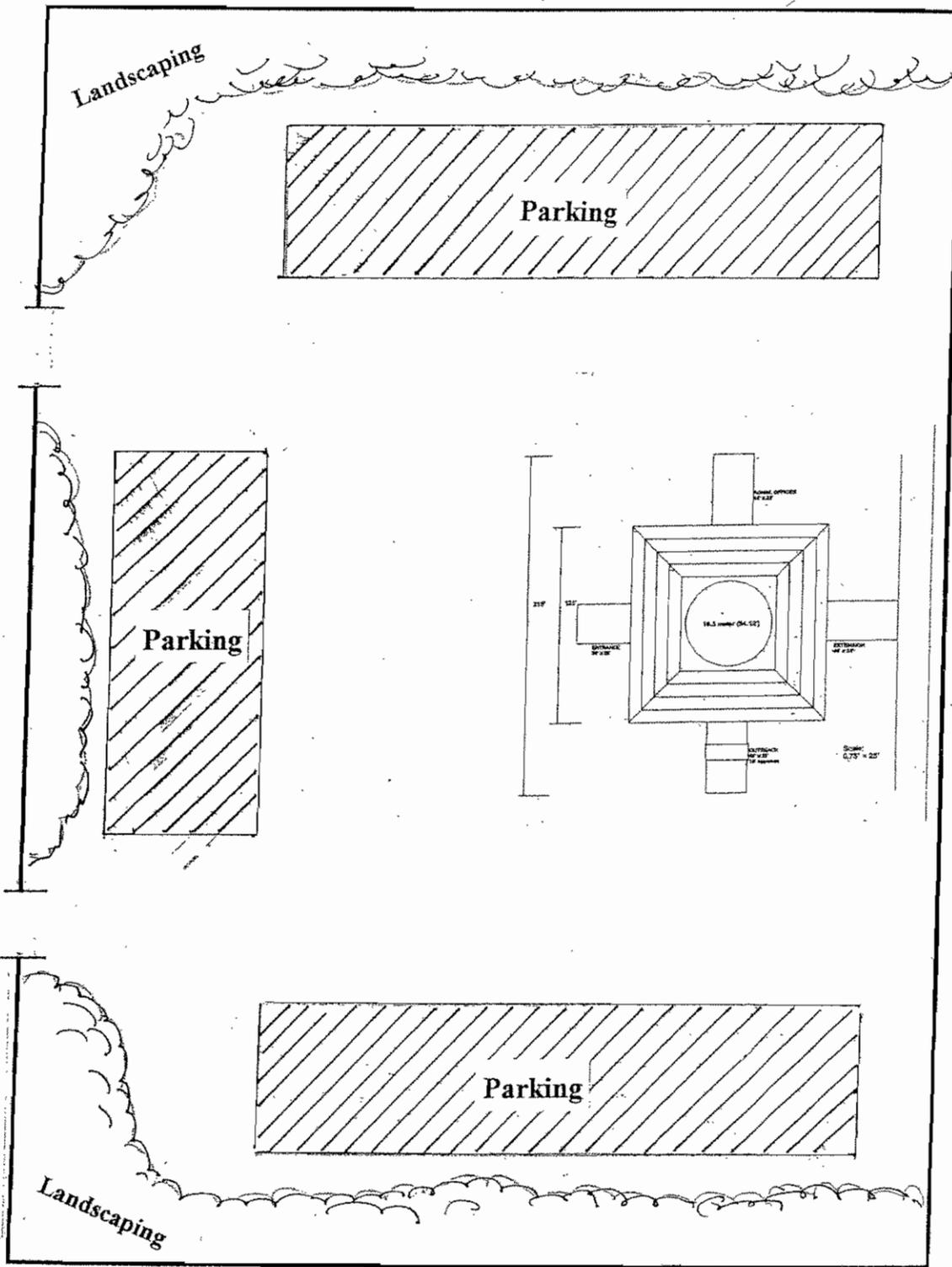
The estimated cost of this project is \$28 million. Of this amount, at least \$14.81 million is needed to complete the essential structural and functional components of this project. To date, NASA has committed \$12 million through two federal earmarks (\$8 million and \$4 million), with a possibility of a third earmark within the near future. The UHH will seek

Scale:
0.75" = 20'



PROPOSED CONCEPTUAL ELEVATION PLAN
Figure 4

NOT TO SCALE



N. A'ohoku Place

Nowelo Street

PROPOSED CONCEPTUAL SITE PLAN

Figure 5

other public and private and corporate funds for the remaining \$2.81 million. The balance of the project, which would cover exhibition planning, design, fabrication, installation, and audio-visual technical support and improvements, would be covered under possible separate federal earmarks coupled with possible funding from other public and/or private sources.

3.0 Existing Environment

3.1 Description of Site

3.1.1 Location and Land Ownership

The subject site is a 9.1-acre (3.7 hectares) area located at the northeast corner of Nowelo Street and N. A`ohoku Place in the UPST (See Figure 3). The UPST is located on the east side of Komohana Street, generally between Pu`ainako and Mohouli Streets, Waiakea, South Hilo, Hawai`i and is identified by TMK: 2-4-01: 7 (See Figure 2). Based on the tax map, the subject parcel within which the UPST is located consists of 142.951 acres (57.8 hectares).

The entire parcel, which is ceded land, is held in trust by the State of Hawai`i. It is leased to and utilized by the UHH with a portion of the total parcel - which includes the subject area - being set aside for the UPST. The MKAEC Project Office and UHH will work with OHA on this matter in the ensuing months.

3.1.2 Physical Description

The 9.1-acre (3.7 hectares) site is presently vacant of any structures or agricultural activity. In the past, there has been some form of agricultural use in either sugar cane production or cattle grazing in this general area. Scattered `ohi`a-uluhe (which is a native canopy tree) and an introduced mixed forest material dominate the site, as well as the adjoining areas.

The topography slopes toward the ocean in a westerly to easterly direction. The overall slope of the UPST ranges from six to ten percent, although there are areas where the slope may slightly exceed ten percent. Elevation of the site varies from about 280 feet (85.4 m) to approximately 230 feet (70.2 m), mean sea level.

The corner site is generally rectangular in shape. It stretches 740 feet (226 m) along N. A`ohoku Place and 560 feet (171 m) along the Nowelo Street frontage.

3.1.3 Climate

The mean annual rainfall in this area is approximately 141 inches. Rainfall is more frequent during the months of October through April. Hilo, being located on the easterly or windward side of the island, is exposed to the traditional "trade" wind. Daytime temperatures range between the upper 70's to the low 80's (degree Fahrenheit) during the days; and from the low 60's to the upper 70's (°F) during the evenings.

3.1.4 Topography and Soils

Terrain of the subject site is comprised predominantly of lava flows covered with thick vegetation. The University of Hawai'i Land Study Bureau's *Detailed Land Classification Report – island of Hawai'i* designates the site E 306, which is essentially poorly suited for intensive agricultural activities (LSB, 1965). The soil series is almost bare smooth, unbroken type of lava called *pahoehoe* with very little or no soil material. It is moderately drained, with slopes generally less than 35 percent. It is very poorly suited for machine tillability.

The *U.S. Soil Conservation Service Soil Survey Report* using its own classification system, designates this site *Pahoehoe* lava flows (*rLW*) and *Keaukaha* extremely rocky muck (*rKFD*) (SCS, 1973). The *Pahoehoe* lava flows is characterized by relatively smooth, billowy, glassy surface which has little or no soil covering. This classification covers that portion of the site adjacent to A'ohoku Place. The balance of the site is classified *Keaukaha* extremely rocky muck. This series is characterized as being rapidly permeable, dark brown muck underlain by *pahoehoe* lava bedrock. The runoff is medium and the erosion hazard is slight.

The *Agricultural Lands of Importance to the State of Hawai'i (ALISH)* map provides three classifications of agricultural lands – Prime, Unique, and Other (State of Hawai'i Department of Agriculture, 1979). As the site is within an urban area, this site is not classified as agricultural land.

3.1.5 Natural Hazards

Tsunami, earthquake and subsidence, and lava flow represent the major natural hazards on the island of Hawai'i. This site is subject to the same natural hazards as the rest of Hawai'i in varying degrees.

The subject site is located more than two miles from the shoreline. As such, unlike coastal properties, this site would not be vulnerable to tsunamis and tsunamis generated by subsidence.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the subject site is designated zone X, areas determined to be outside of the 100- and 500-year flood plain (**Figure 6**).

The U. S. Geologic Survey report notes that the degree of volcanic hazard in this area is 3 out of a scale of 9. The lower the number, the greater the degree of hazard. While this may be of concern, it should be noted that the entire city of Hilo has been designated Zone 3 (Heliker, 1990). In 1881, an historic lava flow from Mauna Loa flowed within one mile of Hilo Bay. About a century later in 1984, a 22-day eruption stopped at least six miles (9.7 km) from the upper slopes of Hilo in Kaumana.

In terms of earthquakes or seismic activity, the entire island of Hawai'i was redesignated from Zone 3 to the more restrictive Zone 4 on the Seismic Probability Rating of the Uniform Building Code 1997 edition. Construction and building standards are now more restrictive, to minimize risk of seismic hazards.

3.2 Land Uses

There are other related uses adjacent and/or immediately proximate to the site within the UPST. These include the Joint Astronomy Centre, UH Institute for Astronomy, and the headquarters/base facility for other astronomy operations at the summit, such as the California Institute of Technology, AURA, Inc. for the Gemini project, and the National Astronomy Observatory of Japan for the Subaru. There are also undeveloped areas within the UPST, as well as its immediate area that have been set aside for the expansion of the UHH campus.

In a broader land use context, surrounding land uses include the UHH campus complex and its related student housing, single-family residential areas, and vacant land populated with vegetation.

The proposed action will not involve the relocation of residents, as the site is currently vacant.

3.3 Infrastructure

3.3.1 Utilities

Electrical service provided by a privately owned utility company regulated by the State Public Utilities Commission, Hawai'i Electric Light Company (HELCO), is currently available to the area. There is an overhead 69 kilovolt (kV) line along Komohana Street. This serves the existing facilities as well as all proposed facilities within the UPST.

Verizon Hawai'i provides telephone service for this area through an overhead line along Komohana Street. Hawaiian Cablevision provides cable television service using the utility poles along Komohana Street.

It should be noted that the project would be designed using the principles and concepts outlined in the LEED™ Green Building Rating System and will meet the minimum certification requirements established under this program.

3.3.2 Storm Water

There are drainage catch basins in the vicinity of the proposed site within the road rights-of-way of Nowelo Street and N. A'ohoku Place. These basins dispose of locally generated

storm water from the streets in the area.

As noted in section 3.1.5 above, the subject site falls within Zone "X", areas outside of the 100- and 500-year flood plain, on the FIRM map (Figure 6). Notwithstanding this designation, an on-site drainage system must still be designed and implemented in a manner meeting with the approval of the County Department of Public Works in conjunction with the development of this project. County policy requires additional storm water resulting from a project to be captured on-site and not be disposed of into the drainage basins within the road rights-of-way.

3.3.3 Potable Water and Fire Suppression Systems

There is a twelve-inch (30.5 cm) water main within Nowelo Street that comes in from Komohana Street. The capacity of these lines is such that it can readily accommodate the potable and fire protective water requirements of the project. The fire flow requirement calls for 2,000 gallons per minute plus maximum daily flow. During the initial stages of the design process, the anticipated average day, maximum day, and peak-hour water usage information will be provided to the Department of Water Supply so that the appropriate facilities charge can be determined.

3.3.4 Wastewater System

Presently, the UHH is serviced by on-site transmission lines that intersect with an eight-inch (20.3 cm) County sewer line along Lanikaula Street. The on-site transmission line has been extended to the subject area. Although the project's wastewater will be disposed into the County system, there may be a need to upgrade some of the off-site transmission lines. This will be determined during the building permit process. If this is required, UHH will work with the County in getting this line upgraded.

