Draft Environmental Impact Statement

PROPOSED PU`UNANI SUBDIVISION

TMKs (2)3-5-002:002 and 003

Prepared for:

Towne Development of Hawaii, Inc.
Endurance Investors, LLC
Association of II Wai Hui, LP

Accepting Authority:

State of Hawai`i,
Land Use Commission

January 2009

MUNEKIYO HIRAGA, INC.

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This document was prepared under my supervision and the information submitted, to the best of my knowledge, fully addresses document content requirements as set forth in sections 11-200-17 and 11-200-18 of the Hawai`i Administrative Rules, as appropriate.

Michael T. Munekiyo, A. I. C. P.
Project Manager

MUNEKIYO HIRAGA, INC.

CONTENTS

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LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Preface

Towne Development of Hawaii, Inc., Endurance Investors, LLC, and the Association of Il Wai Hui, LP propose to develop a subdivision, consisting of approximately 133 rural residential lots, 145 single-family residential lots, and 476 multi-family units on approximately 208 acres of land, in Wailuku, Maui. The project will require land use amendments, including a State District Boundary Amendment, County Community Plan Amendment, and County Change in Zoning. It will also involve an improvement of a government road (Old Waikapu Road) to allow for access to the subdivision. Accordingly, this Environmental Impact Statement document has been prepared, in accordance with the provisions of Chapter 343, Hawai`i Revised Statutes.

Executive Summary

Project Name:	Proposed Pu`unani Subdivision
Type of Document:	Draft Environmental Impact Statement
Legal Authority:	Chapter 343, Hawai`i Revised Statutes
Agency Determination:	Environmental Impact Statement to be Prepared
Applicable Environmental Assessment review "trigger":	Use of State land Use of County land Proposed Amendment to Wailuku-Kahului Community Plan
Location:	TMK (2) 3-5-002:002 and 003 Wailuku Island of Maui
Landowners/Applicants:	Towne Development of Hawaii, Inc. Endurance Investors, LLC Association of II Wai Hui, LP
Accepting Authority:	State Land Use Commission P. O. Box 2359 Honolulu, Hawai`i 96804 Contact: Orlando "Dan" Davidson, Executive Officer Phone: (808) 587-3822
EIS Preparer:	Munekiyo & Hiraga, Inc. (Under contract to Towne Development of Hawaii, Inc., Endurance Investors, LLC, and Association of II Wai Hui, LP) 305 High Street, Suite 104 Wailuku, Hawai`i 96793 Contact: Colleen Suyama Phone: (808) 244-2015

Project Summary

PROJECT DESCRIPTION:

The applicants propose to develop a residential subdivision on approximately 208 acres of land in Wailuku, Maui, Hawai`i. The majority of the subdivision will consist of approximately 127 half-acre, rural lots to be sold in fee simple. The conceptual land plan also provides for approximately six (6) one-acre rural lots, 145 single-family residential lots, 476 multi-family units (which includes affordable units, a portion of which shall be for senior and veteran housing), a 11.5-acre park, an approximately 9.6-acre stormwater retention area, setbacks along Kuikahi Drive and Honoapi`ilani Highway, and a 30-foot no-build zone at the southern border of the project area. Related improvements include site grading, subdivision roadway and utilities installation, the provision of vehicular access points from Kuikahi Drive and Honoapi`ilani Highway, and the development of an onsite water source and related infrastructure.

In order to implement the project, the following approvals and permits are anticipated: State Land Use District Boundary Amendment, Community Plan Amendment, Change in Zoning, Subdivision approval, and construction permits.

SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS:

The project is anticipated to provide a supply of much needed new housing for Maui's residents, including special needs housing. Necessary infrastructure systems and services can be reasonably provided to serve the project. In addition, the project is anticipated to have a beneficial impact on the local economy both during construction and in the long term. Real property taxes generated by the project will contribute to the County's revenue tax base to support increases in regional public service demands over time.

Infrastructure improvements include development of a new water source, storage, and transmission. The applicants are committed to constructing a new well to replace the outdated Shaft 33 and disperse the County wells as recommended by the Commission on Water Resource Management. Of the new water source, the applicants will be allocated 25 percent of the water with the remaining 75 percent allocated to the County of Maui to supply water to Wailuku Town.

From an infrastructure use perspective, project implementation will result in impacts to existing

hydrology (drainage), largely due to the increase in imperious surface area, and other related to wastewater, water, park, school, and roadway usage.

PROPOSED MITIGATION MEASURES:

Impacts resulting from infrastructure and public service use will be mitigated either through the provision of additional resources onsite and offsite (drainage, water, and parks) or through the payment of fair-share contributions (wastewater, school, and traffic). Additionally, in the long-term, real property taxes generated by the project will help to offset costs of increased regional public service demands.

ALTERNATIVES CONSIDERED:

The applicants have evaluated the no action alternative, alternative densities at the site, and alternative site locations. However, these options will not address the pervasive need for the timely provision of affordable housing in this area, especially the proposed special needs housing for seniors and veterans. Alternative site layouts were considered in consultation with the surrounding communities of Waikapu-Waiolani, Wailuku Heights, and Kehalani in order to minimize impacts on these existing communities. The proposed master plan is a reflection of these community meetings and the input of the surrounding residents, as well as the desire of the applicants, to provide a mix of housing types based on market preferences and County requirements.

UNRESOLVED ISSUES:

The applicants will participate in the funding and construction of adequate drinking water source, storage, and transmission facilities and improvements to accommodate water use generated by the project. The applicants are coordinating with the Department of Water Supply (DWS) in the development of a potential onsite water source at the 660 ft. elevation. To meet the water storage needs of the project, the applicants propose the development of a 1.0 million gallon (MG) water tank at the 607 ft. elevation of the project site. All water system improvements will be developed in accordance with a letter of intent with the County of Maui and with the cooperation of the DWS. Regarding potential non-drinking water supply, the applicants will examine other opportunities to obtain non-potable water for irrigation, as well as fire protection.

Additionally, the applicants remain in discussions with various governmental agencies regarding assessment fees for infrastructure and public services, including fair-share educational contribution,

park and playground assessment fees, traffic impact fees, and participation in Central Maui wastewater system improvements. While not specifically determined at this time, these matters will be resolved as the project progresses through the entitlement process and prior to development.

Similarly, while affordable housing requirements are set forth in the Maui Residential Workforce Housing Policy, the applicants will coordinate with the Department of Housing and Human Concerns regarding the formulation and execution of an affordable housing agreement prior to development of the project.

LAND USE COMPATIBILITY:

The proposed project will require several land use entitlement approvals to proceed. A summary of the current land use parameters and the entitlement designations being sought for land use consistency with residential use is presented in **Table S-1**.

Table S-1. Land Use Parameters and Entitlement Designations

Land Use Parameter	Existing Designation	Proposed Designation
State Land Use District	Agricultural (208 acres)	Rural (93.9 acres)
		Urban (114.2 acres)
Wailuku-Kahului Community Plan	Agriculture (183 acres) Single-Family (25 acres)	Multi-Family (46.3 acres)
		Single-Family (46.8 acres)
		Rural (93.9 acres)
		Park (11.5 acres)
		Open Space (9.6 acres)
County Zoning	Agricultural (208 acres)	A-1, Apartment (46.3 acres)
		RU-1, Rural (7.1 acres) RU-0.5, Rural (86.8 acres)
		R-1, Residential (13.4 acres) R-2, Residential (12.6 acres) R-3, Residential (20.8 acres)
		PK-1, Park (11.5 acres)
		OS-2, Open Space (9.6 acres)

LIST OF PERMITS AND APPROVALS:

A summary of the required permits and approvals and an estimated time schedule for application and approval for project implementation is presented in **Table S-2**.

Table S-2. Preliminary Permit/Approval Schedule

Permit or Approval	Anticipated Submission Date	Anticipated Approval Date
District Boundary Amendment	2006	2009
Community Plan Amendment	2009	2011
Change in Zoning	2009	2011
Subdivision Approval	2011	2012
NPDES Permits, as applicable	2011	2011
Construction Permits	2012-2022	2012-2022

LIST OF DOCUMENT AUTHORS

Document Name	Author
Archaeological Inventory Survey Report:	Scientific Consultant Services, Inc.
Biological Resources Survey:	Robert W. Hobdy
Cultural Impact Assessment:	Kalei Tsuha
Environmental Impact Statement:	Munekiyo & Hiraga, Inc.
Market Study and Economic Impact Analysis:	ACM Consultants, Inc.
Preliminary Engineering Report:	Warren S. Unemori Engineering, Inc.
Preliminary Drainage Report:	Warren S. Unemori Engineering, Inc.
Traffic Impact Analysis Report:	Phillip Rowell and Associates, Inc.
Environmental Site Assessment Phase I Investigation:	Vuich Environmental Consultants, Inc. Malama Environmental (MEV, LLC)
Agricultural Impact Assessment:	Bruce Plasch Decision Analysts Hawai`i, Inc.

LIST OF ACRONYMS

ADWF	Average Dry Weather Flow
ALISH	Agricultural Lands of Importance to the State of Hawai`i
AMSL	Above Mean Sea Level
ASTM	American Society of Testing and Materials
BMP	Best Management Practices
CFS	Cubic Feet Per Second
CIZ	Change in Zoning
CML	Central Maui Landfill
CPA	Community Plan Amendment
CWRM	Commission on Water Resource Management
DBA	District Boundary Amendment
DLNR	State Department of Land and Natural Resources
DOE	State Department of Education
DOH	State Department of Health
DOT	State Department of Transportation
DPW	County Department of Public Works
DWS	County Department of Water Supply
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HAR	Hawai`i Administrative Rules
HC&S	Hawaiian Commercial & Sugar Company
HCZMP	Hawai`i Coastal Zone Management Program
HLS	High-Level Service Area
HRS	Hawai`i Revised Statutes
HSA	Hawai`i Stream Assessment
HUD	United States Housing and Urban Development
IbB	Iao Cobbly Silty Clay (3 to 7 percent slopes)
IbC	Iao Cobbly Silty Clay (7 to 15 percent slopes)
IcB	Iao Clay (3 to 7 percent slopes)
IcC	Iao Clay (7 to 15 percent slopes)
LLS	Low-Level Service Area
LOS	Level of Service

LSB	Land Study Bureau
MCC	Maui County Code
MECO	Maui Electric Company
MG	Million Gallon
MGD	Million Gallons Per Day
MLS	Mid-Level Service Area
MRWHP	Maui Residential Workforce Housing Policy
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OHA	Office of Hawaiian Affairs
SHPD	State Historic Preservation Division
SLUC	State Land Use Commission
SMA	Special Management Area
TIAR	Traffic Impact Analysis Report
TMK	Tax Map Key
USF&WLS	United States Fish and Wildlife Service
WWPS	Wastewater Pump Station
WWRD	County Department of Environmental Management, Wastewater Reclamation Division
WWRF	Wastewater Reclamation Facility

I. PROJECT OVERVIEW

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP

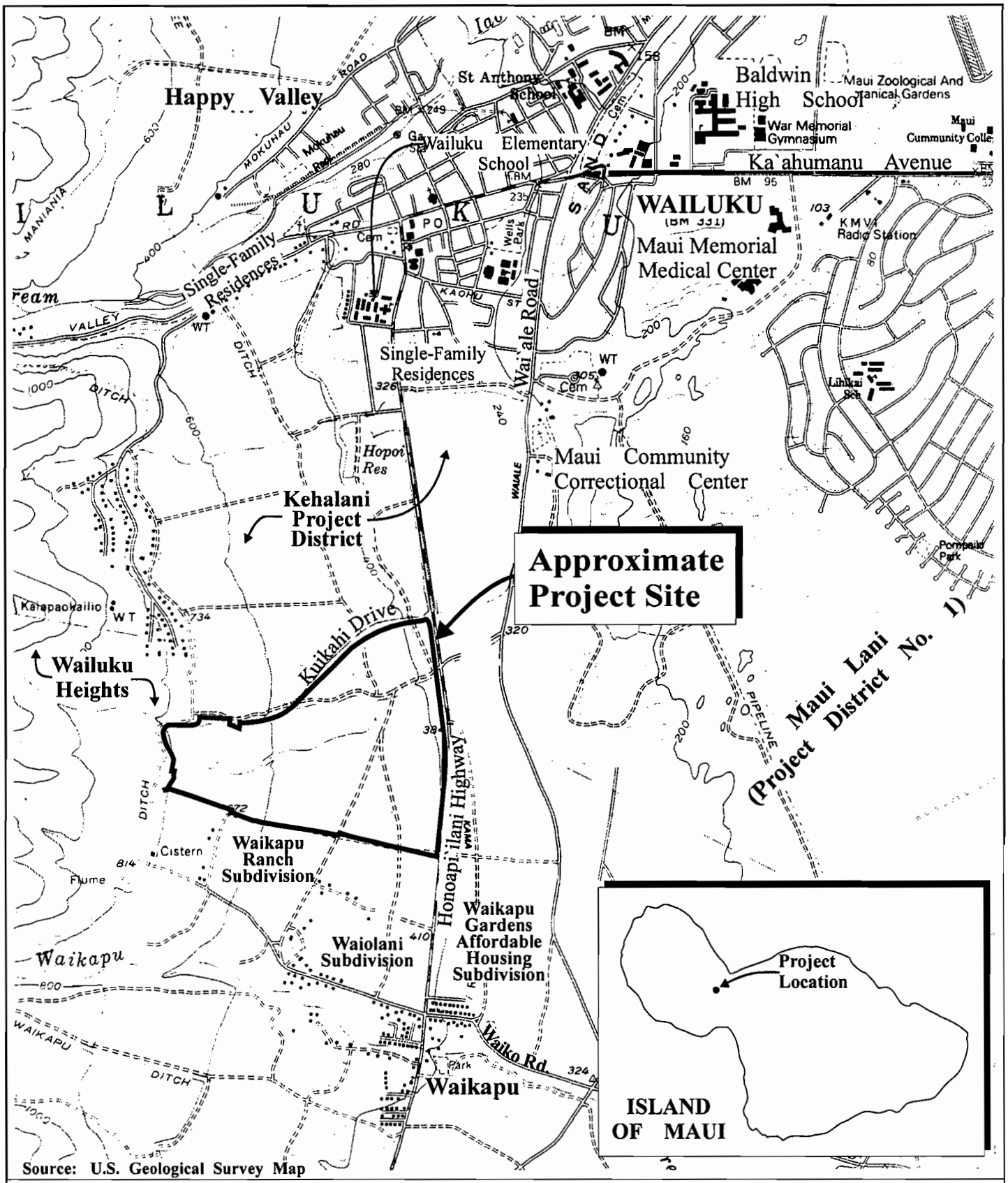
Towne Development of Hawaii, Inc., Endurance Investors, LLC, and the Association of II Wai Hui, LP ("applicants") are proposing the development of a subdivision, including construction of single-family and multi-family units, and related improvements in Wailuku on approximately 208 acres of land, identified as Tax Map Key (2) 3-5-002:002 ("Parcel 2") and (2) 3-5-002:003 ("Parcel 3"). The proposed subdivision will be located east of the Wailuku Heights subdivision. Honoapi`ilani Highway borders the property to the east, while Kuikahi Drive borders the property to the north. The Waiolani Mauka and Waikapu Ranch, Inc. subdivisions are located due south of the project site. See **Figure 1**, **Figure 2**, and **Figure 3**.

Current access to the property is provided off of Kuikahi Drive and Honoapi`ilani Highway. The project site is vacant and has lain fallow after years of pineapple and sugar cane cultivation. Parcels 2 and 3 have been overrun by weeds, primarily consisting of Guinea grass, koa haole, spiny amaranth, hairy horseweed, telegraph plant, *hairy abutilon*, and a few scattered small trees of Macaranga tanarius (no common name).

Parcel 2 is owned in fee simple by the Association of II Wai Hui, LP and Endurance Investors, LLC. Parcel 3 is currently owned in fee simple by Wailuku Kuikahi, LLC. Towne Development of Hawaii, Inc. has an option agreement to purchase the property from Wailuku Kuikahi, LLC.

B. PROPOSED ACTION

The proposed project involves the development of approximately 127 rural half-acre lots, approximately six (6) rural one-acre lots, 145 single-family residential lots, and 476 multi-family units that include affordable housing units, a portion of which shall be senior and veteran housing. See **Figure 4**. Also planned are a 11.5-acre park, a 9.6-acre stormwater retention area, open space buffers 25 feet wide along Honoapi`ilani Highway, a 50-foot wide buffer along Kuikahi Drive, a 50-foot wide rear yard setback for the one-acre lots, and a 30-



Source: U.S. Geological Survey Map

Figure 1 Proposed Pu`unani Subdivision

Regional Location Map

0 500 1000 2000 Feet

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

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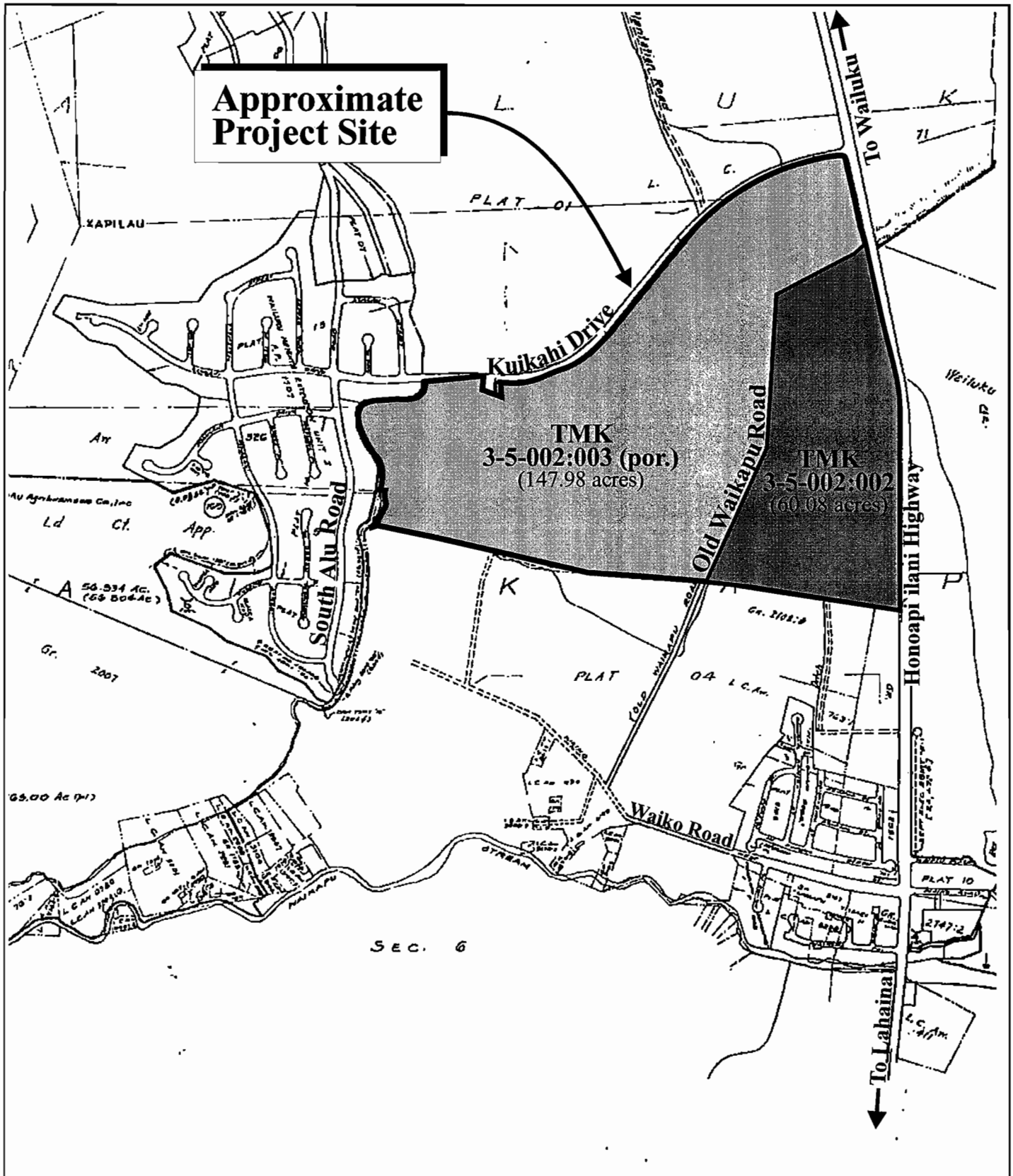

Source: State of Hawai`i, Realty Atlas, 2005

Figure 2 Proposed Pu`unani Subdivision

Tax Parcel Map

500 0 Feet 250 1000

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

Towne\Wlksubd\DEIS\TaxParcel

Source: Endurance Investors, LLC/Association of II Wai Hui, LP

Figure 3

Proposed Pu`unani Subdivision

Aerial Photograph of Property

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

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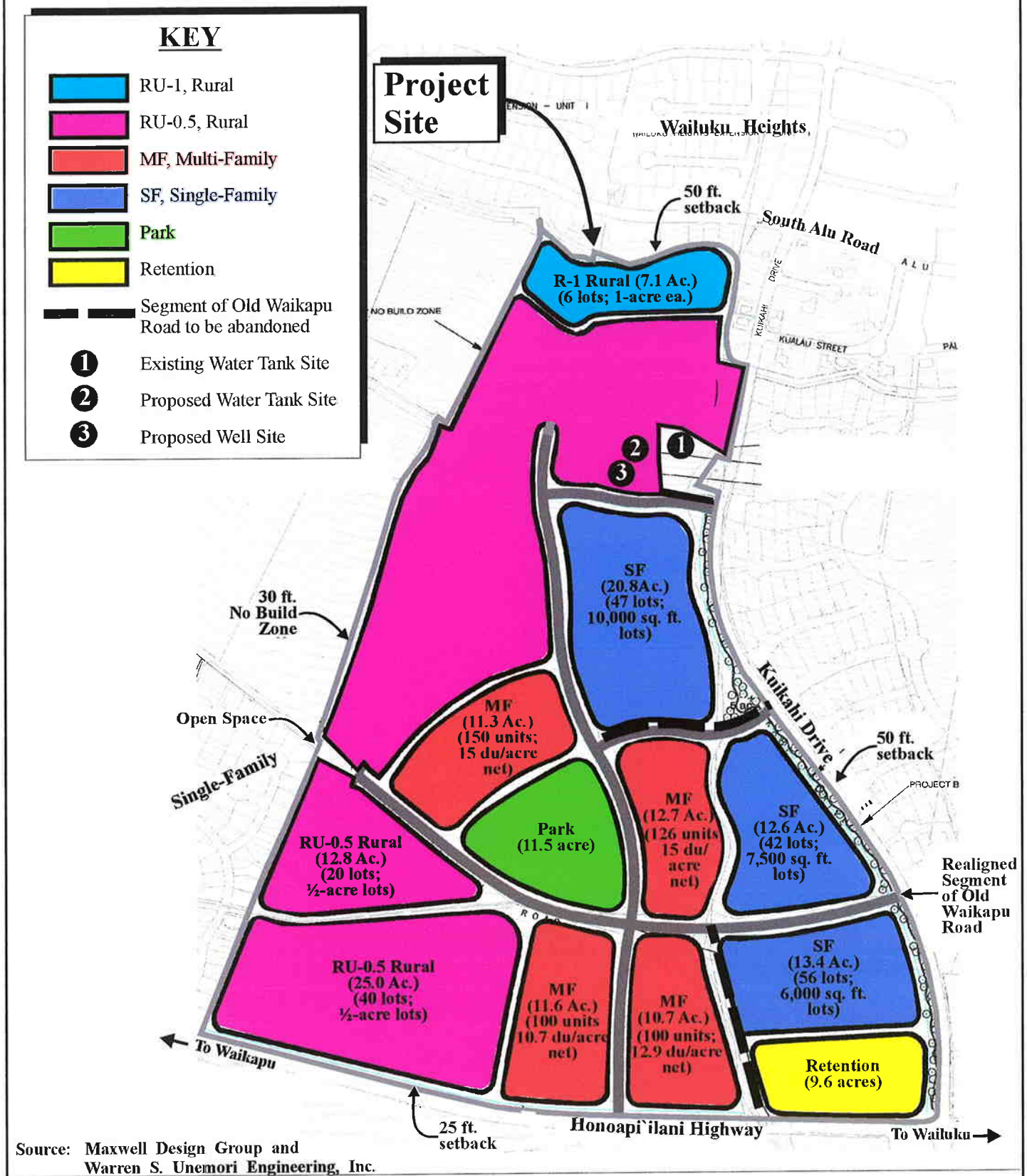

Source: Maxwell Design Group and Warren S. Unemori Engineering, Inc.

Figure 4 Proposed Pu`unani Subdivision

Conceptual Land Use Map

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foot wide no-build zone along the southern border of the project area. See **Table 3**.

Table 3. Preliminary Land Use Spatial Allocations

Land Use Category	Acreage	Unit Count
Rural, one acre lots	7.1	6
Rural, half-acre lots	86.8	127
Urban, single-family units (10,000 square foot lots)	20.8	47
Urban, single-family units (7,500 square foot lots)	12.6	42
Urban, single-family units (6,000 square foot lots)	13.4	56
Residential, multi-family units	46.3	476
Park Area	11.5	N/A
Retention Area	9.6	N/A
Total	**208.1**	**754**

Development of the proposed subdivision will include infrastructure improvements, such as construction of internal roadways and underground utility systems. Onsite improvements include a new domestic water storage tank and a groundwater well next to the existing water tank in the northwest portion of Parcel 3. Site grading work will include the creation of an approximately 9.6-acre stormwater retention basin at the northeast corner of the property, along Honoapi`ilani Highway, and a 11.5-acre park off of Old Waikapu Road.

Old Waikapu Road, formerly used for cane haul operations, will be improved to County standards to serve as a project collector road. The road currently separates Parcels 2 and 3 and extends northward from Waikapu through three-quarters of the project area before veering east and terminating at Honoapi`ilani Highway. The east-west segment of Old Waikapu Road is proposed to be realigned along a north-south axis and extended to connect to Kuikahi Drive. Refer to **Figure 4**.

The applicants are also proposing a project collector road that would extend west to east, midway through the project area, culminating in right-turn in, right-turn out access off Honoapi`ilani Highway. This right-turn in, right-turn out connection to Honoapi`ilani Highway represents a relocation of the existing permitted access attributed to Old Waikapu Road. Refer to **Figure 4**. Coordination with the State of Hawai`i, Department of Transportation, Highways Division is ongoing and a formal request for access relocation off of Honoapi`ilani Highway will be submitted.

The proposed project will provide needed housing in close proximity to existing urban development and infrastructure. The applicants will coordinate with the County of Maui, Department of Housing and Human Concerns to develop an appropriate affordable housing program pursuant to the provisions of the Maui Residential Workforce Housing Policy (MRWHP). As provided under the MRWHP, the sales prices for affordable units will be established at the time of development, and based on Maui's median family income at that time. Sales prices for the market single-family residential lots and homes will be determined by market demand. Information regarding the proposed affordable housing program for the project is provided in Section "D" of this chapter. For a detailed discussion of the housing market, including pricing of affordable units pursuant to the MRWHP. See **Appendix "A"**.

The estimated cost of onsite/offsite infrastructure and site work is approximately $59 million (2008 dollars) (estimate provided by Warren S. Unemori Engineering, Inc.). Building construction cost is estimated at approximately $125.4 million (2008 dollars).

C. PROJECT NEED

The proposed project will increase the supply of available housing for Maui residents and help alleviate the current imbalance between the supply and demand for residential real estate. Over the past five (5) years, the demand for housing on Maui has intensified due to steady population growth, high employment, and historically low interest rates. The strong demand for housing, coupled with limited supply, has led to rising housing prices. The Hawai`i Housing Policy Study Update of 2003, estimated a deficit of approximately 3,755 needed resident housing units as of 2005. This deficit was projected to further increase by approximately 10 percent to approximately 4,156 units by 2024. The long-term projection of housing conditions in Central Maui indicates that the increase in households over the next five (5) years will outnumber the existing supply of new homes.

The project will provide resident housing opportunities in both the near and long term. A range of housing types will serve to meet the varied housing needs of the region in a desired and central location in Central Maui. The project includes 754 residential units intended to provide a range of housing opportunities and choices to meet a broad range of housing segments which include affordable rentals, affordable housing for the local population, senior and veteran housing, and market housing. These product choices are intended to provide for a more balanced housing market. In light of the current and projected housing market conditions, the proposed Pu`unani Subdivision project will provide a significant community

benefit by offering residents new opportunities to secure affordable and market-priced housing products. Refer to **Appendix "A"**.

Since the preparation of the Market Study and Economic Impact Analysis in 2006, the global financial market in 2008 experienced setbacks that will, over the next several years, ultimately affect the housing market on Maui. Government's and the global financial market's response to the current financial crisis and the future stabilization of the market will determine the future impacts on housing. Notwithstanding the current economic slowdown, significant increase in housing supply will be needed to accommodate the region's anticipated growth.

D. AFFORDABLE HOUSING PROGRAM

The applicants propose to provide affordable housing for the Pu`unani Subdivision in accordance with the Maui Residential Workforce Housing Policy (MRWHP), Maui County Code Chapter 2.96. According to the MRWHP,

> *When more than fifty percent of the dwelling units and/or new lots in the development are offered for sale for $600,000 or more, fifty per cent of the total number of units and/or lots shall be sold or rented to residents within the income-qualified groups established by this ordinance.*
>
> *Unless an exemption is granted by the director, the percentage of* ***ownership*** *units within each income group shall be as follows:*
>
> 1. *One-third of the* ***rental*** *units shall be for "very low income" and "low income" residents;*
>
> 2. *One-third of the* ***rental*** *units shall be for "below-moderate income" residents; and*
>
> 3. *One-third of the* ***rental*** *units shall be for "moderate income" residents.*
>
> (Emphasis added)

The proposed action will comply with the MRWHP and any future amendments thereto. Based on current ordinance provisions, of the total 754 units (6 one-acre lots, 127 half-acre lots, 145 residential lots, and 476 multi-family units), 50 percent, or 377 units, for rent or

sale, would be allotted for affordable income qualified families. Of the affordable units, approximately 200 units will be dedicated to seniors and veterans. This 50 percent affordable allocation is preliminarily based on the assumption that the market limits will exceed the threshold for market unit pricing which would otherwise yield a 40 percent affordable requirement. As an example of affordability guidelines to be utilized, a preliminary affordable price allocation for units to be set aside for rental purposes are set forth in **Table 4**.

Table 4. Preliminary Rental Program Parameters for Pu`unani Subdivision

Income Group	Income Range	Multi-Family Units	
	% of Median Income	*Rental Price Range	
Very Low Income and Low Income	<50 to 80	$410.00	$1,514.00
Below-Moderate Income	80 to 100	$1,092.00	$1,893.00
Moderate Income	100 to 120	$1,638.00	$2,271.00
* Based on 2008 Affordable Rent Guidelines prepared by the County of Maui, Department of Housing and Human Concerns.			

The specific number of affordable units and their respective rental and sales prices will be established at the time of development, and based on Maui's median family income at that time.

E. ENTITLEMENTS REQUIRED

The proposed subdivision will require a number of land use entitlements for project implementation. A summary of the current land use designations and entitlements being sought as part of the proposed project is provided below.

1. State Land Use District Boundary Amendment

A petition for District Boundary Amendment was filed with the State Land Use Commission. The current State Land Use designation for the entirety of the project site is "Agricultural". See **Figure 5**. Approximately 114.2 acres are proposed for reclassification to the State Land Use "Urban" district. The remaining 93.9 acres are proposed for reclassification to the "Rural" district. **Figure 6** depicts graphically the

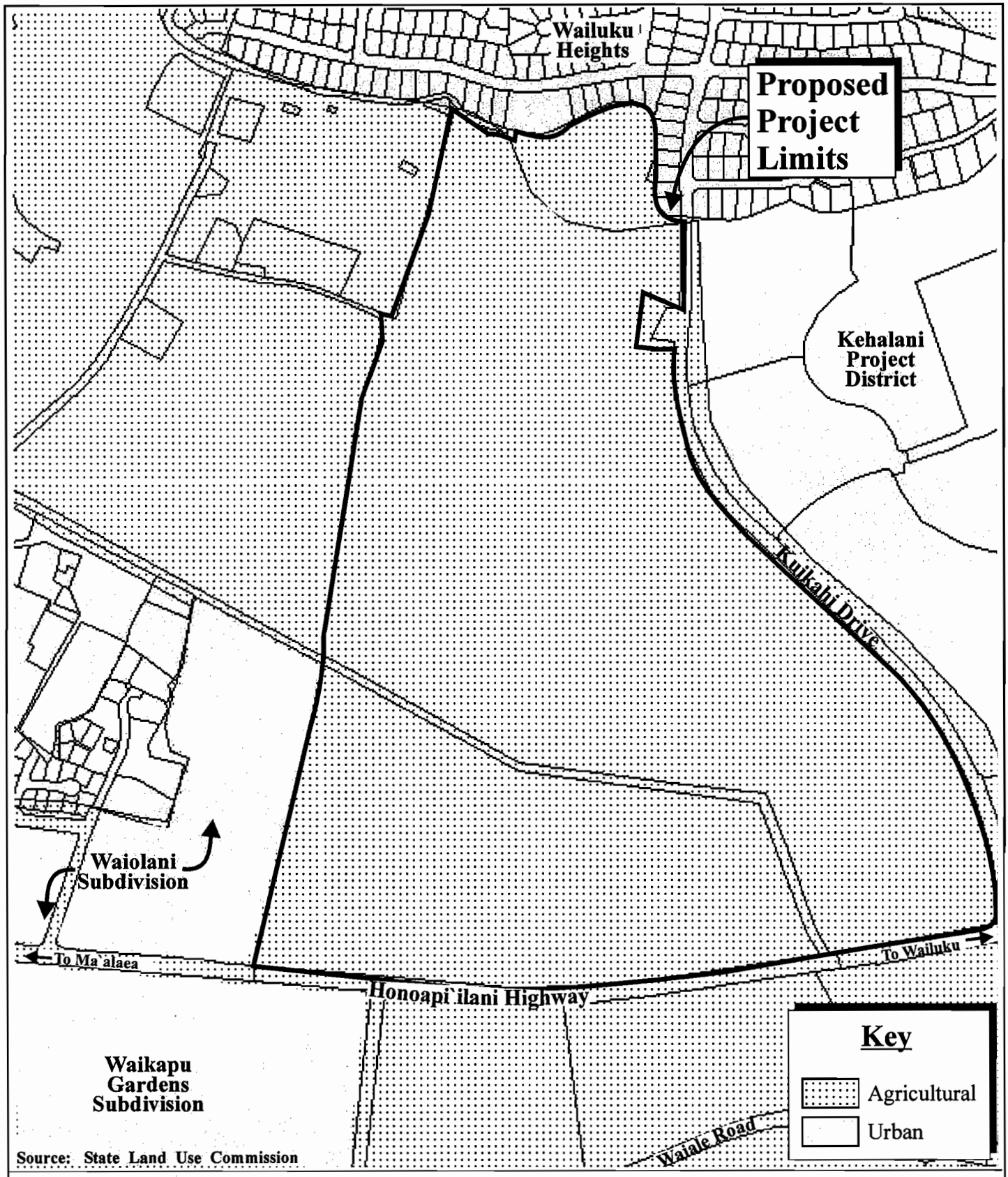

Figure 5 Proposed Pu`unani Subdivision
Existing State Land Use Classifications

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

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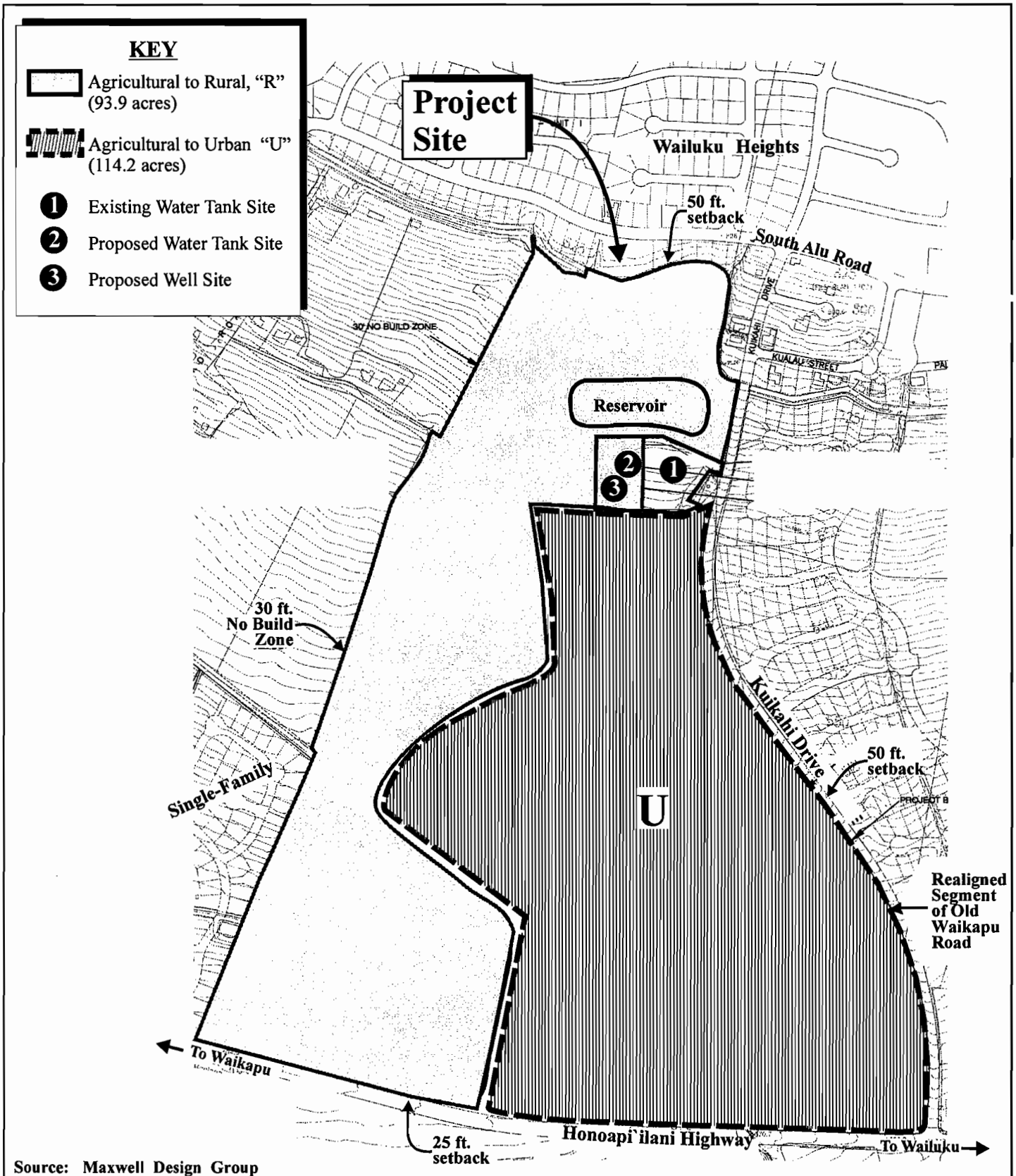

Source: Maxwell Design Group

Figure 6 Proposed Pu`unani Subdivision

Proposed State Land Use Designation

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Towne\Wlksubd\DEIS\SLUD

areas proposed for reclassification.

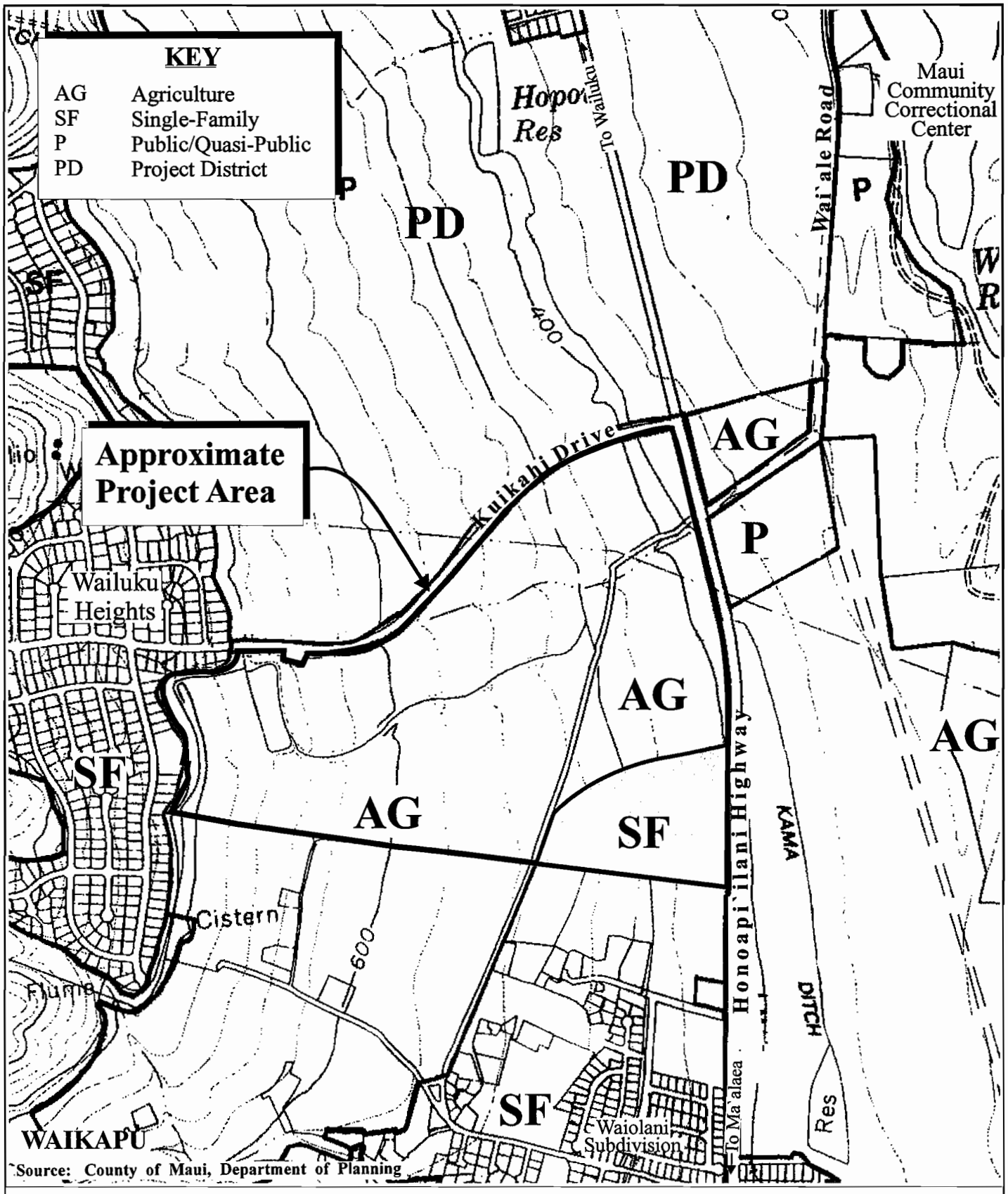
The area proposed for reclassification to the rural district includes an existing agricultural reservoir. Wailuku Agribusiness will continue to operate and maintain the reservoir after reclassification of the underlying property from "Agricultural" district to "Rural" district. Irrigation water from this upper reservoir which is conveyed by an open ditch to Waihee Ditch will be conveyed through a new dropped ditch to Waihee Ditch. A smaller lower reservoir which is no longer in use will be abandoned.

2. Community Plan Amendment

Additionally, a Community Plan Amendment (CPA) application, reflecting the proposed land use changes, will be filed for review, processing, and final action by the Maui County Council. The Community Plan designation for approximately 183 acres of the project area is "Agriculture". The Wailuku-Kahului Community Plan currently designates an approximately 25-acre area at the southeastern extent of the property as "Single-Family". See **Figure 7**. The areas proposed for redesignation are shown in **Figure 8**. The preliminary acreage breakdown for proposed Community Plan land use designations is summarized in **Table 5**.

Table 5. Community Plan Amendment Acreages

Proposed Designation	Acreage
Rural	93.9
Single-Family	46.8
Multi-Family	46.3
Park	11.5
Open Space	9.6
TOTAL	**208.1**



Source: County of Maui, Department of Planning

Figure 7 Proposed Pu`unani Subdivision

Existing Wailuku-Kahului Community Plan Designation

0 500 Feet
250 1000

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

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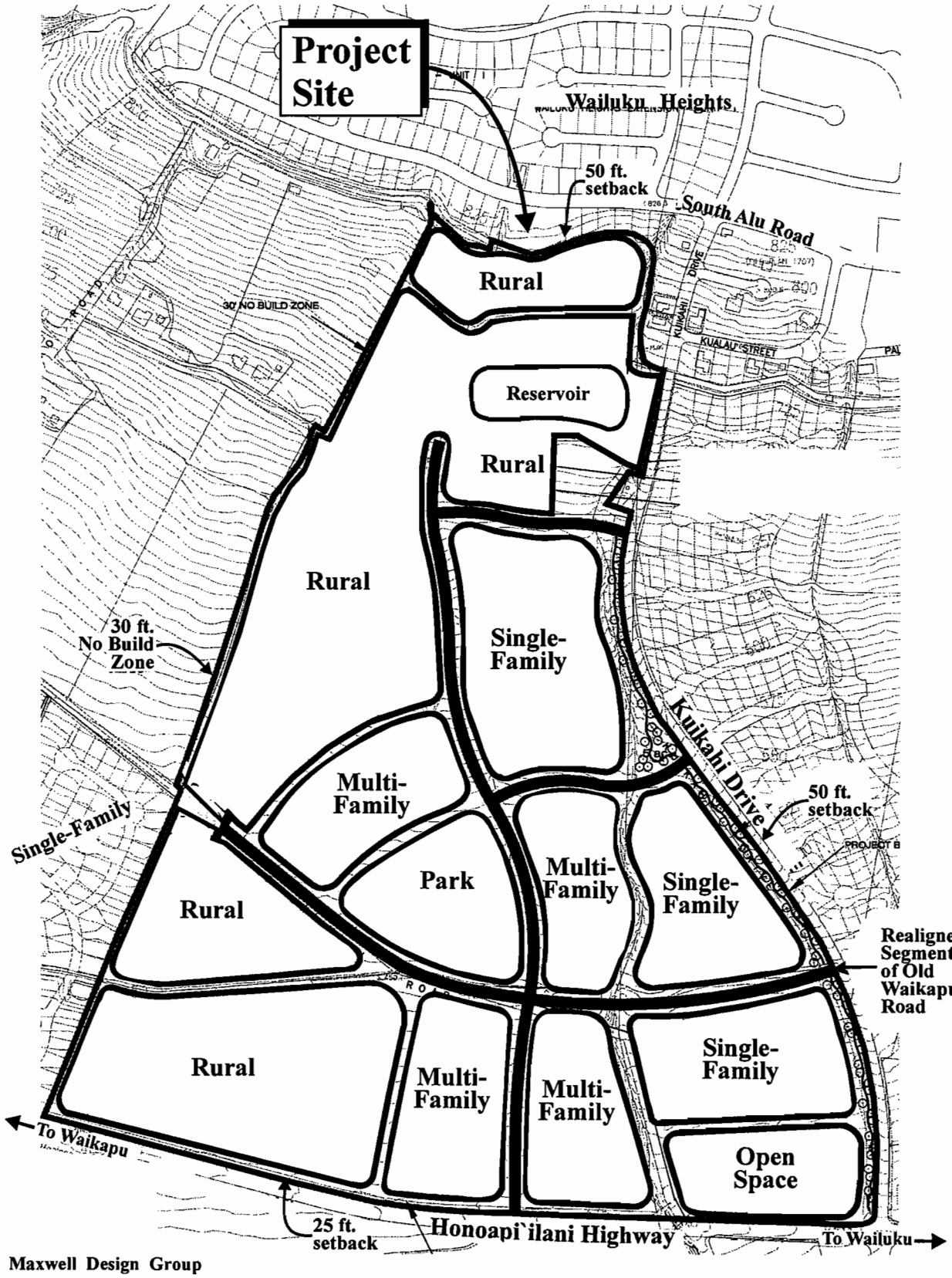

Source: Maxwell Design Group

Figure 8 Proposed Pu`unani Subdivision

Proposed Community Plan Map Amendment

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Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

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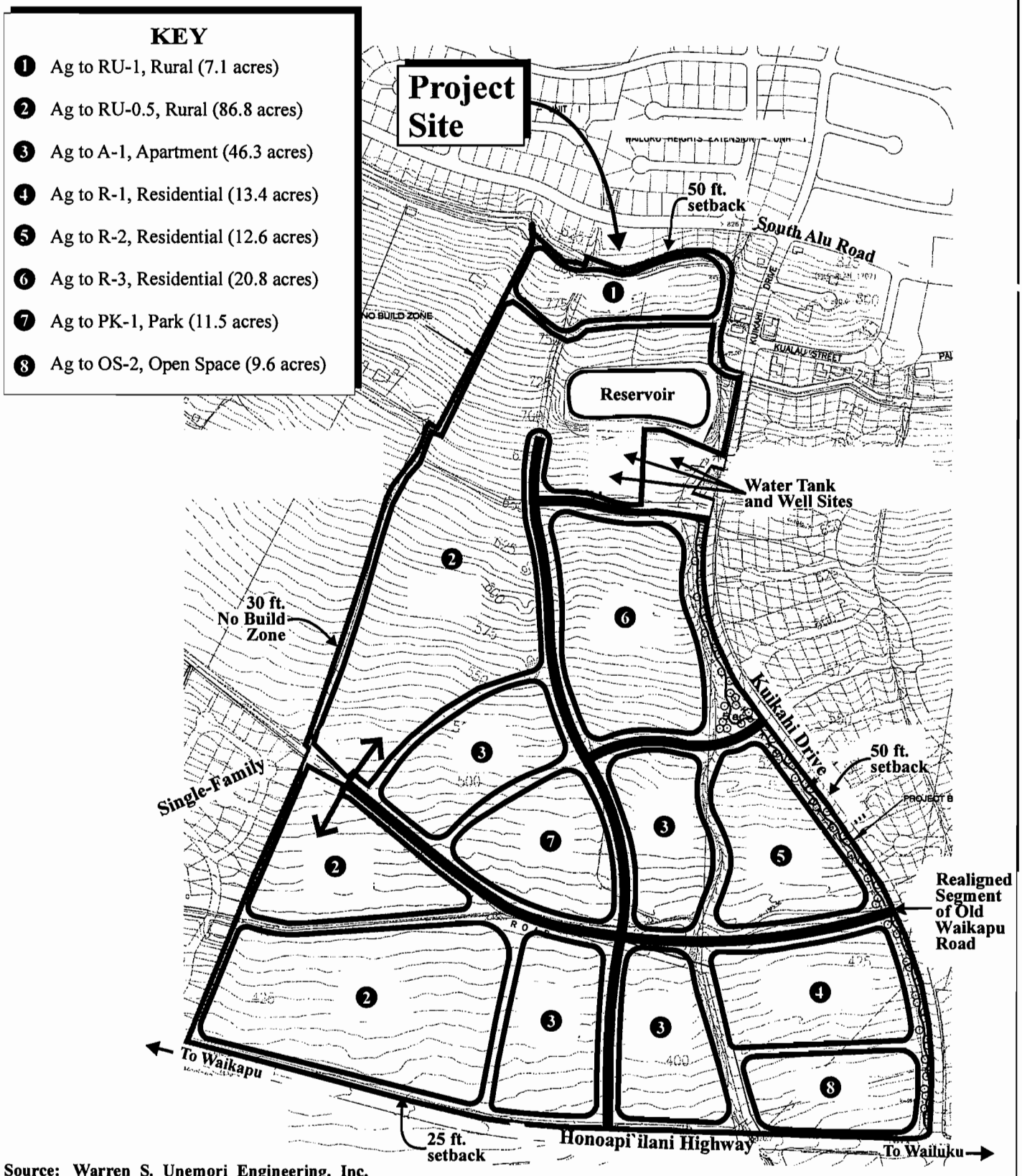
3. Change in Zoning

Concurrently with the Community Plan Amendment, a County Change in Zoning (CIZ) application will be filed. The County zoning for the entire project area is"Agricultural". The preliminary acreage breakdown for proposed zoning changes is summarized in **Table 6** and the changes are estimates at this time. See **Figure 9**.

Table 6. Change in Zoning Acreages

Proposed Designation	Acreage
RU-1, Rural	7.1
RU-0.5, Rural	86.8
A-1, Apartment	46.3
R-1, Residential	13.4
R-2, Residential	12.6
R-3, Residential	20.8
PK-1, Park	11.5
OS-2, Open Space	9.6
TOTAL	**208.1**



Source: Warren S. Unemori Engineering, Inc.

Figure 9 Proposed Pu`unani Subdivision

Proposed County Zoning Changes

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

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4. Summary of Land Use Actions

A summary of the land use actions being sought is presented in **Table 7**.

Table 7. Summary of Land Use Actions

Land Use Parameter	Existing Designation	Proposed Designation
TMK 3-5-002:002		
State Land Use District	Agricultural (60.1 acres)	Rural (37.8 acres) Urban (22.3 acres)
Wailuku-Kahului Community Plan	Agriculture (35.1 acres) Single-Family (25 acres)	Rural (37.8 acres) Multi-Family (22.3 acres)
County Zoning	Agricultural (60.1 acres)	RU-0.5, Rural (37.8 acres) A-1, Apartment (22.3 acres)
TMK 3-5-002:003		
State Land Use District	Agricultural (148 acres)	Rural (56.1 acres) Urban (91.9 acres)
Wailuku-Kahului Community Plan	Agriculture (148 acres)	Rural (56.1 acres) Multi-Family (24.0 acres) Single-Family (46.8 acres) Park (11.5 acres) Open Space (9.6 acres)
County Zoning	Agricultural (148 acres)	RU-1, Rural (7.1acres) RU-0.5, Rural (49.0 acres) A-1, Apartment (24.0 acres) R-1, Residential (13.4 acres) R-2, Residential (12.6 acres) R-3, Residential (20.8 acres) PK-1 Park (11.5 acres) OS-2, Open Space (9.6 acres)

F. CHAPTER 343, HAWAI`I REVISED STATUTES REQUIREMENT

The proposed action will involve an amendment to the Wailuku-Kahului Community Plan, as well as the use of State and County lands. This Environmental Impact Statement (EIS) is intended to cover any use of State and County lands, for purposes including, but not limited to, any roadway, infrastructure, utility system, or other improvements relating to the development of the project. This would include, but not be limited to, roadway, infrastructure, utility systems, and improvements to Kuikahi Drive and Honoapi`ilani

Highway, as well as other off-site locations. These actions are triggers for an environmental impact analysis pursuant to Chapter 343, Hawai`i Revised Statutes (HRS).

A petition for State District Boundary Amendment was filed with the State Land Use Commission on June 2, 2006. At its July 6, 2006 meeting, the State Land Use Commission (SLUC) reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the proposed project and determined that the project may have a significant effect upon the environment to warrant the preparation of an EIS. Accordingly, the SLUC agreed to be the approving authority for the EIS pursuant to Chapter 343, HRS. The EIS, prepared in accordance with Chapter 200 of Title 11, Department of Health Administrative Rules, Environmental Impact Statement Rules, advances findings and conclusions relative to the significance of the proposed action. The EIS will serve as the primary technical supporting document for the land use entitlement application.

The EISPN was published in the August 8, 2006 edition of the Office of Environmental Quality Control's Environmental Notice. Comments received during the 30-day EISPN comment period are included in this document.

G. IMPLEMENTATION TIME FRAME

The implementation of the Pu`unani Subdivision project land use plan sought by this application will commence upon receipt of all land entitlements, regulatory permits, and approvals. It is estimated that the entitlement process will take approximately two (2) years to complete, followed by approximately two (2) years for the design and the approval of construction plans. Site construction is estimated to be initiated in 2012, with build-out of the project estimated over a ten (10) year period until 2022.

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

A. PHYSICAL SETTING

1. Surrounding Land Uses

a. Existing Conditions

The site of the proposed Pu`unani Subdivision is located at the outskirts of Wailuku, immediately north of Waikapu. The property is currently accessed via former agricultural roads which intersect Honoapi`ilani Highway and Kuikahi Drive.

The immediate borders of the subdivision are Kuikahi Drive to the north and Honoapi`ilani Highway to the east. The western extent of the property is bounded by the Wailuku Heights Subdivision. The Kehalani Project District (including the Koa Subdivision, Akolea Subdivision, and Maunaleo Subdivision) is located north, while the Waiolani residential subdivisions and agricultural land are located south of the project site. Urbanized lands are found across Honoapi`ilani Highway, east of the project site. The Waikapu Gardens Subdivision is located across Honoapi`ilani Highway to the southeast of the project site.

From a regional perspective, Waikapu village is located approximately one-half mile south of the property, while Wailuku's civic center is located approximately one (1) mile to the north. The industrial and commercial center of Kahului is located approximately four (4) miles to the northeast of the property.

The vast majority of the subdivision site is vacant, and covered with scrub vegetation, including small trees, shrubs, and tall grasses. The project site is in a transitional area; on the outskirts, but still near the urban area of

Wailuku and in close proximity to single-family subdivisions.

b. Potential Impacts and Mitigation Measures

The project site is located on the outskirts of urban Wailuku, adjacent to the Kehalani Project District and Wailuku Heights Subdivision. Waikapu, which consists of Waikapu Town, Waiolani subdivisions, Waikapu Gardens subdivision, and Waikapu Ranch, an agricultural subdivision, lies due south of the project area. The project land area is currently fallow after years of agricultural production. The proposed project will include multi-family units at the makai extent of the project area, together with one-half acre lots on the southern portion of the site and one-acre rural lots extending mauka, towards Wailuku Heights. This spatial configuration provides a transition from the higher density Kehalani Project District to agricultural lands south of the project area, to allow for a density and visual buffer maintaining a separation between Wailuku and Waikapu towns. The rural land use character to be developed by the proposed plan is intended to respect the distinct village core of Waikapu.

2. Climate

a. Existing Conditions

Like most areas of Hawai`i, Maui's climate is relatively uniform year-round. The island's climate varies by terrain. Characteristic of most of Maui's climate, the project area experiences mild and uniform temperatures year-round, moderate humidity, and a relatively consistent northeasterly tradewind.

Average temperatures at the project site (based on temperatures recorded at Kahului Airport) range from low 60 to high 80 degrees Fahrenheit (Maui County Data Book, 2007). August is historically the warmest month, while January and February are the coolest. Rainfall averages 20 to 30 inches per year. Winds blow predominantly out of the north-northeast and northeast (Maui County Data Book, 2007).

b. Potential Impacts and Mitigation Measures

According to the United States Environmental Protection Agency, the development of cities and suburban areas has a tendency to increase temperatures slightly (up to 10 degrees Fahrenheit, in dense cities) as compared to surrounding natural land cover. This "heat island" effect, as it is often denoted, refers to urban air and surface temperatures that may be higher than nearby rural or undeveloped areas.

In order to minimize the potential of an elevated heat island profile, the applicants will implement a number of landscaping measures. For example, the applicants will provide shade trees and landscape vegetation throughout the subdivision to take advantage of the natural cooling effects of shading and the evaporative effects of water from the soil and leaves.

Further, the buildings will be architecturally designed and built with a low profile to minimize trapped heat and to maximize natural air flow. It is anticipated that these mitigation measures will serve to offset the potential heat island effect of the residences and pavement in the subdivision. As a result, the proposed action is not anticipated to significantly alter local micro-climates.

3. Topography and Soils

a. Existing Conditions

Elevations at the project site range from approximately 350 to 815 feet above sea level. The west to east cross-slope averages approximately 11 percent. The project site is bifurcated by the Waihee Ditch, owned by Wailuku Water Company. There are also two (2) natural drainage gullies which cut across the site in a west to east (mauka to makai) direction and converge into a single gully before crossing Waihee Ditch and Honoapi`ilani Highway. Runoff from the gullies flows to Wai`ale Reservoir, located below Honoapi`ilani Highway and Wai`ale Road (Final Preliminary Engineering Report prepared by Warren S. Unemori Engineering, Inc.).

The project site is located mauka of Honoapi`ilani Highway and consists

of soil which falls within the Pulehu-Ewa-Jaucas association, which is characterized as having deep, nearly level to moderate slope, with well drained soils that have moderately fine to course texture. See **Figure 10.** Underlying the project site are four (4) soil types classified as IbC (Iao cobbly silty clay, 7 to15 percent slopes), IcC (Iao clay, 7 to 15 percent slopes), IbB (Iao cobbly silty clay 3 to 7 percent slopes), and IcB (Iao Clay, 3 to 7 percent slopes). See **Figure 11**. The soil acreages are shown in **Table 8**.

Table 8. Pu`unani Subdivision: Soil Types and NRCS Ratings

Soil Types	Acres		NRCS Ratings
Higher-Quality Soils			
IbB	63.7	30.6%	IIe
IcB	24.1	11.6%	IIe
Moderate-Quality Soil			
IbC	95.1	45.7%	IIIe
IcC	25.2	12.1%	IIIe
Total	208.1	100.0%	
Source: U.S. Soil Conservation Service			

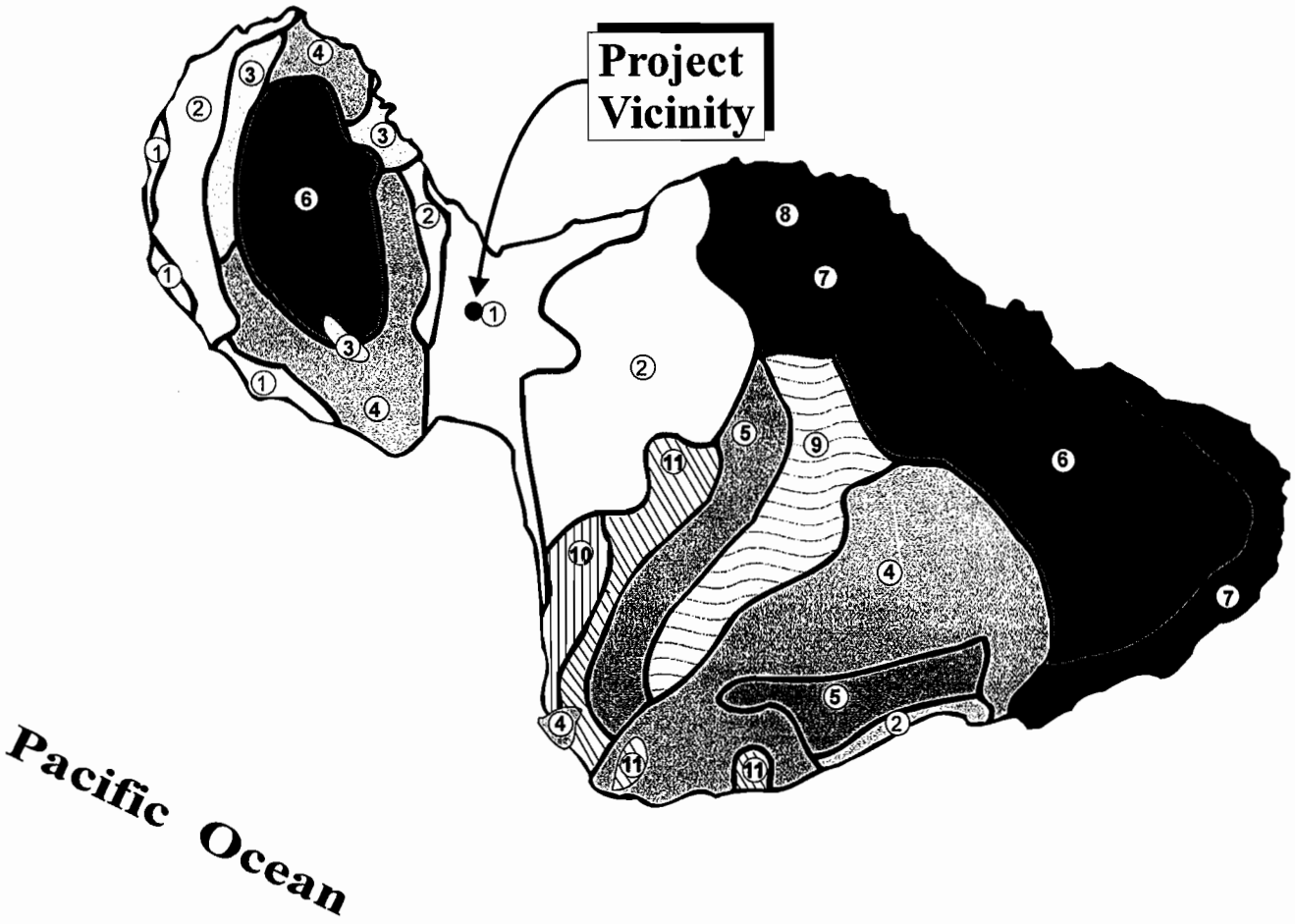
The quality of these soils is rated by the Natural Resources Conservation Service (NRCS). Such soils belong to the Iao series which consists of well-drained soils on valley fill and alluvial fans. The soil series varies according to slope characteristics and erosion potential. All of the above listed soil types are characterized by medium runoff and slight to moderate erosion hazard. Soils belonging to the Iao series are suitable primarily for agricultural uses, such as sugar cane cultivation and pasture.

b. <u>Potential Impacts and Mitigation Measures</u>

Mass grading will be necessary to meet the grade standards required for subdivision roadway and house pad construction. Grading plans will attempt to balance excavation and embankment quantities to the extent possible. Drainage patterns will be maintained to ensure minimal impact

LEGEND

- ① Pulehu-Ewa-Jaucas association
- ② Waiakoa-Keahua-Molokai association
- ③ Honolua-Olelo association
- ④ Rock land-Rough mountainous land association
- ⑤ Puu Pa-Kula-Pane association
- ⑥ Hydrandepts-Tropaquods association
- ⑦ Hana-Makaalae-Kailua association
- ⑧ Pauwela-Haiku association
- ⑨ Laumaia-Kaipoipoi-Olinda association
- ⑩ Keawakapu-Makena association
- ⑪ Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

Figure 10 Proposed Pu`unani Subdivision

NOT TO SCALE

Soil Association Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC

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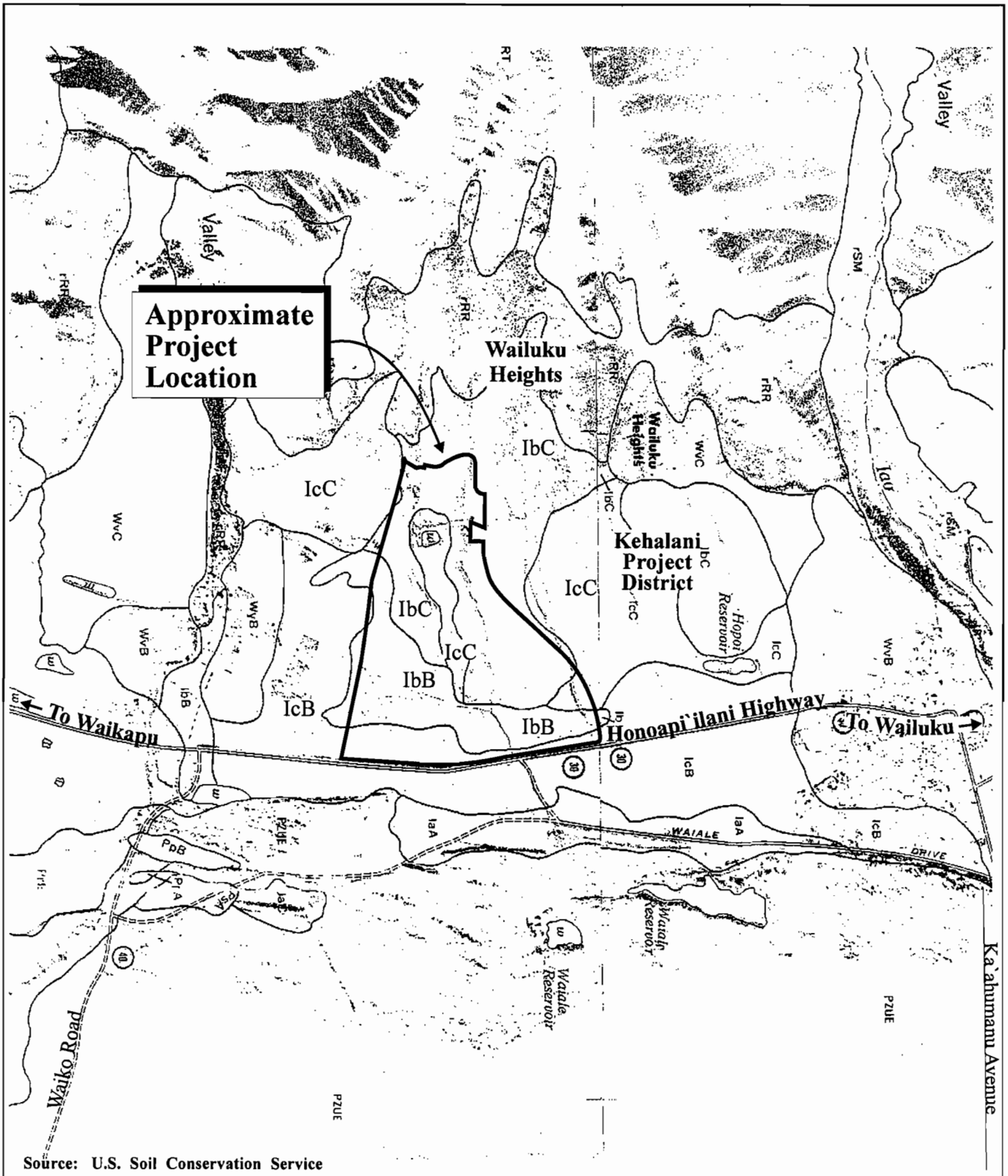

Source: U.S. Soil Conservation Service

Figure 11 Proposed Pu`unani Subdivision

Soils Classification Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC

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to downstream properties. Adverse impact to topography and landforms resulting from grading activities are not expected to result from the proposed project.

The four (4) specific soil types underlying the project site generally exhibit medium runoff and slight to medium erosion hazard. To minimize the possibility of runoff and erosion associated with these soil types, several Best Management Practices (BMPs) will be implemented. These include the following: constructing of detention basins to capture sedimentation to minimize the quantity of sediment leaving the site, protection of natural vegetation, using wind erosion control, intercepting runoff above disturbed slopes, and using seeding and fertilizing or other soil erosion control.

4. Agricultural Productivity Considerations

a. Existing Conditions

An assessment of the agricultural land use impacts was carried out for the project and is included in **Appendix "B"**. The following is a summary of the existing agricultural conditions at the project site. The three (3) classification systems commonly used to rate Hawai`i soils are: (1) Land Capability Grouping, (2) Agricultural Lands of Importance to the State of Hawai`i, and (3) Overall Productivity Rating.

(1) Land Capability Grouping (NRCS RATING)

The 1972 Land Capability Grouping by the U.S. Department of Agriculture NRCS rates soils according to eight (8) levels, ranging from the highest classification Level I, to the lowest Level VIII. The following is a breakdown of the project area by NRCS Land Capability Grouping. Refer to **Appendix "B"**.

Approximately 88 acres (42 percent) of the project area have soils that are rated IIe. Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices. The subclassification "e" indicates that the limitation is due to erosion.

Approximately 120 acres (58 percent) have soils rated IIIe. Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both. The subclassification "e" indicates that the limitation is due to erosion. Refer to **Table 7**.

(2) **Agricultural Lands of Importance to the State of Hawai`i (ALISH)**

In 1977, the State Department of Agriculture developed the ALISH classification system to identify three (3) categories of Agricultural Lands of Importance to the State of Hawai`i (ALISH). The classification system is based primarily, though not exclusively, upon the soil characteristics of the land. The three (3) classes of ALISH lands are "Prime", "Unique", and "Other Important" agricultural land, with all remaining lands termed, "Unclassified". Utilizing modern farming methods, "Prime" agricultural lands have the soil quality, growing season, and moisture supply needed to produce sustainable crop yields, while "Unique" agricultural lands possess a combination of soil quality, location, growing season, and moisture supply utilized to produce sustainable high yields of a specific crop. "Other Important" agricultural lands include those important agricultural lands which have not been rated "Prime" or "Unique".

As indicated by the ALISH map, the project site falls within the "Prime" agricultural lands category. See **Figure 12**. The land in the project area was formerly utilized to support large-scale agricultural activities, but is presently fallow and undeveloped.

(3) **Overall Productivity Rating**

The University of Hawai`i, Land Study Bureau (LSB) classifies soil productivity characteristics on a scale of "A" to "E", with lands designated as "A", reflecting highest productivity and "E", representing lands ranked lowest. See **Figure 13**. Productivity

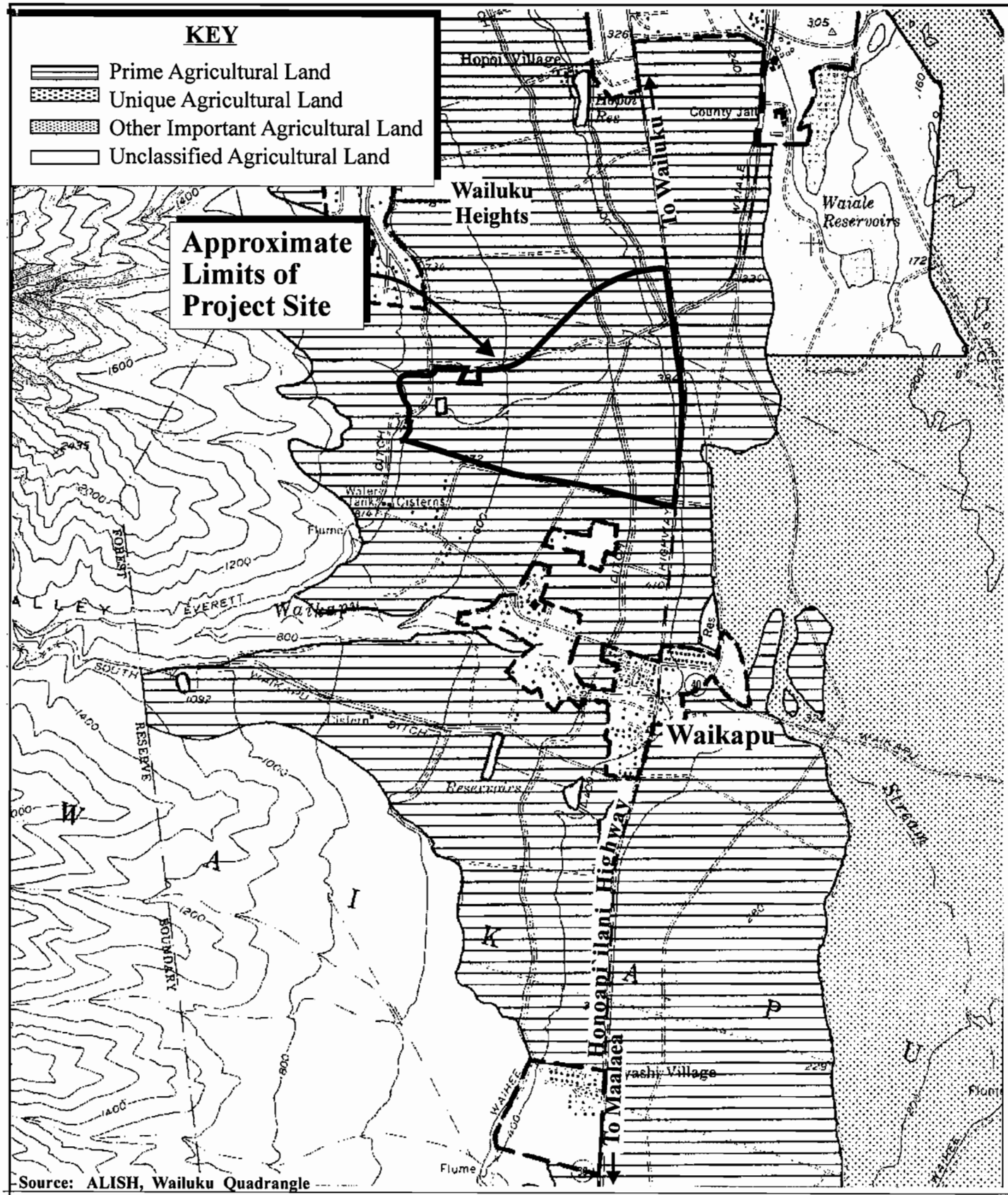

Figure 12 Proposed Pu`unani Subdivision

Agricultural Lands of Importance to the State of Hawai`i

1000 Feet
0 500 2000

Prepared for: **Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC**

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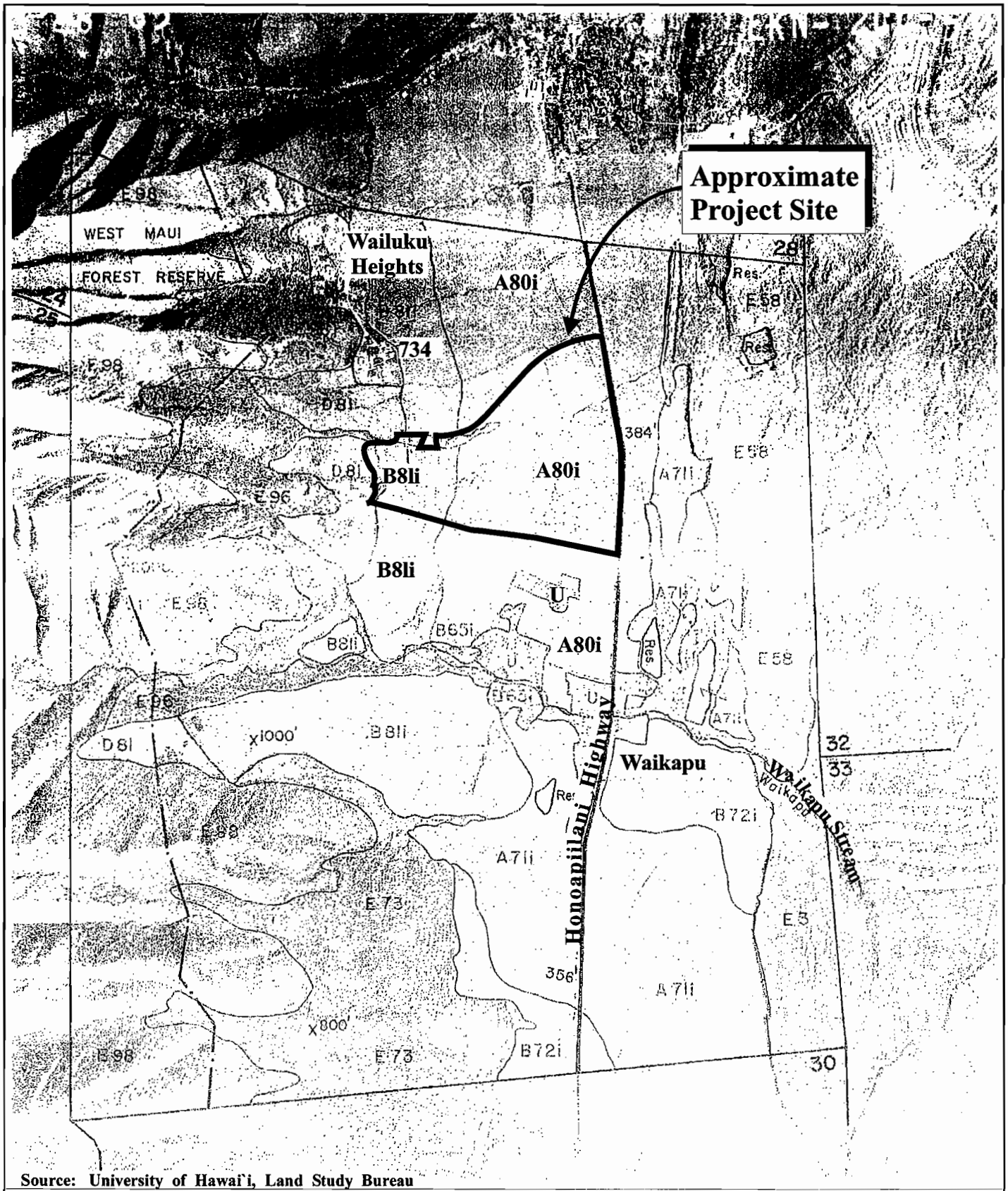

Source: University of Hawai`i, Land Study Bureau

Figure 13 Proposed Pu`unani Subdivision

NOT TO SCALE

Productivity Classification Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

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classifications are further classified by soil types characterized by texture, drainage, and stoniness.

When irrigated, about 170 acres (82 percent) of the project area have soils rated "A", and about 38 acres (18 percent) have soils rated "B". Specifically, land underlying the project site are characterized as A80i and B81i. The A80i classification reflects soil that is over 30 inches deep, nonstony, and well to excessively drained. The B81i classification possesses similar characteristics but are considered less suited for machine tillability. The texture for these soils is characterized as fine (Land Study Bureau).

Fields within the project area were cultivated in sugar cane by Wailuku Agribusiness Co. Inc., which operated a sugar cane plantation in the area from 1862 to 1988. Following closure of the sugar plantation, the subject property was leased to Maui Pineapple Company for part of their pineapple production.

Agronomic conditions make it suitable for low-elevation crops to be grown in the project area. These crops include but are not limited to: asparagus, beans (green, bush and snap), bell peppers, cucumbers, daikon, eggplant, mango, pumpkins, seed crops, sweet corn, and watermelons.

None of the fields in the project area are currently used for farm operations.

b. <u>Potential Impacts and Mitigation Measures</u>

The subject property lies within the State Agricultural district and is designated for "Agriculture" and "Single-Family" uses by the Wailuku-Kahului Community Plan. Maui County zoning designates the parcels for "Agricultural" use. In addition, the subject property lies in between existing residential areas.

The three (3) soil-rating systems described above indicate that about 88 acres (42 percent) of the project area have soils that are good for cultivating

crops (III or better under the NRCS rating, "Prime" under the ALISH rating, and B or better under the LSB Rating).

The project will commit approximately 208 acres of agricultural land to non-agricultural uses. However, because of the enormous contraction of plantation agriculture, there is a corresponding increase in the availability of land for diversified agriculture. The limiting factor to the growth of diversified agriculture is not the land supply, but rather the size of the market for crops that can be grown profitably in Hawai`i, and particularly in Central Maui.

Development of the Pu`unani Subdivision combined with other developments in Hawai`i and on the island of Maui, involves the small loss of agricultural land which will not significantly affect (1) the availability of land to farmers in Hawai`i, (2) agricultural land rents, (3) the growth of diversified crops, or (4) potential agricultural employment. The proposed project will ultimately involve the use of approximately 208 acres of land, which represents 0.08 percent of the roughly 244,000 acres of State Agricultural district lands on the island of Maui (Maui County Data Book, 2007).

Development of the surrounding areas by Waikapu Gardens, the Waiolani Subdivisions, and future development of the makai church lots have eroded the agricultural separation between the two (2) urban centers. Once the makai church lots are developed, the urban area will extend contiguously between Wailuku and Waikapu Town.

The continuing encroachment of primary residential uses make agricultural use of the property less desirable. Further, the cultivation on agricultural lands increase impacts on the surrounding residences from noise, dust, and vector control.

As the project will have little impact on the growth of diversified agriculture, mitigation measures for the loss of agricultural land are not recommended. When evaluated based on the existing urban encroachment in the agricultural district and the housing shortage that exists on Maui,

coupled with the scarcity of entitled lands for residential housing in Central Maui, the conversion of the project's agricultural lands into residential development presents a beneficial opportunity. The proposed urban and rural boundary conversion is reasonable and will allow "Residential" use in an urban infill area.

5. Flood and Tsunami Hazard

a. Existing Conditions

The project site is located near the eastern base of the West Maui Mountains. As indicated by the Flood Insurance Rate Map (FIRM) for the area, the project site is located within Zone C, an area of minimal flooding (Federal Emergency Management Agency). See **Figure 14**.

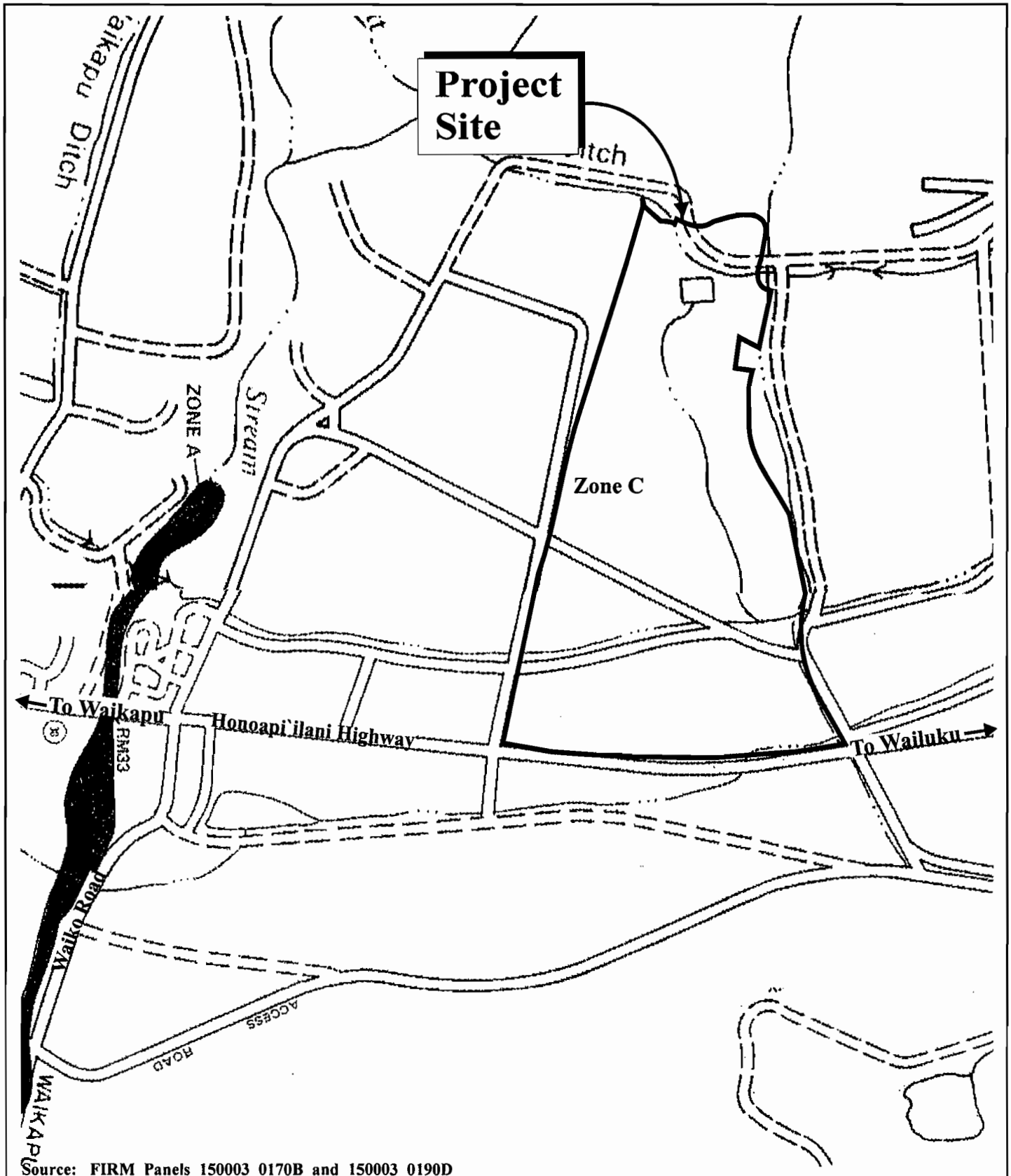
b. Potential Impacts and Mitigation Measures

Appropriate drainage mitigation actions will be implemented in connection with the proposed project. Details regarding project-related drainage considerations is presented in Section D.4 of this chapter. There are no anticipated adverse impacts to flood designated areas. The project area is not affected by tsunami or coastal storm wave actions.

6. Streams, Reservoirs, and Wetlands

a. Existing Conditions

Waikapu Stream is located approximately one-half mile south of the project site. Waikapu Stream is a perennial stream, originating from the upper reaches of Waikapu Valley, ultimately discharging into Kealia Pond in the Ma`alaea flats. According to the Hawai`i Stream Assessment (HSA), the Waikapu Stream has no listed tributaries and flows to the sea year-round. The HSA noted that gauging information exists and that dam or diversion weirs have been noted. Further, the HSA found that the Waikapu Stream was historically vital to taro cultivation and that Waikapu Valley may contain valuable cultural and historic sites (Hawai`i Cooperative Park Service Unit, 1990).



Source: FIRM Panels 150003 0170B and 150003 0190D

Figure 14 Proposed Pu`unani Subdivision

NOT TO SCALE

Flood Insurance Rate Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC

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A plantation reservoir is located in the northwest corner of Parcel 3. The reservoir, maintained by Wailuku Water Company, is actively utilized for agricultural irrigation. Although the reservoir falls within the property limits of Parcel 3, Wailuku Water Company will retain separate easement rights for reservoir maintenance and operations purposes. A lower reservoir located on Parcel 2 is no longer used and will be abandoned. No wetlands have been identified in the vicinity of the subject property.

b. Potential Impacts and Mitigation Measures

There are no wetlands in the vicinity of the subject property. Waikapu Stream will not be affected by the proposed action. Drainage generated from the property will not be discharged directly into Waikapu Stream. Moreover, valuable cultural and historic sites associated with the stream will not be affected.

During construction, the following Best Management Practices (BMPs) will be implemented by the project contractors for erosion and sediment control to maintain the natural and functional integrity of Waikapu Stream.

- Constructing detention basins to capture sedimentation to minimize the quantity of sediment leaving the site
- Staging construction
- Protecting natural vegetation
- Stockpiling topsoil, and covering or stabilizing of the soil stockpiles
- Using wind erosion control
- Intercepting runoff above disturbed slopes
- Constructing of benches, terraces, or ditches at regular intervals to intercept runoff on long or man-made slopes
- Providing linings or other method to prevent erosion of storm channels
- Using seeding and fertilizing or other soil erosion control

- Providing vehicle wheel wash-down facilities
- Using stabilized construction entrances
- Using vegetated filter strips

Greater detail of the design information for the proposed drainage and erosion control plan will be provided when the project progresses to the engineering design phase of development.

7. Flora and Fauna

a. Existing Conditions

Vegetation in the region is generally characterized by introduced grass species. Plant species typically associated with the area include sandbur, lantana, fingergrass, and bristly foxtail.

Terrestrial fauna typically found in the region include introduced species, such as cats, mice, rats, and mongoose. Some of the avifauna introduced to the area include the Spotted Dove, Barred Dove, Japanese white-eye, Cardinal, Red-Crested Cardinal, and Mynah.

Field studies to assess the botanical resources within the project area were made in August 2005 by Robert W. Hobdy. See **Appendix "C"**. The field studies were separated into two (2) sections. The first section involved approximately 60 acres of land on the lower portion of the project area (Parcel 2). The second section involved approximately 148 acres of land on the mauka portion of the project area (Parcel 3). The following is a summary of the field survey.

The flora surveys involved a pedestrian survey of the sites, intense examination of areas more likely to harbor native or rare plants and documentation of plant species, distribution, abundance and terrain, and substrate.

Fifty plant species were identified on Parcel 2 and of them, only one (1) native species, uhaloa, a common and widespread indigenous species found

in the Pacific and tropical America, was identified. The other species were non-native weeds.

On Parcel 3, 65 plant species were identified and of them, two (2) native species, uhaloa and koali awahia, common and widespread indigenous species found in the Pacific and tropical America, were identified, as well as one (1) Polynesian species, Kukui. The other species were non-native weeds.

Other vegetation found on Parcels 2 and 3 consisted of grassland, including Guinea grass, small trees of Macaranga tanarius, koa haole, common shrubs and herbs, hairy horseweed, telegraph plant, and hairy abutilon.

The fauna surveys involved pedestrian surveys of the sites, field observations with binoculars, listening to vocalizations, documentation of species abundance, activities and location and observations of trails, tracks, scat, and feeding. An evening visit was also made to record additional activity for any evidence of the Hawaiian hoary bat. No bats were observed during this visit.

On Parcel 2, animal life typically expected in the project area include rats, mice, cats, mongoose, dogs, and axis deer. Presence of avifauna included seven (7) species of non-native birds that were observed during two (2) site visits. They included the zebra dove, house finch, gray francolin, common myna, Japanese white-eye, Cattle egret, and Rock dove (Pigeon). Other birds that are typically expected in the project area but not observed during the field survey include the Northern cardinal, Nutmeg mannikin, Auku'u or Black-crowned Night-heron, House sparrow, and Pacific golden plover. A moderate amount of insects were present onsite, however, they were not tallied. No endangered insect species were found onsite.

On Parcel 3, two (2) mammals were found onsite. They included the axis deer and dogs. Other animal life expected in the project area include rats, mice, cats, and mongoose. Nine (9) species of non-native birds, one (1) migratory bird, and one (1) indigenous bird were observed during two (2) site visits. They included the Zebra dove, House finch, Gray francolin,

Spotted dove, Common myna, Japanese white-eye, Black francolin, Cattle egret, Kolea or Pacific golden plover, Northern cardinal, and Auku'u or Black-crowned night-heron. There was an abundant amount of insects present throughout the area, however, they were not tallied. No endangered insect species were found onsite. There was no sighting of the Hawaiian hoary bat.

b. Potential Impacts and Mitigation Measures

Parcels 2 and 3 were previously subjected to intense agricultural activity. There are no rare or Federally Threatened or Endangered species of flora on the property. Further, there are no known rare or Federally Threatened or Endangered species of fauna, avifauna, or insects in the project vicinity. There are no unique or special habitats on the property and no wetlands. Thus, the proposed development is not anticipated to have a significant adverse impact on the biological environment.

8. Archaeological Resources

a. Existing Conditions

An Archaeological Inventory Survey of the project site was conducted by Scientific Consultant Services, Inc. (SCS). See **Appendix "D"**. The archaeological inventory survey was comprised of historic background research and settlement pattern research, a complete pedestrian survey of the project area, and subsurface testing via backhoe and reporting.

The fieldwork involved the execution of a complete pedestrian survey of the entire project area for the purpose of site inventory and limited subsurface testing to evaluate the significance of any subsurface deposits. Laboratory work consisted of analysis of any subsurface deposits found and literature research review involved a review of all previous archaeological work conducted in the surrounding area.

During the field inspection, seven (7) historical sites related to the former use of the property for sugar cane cultivation were identified. They include Waihee Ditch (State Site 50-50-04-5197), Waikapu Ditch (State Site 50-50-

04-5493), an unnamed lesser ditch (State Site 50-50-04-5729), another unnamed lesser ditch (State Site 50-50-04-5726), a larger unnamed reservoir (State Site 50-50-04-5727), a series of 14 sugar canefield erosion-control soil berms (State Site 50-50-04-5728), and Old Waikapu Road (State Site 50-50-04-5730). See **Figure 15**. These sites revealed a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road. These sites are new additions to the State's rich historic record of the turn-of-the century sugar industry in Hawai`i. It is noted that no burial features or human remains were identified during the pedestrian surveys or subsurface testing at the site.

b. Potential Impacts and Mitigation Measures

As noted previously, seven (7) sites of historical significance to sugar cane activities were documented during the archaeological inventory survey for the project site. The sites were reviewed in accordance with accepted evaluative protocols.

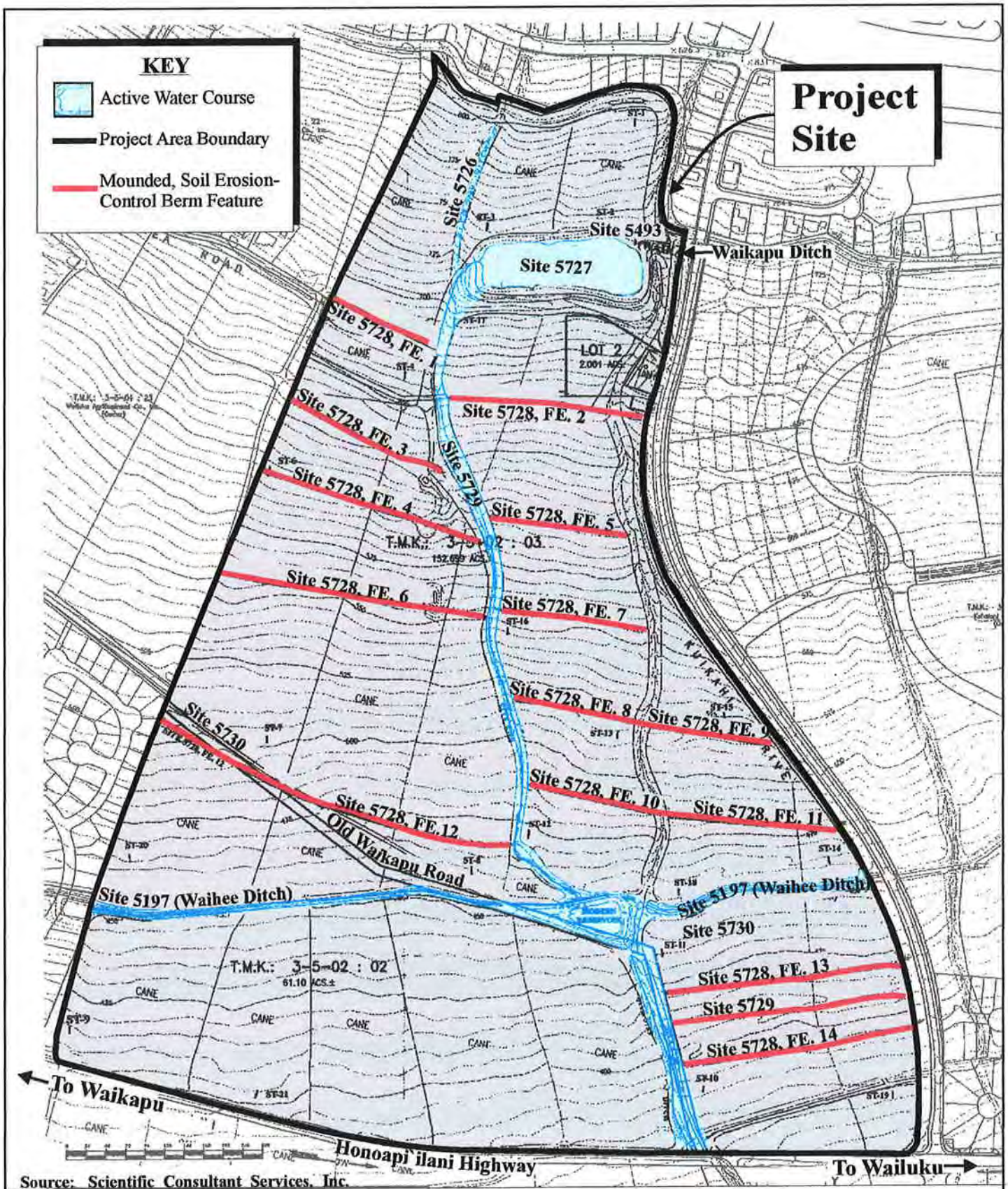
The following significance evaluations are broad criteria established for the State and National Register of Historic Places. These criteria are as follows:

Criterion A: Sites that are associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B: Sites that are associated with the lives of persons significant to our past.

Criterion C: Sites that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value or that represent a significant and distinguishable entity, whose components may lack individual construction.

Criterion D: Sites which have yielded, or may be likely to yield, information important in prehistory or history.



Source: Scientific Consultant Services, Inc.

Figure 15 Proposed Pu`unani Subdivision

NOT TO SCALE

Archaeological Sites Location Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC

MUNEKIYO & HIRAGA, INC.

Criterion E: Sites which have an important value to the native Hawaiian people or to another ethnic group of the State due to associations with traditional cultural practices once carried-out, or still carried-out, at the property or due to associations with traditional beliefs, events, or oral accounts – these associations being important to the groups' history and cultural identity (State of Hawai`i criterion only).

All seven (7) historic sites identified during the archaeological inventory survey are considered significant under Criterion D, due to their potential to yield information important for understanding the history of the region. Information for these sites has been recorded as part of the inventory survey investigation through location documentation, written descriptions, photographs, plan view maps to scale, and oblique view renderings. Based on these findings, the report recommendation is that "no historic properties will be affected", given that the significance of the seven (7) historic sites have been recorded and additional archaeological research would not contribute a significant volume of additional data to the interpretation of the region, or to Hawaiian prehistory/history.

The archaeological inventory survey report was submitted to the State Historic Preservation Division (SHPD) for review. The SHPD concurred with the report's findings and recommendations and accepted the report in a letter dated November 18, 2005. See **Appendix "D-1"**.

Although archaeological monitoring is not recommended, should any significant cultural deposits or human skeletal remains be encountered during construction activities, all work in the vicinity of the find will cease and the SHPD will be contacted to establish appropriate mitigation measures in accordance with Chapter 6E-43.6, Hawai`i Revised Statutes and Chapter 13-300 Hawai`i Administrative Rules. The Office of Hawaiian Affairs (OHA) will also be notified of any significant archaeological findings.

9. Historical and Cultural Resources

a. Existing Conditions

Waikapu is located within the large valley at the foothills of Mauna Li`o and follows the Waikapu River. This district continues south to Kealia in Ma`alaea.

Stories passed down from one generation to the next tell of a famous conch shell (*pu*) named Kihapu located in a cave within Waikapu valley. Storytellers say that this conch shell produced a whistling sound that could be heard throughout the entire archipelago of Hawai`i. The mountain ridges within Waikapu served as surveillance areas that allowed warriors optimal north and south views of the isthmus of Maui. The sight of enemy forces touching upon the shoreline prompted these warriors to use the conch shell to warn the people of impending attack, thus giving the area the name, Waikapu, "water of the conch". No one could invade the island without being noticed. Other tales tell of a dog named Puapualenelena who stole the conch. Since then, the conch has never been heard.

Waikapu is the final valley that is part of Na Wai`Eha (Four Waters) or Na Poko. Historically, Waikapu was a heavily settled valley occupied by houses, fishponds, animal pens, heiau, wet taro ponds, and traditional gardens.

Gathering occurred at one time or another for medicinal plants. Freshwater shellfish and fish were gathered from streams, plantation ditches, and reservoirs in the area. Many of these practices do not continue today.

Waikapu also became one of the large sugar cane plantation camps that housed a large population of field workers. There had also been a few cattle ranchers, as well as a dairy operations in the immediate Waikapu area.

Historically, Waikapu had been a thriving town prior to WWII and up until the mid 1960's. The longtime Waikapu residents remember thriving dairy and ranching businesses. Some of these businesses include the Sakamoto

Store and Gas station, a barbershop, Shimizu fish market, and a theater. The decline of the sugar plantation era led to the relocation of shops and businesses to other areas of Maui or their closure.

b. Cultural Perspectives

As part of the cultural assessment, eleven (11) informant (kama`aina) interviews were conducted to gain an understanding of likely cultural practices which occurred in the vicinity. See **Appendix "E"**. The interviews are summarized below.

(1) Charldine "JoJo" Josephine Kekuikuiloaikapōmaika'i Ledward Apo

Ms. Apo and her family have been living on their family land for the last five (5) generations. She descends from a long line of the Cockett family. They were a fishing family that also lived by raising taro, breadfruit, as well as other plants for subsistence. Her father and uncles would go up into the mountains to gather fiber to make strong twine for fishing line. Aunty Jojo was born and raised in the Wailuku area on Kaho`okele Street during a time when the area was a rural region located on the fringe of a booming and busy Wailuku town. She has raised her five (5) children in Wailuku and continues to reside in the same family home, raising her grandchildren with the same Hawaiian values as was taught to her by her grandparents.

(2) Kahu Charles Kauluwehi Maxwell, Sr.

Charles Kauluwehi Maxwell, Sr. is a cultural practitioner who is also the Hawaiian Cultural Specialist at the Maui Ocean Center. He also presides over the Maui & Lana`i Islands Burial Council as the Chairperson and is the Kahu who has been involved with the proper repatriation of displaced or disturbed human remains for the last 20 years. Kahu Maxwell was born in Lahaina, raised in Kula, and visited his grandparents who lived in Waikapu. Both he and his grandfather refer to Waikapu as the sacred waters and their "*One Hanau*," sands of their birth.

(3) Bernard Nu`uhiwa Bulawan, Sr.

Mr. Bulawan, Sr., was born and raised in Lahaina. He comes from a fishing family and remembers when there wasn't a harbor in

Ma`alaea. He was an entertainer for Emma Sharpe and her Hula Revue who would entertain weekly in the Wailuku Hotel, now occupied by the Maui Medical Group, in the late 40s and 50s. He is also the father of the writer of this assessment report.

(4) Hōkūlani Holt-Padilla

Ms. Holt-Padilla was born and raised in Wailuku, but specifically in the Paukukalo area. She is a renowned kumu hula, Hawaiian historian, and practitioner. She currently works at the Maui Arts and Cultural Center as their Cultural Advisor. She formerly worked at the Bailey House Museum as the Cultural Resource Manager, she then became the Director for the Punana Leo o Maui Hawaiian Language Preschool, and she then worked for the Kaho`olawe Island Reserve Commission. All of these jobs were within the Wailuku District, but much of her Wailuku history comes from her family who has been residents in the Wailuku District for at least seven (7) generations.

(5) Thelma Kahili Cummings

Ms. Cummings was born and raised in Wailuku. Her father was the Prison Warden for the Paukukalo prison. Aunty Kahili was also a Kumu Hula and has lived in Paukukalo for 70 of her 87 years of life.

(6) Ann "Annie" Spencer Vida

Ann "Annie" Spencer Vida was born in Wailuku near the Sand Hills area. She was married to Leslie Vida and had raised their five (5) children on a part of the Vida's 9-acre land adjacent to the proposed project site. Ms. Vida explained that she has resided on the Vida property for 54 years. Her ex-husband's family had the largest hog farm on the island of Maui for over 50 years. Ms. Vida explained that the land has been in the Vida possession for many generations, perhaps close to, if not more than, 80 years. Their country parcel of land still raises horses, chickens, a few hogs, and a few other farm animals.

(7) Ann Nakamoto Wakamatsu

Ann Wakamatsu is a current resident of Waikapū. Her father started a dairy in Waikapū in 1926. They produced and sold milk, cream, and butter during the plantation era.

(8) Ted and Zelie (Rogers) Harders

Ted and Zelie (Rogers) Harders are current residents of Waikapu. The Rogers `ohana had a large ranch that raised cattle near the area now known as Waiolani. The ranch was in operation from the 1940's until the development of the Waiolani homes. The Rogers family is well known to old-time Waikapu and Wailuku residents. They still own quite a few homes and land in the Waikapu area.

(9) Wally Rogers

Wally Rogers is a current resident of Waikapu and is Zelie Harders younger brother. He recounted country living and working on the ranch during the interview.

(10) Mr. Teruo Kamasaki

Mr. Kamasaki is a current resident of Waikapu. He is 82 years old and has a lot of historical information about the pre and post World War II days of Waikapu. Mr. Kamasaki remembers the old government road when it was in operation, as well as water issues during the sugar plantation era. He also remembers the larger reservoir above the project area breaking and flooding out the fields many times in his lifetime.

(11) One Anonymous Individual

This individual had been interviewed on-site during a visit to the property of the proposed project. The individual recounted that he and his family have been involved with farming near the area for at least three (3) generations and remembers when Waikapu was known as "out in the country" and had miles and miles of sugar cane fields.

c. Potential Impacts and Mitigation Measures

The results of the Cultural Assessment study show that the proposed project plans of development should not have any impact on any Hawaiian cultural practices in the area. Also, practices of farming and animal husbandry continue to occur on the Vida property, as it has been for nearly 80 years; it is recommended that these practices should be allowed to occur without interruption.

Although all informants talked about various gathering practices that had occurred at one time or another, none of them were aware of these practices continuing today.

10. Air and Noise Quality

a. Existing Conditions

There are no point sources of airborne emissions within proximity of the project site. Air quality in the vicinity of the project site may be affected by a variety of sources, including vehicular exhaust off Honoapi`ilani Highway or Kuikahi Drive, as well as dust generated through agricultural operations conducted in the Waikapu areas south of the project site; housing construction operations in the Kehalani Project District north of the project area; and/or smoke from sugar cane harvesting and cultivation operations conducted in the central valley area. Emissions from these sources are intermittent and are quickly dispersed by prevailing tradewinds. Overall, air quality in the project vicinity is considered good.

A predominant source of noise in the vicinity of the property stems from traffic traveling along Honoapi`ilani Highway. Background noise sources include traffic traveling along Kuikahi Drive and other local roads in the vicinity, noise associated with agricultural and construction operations, and natural sources, such as wind and rain.

b. Potential Impacts and Mitigation Measures

Emission resulting from operation of construction equipment and other vehicles involved in construction activities may temporarily affect the ambient air quality within the immediate vicinity. However, these effects will be minimized through proper maintenance of construction equipment and vehicles. Additionally, measures will be implemented by the applicants' contractor during construction activities to minimize the proliferation of fugitive dust, in accordance with Hawai`i Administrative Rules, Chapter 11-60.1, Air Pollution Control. Such measures may include the use of wind screens and/or limiting the area that is disturbed at any given time to help contain fugitive dust emissions. Wind erosion of

inactive areas of the site that have been disturbed may be controlled by mulching. Trucks hauling soil material will be covered to mitigate dust. A routine road cleaning and tire washing program will help reduce fugitive dust emissions from trucks/vehicles tracking dirt onto nearby paved roadways. Installation of landscaping early in the construction schedule will also help to control dust.

During the construction phase, emissions from engine exhaust will occur from onsite construction equipment and other construction related vehicles. Increased vehicular emissions due to traffic disruptions by construction equipment or vehicles entering/exiting the site can be mitigated by moving equipment during off-peak hours. Construction related emissions would be limited to the construction period of the project. After the project is completed, emission concentrations at the site are anticipated to remain within acceptable air quality standards.

In the long term, the proposed rural, single- and multi-family residential uses are not anticipated to have an adverse impact on air quality.

Ambient noise conditions may be temporarily affected by construction activities. Heavy construction machinery, such as backhoes, dump trucks, front-end loaders, paving equipment, and material transport vehicles, are anticipated to be the dominant noise-generating sources during the construction period.

Existing residences to the south may be impacted by construction noise due to their close proximity to the project site. Noise from such construction activities would be short term and must comply with the State DOH noise regulations. Should noise during the construction phase of the project exceed the maximum allowable levels, a noise permit may be required. This requirement has been noted by the State DOH Maui District Health Office in their comment letter of August 29, 2006 to the EISPN.

Proper equipment and vehicle maintenance are anticipated to reduce noise levels. Equipment mufflers or other noise attenuating equipment may also be employed as required. All construction activities will be limited to

daylight work hours.

Once completed, except for the normal residential noises, the proposed project is not anticipated to generate adverse impact on noise conditions.

11. Scenic and Open Space Resources

a. Existing Conditions

In addition to Mount Haleakala to the east, the West Maui Mountains define the scenic resources west of the project site. The project site does not lie within a designated scenic corridor. Vast open space and former agricultural lands lie makai of the project area.

b. Potential Impacts and Mitigation Measures

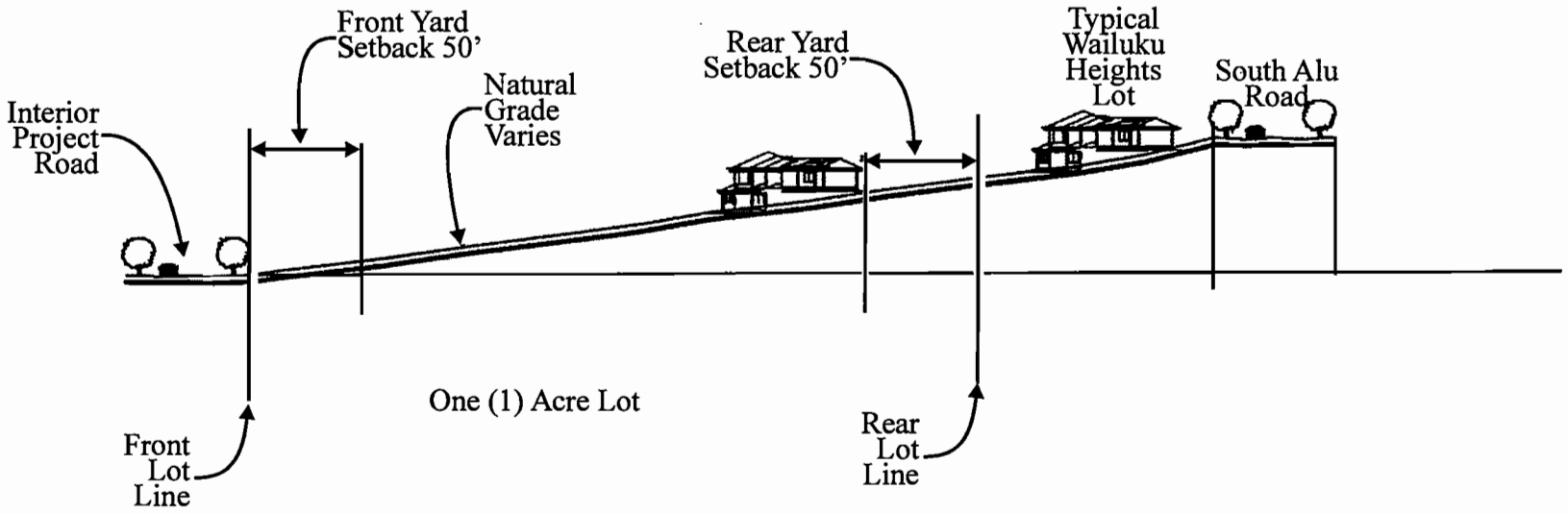
The subject property is not considered a valuable scenic corridor. A key issue, with respect to views, however, pertains to the future dwelling structures within the project site and their view relationship with existing residences at Wailuku Heights. The six (6) one-acre lots bordering Wailuku Heights are the primary lots which need to be considered in this regard.