3.3.5 Transportation and Roads Systems

The Hilo International Airport is located approximately three miles (4.8 km) from the subject property. It provides daily flights to the other Hawai'ian islands, as well as to mainland cities via Honolulu or Maui.

The County's Hele On bus system provides bus service to this area and other outlying areas. Private taxi service is also available.

Komohana Street serves as the principal access to the UPST and the proposed facility. This two-lane County road has an 80-foot (24.8 m) right-of-way with 24 feet (7.3 m) of pavement and improved shoulders in the vicinity of the entrance to the Park. There is also a left-turn storage lane leading into the Park.

Nowelo Street intersects with Komohana Street (See Figure 3) and N. A`ohoku Place. Nowelo Street is a divided roadway within a 60-foot (18.3 m) right-of-way. N. A`ohoku Place is a cul-de-sac, and this road has also been built to County dedicable standards with curb, gutters, and sidewalk.

3.4 Socioeconomics

3.4.1 Community Demographics

Since 1970, the average population growth rate of the State of Hawai`i has been at the 10% level. The County of Hawai`i however, has sustained a greater level. Between 1970 and 1980, it grew from 63,468 to 92,053 (45%). The following decade, the growth rate was 30.7% (to 120,137), while between 1990 to 2000 the rate was by 23.6% (to 148,677). The State projects Hawai`i County will continue this greater than average rate of growth, where the population may exceed 200,000 by the year 2010.

Most of this growth has been in West Hawai`i and the Puna District in East Hawai`i. The population of the South Hilo District (where the UPST is located) grew much slower than the island's rate. Although it grew 27% (33,195 to 42,278) between 1970 to 1980, the growth rate averaged 6% over the next two decades (to 44,639 in 1990 and 47,386 in 2000). The State projects East Hawai`i (which includes Hilo, Hamakua, and Puna) will grow at an annual rate of 2.24%, reaching 95,385 by 2010 (Table 3-1).

It should be noted that East Hawai`i, particularly the City of Hilo, has retained a socioeconomic and ethnic structure that resembles the pre-1960 patterns. This ethnic pattern is one characterized by a predominance of Asians, Hawaiians, and non-white ethnic groups. The demography of West Hawai`i, on the other hand, has changed significantly due to an influx of workers and retirees from the U.S. mainland.

3.4.2 Housing

The preliminary draft of the Hawai`i County General Plan (Draft 2, January 19, 2001) estimated that in 1997, there were 54,643 dwelling units on the Big Island. Of this amount, nearly 50% or over 29,000 units were found in East Hawai`i, most of them in the South Hilo and Puna Districts. In 1999, there was an estimated 124,930 parcels on the Big Island, of which nearly 80,000 were in East Hawai`i. Again, most of these lots were found in the South Hilo and Puna Districts.

The 2000 census noted 62,674 housing units in the County, of which 16,026 were within the Hilo Census District. Eighty-four and one-half (84.5) percent of the units were owner-occupied within the County, while this figure was even higher for Hilo at 91%. The island-wide vacancy rate was 7.6%, while Hilo had a higher rate of 10.9% (Table 3-2).

Table 3-1
Selected Social Characteristics, 2000 Census

CHARACTERISTIC	Hawai'i Island	Hilo
Total Population	148,677	40,759
Percent Caucasian	31.5	17.1
Percent Asian	26.7	38.3
Percent Hawaiian	9.7	13.1
Percent Two or More Races	28.4	29.7
Median Age (Years)	38.6	38.6
Percent Under 18 Years	26.1	24.7
Percent Over 65 Years	13.5	16.7
Percent Households with Children	21.3	30.6
Average Household Size	2.75	2.70
Percent Housing Vacant	15.5	9.0

Source: U.S. Bureau of the Census, 2001

Table 3-2
Selected Housing Data, 2000 Census

	Hilo CDP	Hawai'i County	State of Hawai'i
Housing Stock:	16,026	62,674	460,542
Occupied Units	14,577	52,985	403,240
% occupied	91.0%	84.5%	87.5%
Vacant	1,499	9,689	57,302
For seasonal use, etc.	216	5,101	25,584
% for seasonal use	14.4%	52.6%	44.6%
Rental Vacancy Rate	10.9%	7.6%	8.2%
Owner-occupied Units	8,873	34,175	277,888
(% of occupied units)	60.9%	65.5%	56.5%
Renter-occupied Units	5,704	18,810	175,352
(% of occupied units)	39.1%	35.5%	43.5%
Average population per Household	2.70	2.75	2.92
Family	3.19	3.24	3.42

Source: U.S. Bureau of the Census, 2001

3.4.3 Recreation

There are over 54 private and public parks totaling 590 (2.4 km²) acres within the South Hilo District. Proximate to the proposed MKAEC are two active parks - the University Heights Park and Mohouli Park. These parks are located less than one mile (1.6 km) from the project site. There are also a public golf course and a nine-hole private golf course, a number of parks offering passive recreational activities (such as the Wailoa State Park and Lilioukalani Gardens), and ocean parks within the City.

3.4.4 Schools

There are private and public schools proximate to the UPST. These include the public Waiakea Complex (K-12) and the Hilo School Complex (K-12) as well as the St. Joseph School (K-12), all within two miles (3.2 km) of the project site. There are also a number of smaller private schools within the City and outlying areas.

The UPST is part of the UHH campus. The heart of the campus is located less than one mile (1.6 km) from the subject site.

3.4.5 Police and Fire Services

Hawai'i County's main station of the Police Department is located less than two miles (3.2 km) from the project site, with a five-minute traveling time. There are also a number of fire stations, all of which provide emergency medical services. The central and Kawailani Street fire stations are located about two miles (3.2 km) from the subject site, which is less than five minutes traveling time.

3.4.6 Medical Services

The Hilo Medical Center (also known as the Hilo Hospital) is located about two miles (3.2 km) from the site, with a traveling time of about ten minutes. There are also a number of outpatient private, surgical clinics all within two miles (3.2 km) and a five to ten minute traveling time of the proposed site.

3.4.7 Labor Force and Income

The historical economic root of the Big Island is founded in agriculture. Although there have been some significant islandwide job losses in some of the large-scale agricultural activities – particularly sugar production – agriculture still plays an important economic role. Coffee and macadamia nuts have and still continue to be the island's major agricultural products. There is also significant growth in the diversified agricultural sectors – such as papayas, vegetables, cut flowers, and nursery products. Additionally, there are aquacultural and ranching activities.

Beginning in the 1960s, tourism began to provide an increasing number of jobs. Its importance and growing dominance has continued over the past 40 years. On the Big Island, much of the tourist growth has occurred in West Hawai'i.

Employment opportunities are more readily found in West than in East Hawai'i. The unemployment situation in East Hawai'i has been exacerbated with the closure of various sugar plantations along the Hamakua Coast and Ka'u. Since 1993, over 1,000 sugar industry-related jobs have been lost.

The UHH and the growth of the astronomy and high technology industries have helped strengthen East Hawai'i's economy. The Environmental Impact Statement for the proposed China-US Center cited a study (Hammes 1994) which pointed out that the University contributed at least \$28 million into the local economy during FY 1993-1994. Furthermore, expenditures by students and their visitors, plus other functions (such as conferences and athletic activities) account for \$66 million, making the total annual contribution nearly \$100 million.

3.4.8 Environmental Justice

On February 11, 1994, the President of the United States issued an Executive Order on Environmental Justice requiring agencies to address Federal Actions as they may relate to impacts on minority and low-income population (Executive Order 12898). Specifically, agencies must evaluate a project to assure that a proposed action would not disproportionately burden or adversely impact low-income and minority populations.

Pursuant to said Order, NASA has developed an Environmental Justice Implementation Plan and has adapted its NEPA process to ensure that environmental justice concerns are addressed in each Environmental Assessment and Environmental Impact Statement, as appropriate. This section examines the MKAEC project relative to its impact to low-income and minority populations

Minority Population

The Federal Department of Housing and Urban Development (HUD) defines "minority" as non-white and a "minority community" as one that has more than 40 percent minority populations. According to the U.S. Census for 2000, there were 40,759 persons living in all census tracts within the City of Hilo. Of this amount, 15,611 persons or 38.3 percent were of Asian descent; 5,340 or 13.1 percent were of native Hawaiian descent; and 12,105 or 29.7 percent persons were classified as having multiple races. The number of Whites or Caucasians was 6,970 or 17.1 percent (**Table 3-1**). This breakdown is generally consistent with the County's ethnic demographic. Thus, based on HUD's definition, the City of Hilo is technically considered a "minority community".

Low-Income Population

According to the 2000 County of Hawai'i Data Book, the County unemployment rate was 8.7 percent (6,050 persons) in 1999. During the same period, the South Hilo, Puna, North Hilo/Hamakua and Ka'u Districts had an 8.2 percent (2,050 persons), 14.2 percent (1,500 persons), 9 percent (350 persons), 9.9 percent (250 persons) unemployment rate, respectively. These four districts make up East Hawai'i (Table 3-3).

In the U.S. Census for 2000, the estimated median household income in 1998 for the State was \$41,627, with the County of Hawai'i being the lowest at \$34,411 (Table 3-4). The State's poverty level was estimated at 10.5 percent (122,841), with the County of Hawai'i having the highest percentage at 15.1 percent (21,448) (Table 3-5).

Pursuant to Federal HUD requirements, the County Office of Housing and Community Development prepared a Consolidated Plan (CP) for program years 2000 – 2004. This CP, which identifies low and moderate-income family areas within the County, is required to make the County eligible for Federal funds and/or grants.

As defined by the Federal HUD, low-income households are those households with incomes that earn 51 to 80 percent of the mean household income. The CP defines "low-income" as those families whose family income does not exceed 50 percent of the median family income for the area, while a "moderate-income" family's income is pegged at 80 percent. Although the CP has two categories (low and moderate), collectively they are still considered low-income households under the Federal HUD definition.

As indicated in Figure 7, the MKAEC project falls within census tract 205. Using 1990 census data, the CP identified 58.7 percent of the families to be "low- and moderate-income" (L/M) within this tract. One of the adjoining census tract (204) had a higher L/M rate at 60.4 percent, making that also a "low income" community. The four remaining adjoining tracts (206, 207.01, 207.2, and 208) were not considered "low income" as they had a L/M rate of less than 50 percent, ranging from to 26.3 percent to 45.6 percent.

3.5 Noise

The State Department of Health's rules governing noise (Chapter 11-46, HAR) outlines three classes of noise zoning districts (Agriculture, Residential, Commercial) and the corresponding maximum permissible sound levels due to stationary noise sources – such as air conditioning units, exhaust systems, and equipment related to agricultural, construction, and industrial activities. The noise level cannot be exceeded for more than 10 percent of the time during any 20-minute period. In the case of construction noise, that limit would be 70 decibels between 7 a.m. to 10 p.m.

Table 3-3
Employment Status of the Civilian Labor Force,
By Census Tract, Hawai'i County: 1999

District & Census Tract	Civilian Labor Force	Employed	Unemployed	Unemployment Rate
Hawai'i County	69,900	63,850	6,050	8.7
South Hilo				
201.00	2,550	2,250	300	11.1
202.00	900	850	50	6.8
203.00	2,200	1,850	300	14.4
204.00	1,850	1,650	200	10.8
205.00	3,100	2,750	350	11.2
206.00	2,350	2,050	300	13/4
206.99	--	--	--	--
207.01	2,600	2,450	150	5.7
207.02	2,900	2,800	100	3.2
208.01	1,600	1,550	50	4.4
208.02	3,000	2,900	100	3.5
209.00	2,150	2,000	150	7.6
Puna				
210.01	3,450	3,000	500	13.8
210.02	3,750	3,350	450	11.7
211.00	3,400	2,850	550	15.7
Kau				
212.00	2,450	2,150	300	12.7
South Kona				
213.00	3,250	2,900	350	11.3
214.00	1,750	1,550	200	11.3
North Kona				
215.01	4,150	3,900	250	5.7
215.02	2,050	2,000	50	3.3
215.97	--	--	--	--
215.98	1,700	1,550	150	8.2
216.00	6,450	6,100	350	5.5
South Kohala				
217.00	5,900	5,600	300	5.3
North Kohala				
218.00	2,500	2,300	200	7.4
Hamakua				
219.00	2,150	1,900	250	10.7
220.00	1,000	950	50	5.1
North Hilo				
221.00	750	700	50	8.9

Source: County of Hawai'i Data Book, 2000

Table 3-4
Estimated State & County Median Household Income: 1998

State & County	Median Household Income
	Estimate
Hawai'i	\$41,627
• Hawai'i County	\$34,411
• Honolulu County	\$44,934
• Kalawao County	\$9,859
• Kauai County	\$38,552
• Maui County	\$40,635

Source: U.S. Bureau of the Census: December 2001

Table 3-5
Estimated Number of All Ages in Poverty - State & County: 1998

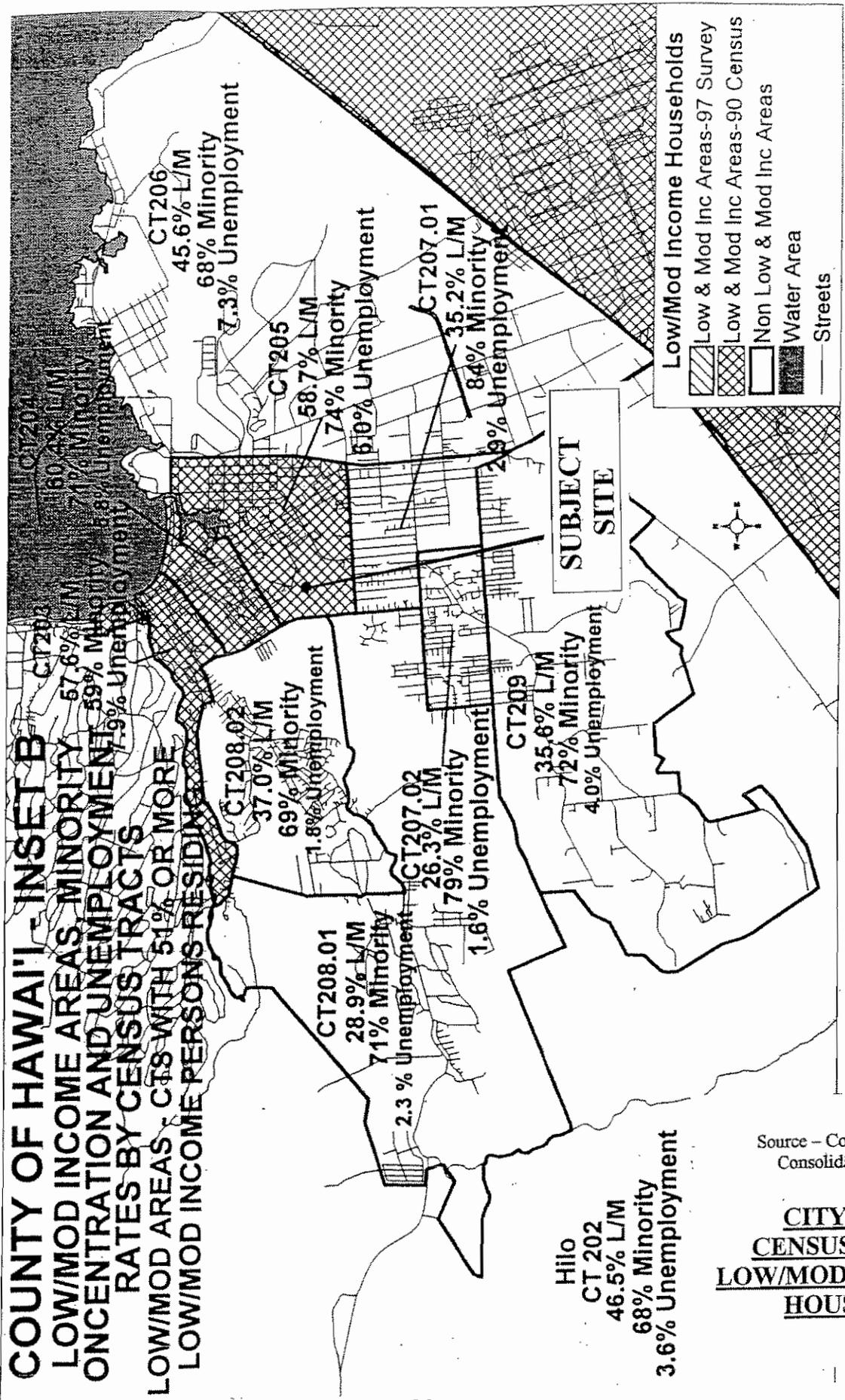
State & County	People of All Ages in Poverty	
	Estimate	Percent
Hawai'i	122,841	10.5
• Hawai'i County	21,448	15.1
• Honolulu County	82,253	9.7
• Kalawao County	0	0.0
• Kauai County	6,428	11.3
• Maui County	12,712	10.4

Source: U.S. Bureau of the Census: December 2001

COUNTY OF HAWAII - INSET B

**LOW/MOD INCOME AREAS, MINORITY
CONCENTRATION AND UNEMPLOYMENT
RATES BY CENSUS TRACTS**

**LOW/MOD AREAS - CTs WITH 51% OR MORE
LOW/MOD INCOME PERSONS RESIDING**



Source - County of Hawaii
Consolidated Plan - 2000

**CITY OF HILO
CENSUS TRACTS
LOW/MOD INCOME
HOUSEHOLDS**

Figure 7

According to a noise impact study done in conjunction with the Environmental Impact Statement for the development of the UPST, the ambient traffic and background noise in this area ranges from "Moderate Exposure, Acceptable" and "Significant Exposure, Normally Unacceptable" levels along the rights-of way of Komohana, Lanikaula and West Kawili Streets. (Engineering Concepts, Inc., 1997) Along Komohana Street, the noise approximates 70 Day-Night Sound Level (Ldn) at a distance of 50 feet (15.2 m) from the street centerline. As the proposed facility would be situated more than 500 feet (152 m) from Komohana Street, the ambient traffic and background noise should be 50Ldn, which is compatible for residential uses. That level is below the Federal Housing Authority and Department of Housing and Urban Development noise abatement standard of 65 Ldn (Table 3-6).

3.6 Air Quality

No specific air quality study of this project was conducted. The information contained in this EA was derived largely from air quality studies performed by B.D. Neal and Associates for the March 2000 Draft EA for the U.S. Pacific Basin Agricultural Research Center Facility of the Department of Agriculture and Jim Morrow for the 1997 EIS for the development of the University Park. It should be noted that the MKAEC site is located within the University Park, while the DOA's Agricultural Facility would be situated less than 1,000 feet (305 m) west of the MKAEC. The Facility, like the MKAEC, would also utilize Komohana Street as its primary access.

3.6.1 Ambient Air Quality Standards

The Federal and state ambient air quality standards (AAQS) limit ambient pollutant concentrations. As noted in the summary of the AAQS, Hawai'i's air quality standards are more stringent than the Federal standards, except for sulfur dioxide and particulate matter.

SUMMARY OF FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

<u>Pollutant</u>	<u>Sampling Period</u>	<u>NAAQS Primary</u>	<u>NAAQS Secondary</u>	<u>State Standards</u>
Particulate Matter Less than 10 Microns (PM ₁₀)	Annual	50	50	50
	24-hour	150	150	150
Sulfur Dioxide	Annual	80	n/a	80
	24-hour	365	n/a	365
Nitrogen Dioxide	Annual	100	n/a	70
Carbon Monoxide	8-hour	10	n/a	5
	1-hour	40	n/a	10
Ozone	1-hour	235	n/a	100
Hydrogen Sulfide	1-hour	n/a	n/a	35
Lead	Quarter	1.5	n/a	1.5

Note: All concentrations in micrograms per cubic meter (ug/m³) except for carbon monoxide, which is in milligrams per cubic meter (mg/m³)

Table 3-6
Exterior Noise Exposure Classification
(Residential Land Use)

Noise Exposure Class	Day-Night Sound Level	Equivalent Sound Level	Federal (1) Standard
Minimal Exposure	Not Exceeding 55 Ldn	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But Not Above 65 Ldn	Above 55 Leq But Not Above 65 Leq	Acceptable (2)
Significant Exposure	Above 65 Ldn But Not Above 75 Ldn	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 Ldn	Above 75 Leq	Unacceptable

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

3.6.2 Existing Conditions

Motor vehicle emissions, industry, and natural sources affect the air quality in the South Hilo district. The natural sources come from the ongoing volcanic activity, which emits sulfur dioxide that converts into particulate sulfate that causes a volcanic haze (vog). The vog affects the Hilo area when trade winds are absent, usually 3% to 4% annually. The industrial sources come from oil-fired power plants, which emit sulfur dioxide, nitrogen oxides, and particulate matter. Automobile emissions include carbon monoxide, nitrogen oxides, and smaller amounts of other pollutants.

The State Department of Health does not frequently monitor air quality in the Hilo area. According to both the Neal and Morrow reports, the results of the monitoring indicated very low pollutant levels. The Neal report went on to note that the annual average concentration levels for the various measured items in 1999 and 2000 were very low. It also indicated that:

- Sulfur dioxide represented about 4 percent of the State and National standards while particulate matter represented only about 20 percent;
- There were no violations during this 2-year measuring period; and
- There were no reported measurements of lead, ozone, nitrogen dioxide or carbon monoxide, pollutants that are primarily motor vehicle oriented.

Notwithstanding the absence of any detailed monitoring of this area, in summarizing Neal's report, the Draft EA for the U.S. Pacific Basin Agricultural Research Center concluded that "Air quality in the project area is believed to be relatively good, except for occasional impacts from nearby volcanic emissions and localized traffic congestion." (Page 88).

The Morrow report, conducted for the EIS for the USPT, also arrived at the same favorable conclusion. It concurred that the air quality in this area is generally good, influenced heavily by the dispersive effects of the trade winds and the island's relative isolation from any major industrial sources of pollution. The existing ambient air quality was considerably lower than the State of Hawai'i and National Ambient Air Quality Standards. Thus, the County of Hawai'i is in attainment with the measured pollutants, which include particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, hydrogen sulfide, and lead. The report also concluded that even with the full development of the UPST, the air quality would not exceed the State or the National Ambient Air Quality Standards.

3.7 Floodplains and Drainage

According to the FEMA FIRM (**Figure 6**), the subject site is designated zone "X" (areas of minimal flood hazard and/or drainage hazards and outside the 100- and 500-year flood way). The southeastern portion of the UPST borders the Waiakea Stream. That area is designated zone "AE" (areas inundated by 100-year flood where the base flood elevation has been

determined) on the FIRM map. The site of the MKAEC, however, is located at least 800 feet (244 m) from this stream and outside of the 100-year flood plain.

3.8 Water Quality

3.8.1 Surface Water

The nearest stream to the subject site is the Waiakea Stream, located over 800 feet (244 m) away. This stream flows intermittently, particularly during heavy rainfall. Surface runoff from upstream residential and agricultural activities frequently feed into this stream.

In 1997, AECOS, Incorporated prepared a report, entitled "*An Assessment of Stream Impacts for a Bridge Crossing of Waiakea Stream at University of Hawai'i, Hilo, Hawai'i*" in conjunction with the EIS for development of the UPST and surrounding properties. The report noted that there were numerous pools, which supported a dense growth of blue-green algae at the bottom. Several freshwater fauna were found, including the guppy (*Poecilia reticulata*) swordtail (*Procambarus clarki*), tadpoles (*Bufo marinus* and *Rana catesbeiana*) and dragonfly naiads (*Pantala flavescens*). No indigenous fauna were found during this survey.