Mitigating measures to be implemented to ensure the preservation of views from the Wailuku Heights Subdivision include the provision of a 50-foot rear yard setback for the one-acre lots. The allowable building height in the RU-1, Rural zoning district is 30 feet. With these parameters, a view sectional analysis has been prepared to graphically represent grade and building height relationships between the one-acre lots and the Wailuku Heights residences situated on the makai or eastern side of South Alu Road. See **Figure 16**. Based on this analysis, there are no view plane interference issues anticipated with the proposed action.

12. Hazardous Materials and Fertilizer Usage

a. Existing Conditions

Sugar cane and pineapple agricultural production had been previously



Source: Maxwell Design Group

Figure 16

Proposed Pu`unani Subdivision

View Relationship Between Wailuku Heights and One-Acre Lots

NOT TO SCALE

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active on and adjacent to the subject property for several decades. During this time, agricultural pest control chemicals and fertilizers were used on the property. Sugar cane and pineapple production on the property ceased in the late 1990's. Since then, the land has remained vacant and fallow.

Phase 1 Environmental Site Assessments were conducted on the properties to identify any physical recognized environmental conditions as defined by American Society of Testing and Materials (ASTM) standards associated with the past use of the properties. See **Appendix "F"**. The inspection revealed no evidence of recognized adverse environmental conditions in connection with the properties, as follows:

- **Database Listings**: The subject site is not listed. The report opined that one (1) nearby listed site and another site located within a half-a-mile do not have a reasonable potential to adversely impact the environmental condition of the subject property due to its down gradient location from the properties.

- **Current and Historic Use or Storage of Hazardous and Regulated Substance**: There is no evidence of any historic misuse or significant spills of hazardous or regulated substances on the subject properties.

- **Solid Waste Management**: A limited amount of historical dumping (construction and miscellaneous debris) was evident on the subject properties. Management of these waste should be performed in a manner that complies with all local, state and federal regulations, as applicable to the waste type. During future site work if large amounts of construction debris or unidentifiable substances (containers) are discovered, proper waste identification, testing, and applicable waste handling and disposal procedures are recommended.

- **Surface Waters and Area Aquifer Protection**. The developer and property owner should be aware of the potential for offsite contaminants to migrate into nearby drainageways. Products of concern relating to any future development project or land-clearing activity would be earthen material (silt), paints, oils, antifreezes, and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

Future land clearing of greater than one (1) acre will require both a County of Maui grading or grubbing permit and a State Department of Health

National Pollution Discharge Elimination System (NPDES) General Permit.

b. Potential Impacts and Mitigation Measures

Based on the past and current use of the subject property, there is no evidence of hazardous materials at the property. As noted previously, up until about the mid-1980's the project site was used for sugar cane and pineapple cultivation. During future site work if large amounts of construction debris or unidentifiable substances (containers) are discovered, proper waste identification, testing, and applicable waste handling and disposal procedures will be implemented.

Use of fertilizers within residential lots and within common areas will be in a manner consistent with best landscape practices to avoid over use of soil amendments and nutrients. With such practices, there are no anticipated adverse effects on groundwater resources attributed to fertilizer use. The proposed drainage plan will be designed to capture and retain all increases in surface storm water runoff within the subject property. No adverse impacts to surface, underground, or marine resources are anticipated.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Regional Setting

a. Existing Conditions

The project area is located at the outskirt of Wailuku before Waikapu and adjacent to agricultural lands and residential areas. Wailuku serves as the seat of County and State governments, with several agencies headquartered in the civic center area between Kaohu Street and Main Street. Wailuku also serves as a center for professional services, including medical, dental, legal, and design professions.

b. Potential Impacts and Mitigation Measures

As noted earlier, the subdivision property is in proximity to other

residential areas of similar character with structures, streets, and services of urban type. The proposed project will include single-family homes, multi-family units, and rural lots. The rural lots will serve as a transition between surrounding residential development and agricultural lands in the vicinity of the subdivision area.

The overall goal of the project is to provide, at the Wailuku-Waikapu interface, low density development which preserves the rural character of the area and serves as a buffer between the two (2) urbanized locales.

2. Population and Demography

a. Existing Conditions

The population of the island of Maui has exhibited relatively strong growth over the last two (2) decades. The 2000 population was estimated at 117,644, an increase from the 1990 population of 91,361. The year 2005 population was estimated at 129,471, while the population for the year 2020 is projected to be 162,370 (Maui County Planning Department, 2006).

The estimated year 2000 population for the Wailuku-Kahului Community Plan region was 41,503. The region's population shows an estimated increase to 46,626 in the year 2005. By the year 2020, population in the region is projected to increase to 60,877 (Maui County Planning Department, 2006).

The average household size in the Wailuku-Kahului area in the year 2000 was 3.17 compared to an island wide average of 2.90. These numbers are expected to decrease to an average of 3.03 and 2.80, respectively, by the year 2010 and 2.98 and 2.72, respectively, by the year 2020 (Maui County Planning Department, 2006).

The median household income in the County of Maui in the year 2000 was $43,261.00. A more detailed breakdown of household income based on the U. S. Department of Housing and Urban Development (HUD) median county income in this region is provided in **Table 9.**

Table 9. Household Income

Number of Households Earning No More Than	2000	2010	2020
50% of HUD Median	4,212	3,795	4,327
80% of HUD Median	6,712	7,417	8,461
100% of HUD Median	8,682	8,995	10,275
120% of HUD Median	9,923	10,625	12,099
140% of HUD Median	10,816	12,251	13,934
Source: SMS Socio-Economic Forecast, 2006.			

b. Potential Impacts and Mitigation Measures

Assuming an average household size of 3.0, the population of the proposed subdivision at build out (Year 2022) is estimated to be 2,262. This population is encompassed within the normal range of population growth estimated for the Wailuku-Kahului Community Plan region, as set forth by the County of Maui. Thus, the increase in population in the Wailuku-Kahului Community Plan region should be within expected growth parameters defined by migration and birth/death rates. The proposed project will address demands for local affordable and market-type housing by existing residents on the island of Maui. No significant impacts to demographic characteristics (e.g. population cohort shifts) are anticipated.

3. Housing

a. Existing Conditions

According to the SMS Socio-Economic Forecast for Maui County, in the year 2000, the island of Maui's housing supply totaled 56,377 units of which 23 percent, or 13,113 units, were located in the Wailuku-Kahului

Community Plan area. This area accounts for the largest percentage of housing units on the island. In the year 2000, there was a housing demand for 13,528 housing units. As the number of households will increase, so will the demand for housing. In the year 2010, the number of households in the Wailuku-Kahului area is estimated to be 15,149 and demand is projected to grow to 15,978 units. By the year 2020, the number of households will increase to 17,357 and demand will grow to 18,270 units (Maui County Planning Department, 2006).

In November 2008, the average sales price for a single-family home in Central Maui was $484,207.00. The average sales price of a condominium in central Maui was $303,227.00 (Realtors Association of Maui, December 2008).

b. Potential Impacts and Mitigation Measures

An assessment of the Pu`unani Subdivision on the demand for housing was carried out by ACM Consultants. Refer to **Appendix "A"**.

Maui real estate sales have recently been at record highs with a short supply of affordable housing. The 2006 Market Study identified eleven (11) large developments and estimated that between 15,700 and 17,500 units are expected within the next 5 to 20 years depending on the financial outlook of the County and acceptance of these potential developments by government and the community.

Based on the experience of the past 10 years, approximately 463 units per year are being sold. The 2006 Market Study estimated that there was a current short-term supply of 2,107 new units which would last approximately 4.5 years. It further estimated that with the anticipated increase in population on Maui and the intensified demand for housing this supply would last 2.6 years.

In this light, the short-term supply of single-family homes in Maui appears to be insufficient for the next five (5) or so years. The proposed project is anticipated to increase the housing supply, especially affordable housing over the build out period, estimated to be through the year 2022.

It is anticipated that the product types offered by the project will be in keeping with market trends and needs. The local community possesses an intense desire for property in this neighborhood, proven by the rapid absorption of previous subdivisions in the area. In addition, the subject multi-family units will provide affordable homes to 377 families on Maui. Furthermore, the proposed rural lots will bring a new type of product to the market in Wailuku and should meet with excellent demand. Low density subdivisions in Central Maui have been well received by the market in past years because they offer larger rural lots in proximity to urban settings. Additionally, during the time that the subject project is approved and construction begins, much, if not all, of the existing supply in ongoing projects will most likely be depleted.

This development will give market participants additional choices in single-family and multi-family living. In recent years, demand has far outpaced supply in the real estate market, leading to dramatic increases in real estate prices across the board. The increased supply will give the consumer a broader variety of choices, provide a better balance in the supply and demand equation, and should lead to more affordable housing to Maui's residents.

4. Economy and Labor Force

a. Existing Condition

The Wailuku region is the island's center of governmental activity. Along with neighboring Kahului, the region encompasses a broad range of commercial, service, and public sector activity. In addition, the region is surrounded by acres of sugar cane and pineapple crops. The vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Maui Pineapple Company, are key contributors to the local economy.

In October 2008, Maui County and the island of Maui unemployment rates (not seasonally adjusted) were 5.3 percent and 5.0 percent, respectively (Labor and Occupational Information Hawai`i, State Department of Labor and Industrial Relations, 2008). In terms of employment distribution, the Wailuku-Kahului region is consistent with the County-wide trend in

various occupational categories shown in **Table 10**.

Table 10. Employment Distribution

Occupational Category	Maui County	Wailuku-Kahului
Agriculture	3 percent	4 percent
Manufacturing	2 percent	5 percent
Construction	4 percent	1 percent
Transportation, Communication, and Utilities	6 percent	10 percent
Trade	21 percent	22 percent
Banking and Finance	4 percent	4 percent
Hotel	14 percent	1 percent
Other Services	16 percent	18 percent
Government	9 percent	14 percent
Self-Employed	21 percent	22 percent
Source: SMS, 2002.		

b. Potential Impacts and Mitigation Measures

An assessment of the Pu`unani Subdivision on the economy was carried out by ACM Consultants. Refer to **Appendix "A"**. The following is a summary of the impacts on the economy.

On a short-term basis, the project will support construction and construction-related employment. Accordingly, the project will have a beneficial impact on the local economy during the period of construction.

From a long-term perspective, residential homeowners will require services related to home maintenance and improvement which are expected to further support local business owners.

Real property taxes generated by the project will contribute to the County's revenue base to support any increase in regional public service demands over time.

The development of the Pu`unani Subdivision will contribute to Maui's

economy while simultaneously provide much needed housing for its growing population.

C. PUBLIC SERVICES

1. Police Protection Services

a. Existing Conditions

Police protection for the Wailuku and Waikapu region is provided by the Maui County Police Department headquartered on Mahalani Street, approximately 4.0 miles from the project site. The region is served by the Department's Central Maui station, which is divided in three (3) sectors. Each sector is divided into three (3) beats, each patrolled by a single officer.

b. Potential Impacts and Mitigation Measures

The Maui County Police Department is reviewing a new police station in Kihei. Once built, the new police station will relieve additional service needs from anticipated new developments.

The proposed action is not anticipated to affect the service capabilities of police protection operations. The project will not extend the existing service area limits for emergency services.

2. Fire Protection Services

a. Existing Conditions

Fire prevention, suppression, and protection services for the Waiehu/Waihee and Wailuku regions are provided by the County Department of Fire and Public Safety's Wailuku station, located on Kinipopo Street in Wailuku Town, approximately 2.0 miles from the project site. The region is also served by the Department's Kahului Station, located on Dairy Road, approximately 5.0 miles from the project site.

b. Potential Impacts and Mitigation Measures

The proposed action is not anticipated to affect the service capabilities of fire protection operations. The project will not extend the existing service area limits for emergency services.

The Department of Fire and Public Safety is reviewing a new fire station site in Pi`ihana Project District located between Wailuku and Waihee to accommodate new developments in the area.

3. Medical and Emergency Services

a. Existing Conditions

Maui Memorial Medical Center, the only major medical facility on the island, serves the Wailuku-Kahului region. Acute, general, and emergency care services are provided at the 231-bed facility. Other private medical service providers in the Central Maui region, which have regular hours, include Maui Medical Group and Kaiser Permanente.

b. Potential Impacts and Mitigation Measures

The proposed action is not anticipated to affect the service capabilities of emergency medical operations. The project will not extend the existing service area limits for emergency services.

Coordination will be undertaken with appropriate agencies to address service capabilities of emergency medical operations.

4. Solid Waste and Disposal Services

a. Existing Conditions

Single-family residential solid waste collection service is provided by the County of Maui. Residential solid waste collected by County crews is disposed at the County's Central Maui Landfill (CML), located four (4) miles southeast of the Kahului Airport. Commercial waste from private collection companies is also disposed at the CML.

Privately owned facilities, such as the Maui Demolition and Construction Landfill and the Pohakulepo Concrete Recycling Facility, accept solid waste and concrete from demolition and construction activities. These facilities are located at Ma`alaea, southwest of the subject property, near Honoapi`ilani Highway's junction with North Kihei Road and Kuihelani Highway. A privately operated green waste recycling facility is located at the Central Maui Landfill.

b. Potential Impacts and Mitigation Measures

A solid waste management plan will be developed for the disposal of materials resulting from the site and construction activities, as appropriate. Once completed, it is anticipated that the rural and single-family residential lots would be served by the County of Maui's solid waste collection operations. The multi-family components of the project would be served by a private waste collection company. The proposed action is not expected to affect County services or infrastructure capacities for solid waste. It is noted that the County of Maui's Solid Waste Division recently opened its landfill expansion project, estimated to provide the island with sufficient capacity for several years. In addition, lands adjacent to the existing landfill are currently utilized for rock quarrying and will likely be available for County expansion of the landfill, further increasing available capacity.

5. Recreational Resources

a. Existing Conditions

A number of recreational facilities are located in the vicinity of the subject parcels. The Waikapu Community Center is located off of Waiko Road in Waikapu. This County-owned facility includes a baseball field, basketball court, and community center. A nearby park, adjacent to the Hale Makana O Wai`ale Affordable Housing complex, contains a baseball field, basketball court, and playground equipment. Park areas are also encompassed within the adjacent Kehalani Project District.

Additionally, the Central Maui region encompasses a full range of recreational opportunities, including shoreline and boating activities at the Kahului Harbor and adjoining beach parks, and individual and organized athletic activities offered at numerous County parks. The Keopuolani Park has various trails for walking or running, as well as numerous playfields, a skate park, and restroom facilities. Across the street from the park are various ballparks, a multi-purpose field, the War Memorial gymnasium, War Memorial Stadium, and Ichiro Maehara Stadium. The Velma Santos Community Center (also known as the Wailuku Community Center) is located within the Wailuku region. Wells Park, Papohaku Park, the Wailuku Gym, and Wailuku Swimming Pool are also located within a two-mile radius.

b. Potential Impacts and Mitigation Measures

The project involves the development of approximately 754 lots and units for residential use. Options for fulfillment of parks and playground requirements include land dedication, payment of fees in lieu of land dedication, or a combination of land dedication and fee payment. Open space and park areas will be incorporated in the subdivision plan. Coordination with the Department of Parks and Recreation will be undertaken to ensure compliance with applicable park assessment requirements. In particular, it is the intent of the applicants to utilize an 11.5-acre park in the subdivision to address parks and playground assessment requirements. Park improvements proposed include grading, landscaping, irrigation, a comfort station, and parking for twenty (20) vehicles.

6. Schools

a. Existing Conditions

An elementary school, to be operated by the State of Hawai`i, Department of Education (DOE), is planned for the Kehalani Project District, in close proximity to the project site.

Presently, the DOE operates three (3) public schools in Wailuku, Maui and

one (1) in Kahului that serves the Wailuku-Ma`alaea area. They are: Baldwin High School for grades 9 to 12; Iao Intermediate School for grades 6 to 8; Wailuku Elementary School for Kindergarten to grade 5; and Pomaikai Elementary School for Kindergarten to grade 5. The DOE projected 2009 to 2010 school year enrollment is provided in **Table 11**.

Table 11. Public School Enrollment Data

School	Capacity for 2005 to 2006 School Year	Enrollment 2008 to 2009 School Year	Projected Enrollment 2009 to 2010
Baldwin High School (Grades 9 to 12)	1,542	1,515	1,595
Iao Intermediate School (Grades 6 to 8)	883	860 (833**)	837
Wailuku Elementary School (Grades K to 5)	1,110	871 (1,111**)	1,164
Pomaikai Elementary School (Grades K to 5)	680*	460	500

Source: State of Hawai`i, Department of Education, 2008.
* 2007-2008 School year when school opened.
** Projected enrollment

The St. Anthony Schools are Catholic-faith based private schools in Wailuku, administered by the Marianist Brothers and Priests. They operate the St. Anthony junior and senior high school, grade school, and the pre-school. In the 2008-2009 school year, St. Anthony Jr. and Sr. High School had an enrollment of 250 students with an enrollment capacity for 450 students. The elementary school had an enrollment of 185 students and an enrollment capacity for 204 students. The recently accredited pre-school has a capacity enrollment for 48 students.

There is one (1) private pre-school for 3 to 4 year olds of native Hawaiian ancestry, operated by Kamehameha Schools, located in the Paukukalo subdivision near the park and community center. The pre-school has an enrollment capacity of 80 students. First enrollment priority is intended for children within the Paukukalo development, the second priority is children

from Waiehu Kou, and the third priority is children from the Waihee Elementary School District. Remaining openings are for children living elsewhere on Maui.

b. Potential Impacts and Mitigation Measures

The implementation of the Pu`unani Subdivision at full build-out is anticipated to generate 257 students. This projection was based on DOE's review of an earlier version of the project's site plan, and will be updated as the project continues through the land use entitlements process.

The DOE general guidelines for student enrollment projections indicate that the proposed subdivision is anticipated to preliminarily generate new student enrollments as follows:

Elementary School ..... 134 students

Intermediate School ..... 57 students

High School ..... 66 students

Educational assessments are required for the Pu`unani Subdivision project as it meets the criteria of 50 residential units or more. Coordination between the applicants and the Department of Education (DOE) has begun to ensure that the assessment policy provisions are appropriately addressed. Should impact fees be assessed and collected, they are assured to be earmarked for complex area schools such as Wailuku Elementary, Iao School, and Baldwin High School. Therefore, it is anticipated that these funds will assist in the upgrade and improvement to the schools servicing the Wailuku region.

The DOE anticipates that the proposed project will have an enrollment impact on the public schools serving Central Maui and has considered the project area for an elementary school site, requiring 12.0 acres of land. Additionally, the DOE has identified new elementary school sites in the neighboring Kehalani project area and at the Hale Mua Subdivision located between Wailuku Town and Waihee Town.

New schools in Central Maui will be dependent on school fair-share contributions of land and cash, therefore, the DOE will ask the State Land Use Commission to impose a school fair-share contribution condition. The project's fair-share contribution condition would include an in-lieu contribution.

Coordination with the DOE and the State Land Use Commission will continue to ensure that assessment policy provisions are appropriately addressed.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

**Honoapi`ilani Highway** is a two-lane, two-way State arterial that runs from the Wailuku and Waikapu areas to West Maui. The highway runs north-south from Wailuku to Ma`alaea and then shifts direction, extending in an east-west direction to Lahaina, Ka`anapali, and Kapalua. In the vicinity of the proposed project site at the Kuikahi Drive signalized intersection, the highway has separate left-turn lanes and a posted speed limit of 30 miles per hour (mph). The applicants are proposing right-turn in, right-turn out access to the project site off of Honoapi`ilani Highway from a relocated access to Old Waikapu Road.

Kuikahi Drive is a two-way, two-lane County road that runs east-west bisected by Honoapi`ilani Highway that connects to the Wailuku Heights subdivision to the west, and Wai`ale Road to the east. Access to the project site is proposed at three (3) locations off of Kuikahi Drive.

**Wai`ale Road** is a two-lane, two-way County road that runs north-south from Wailuku to Waikapu, parallel to Honoapi`ilani Highway.

A Traffic Impact Assessment Report (TIAR) was prepared by Phillip Rowell and Associates, dated February 6, 2006 and revised on December 3, 2008. See **Appendix "G"**.

Traffic counts were performed during the first week of November 2007. The morning counts were performed between 6:30 a.m. and 9:00 a.m. The afternoon counts were performed between 3:30 p.m. and 6:00 p.m. Traffic counts were taken at the following intersections:

- Honoapi`ilani Highway at Kuikahi Drive;
- Honoapi`ilani Highway and East Waiko Road;
- Honoapi`ilani Highway at Pilikana Road;
- Wai`ale Road and Kuikahi Drive;
- Wai`ale Road and Waiinu Road; and
- Wai`ale Road and East Waiko Road.

The highway analysis was consistent with procedures established in the "Highway Capacity Manual" (Transportation Research Board 2000).

The analysis is based on the concept of Level of Service (LOS), a qualitative and quantitative assessment of traffic operation, with LOS A representing ideal traffic operating conditions and LOS F representing unacceptable or congested traffic conditions. The existing LOS was recorded as follows:

1. The intersection of Honoapi`ilani Highway at East Waiko Road operates at LOS C during both the morning and afternoon peak hours. The northbound and southbound through movements operate at LOS A or B, but the side street approaches and minor movements operate at LOS E or F. This is primarily a result of the long traffic signal cycle length.

2. The intersection of Honoapi`ilani Highway at Pilikana Street operates at LOS B during the morning peak hour and LOS A during the afternoon peak hour.

3. At the intersection of Honoapi`ilani Highway at Kuikahi Drive, all traffic movements operate at LOS D, or better, except the northbound left during the morning peak hour and the westbound left during the

afternoon peak hour, which operates at LOS E. The overall intersection operates at LOS C during both peak hours.

4. At the intersection of Wai`ale Road at East Waiko Road, all controlled movements operate at LOS A or B.

5. At the intersection of Wai`ale Road at Kuikahi Drive, all controlled movements operate at LOS D, or better.

6. At the intersection of Wai`ale Road at Waiinu Road, the westbound left turn operates at LOS E during the morning peak hour and LOS F during the afternoon peak hour. All the remaining controlled movements operates at LOS A or B.

b. Potential Impacts and Mitigation Measures

In coordination with State and County governments, the applicants propose to realign and improve a portion of Old Waikapu Road and utilize it as one of three (3) access roads for the project from Kuikahi Drive by extending the road approximately 1,000 feet to Kuikahi Drive. This first access will be located approximately 1,100 feet mauka of the Kuikahi Drive/Honoapi`ilani Highway signalized intersection. A second access will be provided directly across the Kehalani Parkway intersection on Kuikahi Drive. The third access on Kuikahi Drive will be approximately 1,000 feet mauka of the second access. Refer to **Figure 4**.

The project proposes to relocate the existing intersection of Old Waikapu Road at Honoapi`ilani Highway approximately 1,600 feet south of the signalized Kuikahi Drive/Honoapi`ilani Highway intersection and redesign the intersection as a right turn in/out only access. An internal project collector roadway will extend midway through the project area, running mauka to makai, to the relocated intersection on Honoapi`ilani Highway.

The rural zoned area of the project collector roads will have a minimum paved width of 24 feet, while the internal rural subdivision streets will be 22 feet wide. The applicants may opt to install rolled curb and gutter on all rural streets to curtail erosion, mitigate maintenance problems, and comply with Maui Electric Company (MECO) requirements. Streets in urban residential areas will have a curb to curb travel way of 28 feet with

sidewalks on one side. Travel ways on cul-de-sac streets will be 32 feet wide in accordance with Fire Department requirements. Traffic calming measures will also be installed at appropriate intervals to discourage speeding.

The TIAR for the Pu`unani Subdivision was prepared for purposes of assessing traffic impacts attributed to the proposed project and to identify appropriate measures to mitigate these impacts. Refer to **Appendix "G"**. The study examined existing and future traffic conditions with and without the project, traffic assignment, and LOS analysis.

In preparing estimates of future traffic volume conditions, an annual traffic volume growth rate of 1.86 percent was used for morning peak hour and 1.65 percent for afternoon peak hour was utilized (based on the February 1997 Maui Long-Range Land Transportation Plan). Additionally, traffic attributed to new and/or future projects in the vicinity of the proposed project were incorporated in the analysis. Among others, these projects include an unnamed single-family project, Waiolani Mauka, Kehalani Phase 2, Maui Lani, Maalaea Mauka, Kehalani Commercial, and Emmanuel Lutheran Church and School.

A detailed description of planned projects and assumptions made relative to these projects are presented in **Appendix "G"**.

Finally, in undertaking the traffic analysis, proposed roadway improvements anticipated to be completed within the implementation timeframe of the proposed Pu`unani Subdivision were identified. These projects include the following:

1. Signalization of the intersections of Wai`ale Road at Kuikahi Drive and Wai`ale Road at Waiinu Road; and

2. Kuikahi Drive between Honoapi`ilani Highway at Wai`ale Road will be widened from two to four lanes to accommodate improvements associated with the traffic signals.

In analyzing future conditions, 2015 background traffic projections were

calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects.

The LOS analysis of the signalized intersections was performed for background and background plus project conditions and then compared. The assumptions used for the LOS analysis are:

1. The existing intersection configurations will be maintained.

2. The intersections of Wai`ale Road at Kuikahi Drive and Wai`ale Road at Waiinu Road will be signalized.

3. Kuikahi Drive between Honoapi`ilani Highway and Waiko Road will be widened from two to four lanes.

4. Kuikahi Drive between Honoapi`ilani Highway and the entrance to Kehalani Phase 2 is assumed to be four lanes wide. The roadway has already been widened along the north side of the road to accommodate two lanes in addition to the existing two lanes.

5. It was assumed that the intersections along the internal Road A of the project would be four-way STOP sign controlled intersections. This is recommended as a traffic calming measure to reduce vehicle speeds.

For all signalized study intersections, all movements will operate at LOS D or better. As LOS D is the minimum acceptable LOS, no mitigation of the signalized intersections is required.

With the exception of the intersection of Wai`ale Road at Kuikahi Drive, all controlled lane groups will operate at LOS C or better, during all peak periods. At the intersection of Wai`ale Road at Kuikahi Drive, the eastbound to northbound left turn will operate at LOS F during both weekday peak periods, with and without the project. Mitigation will be required for this intersection to operate at an acceptable LOS.

The TIAR recommends the following mitigation:

1. Kuikahi Drive west of Honoapi`ilani Highway should be widened from two and four lanes. The northern side of Kuikahi Drive has been widened to accommodate two lanes in addition to the existing two lanes. The intersection of Honoapi`ilani Highway at Kuikahi Drive would be modified to accommodate this widening and to provide separate left and right turn lanes along all four approaches.

2. Kuikahi Drive between Honoapi`ilani Highway and Wai`ale Road should be widened from two to four lanes. This widening is primarily to accommodate traffic generated for Maui Lani and Kehalani Commercial project that is to be located along the north side of Kuikahi Drive between Honoapi`ilani Highway and Wai`ale Road. Accordingly, this widening should not be the responsibility of Pu`unani.

3. The primary reason for the low levels-of-service along Honoapi`ilani Highway is the heavy northbound and southbound through traffic and the heavy turning movements at the intersections for traffic to get to and from Wai`ale Road. A new connection between Wai`ale Road and Honoapi`ilani Highway in the vicinity of the Maui Tropical Plantation will divert a significant portion of this through traffic. This connection should be pursued jointly by the County of Maui and the developers of Maui Lani, Kehalani, Maalaea Mauka, Pu`unani, and other developers with projects in the area.

4. The connection of Road C at Kuikahi Drive should be removed so that the existing intersection configuration can be retained in order to mitigate the reduced level-of-service as a result of adding the northbound approach to the intersection. The traffic generated by Pu`unani can be accommodated by the adjacent intersections at acceptable levels-of-service.

5. The intersections along Road A should be all-way STOP sign controlled as a traffic calming measure.

2. Water

a. Existing Conditions

Water to the Wailuku-Kahului region is provided by the County Department of Water Supply (DWS) Central Maui System which also serves the Paia, Ma`alaea, Kihei, and Makena areas. See **Appendix "H"**. About 75 percent of the water is drawn from the Iao Aquifer, which has a

capacity of 20 million gallons per day (MGD). The remaining 5 MGD is drawn from the adjacent Waihee Aquifer, tapped from the North Waihee wells. A new well, which taps into the Iao aquifer, is currently being developed in Waikapu near Waiko Road.

There is an existing 300,000 gallon tank that serves Wailuku Heights. The applicants participated in enlarging the planned 300,000 gallon storage tank to be located at elevation 835 ft. serving Kehalani Mauka to a 500,000 gallon storage tank to accommodate the proposed project. Kehalani Mauka, LLC is currently installing a 1.5 million gallon tank at the 670 foot elevation, northwest of the project area.

b. Potential Impacts and Mitigation Measures

Upon project completion, lots at the 725 to 815 foot elevations will be part of the high-level service (HLS) area and will be connected to the Wailuku Heights water system. Since there will be only 15 lots in the HLS area, water for these lots will be stored in an existing 300,000 gallon tank in Wailuku Heights, near the 1,080 foot elevation.

Lots at the 560 to 725 foot elevations will be serviced by the mid-level service (MLS) area and connected to the Kehalani Mauka project's HLS water system. Water for these lots will be stored in a 500,000 gallon tank that the applicants participated in the expansion of the planned 300,000 gallon tank to be located at the 835 foot elevation that serves Kehalani.

Lots at the 350 to 560 foot elevations will be serviced by the low-level service (LLS) area and connected to the water system being constructed by Hawaii Land & Farming, Company, Inc. for the Kehalani project, located north of Kuikahi Drive. Based on the 1,000 gallon per rural lot consumption rate agreed to by the Department of Water Supply (DWS), water for these lots will be stored in a 1.0 MG tank that the applicants plan to construct next to the existing 1.0 MG tank at the 670 foot elevation, northwest of the project area.

The applicants are pursuing the development of a domestic water well in partnership with the County of Maui at the 660 foot elevation on the project

site on Parcel 3. The domestic water well is anticipated to yield approximately 2.0 million gallons (MGD) of water per day. Although the well will be tapping the Iao Aquifer, it will be in keeping with the State of Hawai`i, Department of Land and Natural Resources, Commission on Water Resource Management's (CWRM) recommendation to disperse the well locations to minimize intrusion of brackish water into the aquifer.

The applicants have a letter of intent executed by the Director of DWS and the Mayor for the County of Maui. Refer to **Appendix "I"**. The applicants agree to provide the land and pay for the drilling, testing, and installation of all equipment for the new well in return for receiving a 25 percent allocation from the well. This agreement is subject to review and approval of the CWRM and the Maui County Council.

Water from the surface water treatment plant at the Iao tank site and the Waikapu well, whenever it is completed, will serve as backup for this new well. The applicants provided the easements required for the transmission line from the Waikapu Well to connect to the County's system at Kehalani.

3. Wastewater

a. Existing Conditions

Wastewater from the Wailuku region is treated at the Wailuku-Kahului Wastewater Reclamation Facility (WWRF). The WWRF also receives flow from Kuau, Paia, Skill Village, and Spreckelsville. Currently, the WWRF has a design capacity of 7.9 million gallons per day (MGD) average dry-weather flow (ADWF). According to the Department of Environmental Management, as of October 2008, the current flow at the WWRF is between 4.8 to 4.9 MGD. Allocated capacity is currently at 6.85 MGD. Approximately 1.0 MGD is available for new developments. Effluent disposal is via eight (8) gravity injection wells. Principal solids are treated, processed and digested, dewatered, and composted at the Central Maui Landfill. There are 15 major wastewater pump stations (WWPS) which are part of the WWRF system.

b. **Potential Impacts and Mitigation Measures**

The average wastewater flows for the project area were estimated using County of Maui standards. The total average wastewater flows generated by the project is estimated to be about 272,300 gallons per day. The proposed project will require the installation of an 8-inch gravity collector, along the easterly boundary of the project site, along Honoapi`ilani Highway for connection to an existing 8-inch service line on East Kuikahi Drive. The applicants will also pay the assessment for Facility Expansion of the Wailuku/Kahului Wastewater Treatment System, as provided for in Chapter 14.35, Maui County Code. Coordination with the Department of Environmental Management, Wastewater Reclamation Division (WWRD) will be carried out during the subdivision application process to ensure wastewater capacity will be available for the proposed project.

4. **Drainage**

a. **Existing Conditions**

The existing terrain slopes downward from west to east at grades between 8 and 12 percent. Elevations across the project site range from approximately 810 feet above mean sea level at its western end, to roughly 350 feet at its eastern end. Notable topographic features found on the site include an existing 3-acre irrigation reservoir located at elevation 725 ft., and an existing irrigation ditch which crosses the site at elevation 450 ft. Two (2) gullies running west to east cut across the upper portion of the project site before converging into a single gully at elevation 450 ft. which continues down to Honoapi`ilani Highway.

Runoff from approximately 339 acres of the West Maui mountains and portions of Wailuku Heights, west and mauka of the project site, is conveyed via gullies that run through the proposed development area, eastward to a culvert crossing at Honoapi`ilani Highway. The magnitude of the 100-year, 24-hour peak runoff is estimated to be 1,300 cubic feet per second (cfs) at the mauka boundary of the site. Runoff from the undeveloped project area sheet flows and is conveyed by gullies eastward toward Honoapi`ilani Highway. The 100-year, 24-hour peak runoff

generated from the undeveloped project site is estimated to be 400 cfs.

b. Potential Impacts and Mitigation Measures

Post-development runoff from the project site is estimated to be 570 cfs. The increased runoff will be accommodated through the construction of a 9.6-acre onsite detention basin. The large detention basin will have a storage capacity of at least 15 acre-feet. The proposed basin will be sized to accommodate the increase runoff. The estimated 1,300 cfs offsite runoff from the mauka (west) properties will continue to flow through the property and cross Wai`ale Road into the Maui Lani Project District.

5. Electricity, Telephone, and Cable Television Systems

a. Existing Conditions

Electrical, telephone, and cable services for the project vicinity is provided by Maui Electric Company, Ltd., Hawaiian Telcom, and Oceanic Time Warner Cable, respectively. Overhead transmission lines are located along the eastern boundary of the project site, along Honoapi`ilani Highway. There are also underground electrical transmission lines along Kuikahi Drive, abutting the project site.

b. Potential Impacts and Mitigation Measures

Electrical, telephone, and cable television transmission lines will be installed underground and connect with existing systems on Honoapi`ilani Highway and Kuikahi Drive.

E. CUMULATIVE AND SECONDARY IMPACTS

Existing and future developments in the Wailuku to Ma`alaea region, including portions of Maui Lani, were the basis for analyzing potential cumulative and secondary impacts related to development of the Pu`unani Subdivision. It is noted that some of these projects are in the planning and entitlement phase and may not necessarily be constructed.

The TIAR prepared for the project examined and evaluated traffic impacts of the project, as well as the other potential projects in the Wailuku to Ma`alaea region, including portions of

Maui Lani. Based on the analysis, the TIAR has recommended the implementation of applicable traffic mitigation measures and improvements. To mitigate regional cumulative impacts, the TIAR recommended that this project participate with the County of Maui and other developers in the construction of a new connection between Wai`ale Road and Honoapi`ilani Highway in the vicinity of Maui Tropical Plantation.

With regard to the availability of drinking water for the project, the applicant has agreed to develop a new well site with an estimated capacity of 2 million gallons per day (gpd) in the project to replace the existing Shaft 33. The developer is in the process of executing a water agreement with the County of Maui to develop the new water source in which the developer will have 25 percent of the available water and the County will have access to 75 percent of the available water. Additionally, specific improvements to the water transmission and storage systems will be required by the County.

Sewage generated by the project will be treated at the Wailuku-Kahului Wastewater Reclamation Facility. As indicated by the County of Maui, Department of Environmental Management, wastewater system capacity is currently available for the project. The applicant will be required to make needed system improvements at the time of service. Also, applicable assessment fees for treatment plant expansion will be required. These system improvements and fees will also be applicable to other planned projects to mitigate impacts to the County sewer system and to maintain adequate system service.

The agricultural impact of this project is near negligible when taken in the context of the recent trends occurring on Maui. In the last 20 years, the closures of Wailuku Sugar Company and Pioneer Mill on Maui have taken significant acreages out of active sugar cane cultivation. These actions have greatly increased the supply of non-sugar based agricultural lands. In fact, much of the lands of these former plantations are still fallow. The proposed project will involve the use of approximately 208.1 acres of land, which represents 0.08 percent of the roughly 244,000 acres of State "Agricultural" district lands on the island of Maui. Further, rather than the available land supply, more salient factors facing the agricultural industry include the market demand for products (access to markets and local purchasing patterns) and the overall profitability of crops grown in Hawai`i.

In general, processes and mechanisms for coordinating mitigation measures attributable to cumulative impacts are in place. An example of a process which addresses cumulative impact is the scoping of infrastructure studies (including traffic impact) to include those

projects which are anticipated to be implemented within a time frame similar to that of the proposed action. Similarly, as noted, mechanisms for addressing impacts from more than a single project include impact fees or assessments which require fair-share contribution from the respective applicants.

The projects within the Wailuku to Ma`alaea region, including Maui Lani, represent potential future developments identified in the Wailuku-Kahului Community Plan region. The implementation time frames for these projects are dependent on their respective regulatory and market parameters which are not linked to the proposed Pu`unani Subdivision. It is in this context that the processes and mechanisms (noted above) for assuring cumulative evaluation have evolved. The proposed action is being planned and will be implemented within this framework.

Secondary impacts are those which have the potential to occur later in time or farther in distance, but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects, for example, can occur because they can induce development by removing one of the impediments to growth-transportation access.

Aside from the direct development impacts discussed in the previous sections of this chapter, secondary impacts may be attributed to project effects on the island's overall housing situation. That is, the provision of housing in the Wailuku area may affect demand and pricing in other areas of the island, depending on market conditions at the time of project development. As noted previously, a significant increase in housing supply will be needed to accommodate the region's anticipated growth. The project will provide resident housing opportunities for Maui residents in both the near and long term. This in turn is anticipated to result in a more balanced housing market. The project will also provide a new housing type (rural lots) not currently available in the Wailuku-Kahului town area.

As noted previously, the project will result in construction-term expenditures, wages and taxes. Real property taxes will contribute to the County's revenue tax base to support the increase in public services. The project is not anticipated to have a significant adverse impact on the physical environment. As noted in previous sections, no adverse impacts on historic properties, cultural practices or rare, threatened or endangered species are anticipated. Necessary infrastructure systems and services can be reasonably provided to serve the project. The proposed action is not anticipated to result in significant adverse

secondary impacts.

III. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

III. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICT

Pursuant to Chapter 205, Hawai`i Revised Statutes (HRS), all lands in the State have been placed into one (1) of four (4) land use districts by the State Land Use Commission. These land use districts have been designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is classified "Agricultural". Refer to **Figure 5**. The proposed action involves a request for reclassification from the "Agricultural" District to the "Urban" and "Rural" Districts. Refer to **Figure 6**.

A State Land Use District Boundary Amendment (DBA) for the 208-acre project site for reclassification from the "Agricultural" district to the "Urban" and "Rural" districts is currently being requested as part of the entitlement applications to enable implementation of the Pu`unani Subdivision. The applicants filed the DBA petition with the Land Use Commission on June 2, 2006. Criteria considered in the reclassification of lands are set forth in the State Land Use Commission Rules (Chapter 15-15-18, Hawai`i Administrative Rules (HAR)).

B. LAND USE COMMISSION RULES, CHAPTER 15-15, HAWAI`I ADMINISTRATIVE RULES

The proposed reclassification of the subject property is in conformance with the following standards of the Urban District set forth in Chapter 15-15-18, HAR:

Chapter 15-15-18

(1) It shall include lands characterized by "city-like" concentrations of people, structures, streets, urban level of services and other related land uses.

Comment: The proposed project is adjacent to the Waiolani Mauka and Wailuku Heights Subdivision II. The Koa Subdivision, Akolea Subdivision, and Maunaleo Subdivision, all located within the Kehalani Project District, are located along Kuikahi Drive, adjacent to the

project site. It is also in close proximity to Wailuku Town and Waikapu Town, which consist of single-family residential, commercial, and recreational uses.

(2) It shall take into consideration the following specific factors:

A. Proximity to centers of trading and employment except where the development would generate new centers of trading and employment.

Comment: The area proposed for reclassification is proximately located to existing commercial and employment centers in Kahului and Wailuku towns. Both areas serve as the central business districts of the island. There are a few commercial uses in Waikapu Town, but Waikapu consists primarily of residential and rural uses. Federal, State, and County government offices and courts are located in Wailuku. Additionally, numerous employment opportunity exists in the retail, service, and business district of central Maui.

B. Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection.

Comment: Basic infrastructure, such as transportation systems, drainage, and public utility hook-ups are available in close proximity to the project. Domestic water supply, roads, wastewater service, and solid waste collection for the project will be coordinated with the County of Maui, Departments of Water Supply, Public Works, and Environmental Management. The area is also located in close proximity to Honoapi`ilani Highway. Drainage improvements will comply with County of Maui standards. Two (2) State Department of Education (DOE) schools and public parks are located in close proximity to the project site. Health care facilities, as well as police and fire protection services, are also available in Wailuku. Further, the internal transportation system will include provisions to allow for the County's bus service to be extended into the subdivision to reduce the project's dependency on the automobile. Bike paths will also be included in the roadway design.

C. Sufficient reserve areas for foreseeable urban growth.

Comment: The area of proposed reclassification involves the development of approximately 208 acres for single-family and multi-family residential purposes. Development of the subject property should help address a portion of the existing

housing demand without significantly affecting reserve areas for urban growth. The proposed project involves the development of different housing types, including both single-family and multi-family product varieties. The project will be constructed in phases over a period of approximately ten (10) years depending on market demand.

(3) It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil condition, and other adverse environmental effects.

Comment: The site is relatively flat with an average cross-slope of 11 percent. The project site is located in Zone C, an area of minimal flooding. The project site is not subject to tsunami inundation, nor is it characterized by unstable soil conditions. Drainage improvements will be designed in consultation with applicable governmental agencies to mitigate potential runoff and adverse environmental impacts. No foreseeable adverse environmental effects are anticipated in conjunction with the project.

(4) Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans.

Comment: The subject properties are contiguous with urban district lands to the north, west, and south. Additionally, the Wailuku-Kahului Community Plan designates a portion of the subject property for single-family use. Refer to **Figure 7**.

(5) It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans.

Comment: A majority of the project site is designated "Agriculture" by the Wailuku-Kahului Community Plan. The project area is in the vicinity of the residential land uses of the Kehalani Project District, the Wailuku Heights Subdivision, and Waiolani Subdivisions. The Wailuku-Kahului Community Plan also designates lands within the subject area for single- family uses. The lands proposed for reclassification are, therefore, located within an area suitable for new urban growth as evidenced by the existing urban uses and land reserved for future residential development in the vicinity of the project area.

(6) It may include lands which do not conform to the standards in paragraphs (1) to (5):

A. When surrounded by or adjacent to existing urban development; and

B. Only when those lands represent a minor portion of this district

Comment: The subject property conforms with standards in paragraphs (1) to (5). Moreover, it lies adjacent to Wailuku Heights, Kehalani Project District, and Waiolani Mauka, which are existing urban development areas. The proposed project site represents a small portion of the approximately 244,000 acres of the Agricultural District on the island of Maui and has been uncultivated for several years since Wailuku Sugar Company ceased its agricultural operations.

(7) It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services.

Comment: The proposed reclassification will not result in scattered spot urban development. The project site lies adjacent to Waikapu and Wailuku Towns. The proposed development will not necessitate public investment in infrastructure facilities or public services. The applicants will comply with applicable provisions regarding provision of infrastructure facilities.

(8) It may include lands with a general slope of twenty percent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction controls, as adopted by any federal, state or county agency, are adequate to protect the public health, welfare and safety, and the public's interest in the aesthetic quality of the landscape.

Comment: The subject property slopes from 815 to 350 feet with a cross slope of approximately 11 percent. Governmental regulations will be followed to ensure protection of public health, safety, and welfare.

The proposed reclassification of the subject property is also in conformance with the following standards of the Rural District set forth in Chapter 15-15-21, HAR:

(1) Areas consisting of small farms; provided that the areas need not be included in this district if their inclusion will alter the general characteristics of the areas.

Comment: The subject land was formerly utilized for large-scale agricultural production, which is no longer economically viable. A portion of the land due south of the property remains in agricultural use. A small-lot agricultural subdivision, Waikapu Ranch, is located adjacent to Parcel 3. The proposed reclassification to the Rural district provides an appropriate transition from the urbanized lands to the north and the agricultural lands to the immediate south of the property.

(2) Activities or uses as characterized by low-density residential lots of not less than one-half acre and a density of not more than one single-family dwelling per one-half acre in areas where "city-like" concentration of people, structures, streets, and urban level of services are absent, and where small farms are intermixed with the low-density residential lots; and

Comment: The subject property is located between Wailuku and Waikapu, where urban uses meet agricultural land. As previously noted, the proposed Rural land use will result in a land use transition between the higher density Kehalani Project District area to the north and open, agricultural land to the south.

(3) It may also include parcels of land which are surrounded by, or contiguous to this district, and are not suited to low-density residential uses for small farm or agricultural uses.

Comment: The land proposed for rural classification is surrounded by urban and agricultural uses. The rural transition between agricultural and urban areas is considered appropriate, given the proximity of the project site to infrastructure and services.

C. CHAPTER 226, HRS, HAWAI`I STATE PLAN

Chapter 226, HRS, also known as the Hawai`i State Plan, is a long-range comprehensive plan which serves as a guide for the future long-range development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The proposed action is consistent with the following goals of the Hawai`i State Plan.

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai`i's present and future generations.

- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

- Physical, social, and economic well-being, for individuals and families in Hawai`i, that nourishes a sense of community responsibility, of caring, and of participation in community life.

1. **Objectives and Policies of the Hawai`i State Plan**

The proposed reclassification is consistent with the following objectives and policies of the Hawai`i State Plan:

Chapter 226-5, HRS, Objectives and Policies for Population.

226-5(a), HRS: It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.

226-5(b)(1), HRS: Manage population growth statewide in a manner that provides increased opportunities for Hawai`i's people to pursue their physical, social, and economic aspirations while recognizing the unique needs of each county.

226-5(b)(3), HRS: Promote increased opportunities for Hawai`i's people to pursue their socio-economic aspirations throughout the islands.

Chapter 226-6, HRS, Objective and Policies for the Economy -in General.

226-6(b)(6), HRS: Strive to achieve a level of construction activity responsive to, and consistent with, State growth objectives.

Chapter 226-11, HRS, Objectives and Policies for the Physical Environment - Land-Based, Shoreline, and Marine Resources.

226-11(a)(2), HRS: Effective protection of Hawai`i's unique and fragile environmental resources.

226-11(b)(3), HRS: Take into account the physical attributes of areas when planning and designing activities and facilities.

226-11(b)(8), HRS: Pursue compatible relationships among activities, facilities, and natural resources.

Chapter 226-12, HRS, Objective and Policies for the Physical Environment - Scenic, Natural Beauty, and Historic Resources.

226-12(b)(5), HRS: Encourage the design of developments and activities that complement the natural beauty of the islands.

Chapter 226-13, HRS, Objectives and Policies for the Physical Environment - Land, Air, and Water Quality.

226-13(b)(2), HRS: Promote the proper management of Hawai`i's land and water resources.

226-13(b)(6), HRS: Encourage design and construction practices that enhance the physical qualities of Hawai`i's communities.

226-13(b)(7), HRS: Encourage urban developments in close proximity to existing services and facilities.

Chapter 226-19, HRS, Objectives and Policies for Socio-Cultural Advancement - Housing.

226-19(a)(2), HRS: The orderly development of residential areas sensitive to community needs and other land uses.

226-19(b)(1), HRS: Effectively accommodate the housing needs of Hawai`i's people.

226-19(b)(3), HRS: Increase home ownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

226-19(b)(5), HRS: Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.

226-19(b)(7), HRS: Foster a variety of lifestyles traditional to Hawai`i through the design and maintenance of neighborhoods that reflect the culture and values of the community.

Chapter 226-23, HRS, Objective and Policies for Socio-Cultural Advancement - Leisure.

226-23(b)(4), HRS: Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

2. **Priority Guidelines of the Hawai`i State Plan**

The proposed action coincides with the following priority guidelines of the Hawai`i State Plan.

Chapter 226-103, HRS, Economic Priority Guidelines

226-103(1), HRS: Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

a. Encourage investments which:

(i) Reflect long term commitments to the State;

(ii) Rely on economic linkages within the local economy;

(iii) Diversify the economy;

(iv) Reinvest in the local economy;

(v) Are sensitive to community needs and priorities; and

(vi) Demonstrate a commitment to management opportunities to Hawai`i residents.

Chapter 226-104, HRS, Population Growth and Land Resources Priority Guidelines

226-104(a)(1), HRS: Encourage planning and resource management to insure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the

needs and desires of Hawai`i's people.

226-104(b)(1), HRS: Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.

226-104(b)(2), HRS: Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

226-104(b)(12), HRS: Utilize Hawai`i's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline conservation lands, and other limited resources for future generations.

Chapter 226-106, HRS, Affordable Housing Priority Guidelines

226-106(1), HRS: Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.

226-106(8), HRS: Give higher priority to the provision of quality housing that is affordable for Hawai`i's residents and less priority to development of housing intended primarily for individuals outside of Hawai`i.

D. STATE FUNCTIONAL PLANS

The State Functional Plans define actions for implementation of the Hawai`i State Plan through the identification of needs, problems and issues, and recommendations on policies and priorities, which address the identified areas of concern. The proposed reclassification request is consistent with the following State Functional Plans:

1. State Agricultural Functional Plan

State and County policies call for conserving and protecting prime agricultural lands, including protecting agricultural lands from urban development. However, these

policies, many of which were written before the major contraction of plantation agriculture in the 1990s, assume implicitly that profitable agricultural activities will be available to utilize these agricultural lands. This has proven to be a questionable assumption in view of the enormity of the contraction of plantation agriculture, the abundant supply of land that came available for diversified agriculture, and the slow growth in the amount of land being utilized for diversified agriculture.

Furthermore, discussions in the Agriculture portion of the *State Functional Plan* recognize that redesignation of lands from Agricultural to Urban should be allowed

> *"... upon a demonstrated change in economic or social conditions, and where the requested redesignation will provide greater benefits to the general public than its retention in ...agriculture;" that is, when an "overriding public interest exists."*

The enormous contraction in plantation agriculture, resulting in the supply of agricultural land far exceeding demand, constitutes a major change in economic conditions. Moreover, development of the project will provide community benefits (homes including affordable housing for seniors and veterans, a park, jobs, and tax revenues) that far exceed that which could be provided by diversified agriculture (about 26 jobs). In practice, development of the project will not result in a loss of existing or potential Statewide agricultural employment given that the project area is fallow and crop land is available elsewhere.

2. State Housing Functional Plan

Recent news reports and the growing demand for affordable housing indicate a current shortage of housing in the Central Maui area. The development of 377 affordable priced units, including approximately 200 units for seniors and veterans within the proposed subdivision will help address a critical community need, especially providing affordable housing for these groups. The community's needs at the time of construction will determine the amount of affordable housing that will be made available to these groups.

3. State Recreational Functional Plan

Outdoor recreation is recognized by the Hawai`i State Plan as an important part of life for Hawai`i's residents. As the population rises and residential land uses increase, creating areas dedicated to outdoor recreation becomes increasingly vital. The State Functional Plan for Recreation urges the improvement and expansion of recreational facilities in urban areas and local communities. The proposed action for the subdivision includes provisions to provide approximately 11.5 acres of park space to address this need.

E. COUNTY OF MAUI GENERAL PLAN

The 1990 update of the Maui County General Plan establishes broad objectives and policies to guide the long-range development of the County. As indicated by the Maui County Charter, the purpose of the general plan shall be to:

> *"... indicate desired population and physical development patterns for each island within the county; shall address the unique problems and needs of each island and region within the county; shall explain the opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns, and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development."*

The Maui County General Plan advances five (5) major themes that focus on the overall goals of the plan. The proposed project responds to the following General Plan theme:

Theme Number 2: Prepare a Directed and Managed Growth Plan

Amendments to the General Plan will preserve a desired quality of life where areas of urban settlement must be managed and directed within a framework that consistently and concurrently balances growth demands against human service needs and physical infrastructure supply.

Theme Number 5: Provide for needed resident housing

Amendments to the General Plan address the development of resident housing as a major social need in our community.

The proposed action is consistent with the following General Plan objectives relating to population, land use, housing, urban design, water, and public utilities and facilities.

POPULATION

Objective:

To plan the growth of resident and visitor population through a directed and managed growth plan so as to avoid social, economic and environmental disruptions.

Policy

Balance population growth by achieving concurrence between the resident employee work force, the job inventory created by new industries, affordable resident/employee housing, constraints on the environment and its natural resources, public and private infrastructure, and essential social services such as schools, hospitals, etc.

LAND USE

Objective:

To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.

Policy:

Provide and maintain a range of land use districts sufficient to meet the social, physical, environmental and economic needs of the community.

Objective:

To use the land within the County for the social and economic benefit of all the County's residents.

Policies:

Encourage land use patterns that foster a pedestrian oriented environment to include such amenities as bike paths, linear parks, landscaped buffer areas, and mini-parks.

Encourage land use methods that will provide a continuous balanced inventory of housing types in all price ranges.

Encourage programs to stabilize affordable land and housing prices.

HOUSING

Objective:

To provide a choice of attractive, sanitary and affordable homes for all our residents.

Policies:

Provide or require adequate physical infrastructure to meet the demands of present and planned future affordable housing needs.

Encourage the construction of housing in a variety of price ranges and geographic locations.

Ensure that each community plan region contains its fair share of affordable housing.

URBAN DESIGN

Objective:

To see that all developments are well designed and are in harmony with their surroundings.

Policy:

Require that appropriate principles of urban design be observed in the planning of all new developments.

Objective:

To encourage developments which reflect the character and the culture of Maui County's people.

Policies:

Encourage community design which establishes a cohesive identity.

Encourage the establishment of continuous green areas, bike-paths, active and passive recreation areas and mini-parks in new subdivision development.

WATER

Objective: To make more efficient use of our ground, surface and recycled water sources.

Policy: Maximize use of existing water sources by expanding storage capabilities.

PUBLIC UTILITIES AND FACILITIES

Objective: To improve the quality and availability of public facilities throughout Maui County.

Policy: Seek improvement in the maintenance and operation of public facilities.

F. WAILUKU-KAHULUI COMMUNITY PLAN

The project site is located within the Wailuku-Kahului Community Plan region, one (1) of nine (9) community plan regions established in the County of Maui. Planning for each region is guided by the respective community plans, which are designed to implement the Maui County General Plan. Each community plan contains recommendations and standards which guide the sequencing, patterns, and characteristics of future development in the region.

The Wailuku-Kahului Community Plan was adopted by the County of Maui through Ordinance No. 3061 which took effect on June 5, 2002.

Land use guidelines are set forth by the Wailuku-Kahului Community Plan Land Use Map. Refer to **Figure 7**. Most of the subject property is designated "Agriculture" by the Community Plan, with a 25-acre portion in the southeast corner designated as "Single-Family".

The Wailuku-Kahului Community Plan identifies several major problems and opportunities

of the region. The lack of affordable housing is identified as one of the major problems of the region; as a result, affordable housing opportunities for residents must be aggressively pursued. One of the housing groups identified are those families earning below 140 percent of median income needs. The project includes an affordable component and proposes to provide approximately 377 affordable multi-family housing units, including approximately 200 units for seniors and veterans, and is in compliance with Chapter 2.96 Residential Workforce Housing Policy, Maui County Code.