3.8.2 Groundwater

Due to the porous nature of the subject and surrounding area, surface water quickly infiltrates into the ground. Due to the limited agricultural activity and upslope of the subject site, pesticides and herbicides have not been used intensively in the past. Furthermore, historically, no industrial activities have taken place in this area. As such, it is unlikely that the groundwater is contaminated.

The closest potable well is situated in Panaewa, approximately three miles (4.8 km) from the site.

3.9 Biological Resources

3.9.1 Wetlands

The subject area is not designated as a wetland on the County General Plan. Neither the archaeological nor botanical field investigations conducted for the UPST identified any wetland within the subject area.

3.9.2 Vegetation

Char and Associates conducted a walk-through field study of the subject parcel and the surrounding area's botanical resources in November 1992 and again in 1996. It also re-

evaluated its study in conjunction with this assessment (**Appendix A**). The survey noted, among other plants, a number of endemic (i.e., native only to the Hawaiian islands) plants. These were *'ohi'a lehua* (*Metrosideros polymorpha*), *neneleau* (*Rhus sandwicensis*), *hapu'u* (*Cibotium glaucum*), and *'ahanui* (*Machaerina mariscoides*). Other plants noted were the matted *uluhe* ferns (*Dicranopteris linearis*), melastoma (*Melastoma candidum*), bamboo orchid (*Arundina graminifolia*), and strawberry guava (*Psidium cattleianum*). It also found pockets of introduced mixed forest consisting mainly of large gunpowder and melochia trees.

None of the plants inventoried were listed on the current list of threatened or endangered species; nor were any proposed or candidate for such status.

3.9.3 Wildlife

In 1997, Rana Productions prepared a report, entitled "*An Assessment of the Faunal Makeup of the Proposed UH-Hilo University Park Infrastructure Improvement Project, Phase IIA Sites, Hilo, Island of Hawai'i, Hawai'i*" (**Appendix B**). This assessment was made a part of the EIS for the UPST's infrastructure improvements.

The habitat of the subject area was considered almost completely alien. As such, it was unlikely to harbor native forest bird species. Nonetheless, the Hawaiian Hawk or *I'o* which is endemic to the island of Hawaii, has been found proximate to this area. The author noted that the Short-eared owl or *Pueo*, which is endemic to Hawaii, may also be occasionally found in this general area. These birds may occasionally forage but not nest within the site.

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) or *'Ope'ape'a* may use the site occasionally to roost. The bat is an endemic Hawaiian sub-specie and is listed as endangered by the US Fish and Wildlife Service. Little is known of this species range, population density or habitat preferences. The assessment concluded "Taking into consideration the current knowledge and understanding of the abundance, distribution, and biology of the Hawaiian hoary bat, it is unlikely that the construction on either of these (UPST) sites will have a deleterious impact on this endangered mammalian species." (Page 16).

Other probable species found in this general area are all introduced such as the Norway and Roof rat, European house mouse, domestic dog, small Indian mongoose, cat, and similar species.

3.10 Cultural Resources

3.10.1 Archaeological Resources

An archaeological inventory survey was conducted of the subject parcel (December 1992 to January 1993) by Cultural Surveys Hawaii (**Appendix C**). This survey was done in conjunction with an Environmental Assessment for the construction of on-site infrastructure

improvements within the UPST. The survey, which included the subject site, covered 163 acres (.66 km²).

The report noted that bulldozing had occurred within the study area for an old water main and an electric power line. In addition, two structures (Agriculture Center and the Joint Astronomy Centre) and their associated parking lots and paved roadways were completed prior to the archaeological survey.

Sites were located within the southern portion of the parcel, of which four were described and mapped. None of these sites are located within or even proximate to the area of the proposed MKAEC (See Figure 8). Two agricultural complex sites (18668 and 18669) and a mound feature of a third site (18667) were hand excavated and tested to document stratigraphy in the sites and to search for cultural remains to date the sites. No subsurface cultural deposits were found. No further archaeological research for the sites found was recommended based on the type and age indicated by the date collected and analyzed.

In September 1993, a supplemental archaeological survey was done by Cultural Surveys Hawaii, covering approximately 11 acres (4.45 h) in the vicinity of the Waiakea Stream. This stream also serves as a flood control channel in this area.

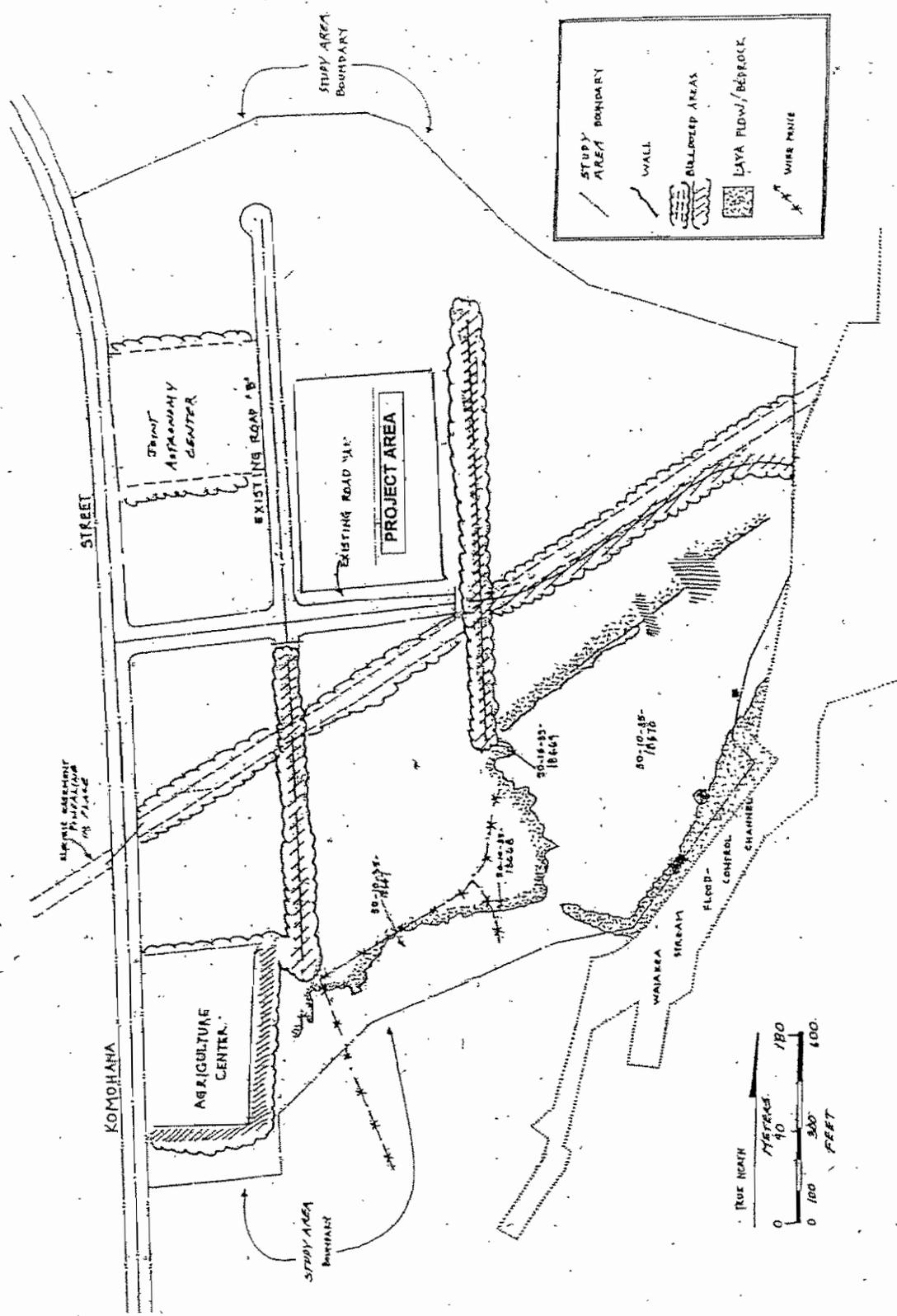
Four plantation era (circa 1870 to 1940) rock clearance features (or mounds) and a portion of a rock wall continuing from the state-owned parcel were identified. These features were included in the original survey under State Historic Site No. 50-10-35-18670. Based on subsurface testing of the largest mound within the Waiakea Stream, and another mound located within the state-owned parcel, these features were determined to be part of the commercial sugarcane cultivation of the Waiakea Cane Lots. As such, no further archaeological research was deemed necessary.

Relative to the proposed site, no archaeological features were found.

3.10.2 Cultural Resources

The archaeological reports discussed above did not indicate the presence of sites in the general area that require physical preservation. The sites were noted to be more agricultural in nature, some of which were of more recent vintage (i.e., associated with the sugar crop). No trails were identified. Furthermore, of the identified sites, none were found within or proximate to the proposed MKAEC.

In its review of the archaeological reports, Alan E. Haun, Ph.D. of Haun and Associates (**Appendix D**) concluded, "Based on the findings of the archaeological survey, there are no traditional Hawaiian cultural or historical resources in the project area." The proposed development would not affect such resources and no protective actions are necessary.



ARCHAEOLOGICAL SITES
Figure 8

The assessment of the area's botanical resources conducted by Char and Associates (see Section 3.9.2) did not identify any rare or endangered plant life in this area. The *uluhe* fern was observed on the site and the general vicinity. This fern is fairly common in this area. There was no visible evidence of native Hawaiians using the subject area for gathering of plants.

While no oral interviews were conducted with area native Hawaiians, based on the botanical report and the archaeological inventory reports and their cultural assessment by Dr. Haun, it does not appear likely that the subject site is used for gathering, access, or other customary activities by native Hawaiians.

3.11 Scenic Resources and Design Considerations

In the Natural Beauty element of the County General Plan, the views of Mauna Kea, Mauna Loa, and Hilo Bay are noted as providing the backdrop of this beauty. Specific sites reflecting this beauty and other natural features are also identified by tax map key (Figure 2). While the subject property and site are not specifically identified by tax map key, the project's visual relationship to the views of Mauna Kea, Mauna Loa, and Hilo Bay are also important.

Relative to the proposed site, the views of Mauna Kea and Mauna Loa would occur from the University campus. Because of the height of the mountains combined with the distance of all prevailing University uses from the proposed site, the mountains would still be visible. From Hilo Bay, the proposed structure would not obstruct views of Mauna Kea and Mauna Loa.

Hilo Bay is located generally east of the subject site. However, due to the existing stand of trees and bushes along Komohana Street in this area, most of the view is somewhat impaired. Temporarily, the outer portions of the Bay become visible in the area of Nowelo Street. As such, the tentative 79-foot (24 m) tall structure may partially affect this brief view of the Bay when traveling along Komohana Street. (See *Section 5.1.13 Scenic Resources and Design Considerations* for a detailed description of the mitigation measures to be undertaken.)

3.12 Solid Waste

The County does not provide solid waste collection services. This service is provided by either commercial haulers or the respective homeowner/business entity. The landfill in Hilo is rapidly approaching its capacity and is anticipated to close within the next few years. As such, the County is developing a long-range solid waste management plan, which may include operating a solid waste transfer station in its place for processing and recompaction, prior to transporting it to the Pu'uana'hulu landfill in West Hawaii.

Like the UHH, the MKAEC intends to engage in recycling and composting. Recycling collection stations will be placed throughout the facility with collection service being provided by private contractors. Composting of green wastes will also be utilized for the

area's landscaping. A Solid Waste Management Plan will also be prepared by the UHH meeting with the requirements of the County Department of Environmental Management, prior to the operation of the facility.

3.13 Toxic Substances

The subject site is vacant of any structures. There is also no evidence that there were structures or uses on the site that would result in residual asbestos, lead, or polychlorinated biphenyls (PCBs). There has not been any active agricultural use of this area within the past 50 years which would have required the extensive use of herbicides or pesticides.

3.14 Health and Safety

The subject site is outside of any airport flight or noise zone. There are no aviation easements within or proximate to the subject site. The Hilo airport is located nearly three miles (4.8 km) from the subject site.

There are no hazardous waste sites within or proximate to the subject site. The nearest solid waste disposal station is located more than three miles (4.8 km) from the subject site, at a lower elevation.

4.0 Regulatory Environment

4.1 State Land Use Law

The parcel is classified *Urban* by the State Land Use Commission. No further action and/or land use permit is required by the State.

4.2 Hawai'i County General Plan

The subject site is designated for *University Use* on the County General Plan Land Use Pattern Allocation Guide map (**Figure 9**). The proposed use would thus be consistent with that designation, and no land use amendment would be required.

It should also be noted that in the General Plan document, one of the policies states that "*The County shall encourage the implementation of existing State and University of Hawaii plans for the establishment of a Research and Technology Park on the campus of the University of Hawaii at Hilo.*"

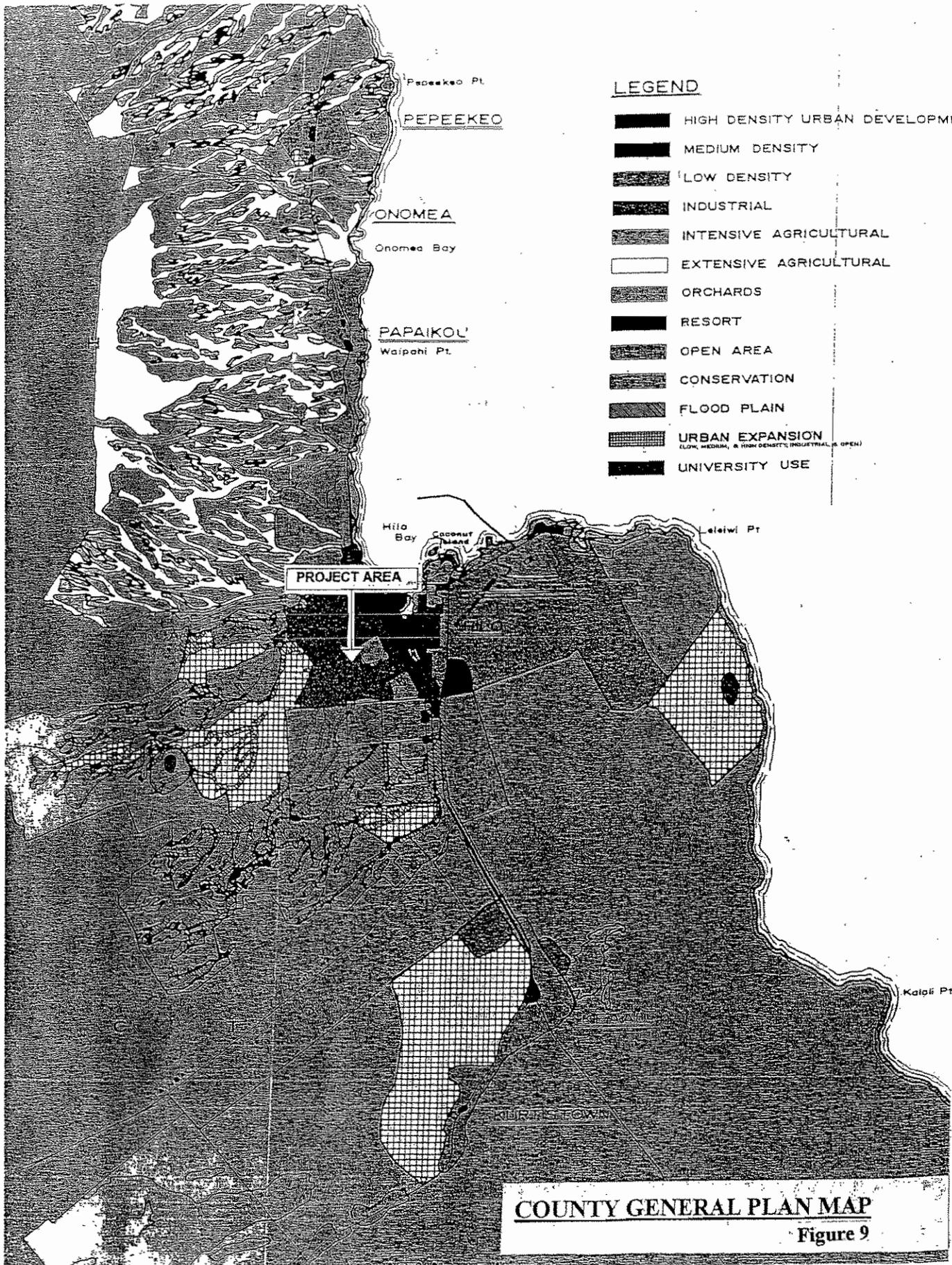
4.3 Hilo Community Development Plan

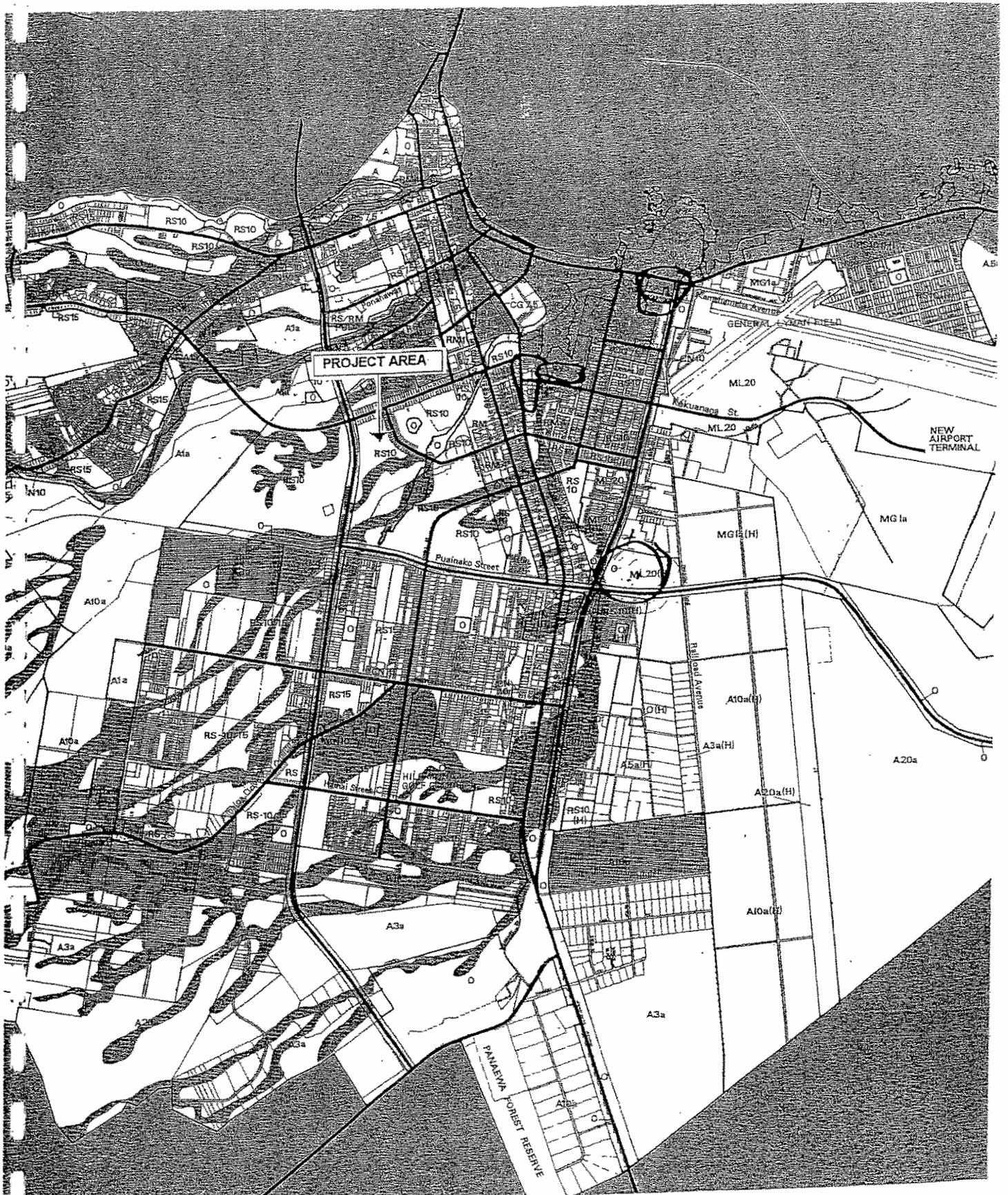
The Community Development Plan was adopted by the Planning Commission in 1975. The land use guide map of this Plan suggests a single-family residential, minimum 10,000 square feet (93 m²) per lot (*RS-10*) for the balance of the University site (**Figure 10**). As a land use guide, no amendment to this plan is needed to accommodate the requested use.

4.4 Zoning

The County zoning of the entire site is split between *RS-10* and Agriculture, 1-acre minimum lot size (*A-1a*). The area of the proposed facility is zoned *A-1a*. Under the County Zoning Code, schools would be allowed in both of those zones, provided that the Planning Commission approves a Use Permit application. In this case, the use would be related to the University. All of the other facilities in this area are considered part of the University and thus were not subject to the Use Permit process. It is believed that this would continue to hold true for the proposed project.

All site planning requirements of the zoning code, such as parking, height, and setback will be met. Adequate on-site parking for both vehicles and buses with turn around areas will be provided on site. A height variance may be required, as the maximum allowable height within the *A-1a* zone is 45 feet (13.7 m), while the tentative height of one of the many tentative concept designs of the structure (because of the dome) is 79 feet (24 m). To the extent practicable, however, the structure will be designed to conform to the prevailing height requirements. Should a variance not be favorably considered, the structure will have to be redesigned to conform to the prevailing height requirements.





HILO COMMUNITY DEVELOPMENT PLAN MAP
Figure 10

4.5 Other Requirements

4.5.1 Special Management Area (SMA) and Coastal Zone Management (CZM)

The Federal CZM Act encourages the management of coastal areas and provides grants to participating States to help with the management of these areas. The State of Hawai'i is a participant in this program. The State's CZM policies and requirements are outlined in Chapter 205A, Hawai'i Revised Statutes. The CZM program requires all Federal and State actions to be consistent with the CZM plans and policies.

In addition to designating all lands within the State in the CZM area, Hawai'i's CZM program includes a special permitting process for areas within the Special Management Area (SMA). The subject site is not located within the County Special Management Area (SMA) and thus not subject to any additional permitting process. The County of Hawai'i Planning Department agreed with this conclusion in a letter, dated April 1, 2002 (see Appendix H).

The proposed project is consistent with the State CZM program. As it is located more than three miles from the shoreline and will not affect any streams or similar water uses, the recreational and coastal ecosystem policies and objectives would not be affected or applicable. There are no archaeological resources within the area of the proposed improvements. In terms of scenic and open space resources, view plans to and from the shoreline from the project site as well as to other natural landmarks such as Mauna Kea and Mauna Loa would not be significantly affected.