The Wailuku-Kahului Community Plan identifies its environment and traditional town character as opportunities within the region and emphasizes the desirability of the surrounding agricultural and open space landscape and the small villages such as Waikapu. The Community Plan recognizes that these agricultural/open space lands provide a buffer for urban development and enhances the visual character of the area. The Community Plan also recommends that the social fabrics of these small communities should be considered with respect to any surrounding urban expansion or intensification of land uses to protect the integrity and character of these established neighborhoods.

In recognition of the desirability of the surrounding environment and traditional town character, the project proposes to establish a rural buffer zone between Wailuku and Waikapu Towns as a transition zone between the more urbanized community of Wailuku and the rural community of Waikapu. It should also be recognized that with the cessation of Wailuku Sugar Company's agricultural operations, the ownership of the properties and land use pattern in the area have changed since the adoption of the current plan in 2002. The large parcels of land have been sold to other owners and is no longer part of a large sugar cane plantation operation.

Prior land use decisions in the region have steadily eroded the surrounding agricultural use of former sugar and pineapple cultivated lands. The area east of Honoapi`ilani Highway and south of Kuikahi Drive has been urbanized from the proposed Valley Isle Fellowship and Emmanuel Lutheran Church sites to Waikapu Gardens. Parcel 2 and portions of Parcel 3 of the project mauka of Honoapi`ilani Highway are the only remaining visual separation between the two (2) towns. An approximate 25-acre portion of Parcel 2 is already community planned for single-family residential use. The land use decisions that have been made established the area west of Honoapi`ilani Highway between Waikapu Town, Wailuku Heights, and Kehalani Project District, as future urban infill since large scale agricultural operations on these lands are no longer viable.

To provide density and visual separation between Waikapu and Wailuku the project proposes rural lots, bordering the Waiolani Mauka Subdivision and agricultural lands to the south, and to the west bordering Wailuku Heights, as a land use transitional zone. The project identifies generous landscaped setback areas from the property boundaries as buffers between the communities of Waikapu, Wailuku Heights, and Kehalani Project District.

The proposed action is consistent with the following goals, objectives, and policies of the Wailuku-Kahului Community Plan.

HOUSING

Goal:

A sufficient supply and choice of attractive, sanitary and affordable housing accommodations for the broad cross section of residents, including the elderly.

Objectives and Policies:

2. Provide sufficient land areas for new residential growth which relax constraints on the housing market and afford variety in type, price, and location of units. Opportunities for the provision of housing are presently constrained by a lack of expansion areas. This condition should be relieved by a choice of housing in a variety of locations, both rural and urban in character.

6. Coordinate the planning, design and construction of public infrastructure improvements with major residential projects that have an affordable housing component.

INFRASTRUCTURE

Goal:

Timely and environmentally sound planning, development and maintenance of infrastructure systems which serve to protect and preserve the safety and health of the region's residents, commuters and visitors through the provision of clean water, effective waste disposal and drainage systems, and efficient transportation systems which meet the needs of the community.

Objectives and Policies (Water and Utilities):

6. Coordinate expansion of and improvements to the water system to coincide with the development of residential expansion areas.

Objectives and Policies (Drainage):

4. Ensure that storm water run-off and siltation from proposed development will not adversely affect the marine environment and nearshore and offshore water quality. Minimize the increase in discharge of storm water runoff to coastal waters by preserving flood storage capacity in low-lying areas, and encouraging infiltration of runoff.

5. Encourage the incorporation of drainageways, setbacks, and flood protection areas into greenways consisting of open space, pedestrian way and bikeway networks.

Objectives and Policies (Transportation):

1. Enhance circulation by improving road maintenance; improving or providing traffic signals and turning lanes at congested intersections; and by providing street and destination signs. Important intersections include Lono and Papa Avenues, and intersections along Papa Avenue, Wakea Avenue, and North Market Street. Additional turning lanes, traffic signals and roadway improvements in the Wailuku Town core should be designed to facilitate safe traffic movement and be compatible with the traditional character of the area.

6. For future residential development, prohibit direct lot access from primary roads.

URBAN DESIGN

Goal:

An attractive and functionally integrated urban environment that enhances neighborhood character, promotes quality design, defines a unified landscape planting and beautification theme along major public roads and highways, watercourses and at major public facilities and recognizes the historic importance and traditions of the region.

Objectives and Policies for the Wailuku - Kahului Region in General:

5. Integrate stream channels and gulches into the region's open space system for purposes of safety, open space relief, greenways for public use and visual separation. Drainage channels and siltation basins should not be used for building sites, but

rather for public open space. Drainage channel rights-of-way and easements may also be used for pedestrian and bikeway facilities.

7. Buffer public and quasi-public facilities and light-heavy industrial/commercial type facilities from adjacent residential uses with appropriate landscape planting.

G. COUNTY ZONING

The proposed project site is zoned "Agricultural", according to Maui County zoning standards. Chapter 19.30A, Agricultural District, Maui County Code (MCC), Section 19.30A.020 identifies lands that meet at least two (2) of the following criteria should be given the highest priority for retention in the agricultural district:

A. Agricultural Lands of Importance to the State of Hawai'i (ALISH);

B. Lands not classified by the ALISH system whose agricultural land suitability, based on soil, topographic, and climatic conditions, supports the production of agricultural commodities, including but not limited to coffee, taro, watercress, ginger, orchard and flower crops and nonirrigated pineapple. In addition, these lands shall include lands used for intensive animal husbandry, and lands in agricultural cultivation in five of the ten years immediately preceding the date of approval of this chapter; and

C. Lands which have seventy-five percent or more of their boundaries contiguous to lands within the agricultural district.

The subject property meets Criteria A and is classified as Agricultural Lands of Importance to the State of Hawai'i and does not meet Criteria B since it is classified by the ALISH system. Two-thirds of its boundaries are bordered by Urban designated lands and does not meet Criteria C. Based on the priorities set by Maui County, the subject property does not have the highest priority for retention in the agricultural district.

As stated previously, the enormous contraction in plantation agriculture, resulting in the supply of agricultural land far exceeding demand, constitutes a major change in economic conditions on Maui Island. Moreover, development of the project will provide community benefits (homes including affordable housing for seniors and veterans, a park, jobs, and tax revenues) that far exceed that which could be provided by diversified agriculture (about 26 jobs). In practice, development of the project will not result in a loss of existing or potential agricultural employment given that the project area is fallow and crop land is available elsewhere.

The current zoning does not allow for the proposed subdivision; a separate Change in Zoning (CIZ) application will be filed with the County of Maui. The request is being made to establish the RU-0.5 and RU-1, Rural zoning districts; PK-1, Park zoning district; A-1, Apartment zoning district; OS-2, Open Space Zoning district; and R-1, R-2, and R-3 Residential zoning districts as discussed in Chapter I.

The limits of the proposed County zoning designations are shown in **Figure 9**. Coordination with the County of Maui, Department of Planning will be undertaken regarding the preparation and submission of the CIZ application for the proposed project.

H. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

Pursuant to Chapter 205A, HRS, projects should be evaluated with respect to Coastal Zone Management (CZM) objectives, policies, and guidelines. The subject property is not located within the County of Maui's Special Management Area, however, the applicability of coastal zone management considerations have been reviewed and assessed.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement

is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The project site is located inland, miles away from the coastline. As such, there should be no impact on coastal recreational opportunities or adverse effect on existing public access to the shoreline. Recreational area needs of the proposed project are anticipated to be addressed through the provision of a park site.

2. Historic Resources

Objective:

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

(A) Identify and analyze significant archeological resources;

(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: The proposed project is not anticipated to have an adverse effect on historical or cultural resources. The project site has already been extensively altered through previous agricultural activities. As reported in the Archaeological Inventory Survey carried out by SCS, there are no sites of cultural or archaeological importance associated with the subdivision site. Refer to **Appendix "D"**.

Should human remains be inadvertently discovered during ground altering activities, work will promptly cease in the immediate area of the find, and the find will be further protected from damage. The SHPD and the Maui/Lanai Islands Burial Council will be notified immediately and procedures for the treatment of inadvertently discovered human remains will be followed pursuant to Chapter 6E, HRS and Chapter 13-300, HAR, including stoppage of work in the immediate vicinity of the burial.

3. **Scenic and Open Space Resources**

Objective:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(A) Identify valued scenic resources in the coastal zone management area;

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments which are not coastal dependent to locate in inland areas.

Response: The proposed project will result in the creation of rural, single-family, and multi-family units that should not have an adverse impact to scenic or open space resources. Open space buffers along Honoapi`ilani Highway and Kuikahi Drive will serve to mitigate view impacts from these adjacent roadways. The project area does not lie within a scenic view corridor. The project is not located on any public right-of-way located in the island's Special Management Area.

4. Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(A) Improve the technical basis for natural resource management;

(B) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

(D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: The proposed action is not expected to adversely impact coastal ecosystems. Drainage system improvements will be designed in accordance with applicable regulatory standards to ensure that there is no adverse effect on downstream properties. Runoff from the development will be routed to a detention area at the northeast extent of the project area. In addition, appropriate erosion control measures will be implemented to minimize the effects of stormwater runoff during construction of the project and to ensure that coastal ecosystems are not adversely impacted. Existing runoff exits into Wai`ale Reservoir and does not exit

into the nearshore waters in the Kahului Harbor area. The proposed drainage plan will not alter the existing condition.

5. **Economic Uses**

Objective:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

(iii) The development is important to the State's economy.

Response: The proposed project is not a coastal dependent development. The proposed project will stimulate the economy through the generation of market and affordable housing to help meet existing demand, related expenditures, and creation of construction-related job opportunities. The proposed project is consistent with the objective and policies for economic use.

6. Coastal Hazards

Objective:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program;

(D) Prevent coastal flooding from inland projects; and

(E) Develop a coastal point and nonpoint source pollution control program.

Response: The project site falls within Zone C, an area of minimal flooding. Drainage improvements will be designed in accordance with the Drainage Standards of the County of Maui to ensure that the project will not adversely affect downstream properties from the effects of flooding and erosion. There is no tsunami inundation concern for the subject property.

7. Managing Development

Objective:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: The District Boundary Amendment, Community Plan Amendment, and Change in Zoning application processes involve review by governmental agencies, the State Land Use Commission, the Maui Planning Commission, and the Maui County Council. The public is afforded the opportunity to participate in hearings on these processes. In addition, the applicants have held several informational meetings for various surrounding area residents and the Wailuku Main Street Association.

Applicable State and County requirements will be adhered to in the design and construction of the project.

8. Public Participation

Objective:

Stimulate public awareness, education, and participation in coastal management.

Policies:

(A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: The project will meet public awareness, education, and participation objectives. An opportunity for agency and public review will be provided as part of the notification review and comment process required for the Environmental Impact Statement. Also, the applicants met with Waikapu, Waiolani, Wailuku Heights Subdivision I and II, and Kehalani residents to discuss issues and concerns. The

applicants have also presented the proposed project to the Wailuku Main Street Association Board and various Committee members to obtain their input on the conceptual land use plan. The applicants plan to keep the area residents informed as the project progresses through the planning process.

9. **Beach Protection**

Objective:

Protect beaches for public use and recreation.

Policies:

(A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;

(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: The proposed project is located inland, away from the shoreline and as a result, there should be no effect on beach processes.

10. **Marine Resources**

Objective:

Implement the State's ocean resources management plan.

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

(B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

(C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

(D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: As previously stated, the project is located inland, away from the ocean and is therefore, not anticipated to have any impact on marine or coastal resources. Appropriate Best Management Practices will be utilized to ensure that construction runoff is appropriately captured, minimizing any impact on coastal waters.

In addition to the aforementioned objectives and policies, SMA permit review criteria, pursuant to Act 224 (2005) provides that:

> *No special management areas use permit or special management area minor permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:*
>
> *(1) Directly illuminates the shoreline and ocean waters; or*
>
> *(2) Is directed to travel across property boundaries toward the shoreline and ocean waters.*

All site illumination will be shielded and down cast. The project site is not a shoreline property. As such, illumination of shoreline and ocean waters and travel of lighting across property boundaries toward the shoreline are not anticipated.

I. OTHER REGULATORY APPROVALS

Consultation has been undertaken with the U.S. Department of the Army regarding permitting requirements associated with the proposed development area and surrounding environment. Similar consultation has been carried out with the State Department of Health and State Office of Planning to determine the applicability of Section 401 Water Quality Certification and Coastal Zone Management Consistency approval requirements, respectively.

IV. ALTERNATIVES TO THE PROPOSED ACTION

IV. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The preferred alternative proposes a subdivision encompassing rural residential lots, urban residential single-family lots, and multi-family uses, including special needs affordable housing for seniors and veterans. The proposed subdivision will also include a park site and generous open space areas for landscaped buffers and drainageways. Portions of the existing agricultural irrigation system on the properties that support agricultural uses further south of the subject properties have been incorporated into the project layout.

The properties were previously utilized for agricultural pursuits, however, it has been vacant for several years with the demise of Wailuku Sugar Company. The large agricultural pieces have been sold to others and are no longer part of a large plantation operation. The changing land use patterns in the area from agriculture to urban uses have further diminished the desirability of these properties for agricultural pursuits. The existing socio-economic conditions of Maui island also does not support the continued use of the properties for agriculture. Housing, especially in Central Maui with the limited availability of land for residential use, is identified as a critical need of the community. The conversion of the properties from agriculture to residential use will help to alleviate the demand for housing, especially affordable and special needs housing.

The applicants went through several iterations of the land use layout, which included community input from the neighboring Waikapu and Wailuku Heights communities. The applicants conducted several community meetings involving adjacent neighborhoods, most recently in October and November 2008. The current layout takes into consideration the concerns expressed by the neighboring landowners. As represented by the applicants at these meetings, the project includes critically needed affordable housing including special needs housing for seniors and veterans.

B. MAXIMUM DENSITY ALTERNATIVE

To alleviate concerns that may be raised by the neighboring communities that the project would be too dense and detract from the existing rural residential character of Waikapu Town, the applicants chose not to implement the maximum densities that could be allowed if all the properties were urbanized and smaller urban lots were developed.

This maximum density alternative was determined to have the most detrimental effect on the existing communities, especially Waikapu Town, and would encourage more urbanization south of the project. The preferred alternative with its rural element provides a transitional zone between the remaining agriculture use south of the property and Waikapu Town.

C. ALTERNATIVE LOCATIONS

The applicants investigated alternative locations for housing. In the Central Maui area, the expansion of land for housing is constrained by several factors. Vacant developable lands for housing are concentrated within a few projects, such as Kehalani and Maui Lani. More than half of the lands have been or are proposed to be developed in the near future and there are few sites remaining for development. Similarly, lands within Maui Lani under the control of Maui Lani Partners LLC have been slated for development and are undergoing the permit review process. Conversely, the Maui Lani lands under the control of the Weinberg Foundation purportedly are not being proposed for development in the near future, except for its commercial properties.

While lands in other areas of Central Maui may be developed for housing purposes, the applicant's acquisition of the subject property was based on the parcel's proximity to existing urbanized lands and infrastructure. These parameters are viewed as critical in ensuring that new housing inventory are brought to the market in the most efficient and cost effective manner.

D. NO-ACTION ALTERNATIVE

No action would leave the project in its current condition which is fallow agriculture lands and serve no socio-economic benefit for Maui island. With the demise of Wailuku Sugar Company and Pioneer Mill plantation, there is an abundance of vacant agricultural lands on Maui in which supply heavily outweighs the demand for such lands for diversified agriculture. Existing constraints, such as the ease in getting agricultural products to State-wide markets, will limit diversified agriculture from expanding at a pace that would absorb the available agricultural lands. In the foreseeable future, there is no cash crop similar to sugar cane envisioned that will be able to absorb the vacant agricultural lands that became available with the demise of these two (2) plantations.

The preferred alternative will provide socio-economic benefit to Maui island. It will supply housing that will alleviate a portion of the demand for housing, especially affordable housing. The preferred alternative includes special needs housing for seniors and veterans. The preferred alternative will provide economic benefits to the construction and service industries, as well as increased real property tax revenues to the County of Maui.

V. SUMMARY OF UNAVOIDABLE IMPACTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

V. SUMMARY OF UNAVOIDABLE IMPACTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

A. UNAVOIDABLE IMPACTS

The development of the project will result in certain unavoidable construction-related environmental impacts as outlined in Chapter II.

In the short term, construction associated with the proposed development will generate noise impacts. These impacts will be limited to the immediate vicinity of the project construction areas. Sound attenuating construction equipment will be used, where practicable, to mitigate noise impacts caused by construction.

Unavoidable air quality impacts will also arise as a result of construction activities, such as the generation of dust and other airborne pollutants. Appropriate BMPs will be incorporated in the construction process to mitigate adverse impacts, including frequent watering of exposed surface and regular maintenance of construction equipment to minimize construction-related impacts.

B. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The project will commit approximately 208.1 acres of agricultural land formerly used for sugar cane and pineapple cultivation to an urban use. The production of pineapple ceased in the mid-1990's and the land has been left fallow since its termination. The loss of former cultivated lands will have a negligible effect when evaluated in the context of the large amount of former sugar cane lands that were taken out of production with the demise of Wailuku Sugar and Pioneer Plantations and the limitations of diversified agriculture on Maui. The smaller agricultural lots under various ownership has diminished the use of the land for large scale agriculture.

Urbanization of the area between Wailuku and Waikapu has continued since the approval of the Waikapu Gardens project. The proposed development of the rural lots will create a

visual and density buffer between Wailuku and Waikapu Towns. Landscape setbacks and a no build zone will further reduce the visual impact of the project from the public right-of-ways.

From an infrastructure use perspective, project implementation will result in alteration of existing hydrology (drainage), largely due to the increase in impervious surface areas, and other impacts related to wastewater, water, park, school, and roadway usage. However, these impacts will be mitigated either through the provision of additional resources onsite and offsite (drainage, water, and park) or through the payment of fair-share contribution (wastewater, school, and traffic).

The proposed drainage improvements are intended to reduce the post-development peak runoff through the creation of a 9.6-acre detention basin to accommodate the increased, post-development runoff volume, thereby limiting the peak rate of runoff. Opportunities to further reduce post-development flows below existing drainage conditions will be evaluated during the design phase of the proposed development. Opportunities to direct runoff from parking lots and driveways to nearby landscaped areas and detention basins will be pursued.

As mentioned, the applicant has a letter of intent with the County of Maui to develop a new well site to replace the existing Shaft 33. The applicants are committed to develop the new well at their expense for a portion of the water capacity from the new well. The remaining capacity will be allocated to the County of Maui. The new well will spread out the well sites in the Iao aquifer as recommended by the CWRM. In addition to the new well, the applicant will develop storage and transmission facilities to serve this project.

The applicant has been in coordination with the County of Maui, Department of Parks and Recreation to ensure satisfactory compliance with parks and playgrounds assessment requirements. The master plan for the development includes an 11.5-acre park site. In addition to the site work for the park, the applicants are committed to constructing a restroom and parking facilities for the park.

The applicants will be required to pay sewer assessment fees for this project. The assessment fees will be used for the treatment plant expansion, as well as any necessary offsite improvements to the collection system and wastewater pump stations.

The 2007 Legislature passed a bill establishing school impact fees. Under this new law, the

project may be required to pay a fair-share fee, which will be used to mitigate the educational demands stemming from the project. The applicant is in discussion with the Department of Education in formulating an appropriate fair-share agreement for the subject project.

The County of Maui is in the process of establishing traffic impact fees for the Wailuku-Kahului region, as set forth in Chapter 14.76 of the Maui County Code. The traffic impact fees will be used to provide a method of sharing the growth-related costs incurred by the county for road and traffic infrastructure improvements made necessary by expanded population levels. The final impact fee amount will be calculated upon adoption of the fee schedule by the County Council.

The commitment of the foregoing lands and resources are not viewed as detrimental to environmental and socio-economic issues, trends, and patterns.

VI. RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

VI. RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The subject property was in sugar cane cultivation prior to the mid-1980's and later in pineapple cultivation to the late-1990's. However, subsequent residential development north and south of the project site has occurred since that time and now poses logistical and compatibility challenges to long-term productive agricultural use of the subject site. The configuration of the site limits agricultural activities and requires a buffer from the neighboring residential subdivision to the north, west, and south. Due to the presence of Kuikahi Drive to the north, Honoapi`ilani Highway to the east, the Waiolani subdivision and private agricultural lands to the south, and Wailuku Heights to the west, agricultural activities are confined, with limited allowance for expansion and limited access. A majority of the site has remained unused and fallow since the cessation of sugar cane and pineapple cultivation.

In light of the housing shortage that exists on Maui, coupled with the scarcity of entitled, undeveloped residential lands in Central Maui, the conversion of the project's agricultural lands for housing presents a beneficial opportunity. From an islandwide perspective, the project's 208 acres of land represent 0.08 percent of the roughly 244,000 acres of State Agricultural lands on the island of Maui.

The project's anticipated short- and long-term housing and economic benefits are expected to outweigh that from the current short-term uses at the site. The project's estimated construction cost of onsite/offsite infrastructure and site work is approximately $59 million (2006 dollars). In addition, building construction cost is estimated at approximately $125.4 million (2006 dollars). As a result, the development of the project is anticipated to inject over $184.4 million into the local economy. Further, the project will contribute an estimated $810,000.00 to $850,000.00 (2006 dollars) in annual real property tax.

It is unlikely that short-term uses of the subject property will yield more than limited agricultural cultivation, considering its limitations for productive long-term agricultural use. In evaluating the conversion of underutilized agricultural lands against the prospect of providing affordable and

market housing for residents who will sustain the local economy, the latter is anticipated to result in greater long-term productivity for the region.

VII. UNRESOLVED ISSUES

VII. UNRESOLVED ISSUES

As noted in the Traffic Impact Analysis Report, Honoapi`ilani Highway, in the vicinity of the project, are anticipated to experience increasing traffic congestion in the future, even without the proposed project. The TIAR recommends applicable mitigation measures to address these future conditions. Included among these is the future connection of Wai`ale Road to Honoapi`ilani Highway south of Waikapu Town near the Maui Tropical Plantation. This future connection will require coordination between the State of Hawai`i, County of Maui, the applicants, and other developers in the Wailuku-Ma`alaea area, including Maui Lani.

The project proposes the realignment of Old Waikapu Road, including the relocation of its intersection with Honoapi`ilani Highway. The applicants are in ongoing discussions with the State of Hawai`i, Department of Transportation to determine this roadway connection and the design standards. Upon completion of the upgrades to the Old Waikapu Road, the Maui County Council will be required to accept the realigned roadway and approve the transfer of the land of the old alignment to the developers.

Other unresolved issues for the project, which will be decided prior to project implementation, include a fair-share educational contribution, parks and playgrounds contribution, traffic impact fees, participation in the Wailuku-Kahului wastewater system improvements, and an affordable housing agreement.

The 2007 Legislature passed a bill establishing school impact fees. Under this new law, the project may be required to pay an impact fee. The applicant will work with the Department of Education in formulating an appropriate fair-share agreement for the subject project.

The applicants have been in coordination with the County of Maui, Department of Parks and Recreation to ensure satisfactory compliance with parks and playgrounds assessment requirements. The applicants are committed, in addition to the site work, to construct restroom and parking facilities for the park.

The County of Maui is in the process of establishing traffic impact fees for the Wailuku-Kahului region, as set forth in Chapter 14.76 of the Maui County Code. The Pu`unani Subdivision may be subject to the provisions of Chapter 14.76.. Although the specific traffic impact fee schedule for the Wailuku-Kahului region has not yet been adopted by ordinance, the final impact fee amount will be

calculated upon adoption of the fee schedule by the County Council.

The applicants remain in coordination with the Department of Environmental Management, Wastewater Reclamation Division regarding assessment fees for the treatment plant expansion, as well as any necessary offsite improvements to the collection system and wastewater pump stations.

Additionally, the applicants have been in discussions with the County of Maui, Department of Housing and Human Concerns to develop an appropriate affordable housing program pursuant to the provisions of the Maui Residential Workforce Housing Policy (MRWHP). As provided under the MRWHP, the rental and sales prices for affordable units will be established at the time of development, and based on Maui's median family income at that time. The applicant must formulate and execute an affordable housing agreement with the Department of Housing and Human Concerns prior to project implementation.

VIII. COMMUNITY MEETINGS

VIII. COMMUNITY MEETINGS

The developers of the Wailuku (Pu`unani) Subdivision met several times with the communities of Waikapu, Waiolani, Wailuku Heights, and Kehalani. The most recent meetings were held in October and November of 2008 as follows:

By letter dated October 17, 2008 the Waikapu and Waiolani communities were invited to a community meeting with the developers. See **Appendix "J"**. On October 28, 2008, the meeting with the Waikapu and Waiolani communities was held at the Waikapu Community Center. Twenty-two (22) persons attended the meeting. Refer to **Appendix "J"**. The first meeting with the Waikapu and Waiolani communities was in April, 2006.

By letter dated October 17, 2008 the Wailuku Heights community was invited to a community meeting with the developers. Refer to **Appendix "J"**. On October 29, 2008, the meeting with the Wailuku Heights community was held at the Wailuku Hongwanji Conference Room. Thirteen (13) persons attended the meeting. Refer to **Appendix "J"**. The first meeting with the Wailuku Heights community was in April, 2006.

By letter dated October 22, 2008 the Kehalani community was invited to a community meeting with the developers. The mailing included over 900 property owners. Refer to **Appendix "J"**. On November 4, 2008, the meeting with the Kehalani community was held at the Wailuku Elementary School Cafeteria. Ten (10) persons attended the meeting. Refer to **Appendix "J"**. Since the initial community meetings in April, 2006, the Kehalani project has grown on the mauka side of Honoapi`ilani Highway towards Kuikahi Drive. For this reason, the Kehalani community was included in the latest community meetings.

IX. LIST OF PERMITS AND APPROVALS

IX. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project.

State of Hawai`i

1. State Land Use Commission District Boundary Amendment (Agricultural to Rural and Urban)

2. Requirements of the State of Hawai`i Department of Health:

    a. As applicable, project activities shall comply with the Administrative Rules of the Department of Health:

    Chapter 11-39, Air Conditioning and Ventilation;
    Chapter 11-45, Radiation Control;
    Chapter 11-46, Community Noise Control;
    Chapter 11-501, Asbestos Requirements;
    Chapter 11-502, Asbestos-Containing Materials in Schools;
    Chapter 11-503, Fees for Asbestos Removal and Certification;
    Chapter 11-62, Wastewater Systems;
    Chapter 11-60.1-33, Fugitive Dust;
    Chapter 11-20, Rules Relating to Potable Water Systems;
    Chapter 11-21, Cross-Connections and Backflow Control; and
    Chapter 11-23, Underground Injection Control.

3. National Pollution Discharge Elimination System (NPDES) Permit. (Coordination with the U.S. Department of the Army has been undertaken.)

4. Commission on Water Resource Management: Ground Water Use Permit and Application for a Well Construction/Pump Installation

County of Maui

1. Change in Zoning
2. Community Plan Amendment
3. Subdivision approval
4. Construction Permits (including, but not limited to, Building and Grading Permits)

X. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS

X. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Impact Statement (EIS). Agency comments and responses to substantive comments are included herein.

FEDERAL AGENCIES

1. Ranae Ganske-Cerizo, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawai`i 96793-2100

2. Lawrence T. Yamamoto,
State Conservationist
Natural Resources Conservation Service
U. S. Department of Agriculture
P. O. Box 50004, Room 4-118
Honolulu, Hawai`i 96850

3. George Young
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Regulatory Branch
Building 230
Fort Shafter, Hawai`i 96858-5440

4. Patrick Leonard
Field Supervisor
U. S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122, Box 50088
Honolulu, Hawai`i 96813

5. U.S. Dept. Of the Interior
U.S. Geological Survey
677 AlaMoana Boulevard, Suite 415
Honolulu, Hawai`i 96813

6. U. S. Department of the Interior
United States Geological Survey
Pacific Islands Water Science Center
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawai`i 96813

STATE AGENCIES

7. Laura Thielen, Director
State of Hawai`i
Office of Planning
P.O. Box 2359
Honolulu, Hawai`i 96804

8. Patricia Hamamoto, Superintendent
State of Hawai`i
Department of Education
P.O. Box 2360
Honolulu, Hawai`i 96804

9. Denis Lau, Chief
Clean Water Branch
State of Hawai`i
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawai`i 96814

10. Herbert Matsubayashi
District Environmental Health
Program Chief
State of Hawai`i
Department of Health
54 High Street
Wailuku, Hawai`i 96793

11. Peter Young, Chairperson
State of Hawai`i
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawai`i 96809

12. Dr. Chiyome Fukino, Director
Hawai`i State Department of Health
P.O. Box 3378
Honolulu, HI 96801

13. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawai`i 96813

14. William K.C. Wong,
Safe Drinking Water Branch
Environmental Management Division
Hawai`i State Department of Health
919 Ala Moana Blvd., Room 308
Honolulu, HI 96814-4920

15. Harold K. Yee
Wastewater Branch
919 Ala Moana Blvd.
Honolulu, HI 96814

16. Sandra Lee Kunimoto, Chairperson
Hawai`i Department of Agriculture
1428 S. King Street
Honolulu, Hawai`i 96814

17. Melanie Chinen, Administrator
State of Hawai`i
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawai`i 96707

18. Dean Nakano, Acting Deputy Director
Department of Land and Natural Resources
Division of Water Resource Management
1151 Punchbowl Street, Room 227
Honolulu, Hawai`i 96813

19. Major Robert G.F. Lee, Director of Civil Defense
Department of Defense
State of Hawai`i
3949 Diamond Head Road
Honolulu, Hawai`i 96816

20. Rodney Haraga, Director
State of Hawai`i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai`i 96813

cc: Fred Cajigal, District Engineer

21. Clyde Namu`o, Administrator
Office of Hawai`ian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawai`i 96813

22. Micah Kane, Chairperson
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawai`i 96805

23. Dan Davidson, Acting Executive Director
Hawai`i Housing Finance and Development Corporation
Department of Business, Economic Development & Tourism
P. O. Box 2359
Honolulu, Hawai`i 96804

24. Russ K. Saito, Comptroller
State of Hawai`i
Department of Accounting and General Services
Kalanimoku Bldg.
1151 Punchbowl St.
Honolulu HI 96813

COUNTY AGENCIES

25. Carl Kaupololo, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, Hawai`i 96732

26. Alice Lee, Director
County of Maui
Department of Housing and Human Concerns
200 S. High Street
Wailuku, Hawai`i 96793

27. Michael W. Foley, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawai`i 96793

28. Glenn Correa, Director
County of Maui
Department of Parks and Recreation
700 Hali`a Nakoa Street, Unit 2
Wailuku, Hawai`i 96793

29. Thomas Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai`i 96793

30. Milton Arakawa, Director
County of Maui
Department of Public Works and Environmental Management
200 South High Street
Wailuku, Hawai`i 96793

31. George Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawai`i 96793

OTHER CONSULTED PARTIES

32. Neal Shinyama, Manager – Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawai`i 96732

33. Avery Chumbley, President
Wailuku Water Company
255 E. Waiko Road
Wailuku, Hawai`i 96793

34. Leona Kushi, President
Waiolani Homeowner's Association
P. O. Box 1376
Wailuku, Hawai`i 96793

35. Paul Ueoka, President
Wailuku Heights Subdivision I Community Association
c/o Carlsmith Ball, LLP
2035 Main Street, Suite 400
Wailuku, Hawai`i 96793

36. John Sullivan
Wailuku Heights Subdivision II Community Association
c/o Oihana Property Management
270 Hookahi Street, Suite 202
Wailuku, Hawai`i 96793

37. Jocelyn Perreira, Executive Director
Wailuku Main Street Association
2035 Main Street, Suite 1
Wailuku, Hawai`i 96793

38. Scott Nunokawa
Waiolani Elua Homeowner's Association
Waikapu 28 Investment, LLC
P. O. Box 946
Wailuku, Hawai`i 96793

39. Jesse Spencer
Spencer Homes, Inc.
P. O. Box 97
Kihei, Hawai`i 96753

40. **Valley Isle Fellowship**
473 High Street
Wailuku, Hawai`i 96793

41. Richard Sudheimer, President
Emmanuel Lutheran Church and Schools
520 W. One Street
Kahului, Hawai`i 96732

42. Councilmember Robert Carroll
Maui County Council
200 South High Street
Wailuku, Hawai`i 96793

AUG 18 2006

NRCS
Natural Resources Conservation Service
210 Imi Kala St. Ste 209
Wailuku, HI 96793
808-244-3100

August 16, 2006

Ms Tara Nakashima, Planner
305 High Street Suite 104
Wailuku, Hawaii 96793

Dear Ms Nakashima,

SUBJECT: Environmental Impact Statement Preparation Notice for the Proposed Pu'unani Subdivision, Wailuku, Maui, TMK's (2) 3-5-02:002 and 003

Our main concern would be the underground storm drainage system and the storm water retention area(s). Development in this area has more than doubled therefore drainage issues, water retention area(s) and traffic congestion and how it directly affects the neighboring residences appears to be a very important issue.

Thank you for the opportunity to comment.

Sincerely,

Ranae F. Ganske-Cerizo
District Conservationist

cc: Anthony Ching, State Land Use Commission

1

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MUG" HIRANO
KAREN S. FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Ranae Ganske-Cerizo, District Conservationist
U. S. Department of Agriculture
Natural Resources Conservation Service
700 Hookele Street, Suite 202
Kahului, Hawai`i 96732

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Ms. Ganske-Cerizo:

Thank you for your letter dated August 16, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. The Draft Environmental Impact Statement will incorporate preliminary engineering studies to address concerns regarding drainage, storm water retention, and traffic congestion. The preliminary drainage report in particular, will examine storm drainage systems, including the storm water retention component.

Thank you again for your feedback. A copy of the Draft Environmental Impact Statement will be submitted to your office for review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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JUL 2 9 2008

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF:

July 23, 2008

Regulatory Branch

File Number POH-2006-322

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

This responds to your August 4, 2006 request letter for early consultation comments in preparation of an Environmental Impact Statement (EIS) for the proposed Puunani Subdivision Residential Development in Wailuku, Maui, Hawaii, (TMK (2) 3-5-02:002 and (2) 3-5-02:003). The file number assigned POH-2006-322 should be referred to in future correspondence with us.

Based on the information submitted, we are unable to confirm jurisdiction over several water resources identified on the subject parcels. It appears the Waihee Ditch and two natural drainages/gullies may be considered waters of the U.S. (WOUS) subject to Corps jurisdiction. We request your EIS provide additional information regarding the WOUS that occur within the land parcels and identify their existing direct or indirect surface water connection to the Pacific Ocean and/or any other tributary or downstream aquatic resources, including adjacent wetlands.

Section 404 of the Clean Water Act requires that a Department of the Army (DA) permit be obtained for the discharge of dredged and/or fill material into waters of the U.S., including jurisdictional wetlands (33 U.S.C. 1344). The Corps defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Section 10 of the Rivers and Harbors Act of 1899 requires that a DA permit be obtained for structures or work in or affecting navigable waters of the U.S. (33 U.S.C. 403). Section 10 waters are those waters subject to the ebb and flow of the tide extending shoreward to the mean high water mark.

Should you have any questions regarding this preliminary jurisdictional determination, please contact Ms. Joy Anamizu of my staff at (808) 438-7023 or at *joy.n.anamizu@usace.army.mil*. For additional information about our Regulatory Program, visit our web site at *http://www.poh.usace.army.mil/EC-R/EC-R.htm*.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

MUNEKIYO & HIRAGA, INC.

December 31, 2008

Mr. George P. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U. S. Army Engineer District, Honolulu
Fort Shafter, Hawai`i 96858-5440

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766) (File Number POH-2006-322)

Dear Mr. Young:

Thank you for your letter of July 23, 2008. The Preliminary Drainage Report for the project will include additional information regarding the waters of the U. S. It will identify any direct or indirect surface water connection to the Pacific Ocean and/or any other tributary or downstream aquatic resources.

If it is determined that a Section 404 permit of the Clean Water Act or a Department of the Army (DA) permit is required, the applicants will file the necessary permits with the Department of the Army.

environment
planning

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

4

Thank you again for your letter. Should you have further comments or questions, please call me at (808) 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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AUG 2 1 2006

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Pacific Islands Water Science Center
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813
Phone: (808) 587-2400/Fax: (808) 587-2401

July 21, 2006

Ms. Laura H. Thielen, Director
Office of Planning
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Ms. Thielen:

Subject: Petition for Amendment to the State Land Use District Boundaries
A06-766/Towne Development of Hawaii, Inc.
Endurance Investors, LLC and Association of II Wai Hui LP
Wailuku, Maui, Hawaii
TMK: 3-5-02: 002 and 003

Thank you for forwarding the subject DEA for review and comment by the staff of the U.S. Geological Survey, Pacific Islands Water Science Center. We regret however, that due to prior commitments and lack of available staff, we are unable to review this document and are returning it for your future use.

We appreciate the opportunity to participate in the review process.

Sincerely,

Gordon Tribble
Center Director

Enclosure

cc: Tara Nakashima, Planner w/o Enc.
Munekiyo & Hiraga, Inc.
305 High St., Suite 104
Wailuku, HI 96793

Anthony Ching, Executive Officer
State Land Use Commission
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804-2359

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
LAURA H. THIELEN
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-11419

July 11, 2006

U.S. Department of the Interior
U.S. Geological Survey
Pacific Islands Water Science Center
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Gentlemen:

Subject: Petition for Amendment to the State Land Use District Boundaries

We have received the following petition requesting a District Boundary change:

Petition:	A06-766/Towne Development of Hawaii, Inc., Endurance Investors, LLC and Association of II Wai Hui LP
Requested Change:	Agricultural to Rural and Urban Districts
Proposed Use:	Residential, development
Location:	Wailuku, Maui, Hawaii TMK: 3-5-02: 002 and 003
Area:	210 acres

We are transmitting the subject petition for your review and comments. We are particularly interested in information regarding your Department's existing and proposed programs for the subject area and the anticipated effects of the boundary change on these programs. Any available maps, statistics or other information which you feel are applicable would also be appreciated.

The State's position on each petition must be filed with the Land Use Commission (LUC) within 30 days of the petition's acceptance as a proper filing by the LUC. On July 6, 2006, the LUC determined that it is the appropriate accepting authority pursuant to Chapter 343 HRS and that the preparation of an Environmental Impact Statement (EIS) is warranted.

Please copy the Office of Planning with any comments submitted during the EIS review process. The petition will be deemed complete when the Final EIS is accepted by the LUC.

If there are any questions on the petition, or if you are not able to provide comments on the EIS, please contact Mary Alice Evans of the Land Use Division at 587-2802.

Sincerely,

Laura H. Thielen
Director

Attachment

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICHI" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Gordon Tribble, Center Director
Pacific Islands Water Science Center
U. S. Department of the Interior
U. S. Geological Survey
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawai`i 96813

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Tribble:

Thank you for your letter dated July 21, 2006, to Office of Planning Director Laura Thielen, commenting on the EISPN for the proposed Pu`unani Subdivision. We appreciate your notification and return of the EISPN.

Thank you again for your letter. Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
LAURA H. THIELEN
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-11492

September 6, 2006

Ms. Tara Nakashima
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Subject: Proposed Puunani Subdivision
Environmental Impact Statement Preparation Notice (EISPN)
TMK: (2) 3-5-02:002 and 003
Wailuku, Maui, Hawaii
Land Use Commission Docket No. A06-766

Dear Ms. Nakashima:

Thank you for sending the Office of Planning the EISPN for the above referenced proposal to reclassify approximately 210 acres of land in Wailuku, Maui, Hawaii from the State Agricultural District to the State Urban and Rural District for the development of 220 rural one-acre and half-acre lots and 330 single-family and multi-family residential units.

The Office of Planning will be coordinating the State's position on areas of crosscutting State concern. I am writing to request that the Draft Environmental Impact Statement (DEIS) consider the impacts of the proposed project on the following issues:

1. **Ocean Resources** – The EISPN states that the subject property is located on an incline and will require mass grading, with the potential for drainage and runoff to impact downstream properties and coastal ecosystems. As such, the EISPN notes that the proposed project will require a National Pollutant Discharge Elimination System permit. Please discuss these issues in the DEIS, along with relevant State Department of Health guidelines and other required permits. Best Management Practices (BMPs) should also be discussed as phases of the development are completed and occupied.

2. **Agricultural Lands** – Preservation of important agricultural lands is a priority for the State and Counties. The EISPN states that the subject project is classified as Prime Agricultural Lands according to the Agricultural Lands of Importance to

the State of Hawaii (ALISH) classification system. Please discuss how the loss of these lands can be justified or how other lands of equal importance can be protected.

3. **Affordable Housing** – Increasing the supply of affordable housing is a critical State and County issue. Please discuss specifically how the Petitioner plans to meet the County affordable housing requirements, including the length of time the units will remain affordable and how that guarantee will be met.

4. **Water Supply** – Water resource protection is a critical State issue. Please include information on the drinking water and non-potable water sources that will be available for the project, as well as a discussion of coordination and agreements reached with the Maui Department of Water Supply and the State Commission on Water Resource Management. The EISPN states that the primary water sources for the subject project are the Īao and Waihee aquifers. Because the 'Īao water system is a designated ground-water management area. Please address the additional measures that will be taken to address water resource limitations.

5. **Public Health** – If the project will have the potential to generate hazardous materials or result in the possible contamination of the air, soil or water, please discuss how public health and safety will be protected. As the subject project is located within a wellhead protection area, please include information about measures that will be undertaken to protect the area's drinking water wells from pollution.

6. **Cultural/Historic Resources** – The EISPN states that an archaeological inventory survey has already been completed and that a cultural impact assessment will be conducted and included in the DEIS. Please discuss these findings, as well as monitoring and preservation plans approved by the State Historic Preservation Division. Please note, in particular, how access for Native Hawaiians for traditional and customary practices will be preserved, including visual landmarks if applicable.

7. **Environmental, Recreational, and Scenic Resources** –Please include an inventory of flora and fauna on the project site and any required protections for important species. Please include a description of recreational uses on or near the project site and a description of scenic resources.

8. **Coastal Zone Management** – The State oversees protection of natural and cultural resources within the coastal zone. Please discuss any impact the proposed project may have on coastal and marine resources, and how the proposed project will balance the competing values of economic development and

preservation of coastal resources, including protection from flood hazard and soil erosion.

The Office of Planning looks forward to receiving the DEIS with the potential impacts and mitigation measures for the above issues addressed. In addition, please send us all comments received during the EISPN process. If you have any questions, please call Koren Ishibashi in the Land Use Division at 587-2803.

Sincerely,

Laura H. Thielen
Director

c: Anthony Ching, LUC

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Abbey Seth Mayer, Director
Office of Planning
Department of Business, Economic
Development and Tourism
235 South Beretania Street, 6th Floor
Honolulu, Hawai`i 96813

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, <u>Land Use Commission Petition (A06-766)</u>

Dear Mr. Mayer:

Thank you for your office's September 6, 2006 letter, commenting on the EISPN for the proposed Pu'unani Subdivision. The applicants acknowledge that your office will be coordinating the State's position on areas of concern and on behalf of the applicants, we would like to provide the following information to help address your comments:

1. *<u>Ocean Resources:</u>*

The applicants will obtain a National Pollutant Discharge System (NPDES) and/or other permits, as applicable, during the building permit and subdivision review processes. More detailed discussion regarding Best Management Practices (BMPs) to be utilized, to mitigate potential drainage and runoff impacts to downstream properties and coastal ecosystems will be discussed in the Draft Environmental Impact Statement (EIS).

2. *<u>Agricultural Lands:</u>*

The applicants have contracted with Decision Analysts Hawaii for preparation of an Agricultural Impact Study which will address issues relating to the loss of agricultural lands. The Draft EIS will include the findings of the report and a copy of the study will be attached as an appendix.

planning environment

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

3. ***Affordable Housing:***

The proposed development will provide affordable housing, as required by workforce housing policies adopted by the County of Maui. The applicants have been coordinating with the County Department of Housing and Human Concerns (DHHC) to ensure fulfillment of affordable housing requirements. The Draft EIS will include discussion on how the proposed subdivision will satisfy the requirements. The applicants are still coordinating with the DHHC on the length of time the units will remain affordable. The applicants will make a commitment to the community that approximately 200 of the affordable units will be for senior and veteran housing. The applicant is in discussion with Hale Mahaolu regarding the senior housing for the project.

4. ***Water Supply:***

The project team has consulted with the County of Maui, Department of Water Supply to ensure that domestic and irrigation water will be made available for the project. The applicants also consulted with the Commission on Water Resource Management during the EISPN early consultation process. The Draft EIS will address issues relating to water provision, including source, storage, and transmission, an assessment of impacts, and effect of the proposed project on the Iao Aquifer. The applicants would like to note that they plan to undertake water conservation measures, where appropriate.

5. ***Public Health:***

The applicants would like to note that Phase I Environmental Site Assessments have been prepared for the subject properties. The studies discuss and identify potential hazardous materials found at the project site. Pertinent findings of the studies and recommended mitigation will be included in the Draft EIS. As applicable, appropriate mitigation measures will be implemented and BMPs will be utilized where possible, to minimize infiltration and runoff from construction activities.

The applicants are in consultation with the State Department of Health, Hazard Evaluation and Emergency Response (HEER) Office concerning their comment regarding the identification of hazardous substances, pollutants, or contaminants at the site. The applicant will work with the HEER Office regarding compliance with all applicable State rules pertaining to HRS, Chapter 128D, Environmental Response Law.

6. Cultural/Historic Resources:

As stated in the EISPN, an Archaeological Inventory Survey has been completed for the proposed project. The report was submitted to the State Historic Preservation Division, which found the report to be acceptable with concurrence that no further archaeological mitigation is necessary. The findings and report will be included in the Draft EIS. In addition, a Cultural Impact Assessment report has been prepared and will be included in the Draft EIS.

7. Environmental, Recreational, and Scenic Resources:

A Biological Resources Survey of the project site was conducted and will be included in the Draft EIS. The Draft EIS will also include discussion on recreational uses on or near the project site. A description of scenic resources will also be included in the Draft EIS.

8. Coastal Zone Management:

A discussion of any potential impact to coastal and/or marine resources, economic development, preservation of coastal resources, including protection from flood hazard and soil erosion, associated with the proposed development will be addressed in the Draft EIS.

Again, thank you for your feedback. A copy of the Draft EIS will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
Mike Dega, Scientific Consultant Services, Inc.
Bruce Plasch, Decision Analysts Hawaii
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AUG 18 2006

LINDA LINGLE
GOVERNOR OF HAWAII

COPY

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

July 19, 2006

REF: PuunaniTowne.SLUD.dr

Ms. Laura Thielen, Director
Office of Planning
235 South Beretania, 6th Floor
Honolulu Hi 96813

Dear Ms. Thielen:

SUBJECT: Towne Development Wailuku SLUD

FILE NO.: A06-766

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm*.

Our comments related to water resources are checked off below.

☒ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM: Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm*.

☒ 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

☒ 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☒ 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☒ 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☐ 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ 13. We recommend that the report identify feasible alternative non-potable water resources, including reclaimed wastewater.

☒ OTHER:
The primary water source for this project is the Iao Ground Water Management Area under the State Commission on Water Resource Management (CWRM). New uses initiated after July 21, 2003 will be addressed under new applications by the Maui Department of Water Supply. Limited pumpage from Iao is augmented from other sources, but inadequate supplies could result in restrictions of use within the service area. New uses within the Central Maui Service Area not relying on Iao sources may also be affected if Iao sources are restricted.

If there are any questions, please contact Charley Ice at 587-0251.

Sincerely,

for: Edwin T. Sakuda
DEAN A. NAKANO
Acting Deputy Director

Cl:ss

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN O[illegible] HIRAGA
MITSURU [illegible]NO
KAR[illegible]KUDA

MARK AL[illegible] ROY
[illegible]A

December 31, 2008

Ken C. Kawahara, P.E., Deputy Director
Commission on Water Resource Management
State of Hawai`i
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawai`i 96809

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Kawahara:

Thank you for your office's letter dated July 19, 2006, to Office of Planning Director Laura Thielen, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants have been and will continue to coordinate with the County to ensure the project is incorporated into the County's Water Use and Development Plan.

2. The applicants will obtain a Water Use Permit prior to use of ground water.

3. Should the applicants decide to pursue work on a well, they will obtain a Well Construction Permit(s).

4. The applicants will obtain a Pump Installation Permit prior to ground water source development.

5. There are no plans to abandon any wells in the vicinity of the subject property.

6. The applicants acknowledge the agency's concern with respect to limited pumpage affecting new uses and the possibility for subsequent restriction on use within the service area.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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PHONE (808) 594-1888 FAX (808) 594-1865

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

HRD06/2578

August 7, 2006

Laura H. Thielen
Director, Office of Planning
Department of Business,
Economic Development and Tourism
P.O. Box 2359
Honolulu, HI 96813

RE: Environmental Impact Statement Preparation Notice for the Petition for Amendment to the State Land Use District Boundaries, Wailuku, Maui, TMK 3-5-02:002 and 003.

Dear Laura H. Thielen,

The Office of Hawaiian Affairs (OHA) is in receipt of your July 14, 2006 submission and offers the following comments:

Our staff has no comment regarding the above-listed submission, but we do look forward to reviewing the Environmental Impact Statement when completed. Thank you for your continued correspondence.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

Aloha,

Clyde W. Nāmu'o
Administrator

CC: Thelma Shimaoka
OHA Community Affairs Coordinator (Maui)
140 Hoohana St., Ste. 206
Kahului, HI 96732

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KAREN FUKUDA

MARK ALEXANDER ROY
[illegible] GINOZA

December 31, 2008

Clyde W. Nāmu`o, Administrator
State of Hawai`i
Office of Hawaiian Affairs
711 Kapi`olani Boulevard, Suite 500
Honolulu, Hawai`i 96813

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Nāmu`o:

Thank you for your letter dated August 7, 2006, to Office of Planning Director, Laura Thielen, commenting on the EISPN for the proposed Pu`unani Subdivision. A copy of the Draft Environmental Impact Statement will be submitted to your office for review and comment.

Should you have any additional questions or comments, please call me at (808) 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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LINDA LINGLE
GOVERNOR OF HAWAII

AUG 15 2006

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

08046PKP.06

August 10, 2006

Ms. Tara K. Nakashima
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Nakashima:

Subject: Environmental Impact Statement Preparation Notice for the Proposed Puuanani Subdivision, Wailuku, Maui

As requested, enclosed is the comments we sent to the Office of Planning.

If you have any questions, please contact Ms. Kris Poentis, Engineering Section of the Clean Water Branch, at (808) 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:np

c: Mr. Anthony Ching, Land Use Commission, DBEDT (w/enclosure)

GC
FILE

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

07058PKP.06

July 18, 2006

mailed 07/18/06

Ms. Laura H. Thielen
Director
Office of Planning
Department of Business, Economic
Development and Tourism
P. O. Box 2359
Honolulu, Hawaii 96804

Attention: Ms. Mary Alice Evans
Land Use Division

Dear Ms. Thielen:

Subject: Petition for Amendment to the State Land Use District Boundaries A06-766/Towne Development of Hawaii, Inc., Endurance Investors, LLC and Association of II Wai Hui LP

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated July 11, 2006, and associated documents. The CWB has reviewed the limited information contained in the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 for this project. Pursuant to Federal Water Pollution Control Act (commonly known as the "Clean Water Act" (CWA) Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40, Code of Federal Regulations (CFR), Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

2. In accordance with HAR, Sections 11-55-04 and 11-55-34.05, the Director of Health may require the submittal of an individual permit application or a Notice of Intent (NOI) for general permit coverage authorized under the National Pollutant Discharge Elimination System (NPDES).

   a. An application for an NPDES individual permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

   b. An NOI to be covered by an NPDES general permit is to be submitted at least 30 days before the commencement of the respective activity. A separate NOI is needed for coverage under each NPDES general permit. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

      i. Storm water associated with industrial activities, as defined in Title 40, CFR, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi). [HAR, Chapter 11-55, Appendix B]

      ii. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.** [HAR, Chapter 11-55, Appendix C]

      iii. Discharges of treated effluent from leaking underground storage tank remedial activities. [HAR, Chapter 11-55, Appendix D]

      iv. Discharges of once through cooling water less than one (1) million gallons per day. [HAR, Chapter 11-55, Appendix E]

      v. Discharges of hydrotesting water. [HAR, Chapter 11-55, Appendix F]

      vi. Discharges of construction dewatering effluent. [HAR, Chapter 11-55, Appendix G]

      vii. Discharges of treated effluent from petroleum bulk stations and terminals. [HAR, Chapter 11-55, Appendix H]

viii. Discharges of treated effluent from well drilling activities. [HAR, Chapter 11-55, Appendix I]

ix. Discharges of treated effluent from recycled water distribution systems. [HAR, Chapter 11-55, Appendix J]

x. Discharges of storm water from a small municipal separate storm sewer system. [HAR, Chapter 11-55, Appendix K]

xi. Discharges of circulation water from decorative ponds or tanks. [HAR, Chapter 11-55, Appendix L]

3. In accordance with HAR, Section 11-55-38, the applicant for an NPDES permit is required to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD. If applicable, please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.

4. Any discharges related to project construction or operation activities, with or without a Section 401 WQC or NPDES permit coverage, shall comply with the applicable State Water Quality Standards as specified in HAR, Chapter 11-54.

The Hawaii Revised Statutes, Subsection 342D-50(a), requires that "[n]o person, including any public body, shall discharge any water pollutants into state waters, or cause or allow any water pollutant to enter state waters except in compliance with this chapter, rules adopted pursuant to this Chapter, or a permit or variance issued by the director."

If you have any questions, please contact Mr. Alec Wong, Supervisor of the Engineering Section, CWB, at 586-4309.

Sincerely,

for Alec Wong

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:np

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KAREN T. NAKAMURA

MARK ALEXANDER ROY
[illegible] STRUZA

December 31, 2008

Alec Wong, P.E., Chief
Clean Water Branch
State of Hawai`i
Department of Health
P. O. Box 3378
Honolulu, Hawai`i 96801-3378

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Wong:

Thank you for the letters from your office dated August 10, 2006, to our office and July 18, 2006, to Office of Planning Director Laura Thielen, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants have been in contact with the Army Corps of Engineers for early consultation on the project. In addition, a site visit to the project site was conducted with the Army Corps of Engineers on August 6, 2008.

2. The applicants will comply with the requirements of Hawaii Administrative Rules (HAR) Sections 11-55-04 and 11-55-34.05, relating to the National Pollutant Discharge Elimination System, as applicable.

3. As required by HAR Section 11-55-38, appropriate coordination will be undertaken with the State Historic Preservation Division.

4. Project construction and operations will comply with HAR, Chapter 11-54, as applicable.

5. The applicants acknowledge and understand the requirements of Hawai`i Revised Statutes, Subsection 342D-50(a).

Thank you again for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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AUG 15 2006

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
FRANCIS PAUL KEENO
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.2232

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

August 11, 2006

TO: MS. LAURA H. THIELEN, DIRECTOR
OFFICE OF PLANNING
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM

FROM: RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: PU'UNANI SUBDIVISION
PETITION DOCKET NO. A06-766 WITH EIS PREPARATION NOTICE
TOWNE DEVELOPMENT OF HAWAII, INC., ENDURANCE INVESTORS, LLC AND ASSOCIATION OF II WAI HUI, WAILUKU, MAUI

We have the following initial comments on the subject petition covering a proposed 210-acre residential development project:

1. The project will have an impact on our State highway facilities and also contribute to the cumulative impacts from other adjacent land developments in the area on our highways.

2. According to the EIS Preparation Notice, the petitioner is preparing a traffic impact analysis report (TIAR) and the TIAR will be included in the project's forthcoming Draft EIS. The Draft EIS and TIAR should cover, but not limited to, the project's impacts and contribution to the collective traffic impacts in the area and region: mitigation measures and required or recommended improvements; lateral connectivity of the project to adjoining subdivisions, and drainage flow control and improvements by the project.

We will defer further comment on the project until the Draft EIS and TIAR are completed. We request that the petitioner provide at least four (4) copies of the Draft EIS and TIAR for our departmental review.

c: [redacted]
Anthony Ching, Land Use Commission, DBEDT

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KAILYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Brennon Morioka, Director
State of Hawai`i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai`i 96813-5097

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Morioka:

Thank you for your department's letter dated August 11, 2006, to the Office of Planning, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants acknowledge that the proposed project will have an impact on State Highway facilities and also contribute to the cumulative impacts from other adjacent land developments in the area on highways. The applicants would like to note that their land use planner, traffic engineer, and project engineer have been coordinating with the Maui District Office to ensure impacts are mitigated to the extent practicable.

2. The Draft Environmental Impact Statement (EIS) will contain findings of the Traffic Impact Analysis Report, being prepared by the traffic engineer, which will consider cumulative impacts associated with the proposed development and mitigative measures. The report(s) will address lateral connectivity to adjoining subdivisions. Additionally, a preliminary drainage report will be prepared by the project's civil engineer to address drainage flow control and improvements.

Again, thank you for your feedback. Four (4) copies of the Draft EIS, including the Traffic Impact Analysis Report, will provided to your office for your review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
Phillip Rowell, Phillip Rowell & Associates
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AUG 2 2 2006

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I

DEPARTMENT OF EDUCATION

P.O. BOX 2360

HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

August 17, 2006

Ms. Tara K. Nakashima, Planner
Munekiyo & Haraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Nakashima:

Subject: Environmental Impact Statement Preparation Notice for Pu`unani Subdivision, Wailuku, Maui, TMK: 3-5-02: 002 and 003

The Department of Education (DOE) has reviewed Environmental Impact Statement Preparation Notice (EISPN) for the Pu`unani residential project in Wailuku, Maui.

The DOE would like to supply the following public school enrollment, facility capacity and projected enrollment information for the Waikapu-Wailuku area, for inclusion in the forthcoming Draft Environmental Impact Statement (DEIS). The DOE's estimates of future school enrollment in the area have increased in the past year, based in part on the large number of new residential developments proposed for the area.

Schools serving Ma`alaea to Wailuku Area: actual enrollment, facility capacity and projected enrollment, school years '03-'04 to '11-'12

	Actual enrollment			Capacity	Projected enrollment		
	'03-'04	'04-'05	05-'06		'06-'07	'08-'09	'11-'12
Wailuku Elementary K-5	937	937	953	1110	967	1143	1324
Iao Intermediate 6-8	830	831	830	883	854	962	1053
Baldwin High 9-12	1651	1680	1574	1542	1513	1614	1776

The enrollment data are compared to the 2005-2006 facility capacity numbers which are calculated annually by the DOE to determine the amount of classroom space available for students. In the 2005-2006 school year, there was some excess capacity at Wailuku Elementary and Iao Intermediate, but enrollment exceeded capacity at Baldwin High. By the 2008-2009 school year, the student enrollment at all three schools will exceed their facility capacity.

The DOE anticipates that the Pu`unani project will have an enrollment impact on the public schools serving Central Maui. We estimate that the total number of students residing in the project after completion will be 257 students; 134 in elementary school, 57 in middle school, and 66 in high school.

The DOE recognizes the need for additional schools in Central Maui and we are currently considering and selecting the best locations for new schools in the area from Wailuku to Ma`alaea.

New schools in Central Maui will be dependent on school fair-share contributions of land and cash; therefore, the DOE will ask the State Land Use Commission to impose a school fair-share contribution condition. We will ask for the standard condition language, which reads as follows:

> "The Applicant shall contribute to the development, funding, and/or construction of school facilities, on a fair-share basis, as determined by, and to the satisfaction of, the Department of Education. Terms of the contribution shall be agreed upon in writing by the Applicant and the Department of Education prior to obtaining building permits for any area of the development."

We look forward to reviewing the DEIS and providing more detailed comments at that time.

Thank you for an opportunity to comment on your plans. If you have any questions, please call Heidi Meeker of the Facilities Development Branch at (808) 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:jmb

cc: Randolph Moore, Acting Assistant Superintendent, OBS
Duane Kashiwai, Public Works Manager, FDB
Ken Nomura, CAS, Baldwin/Kekaulike/Maui Complex Areas
Laura Thielen, Office of Planning, DBEDT
Anthony Ching, State Land Use Commssion, DBEDT

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HINANO
KAI[illegible]UDA

MARK A[illegible] ROY
[illegible]UDA

December 31, 2008

Patricia Hamamoto, Superintendent
State of Hawai`i
Department of Education
P. O. Box 2360
Honolulu, Hawai`i 96804

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Ms. Hamamoto:

Thank you for your August 17, 2006 letter, commenting on the EISPN for the proposed Pu`unani Subdivision. The applicants understand the need for additional schools in Central Maui and your Department's position that a fair-share contribution rather than a contribution of land is appropriate for the proposed development. They look forward to working with the Department in formulating an appropriate school fair-share contribution agreement.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M. D.
DIRECTOR OF HEALTH

LORRIN W. PANG, M. D., M. P. H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2102

August 29, 2006

Ms. Tara Nakashima
Planner
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Ms. Nakashima:

Subject: **Environmental Impact Statement Preparation Notice for the Proposed Pu`unani Subdivision**
TMK: (2) 3-5-02: 002 and 003

Thank you for the opportunity to comment on the proposed Pu`unani Subdivision. The following comments are offered:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage is required for this project. The Clean Water Branch should be contacted at 808 586-4309.

2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work.

3. All lands formerly in the production of sugarcane should be characterized for arsenic contamination. If arsenic is detected above the US EPA Region preliminary remediation goal (PRG) for non-cancer effects, then a removal and/or remedial plan must be submitted to the Hazard Evaluation and Emergency Response (HEER) Office of the State Department of Health for approval. The plan must comply with Chapter 128D, Environmental Response Law, Hawaii Revised Statutes, and Title 11, Chapter 451, HAR, State Contingency Plan.

It is strongly recommended that the Standard Comments found at the Department's website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html be reviewed, and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please call me at 808 984-8230.

Sincerely,

Herbert S. Matsubayashi
District Environmental Health Program Chief

c: Anthony Ching
Kelvin Sunada

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

Decmeber 31, 2008

Herbert S. Matsubayashi, Chief
District Environmental Health Program
State of Hawai`i
Department of Health
54 High Street
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`I
(TMKs (2) 3-5-002:002 and 003),
Land Use Commission Petition A06-766

Dear Mr. Matsubayashi:

Thank you for your letter dated August 29, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants will obtain a permit to comply with the requirements of Hawaii Administrative Rules (HAR) Sections 11-55-04 and 11-55-34.05, related to the National Pollutant Discharge Elimination System, as applicable.

2. Pursuant to Chapter 11-46, *"Community Noise Control"*, a noise permit will be secured prior to commencement of construction, as applicable.

3. The applicants acknowledge the agency's comments with regard to the prior agricultural use of the subject properties. Phase I Environmental Site Assessments were prepared for the subject properties. Pertinent findings and recommendations from the assessments will be included in the Draft Environmental Impact Statement (EIS).

4. As applicable, other regulatory requirements on the Department of Health website, will be addressed as project plans are more refined.

Again, thank you for your feedback. A copy of the Draft EIS will be provided to your office for your review and comment.

Should you require further information, please do not hesitate to contact me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:

EPO-06-142

August 30, 2006

Mr. Tara Nakashima, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Nakashima:

SUBJECT: Environmental Impact Statement Preparation Notice for the Proposed Pu'unani Subdivision at Wailuku, Maui, Hawaii
TMK: (2) 3-5-002: 002 and 003

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have the following Hazard Evaluation & Emergency Response Office (HEER) comments.

Hazard Evaluation & Emergency Response Office (HEER)

1. Phase I Environmental Site Assessment (ESA) should be conducted for developments or redevelopments. If the investigation shows that a release of petroleum, hazardous substances, pollutants or contaminants occurred at the site, the site should be properly characterized through an approved Hawaii State Department of Health (DOH)/ HEER soil and or groundwater sampling plan. If the site is found to be contaminated, then all removal and remedial actions to clean up hazardous substance or oil releases by past and present owners/tenants must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

2. All lands formerly in the production of sugarcane should be characterized for arsenic contamination. If arsenic is detected above the US EPA Region 9 preliminary remediation goal (PRG) for non-cancer effects, then a removal and or remedial plan must be submitted to the DOH HEER office for approval. The plan must comply with Chapter 128D, Environmental Response Law, HRS, and Title 11, Chapter 451, HAR, State Contingency Plan.

3. If the land has a history of previous releases of petroleum, hazardous substances, pollutants, or contaminants, we recommend that the applicant request a " no further action"

(NFA) letter from the DOH HEER office prior to the approval of the land use change or permit approval.

Should you have any questions, please contact HEER office at 586-4250.

We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

C: EPO
HEER

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE SINOZA

December 31, 2008

Kelvin H. Sunada, Manager
Environmental Planning Office
State of Hawai`i
Department of Health
P. O. Box 3378
Honolulu, Hawai`i 96801-3378

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Sunada:

Thank you for your letter dated August 30, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. Phase I Environmental Site Assessments were prepared for the subject properties. Pertinent findings of the studies will be included in the Draft Environmental Impact Statement (EIS). As applicable, appropriate mitigation measures will be implemented to comply with Chapter 128D, Environmental Response Law, Hawai`i Revised Statutes (HRS) and Title 11, Chapter 451, Hawai`i Administrative Rules (HAR), State Contingency Plan.

2. As noted above, the applicants will comply with Chapter 128D, Environmental Response Law, HRS and Title 11, Chapter 451, HAR, State Contingency Plan, as applicable.

3. Should the Environmental Site Assessments indicate that the land has a history of release of petroleum, hazardous substances, pollutants or contaminants, the applicant will request a *"no further action"* letter from Hazard Evaluation & Emergency Response (HEER) Office prior to the land use change or permit approval, as applicable.

The applicants will review the standards comments posted on your website and adhere to comments applicable to the proposed project.

Again, thank you for your feedback. A copy of the Draft EIS will be provided to your office for your review and comment.

Should you require further information, please do not hesitate to contact me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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SEP 0 5 2006

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

September 1, 2006

Mr. Anthony Ching, Executive Officer
State Land Use Commission
235 South Beretania Street, 4th Floor
Honolulu, Hawai'i 96813

Dear Mr. Ching:

Subject: EISPN for the Pu'unani Residential Subdivision, Island of Hawa'ii

Thank you for the opportunity to review the subject document. We have the following comments.

1. The applicant should discuss how it plans to provide water for this development and fully analyze the impacts the proposed water projects. How would this project affect the Iao aquifer?

2. Please describe whether this residential project will provide affordable housing units?

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: Towne Development
Munekiyo and Arakawa

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARILYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Katherine Kealoha, Director
Office of Environmental Quality Control
State of Hawai`i
235 South Beretania Street, Suite 702
Honolulu, Hawai`i 96813

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Ms. Kealoha:

Thank you for your department's letter dated September 1, 2006, to State Land Use Commission, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. Water provision, an assessment of impacts, and effect of the proposed project on the Iao Aquifer will be included in the Draft Environmental Impact Statement (EIS).

2. The proposed project will provide affordable housing units and comply with the County of Maui Residential Workforce Housing Policy. The Draft EIS will include more detailed discussion on affordable housing product type, approximate sale price, and identify who the proposed project will serve in terms of HUD median income level.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for your review and comment.

environment
planning
305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Should you have further comments or questions, please call me at (808)244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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ALAN M. ARAKAWA
Mayor

MICHAEL W. FOLEY
Director

Don Couch
Deputy Director

JUN 27 2006

COUNTY OF MAUI
DEPARTMENT OF PLANNING

June 23, 2006

Mr. Mike Munekiyo, AICP
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Munekiyo;

RE: Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Pu'unani Residential Subdivision located at TMK: 3-5-002: 003 Wailuku Island of Maui, Hawaii (EAC 2006/0022)

The Maui Planning Department (Department) has reviewed the above-referenced document for the proposed action involving the development of:

- A residential subdivision including approximately:
  - 214 rural, half-acre lots,
  - six (6) rural one-acre lots,
  - 90 single-family residential lots of 4,000 sq. ft., and
  - 240 multi-family units;
- An area measuring 14.6 acres serving dually as a stormwater retention basin and park; and
- Open space buffers of a width varying from 25 to 200 feet along Honoapiilani Highway, 50 feet along Kuikahi Drive, and a 30 feet no build zone along the western border of the project area.

Based on the foregoing, the Department provides the following comments:

1. Provide a regional map depicting the existing and proposed realignment of Old Waikapu Road in relation to the existing roadway alignment for the properties and project located across Honoapiilani Highway.

2. Will the proposed development provide affordable housing?

3. Clarify whether ohana units be allowed throughout the development. If ohana units are allowed, then the analysis should reflect the increase.

4. As stated, mass-grading will be necessary. Provide a grading plan. Discuss potential impacts relative to scenic view resources from Honoapiilani Highway towards the West Maui Mountains. To the greatest extent possible, views of the West Maui Mountains should be considered in the design of the project.

5. The Agricultural Impact Study and discussion of Cumulative Impacts should consider the loss of all agricultural lands from projects proposed or approved to date. A list of projects and regional project maps may be obtained from the Department's Long Range Division.

6. The drainage studies should provide a regional analysis and include a discussion of the alternative of designing a system to manage more than the net increase in stormwater runoff.

7. The discussion should address section 19.30.020 , Maui County Code, which states that:

   "Agricultural lands that meet at least two (2) of the following criteria should be given the highest priority for retention in the agricultural district:

   A. Agricultural Lands of Importance to the State of Hawaii (ALISH);
   B. Lands not classified by the ALISH system whose agricultural land suitability, based on soil, topographic and climatic conditions, supports the production of agricultural commodities, including but not limited to coffee, taro, watercress, ginger, orchard and flower crops and non-irrigated pineapple. In addition, these lands shall include lands used for intensive animal husbandry, and lands in agricultural cultivation in five of the ten years immediately preceding the date of approval of this chapter; and
   C. Lands which have seventy-five percent or more of the their boundaries contiguous to lands within the agricultural district."

8. Alternatives Discussion

   a. Include a discussion of the current Maui County General Plan Update with particular emphasis on the Island of Maui. The Department strongly encourages proceeding with the proposed action's land use entitlements following the County's General Plan update.

   b. Discuss different densities analyzed during project development.

9. The Department concurs with your list (Chapter VIII) of County agencies to be consulted in preparation during the Draft EIS. Please be advised that to simulate a timely review, the agencies may require additional copies.

   Further, the Department recommends that the Applicant consult with the Maui Planning Commission on the Draft EIS.

10. Please provide four (4) copies of the Draft EIS to the Department.

Should you require further clarification, please contact Ms. Kivette Caigoy, Environmental Planner, at kivette.caigoy@co.maui.hi.us or Ms. Ann Cua, Staff Planner, at ann.cua@co.maui.hi.us or by phone at 270-7735.

Sincerely,

MICHAEL W. FOLEY
Planning Director

MWF:KAC:bg
c: Don Couch, Deputy Planning Director
Ann Cua, Staff Planner
State Land Use Commission
OEQC
EAC Project File
General File
K:\WP_DOCS\PLANNING\EAC\2006\0022_PuunaniSubd\EISPNcomments.wpd

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Jeffrey S. Hunt, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Hunt:

Thank you for your department's June 23, 2006 letter, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The Draft Environmental Impact Statement (EIS) will include a regional map that shows the existing and proposed realignment of Old Waikapu Road. In this connection, a regional roadway map will be included in the Draft EIS to show the relationship between Old Waikapu Road and adjacent or nearby properties.

2. The proposed development will provide affordable housing, as required by workforce housing policies adopted by the County of Maui. The applicants have been coordinating with the County Department of Housing and Human Concerns to ensure fulfillment of affordable housing requirements. The Draft EIS will include discussion of how the proposed subdivision will satisfy the requirements.

3. In accordance with Maui County Code, ohana units will be allowed in the proposed subdivision.

4. The Draft EIS will include a conceptual grading plan. There will also be discussion of potential impacts to views of the West Maui Mountains from Honoapi`ilani Highway. As the project progresses through the entitlement process, a conceptual grading plan will be provided. The project includes larger rural lots, it is anticipated that grading in the rural lots will be limited to the infrastructure improvements. There will also be discussion of potential impacts to views in the Draft EIS.

5. The Agricultural Impact Study will include discussion of cumulative impacts associated with development of the proposed subdivision. The project consultant has received a list of projects and regional maps from the Department's Long Range Division and will ensure incorporation of such projects into the analysis.

6. The drainage studies will consider the entire hydrologic drainage affecting the project site. Alternatives for storm water management will include options for accommodating runoff in excess of that required by the Department of Public Works.

7. The Draft EIS will include discussion of the proposed project in relation to Maui County Code, Section 19.30.020, relating to agricultural lands and priority for retention in the agricultural district.

8. a. In the discussion of alternatives to be included in the Draft EIS, there will be discussion of how the proposed project will meet current Maui County General Plan objectives. The applicants' intent at this time is to proceed through the Chapter 343, Hawaii Revised Statutes (HRS), EIS process with the Land Use Commission. To the extent that the General Plan Update process is proceeding on a timely and parallel schedule with State Land Use Commission's EIS and District Boundary Amendment processes, the preparation and filing of County land use applications (e.g., community plan amendment and change in zoning applications) will be held in abeyance.

   b. The Draft EIS will include analysis of various land use plans considered during the planning process.

9. As may be required, multiple copies of the Draft EIS will be distributed to reviewing agencies to facilitate timely document reviews. Copies of the Draft EIS will also be provided to Maui Planning Commission for review and comment.

Again, thank you for your feedback. As requested, four (4) copies of the Draft EIS will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
Bruce Plasch, Decision Analysts Hawai`i
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AUG 10 2006

ALAN M. ARAKAWA
Mayor

GEORGE Y. TENGAN
Director

ERIC H. YAMASHIGE, P.E., L.S.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

July 27, 2006

Ms. Laura H. Thielen, Director
Office of Planning
Department of Business, Economic Development & Tourism
235 South Beretania Street, 6th Floor
Honolulu, HI 96804

SUBJECT: Petition for Amendment to the State Land Use District Boundaries
Petition A06-766 - Towne Development of Hawaii, Inc. Pu'unani Subdivision
TMK - (2) 3-5-002:002 & 003

Dear Ms. Thielen:

Thank you for the opportunity to provide comments on this petition.

Source Availability and Consumption
The project site is served by the Central Maui System. The main sources of water for this system are the designated Iao aquifer, Waihee aquifer, the Iao tunnel and the Iao-Waikapu Ditch. DWS will not issue reservations for future meters or temporary construction meters for Central Maui projects until new sources are brought on-line. Remaining capacity of the Central System can not currently meet demand of this project. New source development projects include Kupaa well and expansion of the Iao Water Treatment Plant. Water for new projects may not be available until these sources are on-line.

Due to the cumulative demand for Kehalani Mauka Development, the applicant will need to develop or participate in source development for build-out of this project. Estimated demand based on system standards would be about 320,400 gallons per day.

System Infrastructure
The project site is served by an 8-inch waterline along Kuikahi Drive. The applicant will be required to meet DWS Rules and Regulations for Subdivision and provide domestic and irrigation services as well as fire protection in accordance with system standards.

Conservation

In order to reduce demand in the Central System, we encourage the applicant to include the following water conservation measures in the project design and construction:

Use brackish and/or reclaimed water sources for all non-potable water uses, including irrigation and dust control during construction.

Use Climate -adapted Plants: The project is located in the Maui County Planting Plan - Plant Zone 3. We encourage the applicant to utilize appropriate native and non invasive species and avoid the use of potentially invasive plants. Native plants adapted to the area, conserve water and protect the watershed from degradation due to invasive alien species. Attached is a list of appropriate plants for the zone as well as potentially invasive plants to avoid.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low-flow water fixtures and devices in faucets, showerheads, urinals, water closets, and hose bibs. Water conserving washing machines, ice-makers and other units are also available.

Pollution Prevention

The project overlies the Iao aquifer and is located within the wellhead protection area which recharges drinking water wells in the Central Maui communities. Please refer tot he attached Draft Wellhead Protection Ordinance for residential development guidelines and restrictions. The project is within the 1,000-ft radius of DWS drinking water wells. DWS strives to protect the integrity of surface and groundwater resources by encouraging the applicant to utilize Best Management Practices (BMPs) relevant to potentially polluting activities. We have attached sample BMPs for construction and also some information on household uses that involve potential groundwater contamination and prevention for preventive measures. We suggest that the developer provide the brochure to future homeowners. Additional information can be obtained from the State Department of Health. Additional mitigation measures are enumerated below and should be implemented during construction:

1. Prevent cement products, oil, fuel and other toxic substances from falling or leaching into the water.
2. Properly and promptly dispose of all loosened and excavated soil and debris material from drainage structure work.
3. Retain ground cover until the last possible date.
4. Stabilize denuded areas by sodding or planting as soon as possible. Replanting should include soil amendments, fertilizers and temporary irrigation. Use high seeding rates to ensure rapid stand establishment.
5. Avoid fertilizers and biocides, or apply only during periods of low rainfall to minimize chemical run-off.
6. Keep run-off on site.

Should you have any questions, please contact our Water Resources and Planning Division at 244-8550.

Sincerely,

George Y. Tengan, Director

eam

c: engineering division
applicant, with attachments:
The Costly Drip
Selected BMP's from "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters"-EPA
Maui County Planting Plan - Saving Water in the Yard - What and How to Plant in your Area
Ordinance No. 2108 - A Bill for an Ordinance Amending Chapter 16.20 of the Maui County Code, Pertaining to the Plumbing Code
A Checklist of Water Conservation Ideas for Home and Yard
HAPPI - Water Quality Around the House
Draft Wellhead Protection Ordinance - County of Maui

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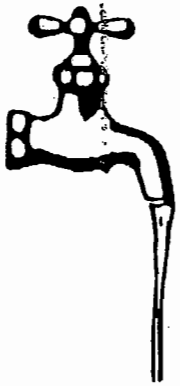
"THE COSTLY DRIP"

Slowly Dripping
Spigot Wastes
15 Gallons a day.

1/32" Leak Wastes
25 Gallons a day.

1/16" Stream Wastes
100 Gallons a Day.



1/8" Stream Wastes
400 Gallons a day.

United States
Environmental Protection
Agency

Office of Water
Washington, DC 20460

840-B-92-002
January 1993

EPA

Guidance Specifying Management Measures For Sources Of Nonpoint Pollution In Coastal Waters

Issued Under the Authority of
Section 6217(g) of the Coastal Zone Act
Reauthorization Amendments of 1990

III. CONSTRUCTION ACTIVITIES

A. Construction Site Erosion and Sediment Control Management Measure

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

(2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

1. Applicability

This management measure is intended to be applied by States to all construction activities on sites less than 5 acres in areas that do not have an NPDES permit[3] in order to control erosion and sediment loss from those sites. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The goal of this management measure is to reduce the sediment loadings from construction sites in coastal areas that enter surface waterbodies. This measure requires that coastal States establish new or enhance existing State erosion and sediment control (ESC) programs and/or require ESC programs at the local level. It is intended to be part of a comprehensive land use or watershed management program, as previously detailed in the Watershed and Site Development Management Measures. It is expected that State and local programs will establish criteria determined by local conditions (e.g., soil types, climate, meteorology) that reduce erosion and sediment transport from construction sites.

Runoff from construction sites is by far the largest source of sediment in urban areas under development (York County Soil and Water Conservation District, 1990). Soil erosion removes over 90 percent of sediment by tonnage in urbanizing areas where most construction activities occur (Canning, 1988). Table 4-14 illustrates some of the

[3] On May 27, 1992, the United States Court of Appeals for the Ninth Circuit invalidated EPA's exemption of construction sites smaller than 5 acres from the storm water permit program in *Natural Resources Defense Council* v. *EPA*, 965 F.2d 759 (9th Cir. 1992). EPA is conducting further rulemaking proceedings on this issue and will not require permit applications for construction activities under 5 acres until further rulemaking has been completed.

measured sediment loading rates associated with construction activities found across the United States. As seen in Table 4-14, erosion rates from natural areas such as undisturbed forested lands are typically less than one ton/acre/year, while erosion from construction sites ranges from 7.2 to over 1,000 tons/acre/year.

Table 4-14. Erosion and Sediment Problems Associated With Construction

Location	Problem	Reference
United States	Sediment loading rates vary from 36.5 to 1,000 ton/ac/yr. These are 5 to 500 times greater than those from undeveloped land. Approximately 600 million tons of soil erodes from developed sites each year. Construction site sediment in runoff can be 10 to 20 times greater than that from agricultural lands.	York County Soil and Water Conservation District, 1990
Franklin County, FL	Sediment yield (ton/ac/yr): forest < 0.5 rangeland < 0.5 tilled 1.4 construction site 30 established urban < 0.5	Franklin County, FL
Wisconsin	Erosion rates range from 30 to 200 ton/ac/yr (10 to 20 times those of cropland).	Wisconsin Legislative Council, 1991
Washington, DC	Erosion rates range from 35 to 45 ton/ac/yr (10 to 100 times greater than agriculture and stabilized urban land uses).	MWCOG, 1987
Anacostia River Basin, VA, MD, DC	Sediment yields from portions of the Anacostia Basin have been estimated at 75,000 to 132,000 ton/yr.	U.S. Army Corps of Engineers, 1990
Washington	Erosion rates range from 50 to 500 ton/ac/yr. Natural erosion rates from forests or well-sodded prairies are 0.01 to 1.0 ton/ac/yr.	Washington Department of Ecology, 1989
Anacostia River Basin, VA, MD, DC	Erosion rates range from 7.2 to 100.8 ton/ac/yr.	USGS, 1978
Alabama	1.4 million tons eroded per year.	Woodward-Clyde, 1991
North Carolina	6.7 million tons eroded per year.	
Louisiana	5.1 million tons eroded per year.	
Oklahoma	4.2 million tons eroded per year.	
Georgia	3.8 million tons eroded per year.	
Texas	3.5 million tons eroded per year.	
Tennessee	3.3 million tons eroded per year.	
Pennsylvania	3.1 million tons eroded per year.	
Ohio	3.0 million tons eroded per year.	
Kentucky	3.0 million tons eroded per year.	

Eroded sediment from construction sites creates many problems in coastal areas including adverse impacts on water quality, critical habitats, submerged aquatic vegetation (SAV) beds, recreational activities, and navigation (APWA, 1991). For example, the Miami River in Florida has been severely affected by pollution associated with upland erosion. This watershed has undergone extensive urbanization, which has included the construction of many commercial and residential buildings over the past 50 years. Sediment deposited in the Miami River channel contributes to the severe water quality and navigation problems of this once-thriving waterway, as well as Biscayne Bay (SFWMD, 1988).

ESC plans are important for controlling the adverse impacts of construction and land development and have been required by many State and local governments, as shown in Table 4-13 (in the Site Development section of this chapter). An ESC plan is a document that explains and illustrates the measures to be taken to control erosion and sediment problems on construction sites (Connecticut Council on Soil and Water Conservation, 1988). It is intended that existing State and local erosion and sediment control plans may be used to fulfill the requirements of this management measure. Where existing ESC plans do not meet the management measure criteria, inadequate plans may be enhanced to meet the management measure guidelines.

Typically, an ESC plan is part of a larger site plan and includes the following elements:

- Description of predominant soil types;
- Details of site grading including existing and proposed contours;
- Design details and locations for structural controls;
- Provisions to preserve topsoil and limit disturbance;
- Details of temporary and permanent stabilization measures; and
- Description of the sequence of construction.

ESC plans ensure that provisions for control measures are incorporated into the site planning stage of development and provide for the reduction of erosion and sediment problems and accountability if a problem occurs (York County Soil and Water Conservation District, 1990). An effective plan for urban runoff management on construction sites will control erosion, retain sediments on site, to the extent practicable, and reduce the adverse effects of runoff. Climate, topography, soils, drainage patterns, and vegetation will affect how erosion and sediment should be controlled on a site (Washington State Department of Ecology, 1989). An effective ESC plan includes both structural and nonstructural controls. Nonstructural controls address erosion control by decreasing erosion potential, whereas structural controls are both preventive and mitigative because they control both erosion and sediment movement.

Typical nonstructural erosion controls include (APWA, 1991; York County Soil and Water Conservation District, 1990):

- Planning and designing the development within the natural constraints of the site;
- Minimizing the area of bare soil exposed at one time (phased grading);
- Providing for stream crossing areas for natural and man-made areas; and
- Stabilizing cut-and-fill slopes caused by construction activities.

Structural controls include:

- Perimeter controls;
- Mulching and seeding exposed areas;
- Sediment basins and traps; and
- Filter fabric, or silt fences.

Some erosion and soil loss are unavoidable during land-disturbing activities. While proper siting and design will help prevent areas prone to erosion from being developed, construction activities will invariably produce conditions where erosion may occur. To reduce the adverse impacts associated with construction, the construction management measure suggests a system of nonstructural and structural erosion and sediment controls for incorporation into an

ESC plan. Erosion controls have distinct advantages over sediment controls. Erosion controls reduce the amount of sediment transported off-site, thereby reducing the need for sediment controls. When erosion controls are used in conjunction with sediment controls, the size of the sediment control structures and associated maintenance may be reduced, decreasing the overall treatment costs (SWRPC, 1991).

3. Management Measure Selection

This management measure was selected to minimize sediment being transported outside the perimeter of a construction site through two broad performance goals: (1) **reduce** erosion and (2) **retain** sediment onsite, to the extent practicable. These performance goals were chosen to allow States and local governments flexibility in specifying practices appropriate for local conditions.

While several commentors responding to the draft (May 1991) guidance expressed the need to define "more measurable, enforceable ways" to control sediment loadings, other commentors stressed the need to draft management measures that do not conflict with existing State programs and allow States and local governments to determine appropriate practices and design standards for their communities. These management measures were selected because virtually all coastal States control construction activities to prevent erosion and sediment loss.

The measures were specifically written for the following reasons:

(1) Predevelopment loadings may vary greatly, and some sediment loss is usually inevitable;

(2) Current practice is built on the use of systems of practices selected based on site-specific conditions; and

(3) The combined effectiveness of erosion and sediment controls in systems is not easily quantified.

4. Erosion Control Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Erosion controls are used to reduce the amount of sediment that is detached during construction and to prevent sediment from entering runoff. Erosion control is based on two main concepts: (1) disturb the smallest area of land possible for the shortest period of time, and (2) stabilize disturbed soils to prevent erosion from occurring.

a. Schedule projects so clearing and grading are done during the time of minimum erosion potential.

Often a project can be scheduled during the time of year that the erosion potential of the site is relatively low. In many parts of the country, there is a certain period of the year when erosion potential is relatively low and construction scheduling could be very effective. For example, in the Pacific region if construction can be completed during the 6-month dry season (May 1 - October 31), temporary erosion and sediment controls may not be needed. In addition, in some parts of the country erosion potential is very high during certain parts of the year such as the spring thaw in northern areas. During this time of year, melting snowfall generates a constant runoff that can erode soil. In addition, construction vehicles can easily turn the soft, wet ground into mud, which is more easily washed offsite. Therefore, in the north, limitations should be placed on grading during the spring thaw (Goldman et al., 1986).

b. Stage construction.

void areawide clearance of construction sites. Plan and stage land disturbance activities so that only the area irrently under construction is exposed. As soon as the grading and construction in an area are complete, the area ıould be stabilized.

ly clearing only those areas immediately essential for completing site construction, buffer zones are preserved and oil remains undisturbed until construction begins. Physical markers, such as tape, signs, or barriers, indicating the imits of land disturbance, can ensure that equipment operators know the proposed limits of clearing. The area of he watershed that is exposed to construction is important for determining the net amount of erosion. Reducing the xtent of the disturbed area will ultimately reduce sediment loads to surface waters. Existing or newly planted egetation that has been planted to stabilize disturbed areas should be protected by routing construction traffic around ınd protecting natural vegetation with fencing, tree armoring, retaining walls, or tree wells.

c. Clear only areas essential for construction.

Often areas of a construction site are unnecessarily cleared. Only those areas essential for completing construction ctivities should be cleared, and other areas should remain undisturbed. Additionally, the proposed limits of land listurbance should be physically marked off to ensure that only the required land area is cleared. Avoid disturbing egetation on steep slopes or other critical areas.

d. Locate potential nonpoint pollutant sources away from steep slopes, waterbodies, and critical areas.

Material stockpiles, borrow areas, access roads, and other land-disturbing activities can often be located away from critical areas such as steep slopes, highly erodible soils, and areas that drain directly into sensitive waterbodies.

e. Route construction traffic to avoid existing or newly planted vegetation.

Where possible, construction traffic should travel over areas that must be disturbed for other construction activity. This practice will reduce the area that is cleared and susceptible to erosion.

f. Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells.

Tree armoring protects tree trunks from being damaged by construction equipment. Fencing can also protect tree trunks, but should be placed at the tree's drip line so that construction equipment is kept away from the tree. The tree drip line is the minimum area around a tree in which the tree's root system should not be disturbed by cut, fill, or soil compaction caused by heavy equipment. When cutting or filling must be done near a tree, a retaining wall or tree well should be used to minimize the cutting of the tree's roots or the quantity of fill placed over the tree's roots.

g. Stockpile topsoil and reapply to revegetate site.

Because of the high organic content of topsoil, it cannot be used as fill material or under pavement. After a site is cleared, the topsoil is typically removed. Since topsoil is essential to establish new vegetation, it should be stockpiled and then reapplied to the site for revegetation, if appropriate. Although topsoil salvaged from the existing site can often be used, it must meet certain standards and topsoil may need to be imported onto the site if the existing topsoil is not adequate for establishing new vegetation.

h. Cover or stabilize topsoil stockpiles.

Unprotected stockpiles are very prone to erosion and therefore stockpiles must be protected. Small stockpiles can be covered with a tarp to prevent erosion. Large stockpiles should be stabilized by erosion blankets, seeding, and/or mulching.

i. Use wind erosion controls.

Wind erosion controls limit the movement of dust from disturbed soil surfaces and include many different practices. Wind barriers block air currents and are effective in controlling soil blowing. Many different materials can be used as wind barriers, including solid board fence, snow fences, and bales of hay. Sprinkling moistens the soil surface with water and must be repeated as needed to be effective for preventing wind erosion (Delaware DNREC, 1989); however, applications must be monitored to prevent excessive runoff and erosion.

j. Intercept runoff above disturbed slopes and convey it to a permanent channel or storm drain.

Earth dikes, perimeter dikes or swales, or diversions can be used to intercept and convey runoff above disturbed areas. An earth dike is a temporary berm or ridge of compacted soil that channels water to a desired location. A perimeter dike/swale or diversion is a swale with a supporting ridge on the lower side that is constructed from the soil excavated from the adjoining swale (Delaware DNREC, 1989). These practices should be used to intercept flow from denuded areas or newly seeded areas to keep the disturbed areas from being eroded from the uphill runoff. The structures should be stabilized within 14 days of installation. A pipe slope drain, also known as a pipe drop structure, is a temporary pipe placed from the top of a slope to the bottom of the slope to convey concentrated runoff down the slope without causing erosion (Delaware DNREC, 1989).

k. On long or steep, disturbed, or man-made slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff.

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet, such as a sediment basin or trap. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops. This practice should be used if there is a potential for erosion along the slope.

l. Use retaining walls.

Often retaining walls can be used to decrease the steepness of a slope. If the steepness of a slope is reduced, the runoff velocity is decreased and, therefore, the erosion potential is decreased.

m. Provide linings for urban runoff conveyance channels.

Often construction increases the velocity and volume of runoff, which causes erosion in newly constructed or existing urban runoff conveyance channels. If the runoff during or after construction will cause erosion in a channel, the channel should be lined or flow control BMPs installed. The first choice of lining should be grass or sod since this reduces runoff velocities and provides water quality benefits through filtration and infiltration. If the velocity in the channel would erode the grass or sod, then riprap, concrete, or gabions can be used.

n. Use check dams.

Check dams are small, temporary dams constructed across a swale or channel. They can be constructed using gravel or straw bales. They are used to reduce the velocity of concentrated flow and, therefore, to reduce the erosion in

a swale or channel. Check dams should be used when a swale or channel will be used for a short time and therefore it is not feasible or practical to line the channel or implement flow control BMPs (Delaware DNREC, 1989).

o. *Seed and fertilize.*

Seeding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once a dense vegetative cover has been established. However, often seeding and fertilizing do not produce as thick a vegetative cover as do seed and mulch or netting. Newly established vegetation does not have as extensive a root system as existing vegetation and therefore is more prone to erosion, especially on steep slopes. Care should be taken when fertilizing to avoid untimely or excessive application. Since the practice of seeding and fertilizing does not provide any protection during the time of vegetative establishment, it should be used only on favorable soils in very flat areas and not in sensitive areas.

p. *Use seeding and mulch/mats.*

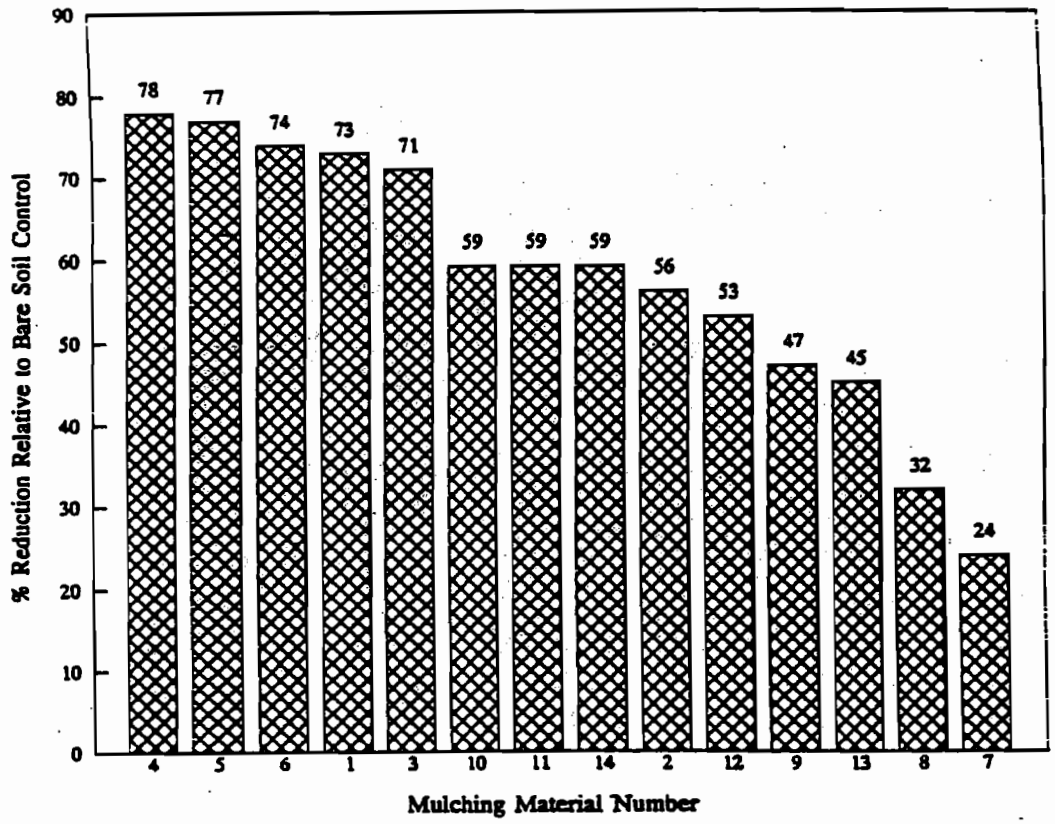
Seeding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once the vegetative cover has been established. The mulching/mats protect the disturbed area while the vegetation becomes established.

The management of land by using ground cover reduces erosion by reducing the flow rate of runoff and the raindrop impact. Bare soils should be seeded or otherwise stabilized within 15 calendar days after final grading. Denuded areas that are inactive and will be exposed to rain for 30 days or more should also be temporarily stabilized, usually by planting seeds and establishing vegetation during favorable seasons in areas where vegetation can be established. In very flat, non-sensitive areas with favorable soils, stabilization may involve simply seeding and fertilizing. Mulching and/or sodding may be necessary as slopes become moderate to steep, as soils become more erosive, and as areas become more sensitive.

q. *Use mulch/mats.*

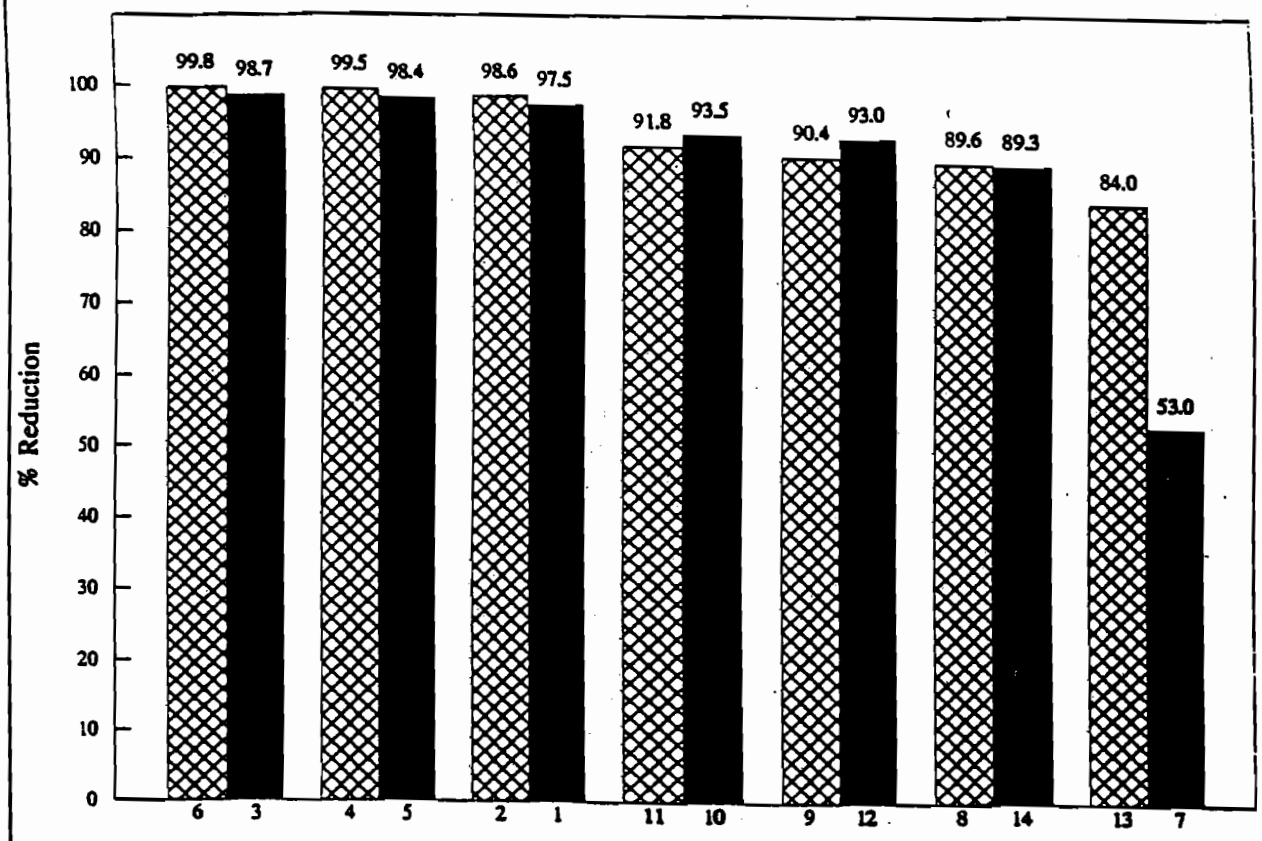
Mulching involves applying plant residues or other suitable materials on disturbed soil surfaces. Mulchs/mats used include tacked straw, wood chips, and jute netting and are often covered by blankets or netting. Mulching alone should be used only for temporary protection of the soil surface or when permanent seeding is not feasible. The useful life of mulch varies with the material used and the amount of precipitation, but is approximately 2 to 6 months. Figure 4-5 shows water velocity reductions that could be expected using various mulching techniques. Similarly, Figure 4-6 shows reductions in soil loss achievable using various mulching techniques. During times of year when vegetation cannot be established, soil mulching should be applied to moderate slopes and soils that are not highly erodible. On steep slopes or highly erodible soils, multiple mulching treatments should be used. On a high-elevation or desert site where grasses cannot survive the harsh environment, native shrubs may be planted. Interlocking ceramic materials, filter fabric, and netting are available for this purpose. Before stabilizing an area, it is important to have installed all sediment controls and diverted runoff away from the area to be planted. Runoff may be diverted away from denuded areas or newly planted areas using dikes, swales, or pipe slope drains to intercept runoff and convey it to a permanent channel or storm drain. Reserved topsoil may be used to revegetate a site if the stockpile has been covered and stabilized.

Consideration should be given to maintenance when designing mulching and matting schemes. Plastic nets are often used to cover the mulch or mats; however, they can foul lawn mower blades if the area requires mowing.



Mulch Material	Characteristics
1	100% wheat straw/top net
2	100% wheat straw/two nets
3	70% wheat straw/30% coconut fiber
4	70% wheat straw/30% coconut fiber
5	100% coconut fiber
6	Nylon monofilament/two nets
7	Nylon monofilament/rigid/bonded
8	Vinyl monofilament/flexible/bonded
9	Curled wood fibers/top net
10	Curled wood fibers/two nets
11	Antiwash netting (jute)
12	Interwoven paper and thread
13	Uncrimped wheat straw – 2,242 kg/ha
14	Uncrimped wheat straw – 4,484 kg/ha

Figure 4-5. Water velocity reductions for different mulch treatments (adapted from Harding, 1990).



Mulch Material	Characteristics
1	100% wheat straw/top net
2	100% wheat straw/two nets
3	70% wheat straw/30% coconut fiber
4	70% wheat straw/30% coconut fiber
5	100% coconut fiber
6	Nylon monofilament/two nets
7	Nylon monofilament/rigid/bonded
8	Vinyl monofilament/flexible/bonded
9	Curled wood fibers/top net
10	Curled wood fibers/two nets
11	Antiwash netting (jute)
12	Interwoven paper and thread
13	Uncrimped wheat straw – 2,242 kg/ha
14	Uncrimped wheat straw – 4,484 kg/ha

Figure 4-6. Actual soil loss reductions for different mulch treatments (adapted from Harding, 1990).

r. Use sodding.

Sodding permanently stabilizes an area. Sodding provides immediate stabilization of an area and should be used in critical areas or where establishment of permanent vegetation by seeding and mulching would be difficult. Sodding is also a preferred option when there is a high erosion potential during the period of vegetative establishment from seeding.

s. Use wildflower cover.

Because of the hardy drought-resistant nature of wildflowers, they may be more beneficial as an erosion control practice than turf grass. While not as dense as turfgrass, wildflower thatches and associated grasses are expected to be as effective in erosion control and contaminant absorption. Because thatches of wildflowers do not need fertilizers, pesticides, or herbicides, and watering is minimal, implementation of this practice may result in a cost savings (Brash et al., undated). In 1987, Howard County, Maryland, spent $690.00 per acre to maintain turfgrass areas, compared to only $31.00 per acre for wildflower meadows (Wilson, 1990).

A wildflower stand requires several years to become established; maintenance requirements are minimal once the area is established (Brash et al., undated).

5. Sediment Control Practices[4]

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Sediment controls capture sediment that is transported in runoff. Filtration and detention (gravitational settling) are the main processes used to remove sediment from urban runoff.

a. Sediment Basins

Sediment basins, also known as silt basins, are engineered impoundment structures that allow sediment to settle out of the urban runoff. They are installed prior to full-scale grading and remain in place until the disturbed portions of the drainage area are fully stabilized. They are generally located at the low point of sites, away from construction traffic, where they will be able to trap sediment-laden runoff.

Sediment basins are typically used for drainage areas between 5 and 100 acres. They can be classified as either temporary or permanent structures, depending on the length of service of the structure. If they are designed to function for less than 36 months, they are classified as "temporary"; otherwise, they are considered permanent structures. Temporary sediment basins can also be converted into permanent urban runoff management ponds. When sediment basins are designed as permanent structures, they must meet all standards for wet ponds.

b. Sediment Trap

Sediment traps are small impoundments that allow sediment to settle out of runoff water. Sediment traps are typically installed in a drainageway or other point of discharge from a disturbed area. Temporary diversions can be

[4]Adapted from Goldman (1986).

used to direct runoff to the sediment trap. Sediment traps should not be used for drainage areas greater than 5 acres and typically have a useful life of approximately 18 to 24 months.

c. Filter Fabric Fence

Filter fabric fence is available from many manufacturers and in several mesh sizes. Sediment is filtered out as urban runoff flows through the fabric. Such fences should be used only where there is sheet flow (i.e., no concentrated flow), and the maximum drainage area to the fence should be 0.5 acre or less per 100 feet of fence. Filter fabric fences have a useful life of approximately 6 to 12 months.

d. Straw Bale Barrier

A straw bale barrier is a row of anchored straw bales that detain and filter urban runoff. Straw bales are less effective than filter fabric, which can usually be used in place of straw bales. However, straw bales have been effectively used as temporary check dams in channels. As with filter fabric fences, straw bale barriers should be used only where there is sheet flow. The maximum drainage area to the barrier should be 0.25 acre or less per 100 feet of barrier. The useful life of straw bales is approximately 3 months.

e. Inlet Protection

Inlet protection consists of a barrier placed around a storm drain drop inlet, which traps sediment before it enters the storm sewer system. Filter fabric, straw bales, gravel, or sand bags are often used for inlet protection.

f. Construction Entrance

A construction entrance is a pad of gravel over filter cloth located where traffic leaves a construction site. As vehicles drive over the gravel, mud, and sediment are collected from the vehicles' wheels and offsite transport of sediment is reduced.

g. Vegetated Filter Strips

Vegetated filter strips are low-gradient vegetated areas that filter overland sheet flow. Runoff must be evenly distributed across the filter strip. Channelized flows decrease the effectiveness of filter strips. Level spreading devices are often used to distribute the runoff evenly across the strip (Dillaha et al., 1989).

Vegetated filter strips should have relatively low slopes and adequate length and should be planted with erosion-resistant plant species. The main factors that influence the removal efficiency are the vegetation type, soil infiltration rate, and flow depth and travel time. These factors are dependent on the contributing drainage area, slope of strip, degree and type of vegetative cover, and strip length. Maintenance requirements for vegetated filter strips include sediment removal and inspections to ensure that dense, vigorous vegetation is established and concentrated flows do not occur. Maintenance of these structures is discussed in Section II.A of this chapter.

6. Effectiveness and Cost Information

a. Erosion Control Practices

The effectiveness of erosion control practices can vary based on land slope, the size of the disturbed area, rainfall frequency and intensity, wind conditions, soil type, use of heavy machinery, length of time soils are exposed and unprotected, and other factors. In general, a system of erosion and sediment control practices can more effectively reduce offsite sediment transport than can a single system. Numerous nonstructural measures such as protecting natural or newly planted vegetation, minimizing the disturbance of vegetation on steep slopes and other highly

erodible areas, maximizing the distance eroded material must travel before reaching the drainage system, and locating roads away from sensitive areas may be used to reduce erosion.

Table 4-15 contains the available cost and effectiveness data for some of the erosion controls listed above. Information on the effectiveness of individual nonstructural controls was not available. All reported effectiveness data assume that controls are properly designed, constructed, and maintained. Costs have been broken down into annual capital costs, annual maintenance costs, and total annual costs (including annualization of the capital costs).

b. Sediment Control Practices

Regular inspection and maintenance are needed for most erosion control practices to remain effective. The effectiveness of sediment controls will depend on the size of the construction site and the nature of the runoff flows. Sediment basins are most appropriate for drainage areas of 5 acres or greater. In smaller areas with concentrated flows, silt traps may suffice. Where concentrated flow leaves the site and the drainage area is less than 0.5 ac/100 ft of flow, filter fabric fences may be effective. In areas where sheet flow leaves the site and the drainage area is greater than 0.5 acre/100 ft of flow, perimeter dikes may be used to divert the flow to a sediment trap or sediment basin. Urban runoff inlets may be protected using straw bales or diversions to filter or route runoff away from the inlets.

Table 4-16 describes the general cost and effectiveness of some common sediment control practices.

c. Comparisons

Figure 4-7 illustrates the estimated TSS loading reductions from Maryland construction sites possible using a combination of erosion and sediment controls in contrast to using only sediment controls. Figure 4-8 shows a comparison of the cost and effectiveness of various erosion control practices. As can be seen in Figure 4-8, seeding or seeding and mulching provide the highest levels of control at the lowest cost.

Table 4-15. ESC Quantitative Effectiveness and Cost Summary

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sod	Immediate erosion protection where there is high erosion potential during vegetative establishment.	Average: 99% Observed range: 98% - 99% References: Minnesota Pollution Control Agency, 1989; Pennsylvania, 1983 cited in USEPA, 1991	2	Average: $0.2 per ft^2 [$11,300 per acre] Range: $0.1 - $1.1 References: SWRPC, 1991; Schueler, 1987; Virginia, 1980	Average: 5% Range: 5% Reference: SWRPC, 1991	$0.20 per ft^2 $7,500 per acre
Seed	Establish vegetation on disturbed area.	After vegetation established- Average: 90% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberts, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: $400 per acre Range: $200 - $1000 per acre References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986; Virginia, 1980	Average: 20% Range: 15% - 25% References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991	$300 per acre
Seed and Mulch	Establish vegetation on disturbed area.	After vegetation established- Average: 90% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberts, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: $1,500 per acre Range: $800 - $3,500 per acre References: Goldman, 1986; Washington DOT, 1990; NC State, 1990; Schueler, 1987; Virginia, 1980; SWRPC, 1991	Average: NA[b] Range: NA References: None	$1,100 per acre

Table 4-15. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Mulch	Temporary stabilization of disturbed area.	Observed range: sand: 20% slope / 50% slope wood fiber @ 1500 lb/ac: 50-60% / 0-20% wood fiber @ 3000 lb/ac: 50-85% / 50-70% straw @ 3000 lb/ac: 90-100% / 95% Silt-loam: 20% slope / 50% slope wood fiber @ 1500 lb/ac: 20-60% / 40-60% wood fiber @ 3000 lb/ac: 60-90% / 60-70% straw @ 3000 lb/ac: 80-95% / 70-90% Silt-clay-loam: 10-30% slope / 30-50% slope wood fiber @ 1500 lb/ac: 5% / -- wood fiber @ 3000 lb/ac: 40% / -- jute netting: 30-60% / 30% straw @ 3000 lb/ac: 40-70% / 20-40% wood chips @ 10,000 lb/ac: 60-80% / 50-60% mulch blanket: 60-80% / 50-60% excelsior blanket: 60-80% / 50-60% multiple treatment (straw and jute): 90% / 90% References: Minnesota Pollution Control Agency, 1989; Kay, 1983 cited in Goldman, 1986	Straw mulch: 0.25 Wood fiber mulch: 0.33 Jute netting: 0.33 Straw and jute: 0.33	Straw mulch: Average: $1,700 per acre Range: $500 - $5,000 per acre References: Wisconsin DOT cited in SWRPC, 1991; Washington DOT, 1990; Virginia, 1980 Wood fiber mulch: Average: $1,000 per acre Range: $100 - $2,300 per acre References: Washington DOT, 1990; Virginia, 1980 Jute netting: Average: $3,700 per acre Range: $3,500-$4,100 per acre References: Washington DOT, 1990; Virginia, 1980 Straw and jute: Average: $5,400 per acre Range: $4,000-$9,100 per acre References: Washington DOT, 1990; Virginia, 1980	Average: NA[b] Range: NA References: None	Straw mulch: $7,500 per acre Wood fiber mulch: $3,500 per acre Jute netting: $12,500 per acre Straw and jute: $18,000 per acre

Table 4-15. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Terraces	Break up long or steep slopes.	Observed range: Land Slope / Reduction in Erosion 1-12% 70% 12-18% 60% 18-24% 55% Additionally, if the slope steepness is halved, while other factors are held constant, the soil loss potential decreases 2-1/2 times. If both the slope and length are halved, the soil loss potential is decreased 4 times. References: Goldman, 1986; Beasley, 1972	2	Average: $5 per lin ft Range: $1 - $12 References: SWRPC, 1991; Goldman, 1986; Virginia, 1991	Average: 20% Range: 20% Reference: SWRPC, 1991	$4 per lin ft
All Erosion Controls	Reduce amount of sediment entering runoff.	Average: 85% Observed range: 85% Reference: Schueler, 1990	--	Varies but typically low	Varies but typically low	Varies but typically low

NA - Not available.
[a] Useful life estimated as length of construction project (assumed to be 2 years).
[b] For Total Annual Cost, assume Annual Maintenance Cost = 2% of construction cost.