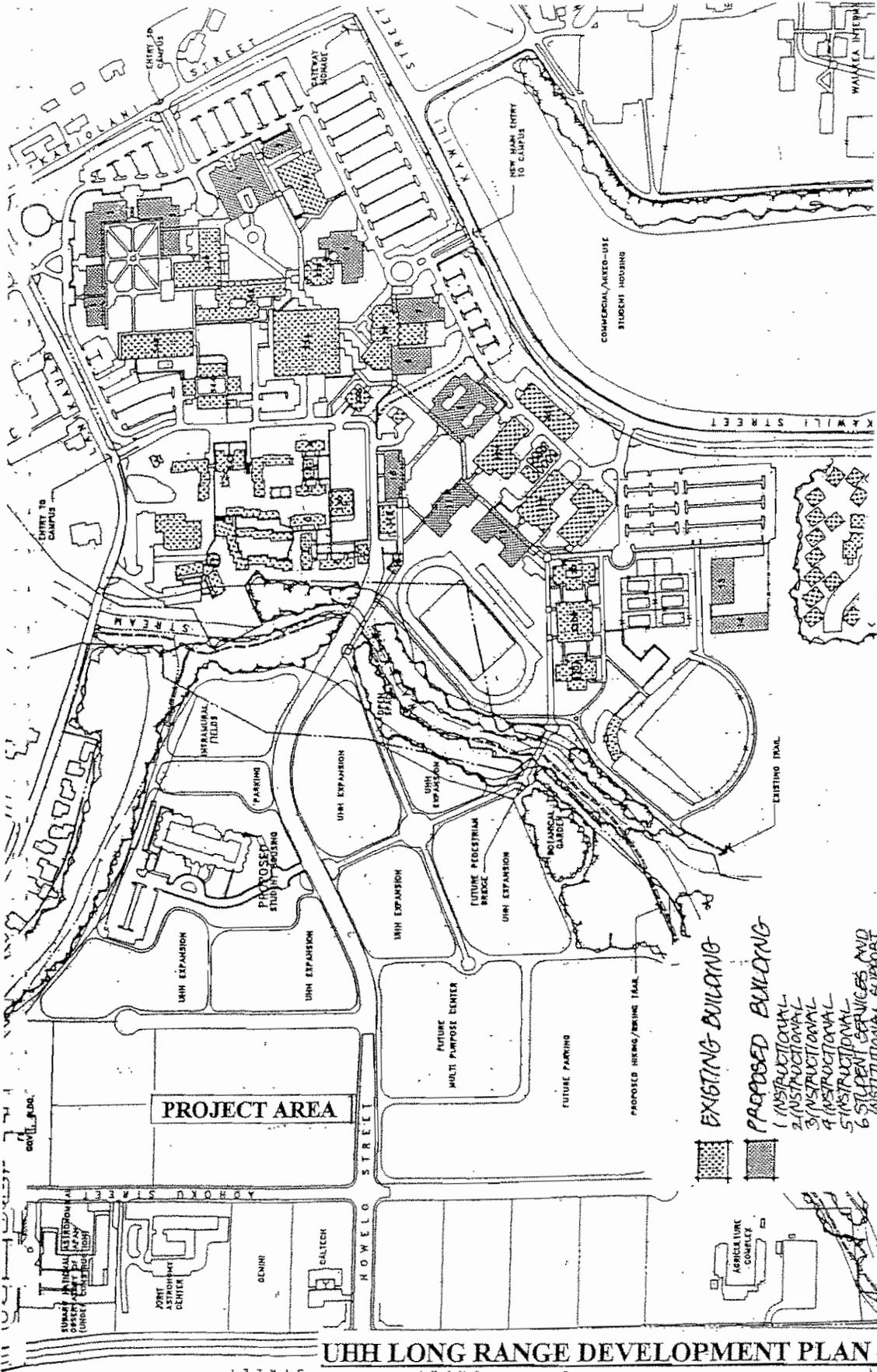
4.5.2 UH at Hilo Long Range Development Plan

The University of Hawai'i at Hilo Long Range Development Plan, developed in 1981, includes an "Ultimate Site Plan", guidelines for the campus development, including its architecture and landscaping plans to maintain a consistent design character with the existing campus buildings. The proposed use would be consistent with the Ultimate Site Plan (**Figure 11**). Further, the proposed building will follow the development plan's guidelines as well as the State and County building codes.

4.6 Status of Required Permits

The following permits are or may be required for this project, and to date, none have been applied for:

- Use Permit
- Plan Approval
- Height Variance
- Underground Injection Control (UIC) Permit



ULTIMATE SITE PLAN
UH-HILO LONG RANGE DEVELOPMENT PLAN

0 250 500 FEET

KAJIOKA, OKADA, YAMAGUCHI ARCHITECTS

March 1996

- EXISTING BUILDING**
- PROPOSED BUILDING**
- 1 INSTRUCTIONAL
 - 2 INSTRUCTIONAL
 - 3 INSTRUCTIONAL
 - 4 INSTRUCTIONAL
 - 5 INSTRUCTIONAL
 - 6 STUDENT SERVICES AND OFFICES
 - 7 STUDENT SERVICES
 - 8 STUDENT SERVICES
 - 9 INSTRUCTIONAL
 - 10 INSTRUCTIONAL
 - 11 INSTRUCTIONAL
 - 12 INSTRUCTIONAL
 - 13 MAINTENANCE AND OPERATIONS
 - 14 MAINTENANCE AND OPERATIONS
 - 15 MAIN SERVICE CENTER

UHH LONG RANGE DEVELOPMENT PLAN - SITE PLAN

Figure 11.

- Grading Permit
- Building Permit
- Stormwater NPDES Permit

It should be noted that in conjunction with the building permit process, other permits will be needed, such as the electrical, plumbing, and air conditioning.

5.0 Environmental Impacts and Proposed Mitigation

5.1 Proposed Action

5.1.1 Geology and Hydrogeology

There are no soil or geological limitations to the construction of the MKAEC on the proposed site. The site is designated "X", areas determined to be outside the 100-year flood plain, on the FIRM map (Figure 6).

The subject site is located more than two miles (3.2 km) from the shoreline. It is outside of the Civil Defense tsunami evacuation zone. Construction of the MKAEC must comply with the 1997 edition of the Uniform Building Code (UBC) which upgraded the seismic zonation of Hawai'i County from Zone 3 to Zone 4.

5.1.2 Land Use

No adverse land use impacts are anticipated by this project. The proposed use is consistent with the County General Plan, Zoning Code, and UHH Long Range Development Plan. The proposed use is consistent with the immediately adjacent uses within the UPST. Further, no person or business will be displaced from this site.

5.1.3 Infrastructure

The UHH recently installed a 12-inch (30.5 cm) water line along Nowelo Street. That system should be sufficient to address the water quantity and pressure needs of the MKAEC. Discussions with the County Department of Water Supply will be initiated by the selected in the near future to establish a projected water use and the appropriate water facilities charge. The wastewater will be disposed of into an existing sewer transmission line within Nowelo Street, which connects to the County's 8-inch (20.3 cm) line along Lanikaula Street. Any upgrades to this line, if required, will be coordinated by the UHH with the County. All other utilities -- such as electricity and telephone -- are available to the subject site. Inasmuch as the building will be designed to meet the minimum certification requirements established under the LEED™ Green Building Rating System, there will be some measure of savings on the consumption of energy.

The project would not have any adverse impact on the area's existing wastewater, water, and utility infrastructure. Whatever impacts that may result from this project would be mitigated by additional improvements made by the UHH.

5.1.4 Traffic

A **revised** Traffic Impact Analysis Report (TIAR) for this project was prepared by M&E Pacific, Inc. (**Appendix E**). The report reviewed the project's impact to three intersections on Komohana Street proximate to the subject site: Pu`ainako Street (and Extension), Nowelo Street, and Mohouli Street. Based on the projected opening of 2005, the report noted that the mid-morning hours would have acceptable traffic operations, with the levels of service at level C or better. The afternoon peak hours would be more problematic for left-turn movements exiting Nowelo Street. The levels of service would deteriorate from "D" to "E" to "F". Traffic signals would mitigate this problem. It should be noted that this deteriorative condition would occur with or without this project.

Having traffic signals at the other two intersections would mitigate traffic impacts. The Mohouli Street intersection is already signalized, while the Pu`ainako Street intersection will be signalized in 2003. Thus, the only outstanding intersection would be Nowelo Street. The UHH and/or MKAEC will install traffic lights at the intersection of Komohana Street and Nowelu Street. Based on this mitigation, the project would have no significant traffic impact.

5.1.5 Socioeconomics

The estimated construction cost of this project is nearly \$28 million. Over the short term, this would greatly help the construction industry. Furthermore, this activity would occur in an area that would not result in any displacement of existing businesses, residences, or agricultural uses.

Over the long run, the project's operation would mean additional funds into the island's economy and would help broaden the island's tax base. It would also attract more interests in the research and technology fields to the island, and thus serve as an important catalyst for more growth in these fields.

At the same time, this project would help enrich and expand the island's – particularly East Hawai`i's – and the State's educational and cultural environment.

The proposed project is anticipated to generate at least fifteen full- and five part-time jobs. Existing residents can fill most of these positions. The 2000 census indicated nearly 1,500 vacant residential units in Hilo alone and additional 9,689 units for the rest of the island. As such, the additional housing demand directly generated by this project can be readily absorbed in Hilo.

Parks, medical, police, fire, and other public facilities are available within a three-mile (4.8 km) radius of the project site.

5.1.6 Environmental Justice

The on-site development issues associated with the MKAEC project itself would not cause any direct substantial impacts to adjoining properties relative to drainage or stormwater runoff, wastewater, and utilities. The nature of the project itself would not generate direct substantial noise or air quality impacts.

However, potential sources of environmental justice issues would be traffic and air and noise pollution associated with the increase in traffic during the construction and post-construction periods. As discussed in sections 5.1.4, 5.1.7, and 5.1.8, these impacts, while not substantial, will still be mitigated. Nonetheless, it is still important to examine whether the construction and operation of the MKAEC would cause disproportionate impacts on minority and low-income communities proximate to the subject site.

Minority Populations

Using HUD's definition, all census tracts -- including census tract 205, the tract of the proposed MKAEC - within the City of Hilo would be considered a "minority community". The 2000 Census identified over 82 percent of the City of Hilo's population to be non-white. Thus, the project's traffic and associated air quality impacts resulting from the construction and operation of the MKAEC would not disproportionately affect minority communities. Given the population demographics of the City of Hilo, the "minority community" really makes up the majority of the population. In that regard, all of the census tracts would be affected similarly by the MKAEC. As such, there would be no disproportionate affects on minority communities from traffic generated by the construction and operation of the MKAEC.

Low Income Populations

The MKAEC falls within census tract 205, a tract that has over 58 percent low- and moderate-income families. One of the adjoining tracts had an even higher rate of low- and moderate-income families at 60.4 percent. Three of the other adjoining census tracts (CT 207.01, 207.02, and 208.2) would also sustain traffic and associated air quality impacts resulting from this project. Those tracts also front either Pu'ainako Street and Komohana Street, the principal accesses to the MKAEC.

The traffic and vehicular related air quality impacts resulting from the MKAEC would thus not disproportionately affect those living within census tract 205. It will affect all tracts equally. In addition, traffic impacts will be mitigated largely through the construction of traffic lights at the Nowelo Street/Komohana Street intersection.

There would thus not be any significant environmental justice impacts resulting from the construction and operation of the MKAEC.

5.1.7 Noise

There will be short-term impacts associated with the construction of the facility that would occur during normal working hours and days, not on weekends. All construction noise levels will comply with existing Department of Health regulations (Chapter 11-46) governing noise, including construction noise. It should be noted that there are no immediate surrounding residential use areas.

The subject area is generally associated with ambient noise levels associated with traffic along Komohana Street. The proposed MKAEC will generate its own noise. However, as the uses are intended to be limited, for the most part, to daytime and indoor activities, the noise level would not be significant and for the most part be comparable to the acceptable residential decibel level of 55. As such, no adverse noise impacts are expected.

5.1.8 Air Quality

During the construction phase of this project, there will be short-term direct and indirect impacts to the area's air quality. This impact would be largely through the fugitive dust resulting from vehicular movements and soil excavation as well as the emissions from the exhaust of the vehicles and other construction equipment.

The State Department of Health's regulations (Chapter 11-60, HAR) prohibits visible emissions of fugitive construction dust beyond the construction line.

The use of the MKAEC would generate vehicular traffic, and traffic would be singularly the most important contributor affecting air quality. Although the annual volume of visitors is projected at 250,000, many of these will be students who will arrive by buses. That plus the higher emission control standards for motor vehicles should help abate excessive pollutants indirectly resulting from the MKAEC project.

As noted Section 3.6.2 of this Assessment, the major vehicular-related pollutants are lead, ozone, nitrogen dioxide and carbon monoxide. With the exception of carbon monoxide, the State does not monitor the other pollutants in this vicinity.

The air quality report prepared by B.D. Neal and Associates this year for the Draft EA for the US Pacific Basin Agricultural Research Center (USPBARC) prepared a model to project carbon monoxide concentrations in this area. It took an estimated worst-case 8-hour carbon monoxide concentrations by multiplying the worst-case 1-hour morning and afternoon ambient carbon monoxide concentrations by a persistence factor of 0.5. The model measured carbon monoxide concentrations at the intersections of Komohana Street and Pu`ainako Street and Komohana Street and Nowelo Street.

The Draft EA for USPBARC noted the estimated worst-case 8-hour concentrations of carbon monoxide at the Pu`ainako Street intersection to be 2.8 milligrams per cubic meter (mg/m^3), while the Nowelo Street intersection had a much lower level at $1.3 \text{ mg}/\text{m}^3$. In projecting this level to the year 2010, the Pu`ainako Street intersection had a level of $3.9 \text{ mg}/\text{m}^3$, while the Nowelo Street intersection was higher at $4.4 \text{ mg}/\text{m}^3$. This value was the same, with or without the project. This was attributed not so much to the project's traffic generation but the anticipated uses within the UPST and other planned major uses in this area, such as the China-U.S. Center and the UHH multi-purpose sport and recreational complex. (Pages 91-92).

Accordingly, the Neal model did account for the development and in-filling of uses within the UPST, such as the proposed MKAEC. The 8-hour worst case concentration of carbon monoxide in this area is estimated at $4.4 \text{ mg}/\text{m}^3$ at the Nowelo Street intersection.

Further, the traffic study prepared for this EA by M&E Pacific, Inc. (Appendix E) projected 38 incoming and 10 outbound trips in the mid-morning hour and 64 outbound trips in the afternoon peak hour. Based on this projected volume as well as recent and planned traffic improvements in this area (notably the completion of Mohouli Street extension, the on-going construction of the Pu`ainako Street extension, and the signalization of Nowelo Street), the study concluded that the current level of service along Komohana Street will be maintained. However, while the level of service for left-turn traffic exiting Nowelo Street would deteriorate from level of service D to F, a signalized intersection would improve the existing level of service.

Thus, while the volume of vehicles in this area will increase, the wait time (which adds to the level of carbon monoxide concentration) would not change significantly with all of the planned and on-going improvements in the area.

Given all of those circumstances, it is maintained that the carbon monoxide concentration level attributable to the MKAEC would be well within the National limit of $10 \text{ mg}/\text{m}^3$ and the more stringent State standard of $5 \text{ mg}/\text{m}^3$. This conclusion was also reached in the EIS for the UPST and the Draft EA for the USPBARC. As such, the overall air quality impacts resulting from the MKAEC project would not be significantly adverse.

5.1.9 Floodplains and Drainage

The floodplain impact resulting from this project would not be adverse. The project site is outside of any designated flood plain area. The proposed parking and structures should increase the area of semi-impervious surface. Given the existing permeable condition of the land, on-site drainage problems are not anticipated.

The County requires all locally generated stormwater to be captured and disposed on site. The conventional means is through natural percolation, and in certain situations, the

construction of drywells at a depth of 10 feet (3.05 m). Because of potential groundwater impacts, all drywells are subject to an Underground Injection Control (UIC) permit from the State Department of Health.

In this situation, this project will have, if needed, drywells (subject to the UIC permit) and any other drainage systems as may be required by the County. This will be installed and properly maintained by UHH.

5.1.10 Water Quality

As the proposed site is located at least 800 (244 m) feet from the Waiakea Stream, the surface water impact resulting from this project would be negligible.

Likewise, impacts to the groundwater resulting from this project would not be adverse. The nearest potable well is located approximately three miles (4.8 km) from the project site. Furthermore, all drywell constructed on site to handle on-site drainage would require an Underground Injection Control permit from the State Department of Health. Said permit is evaluated relative to the impact of a drywell to the groundwater.

5.1.11 Biological Resources

No adverse impacts to biological resources are anticipated from the development of this project. According to the botanical assessment of this area prepared by Char and Associates in 1996 (Appendix A), there were no rare or endangered plant species or animal life found within the project site. A re-review of the current list of threatened or endangered plant species also noted that none of the inventoried site was listed.

5.1.12 Cultural and Archaeological Resources

Archaeological inventory surveys were conducted of the site and immediately surrounding areas. The surveys did not find any historic trail or anything of archaeological significance within the area of the proposed project. In its comments on the Draft Environmental Assessment, the State Historic Preservation Officer concluded that "no historic properties will be affected" by this project (See Appendix H). A cultural assessment of the archaeological reports (Appendix D) also concluded that there would be no adverse cultural impacts.

The botanical study also did not identify any rare or endangered plants within the project site. The Office of Hawaiian Affairs noted that "*uluhe* is often used in lei-making, and given the abundant growth of *uluhe* in the project area, Native Hawaiian practitioners would not have to go far to pick adequate supplies." The *uluhe* fern is not unique to the subject site. It grows in abundance in the general area and many other parts of the island. Thus, while the site and surrounding area may have been used in the past for gathering of the *uluhe*, because

of its abundance the development of this site for the MKAEC or any other use would have little impact on the overall *uluhe* population. The MKAEC will also use native plants for its landscaping, and the *uluhe* fern could be incorporated into its landscaping program and subsequently made accessible to those with legitimate access claims.

Based on archaeological surveys conducted and input from the Hawai'i State Preservation Officer and other parties, the UHH has determined that no property that would meet the criteria for listing in the National or State Register of Historic Places lies within the area of the proposed project's effects. Consequently, there would be no adverse effect on such properties.

5.1.13 Scenic Resources and Design Considerations

The project site itself is not designated as a scenic resource on the County General Plan. Relative to its impacts to other identified resources (Mauna Kea, Mauna Loa, and Hilo Bay), one of the tentative design concepts heights noted in the Draft EA reflected the height of the structure to be 79 feet (24 m) tall. By itself, that height may be imposing.

However, the views of the identified resources would not be significantly impacted by this project. The existing vegetation along Komohana Street partially impairs the view of Hilo Bay. In addition, the elevation at Komohana Street is at least ten feet greater than the project site. Together, the impacts to Hilo Bay from Komohana Street would not be significantly compromised.

When viewed immediately from the project site to Mauna Kea and Mauna Loa, the views may be somewhat impaired. However, when viewed from existing uses at different parts along the UHH campus or from Hilo Bay, the views of Mauna Kea and Mauna Loa would not be affected at all, given the prominence of those mountains. Accordingly, this project would not result in creating significantly adverse visual impacts.

It should also be noted that any structure that exceeds the maximum height limit of 35 feet (10.7m) or 45 (13.7m) feet, depending on the zoning of the affected area, would require a height variance. During that process, there will be opportunities for public comments, and the visual impacts of the additional height would again have to be closely examined by the County of Hawai'i Planning Director before a decision is rendered.

It should be emphasized that the concept design in the Draft EA is one of the many tentative options available. Since publication of the Draft EA, the MKAEC Selection and Design Committee selected the team of Taisei Construction Corporation, Durrant Media Five and Oda/McCarty Architects, Ltd. for the design/build services. To assure the development of a visually sensitive yet functional design, the selected architectural/design firm has been instructed by the MKAEC project office to:

- Actively solicit and consider input from the surrounding community and public before submitting final design concepts to the MKAEC Selection and Review committee;
- Provide written evidence to the MKAEC project office that it has actively sought public input on the design; and
- Provide to the MKAEC project office copies of all comments received in writing and a written summary of oral comments received.

The MKAEC project office shall provide all public comments to the MKAEC Selection and Review Committee in a timely manner for its consideration during the final design selection process. It should be noted that as one of the funders of this project, NASA has strongly encouraged the MKAEC project office to seek a building design that is consistent with the functional needs of the facility, yet reduces the height of the building to the extent practicable. In addition, NASA has strongly encouraged the MKAEC project office to make visual and aesthetic compatibility with the surrounding environment a factor in making the final design selection. The MKAEC Selection and Review Committee will make the final design selection.

5.1.14 Solid Waste

A solid waste management plan will be prepared by UHH for this facility and shall conform to the rules and regulations of the County Department of Environmental Management. The plan will include many of UHH's existing conservation and recycling measures.

While the project will have a solid waste impact, its proposed and on-going practices would help mitigate the problem. Like the UHH, this facility will engage in recycling and composting. Recycling collection stations will be placed throughout the facility with collection services being provided by private contractors. Composting of green waste will also be utilized for the area's landscaping. As such, this project is not anticipated to create a significantly adverse solid waste impact.

5.1.15 Toxic Substances

There is no evidence or knowledge that the project site was used to store toxic waste or any chemicals. It has not been used for any urban type of uses and has been used for very low level agricultural use in the past. In addition, the proposed MKAEC will not use or produce any hazardous material. As such, there would be no adverse impact resulting from or affecting the subject project.

5.1.16 Health and Safety

There would be no adverse health and safety impacts resulting from this project. The project site is not located within any flight zones or aviation easements. It will not generate and/or use any toxic material or chemical.

5.2 Alternative 1: Construction of the MKAEC at other locations

This alternative would not be practical or cost effective. Infrastructure costs would potentially be much higher. All required infrastructure exists for the proposed site. Furthermore, the proposed site is consistent with the UHH Long Range Development Plan, while other sites would require a re-examination of all applicable land use plans.

5.3 Alternative 2: Reduction of Size and Scope of MKAEC

By not including a dome, the project could be scaled back in both size and function, with similar environmental impacts as the proposed action. However, if the height of the structure were reduced to 45 feet (13.7 m), it would compromise the function served by the dome. It may also require construction of a number of freestanding structures to accomplish the objectives of the Center. Having multiple structures could be more costly and would require a larger land area.

A reduction in the scope of the MKAEC could achieve potential construction savings. However, because programs and/or functions of the Center would have to be eliminated, it could also affect the interest and quality of the project. That, in turn, could adversely affect the level of public and professional interest in this project, and thus have potentially adverse socioeconomic effects.

5.4 Alternative 3: No Action

Under this alternative, the MKAEC would not be constructed. The site would be left in its present undeveloped state, surrounded with a number of astronomy-related offices and facilities and the UHH campus. There would be no short-term construction impacts or long-term impacts relative to traffic and other infrastructure.

At the same time, the educational, scientific, and cultural growth and expansion of the UHH, the UPST, and the community would be diminished. The economic impacts of such a facility both in terms of employment and expanded tax base would also be adversely affected. Relatedly, there would potentially be continued and expanded visitor traffic on the summit of Mauna Kea. Such an increase would compound the traffic hazard as well as the health and welfare of the visitors. This alternative would potentially have adverse socioeconomic and environmental impacts through loss of visitors and increased traffic to the summit of Mauna Kea.