Table 4-16. ESC Quantitative Effectiveness and Cost Summary for Sediment Control Practices

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sediment basin	Minimum drainage area = 5 acres, maximum drainage area = 100 acres	Average: 70% Observed range: 55% - 100% References: Schueler, 1990; Engle, BW and Jarrett, AR, 1990; Baumann, 1990	2	Less than 50,000 ft^3 storage Average: \$0.60 per ft^3 storage (\$1,100 per drainage acre[c]) Range: \$0.20 - \$1.30 per ft^3	Average: 25% Range: 25% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991	Less than 50,000 ft^3 storage \$0.40 per ft^3 storage \$700 per drainage acre[b]
				Greater than 50,000 ft^3 storage Average: \$0.3 per ft^3 storage (\$550 per drainage acre[c]) Range: \$0.10 - \$0.40 per ft^3 References: SWRPC, 1991		Greater than 50,000 ft^3 storage \$0.20 per ft^3 storage \$900 per drainage acre[c]
Sediment trap	Maximum drainage area = 5 acres	Average: 60% Observed range: (-7%) - 100% References: Schueler, et al., 1990; Tahoe Regional Planning Agency, 1989; Baumann, 1990	1.5	Average: \$0.60 per ft^3 storage (\$1,100 per drainage acre[c]) Range: \$0.20 - \$2.00 per ft^3 References: Denver COG cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986	Average: 20% Range: 20% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991	\$0.70 per ft^3 storage \$1,300 per drainage acre[c]
Filter Fabric Fence	Maximum drainage area = 0.5 acre per 100 feet of fence. Not to be used in concentrated flow areas.	Average: 70% Observed range: 0% - 100% sand: 80% - 99% silt-loam: 50% - 80% silt-clay-loam: 0% - 20% References: Munson, 1991; Fisher et al., 1984; Minnesota Pollution Control Agency, 1989	0.5	Average: \$3 per lin ft (\$700 per drainage acre[c] Range: \$1 - \$8 per lin ft References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986; Virginia, 1991; NC State, 1990	Average: 100% Range: 100% References: SWRPC, 1991	\$7 per lin ft \$850 per drainage acre[c]

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Straw Bale Barrier	Maximum drainage area = 0.25 acre per 100 feet of barrier. Not to be used in concentrated flow areas.	Average: 70% Observed Range: 70% References: Virginia, 1980 cited in EPA, 1991	0.25	Average: $4 per lin ft ($1,600 per drainage acre[d] Range: $2 - $6 per lin ft References: Goldman, 1986; Virginia, 1991	Average: 100% Range: 100% References: SWRPC, 1991	$17 per lin ft $6,800 per drainage acre[d]
Inlet Protection	Protect storm drain inlet.	Average: NA Observed Range: NA References: None	1	Average: $100 per inlet Range: $50 - $150 References: SWRPC, 1991; Denver COG cited in SWRPC, 1991; Virginia, 1991; EPA cited in SWRPC, 1991	Average: 60% Range: 20% - 100% References: SWRPC, 1991; Denver COG cited in SWRPC, 1991	$150 per inlet
Construction Entrance	Removes sediment from vehicles wheels.	Average: NA Observed Range: NA References: None	2	Average: $2,000 each Range: $1,000 - $4,000 References: Goldman, 1986; NC State, 1990	Average: NA[e] Range: NA References: None	$1,500 each
				With washrack: Average: $3,000 each Range: $1,000 - $5,000 References: Virginia, 1991		$2,200 each

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Vegetative Filter Strip	Must have sheet flow.	Average: 70% Observed Range: 20% - 80% References: Hayes and Hairston, 1983 cited in Casman, 1990; Dillaha et al., 1989, cited in Glick et al., 1991; Virginia Department of Conservation, 1987; Nonpoint Source Control Task Force, 1983 cited in Minnesota PCA, 1989; Schueler, 1987	2	Established from existing vegetation- Average: $0 Range: $0 References: Schueler, 1987 Established from sod- Average: $11,300 per acre Range: $4,500 - $48,000 per acre References: Schueler, 1987; SWRPC, 1991	Average: NA Range: NA References: None	NA

NA - Not available.
[a] Useful life estimated as length of construction project (assumed to be 2 years)
[b] For Total Annual Cost, assume Annual Maintenance Cost=20% of construction cost.
[b] Assumes trap volume = 1800 cf/ac (0.5 inches runoff per acre).
[c] Assumes drainage area of 0.5 acre per 100 feet of fence (maximum allowed).
[d] Assumes drainage area of 0.25 acre per 100 feet of barrier (maximum allowed).

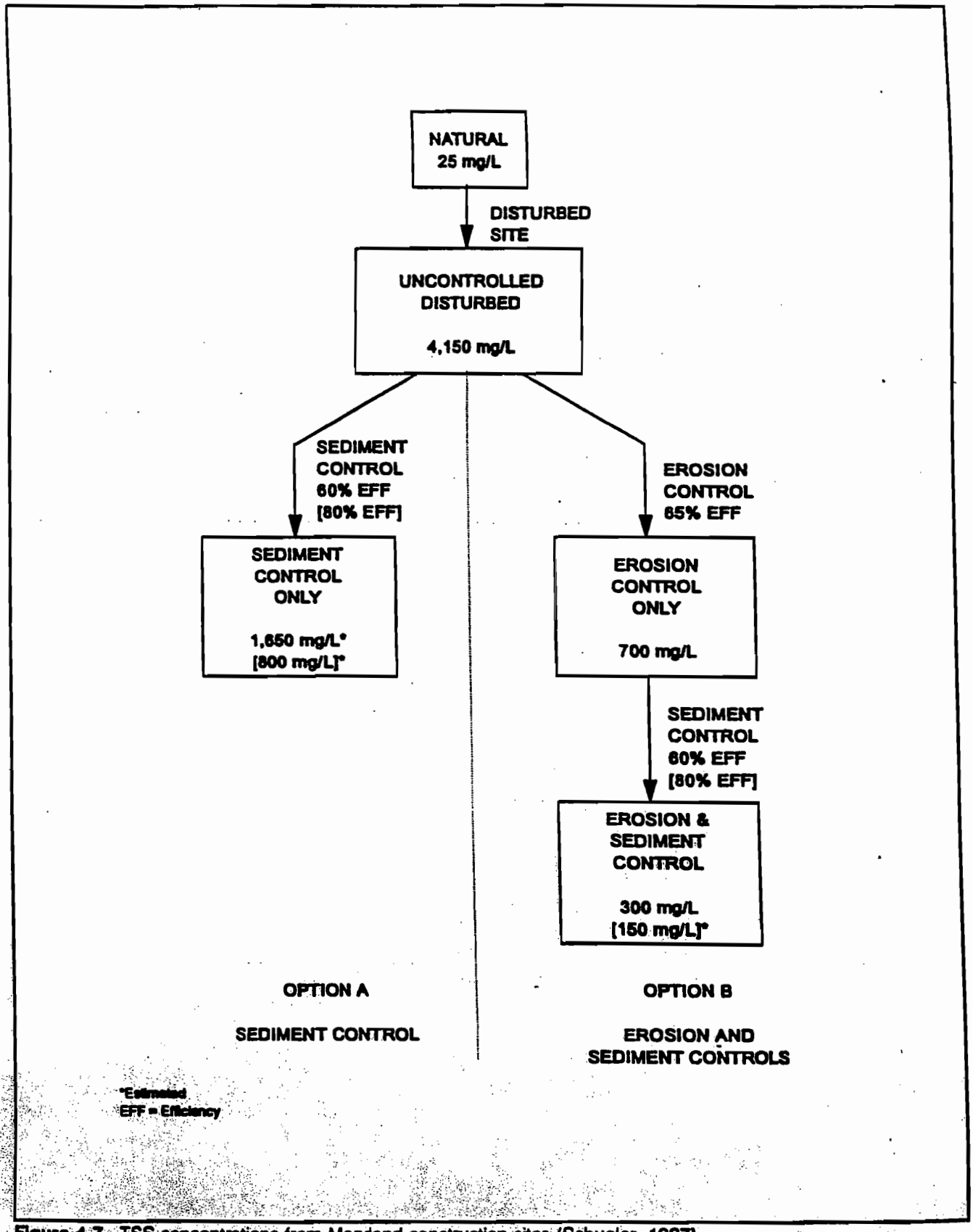


Figure 4-7. TSS concentrations from Maryland construction sites (Schueler, 1987).

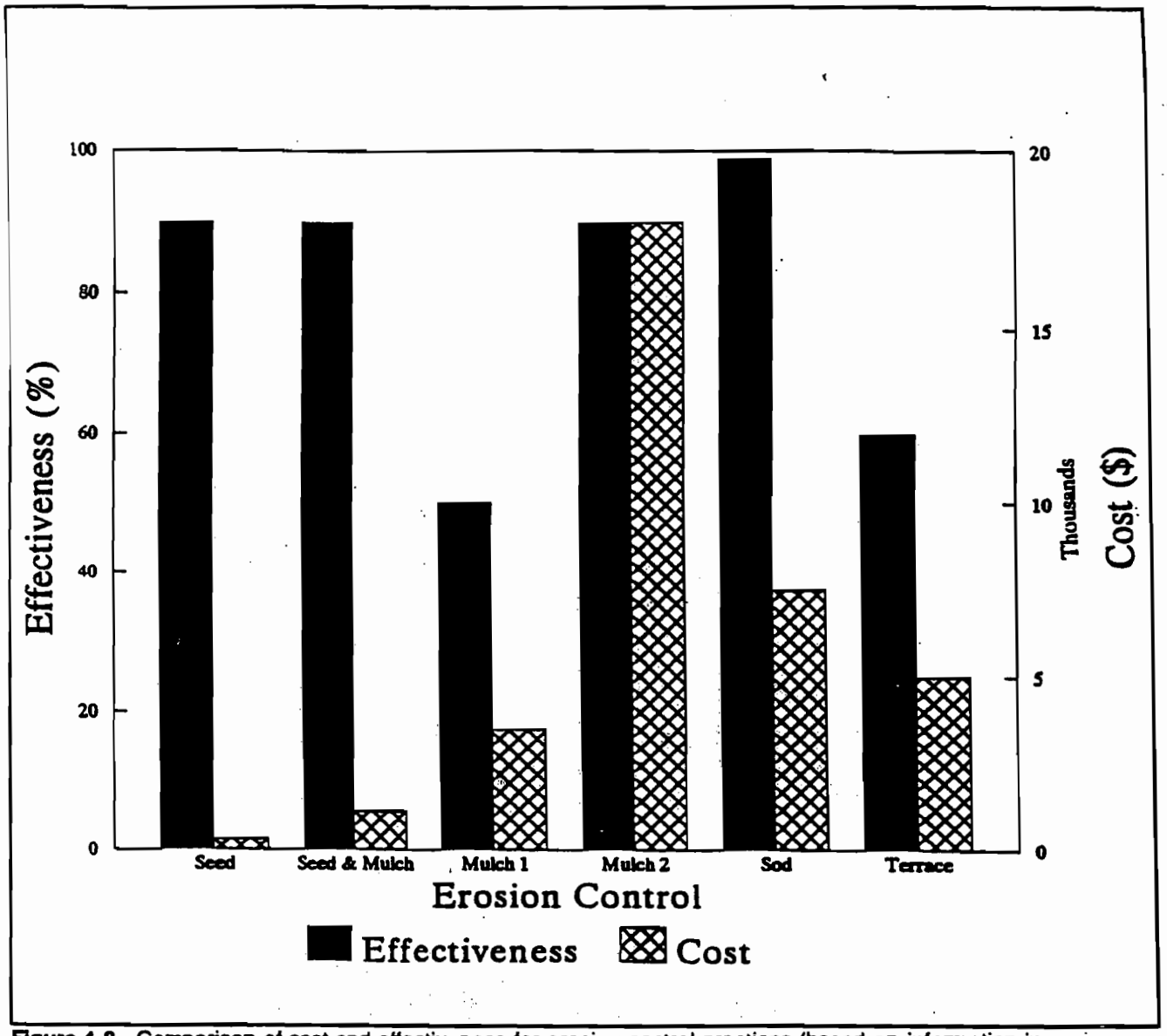


Figure 4-8. Comparison of cost and effectiveness for erosion control practices (based on information in Tables 4-15 and 4-16).

B. Construction Site Chemical Control Management Measure

(1) Limit application, generation, and migration of toxic substances;

(2) Ensure the proper storage and disposal of toxic materials; and

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

1. Applicability

This management measure is intended to be applied by States to all construction sites less than 5 acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformance with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The purpose of this management measure is to prevent the generation of nonpoint source pollution from construction sites due to improper handling and usage of nutrients and toxic substances, and to prevent the movement of toxic substances from the construction site.

Many potential pollutants other than sediment are associated with construction activities. These pollutants include pesticides (insecticides, fungicides, herbicides, and rodenticides); fertilizers used for vegetative stabilization; petrochemicals (oils, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers, and paints; wash water associated with these products; paper; wood; garbage; and sanitary wastes (Washington State Department of Ecology, 1991).

The variety of pollutants present and the severity of their effects are dependent on a number of factors:

(1) **The nature of the construction activity.** For example, potential pollution associated with fertilizer usage may be greater along a highway or at a housing development than it would be at a shopping center development because highways and housing developments usually have greater landscaping requirements.

(2) **The physical characteristics of the construction site.** The majority of all pollutants generated at construction sites are carried to surface waters via runoff. Therefore, the factors affecting runoff volume,

such as the amount, intensity, and frequency of rainfall; soil infiltration rates; surface roughness; slope length and steepness; and area denuded, all contribute to pollutant loadings.

(3) **The proximity of surface waters to the nonpoint pollutant source.** As the distance separating pollutant-generating activities from surface waters decreases, the likelihood of water quality impacts increases.

a. Pesticides

Insecticides, rodenticides, and herbicides are used on construction sites to provide safe and healthy conditions, reduce maintenance and fire hazards, and curb weeds and woody plants. Rodenticides are also used to control rodents attracted to construction sites. Common insecticides employed include synthetic, relatively water-insoluble chlorinated hydrocarbons, organophosphates, carbamates, and pyrethrins.

b. Petroleum Products

Petroleum products used during construction include fuels and lubricants for vehicles, for power tools, and for general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving also can be particularly harmful since it releases various oils for a considerable time period after application. Asphalt overloads might be dumped and covered without inspection. However, many of these pollutants adhere to soil particles and other surfaces and can therefore be more easily controlled.

c. Nutrients

Fertilizers are used on construction sites when revegetating graded or disturbed areas. Fertilizers contain nitrogen and phosphorus, which in large doses can adversely affect surface waters, causing eutrophication.

d. Solid Wastes

Solid wastes on construction sites are generated from trees and shrubs removed during land clearing and structure installation. Other wastes include wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic and glass, and masonry and asphalt products. Food containers, cigarette packages, leftover food, and aluminum foil also contribute solid wastes to the construction site.

e. Construction Chemicals

Chemical pollutants, such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, soil additives used for stabilization, and concrete-curing compounds, may also be used on construction sites and carried in runoff.

f. Other Pollutants

Other pollutants, such as wash water from concrete mixers, acid and alkaline solutions from exposed soil or rock, and alkaline-forming natural elements, may also be present and contribute to nonpoint source pollution.

Revegetation of disturbed areas may require the use of fertilizers and pesticides, which, if not applied properly, may become nonpoint source pollutants. Many pesticides are restricted by Federal and/or State regulations.

Hydroseeding operations, in which seed, fertilizers, and lime are applied to the ground surface in a one-step operation, are more conducive to nutrient pollution than are the conventional seedbed-preparation operations, in which fertilizers and lime are tilled into the soil. Use of fertilizers containing little or no phosphorus may be required by

local authorities if the development is near sensitive waterbodies. The addition of lime can also affect the pH of sensitive waters, making them more alkaline.

Improper fueling and servicing of vehicles can lead to significant quantities of petroleum products being dumped onto the ground. These pollutants can then be washed off site in urban runoff, even when proper erosion and sediment controls are in place. Pollutants carried in solution in runoff water, or fixed with sediment crystalline structures, may not be adequately controlled by erosion and sediment control practices (Washington Department of Ecology, 1991). Oils, waxes, and water-insoluble pesticides can form surface films on water and solid particles. Oil films can also concentrate water-soluble insecticides. These pollutants can be nearly impossible to control once present in runoff other than by the use of very costly water-treatment facilities (Washington Department of Ecology, 1991).

After spill prevention, one of the best methods to control petroleum pollutants is to retain sediments containing oil on the construction site through use of erosion and sediment control practices. Improved maintenance and safe storage facilities will reduce the chance of contaminating a construction site. One of the greatest concerns related to use of petroleum products is the method for waste disposal. The dumping of petroleum product wastes into sewers and other drainage channels is illegal and could result in fines or job shutdown.

The primary control method for solid wastes is to provide adequate disposal facilities. Erosion and sediment control structures usually capture much of the solid waste from construction sites. Periodic removal of litter from these structures will reduce solid waste accumulations. Collected solid waste should be removed and disposed of at authorized disposal areas.

Improperly stored construction materials, such as pressure-treated lumber or solvents, may lead to leaching of toxics to surface water and ground water. Disposal of construction chemicals should follow all applicable State and local laws that may require disposal by a licensed waste management firm.

3. Management Measure Selection

This management measure was selected based on the potential for many construction activities to contribute to nutrient and toxic NPS pollution.

This management measure was selected because (1) construction activities have the potential to contribute to increased loadings of toxic substances and nutrients to waterbodies; (2) various States and local governments regulate the control of chemicals on construction sites through spill prevention plans, erosion and sediment control plans, or other administrative devices; (3) the practices described are commonly used and presented in a number of best management practice handbooks and guidance manuals for construction sites; and (4) the practices selected are the most economical and effective.

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

a. Properly store, handle, apply, and dispose of pesticides.

Pesticide storage areas on construction sites should be protected from the elements. Warning signs should be placed in areas recently sprayed or treated. Persons mixing and applying these chemicals should wear suitable protective clothing, in accordance with the law.

Application rates should conform to registered label directions. Disposal of excess pesticides and pesticide-related wastes should conform to registered label directions for the disposal and storage of pesticides and pesticide containers set forth in applicable Federal, State, and local regulations that govern their usage, handling, storage, and disposal. Pesticides and herbicides should be used only in conjunction with Integrated Pest Management (IPM) (see Chapter 2). Pesticides should be the tool of last resort; methods that are the least disruptive to the environment and human health should be used first.

Pesticides should be disposed of through either a licensed waste management firm or a treatment, storage, and disposal (TSD) facility. Containers should be triple-rinsed before disposal, and rinse waters should be reused as product.

Other practices include setting aside a locked storage area, tightly closing lids, storing in a cool, dry place, checking containers periodically for leaks or deterioration, maintaining a list of products in storage, using plastic sheeting to line the storage area, and notifying neighboring property owners prior to spraying.

b. ***Properly store, handle, use, and dispose of petroleum products.***

When storing petroleum products, follow these guidelines:

- Create a shelter around the area with cover and wind protection;
- Line the storage area with a double layer of plastic sheeting or similar material;
- Create an impervious berm around the perimeter with a capacity 110 percent greater than that of the largest container;
- Clearly label all products;
- Keep tanks off the ground; and
- Keep lids securely fastened.

Oil and oily wastes such as crankcase oil, cans, rags, and paper dropped into oils and lubricants should be disposed of in proper receptacles or recycled. Waste oil for recycling should not be mixed with degreasers, solvents, antifreeze, or brake fluid.

c. ***Establish fuel and vehicle maintenance staging areas located away from all drainage courses, and design these areas to control runoff.***

Proper maintenance of equipment and installation of proper stream crossings will further reduce pollution of water by these sources. Stream crossings should be minimized through proper planning of access roads. Refer to Chapter 3 for additional information on stream crossings.

d. ***Provide sanitary facilities for constructions workers.***

e. ***Store, cover, and isolate construction materials, including topsoil and chemicals, to prevent runoff of pollutants and contamination of ground water.***

f. ***Develop and implement a spill prevention and control plan. Agencies, contractors, and other commercial entities that store, handle, or transport fuel, oil, or hazardous materials should develop a spill response plan.***

Post spill procedure information and have persons trained in spill handling on site or on call at all times. Materials for cleaning up spills should be kept on site and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed of. Spill control plan components should include:

- Stop the source of the spill.
- Contain any liquid.
- Cover the spill with absorbent material such as kitty litter or sawdust, but do not use straw. Dispose of the used absorbent properly.

g. *Maintain and wash equipment and machinery in confined areas specifically designed to control runoff.*

Thinners or solvents should not be discharged into sanitary or storm sewer systems when cleaning machinery. Use alternative methods for cleaning larger equipment parts, such as high-pressure, high-temperature water washes, or steam cleaning. Equipment-washing detergents can be used, and wash water may be discharged into sanitary sewers if solids are removed from the solution first. (This practice should be verified with the local sewer authority.) Small parts can be cleaned with degreasing solvents, which can then be reused or recycled. Do not discharge any solvents into sewers.

Washout from concrete trucks should be disposed of into:

- A designated area that will later be backfilled;
- An area where the concrete wash can harden, can be broken up, and then can be placed in a dumpster; or
- A location not subject to urban runoff and more than 50 feet away from a storm drain, open ditch, or surface water.

Never dump washout into a sanitary sewer or storm drain, or onto soil or pavement that carries urban runoff.

h. *Develop and implement nutrient management plans.*

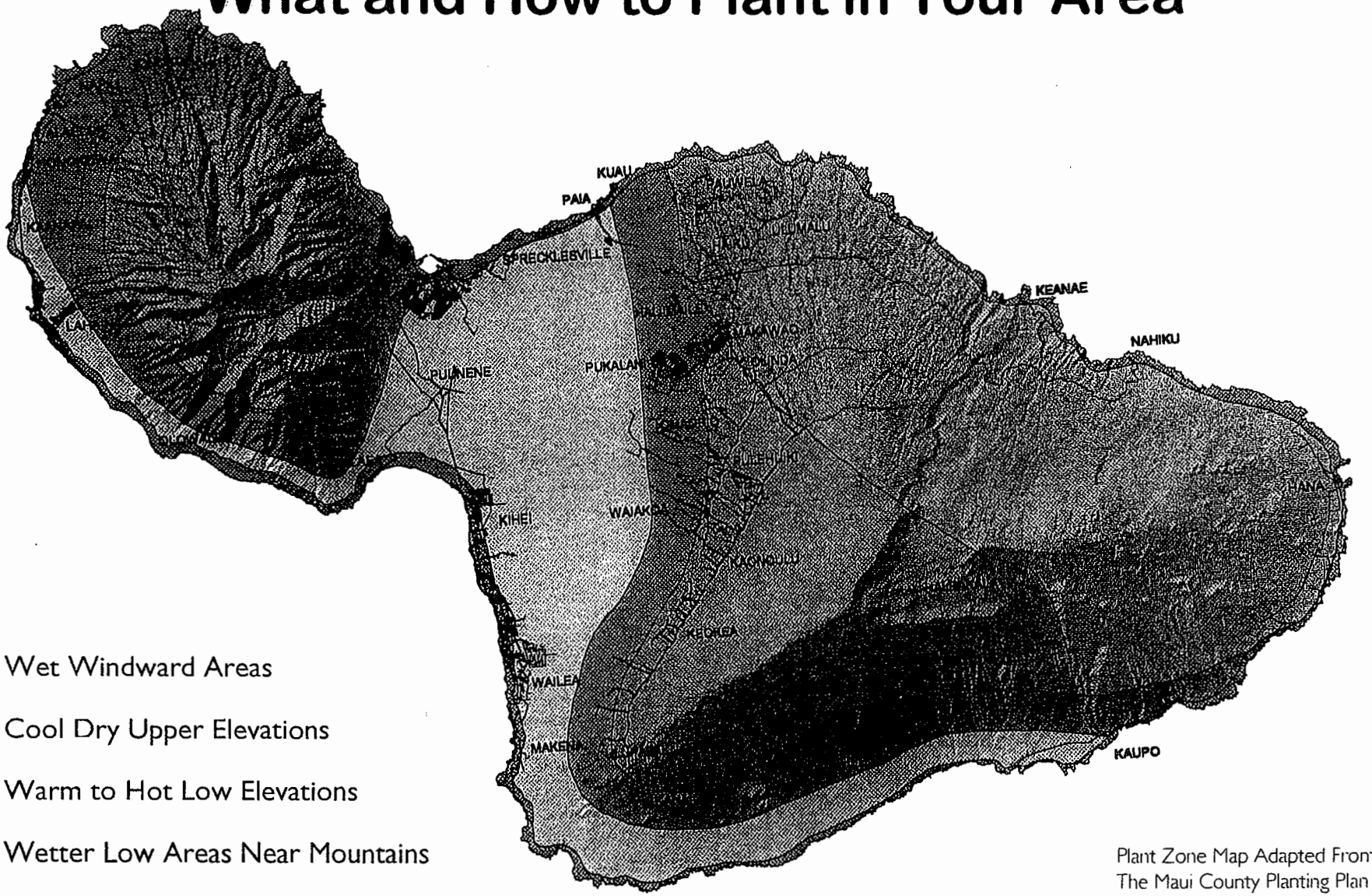
Properly time applications, and work fertilizers and liming materials into the soil to depths of 4 to 6 inches. Using soil tests to determine specific nutrient needs at the site can greatly decrease the amount of nutrients applied.

i. *Provide adequate disposal facilities for solid waste, including excess asphalt, produced during construction.*

j. *Educate construction workers about proper materials handling and spill response procedures. Distribute or post informational material regarding chemical control.*

Saving Water in The Yard

What and How to Plant in Your Area



1 Wet Windward Areas

2 Cool Dry Upper Elevations

3 Warm to Hot Low Elevations

4 Wetter Low Areas Near Mountains

5 Windward Coastal Salt Spray Zones

Plant Zone Map Adapted From
The Maui County Planting Plan

Tips From The Maui County Department of Water Supply

By Water All Things Find Life

Zone-specific Native and Polynesian plants for Maui County

Zone 1

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia arecina	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	Pritchardia forbesiana	lo'ulu	15'			
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Cordyline fruticosa	ti, ki	6			
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Charpentiera obovata		15'			
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 2

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia mauiensis var. diffusa	Maui wormwood, 'ahinahina	2'	3'	1,000' to higher	Dry to Medium
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Styphelia tameiameiae	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Charpentiera obovata		15'			
Tr	Erythrina sandwicensis	wiliwili	20'	20'	sea to 1,000'	Dry
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 2

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Sophora chrysophylla	mamane	15'	15'	1,000' to 3,000'	Medium
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 3

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 3

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Bidens menziesii ssp. menziesii	ko'oko'olau	1'	3'		
Sh	Bidens micrantha ssp. micrantha	ko'oko'olau	1'	3'		
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Styphelia tameiameiae	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Canthium odoratum	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Diospyros sandwicensis	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	Erythrina sandwicensis	wiliwili	20'	20'	sea to 1,000'	Dry
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 3

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Nesoluma polynesicum	keahi	15'	15'	sea to 3,00'	Dry
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Reynoldsia sandwicensis	'ohe makai	20'	20'	1,000' to 3,000'	Dry
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 4

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia arecina	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	Pritchardia forbesiana	lo'ulu	15'			
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 4

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Artemisia mauiensis var. diffusa	Maui wormwood, 'ahinahina	2'	3'	1,000' to higher	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens menziesii ssp. menziesii	ko'oko'olau	1'	3'		
Sh	Bidens micrantha ssp. micrantha	ko'oko'olau	1'	3'		
Sh	Cordyline fruticosa	ti, kI	6			
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Styphelia tameiameiae	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Canthium odoratum	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	Charpentiera obovata		15'			
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Diospyros sandwicensis	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 4

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Sophora chrysophylla	mamane	15'	15'	1,000' to 3,000'	Medium
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 5

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 5

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Ipomoea pes-caprae	beach morning glory, pohuehue	1			

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
black wattle	Acacia mearnsii	Mimosaceae
blackberry	Rubus argutus	Rosaceae
blue gum	Eucalyptus globulus	Myrtaceae
bocconia	Bocconia frutescens	Papaveraceae
broad-leaved cordia	Cordia glabra	Boraginaceae
broomsedge, yellow bluestem	Andropogon virginicus	Poaceae
buffelgrass	Cenchrus ciliaris	Poaceae
butterfly bush, smoke bush	Buddleja madagascariensis	Buddlejaceae
cats claw, Mysore thorn, wait-a-bit	Caesalpinia decapetala	Caesalpiniaceae
common ironwood	Casuarina equisetifolia	Casuarinaceae
common velvet grass, Yorkshire fog	Holcus lanatus	Poaceae
fiddlewood	Citharexylum spinosum	Verbenaceae
fire tree, faya tree	Myrica faya	Myricaceae
glorybower	Clerodendrum laponicum	Verbenaceae
hairy cat's ear, gosmore	Hypochoeris radicata	Asteraceae
haole koa	Leucaena leucocephala	Fabaceae
ivy gourd, scarlet-fruited gourd	Coccinia grandis	Cucurbitaceae
juniper berry	Citharexylum caudatum	Verbenaceae
kahili flower	Grevillea banksii	Proteaceae
klu, popinac	Acacia farnesiana	Mimosaceae
logwood, bloodwood tree	Haematoxylon campechianum	Caesalpiniaceae
loquat	Eriobotrya japonica	Rosaceae
meadow ricegrass	Ehrharta stipoides	Poaceae
melaleuca	Melaleuca quinquenervia	Myrtaceae
miconia, velvet leaf	Miconia calvescens	Melastomataceae
narrow-leaved carpetgrass	Axonopus fissifolius	Poaceae
oleaster	Elaeagnus umbellata	Elaeagnaceae
oriental mangrove	Bruguiera gymnorrhiza	Rhizophoraceae
padang cassia	Cinnamomum burmanii	Lauraceae
palmgrass	Setaria palmifolia	Poaceae
pearl flower	Heterocentron subtriplinervium	Melastomataceae
quinine tree	Cinchona pubesens	Rubiaceae
satin leaf, caimitillo	Chrysophyllum oliviforme	Sapotaceae
silkwood, Queensland maple	Flindersia brayleyana	Rutaceae
silky oak, silver oak	Grevillea robusta	Proteaceae
strawberry guava	Psidium cattleianum	Myrtaceae
swamp oak, saltmarsh, longleaf ironwood	Casuarina glauca	Casuarinaceae
sweet vernalgrass	Anthoxanthum odoratum	Poaceae
tree of heaven	Ailanthus altissima	Simaroubaceae
trumpet tree, guarumo	Cecropia obtusifolia	Cecropiaceae
white ginger	Hedychium coronarium	Zingiberaceae
white moho	Heliocarpus popayanensis	Tiliaceae
yellow ginger	Hedychium flavescens	Zingiberaceae

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
	Jasminum fluminense	Oleaceae
	Arthrostema ciliatum	Melastomataceae
	Dissotis rotundifolia	Melastomataceae
	Erigeron karvinskianus	Asteraceae
	Eucalyptus robusta	Myrtaceae
	Hedychium gardnerianum	Zingiberaceae
	Juncus planifolius	Juncaceae
	Lophostemon confertus	Myrtaceae
	Medinilla cumingii	Melastomataceae
	Medinilla magnifica	Melastomataceae
	Medinilla venosa	Melastomataceae
	Melastoma candidum	Melastomataceae
	Melinis minutiflora	Poaceae
	Olea europaea	
	Oxyspora paniculata	Melastomataceae
	Panicum maximum	Poaceae
	Paspalum urvillei	Poaceae
	Passiflora edulis	Passifloraceae
	Phormium tenax	Agavaceae
	Pinus taeda	Pinaceae
	Prosopis pallida	Fabaceae
	Pterolepis glomerata	Melastomataceae
	Rhodomyrtus tomentosa	Myrtaceae
	Schefflera actinophylla	Araliaceae
	Syzygium jambos	Myrtaceae
Australian blackwood	Acacia melanoxylon	Mimosaceae
Australian tree fern	Cyathea cooperi	Cyatheaceae
Australian tree fern	Sphaeropteris cooperi	Cyatheaceae
Beggar's tick, Spanish needle	Bidens pilosa	Asteraceae
California grass	Brachiaria mutica	Poaceae
Chinese banyon, Maylayan banyon	Ficus mirocarpa	Moraceae
Chinese violet	Asystasia gangetica	Acanthaceae
Christmasberry, Brazilian pepper	Schinus terebinthifolius	Anacardiaceae
Formosan koa	Acacia confusa	Mimosaceae
German ivy	Senecio mikanioides	Asteraceae
Japanese honeysuckle	Lonicera japonica	Caprifoliaceae
Koster's curse	Clidemia hirta	Melastomataceae
Lantana	Lantana camara	Verbenaceae
Mauritius hemp	Furcraea foetida	Agavaceae
Mexican ash, tropical ash	Fraxinus uhdei	Oleaceae
Mexican tulip poppy	Hunnemannia fumariifolia	Papaveraceae
Mules foot, Madagascar tree fern	Angiopteris evecta	Marattiaceae
New Zealand laurel, karakaranut	Corynocarpus laevigatus	Corynocarpaceae
New Zealand tea	Leptospermum scoparium	Myrtaceae
Pampas grass	Cortaderia jubata	Poaceae
Panama rubber tree, Mexican rubber tree	Castilloa elastica	Moraceae
Shoebutton ardisia	Ardisia elliptica	Myrsinaceae
banana poka	Passiflora mollissima	Passifloraceae

Selection

As a general rule, it is best to select the largest and healthiest specimens. However, be sure to note that they are not pot-bound. Smaller, younger plants may result in a low rate of plant survival.[1] When selecting native species, consider the site they are to be planted in, and the space that you have to plant. For example: Mountain species such as koa and maile will not grow well in hot coastal areas exposed to strong ocean breezes. Lowland and coastal species such as wiliwili and Kou require abundant sunshine and porus soil. They will not grow well with frequent cloud cover, high rainfall and heavy soil.

Consider too, the size that the species will grow to be. It is not wise to plant trees that will grow too large.[2] Overplanting tends to be a big problem in the landscape due to the underestimation of a species' height, width or spread.

A large, dense canopied tree such as the kukui is a good shade tree for a lawn. However, it's canopy size and density of shade will limit what can be planted in the surrounding area. Shade cast by a koa and ohia lehua is relatively light and will not inhibit growth beneath it.

Keep seasons in mind when you are selecting your plants. Not all plants look good year round, some plants such as ilima will look scraggly after they have flowered and formed seeds. Avoid planting large areas with only one native plant. Mixing plants which naturally grow together will ensure the garden will look good all year round.[3] Looking at natural habitats helps to show how plants grow naturally in the landscape.

When planting an area with a mixed-ecosystem, keep in mind the size and ecological requirements of each plant. Start with the hardiest and most easily grown species, but allow space for fragile ones in subsequent plantings.

Acquiring natives

Plants in their wild habitat must be protected and maintained. It is best and easiest to get your plants from nurseries (see list), or friend's gardens. Obtain proper permits from landowners and make sure you follow a few common sense rules:

- collect sparingly from each plant or area.
- some plants are on the state or Federal Endangered Species list. Make sure you get permits (see app. A,B)

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[1] K. Nagata, P.6

[2] K. Nagata, P.9

[3] Nagata, P.9

Soil

Once you have selected your site and the plants you wish to establish there, you must look at the soil conditions on the site. Proper soil is necessary for the successful growth of most native plants, which preform poorly in hard pan, clay or adobe soils. If natives are to be planted in these types of soil, it would be wise to dig planting holes several times the size of the rootball and backfill with 50-75% compost.[4] A large planting hole ensures the development of a strong root system. The plant will have a headstart before the roots penetrate the surrounding poor soil.[5]

It is recommended that native plants not be planted in ground that is more dense than potting soil. If there is no alternative, dig a hole in a mound of soil mixed with volcanic cinder which encourages maximum root development. Fill the hole with water, if the water tends to puddle or drain too slowly, dig a deeper hole until the water does not puddle longer than 1 or 2 minutes.[6] Well-drained soil is one of the most important things when planting natives as you will see in the next section.

Irrigation

Most natives do very poorly in waterlogged conditions. Do not water if the soil is damp. Water when the soil is dry and the plants are wilting. Once established, a good soaking twice a week should suffice. Deep soaking encourages the development of stronger, and deeper root systems. This is better than frequent and shallow watering which encourage weaker, more shallow root systems.

The following is a watering schedule from Kenneth Nagata's Booklet, *How To Plant A Native Hawaiian Garden*:

WATER REQUIREMENT	WATERING FREQUENCY
Heavy	3x / week
Moderate	2x / week
Light	1x / week

Red clay soils hold more water for a longer period of time than sandy soils do. If your area is very sunny or near a beach, things will dry out faster. Even in the area of one garden, there are parts that will need more or less water. Soils can vary and amount of shade and wind differ. After plants are established (a month or two for most plants, up to a year for some trees), you can back off watering.

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[4] Nagata, p. 6

[5] Nagata, p. 8

[6] Nagata, p. 8

Automatic sprinkler systems are expensive to install and must be checked and adjusted regularly. Above-ground systems allow you to monitor how much water is being put out, but you lose a lot due to malfunctioning of sprinkler heads and wind. The most efficient way to save water and make sure your plants get enough water, is to hand-water. This way you are getting our precious water to the right places in the right amounts.[7]

Fertilizer

An all-purpose fertilizer 10-10-10 is adequate for most species. They should be applied at planting time, 3 months later, and 6 months thereafter. Use half the dosage recommended for ornamentals and pay special attention to native ferns which are sensitive to strong fertilizers. Use of organic composts and aged animal manures is suggested instead of chemical fertilizers. In addition, use of cinders for providing trace minerals is strongly recommended.[8]

Natives are plants which were here hundreds of years before the polynesians inhabited the Hawaiian Islands. They were brought here by birds, or survived the harsh ocean conditions to float here. They are well-adapted to Hawaii's varying soil and environmental conditions. This is why they make prime specimens for a xeriscape garden. However, natives will not thrive on their own, especially under harsh conditions. On the other hand, like any other plant, if you over-water and over-fertilize them, they will die. Follow the instructions given to you by the nursery you buy the plant from, or from this booklet. Better yet, buy a book (suggested readings can be found in the bibliography in the back of this pamphlet), read it, and learn more about native plants. I guarantee that you will be pleased with the results.

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[7] Bornhorst, p. 19-20

[8] Nagata, p. 6

Propagation

There are many ways to propagate and plant-out native Hawaiian species. One of the most thourough and helpful book is Heidi Bornhorst's book, *Growing Native Hawaiian Plants.* The easiest, and best way to obtain natives for the novice gardener is to get them from a reputable nursery (see appendix c). That way all you will have to do is know how to transplant (if necessary) and plant-out when you are ready. These are the two methods I have listed here.

Transplanting

1. Use pots that are one size bigger than the potted plant is in
2. Get your potting medium ready

Good potting medium is a ½, ½ mixture of peat moss and perlite. If the plant is from a dry or coastal area, add chunks of cinder or extra perlite. If it is a wet forest species, add more peat moss or compost. Be aware that peat moss is very acidic and certain plants react severely to acidity.

If the plant is to eventually be planted into the ground, make a mix of equal parts peat moss, perlite, and soil from the area in which the plant is to be planted. Slow-release fertilizer can be mixed into the potting medium.

3. Once pots, potting medium, fertilizer and water are ready, you can begin re-potting. Keep the plant stem at the same depth it was in the original pot. Avoid putting the plant in too large a pot, as the plant may not be able to soak up all the water in the soil and the roots may drown and rot.

Mix potting medium and add slow-release fertilizer at this time. Pre-wet the medium to keep dust down and lessen shock to the plant. Put medium in bottom of pot. Measure for the correct depth in the new pot. Make sure there is from ½ to 2 inches from the top of the pot so the plant can get adequate water. Try to stand the plant upright and center the stem in the middle of the pot.

Water the plant thoroughly after transplanting. A vitamin B-1 transplanting solution can help to lessen the transplant shock. Keep the plant in the same type of environment as it was before, sun or shade. If roots were broken, trimm off some of the leaves to compensate for the loss.[9]

Planting out

1. Plant most native Hawaiian plants in a sunny location in soil that is well-drained.
2. Make the planting hole twice as wide as the root ball or present pot, and just as deep.

If the soil is clay-like, and drains slowly, mix in some coarse red or bland cinder, coarse perlite or

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[9] Bornhorst, p.20-21

coarse compost. Place some slow-release fertilizer at the bottom of the hole.

3. Carefully remove the plant from the container and place it in the hole.

The top of the soil should be at the same level as the top of the hole, if it is too high or too low, adjust the soil level so that the plant is at the right depth.

4. Water thoroughly after you transplant.

Mulch

Most natives cannot compete with weeds, and therefore must be weeded around constantly in order to thrive. Mulch is a practical alternative, which discourages and prevents weeds from growing.

Hawaii's hot, humid climate leads to the breaking down of organic mulches. Thick organic mulches such as wood chips and leaves, may also be hiding places for pests.

Stone mulches are attractive, permanent and can help to improve soil quality. Red or black cinder, blue rock chips, smooth river rocks and coral chips are some natural choices.[10] Macadamia nut hulls are also easy to find and can make a nice mulch.[11]

Never pile up mulch right next to the stem or trunk of a plant, keep it a few inches away.

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[10] Bornhorst, p. 24

[11] Nagata, p. 7

ZONES

The Maui County Planting Plan has compiled a system of 5 zones of plant growth for Maui County. The descriptions of zones and maps for these zones are as follows:

Zone 1:

Wet areas on the windward side of the island. More than 40 inches of rain per year. Higher than 3,000 feet.

Zone 2:

Cool, dry areas in higher elevations (above 1,000 feet). 20 to 40 inches of rain per year.

Zone 3:

Low, drier areas, warm to hot. Less than 20 inches of rain per year. Sea level to 1,000 feet.

Zone 4:

Lower elevations which are wetter due to proximity of mountains. 1,000 to 3,000 feet.

Zone 5:

Salt spray zones in coastal areas on the windward side.

These zones are to be used as a general guide to planting for Maui County. In addition to looking at the maps, read the descriptions of the zones and decide which zone best fits your area. Plants can be listed in more than one zone and can be planted in a variety of conditions. For best results, take notes on the rainfall, wind, sun and salt conditions of your site. Use the zones as a general guide for selection and read about the plants to decide which best fits your needs as far as care and or function.

PLACES TO SEE NATIVES ON MAUI:

The following places propagate native Hawaiian plants from seeds and/or cuttings. Their purpose is to protect and preserve these native plants. Please contact them before going to view the sites, they can provide valuable information and referral to other sources.

1.	Hoolawa Farms P O Box 731 Haiku HI 96708	575-5099
2.	The Hawaiian Collection 1127 Manu Street Kula HI 96790	878-1701
3.	Kula Botanical Gardens RR4, Box 228 Kula HI 96790	878-1715
4.	Maui Botanical Gardens Kanaloa Avenue, Kahului across from stadium	249-2798
5.	Kula Forest Reserve access road at the end of Waipoli Rd Call the Maui District Office	984-8100
6.	Wailea Point, Private Condominium residence 4000 Wailea Alanui, Kihei public access points at Four Seasons Resort or Polo Beach	875-9557
7.	Kahanu Gardens, National Tropical Botanical Garden Alau Place, Hana HI 96713	248-8912
8.	Kahului Library Courtyard 20 School Street Kahului HI 96732	873-3097

PLACES TO BUY NATIVE PLANTS ON MAUI

1. Ho'olawa Farms
   Anna Palomino
   P O Box 731
   Haiku HI 96708
   575-5099

   * The largest and best collection of natives in the state. They will deliver, but worth the drive to go and see! Will propagate upon request

2. Kahanu Gardens
   National Tropical Botanical Garden
   Alau Place, Hana
   248-8912

3. Kihana Nursery
   1708 South Kihei Road
   Kihei HI 96753
   879-1165

4. Kihei Garden and Landscape
   Waiko Road, Wailuku
   P O Box 1058
   Puunene HI 96784
   244-3804

5. Kula Ace Hardware and Nursery
   3600 Lower Kula Road
   Kula HI 96790
   876-0734
   * many natives in stock
   * get most of their plants from Ho'olawa Farms
   * they take special requests

6. Kulamanu Farms - Ann Carter
   Kula HI 96790
   878-1801

7. Maui Nui Botanical Gardens
   Kanaloa Avenue
   (Across from stadium)
   Kahului HI 96732
   249-2798

8. Native Gardenscapes
   Robin McMillan
   1330 Lower Kimo Drive
   Kula HI 96790
   870-1421

   * grows native plants and installs landscapes including irrigation.

9. Native Hawaiian Tree Source
   1630 Piiholo Road
   Makawao HI 96768
   572-6180

10. Native Nursery, LLC
    Jonathan Keyser
    250-3341

11. New Moon Enterprises - Pat Bily
    47 Kahoea Place
    Kula HI 96790
    878-2441

12. Waiakoa Tree Farm - Kua Rogoff
    Pukalani HI 96768
    Cell - 264-4166

ORDINANCE NO. 2108

BILL NO. 6 (1992)

Draft 1

A BILL FOR AN ORDINANCE AMENDING CHAPTER 16.20 OF THE MAUI COUNTY CODE, PERTAINING TO THE PLUMBING CODE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

SECTION 1. Title 16 of the Maui County Code is amended by adding a new section to Chapter 10 of the Uniform Plumbing Code to be designated and to read as follows:

"16.20.675 Section 1050 added. Chapter 10 of the Uniform Plumbing Code is amended by adding a new section, pertaining to low-flow water fixtures and devices, to be designated and to read as follows:

Sec. 1050 Low-flow water fixtures and devices. (a) This section establishes maximum rates of water flow or discharge for plumbing fixtures and devices in order to promote water conservation.

(b) For the plumbing fixtures and devices covered in this section, manufacturers or their local distributors shall provide proof of compliance with the performance requirements established by the American National Standards Institute (ANSI) and such other proof as may be required by the director of public works. There shall be no charge for this registration process.

(c) Effective December 31, 1992, only plumbing fixtures and devices specified in this section shall be offered for sale or installed in the County of Maui, unless otherwise indicated in this section. All plumbing fixtures and devices which were installed before December 31, 1992, shall be allowed to be used, repaired or replaced after December 31, 1992.

(1) Faucets (kitchen): All kitchen and bar sink faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two-tenths gallons per minute at sixty pounds per square inch of water pressure.

(2) Faucets (lavatory): All lavatory faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two tenths gallons per minute at sixty pounds per square inch of water

pressure.

(3) Faucets (public rest rooms): In addition to the lavatory requirements set forth in paragraph (2), lavatory faucets located in rest rooms intended for use by the general public shall be of the metering or self-closing types.

(4) Hose bibbs: Water supply faucets or valves shall be provided with approved flow control devices which limit flow to a maximum three gallons per minute.

EXCEPTIONS: (A) Hose bibbs or valves not used for fixtures or equipment designated by the director of public works.

(B) Hose bibbs, faucets, or valves serving fixed demand, timing, or water level control appliances, and equipment or holding structures such as water closets, pools, automatic washers, and other similar equipment.

(5) Showerheads: Showerheads, except where provided for safety or emergency reasons, shall be designed, manufactured, or installed with a flow limitation device which will prevent a water flow rate in excess of two and one-half gallons per minute at eighty pounds per square inch of water pressure. The flow limitation device must be a permanent and integral part of the showerhead and must not be removable to allow flow rates in excess of two and one-half gallons per minute or must be mechanically retained requiring force in excess of eight pounds to remove.

(6) Urinals: Urinals shall be designed, manufactured, or installed so that the maximum flush will not exceed one gallon of water. Adjustable type flushometer valves may be used provided they are adjusted so the maximum flush will not exceed one and six tenths gallons of water.

(7) Water closets (toilets): Water closets shall be designed, manufactured, or installed so that the maximum flush will not exceed one and six tenths gallons of water.

(d) Beginning December 31, 1992, it is unlawful to sell or install any plumbing fixtures or devices not specified in this section, except as permitted under this section.

(e) The director of public works may exempt the use of low-flow water fixtures and devices if there is a finding that the use of such fixtures and devices would not be consistent with accepted engineering practices and would be detrimental to the public health, safety and welfare.

(f) Any person violating this section shall be fined $250 for each violation and shall correct all instances of non-compliance for which a citation is issued. Violation of this section shall constitute a violation as defined in section 701-107 Hawaii Revised Statutes and shall be enforceable by employees of the department of public works. The foregoing fine may also be imposed in a civil, administrative proceeding pursuant to Rules and Regulations adopted by the department of public works in accordance with chapter 91 Hawaii Revised Statutes."

SECTION 2. New material is underscored. In printing this bill, the County Clerk need not include the underscoring.

SECTION 3. This ordinance shall take effect upon its approval.

APPROVED AS TO FORM
AND LEGALITY:

HOWARD M. FUKUSHIMA
Deputy Corporation Counsel
County of Maui
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105

WE HEREBY CERTIFY that the foregoing BILL NO. 6 (19 92), Draft 1

1. Passed FINAL READING at the meeting of the Council of the County of Maui, State of Hawaii, held on the 1st day of May , 1992 , by the following votes:

Howard S. KIHUNE Chair	Patrick S. KAWANO Vice-Chair	Vince G. BAGOYO, Jr.	Goro HOKAMA	Alice L. LEE	Ricardo MEDINA	Wayne K. NISHIKI	Joe S. TANAKA	Leinaala TERUYA DRUMMOND
Aye	Aye	Excused	Excused	Aye	Aye	Aye	Aye	Aye

2. Was transmitted to the Mayor of the County of Maui, State of Hawaii, on the 1st day of May , 1992 .

DATED AT WAILUKU, MAUI, HAWAII, this 1st day of May , 1992 .

HOWARD S. KIHUNE, CHAIR
Council of the County of Maui

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

THE FOREGOING BILL IS HEREBY APPROVED THIS 5th DAY OF MAY , 1992 .

LINDA CROCKETT LINGLE, MAYOR
County of Maui

I HEREBY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of Maui, the said BILL was designated as ORDINANCE NO. 2108 of the County of Maui, State of Hawaii.

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

Passed First Reading on January 17, 1992.
Effective date of Ordinance May 5, 1992.

I HEREBY CERTIFY that the foregoing is a true and correct copy of Ordinance No. 2108 , the original of which is on file in the Office of the County Clerk, County of Maui, State of Hawaii.

Dated at Wailuku, Hawaii, on

County Clerk, County of Maui

106

A Checklist of Conservation Ideas for the Yard

Limit Lawn Size

Most turf grasses require 30% to 50% more water than shrubs and ground covers. Limit the use of grass and lawns to active picnicking and play areas. Shade in these areas will reduce moisture loss and make a cool area for children to play. If you do have a lawn, mow at least once per week, and try to cut no more than ⅓ of the grass blade, or ½ to ¾ of an inch at a time. Adjust your lawn mower to a higher setting. Taller blades of grass actually hold up better in the heat, because that little bit of extra shade helps to more moisture in the soil. If you mow the grass too short, root shock will cause your grass to turn yellow despite your watering!

Designing for Irrigation Zones

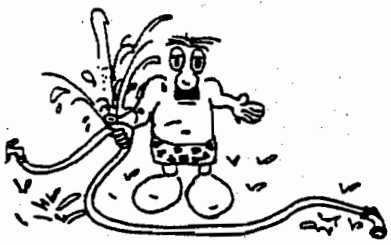
Avoid putting thirsty exotics with plants that do well in dry weather. Zone your plants so that each area has similar water needs. This will enable you to water more efficiently, and keep the plants healthier. Limit thirsty plants to small decorative borders around the house itself or in specific viewing areas or shady areas. While you're at it, call the Board of Water Supply at 270-7199 for more information.

Choosing Native Plants: A Hawaiian Sense of Place

An out-of-place, thirsty landscape can slurp up ¾ of your home's water use. Plant shrubs and trees that nature designed to look green and full here on Maui without a lot of water. Make sure they get regular watering in the first year or two, to help them establish good, deep roots. Then, once they are grown in, you can cut back or stop watering, depending upon your location. At worst, in our hot, low southern areas an occasional, slow, deep watering placed right at the roots should be enough to keep a climate adapted plant looking good even through the hot summer.

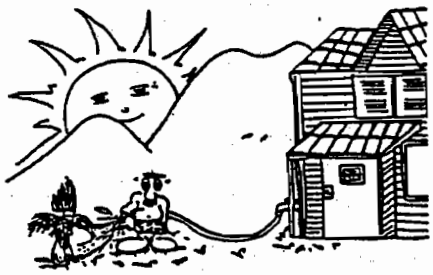
Find and Repair Leaks

Your garden hose and irrigation lines can carry thousands of gallons per day, so you can imagine a leak outdoors wastes a lot of water! Check and repair all of your outdoor fixtures regularly.



Irrigation Systems

Drip irrigation is designed to get water slowly and directly to the roots of plants. This not only saves water, but for some plants it helps to reduce the risk of diseases. Sprinklers with fine, high sprays lose a lot of water to evaporation. So, if you do use a sprinkler for certain plants, go for the sort with low, flat spay patterns and larger drops of water. Check timers on irrigation controllers and adjust them monthly to water appropriately for the season. For small grassy areas, watering by hand can actually reduce waste! But if you use a hose, set a kitchen timer or buy a timer attachment that hooks on between the faucet and hose. This will help remind you not to over-water one area. Use a soaker hose on slopes to reduce run-off.



Watering

If you do have a lawn, water only when it needs it. A good deep soaking is better than a light sprinkling. If you water too frequently and lightly, plants develop shallower roots and become less drought resistant! A good way to see if your lawn needs watering is to step on the grass. If it springs back up when you move, it doesn't need water. If it stays flat, it could use a bit. Avoid watering in the heat of the day. By 10 A.M., the sun is up and so is the heat. This will rob your lawn's moisture. In dry areas you can also choose evenings to water.

Watching the Weather...

As simple-minded as it sounds ....never water while it's raining! Many people forget to follow this simple rule. Install rain-shutoffs or soil moisture sensors on automated systems. Teach your family to turn off your irrigation in the rain. You also create "weather conditions" by how and where you plant. Sunny exposed areas and slopes need to be watered more frequently than shady areas. Place your plants appropriately.

Getting to the Root

Root feeder or water aerator probes around trees and bushes will help direct water where it is needed. Even for the biggest trees, you don't need to go any deeper than 18 inches. 8 to 12 inches is big enough for small trees and shrubs. You can also build a watering basin in the soil around the base of your plants to help the water to soak in deeply. Drip systems are good for this too.

Soils & Mulch

Soils are not all alike. Clay soils can typically take from ¼ to ½" of water per hour before water starts running off and is wasted. Sandy soils require more frequent, shorter watering. You can have your soils tested. Call the Ag Extension Service at MCC for advice (244-3242). Compost or other organic material will also help soils hold moisture and support heartier, more drought-tolerant plants. Try leaves, grass clippings, manure, aged sawdust, wood chips, or humic acid. Mulching is an excellent way to hold moisture, keep the ground from overheating and discourage weeds. You should also loosen the soil by rototilling or spading while you add the organic matter. Looser soil can make a healthier lawn.

A Checklist of Conservation Ideas for the Home

Wise Water Habits

❑ Shaving & Brushing Teeth
If you leave the water running while you shave or brush your teeth, you are wasting a gallon a minute! Stopper the sink and fill the basin half way when you shave, and you use just ½ a gallon! Turn off the water while brushing your teeth!

❑ Bathing & Showering
Which uses more water, a shower or a tub bath? That depends! A partially filled tub uses less water than a long shower, but a short shower with a low flow showerhead uses much less than a brimful tub! You can compare for yourself. Try plugging the tub while you shower and see how high the water gets. Make a habit of showering quickly or using a partially filled tub. Or try the "navy shower". Turn on the water to get wet, turn it off to soap up, and turn it back on to rinse off. It's a great conservation technique, especially in drought emergencies.

❑ House plants & Fish Tanks
If you have a fish tank, you probably clean it regularly. Use the dirty water to water your House plants. It saves using the same water twice, and the plants love the water, which is rich in nitrogen and phosphorous!

❑ Washing Smart
Some washing machines use 40 or more gallons whether you're washing a full load, or only a few pairs of socks. Use full washloads, especially for older machines. If your machine is adjustable, use the proper setting. You'll save electricity as well as water.

❑ Food Prep
If you like to rinse off vegetables and fruits, stopper the sink instead of using running water. And when you're finished, turn on the garbage disposal as you pull the plug, rather than running water just for the disposal.

❑ Doing Dishes
Which is more efficient, washing dishes in the sink or in a dishwasher? You can check by testing how much water your full sink basin holds compared with the 9.5 to 12 gallons dishwashers use during a regular cycle. Either way, it is more water efficient to wash full loads. If you do wash dishes by hand, stopper the sink and run the disposal as you pull the plug.

❑ Washing the Car
Do you wash your car at home? Use a bucket, or a hose with a trigger nozzle to avoid wasting water. Wet the car thoroughly, and then turn off the hose while you wash the car! Swab the car with soapy water from a bucket. You can use the hose again for a final rinse. Better still, take your car to a car wash. Most of the car washes on Maui are fitted with recirculating water.

❑ For a Cold Glass of Water
Keep a pitcher of cool water in the refrigerator. Running the water until it turns cool can waste a gallon for each glass. Letting the water sit in the fridge can also allow any chlorine to dissipate, and improve the taste.

❑ Don't Use the Toilet for Trash!!
Some people toss and flush away tissues, cigarettes or bits of trash in the toilet. Use a wastebasket instead. If everyone in the U.S. flushed just once less per day, we could save a sea full of water a mile wide, a mile long and four feet deep, every day!

Water Saving Devices

❑ Showerheads
Replacing your old showerhead with a low flow can save as much as 7.2 gallons per person per day. You can get showerheads and other low flow fixtures from the Maui County Board of Water Supply (270-7199), or the Public Works Department (270-7417).

❑ Toilets
Installing A New Water Conserving Toilet can save as much as 17 gallons per person per day. Even a low cost installing a toilet flapper can save more than 5 gallons per person per day.

❑ Faucets
Replacing your old faucets with more efficient models can save 4 gallons per person per day. Faucet aerators or spray taps can also help, by mixing air with water. This cuts the flow and reduces splashing, while leaving enough pressure to cut the soap and grease.

❑ Washing Machines
A water-efficient washing machine can save up to 20 gallons per load. With the average household washing 6 loads per week, that's a lot of water! In fact, within 2 years, these can save as much water as the average person drinks in a lifetime! And that's not all. Statistics on energy savings potential indicate that highly efficient washing machines save from 35% to 65% on energy used for washing!

Maintenance

❑ Check for Leaks!
Leaking faucets cost you money! Even a slow drip wastes 15 gallons per day. A $^1/_8$" stream can waste 400 gallons per day! Think about it. A single dripping faucet can waste more water in one day than a person needs for drinking for an entire week! Unfortunately, the average non-conserving home looses more than 10% of the water it pays for to leaks! Check for leaks regularly. Try putting 10 drops of food coloring in your toilet tank. Don't flush, just wait 15 minutes. If colored water shows up in the bowl, your tank is leaking. Check your water meter while no water is running in your house. If the meter is registering, you have a leak somewhere.

After toilets, most indoor leaks are caused by worn washers in faucets. Check your faucets twice a year. If any drip after you've turned them off firmly, turn off the supply line, take the faucet apart and replace the washer. And don't forget the faucets on the side of the house.

❑ A Clean Sweep
Did you know that 5 minutes of unnecessary hosing will waste 25 gallons of water? Try sweeping sidewalks and driveways. This will get them clean without wasting water.

❑ Pipes Break - Be Prepared
Do you know where your master shut-off valve is located? If a pipe breaks in your home, you could experience flooding and property damage as well as huge water waste unless you quickly shut your valve. Locate your valve and mark it for quick easy identification. Learn how to shut it properly, and teach your family to do so as well.

❑ Cover Pools and Jacuzzis
They're fun, but they can waste a lot of water! An average sized pool loses about 1,000 gallons of water per month to evaporation. A pool cover can cut these losses by 90%!

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 1

Water Quality Around Your Home

Introduction to the HAPPI-Home Series

Over 90 percent of Hawaii residents depend on groundwater for their water needs. Although few serious problems have been reported, pollution is a threat to our drinking water supplies. Pollution also affects surface waters including streams, rivers, and coastal areas used for recreation, wildlife habitat, and irrigation. You can help protect Hawaii's water resources by learning to recognize potential sources of pollution and by reducing or eliminating them. The box below contains definitions of some terms used in this worksheet and others in the HAPPI-Home series.

Pollution
Anything placed in the environment that reduces the ability of that environment to support the organisms that live there or to be used for a desired purpose.

Non-point source (NPS) pollution
Pollution that does not come from a source that can be identified easily. An example of NPS pollution is sediment (soil) in a stream. It could have come from almost any location in the stream's watershed, including fields along the stream, roadcuts, and other disturbed areas, or the stream bank itself.

Water quality
The suitability of water for a given use or uses. For example: water in a stream may be of high quality for recreation but not of high quality for drinking.

This is the first in a set of 16 informational worksheets developed by the HAPPI program (Hawaii's Pollution Prevention Information) to address water-pollution issues. Because every publication in this series may not apply to your situation, the questions on page 2 will help you choose the ones you need. Each HAPPI worksheet provides additional information on a specific topic, helps you assess your water pollution risks, and helps you develop an action plan to reduce those risks.

Drawing a map will help you visualize the layout of your property and your management practices. Information from your map may help you better determine which HAPPI project materials will be useful to you. HAPPI-Home 2, *Mapping your house and yard*, will help you to make a map of your property.

Choosing the appropriate HAPPI materials

Everyone should look at the following four HAPPI documents:

HAPPI-Home 3—*Reducing pollution risks from your trash*
HAPPI-Home 4—*Managing hazardous household products*
HAPPI-Home 5—*Think before you dump it: safe disposal of hazardous products*
HAPPI-Home 6—*Alternatives to hazardous household products*

To find out which other HAPPI-Home materials you need, answer the questions on the next page.

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from materials produced by the National Farm•A•Syst/Home•A•Syst program staff, Gary Jackson, Coordinator, Madison, Wisconsin. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst / Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a US EPA 319(h) grant administered by the Hawaii State Department of Health.

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Answer the following questions and refer to the HAPPI documents indicated

1. Was your house or apartment built before 1980? ..... HAPPI-Home 7, *Lead in and around the home*

2a. Does your house or apartment have air conditioning or combustion appliances (gas stove, etc.)?
OR
2b. Does a member of your family have allergies? ..... HAPPI-Home 8, *Indoor air quality*

3. Do you have municipal water service? ..... If yes, skip to question 6.
If no, answer the questions below:

4. Do you have a drinking water well? ..... HAPPI-Home 9, *Drinking water wells*

5. Do you have a water catchment system? ..... HAPPI-Home 10, *Rainwater catchment systems*

6. Do you have a household septic system or cesspool? ..... HAPPI-Home 11, *Household wastewater treatment systems*

7a. Do you have a lawn, garden or landscaped areas on your property?
OR
7b. Do you have a community garden plot? ..... HAPPI-Home yard and garden set:
HH-12, *Runoff control in your yard and garden*
HH-13, *Yard and garden nutrient management*
HH-14, *Yard and garden pest management*

8. Do you own a car, truck, motorcycle, or moped? ..... HAPPI-Home 15, *Motor vehicle maintenance*

9. Do you own a pet? ..... HAPPI-Home 16, *Pet waste management*

10. Do you grow commercial crops such as fruits, vegetables, or flowers on your property? ..... HAPPI-Farm 1, *Water quality on your farm*

For more information

HAPPI materials do not cover all potential risks that could affect the quality of water and other natural resources. They are designed to create an awareness of potential risks to water quality and other natural resources and to provide voluntary solutions to reduce pollution risks.

If you have questions about protecting your water and other natural resources, contact the HAPPI Program at the Department of Natural Resources and Environmental Management, University of Hawaii at Manoa, 1910 East-West Road, Honolulu, HI 96822, phone (808) 956-2617 or (808) 956-8825, e-mail <wq@ctahr.hawaii.edu>; you can also contact your local Cooperative Extension Service office or the Clean Water Branch of the Hawaii Department of Health.

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University of Hawaii at Manoa

Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 2

Mapping Your House and Yard
to Identify Pollution Risks

One way to help identify potential sources of water pollution around your home is to make a map showing the features of your house and yard. Although your property may have physical features that you cannot change, there may be things that can be done to minimize risks.

To make your map you need: a clipboard or notebook, a pencil, and page 3 of this worksheet. The map you create will be an aerial view—the way your house and yard would look if you took a photo of it from the air. A sample map is provided on page 2. Your land title or lease documents may also contain useful maps. The amount of detail you put in your map will depend on the map(s) you already have and the time and resources you have available, but be sure to include the following features:

- property boundaries
- garden areas and flower beds
- roads
- ponds, streams and drainage ditches
- any paved areas like driveways and patios.

Some management practices and site characteristics can have major effects on water quality. As you survey your property to make your map, be especially watchful for the following and mark their location on your map:

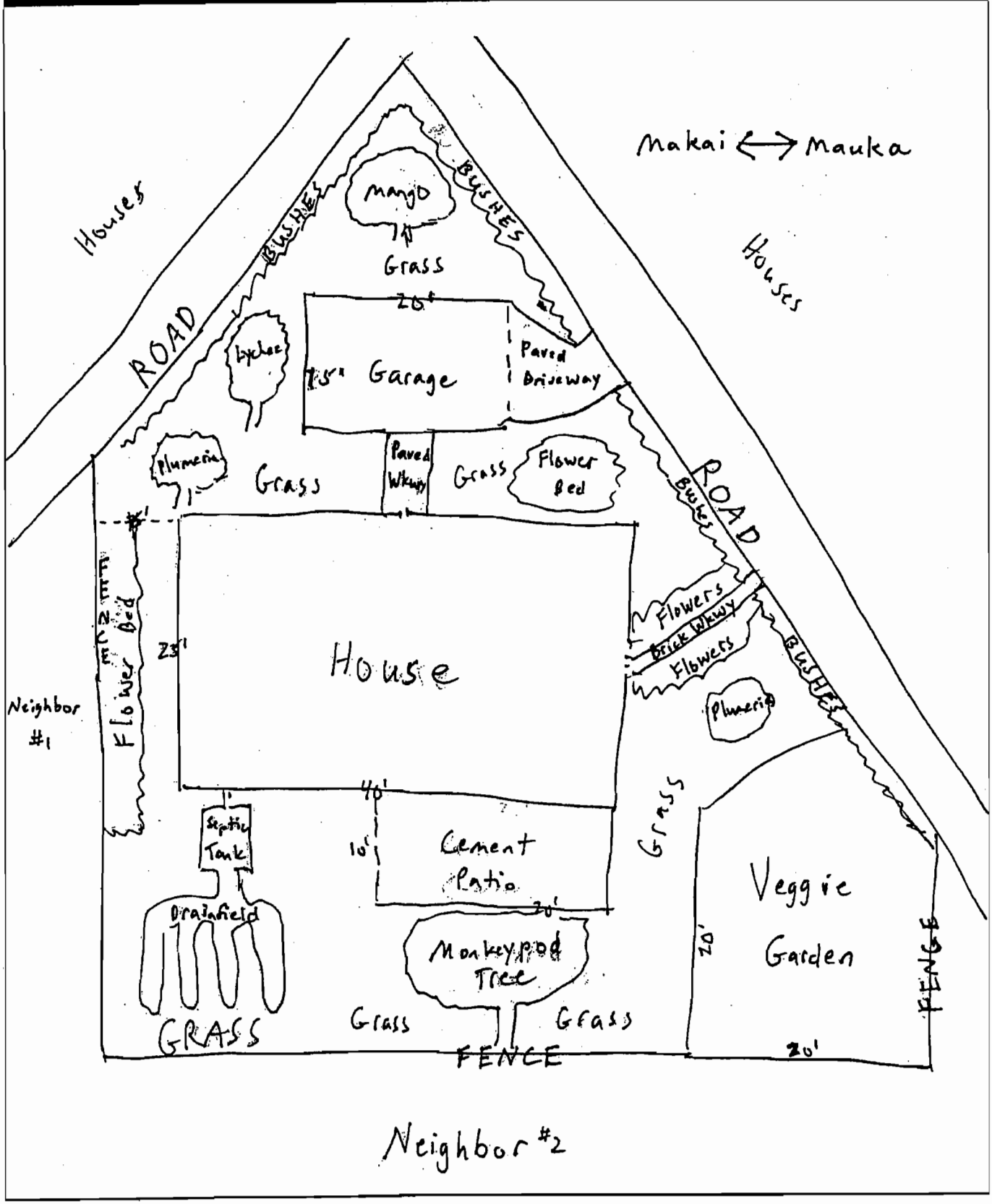
- drinking water well or catchment system if you do not have municipal water service
- septic system or cesspool if you do not have municipal sewer service
- abandoned wells
- places where you store, use, or dispose of potentially hazardous household products such as fertilizers, pesticides, gasoline, oil, paints, and solvents
- large paved or concrete-covered areas.

Try to include as much information as possible on your map. Show the approximate size of flower beds, gardens, driveways and patios and their distances from each other. A sketch will be adequate for beginning the planning process. Having a more accurate map will allow you to calculate the areas of gardens, lawns, and other features, which can later be useful in planning the best ways to reduce pollution hazards around your home.

After making a map of your property, you can use it to complete HAPPI-Home 1, *Water quality around the home*, which will direct you to the other HAPPI worksheets that fit your situation.

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Site assessment: protecting water quality around your home* by Alyson McCann, Chapter 1, pp. 7–14, in *Home•A•Syst: An environmental risk assessment guide for the home*, developed by the National Farm•A•Syst/Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst/Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

Example Home Map of Pollution Hazards



112

Your Home Map

Information about your home

As you complete other HAPPI-Home worksheets, it may be helpful to have additional information available about your property and activities. Fill in the space below with information about your home. Attach additional pages if you need more space.

Your property

Owner _____

Address _____

_____

Size 5K sq ft

Tax Map Code (TMK) _____

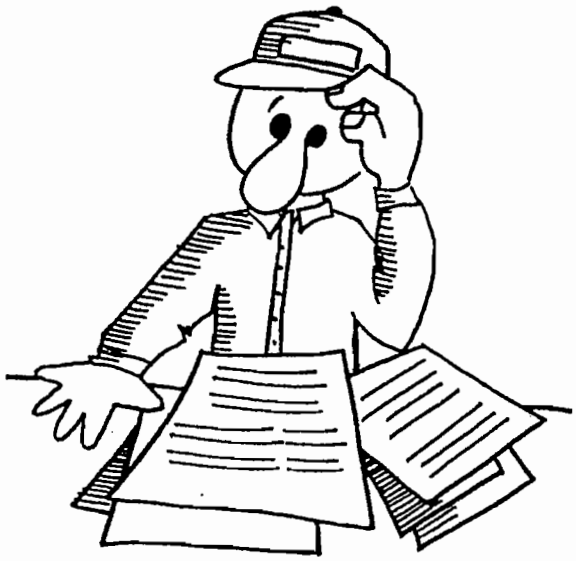
Zoning R-10

History and plans:

Purchase date 11/96

Construction date 10/97

Remodeling descriptons and dates:



Previous land uses:

vacant lot

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 3

Reducing Pollution Risks from Your Trash

One of the most visible forms of pollution in Hawaii is household waste. This worksheet will help you determine the pollution risks from your trash disposal practices and give you some ideas of how to manage your trash to reduce those risks. The topics covered are

- identifying what is in your trash
- reusing, recycling, and composting
- proper waste disposal.

What is household waste?

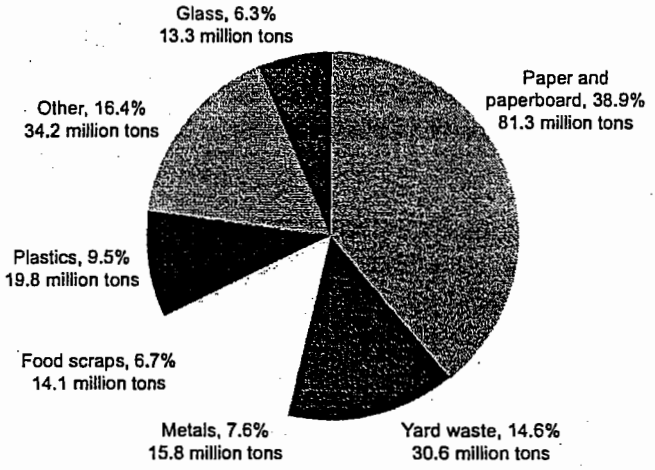
What do you call the stuff you want to get rid of? Trash? Garbage? Solid waste? Recyclables? Refuse? Junk? Here's how we define the terms:

- ***Trash*** and ***waste*** refer to items and materials that are being discarded.
- ***Reusables*** are items that are used again by a different user or for a different purpose, like a hand-me-down jacket or a jar used for a cup; they are not reprocessed into raw materials.
- ***Recyclables*** are materials including glass, metal, paper, even refrigerators that are collected, separated, processed back into raw materials, and made into new products.
- ***Compostables*** are primarily yard and food wastes that can decompose and return to the land as nutrients or organic matter.
- ***Garbage*** is generally food waste or wet food, either of animal or plant origin.

What is in your trash?

As Hawaii's population increases, the amount of waste produced each year also rises. In fact, material consumption has increased faster than the population. Studies estimate that in 1994 each person in the USA produced around 4.4 pounds of waste each day, a significant increase from the 2.7 pounds produced per person daily in 1960.

Most consumers do not realize what makes up solid waste. Many think that we throw away more plastics by weight than we really do, or that disposable diapers are a major source of trash—which they are not. The following graph shows what is in the solid waste thrown away in the USA each year.



Components of the U.S. national waste burden
(Source: Franklin & Assoc. Ltd. 1995)

The problem with waste

Much of Oahu's household waste is used for power generation by H-Power. However, the ash produced by the H-Power plant goes to landfills. On the other islands, most waste goes directly to landfills, and they are filling up. New regulations and land scarcity make it harder to find places for new landfills. Waste is a major environmental and economic problem for consumers and municipalities. Producing less waste and finding ways to deal with waste not only saves money but also helps protect air, soil, and water quality and the health of people and wildlife.

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Preventing and minimizing waste

Every household produces waste. This waste has to go somewhere. One way to minimize waste is to purchase products that produce less waste. Here are four things you can do:

- Buy only what you need and avoid accumulating unused products.
- Select products based on their durability, ease of repair, and potential for reuse.
- Purchase containers and packaging that can be recycled locally.
- When safe to do so, select packaging that minimizes waste.

Reusing, recycling and composting are three additional ways to keep trash out of landfills or incinerators.

Reuse

Reuse also benefits the environment. You can usually find uses for more materials than you realize. Sharing old clothes and used furniture is a common form of reuse. If you can't share with friends or family, try to donate usable items to charitable organizations or thrift shops. Holding a neighborhood yard sale is a good way to get rid of unwanted possessions.

Recycle

Wastes often can be recycled. Empty glass bottles can be used to make new bottles. Old newspapers can be used to make new paper. Some plastic containers such as milk cartons and soda bottles can be used to make new plastic things. Recycling almost always uses fewer resources and causes less pollution than making new materials.

Many schools on Oahu have recycling bins on their grounds. These bins are for recycling newspaper, glass, aluminum, and some plastics like milk cartons. Some apartment buildings, townhouses and condominium complexes also have recycling, either in the building itself or at a central location. If your building or complex does not have recycling, you may want to bring up the idea of starting a recycling program at the next association meeting.

The island you live on determines what materials you can recycle, how they need to be prepared, and where they can be recycled. Contact the appropriate number in the box below for additional information on recycling opportunities on your island.

Recycling information

Statewide

Office of Solid Waste Management, Hawaii Department of Health, <http://www.state.hi.us/health/eh/shwb/sw/index.html>

Hawaii: ..... 974-4000 ext. 64226
Maui: ..... 984-2400 ext. 64226
Kauai: ..... 274-3141 ext. 64226
Molokai and Lanai: ..... 1-800-468-4644 ext. 64226
Oahu: 586-4226

County-specific

Oahu: City and County of Honolulu Department of Environmental Services, 527-5335, <http://www.opala. org>

Maui, Molokai, Lanai: Maui County Department of Public Works, 270-7880

Hawaii: Recycle Hawaii, 329-2886 or 961-2676, <http://www.recyclehawaii.org/what.htm> for recycling information

Kauai: Kauai County Solid Waste Office, 241-6880

Compost

Yard trimmings and food wastes typically make up 10–25 percent of the wastes going into landfills. Composting is a natural process that turns kitchen and garden wastes into a high-quality organic fertilizer. Many common materials can be composted: leaves, grass clippings, plant trimmings, straw, and some kitchen scraps like coffee grounds and vegetable peelings. The final product is dark brown, crumbly compost that has a clean, earthy smell. It can be spread on lawns or mixed with garden soil as an excellent natural soil conditioner. As an alternative to landfill disposal, some communities, such as Kailua, Oahu, have established yard-waste compost programs with convenient drop-off sites. To compost at home, you can use one of the many compact and efficient composting bins on the market, or you can build your own. If you live in an apartment or condominium, it may be impossible for you to compost at home. But, you may be able to do it in a neighbor's yard or a community garden.

Basic information on composting grass and yard wastes is available in the publication *Reduce and recycle green waste* from the Hawaii Department of Health.

116

Additional materials on composting are available by request from your local CTAHR Cooperative Extension Service office.

Waste disposal

Disposing of household wastes by burning it or dumping it on private property can pose threats to your health and the environment. Waste dumped at your home is not only unsightly, it may contain harmful chemicals that can leach out and contaminate groundwater, or be spread by wind and rain. Burning your waste can produce toxic fumes as well as contaminated ashes that can blow or wash away and cause pollution.

Wastes dumped directly into storm drains, ditches or steams or washed into these water bodies can quickly cause pollution problems. Other materials, like foam "peanuts" and other plastic debris, can be transported by storm runoff to open water where they may be mistaken for food and eaten by fish or birds. Dumping potentially hazardous substances down a drain that leads to a septic system or sewer system can also cause problems. The table below provides information on the disposal methods for various types of household wastes that create the lowest water pollution risks.

You need to take particular care when disposing of household hazardous products. By reading product labels, you can generally tell which ones have hazardous ingredients. Look for words like CAUTION, WARNING, DANGER, FLAMMABLE, POISON, VAPOR HARMFUL, or HARMFUL OR FATAL IF SWALLOWED. These are clues that a substance in the product is potentially hazardous to your health and to the environment.

Carefully dispose of any of these types of products. If it is safe and legal to do so, use the product up according to the label directions so nothing is left to discard. If you do have extra that you do not need, always read the label for disposal recommendations, or contact the manufacturer. For more information, see HAPPI-Home 4, *Managing hazardous household products*.

Assessing your risks

There are two ways to reduce the risk of pollution from trash disposal. The first is to generate less trash and the second is to dispose of it in the most environmentally friendly way. Use the table on page 4 to assess your *waste potential*. A low waste potential means that less trash needs to be disposed of. Also, assess the pollution risks from the trash that you do have to throw away.

Waste resource	Water quality–friendly disposal methods
Food waste	Compost vegetable matter if possible; dispose of meat and other materials in landfill
Green waste, grass clippings, leaves	Compost or use as mulch; separate from other waste for municipal composting where available
Paper, cardboard	Reuse and recycle where possible; dispose in landfill as last resort
Plastics	Reuse and recycle where possible; dispose in landfill as last resort
Aluminum	Recycle where possible; dispose in landfill as last resort
Other metals (steel, tin)	Recycle where possible; dispose in municipal trash (on Oahu, recycled at H-power)
Glass	Reuse or recycle where possible; dispose in landfill as last resort
Large appliances	Have potentially hazardous parts/items removed before recycling (PCBs, freon, mercury in lights, capacitors, etc.); take to landfill.

For other potentially hazardous products including household cleaners, aerosol cans, paint, paint thinner, glues and adhesives, and gasoline, see HAPPI-Home 4, *Managing hazardous household products*, for information on storage and disposal.

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Managing household waste: preventing, reusing, recycling, and composting*, by Shirley Niemeyer, Michael P. Vogel, and Kathleen Parrott, Chapter 11, pp. 106–115, in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst / Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst/Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

Waste Potential and Trash Disposal

	Low risk	Moderate risk	High risk	Your waste potential
Quantities purchased	I only buy what I need and avoid accumulating unused products	I sometimes buy more product than I can use	I often buy more product than I can use	❑ low ❑ moderate ❑ high
Product durability and potential for reuse	I select products based on their durability, ease of repair, and potential for reuse	I sometimes consider durability, ease of repair, or potential for reuse	I seldom consider durability, ease of repair, or potential for reuse	❑ low ❑ moderate ❑ high
Recyclability of packaging	I regularly purchase containers / packaging that can be recycled locally	I sometimes consider packaging that can be recycled	I seldom consider recyclability	❑ low ❑ moderate ❑ high
Packaging selected	I always select packaging that minimizes waste	I sometimes select packaging that minimizes waste	I seldom consider whether a packaging minimizes waste	❑ low ❑ moderate ❑ high
Trash disposal in storm drains, streams, or ditches	No household wastes are discarded near storm drains, streams, or ditches; there is very little water runoff from driveways and yards	Some runoff from a driveway carries spills and yard chemicals away; runoff occasionally flows into storm drains, ditches, or streams	Household wastes are dumped into storm drains, streams, or ditches	❑ low ❑ moderate ❑ high
Yard and garden waste (green waste) disposal	All green waste is composted, disposed of in a municipal collection program, or left on the ground as mulch where it will not wash into streams or storm drains	Green waste is collected and disposed of on my property in a location far from streams or drainage ditches	Green waste is collected and disposed of in or near a stream or drainage ditch	❑ low ❑ moderate ❑ high

Your Action Plan

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action

For more information on the disposal of hazardous household products, see HAPPI-Home 4, *Managing hazardous household products.*

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 4

Managing Hazardous Household Products

Many products that people commonly use in their everyday activities can harm people and can cause pollution. This worksheet provides information about proper storage and disposal practices for these types of products. You can assess your current practices and develop an action plan to minimize health hazards and water pollution risks.

Identify hazardous products at home

Household products are hazardous if they include ingredients that might pose dangers to human health or the environment. Not every product is equally hazardous—for example, some paint and strippers are less hazardous than others.

The first thing to do is to ***read the label.*** The label will help you identify the correct product to meet your needs. It will also provide information on the relative toxicity of the product. Guide-words on the label tell you how dangerous a product is: products labeled CAUTION have relatively low toxicity; products labeled WARNING have moderate toxicity; products labeled DANGER have high toxicity.

The precautions you need to take will depend on the individual product and its toxicity. Make sure that you can use the product safely before you purchase it. The label also contains information on first aid.

If you need more information about a product than the label provides, you may request a Material Safety Data Sheet (MSDS) from the manufacturer. Their phone number is often on their product label. If there is an emergency, or you need more information, call the Poison Control Center (see Contacts). If you have small children in your home, you may want to write the number of the poison control center on or near your phone.

Choosing products

You can control the degree of hazard you bring to your home or property. When choosing from among several brands of a product, read the labels to learn which will meet your needs most safely. There also may be other less hazardous choices to some commercial products. HAPPI-Home 6, *Alternatives to hazardous household products*, lists some of these. Additional information can be found on the Web; for example, see <http://foe.org/eday99/cleaners.html> and <http://www.ecomall.com/greenshopping/mtngreen.htm>.

If you buy more than you need, household products can create storage problems. If unused for long periods, product containers may leak. Also, some products may change and not be effective when you use them. Some pesticide products may have been banned since they were purchased. If that occurs, disposal becomes more difficult. Avoid these problems by purchasing and using only what you need.

Storage

The primary storage concerns are child safety, indoor air quality, and prevention of damage to household equipment or the environment. If you can smell a household product while it is not in use, you may have a problem. Keep the following in mind when storing household products:

- Keep them out of the reach of children and pets, preferably in a locked, secure area.
- Store them in their original containers with the label and a date.

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- Always store fuels in approved fuel containers.
- Keep containers tightly sealed and dry.
- Store products at least 150 ft from a well or waterway.
- Keep products in a well ventilated area and away from sources of ignition like a gas stove or water heater.
- Store batteries and flammable chemicals in an area shaded from direct sunlight.
- Separate corrosives like acids or lye to prevent chemical reactions.

Routinely check storage areas to make sure that containers are closed tightly and not leaking and that the sides of containers are not bulging. Storage areas should have a floor made of concrete or another impermeable surface and should be well ventilated. If you regularly store large amounts of fuel, consider installing an aboveground tank.

Disposal

Unless a product is used up, you will have to dispose of it. Even the product container may have to be disposed of carefully. Disposal can be costly and, if not done properly, can be unsafe for you and the environment. You can avoid disposal by buying and using only what you need, using leftovers, or recycling.

Disposing of potentially hazardous products, especially in or near streams or other water bodies, can cause pollution. Even empty containers can be a source of pollution, if water enters and carries the chemical away. Containers should be rinsed at least three times ("triple-rinsed"), and the rinse water should be used in the same way as the chemical itself. Then the container should be punctured. Burning potentially hazardous products is also not advised, because some items (e.g., aerosol cans) may explode and others may release toxic fumes.

HAPPI-Home 5, *Think before you dump it: Safe disposal of hazardous household products*, contains additional information on how to safely dispose of a wide range of common farm and household chemicals. Information is also available from the City and County of Honolulu Department of Environmental Services (see Contacts). These resources only provide general disposal information on types of products. Read the product label for specific instructions for any particular product. County hazardous waste offices and the Solid and Hazardous Waste Branch of the Hawaii Department of Health (see Contacts) also can provide additional information.

Recycling is an even better option for many products including used motor oil and antifreeze, solvents like paint thinner and turpentine, and automotive batteries. Not all products can be recycled on every island. Check with your county recycling program (see Contacts) for additional information about what can be recycled in your county and where it can be recycled. HAPPI-Home 14, *Yard and garden pest management*, provides additional information on proper use, storage, and disposal of yard and garden pesticides.

Assessing your risks

Your next step is to assess the your pollution risks. Complete the table on page 3 by selecting the practices that best describe what you do. If the category does not apply, leave it blank.

Contacts

For more information on the safest way to dispose of hazardous household products, contact the Office of Solid Waste Management in the Hawaii State Department of Health at the following telephone numbers:

Hawaii	974-4000 ext. 64226
Maui	984-2400 ext. 64226
Kauai	274-3141 ext. 64226
Molokai and Lanai	1-800-468-4644 ext. 64226
Oahu	586-4226

Poison Control Center: 941-4411 (Oahu) or 1-800-362-3585 (neighbor islands)

Additional county-specific information is available from your local county hazardous waste management office:

Oahu: City and County of Honolulu Department of Environmental Services, 523-4774, or on the Web at <http://www.opala.org>

Maui, Molokai, Lanai: Maui County Department of Public Works, 270-7880; locations and hours for used oil recycling on the web at <http://www.maui.net/~recyclemaui>

Hawaii: Hawaii County Solid Waste Office, 961-8339 for disposal information; Recycle Hawaii, 329-2886 or 961-2676, or on the web at <http://www. recyclehawaii. org/what.htm> for recycling information

Kauai: Kauai County Solid Waste Office, 241-6880

120

Risk Assessment Table for Hazardous Household Products

	Low risk	Moderate risk	High risk	Your risk
Product selection	I always read labels and respect the health or environmental hazards labels describe; I choose the least hazardous product needed for the job	I sometimes don't read labels or don't understand what they mean, but I use a "common sense" approach to safety	I seldom read labels; I purchase products first and later on consider what the product is made of and how it will be used	❑ low ❑ moderate ❑ high
Quantities purchased	I buy only what is needed for a specific job; I use up most of the product within a few months of purchase	I buy excess product, but provide safe and accessible storage	I buy more than is needed, then purchase additional product without checking on current supplies	❑ low ❑ moderate ❑ high
Safety precautions	I follow label instructions and take recommended precautions against exposure (such as providing good ventilation and wearing safety goggles and gloves)	I occasionally read label instructions; I take some precautions	I seldom follow label instructions and take no precautions, even when recommended	❑ low ❑ moderate ❑ high
Child safety	I store hazardous products in a locked cabinet or other location inaccessible to children	I keep products out of the direct reach of children (e.g., on a high shelf) but still accessible	My products are easily accessible to children (for example, in an unlocked cabinet on the lower shelf)	❑ low ❑ moderate ❑ high
Containers, storage location, and spill protection	I store leftovers in their original containers, properly sealed; products are stored by type; my home environment is protected against leaks or spills	I store original containers in a disorganized way; I don't provide protection against leaks or spills	I transfer leftovers to other containers such as used milk jugs or glass jars; I store leftovers without caps or lids; I don't provide protection against leaks or spills	❑ low ❑ moderate ❑ high
Ventilation	I store volatile products (such as solvents and petroleum-based fluids) in places with good ventilation	I don't pay attention to storage location, but each container is in good shape and tightly sealed	I store products in areas with poor ventilation, such as basements, closets, or crawl spaces; some containers are damaged or left open	❑ low ❑ moderate ❑ high
Hazardous household products	I use up products when possible; I dispose of leftover products according to label directions; I take leftover products containing mercury, pesticides, or hazardous solvents to a hazardous waste disposal program	I dispose of all leftover products in a community landfill	I always dump leftover products; I dump leftovers in or near a stream or waterway (*NOTE:* this is illegal!)	❑ low ❑ moderate ❑ high

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may create household hazards. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential hazard risk for your home?	Set a target date for action
Samples of action items:		
Cabinet with antifreeze and paint stripper is not child-proof	*Buy a lock and install it on cabinet*	*One week from today*

Mention of a trademark, company, or proprietary name does not constitute an endorsement, guarantee, or warranty by the University of Hawaii Cooperative Extension Service or its employees and does not imply recommendation to the exclusion of other suitable products or companies.

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Managing hazardous household products* by Elaine Andrews, Chapter 5, pp. 47–60, in *Home•A•Syst: An environmental risk assessment guide for the home,* developed by the National Farm•A•Syst/Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Additional graphics are taken from *Protecting Your Resources Through a Farm and Home Assessment.* Permission to use these materials was granted by the National Farm•A•Syst/Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

122

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 5

Think Before You Dump It— Safe Disposal of Hazardous Products

When you dump a can of paint thinner down the drain or throw an old car battery out with the trash, you could be polluting the water supply. Wastewater treatment plants are not designed to handle certain types of hazardous wastes. In landfills, these materials can pollute the groundwater, surface water, and air.

You can help protect your environment if you know how to take care of wastes. The chart on pages 2–3 shows you the safest ways to dispose of common hazardous products used around the home or garden. Because products change, be sure to check the product label for specific disposal guidelines, and above all, use common sense!

Contacts

For more information on the safest way to dispose of the products on the chart, contact the Office of Solid Waste Management in the Hawaii Department of Health at the following telephone numbers:

Hawaii	974-4000 ext. 64226
Maui	984-2400 ext. 64226
Kauai	274-3141 ext. 64226
Molokai and Lanai	1-800-468-4644 ext. 64226
Oahu	586-4226

Additional county-specific information is available from your local county hazardous waste management office:

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Maui, Molokai, Lanai: Maui County Department of Public Works, 270-7880

Hawaii: Hawaii County Solid Waste Office, 961-8339 for disposal information; Recycle Hawaii, 329-2886 or 961-2676, or on the Web at <http://www. recyclehawaii. org/what.htm> for recycling information.

Kauai: Kauai County Solid Waste Office, 241-6880

The table on pages 2–3 is based on information from the United States Environmental Protection Agency's Hazardous Waste regulations. The Water Environment Federation assumes no responsibility and disclaims any liability for any injury or damage resulting from the use or effect of any product or information specified in this publication.

For more information, see HAPPI-Home 4, *Managing hazardous household products.*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Protecting your resources through a farm and home assessment,* produced by the staff of the National Farm•A•Syst/Home•A•Syst Program in Madison, Wisconsin. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

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Hazardous Waste Disposal Practices for the Home

Type of waste	Disposal practice (see definitions at bottom of table)			
	Pour down drain with water	Dispose in sanitary landfill	Dispose in hazardous waste collection only	Recycle if program is available
Kitchen				
Aerosol cans (empty)		**		
Aluminum cleaners	*			
Ammonia based cleaners	*			
Bug sprays			***	
Drain cleaners	*			
Floor care products			***	
Furniture polish			***	
Metal polish with solvent			***	
Window cleaner	*			
Oven cleaner (lye base)		**		
Bathroom				
Alcohol-based lotions (aftershaves, perfumes, etc.)	*			
Bathroom cleaners	*			
Depilatories	*			
Disinfectants	*			
Permanent lotions	*			
Hair relaxers	*			
Medicine (expired)	*			
Nail polish (solidified)		**		
Toilet bowl cleaner	*			
Tub and tile cleaners	*			
Garage				
Antifreeze				****
Automatic transmission fluid			***	****
Auto body repair products		**		
Battery acid (or batteries)			***	****
Brake fluid			***	
Car wax with solvent			***	
Diesel fuel			***	****
Fuel oil			***	****
Gasoline			***	****
Kerosene			***	****
Metal polish with solvent			***	
Motor oil			***	****
Other oils			***	
Windshield washer solution	*			
Workshop				
Paint brush cleaner with solvent			***	****
Paint brush cleaner with TSP	*			
Aerosol cans (empty)		**		

Cutting oil			***	
Glue (solvent based)			***	
Glue (water based)	*			
Paint, latex		**		
Paint, oil based			***	
Paint, auto			***	
Paint, model			***	
Paint thinner			***	****
Paint stripper			***	
Paint stripper (lye based)	*			
Primer			***	
Rust remover (with phosphoric acid)	*			
Turpentine			***	****
Varnish			***	****
Wood preservative			***	
Lawns, gardens, and fields				
Fertilizer		**		
Fungicide			***	
Herbicide (weed killer)			***	
Insecticide			***	
Rat poison			***	
Miscellaneous				
Ammunition			***	
Artists' paints, mediums			***	
Dry cleaning solvents			***	****
Fiberglass epoxy			***	
Gun cleaning solvents			***	****
Lighter fluid			***	
Mercury batteries			***	
Moth-balls			***	
Old fire alarms			***	
Photographic chemicals (unmixed)			***	
Photographic chemicals (mixed / diluted)	*			
Shoe polish		**		
Swimming pool acid			***	

* Products that can be poured down the drain with plenty of water. If you have a septic tank, additional caution should be exercised when dumping these items down the drain. In fact, there are certain chemical substances that cannot be used with a septic tank. Read label to determine if a product could damage the septic tank

** Materials that cannot be poured down the drain but can be safely disposed of in a sanitary landfill. Be certain the material is properly contained before it is put out for collection or carried to the landfill.

*** Hazardous wastes that should be saved for a community-wide collection day or given to a licensed hazardous wastes contractor. (Even empty containers should be taken to a licensed contractor if one is available.)

**** Materials that can be recycled if a recycling program is available in your community. If there is no recycling program, encourage local officials to start such a program.

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 6

Alternatives to Hazardous Household Products

When someone mentions hazardous products, you may not think of things that you have at home. However, many products like drain cleaners, bug spray, nail polish remover, shoe polish, oil, paint, and turpentine, can pollute the environment. Improper use and disposal of some of these products can also harm you or your family, especially small children. One way to reduce the risk to yourself and your family is to use hazardous household products only when necessary. Fortunately, other choices are available. This document provides basic information on some of these alternatives. Additional information on environmentally friendly cleaning products can be found on the Web at <http://foe.org/eday99/cleaners.html> or <http://www.ecomall.com/greenshopping/mtngreen.htm>.

If they are used or disposed of improperly, even products sold as "environmentally-friendly" can sometimes cause pollution and can poison you or your children. Before you use or dispose of any household chemical you should read the label. The label contains instructions on how to safely use the product and often contains guidelines on proper disposal. You can also call the manufacturer's phone number on the label to get more information.

Type of product	Major problems	Possible alternatives
Drain cleaners	Lye and acids can burn human tissue; some products can explode if used incorrectly; particularly dangerous around children	To clear clogs: Pour 2 cup of baking soda and 2 cup vinegar down the drain. Let sit for one minute and flush with hot water. Use a metal snake for persistent clogs. Keep drains clean by using a drain strainer and flushing weekly with a mixture of 2 cups salt and 1/8 cup cream of tartar followed by hot water.
Oven cleaners	Lye and acids can burn human tissue. Some products can explode if used incorrectly. Particularly dangerous around children.	Protect oven floor from spills with aluminum foil or other oven liner. Clean stains by mixing 2 tablespoons liquid dish soap, 2 teaspoons borax, and 2 cups warm water; apply and let sit for 20 minutes, then scrub with steel wool and non-chlorine scouring power. For fresh spills, pour on lots of salt when warm and scrub off the next day.
Toilet cleaners	Often contain chlorine and strong acids. Highly poisonous if swallowed. Fumes can be dangerous.	Clean and deodorize with 2 cups borax and 1 gallon warm water. If bowl is stained, coat with a paste of lemon juice and borax, let sit about 20 minutes, and scrub with a bowl brush.
Surface cleaners	Products often contain either chlorine or ammonia; both are poisonous is swallowed. If chlorine and ammonia are mixed together, they form deadly chloramine gas.	General cleaning: Use 2 cups washing soda or borax per bucket of hot water. Scouring: Use a paste of baking soda and warm water then scrub with a damp cloth or scouring pad.
Glass/window cleaners	Often contain ammonia, which is poisonous if swallowed. Fumes can cause irritation.	Use 1 cup vinegar in 1 quart water; rub dry with newspaper or squeegee to prevent streaking.

(continued, over)

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Type of product	Major problems	Possible alternatives
Mold/mildew cleaners	Contain pesticides. Chemicals usually harmful if swallowed or inhaled.	Wash bath and sink grout often so mold and mildew can't get established, seal with water sealer. To inhibit mold and mildew, wash area with 2 cups borax and 1 gallon hot water. Scrub mildew spots with borax/water mix and scouring pad. To clean mildew from a shower curtain use vinegar full strength or use 2 cups borax to 1 gallon hot water.
Furniture and floor polishes	Contain petroleum distillates and/or phenols. Often flammable and very dangerous if swallowed. May have strong, lingering odors. Some may cause skin irritation.	Furniture polish: Combine equal parts mineral oil and lemon oil (do not melt over open flame). Wood floors: Combine equal parts mineral oil and vinegar. Linoleum or tile floors: Mix ¼ cup white vinegar, ¼ cup washing soda, and 1 gallon warm water; apply with damp mop. Scrub scuff marks with toothpaste.
Metal polishes	Fumes pollute the air in your home. They are strong acids so must be disposed of as hazardous waste.	Silver: Boil in 2 quarts of water with 1 teaspoon baking soda, 1 teaspoon salt, and a piece of aluminum foil. Polish with a paste of baking soda and water. Brass: Polish with a paste of equal parts salt and flour with a little vinegar. Copper: Rub with lemon juice or with hot vinegar and salt. Chrome: Use rubbing alcohol or white flour on a dry rag. Aluminum: Dip a cloth in lemon juice, polish, then rinse with warm water.
Detergents	Phosphates in many detergents cause water pollution that can harm aquatic life	Use as little detergent as possible for laundry and dishes; use low- or no-phosphate detergents; use soaps like laundry soap where possible. You can use borax to increase the effectiveness of soap if you have hard water.
Paint (non-latex)	Lead-based paint can cause lead poisoning if paint chips or dust are eaten, especially by small children. Other solvents can cause water pollution.	Use water-based latex paints if possible. Non-latex paints should be used up or disposed of as hazardous waste (see HAPPI-Home 5 for additional information).
Turpentine, paint thinner	These chemicals can move rapidly through the soil and contaminate ground waters. Fumes can cause harm, especially in enclosed spaces. Highly poisonous if consumed, especially to small children.	Always use according to directions. Strain and reuse thinners and turpentine. Always keep covered to avoid evaporation. Should always be disposed of as household hazardous waste (see HAPPI-Home 5 for additional information).
Aerosol cans	Solvents and propellants used can contaminate ground and surface waters. Cans are potentially explosive if disposed of incorrectly	Purchase equivalent products in non-aerosol forms including roll-ons, creams, and sticks for deodorants and pump sprays, creams and gels for hair care products. Good ventilation, regular cleaning and fresh flowers or potpourri can reduce the need for air fresheners.

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox based on information from *Alternatives to household hazardous products* published by the Pollution Prevention Program of the Hawaii State Department of Health and from CTAHR extension publications WQ-#7, WQ-#8, and WQ-#9, June 1992, developed by Alyson McCann. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

/27

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C/T/A/H/R
College of Tropical Agriculture & Human Resources
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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 13

Yard and Garden Nutrient Management

A major source of water pollution is nutrients from yard and garden areas. The two most harmful nutrients are phosphorus, which is carried on soil eroded in water running into water bodies, and nitrogen, which leaches through the soil to the groundwater. Deep groundwater sources provide most of Hawaii's drinking water, while shallow groundwater eventually flows into stream and the ocean. This HAPPI-Home worksheet will help you recognize nutrient pollution risks from your current yard and garden management practices and identify areas for improvement. It is designed for people with lawns or small gardens and for urban residents who have plots in community gardens. If you are a commercial grower, please consult the HAPPI-Farm series for more information.

All plants need nutrients, including nitrogen, phosphorus and potassium, to grow. However, excessive nutrients can pollute streams and other bodies of water. In the home yard, two potential sources of nutrient pollution are applying more fertilizer than plants can use and improperly disposing of grass clippings, leaves, prunings, and fruits.

Fertilizer management

Before applying either organic or chemical fertilizer to plants, identify the type and amount of fertilizer that will be the most effective. Using too much fertilizer can cause water pollution and is costly. Testing your soil is the best way to learn how much fertilizer you need. The CTAHR Agricultural Diagnostic Service Center conducts basic soil tests for a fee and provides application recommendations. Information on how to take a soil sample can be found in the free CTAHR publication *Testing your soil—why and how to take a soil-test sample* available on the college Web page (http://www2.ctahr.hawaii.edu/oc/freepubs/) or by request from CTAHR Cooperative Extension Service (CES) offices.

On Oahu or Maui, the master gardener programs at the Pearl City Urban Garden Center and the Maui Garden Center can help. On Oahu, call them at 453-6055. The phone number of Maui is 244-3242.

Information is also available in various free CTAHR publications, including *Calculating the amount of fertilizer needed for your lawn* (TM-9), *Fertilizers for trees and shrubs* (L-2), and *Fertilizers for fruit trees in the home garden* (GHG-37). Other publications cover specific vegetables and ornamentals. Recent CTAHR publications can be found on the Web page <http://www2.ctahr.hawaii.edu/oc/freepubs/>; many others can be requested through your local CES office.

Organic fertilizers such as manure or compost generally release their nutrients more gradually than most inorganic fertilizers, but they can still cause water pollution if used improperly. Be sure to apply the right amount of organic fertilizer based on the nutrient requirements of your lawn, vegetables, flowers, or other landscape plants. Compost and manure are often applied to the soil surface, and special care should be taken to ensure that they cannot be carried off by rainwater during storms.

Slow-release fertilizers can also help reduce nutrient loss by slowly providing plant nutrients. Unlike soluble inorganic fertilizers, which dissolve quickly, slow-release fertilizers contain materials or have coatings that allow them to dissolve slowly. This can help reduce leaching and runoff losses of nutrients. Fertilizers should be lightly worked into the soil or covered by mulch to prevent their being washed away by rain.

Disposal of organic wastes

Organic wastes including grass clippings, shrub and tree trimmings, leaves, and fruits are another potential source of nutrient pollution. As they decompose, nutrients are released. Do not dispose of these materials on paved

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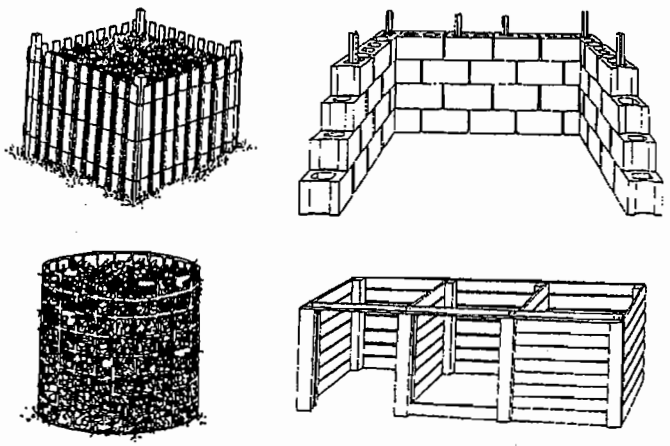
areas or in ditches where they will be carried to streams or storm drains by rainwater. Grass clippings are best left on your lawn to decompose and provide nutrients. On Oahu, curbside collection is provided in some neighborhoods, and drop-off sites are available. Organic waste is composted into mulch that you can get for free. Contact the City Recycling Office at 527-5335 or <http://www.opala.org> for more information.

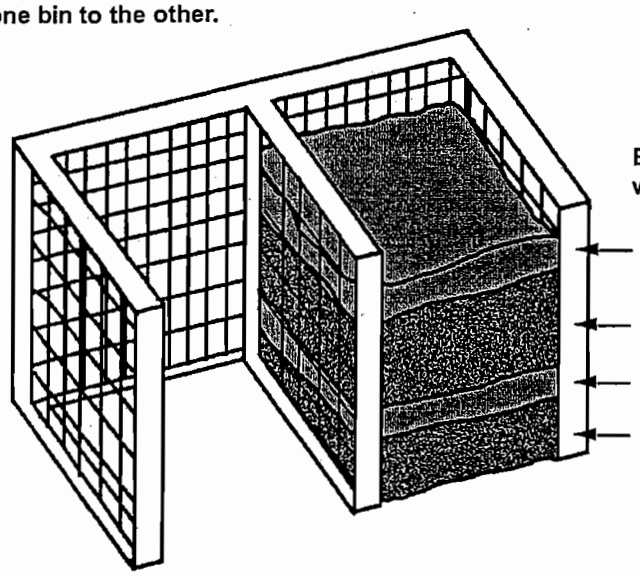
If you have the space, composting is a cost-effective, natural way to recycle leaves, grass clippings, and other yard residues. To compost, put yard wastes in a pile, or install homemade or store-bought bins to contain the material. In addition to yard waste, you can add vegetable trimmings and fruit peels from your kitchen. Your compost pile will remain relatively odor-free if it is turned and aerated regularly. Finished compost can be mixed into garden soil or spread on lawns as a slow-release fertilizer and soil enhancer. For additional information, please consult two other CTAHR publications: *Backyard composting: Recycling a natural product*, and *Composting at a glance*. Both are available on request from your local CES office. On Oahu, the City and County of Honolulu Recycling Office sponsors periodic workshops on backyard composting. Contact them at 527-5335 for more information.

Animal manures contain high levels of nitrogen, and different types of manure have different levels. If manure is left in piles exposed to the weather, nitrogen-rich runoff may result. If you mix manure from horses, sheep, cows, or other plant-eating animals into your compost, be sure to add plenty of high-carbon materials such as leaves, straw, or sawdust. This will keep the nitrogen from being lost to runoff or leaching. Do not put pet wastes in compost piles because of potential parasite and disease problems. To minimize water pollution risks, cover piles so water will not run off and carry away nutrients and locate piles at least 50 feet from streams or other water bodies.

Different types of compost bin



Turning the compost pile speeds decomposition. With two adjacent bins, the compost can be turned by shifting it from one bin to the other.



Build a layered pile at first. The ingredients will be mixed as the pile is turned.

- 1–2 inches of soil
- 6 inches of organic material (grass, leaves, weeds, etc.)
- 1–2 inches of soil
- 6 inches of organic material

129

Risk Assessment Table for Yard and Garden Nutrients and Wastes

	Low risk	Moderate risk	High risk	Your risk
Inorganic fertilizers	Inorganic fertilizers not applied; if used, applied as part of nutrient management plan based on plant requirements and soil test results; slow-release formulations used	Fertilizers applied when poor growth is apparent and nutrient deficiencies are suspected, but soil test results and plant requirements are not considered	Fertilizers regularly applied without considering plant requirements or soil nutrient levels, *or* fertilizers not applied according to label directions	❑ low ❑ moderate ❑ high
Organic fertilizers	Organic fertilizers not applied; if used, applied as part of nutrient management plan based on plant requirements and soil test results; incorporated into soil	Fertilizers applied when poor growth is apparent and nutrient deficiencies are suspected, but soil test results and plant requirements are not considered	Fertilizers regularly applied without considering plant requirements or soil nutrient levels, *or* fertilizers applied to soil surface where they can be easily washed off in stormwater	❑ low ❑ moderate ❑ high
Grass clippings, leaves, fruits, and trimmings	Grass clippings, leaves, fruits, and trimmings are left on the lawn or garden or under bushes and flowering plants, composted, or disposed of on property far from water bodies; on Oahu, yard wastes sent for municipal composting	Grass clippings, leaves, fruits, and trimmings are dumped near or in a water body flood zone or on paved surfaces where they can be washed into storm drains	Grass clippings, leaves, fruits, and trimmings are dumped directly into a water body	❑ low ❑ moderate ❑ high
Composting	No compost pile, *or* the compost pile is well maintained; it is aerated regularly and contains a balanced mixture of yard waste, vegetable food scraps, and a nitrogen source such as manure	The compost pile is poorly maintained; it is not aerated or lacks the proper mix of materials; dog, cat, and other pet wastes are added to the pile	The compost pile is poorly maintained: It contains excessive high-nitrogen material and is not turned regularly. The pile is uncovered or less than 50 feet from surface water	❑ low ❑ moderate ❑ high

Sometimes grass clippings, compost or excess fertilizer end up on sidewalks and driveways. These materials can easily wash into storm drains and on into streams. Sweeping them back onto your lawn where they belong will stop this from happening.

Assessing your risks

The next step is to determine the water pollution risks from nutrient management in your yard and garden. Compare the items in the risk assessment table above with your management practices and rate your risk as low, moderate, or high for each category.

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
Fertilizers are regularly applied to garden but soil has never been tested	*Collect soil sample and send to CTAHR Agricultural Diagnostic Service Center for analysis and fertilizer recommendation*	*One week from today*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Yard and garden care* by K Marc Teffeau and Ray Bosmans, Chapter 7, pp. 69–74, in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst/Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst/Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

131

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College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa

Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 12

Runoff Control in Your Yard and Garden

Well maintained yards cause few if any water quality problems. However, improper yard and garden management can cause water pollution. This worksheet is the first of three HAPPI-Home documents that will help you identify and correct some of the major water pollution risks from your yard and garden management practices. This worksheet provides information on water runoff and soil erosion risks. No. 13, *Yard and garden nutrient management*, focuses on fertilizers and yard wastes, and no. 14, *Yard and garden pest management*, covers pesticide use. This series is designed for people with yards and for apartment dwellers who have plots in community gardens. If you are producing vegetables, fruits, or flowers in large areas or for sale, please consult the HAPPI-Farm series of publications.

Here are definitions of some yard and garden management terms:

Impervious surface: Any surface that does not allow water to soak in; instead, water forms puddles or runs off such as concrete, asphalt, and metal.

Stormwater: Water from rainfall that does not soak into the ground.

Runoff: Water flowing over the ground, grass, or paved areas; this water is called runoff until it reaches a stream or other water body.

Soil erosion: The process that moves soil from one place to another. The most common kind of erosion in Hawaii is caused by water washing over soil and carrying it downhill to streams and the ocean.

Why is stormwater important?

As stormwater flows, the runoff collects and moves pollutants such as soil, nutrients, chemicals, and pathogens to streams and coastal waters. Soil clouds water and degrades habitats for fish and other marine organisms, including corals. Nutrients promote growth of algae in streams and coastal waters. Large amounts of algae make the water unfit for swimming and can crowd out other aquatic life. Chemicals such as oil and pesticides can be toxic to fish and other aquatic life. Bacteria and parasites from animal wastes can make streams and beaches unsafe for wading and swimming after storms. Even if your house is not next to a stream or the ocean, urban and suburban storm drains carry runoff water from your neighborhood to the ocean. Common sources of stormwater pollutants include:

Silt, sand, and clay particles and other debris: Construction sites, bare spots in lawns and gardens, wastewater from washing cars and trucks on driveways or parking lots, unprotected streambanks.

Nutrients: Overused or spilled fertilizers, pet wastes, grass clippings and leaves left on streets or sidewalks.

Hydrocarbons: Car and truck exhaust, leaks and spills of oil and gas.

Pesticides: Improperly applied or spilled pesticides.

Where does stormwater go?

Next time it rains, watch where the rainwater goes. On the sketch of your property that you made using HAPPI-Home 2, draw arrows showing the direction that stormwater runoff flows. Note where it soaks in and where it makes puddles. Your soil type affects water infiltration (soaking into the ground). Water infiltrates sandy soil quickly but has a hard time seeping into clay soils. In areas on the Big Island that have very thin soils, especially those on top of pahoehoe lava, water can run off very quickly. Find out how far it is to the nearest storm drain, ditch, wetland, stream, or body of open water, and observe whether runoff flows onto your land from adjacent streets, lands, or stormwater systems.

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Concrete and asphalt are impervious surfaces that prevent rainwater from soaking into the ground. When you have the choice, consider materials such as gravel for driveways and gravel, brick, or wood chips for walkways. Avoid paving areas such as patios. Where you need a more solid surface, consider using a "porous pavement" made from interlocking cement blocks or rubber mats that allow spaces for rainwater to seep into the ground. If you must pour concrete, keep the paved area as short and narrow as possible.