6.0 Mitigation and Unavoidable Short- and Long-Term Adverse Impacts

In conjunction with the development of this project, certain mitigation work is required by UHH. These include:

- the active solicitation of public input by the architectural/design firm and the consideration of public comments on the proposed building design concepts by the architectural/design firm and the MKAEC Selection and Review Committee prior to finalization of the building design;
- the installation of a traffic signal light at the intersection of Komohana and Nowelo Streets to help mitigate potential traffic impacts;
- the installation of landscaping consistent with the County Planning Department Rule No. 17 (**Appendix F**) and NASA policies encouraging the use of native vegetation for landscaping and incorporating *uluhe* fern into its landscaping program and allowing its gathering to those Native Hawaiians with legitimate claims;
- adherence to appropriate State Department of Health noise and dust emission control standards and regulations during the construction phase of this project;
- the preparation and implementation of a Solid Waste Management Plan to mitigate impacts to the County's solid waste sites;
- the possible data recovery and/or physical preservation of inadvertent archaeological finds during the course of construction. This will include the preparation and approval of a data recovery and/or physical preservation plan, by the Department of Land & Natural Resources – Historic Preservation Division prior to its implementation.
- the installation of drywells and any other drainage system that may be required by the County of Hawai'i;
- the incorporation of the principles and concepts outlined in the LEED™ Green Building Rating System to achieve greater design economic and environmental efficiencies.

All of the other mitigation will take place during the normal permitting and construction process. These would include activities such as designing and constructing all structures to address appropriate seismic requirements; installing County-approved drainage systems, which may include drywells meeting with the approval of the State Department of Health through the issuance of the underground injection control permits to address groundwater concern; and installation of utility connections.

6.1 Unavoidable Adverse Short-Term Impacts

In spite of the mitigation work, there will be some unavoidable short-term adverse impacts. These, which are associated with the construction activity, include:

- a. some measure of traffic slow down and congestion along local streets;
- b. construction noise and dust; and
- c. some negligible construction dust runoff, including possible mud and dirt on Nowelo Street and North A`ohoku Place.

6.2 Unavoidable Adverse Long-Term Impacts

Although some of the long-term impacts can be mitigated, there will still be some adverse long-term impacts. These include:

- a. loss of open space and possible brief loss of view of Hilo Bay from Komohana Street;
- b. alteration of existing topography; and
- c. loss of some vegetation in the area of the proposed improvements.

7.0 List of Agencies and Individuals Contacted

7.1 Consulting Parties

The following public agencies were consulted in the process of preparing this environmental assessment:

Federal

- US Fish and Wildlife Service

State

- Department of Land and Natural Resources
 - Division of Historic Preservation
 - Division of Forestry and Wildlife
 - Division of Land
- Department of Transportation, Highways Division
- Office of Hawaiian Affairs
- Office of Environmental Quality Control
- Land Use Commission
- Department of Education – Hilo Area Complex
- Business, Economic Development & Tourism
- Department of Health – Environmental Services Division

County

- Planning Department
- Department of Public Works
- Department of Water Supply
- Department of Environmental Management
- Department of Research and Development
- Police Department
- Fire Department
- Department of Parks and Recreation
- Office of Housing and Community Development

A content advisory panel has also been formed by the UHH consisting of 24 members of the community.

7.2 Comments and Responses (Consultation Period)

During the consultation period, comments from various agencies were received. Their comments and responses thereto are found in **Appendix G**. The comments have been incorporated into this Draft EA.

7.3 Comments and Responses (Draft EA)

The Draft State EA was published in the July 8, 2002 OEQC Environmental Notice. As Federal funds are involved, a Draft Federal EA (which contained the substantively the same information as the Draft State EA) was prepared and a notice of its availability with a request for public comments was published in the island's two most widely circulated newspapers, the West Hawaii Today and the Hawaii Tribune Herald, on June 12, 2002. Copies of the Draft EA were made available at 8 public libraries in the County. Additionally, a copy was provided to thirty-two (32) government agencies and interested parties. A complete list of these agencies and parties as well as the comment and response letters are found in **Appendix H**.

Comments on either the Draft Federal EA or Draft State EA were received from nine (9) government agencies and a joint letter from two members of the public. These comments and responses thereto are found in Appendix H in their entirety. It should be noted that with one exception, all responses originated from NASA. The UHH concurred with and was provided a copy of all response letters.

Two agencies (County Departments of Fire and Parks and Recreation) had no comments or objections to the project, while the State Historic Preservation Officer noted that "no historic properties will be affected by this (MKAEC) undertaking." The County Police Department noted that the construction of traffic lights at the intersection of Nowelo Street and Komohana Street, as well as the use of the University campus road, would alleviate their traffic concerns.

The County Department of Research and Development recommended the use of concepts and principles of the LEED™ Green Building Rating System. As NASA has already adopted such a policy, the respective design consultants will be advised of this requirement, which would then assure greater economic and environmental efficiencies of the project. **(See Section 5.1.3 Infrastructure)**

The County Department of Water Supply recommended that the water use calculation be determined as soon as possible to facilitate the determination of the facilities charge. Once the design consultants have been selected, discussions with the Department of Water Supply will take place. **(See Section 5.1.3 Infrastructure)**

The Engineering Division of County Department of Public Works commented that the project should comply with appropriate building, drainage, grading/earthwork, road right-of-work, and streetlights/traffic control codes and requirements. The appropriate design and/or engineering consultants will be responsible for the preparation of the required plans and securing the appropriate permits. **(See Section 5.1.3 Infrastructure)**

The University of Hawai'i Institute for Astronomy commented that the project could relieve traffic congestion at the summit. **(See Section 2.4 Alternative 3: No Action)** It also noted that adequate on-site parking and turnaround areas should be provided to minimize traffic impacts along A`ohoku Place. Adequate parking and bus turnaround areas, meeting with the requirements of the County Zoning Code, will be provided on-site. **(See Section 4.4 Zoning)**

The State Office of Hawaiian Affairs (OHA) offered comments relating to "ceded" land, adequacy of the discussion on the project's cultural and archaeological impacts, absence of consultation, and the design of the project. The "ceded" land issue is a State issue, and UHH will be working with OHA on this matter. **(See Section 3.1.1 Location and Land Ownership)** The archaeological inventory survey concluded, as did the State Historic Preservation Officer, that the project would not have any adverse archaeological impacts. The cultural assessment also arrived at the same conclusion. **(See Section 5.1.12 Cultural and Archaeological Resources)** No comments were received from OHA during the "consultation" process. Finally, OHA expressed concerns about the concept design. The concept design in the Draft EA is one of the many tentative options available. The architectural firm selected will be advised to solicit public input on the proposed building design concepts. They will be required to take into consideration public comments before submitting final design concepts to the MKAEC Selection and Review Committee. **(See Section 2.5.1 Project Description; Section 3.11 Scenic Resources and Design Considerations; and Section 5.1.13 Scenic Resources and Design Considerations for a detailed description of the mitigations measures to be undertaken.)**

Finally, two public individuals jointly expressed some design issues. As noted earlier, the selected consultants will take those concerns into consideration. **(See Section 5.1.13 Scenic Resources and Design Considerations.)**

8. **Determination, Findings, and Reasons for Supporting Determination – Chapter 343, HRS and Rule 11-200-12, HAR**

The Department of Health's Administrative Rules (Title 11, Chapter 200) establish "Significance Criteria" to help the agency make a determination of whether a proposed action would have a significant environmental impact. This assessment is designed to consider the "significance" of potential environmental effects, which includes the overall and cumulative effects of the proposed action. The significance criteria and the project's relationship are discussed below.

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.*

The site upon which the proposed facility would be located does not have any significant natural resources. There would be no destruction or loss of any significant, endangered, or threatened botanical, faunal, geological, or other natural resources.

While there are some archaeological features on the property, none are located in the area of the proposed facility. The *Uluhe* fern is abundant in this general vicinity. It will be incorporated into the MKAEC's landscaping program and made accessible to Native Hawaiians with legitimate gathering claims.

2. *Curtails the range of beneficial uses of the environment.*

The requested use would not interfere with any of the existing surrounding uses. The proposed MKAEC is consistent and compatible with the on-going research and scientific activities at the University Park.

Its noise and vehicular impacts will be accommodated through appropriate mitigative measures. Any associated drainage and wastewater requirements will be handled in a manner meeting with the requirements of the appropriate government agencies. Thus, environmental options for the surrounding area should still exist in spite of the proposed facility.

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

The EA addressed probable environmental impacts of the proposed action and demonstrated that the impacts would not be significant. All potential adverse impacts are mitigatable. All required improvements – wastewater, traffic, and drainage- will

be done in accordance with the requirements of the State and/or County. Any impacts on other public infrastructure would not be significantly adverse.

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

During the construction phase, the project will generate construction jobs for more than a year. When completed, the project is expected to inject over \$10 million annually to the island's economy. There will be more than 15 full time and 5 part time jobs created. These jobs and funds will mean a lot to the Big Island, which is hovering at the double-digit unemployment figure.

As the archaeological and botanical reports noted, there are no historic trails within the subject site. Neither is there any recent evidence of gathering of plants by Native Hawaiians for customary or traditional purposes on the site. Nonetheless, the Office of Hawaiian Affairs has pointed out that this general area has at times being used to harvest the *uluhe* fern. As such, the MKAEC has elected to incorporate the *uluhe* fern into its landscaping program and make the fern accessible to those Native Hawaiians with legitimate gathering claims. As such, there would be no significantly adverse impacts to the cultural practices of the community or the State.

5. *Substantially affects public health.*

As the project will not have an adverse impact on the environment, its impacts to public health should equally not be adverse. All improvements relating to public health – such as wastewater and drainage system – will be pursuant to County requirements. The wastewater for example will be disposed of into the County's system. Air emission and noise controls during the construction period will be implemented pursuant to the State Department of Health air quality and noise control regulations.

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

The proposed MKAEC is consistent with the UHH's plans for the Park and surrounding area as outlined in its Long-Range Development Plan. The development of this Park, which would include uses such as the MKAEC were considered and addressed in the Final EIS for the construction of the Park's required infrastructure in 1997.

7. *Involves a substantial degradation of environmental quality.*

The development of the MKAEC would not result in a substantial degradation to the area's environmental quality. The assessment noted that while there will be changes to the physical landscape of the area, there will also be mitigation measures taken, including the replanting of native vegetation. All of the required infrastructure exists and where they do not, will be constructed by the UHH or MKAEC.

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

The probable impacts of the MKAEC have been discussed in this document, which did take into account the existing and planned facilities in this area. This assessment included the cumulative impacts of the traffic and other infrastructure.

This project is a stand-alone project. It is not reliant on any other facilities being built within or outside of the University Park.

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

As noted in this report, the biological and faunal resources of this area would not be threatened. No rare, threatened, or endangered plant or animal life was found on the subject site or purported to be vulnerable to the proposed action.

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

The project would not affect air, water quality, or ambient noise levels. There will be impacts particularly during the short-term construction phase, impacts that will be mitigated. From a long-term perspective, there will be no such significantly adverse impacts. The project itself is not a pollutant activity; all wastewater will be disposed of into the County system; and much of the activity will be conducted indoors.

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

The subject site is situated more than 2 miles from the shoreline. As such, the usual issues of tsunami or beach erosion are absent. There are no wetlands on the site, and the site is designated zone "X", areas outside of the 500-year floodplain, on the FIRM map. As such, the project should not have adverse impacts to any environmentally sensitive area.

12. *Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.*

As noted in this report, there should be no visual impacts to Mauna Kea and Mauna Loa. There may be some impact to Hilo Bay. This impact, however, should not be significant, as the site is somewhat lower than Komohana Street and the stand of vegetation along the Street already interferes with any views of the Bay. Furthermore, there are other areas along Komohana Street where the views are more commanding.

The selected architectural/design consultants will be required to solicit public input prior to finalizing and submitting their design alternatives to the MKAEC Selection and Review Committee for determination.

13. *Requires substantial energy consumption.*

The project will increase energy consumption. The increase, however, is not expected to significantly exceed the requirements of other facilities in the area. The facility will also be designed to be energy efficient in terms of lighting and air circulation. It will also follow the principles and concepts of the LEED™ Green Building Rating System. This energy-efficient design emphasis will help reduce what would otherwise have been a more substantial energy consuming facility.

Based on the analysis performed through the Environmental Assessment process, the Accepting Authority (University of Hawai'i at Hilo) has determined that a Finding of No Significant Impact (FONSI) for this project is warranted and has so issued such a finding.

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