Your house roof is also an impervious surface that sheds water. If downspouts from roof gutters empty onto grassy areas, the water will have a chance to soak into the ground. Aim downspouts away from foundations and paved surfaces. For roofs without gutters, plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase the ground's capacity to absorb water. Consider using cisterns or rain barrels to catch rainwater for watering in dry weather.

Watering your trees, lawn, or garden

Most plants can stand short dry periods, and watering should be timed to meet the needs of the plants. Slow, deep watering helps develop deep roots so that plants need to be watered less often. Too much watering can cause runoff that carries eroded soil, nutrients, and pesticides, especially if the latter have been applied recently. Overwatering can also result in the leaching of nutrients and pesticides through the soil and into the groundwater.

If you live in a drier area, Xeriscaping® is an option. With Xeriscaping, you use less water including choosing plants that are naturally suited to dry areas. More information on Xeriscaping is available from the Halawa Xeriscape Garden on Oahu (808-527-6113), or your county board of water supply, or on the Web at <http://www.hbws.org/fa_conserv/fa01_ct01_mainpage.htm> or <http://www. mauiwater.org/xeriscape.html>.

If possible, water using drip irrigation or a soaker hose instead of a sprinkler. Since sprinkler systems put water on top of the vegetation, the water evaporates directly into the air. The time of day when you water matters, too. In the heat of the day, more water will evaporate instead of going into the soil. Early morning or late afternoon are the best times. More information on watering practices can be found in the free CTAHR publications, *Watering lawns* (TM-7) and *Watering trees* (L-2), on the Web site <http://www2.ctahr.hawaii.edu/oc/freepubs/> or at your local CTAHR Cooperative Extension Service office.

Controlling soil erosion

Bare soil in vegetable and flower gardens, newly seeded lawns, areas under trees with thick shade, bare dirt paths and driveways, and areas around construction projects is most likely to cause erosion because rain can wash the soil away. Sloping areas have even greater erosion risk. Planting grass or other groundcovers is the best way to stop erosion. If a groundcover will not work for you, mulch will also slow erosion. Wood chips and macademia nut shells are common mulching materials. More information on mulching can be found in the free CTAHR publication, *Mulching for healthier landscape plants* (L-3). Diversion ditches and commercially available silt fences around construction sites can help slow runoff and trap sediment on-site. If you are working with a contractor, insist runoff and erosion are controlled during construction.

You can also reduce erosion by avoiding soil compaction so water can go into the soil. Compacting the soil under your lawn, which can be caused by heavy athletic use or by driving or parking on it, reduces infiltration and leads to water runoff that can cause soil erosion.

When eroded soil reaches a water body, it is called sediment. Sediment pollution of the coastal waters is the biggest water pollution problem in Hawaii. You can help stop it by keeping sediment on your property. One way to do this is to surround bare soil areas, such as a driveway, a flower bed, or under a mango tree, with vegetation, such as a lawn. Water carrying soil will run slowly through the grass. More water will soak in, and the soil particles will be left to enrich the lawn. If your property is on a hill, terraces can prevent erosion. Consider "naturalizing" large areas with native plants.

If your property is next to a stream or drainage ditch, please take extra care. Mowing right up to the water's edge makes it easier for runoff to cause erosion. It is better to leave a buffer strip of vegetation along the stream bank. This will trap any pollutants before they reach the stream or ditch and will protect the banks from erosion. Your local office of the CTAHR Cooperative Extension Service, the Natural Resources Conservation Service, or the Soil and Water Conservation District can help you decide the best plants for buffer areas.

Assessing your risks

The next step is to determine the water pollution risks from your yard and garden. Compare the items in the risk assessment table below with your management practices and rate your risk for each category. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan on page 4.

Risk Assessment Table for Water Management in Yards and Gardens

	Low risk	Moderate risk	High risk	Your risk
Paved surfaces	Paved surfaces are minimized. Alternatives such as wood chips or paving blocks are used for walkways, patios, and other areas	Some small areas are paved for patios or basketball	Paved surfaces are used extensively	❑ low ❑ moderate ❑ high
Roof drainage	Downspouts and drip lines direct roof drainage onto a lawn or garden where water soaks into the ground	Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off	Most or all drip lines or downspouts discharge onto paved surfaces, or downspouts are connected directly to storm drains	❑ low ❑ moderate ❑ high
Bare soil in lawns and gardens	Bare spots in the lawn are promptly seeded and topped with a layer of straw or mulch; bare soil in gardens and under trees is covered with mulch; soil aerated regularly	Grass or other ground cover is spotty, particularly on slopes; all bare soil areas are surrounded by vegetated areas	Spots in the lawn or garden are left exposed without mulch or vegetation for long periods; bare soil areas exist on steep slopes or near streams or ditches	❑ low ❑ moderate ❑ high
Bare soil on paths or driveways	No dirt paths or driveways	Dirt paths or driveways surrounded by vegetated areas	Water runoff from dirt paths or driveways goes directly into a ditch or stream	❑ low ❑ moderate ❑ high
Bare soil during construction	Bare soil is seeded and mulched as soon as possible (before construction is completed); sediment barriers are used until grass covers soil	Soil is left bare until construction is completed; sediment barriers are installed and maintained to detain muddy runoff until grass covers soil	Soil is left bare and no sediment barriers are used	❑ low ❑ moderate ❑ high
Landscaping and buffer strips	Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground; unmowed buffer strips of thick vegetation are left along streams	No areas are landscaped to encourage water to soak in, but yard is relatively flat and little runoff occurs; mowed grass or spotty vegetation next to a stream	There is no landscaping to slow the flow of stormwater, especially on hilly areas; stream banks are eroding	❑ low ❑ moderate ❑ high
Watering methods	No runoff from watering occurs; low water-use devices (e.g., soaker hoses, drip systems) are used; the sprinkler system is on manual control	Watering is excessive (e.g., the sprinkler is left unattended, and much water lands on the pavement);moderate runoff occurs	Sprinkler system is used daily without regard to weather conditions; there is excessive water runoff;soil loss (eg. gullies) is evident	❑ low ❑ moderate ❑ high

Your Action Plan

After assessing your water management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk in the table on page 3, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
Downspouts from roof gutters flow directly onto the driveway and on into the storm drain	*Buy new sections of pipe and redirect downspouts onto grassy areas*	*One month from today*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Stormwater management* by Carl DuPolt and Carolyn Johnson, and *Yard and garden care*, by K. Marc Teffeau and Ray Bosmans, Chapters 2 and 7, pp. 15–22 and 69–74, respectively, in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst /Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst / Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

135

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 14

Yard and Garden Pest Management

Managing pests is an important part of keeping your lawn, trees, vegetables, and flowers beautiful and productive. Chemical pesticides can be used to control pests, but you should know that pesticides can cause water pollution. In addition, studies have shown that homeowners often apply more pesticides than needed, and they often apply pesticides incorrectly. Traces of pesticides have been found in many urban streams and coastal waters in Hawaii. This worksheet will help you learn the risks of home pesticide use and improve your pest management practices in your lawn and garden.

Pesticide use practices

Using no chemical pesticides and removing weeds, insects, and other pests by hand is safest for the environment and your health. If properly used, however, pesticides pose only a minimal risk. To use chemical pesticides safely, follow these five steps:

- Identify the pest or disease problem and determine the best way to control it.
- If you need a chemical pesticide, ***read the label*** to make sure that it is the right one for the job
- Apply the pesticide according to the label directions
- Be prepared to deal with accidental poisoning or spills
- Properly store and dispose of leftover pesticides and pesticide containers.

Step 1: Identify the pest or disease problem and the best way to control it

Many plant problems are not caused by insects or disease but are related to temperature extremes, waterlogging or drought, damage caused by lawn mowers, or overuse of chemicals. Poor nutrition can also make your plants more susceptible to pests and disease. The CTAHR-CES Master Gardener Program (on Oahu, call 453-6055) can help you determine if your problem is pest-related. If it is, they can help you decide if you need to spray or if you can control the pest another way. If you need to spray, they can help you choose the right product. The KnowledgeMaster section of the CTAHR Web page (<http://www2.hawaii.edu/>) also provides more information about pest management. For a fee, the CTAHR Agricultural Diagnostic Service Center will also examine a leaf or twig sample, identify the pest or disease problem, and recommend the appropriate control measures. Contact them by phone at 808-956-6706 to find out what part of your plant you should bring in to get their advice and recommendation.

Step 2: Get the right pesticide for the job

If you decide to use a pesticide, you must ***read the label*** before you apply, store, or dispose of a pesticide. Additional information is provided in CTAHR publication WC-3, *Before you buy or apply an herbicide*, available free on the Web at <http://www2.ctahr.hawaii.edu/oc/freepubs/pdf/WC-3.pdf> or by request from your local CES office. The label will tell you the active ingredient in the pesticide and the pests that it will kill. It will also tell you which plants you can use the pesticide on. Different companies sell similar products under different brand names, so double-check that you are buying the right product. If you ask your CES agent or master gardener for advice, they will provide you with the name of the active ingredient you need or with a list of the product or products that will meet your needs.

Some pesticides contain chemicals designed to kill more than one pest; these are called "broad-spectrum" pesticides. Other pesticides have been developed to kill one or a few specific pests; these are called "selective" pesticides. Selective pesticides are best, because broad-spectrum pesticides may kill beneficial insects that help keep your plants healthy by eating other pests.

The pesticide label also provides information on the relative toxicity of the product. Chemicals labeled "CAUTION" have relatively low toxicity. Chemicals labeled "WARNING" have moderate toxicity. Chemicals labeled "DANGER" have high toxicity. The equipment you need to mix and apply the product safely and

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effectively will depend on the individual chemical and the toxicity. Make sure that you have the equipment you need before you purchase the pesticide. The label also contains information on first aid, application restrictions, and other hazards.

Labels, however, do not provide all the information you may need. You can ask your pesticide retailer for a copy of the Materials Safety Data Sheet (MSDS) that contains additional information. If you have more questions, ask your pesticide retailer, your local CES agent, or the master gardener program (On Oahu, call 453-6055). You can also obtain information directly from the pesticide manufacturer by calling the toll-free number provided on the label.

Because pesticides can be hazardous, safe and proper disposal of any leftover chemicals can be time-consuming. The best way to avoid this problem is to purchase only the amount you need to address your problem. Purchasing only what you need also means that you also will not have to worry about safely storing pesticides in your home.

Step 3: Apply the pesticide according to label directions

Federal and state law requires that you follow label directions when you use any pesticide. When applied according to label directions, pesticides will not harm your plants or the environment. Improper use may poison you, hurt your plants, and harm the environment.

When and where you apply pesticides also affects the water pollution risk. You want as much of the pesticide as possible to reach the target pest. Apply the pesticide to the appropriate location on the plant or to the soil based on the type of pest. Do not apply pesticides when it is windy or raining or just before watering your plants. If you do not follow this rule, the pesticide can be blown away or washed off and not reach the target pest. Do not to apply pesticides near streams or other water bodies unless absolutely necessary, and only if permitted by the label. Pesticides applied on stream banks or other areas near water can enter the water more easily and cause pollution.

Step 4: Be prepared to deal with accidental poisoning and spills

When you are using any pesticide, you should be prepared in case you or someone else accidentally is exposed to too much of it. Depending on the chemical, pesticides can cause poisoning if they are swallowed, inhaled, get in someone's eyes, or, for very toxic chemicals, get on someone's skin. Young children, who may not know any better, are at a higher risk for accidental poisoning. The label on the pesticide container will contain basic information on first aid if someone is improperly exposed to the pesticide. If you have additional questions, contact the Poison Control Center at 941-4411 (Oahu) or 1-800-362-3585 (other islands). If the person's health is in immediate danger, call 911.

You should also be prepared to deal with spills. You should follow the "3 Cs" of spill management: Control, Contain and Clean up. First, control the spill and stop more of the pesticide from spilling. Second, keep if from spreading. Then, clean it up according to the directions on the pesticide label or on the Materials Safety Data Sheet. Be sure that you can clean up the spill safely before you try to clean it up. If the spill is putting you or anyone else in danger, or if there is any risk of the spill entering a water body (including a storm drain) or otherwise posing risk to the public, call 911.

Step 5: Properly store and dispose of leftover pesticides and pesticide containers

After you are finished using the pesticide, be sure that you store and dispose of any leftover chemicals and empty pesticide containers according to the directions on the label or MSDS. Pesticides should be stored in their original containers in a dry, well-ventilated, and secure (locked) location. Check the label or MSDS for any specific storage guidelines.

Leftover pesticides that are no longer needed or wanted must be disposed of as hazardous waste. If possible, empty containers should be recycled. However, recycling is often not available for household pesticide containers. So, empty containers should be rinsed three times with water, "triple-rinsed." The rinse water should be disposed of on a vegetated area far from streams or ditches, and the containers should be punctured so they cannot be used again and placed in your household trash for disposal at a licensed facility. Check the label or MSDS for any specific disposal instructions. HAPPI-Home 4, *Managing household hazardous products*, provides additional information on proper storage and disposal practices.

Integrated Pest Management (IPM)

You may want to consider using Integrated Pest Management (IPM) in your yard and garden. IPM is a systematic approach to controlling pests. It focuses on the use of nonchemical controls and the selective use of

Risk Assessment Table for Yard and Garden Pest Management

	Low risk	Moderate risk	High risk	Your risk
Read the label	Always read the label and follow label directions	Sometimes read the label and follow the directions	Seldom or never read the label and follow directions	❑ low ❑ moderate ❑ high
Alternative pest control	Never use chemical pesticides; or, carefully use pesticides only when necessary	Seldom use non-chemical controls; use pesticides regularly	Often use broad-spectrum pesticides or fertilizer/ herbicide mixtures	❑ low ❑ moderate ❑ high
Choice of pesticide	Always identify specific pest and choose selective pesticide	Identify general type of pest; use broad-spectrum pesticides occasionally	Don't identify pest; apply broad spectrum pesticides over and over	❑ low ❑ moderate ❑ high
Application practices (A)	Always carefully apply pesticides to the appropriate part of the plant based on the target pest; spray until just wet	Usually apply pesticides to the appropriate part of the plant based on the target pest; spray until dripping	Apply blanket application of pesticide to entire plant without considering target pest; spray until runoff	❑ low ❑ moderate ❑ high
Application practices (B)	Never apply pesticides when it is windy or raining	Seldom apply pesticides when it is windy or raining	Do not consider weather conditions when applying pesticides	❑ low ❑ moderate ❑ high
Application practices (C)	No pesticides applied within 100 ft of stream or other water body	Few pesticides applied within 100 ft of water body, using small sprayer	Pesticides regularly sprayed within 100 ft of water body	❑ low ❑ moderate ❑ high
Accidental poisoning and spills	Always read first aid and clean-up information on the label before using; clean up any spills quickly and safely according to label directions; Poison Control Center number posted by the phone	Know general first aid and keep pesticide container nearby in case I need label information; know where to find Poison Control Center number (front page of phone book)	Don't read first aid or clean-up information on label before using pesticide or cleaning up any spills; don't know where to find Poison Control Center number	❑ low ❑ moderate ❑ high
Storage	Pesticides stored in their original packaging in a dry, well ventilated, secure area; or, no pesticides stored.	Pesticides stored in original packaging that is in fair condition in a dry, well ventilated, secure area	Pesticides not stored in original packaging or stored in original packaging that is in poor condition; pesticides stored in an unsecured area	❑ low ❑ moderate ❑ high
Disposal	Unwanted pesticides used up; empty containers recycled or triple rinsed and disposed of in household trash	Unwanted pesticides disposed as hazardous waste	Unwanted pesticides and used containers not disposed of properly	❑ low ❑ moderate ❑ high

chemicals when necessary. Weeds can be controlled by hand pulling or hoeing, and bugs can be removed by picking them off vegetables and garden plants. Cleaning up dead leaves and debris removes potential homes to pests. Putting beneficial insects and microorganisms into your garden is another method used to control pests. The KnowledgeMaster section of the CTAHR Website, <http://www2.ctahr.hawaii.edu>, provides more information on IPM, and your local extension agent or Master Gardener can also provide more information on how you can apply IPM principles to your yard and garden management.

Assessing your risks

Complete the risk assessment table above to determine your water pollution risks. For each category, choose the set of practices that best fits your situation. Then, go to page 4 and develop an action plan to minimize water pollution on your land.

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
Don't identify pests, apply broad spectrum pesticides over and over.	*Check Knowledge Master Website to identify specific pest problem; purchase appropriate pest-specific pesticide.*	*One week from today.*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Yard and garden care* by K. Mark Teffeau and Ray Bosmans, Chapter 7, pp. 69–74, in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst/Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst /Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

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Hawaii's Pollution Prevention Information
Dec. 2000
HAPPI-Home 15

Motor Vehicle Maintenance

Your motor vehicle can be a source of water pollution even if it is not near the water. Oil spilled on a driveway or parking lot and outdoor spills of antifreeze, brake fluid, and other automotive fluids can be washed away by rain into streams and the ocean. There, they can harm aquatic life and make the water unpleasant and sometimes unsafe to swim or fish in. Washing your vehicle can also cause pollution if the dirty water flows into a storm drain and on to the ocean. However, there are several things that you can do to reduce the risks of water pollution from your vehicles.

Vehicle maintenance

Proper vehicle maintenance and appropriate disposal of waste oil, antifreeze, and other fluids will greatly reduce water pollution risks. Some specific things you can do to reduce your risk are listed below:

- Keep your vehicle in good running condition to prevent oil and fluid leaks.
- Use a pan, a scrap of carpet, or matting to catch drips.
- If you change your own oil, be careful to avoid spills and dispose of the oil by using an oil-change box on Oahu or collecting it for recycling on other islands.
- Store oily car parts and fluid containers where rain and runoff cannot reach them.
- Never dump used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground. You should recycle these fluids if possible. Refer to HAPPI-Home 4, *Managing hazardous household products*, for more information.
- Properly dispose of old automobile batteries by recycling them or taking them to an approved disposal facility. Because batteries contain acids and heavy metals like lead and zinc which are poisonous to humans, animals, and marine life, improper disposal can cause serious water pollution. Refer to HAPPI-Home 4, *Managing hazardous household products,* for more information.

Washing your vehicle

Washing your vehicle can cause water pollution. If you live in an urban area and wash your vehicle on the street, in a driveway, or in a paved parking lot, the dirty, soapy water drains off and flows directly into the storm drain, picking up oil and other pollutants as it goes. A better option is to wash your car in an approved car-washing area of your building where water goes into the sewer system, or to take it to a commercial car wash or spray booth that sends its dirty water into the sewer system. If you are using the car-wash area in your building or condominium complex, be sure to check that the water drains into the sewer system and doesn't just flow out of the parking lot and into the nearest storm drain.

The next best option is to wash your car on your lawn or another unpaved area where the dirty water can soak into the ground. That way most pollutants will be absorbed in the soil. Be careful not to wash your car on an area with bare soil or on a steep slope, because the wash water will run off before it can soak in, carrying any pollutants with it, including eroded soil.

Vehicle washing seldom causes water pollution in rural areas as long as you take a few simple precautions. Wash your vehicle on a relatively level place with grass or other groundcover where the wash water can soak into the ground. Do not wash your vehicle on steeply sloping areas or areas with bare soil, because the water runoff may cause soil to be washed away. Also, check to make sure that the dirty water is not flowing directly into a stream or other water body, or flowing toward your drinking water well if you have one on your property.

Wherever you are washing your vehicle, you can reduce the risk of causing water pollution by doing the following four things:

- Use a mild soap that does not contain phosphates, such as a mild dish detergent; use a biodegradable or "environmentally friendly" soap if possible.

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- Reduce the amount of soap you need to use by using bucket to hold soapy water instead of putting soap on a rag or sponge and spraying it directly with a hose.
- Dump the bucket of soapy water down the toilet if you are in an urban or suburban area, or in a vegetated area away from streams, ditches, and wells if you are in a rural area.
- Use specialty cleaning products, including waxes, only when necessary, and always use and dispose of them according to label directions.

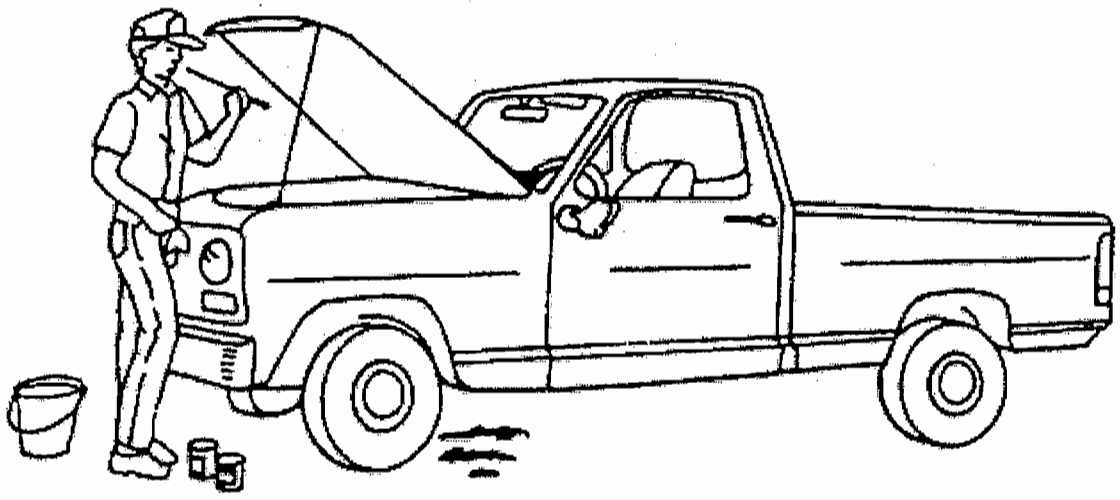
Assessing your risks

Complete the risk assessment table on page 3 to determine the water pollution risks from your motor vehicle maintenance. For each category, choose the set of practices that best fits your situation. Then, go to page 4 and develop an action plan to minimize water pollution on your property.

Contacts

For information on safe disposal of various automotive wastes or used parts, see HAPPI-Home 4, *Managing hazardous household products* and 5, *Think before you dump it—safe disposal of hazardous products.*

For information on waste oil disposal, call your local county waste management office:
Oahu: Dept. of Environmental Services, 523-4774
Maui, Molokai, Lanai: Dept. of Public Works, 270-7880
Hawaii: Recycle Hawaii, 329-2886 or 961-2676
Kauai: Solid Waste Office, 241-6880



Careless disposal of used motor vehicle oil on the ground is a water pollution hazard. Use an inexpensive oil-change box to prevent this contamination.

14/

Risk Assessment Table for Motor Vehicle Maintenance

	Low risk	Moderate risk	High risk	Your risk
Vehicle maintenance	Oil drips and fluid spills are cleaned up; dirty car parts and other vehicle wastes are kept out of reach of stormwater runoff; used car parts, rags, and paper towels are disposed of properly	Drips and small spills are not cleaned up; dirty car parts, rags and paper towels are left on unpaved areas outside	Large spills are not cleaned up; used car parts, rags, and paper towels are not disposed of properly	❑ low ❑ moderate ❑ high
Antifreeze, waste motor oil, other fluids (e.g., brake fluid)	Antifreeze, waste oil, and other waste fluids are recycled by taking them to properly qualified dumping stations or waste oil is drained into an oil change box and put in Honolulu municipal trash	Used antifreeze is poured into a septic system or municipal treatment system	Used antifreeze, waste oil, or other waste fluid is dumped on the ground, into a storm drain or directly into a stream or the ocean	❑ low ❑ moderate ❑ high
Batteries	Batteries are recycled or taken to a hazardous waste disposal program	Batteries are disposed of in a community landfill	Batteries aren't recycled or disposed of in a community landfill	❑ low ❑ moderate ❑ high
Washing location	Urban vehicles taken to a commercial wash or spray booth or washed in a special car-wash area in condominium and apartment complexes; rural vehicles washed on flat, vegetated area away from water bodies	Urban cars, trucks, or other items are washed on a relatively flat lawn or gravel drive; rural vehicles washed on paved driveway surrounded by vegetated and/or gravel areas	Urban or rural vehicles are washed on a paved driveway or street where runoff goes into a storm drain or are washed on bare ground, or steeply sloping areas	❑ low ❑ moderate ❑ high
Washing supplies	Minimum amount of mild or biodegradable soap used; concentrated wash water disposed into sewer systems; seldom use specialty cleaning products; always read and follow label directions when using specialty products	Use moderate amounts of mild soap and specialty products; don't always read the label when using specialty products	Use any soap that is available; don't worry about using too much; regularly use specialty cleaning products without reading the label or following label directions	❑ low ❑ moderate ❑ high

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
I live in Honolulu and wash my car in a paved condo parking lot every weekend	*Take car to car wash at the gas station down the street*	*Next Saturday*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Stormwater management,* by Carl DuPoldt and Carolyn Johnson, and Managing Hourehold Hazardous Products, by Elaine Andrews, Chapters 2 and 5, pp. 15–22 and 47–60, respectively, in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst /Home•A•Syst Program in cooperation with NRAES, the Northeast Regional Agricultural Engineering Service. Permission to use these materials was granted by the National Farm•A•Syst / Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

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HAPPI-Home 16

Pet Waste Management

When you think of water pollution, you probably do not think of your pet. However, if pet wastes are disposed of incorrectly, they can cause water pollution. More than half of all U.S. households own a dog, cat, or other pet. Although each household only generates a small amount of pet waste, these small amounts can add up to a water quality problem. This worksheet is designed for households that have a few, small animals. If you have a large number of animals in one place, such as a dog kennel, or if you keep large animals such as horses, please refer to HAPPI-Farm 7 on livestock management and HAPPI-Farm 8 on pasture management for additional information.

Droppings from dogs and cats and other commonly kept animals including exotic birds, rabbits, goats, potbellied pigs, and chickens can cause two kinds of problems.

First, pet wastes contain nutrients that can promote the growth of algae if they enter streams and the ocean. Algal blooms change the color of streams and the ocean so you don't want to swim in the water. Algae can also clog streams and destroy habitat for aquatic organisms, such as fish.

Second, animal droppings are a source of pests and disease. Pets, children playing outside, and adults gardening are most at risk for infection from some of the bacteria and parasites found in pet waste. Flies may also spread diseases from animal waste. Diseases that can be transmitted from pet waste to humans include leptospirosis, campylobacteriosis, salmonellocis, and toxoplasmosis. Although none of these diseases are common in Hawaii, leptospirosis is spread by waste from wild animals including rats and mongooses. In some neighborhoods where many dogs are kept, the dog-dung fly can be an annoying problem.

Pet waste will seldom cause water pollution if you take these simple precautions:

- Clean up waste in areas near water bodies, ditches, and storm drains.
- Don't allow pet waste to accumulate in pens.
- Don't leave pet waste on a sidewalk, street, or driveway where it can be washed into storm drains.
- Always clean up after your pet. In Honolulu, if you do not clean up after your pet, you can be given a ticket and required to pay a fine.

There are three easy ways that you can dispose of pet waste and minimize water pollution risks:

- Flush it down the toilet. To prevent plumbing problems, don't flush debris such as rocks, sticks and cat litter; dispose of these in the trash.
- Put it in the trash. Be sure to put your pest waste in a closed, tied trash bag so that it will not spill during trash collection.
- If you have a yard, you can bury your pet waste. Dig a hole or trench that is about 5 inches deep in an area away from streams or drainage ditches. Put the waste in the hole and cover it with dirt. The waste will break down and release nutrients that will help your plants. But, you need to be careful. To prevent disease, don't bury pet waste near vegetable gardens, and don't add pet waste to your compost pile. Most small household compost piles do not get hot enough to kill the disease organisms that might be found in pet waste.

Assessing your risks

Complete the risk assessment table on page 2 to determine the water pollution risks from your pets' wastes. For each category, choose the set of practices that best fits your situation. Then, at the bottom of page 2, develop an action plan to minimize water pollution hazard.

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Risk Assessment Table for Pet Waste Management

	Low risk	Moderate risk	High risk	Your risk
Cleaning up after my pet	Pet lives inside or in fenced yard; *and* I always clean up after my pet in public areas	I clean up after my pet in public areas most of the time	I seldom clean up after my pet in public areas	❑ low ❑ moderate ❑ high
Waste disposal	Pet wastes are flushed down the toilet; *or* buried away from gardens, wells, ditches, and areas where children play; *or* wrapped and placed in the garbage for disposal	Pet wastes are left to decompose on grass or soil. Wastes are scattered over a wide area	Pet wastes are left on paved surfaces, concentrated in the pen or yard areas, or dumped down a storm drain or into a ditch	❑ low ❑ moderate ❑ high

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items: *Pet wastes are left on the sidewalk and in the driveway*	*Collect and bury the wastes in an appropriate location*	*Next time wastes are deposited*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Pet waste and water quality,* by Jennifer Hill and Carolyn Johnson, University of Wisconsin Extension Publication GWO006 and includes information from *Stormwater management* by Carl DuPoldt and Carolyn Johnson, Chapter 2, pp. 15–22 in *Home•A•Syst: An environmental risk assessment guide for the home* developed by the National Farm•A•Syst / Home•A•Syst Program. Permission to use these materials was granted by the National Farm•A•Syst/Home•A•Syst Office. HAPPI-Home materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst/Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health.

Draft Wellhead Protection Ordinance,
County of Maui, Hawaii

1. PURPOSE AND INTENT

The jurisdiction of Maui County recognizes that many residents rely on groundwater for their safe drinking water supply, and that certain land uses can contaminate groundwater. To ensure the protection of these drinking water supplies, this ordinance establishes a zoning overlay district to be known as the Wellhead Protection Overlay District.

The purpose of the Wellhead Protection Overlay District is to protect public health and safety by minimizing contamination of aquifers and preserving and protecting existing and potential sources of drinking water supplies. It is the intent to accomplish this through both public education and public cooperation, as well as by creating appropriate land use regulations that may be imposed in addition to those currently imposed by existing zoning districts or other county regulations.

The Wellhead Protection Overlay District is superimposed on current zoning districts and shall apply to all new construction, reconstruction, or expansion of existing buildings and new or expanded uses. Other existing uses and facilities are exempt from the provisions of this ordinance. Applicable activities/ uses allowed in a portion of one of the underlying zoning districts which fall within the Wellhead Protection Overlay District must additionally comply with the requirements of this district. Uses prohibited in the underlying zoning districts shall not be permitted in the Wellhead Protection Overlay District.

The uses prohibited have been identified as risks for groundwater contamination and represent the state of present knowledge and most common description of such uses. Prohibitions are based upon the combined pollution experience of many individual uses, and the technology generally employed by that class of uses, which technology causes the uses as a class to be groundwater pollution risks. As other polluting uses are discovered, or other terms of description become necessary, it is the intention to add them to the list of prohibited uses. As the technology of identified use classes changes to non-risk materials or methods, upon petition from such a use, and after conferring with expert geological and other opinion, it is the intention to delete from the prohibited list, or allow conditionally, uses that demonstrate convincingly that they no longer pose a pollution hazard.

2. DEFINITIONS

For the purposes of this section, the following terms are defined below:

AQUIFER. A geological formation, group of formations or part of a formation composed of rock, sand or gravel capable of storing and yielding groundwater to wells and springs.

CONTAMINATION. An impairment of water quality by chemicals, radionuclides, biologic organisms, or other extraneous matter whether or not it affects the potential or intended beneficial use of water.

DEVELOPMENT. The carrying out of any construction, reconstruction, alteration of surface or structure or change of land use or intensity of use.

FACILITY. Something that is built, installed, or established for a particular purpose.

HAZARDOUS MATERIAL. A material which is defined in one or more of the following categories:
Ignitable: A gas, liquid or solid which may cause fires through friction, absorption of moisture, or which has low flash points. Examples: white phosphorous and gasoline.
Carcinogenic: A gas, liquid, or solid which is normally considered to be cancer causing or mutagenic. Examples: PCB's in some waste oils.

Explosive: A reactive gas, liquid or solid which will vigorously and energetically react uncontrollably if exposed to heat, shock, pressure or combinations thereof. Examples: dynamite, organic peroxides and ammonium nitrate.

Highly Toxic: A gas, liquid, or solid so dangerous to man as to afford an unusual hazard to life. Example: chlorine gas.

Moderately Toxic: A gas, liquid or solid which through repeated exposure or in a single large dose can be hazardous to man.

Corrosive: Any material, whether acid or alkaline, which will cause severe damage to human tissue, or in case of leakage might damage or destroy other containers of hazardous materials and cause the release of their contents. Examples: battery acid and phosphoric acid

PRIMARY CONTAINMENT FACILITY. A tank, pit, container, pipe or vessel of first containment of a liquid or chemical.

RELEASE. Any unplanned or improper discharge, leak, or spill of a potential contaminant including a hazardous material.

SECONDARY CONTAINMENT FACILITY. A second tank, catchment pit, pipe, or vessel that limits and contains liquid or chemical leaking or leaching from a primary containment area; monitoring and recovery are required,

TIME-OF-TRAVEL DISTANCE. The distance that groundwater will travel in a specified time. This distance is generally a function of the permeability and slope of the aquifer.

WELLHEAD PROTECTION AREA. The surface and subsurface area surrounding a water well or wellfield, that supplies a public water supply system, through which contaminants are reasonably likely to move toward and reach the water well or wellfield.

WELLHEAD PROTECTION OVERLAY DISTRICT: The zoning district defined to overlay other zoning districts in Maui County. This district may include the designated wellhead protection areas as identified on Land Zoning Maps.

3. ZONES WITHIN THE WELLHEAD PROTECTION OVERLAY DISTRICT

3.1 ZONE A1 – 50 FEET DIRECT CHEMICAL CONTAMINATION ZONE.

Zone A1 is defined as the fixed 50 feet radius around each well. The purpose of this zone is to provide protection from vandalism, tampering, or other threats at the well site.

a. **Permitted Uses**. The following uses are allowed within Zone A1 provided they meet the appropriate performance standards outlined in section 3.1.b below and are designed so as to prevent any groundwater contamination.

Necessary public utilities/facilities including the construction, maintenance, repair, and enlargement of drinking water supply related facilities such as, but not limited to, wells, pipelines, aqueducts, and tunnels.

b. **Performance Standards**:

Vehicles shall not be parked in the immediate well area, even when working on well maintenance or repair, unless required for power supply

Motor oil, fuel, paints, and any maintenance chemicals shall not be stored in the pump house or Zone A1.

Any underground storage tanks, hazardous materials, and septic systems shall be removed or relocated from this zone, where possible

Hazardous materials shall be stored in a secure building on an impermeable surface with adequate spill containment

Propane gas shall be used for power pumps

Any non-water supply activities shall be kept out of the Zone A1 area

3.2 ZONE A2 – 1,000 FEET DIRECT CHEMICAL CONTAMINATION ZONE.

Zone A2 is defined as the intersection of the modeled Wellhead Protection Area and the fixed 1,000 feet radius around each well. The purpose of this zone is to provide minimum distance from sources of pollution consistent with Hawaii Well Construction and Pump Installation Standards.

a. **Prohibited Uses**: The following uses are prohibited within Zone A2:

All uses prohibited in sections 3.3 b and c and 3.4 b and c.

Cesspool, septic tank, or subsurface sewage leaching field

Hazardous waste landfills and ponds, or chemical storage

Treated effluent injection well

3.3 ZONE B – INDIRECT MICROBIAL CONTAMINATION ZONE: TWO-YEAR TRAVEL TIME.

Zone B consists of the surface area overlying the portion of the aquifer(s) that contributes water to the well within a two-year time-of-travel.

a. **Permitted Uses**: All other uses permitted in the underlying zoning districts, unless prohibited in section 3.3 b. provided that they can meet the Performance Standards as outlined for the Wellhead Protection Overlay District in section 3.3.e.

Minimum lot size for unsewered residential uses shall be two acres, except for; a) existing lots of record on the effective date of this Ordinance and b) developments which will be served by municipal sewer within five years of the approval of the development. In order to provide for efficiently serving these developments with municipal sewer, lots smaller than two acres can be approved, provided that sufficient land area will be maintained in an undeveloped state such that no more than one residence is allowed for each two acres of the overall development.

New development construction shall implement best management practices described in section 3.3.e.

b. **Prohibited Uses**. The following uses are prohibited within Zone B, the two-year time-of-travel zone.

Electrical/electronic manufacturing facility;

Funeral services/graveyards

Golf courses

Metal plating/finishing/fabricating facility

Chemical processing/storage facility

Plastics/synthetic production facility

Junk/scrap/salvage yard

Major transportation corridors/highways/freeways/turnpikes

Mines/gravel pit

Landfills/dumps

Injection wells/dry wells/sumps

Artificial recharge projects (non-potable water)

Reclaimed wastewater irrigation class R2 and R3

Sewage sludge land application

Slaughterhouses

Wastewater percolation ponds

Underground storage tanks, (except those with spill, overfill, and corrosion protection requirements in place);

All uses not permitted in the underlying zone district

c. **Prohibited Uses Subject To Exception**: The following uses, unless granted an exception in section 3.3.d., are prohibited within Zone B, the two-year time-of-travel zone.

Automobile body/repair shop

Car washes;

Cement/concrete plants

Gas station

Fleet/trucking/bus terminal

Dry cleaner

Irrigated crops using soil fumigants (> 50 acres) or pesticides with high leachability

Land divisions resulting in high density (>1 unit/2 acre) septic systems

Machine shop

Wood preserving/treating facility

Confined animal feeding operations

Equipment maintenance/fueling areas

Hospitals

Parking lots/malls (>50 spaces)

Reclaimed wastewater irrigation R1 or better

Waste transfer/recycling stations

Above ground storage tanks

All other facilities involving collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having potentially harmful impact on groundwater quality

d. **Exceptions**: Where the underlying zoning permits a use that would be prohibited by this ordinance, a wellhead area exception may be granted by the County Department of Water Supply, provided that the use conforms to provisions of the underlying zoning district as certified by the County Department of Planning, meets the performance standards outlined in section 3.3.e below, follows design guidelines outlined in section 4, that any concerns of the State Department of Health have been addressed, and that adequate information to evaluate the project has been provided.

Exception may be approved by the County Department of Water Supply for expansion of existing nonconforming uses to the extent allowed by the underlying district. The applicant should consult the local zoning plan to confirm nonconforming uses. The County Department of Water Supply reserves the right to review all applications and shall not grant approval unless it finds such expansion does not pose greater potential contarnination of groundwater than the existing use.

e. **Performance Standards**: The following standards shall apply to uses in Zones B and C of the Wellhead Protection Overlay District:

Any facility involving the collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or wastes, unless granted a special exception either through permit or another ordinance, must have a secondary containment system which is easily inspected and whose purpose is to intercept any leak or release from the primary containment vessel or structure. Underground tanks must be in compliance with underground storage tank rules adopted January 28, 2000 in HAR Title 11 Chapter 281.

Open liquid waste ponds containing materials referred to in item (1) above will not be permitted without a secondary containment system.

All permitted facilities must adhere to appropriate federal and state standards for storage, handling and disposal of any hazardous waste materials.

All abandoned wells should be properly plugged according to local and state regulations.

Confined animal facilities should meet "Management Measure for Wastewater and Runoff from Confined Animal Facilities" as set in Hawaii's Coastal Nonpoint Pollution Control Program Management Plan, Volume 1, 1996.

Irrigated crops should implement Integrated Pest Management in accordance with US Department of Agriculture Natural Resources Conservation Service Technical Guide 1989.

Construction activities shall be in accordance to County Code Chapter 20.08 and these standards:

There shall be a designated person on site during operating hours who is responsible for supervising the use, storage, and handling of hazardous material and who shall take appropriate mitigating actions necessary in the event of fire or spill.

Hazardous materials left on site when the site is unsupervised must be inaccessible to the public. Locked storage sheds, locked fencing, locked fuel tanks on construction vehicles, or other techniques may be used if they will preclude access.

Construction vehicles and stationary equipment that are found to be leaking fuel, hydraulic fluid, and/or other hazardous materials shall be removed from the site and from Wellhead Protection Zones A, B or C. The vehicle or equipment may be repaired in place, provided the leakage is completely contained.

Storage and dispensing of flammable and combustible liquids from tanks, containers, and tank vehicles into the fuel and fluid reservoirs of construction vehicles or stationary equipment on the construction site shall be in accordance with these standards and County Fire Code Chapter 16.04A

Hazardous materials and other deleterious substances shall not be allowed to enter stormwater systems.

3.4 ZONE C – INDIRECT CHEMICAL CONTAMINATION ZONE: TEN-YEAR TRAVEL TIME.

Zone C consists of the surface area overlying the portion of the aquifer(s) that contributes water to the well within a ten-year time-of-travel.

a. **Permitted Uses**: All other uses permitted in the underlying zoning districts, unless prohibited in section 3.4 b. provided that they can meet the Performance Standards as outlined for the Wellhead Protection Overlay District in section 3.3.e.

b. **Prohibited Uses**. The following uses are prohibited within Zone C, the ten-year time-of-travel zone.

Electrical/electronic manufacturing facility

Chemical processing/storage facility

Plastics/synthetic production facility

Junk/scrap/salvage yard

Metal plating/finishing/fabricating facility

Mines/gravel pit

Landfills/dumps

Injection wells/dry wells/sumps

Underground storage tanks, (except those with spill, overfill, and corrosion protection requirements in place)

Wastewater percolation ponds

All uses not permitted in the underlying zone district

c. **Prohibited Uses Subject To Exception**: The following uses, unless granted an exception in section 3.4.d., are prohibited within Zone B, the ten-year time-of-travel zone.

Automobile body/repair shop;

Gas station;

Fleet/trucking/bus terminal;

Dry cleaner;

Golf courses;

Machine shop;

Wood preserving/treating facility;

Confined animal feeding operations

Land divisions resulting in high density (>1 unit/acre) septic systems;

Equipment maintenance/fueling areas;

All other facilities involving collection, handling, manufacture, use, storage, transfer or disposal of any solid or liquid material or waste having potentially harmful impact on groundwater quality;

d. **Exceptions**: Where the underlying zoning permits a use that would be prohibited by this ordinance, a wellhead area exception may be granted by the County Department of Water Supply, provided that the use conforms to provisions of the underlying zoning district as certified by the County Department of Planning, meets the performance standards outlined in section 3.3.e, follows design guidelines outlined in section 4, that any concerns of the State Department of Health have been addressed, and that adequate information to evaluate the project has been provided.

Exception may be approved by the County Department of Water Supply for expansion of existing nonconforming uses to the extent allowed by the underlying district. The applicant should consult the local zoning plan to confirm nonconforming uses. The County Department of Water Supply reserves the right to review all applications and shall not grant approval unless it finds such expansion does not pose greater potential contamination of groundwater than the existing use.

4. DEVELOPMENT GUIDELINES

The following design guidelines are encouraged for all new commercial, residential or mixed use development projects, excluding residential subdivisions of 2 lots or less in the two-year time of travel Zone B:

Commercial and high-density residential development should be minimized and located at as far distance from the wellhead as possible.

Appropriate uses are open space, passive parks, schools and low density residential (minimum 2-acre lots)

The following design guidelines are encouraged for all new commercial, residential or mixed use development projects, excluding residential subdivisions of 2 lots or less in the ten-year time of travel Zone C:

High risk commercial and high-density residential development should be minimized and located at as far distance from the wellhead as possible.

Appropriate uses are open space, passive parks, schools, low risk commercial and low density residential (minimum 1-acre lots)

The following design guidelines are encouraged for all new commercial, residential or mixed use development projects, excluding residential subdivisions of 2 lots or less in Zone B and C:

Storm-water infiltration basins should be located outside the WHPA where feasible.

Active parks and schools should implement Integrated Pest Management.

Where development is proposed on property extending both inside and outside the WHPA, and where sufficient buildable land area exists on the portion of the property outside the WHPA boundary to accommodate the proposed development, and where applicable setbacks permit, that area in its entirety should be utilized before any land within the WHPA should be used. Where insufficient buildable land area exists on the portion of the property outside the WHPA to accommodate the proposed development, as much of the development as possible should be sited outside the WHPA.

Proposed development entirely within the WHPA should be grouped and sited on the subject parcel at as far distance as possible from the wellhead.

Expansions of existing uses should at least conform to these guidelines where the use is expanding beyond its' property boundaries.

Vegetative cover should be provided on all disturbed land areas, excluding fallow agricultural fields, not covered by paving, stone or other solid material. The maintenance or use of native plant materials with lower water and nutrient requirements is encouraged.

5. APPLICANT'S RESPONSIBILITY

It shall be the responsibility of any person owning real property and/or owning or operating a business within Maui County to make a determination of the applicability of Wellhead Protection Area Overlay Districts as it pertains to the property and/or business under his ownership or operation, and his failure to do so shall not excuse any violations of said sections

6. LIABILITY

Nothing in this ordinance shall be construed to imply that the County of Maui has accepted any of an owner/developer's liability if a permitted facility or use contaminates groundwater in any aquifer.

7. DISTRICT BOUNDARY DISPUTES

If the location of the Wellhead Protection Overlay District boundary in relation to a particular parcel is in doubt, the rules in Chapter 19.06 apply.

8. ENFORCEMENT

a. Any person may submit a verbal or written complaint alleging a violation of this ordinance.

b. Any approval or permit issued pursuant to the provisions of this ordinance shall comply with all applicable requirements of Chapter 19.530.

c. Where an exception to a prohibited use is granted condition to performance standards, the appropriate enforcement agency of the applicable performance standard shall be notified to follow up with inspection as needed.

9. SAVING CLAUSE

Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the ordinance as a whole or any other part thereof. A determination that any portion or provision of this overlay protection district is invalid shall not invalidate any special permit previously issued thereunder.

Approved by: _____

Date: _____

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Jeffrey Eng, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`I
(TMKs (2) 3-5-002:002 and 003),
Land Use Commission Petition A06-766

Dear Mr. Eng:

A letter dated July 27, 2006 to Office of Planning Director, Laura Thielen, commenting on the Environmental Impact Statement Preparation Notice for the proposed Pu`unani Subdivision from the Department of Water Supply (DWS) was received by our office. On behalf of the applicants, we would like to provide the following information to help address the comments in that letter.

1. The applicants understand the DWS position on the issuance of reservations for water meters and temporary construction meters. The applicants are currently undertaking coordination efforts with the DWS regarding the development of new water source in the project area.

2. The applicants will provide domestic, irrigation, and fire protection service in accordance with system standards.

3. The applicants will undertake water conservation measures, such as use of brackish or reclaimed water for dust control and non-potable water during construction, elimination of single-pass water-cooled systems, use of low-flow fixtures and devices, and/or use of climate-adaptive plants where appropriate.

4. The applicants understand the department's concerns on water conservation and pollution prevention measures and will utilize Best Management Practices, where possible, to minimize infiltration and runoff from construction activities.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Thank you again for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for review and comment.

Should you require further information, please contact me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Abbey Seth Mayer, Office of Planning
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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AUG 1 1 2006

ALAN M. ARAKAWA
MAYOR

CARL M. KAUPALOLO
CHIEF

NEAL A. BAL
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE AND PUBLIC SAFETY

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

August 8, 2006

Ms. Tara Nakashima, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: **EIS Preparation Notice for the Proposed Pu'unani Subdivision Wailuku, Maui, Hawaii TMK (2)3-5-002:002 and 003**

Dear Ms. Nakashima,

We have had the opportunity to review the EIS preparation application. The fire department is concerned with the emergency access road widths and routes. We are very pleased with the absence of cul-de-sac's in this proposed project. A close look at the construction details will take place when the subdivision and building permit application is applied for.

At this time, we are able to provide adequate emergency services for this particular area. Feel free to contact Lieutenant Scott English at 270-7122 if there are any questions or concerns regarding this project..

Sincerely,

Valeriano F. Martin
Captain
Fire Prevention Bureau

cc: Mr. Anthony Ching, Executive Officer, State Land Use Commission

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Captain Valeriano F. Martin
Department of Fire and Public Safety
County of Maui
200 Dairy Road
Kahului, Hawai`i 96732

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Captain Martin:

Thank you for your letter dated August 8, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants understand your concern with respect to emergency access road widths and routes. The applicants' land use planner and/or project engineer will coordinate with your department to ensure adequate access provision.

2. The applicants will submit more detailed plans during the subdivision and building permit processes for review by your department.

305 High Street, Suite 104· Wailuku, Hawaii 96793· ph: (808)244-2015· fax: (808)244-8729· planning@mhplanning.com· www.mhplanning.com

Thank you for your feedback. A copy of the Draft Environmental Impact Statement will be submitted to your office for review and comment.

Should you require further information, please do not hesitate to contact me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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AUG 17 2006

ALAN M. ARAKAWA
Mayor

GLENN T. CORREA
Director

JOHN L. BUCK III
Deputy Director

(808) 270-7230
Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2 , Wailuku, Hawaii 96793

August 11, 2006

Ms. Tara Nakashima
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Nakashima:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED PU`UNANI SUBDIVISION, WAILUKU, MAUI, TMKs (2) 3-5-02:002 AND 003

We have been working with the applicant on dedication of park land to meet the park dedication requirements of the subdivision ordinance for the proposed project. They have revised their original plans in response to our comments. However, detailed site and grading plans have not been submitted.

We reserve further comments as detailed plans for the park are developed.

Thank you for the opportunity to review and comment on this matter. Please contact me or Mr. Patrick Matsui, Chief of Planning and Development, at 270-7387 if there are any questions.

Sincerely,

Glenn T. Correa
Director of Parks and Recreation

GTC:PM:do

c: Anthony Ching, Land Use Commission

159

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KAILYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Tamara Horcajo, Director
Department of Parks and Recreation
County of Maui
700 Hali`a Nakoa Street, Unit 2
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Ms. Horcajo:

Thank you for your department's letter dated August 11, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. The applicants will continue to coordinate with your department, as subdivision plans are refined. We would also like to note that the applicants will submit detailed site and grading plans during the building permit process for review by your department.

Thank you for your feedback. A copy of the Draft Environmental Impact Statement will be submitted to your office for review and comment.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Should you require further information, please do not hesitate to contact me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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SEP 11 2006

POLICE DEPARTMENT
COUNTY OF MAUI

ALAN M. ARAKAWA
MAYOR

OUR REFERENCE
YOUR REFERENCE ti

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

THOMAS M. PHILLIPS
CHIEF OF POLICE

GARY A. YABUTA
DEPUTY CHIEF OF POLICE

September 6, 2006

Ms. Tara Nakashima, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Nakashima:

SUBJECT: EIS Preparation Notice fo the Proposed Pu'unani Subdivision, Wailuku, Maui TMK (2) 3-5-02:002 and 003

Thank you for your letter of August 4, 2006, requesting comments on the above subject.

We have reviewed the information submitted for this project and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Wayne T. Ribao
for: Thomas M. Phillips
Chief of Police

c: Michael Foley, Planning Department
Anthony Ching, State Land Use Commission

Enclosure

162

COPY

TO : **THOMAS M. PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI**

VIA : **CHANNELS**

FROM : **SCOTT Y. MIGITA, ADMINISTRATIVE SERGEANT, WAILUKU PATROL**

SUBJECT : **ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE - PROPOSED PU'UNANI SUBDIVISION: TMKs (2) 3-5-02:02 and 03**

Sir, this transmittal is being submitted regarding a Draft Environmental Impact Statement Preparation Notice to the proposed Pu'unani Subdivision (TMKs (2) 3-5-02:02 and 03) submitted by Munekiyo & Hiraga, Inc. on behalf of applicants Towne Development of Hawaii, Inc., Endurance Investors, LLC., and Association of II Wai Hui, LP.

This proposed residential development is located on the mauka side of Honoapiilani Highway, on the Waikapu side of Kuikahi Drive on approximately 210 acres of land. The majority of the subdivision will consist of approximately 214 half acre, rural fee simple lots. The land plan also provides for approximately six (6) one acre rural lots, 90 4,000 square feet, single family residential lots, 240 multi-family units, a 14.6 acre park, a storm water retention area, along with other infrastructure developments.

Access to the project site will be via three (3) openings off of Kuikahi Drive and one opening off of Honoapiilani Highway. There is a proposal for a major project collector, which will extend midway through the project area, running mauka to makai, with right turn in, right turn out access off Honoapiilani Highway. On 07/28/06, I had attended a Affordable Housing Technical Review Committee meeting regarding this project and the proposed collector road. One area of concern from a police perspective relative to the issue of traffic and safety is the right turn in and right turn out roadway into the development. No left turn will be allowed from Honoapiilani Highway into this development, where vehicles need to continue northbound and make a left turn onto Kuikahi Drive to access this development. The concern from a police standpoint would be vehicles making illegal left turns into the subdivision, where vehicles traveling in the opposite direction may be traveling at a higher rate of speed, thus causing a potential traffic hazard. The same concern applies to vehicles entering Honoapiilani Highway, attempting to make a left turn onto the highway from the development.

A suggestion would be to signalize the roadway at the Waiolani Mauka subdivision at the three way intersection. This area is located on the south end of the development between Waiko Road and this proposed development. This would create a signalized entrance from the highway at both ends of the development. The intersection of Kuikahi Drive and the highway on the north end of this development is already signalized. Another suggestion would be to eliminate the right turn in, right turn out access which connects to the highway or place turn in and turn out curbing at this location.

Another suggestion would be to include a left turn in lane from Honoapiilani Highway into the development, as well as allowing left turns out from the development with a right merge lane on Honoapiilani Highway. This would create a safer intersection for vehicles attempting to make left turns into and out of the development.

A Traffic Impact Assessment Report (TIAR) is being prepared by the project's traffic engineer. This TIAR will address the impact of traffic generated from this proposed project, an assessment of cumulative impacts, and identify mitigation measures. This study will be attached as an exhibit in the Draft EIS.

Submitted for your information and perusal.

Respectfully submitted,

S 1122

Scott Y. MIGITA, E-1122
Administrative Sergeant, Wailuku Patrol
09/05/06 at 1520 hours

IF THIS COLLECTOR ROAD DOES NOT HAVE A SIGNAL THEN CURBING IS NEEDED FOR THE RIGHT TURN IN AND RIGHT TURN OUT TO PREVENT THE LEFT TURN FROM H'PIILANI HWY. INTO THE COLLECTOR RD.
CPT 1634
09/06/06

NOTED:
AC
9/6/06

MUNEKIYO & HIRAGA, INC.

Michael T. Munekiyo
Gwen [illegible] Hiraga
Mitsuru [illegible] Hirano
K[illegible]

Mark Alexander Roy
[illegible]ndoza

December 31, 2008

Thomas M. Phillips, Chief of Police
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Chief Phillips:

Thank you for your September 6, 2006 letter, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. The applicants are carefully considering traffic impacts associated with development of the proposed subdivision and would like to note that project engineers and planners have been coordinating with the Department of Transportation (DOT), Maui District on proposed subdivision access locations. In this regard, the right-turn in and right-turn out limitation was evaluated and coordinated with the State DOT. Potential illegal left-turn movements at this access point will be addressed through intersection design measures, such as the provision of vertical plastic delineators to mark turning movement limitations, or as suggested, utilization of raised curbs to discourage illegal movements. Other traffic safety measures such as speed limit reductions will also be considered.

2. With respect to traffic signalization, a new traffic signal has been installed at the Pilikana Street-Honoapi`ilani Highway intersection. This signal, together with the existing signal at the Kuikahi Street-Honoapi`ilani Highway intersection, provides vehicle platoon breaks to facilitate traffic movements at the proposed right-turn in and right-turn out access point.

3. We note that the possible implementation of a full movement intersection to allow left-turns in and out of the project area was considered but was not deemed feasible. In discussing this alternative with the State DOT, the preference expressed

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was to limit turning movements to minimize vehicle conflicts attributed to traffic volumes along Honoapi`ilani Highway.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement, including the Traffic Impact Analysis Report, will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
Phillip Rowell, Phillip Rowell & Associates, Inc.
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Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

August 28, 2006

Munekiyo & Hiraga, Inc.
Attn: Ms. Tara K. Nakashima
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Nakashima,

Subject: Pu'unani Subdivision – Environmental Impact Statement Preparation Notice (EISPN) –
Wailuku, Maui, Hawaii
Tax Map Key: (2) 3-5-02:002 and 003

Thank you for allowing us to comment on the Environmental Impact Statement for the subject project.

In reviewing our records and the information received, Maui Electric Company (MECO) will be requiring access and electrical easements for our facilities to serve the subject project site. Since this project's anticipated electrical demand will have a substantial impact to our system, we highly encourage the customer's electrical consultant to submit electrical drawings and a project time schedule as soon as practical so that service can be provided on a timely basis.

Should you have any questions or concerns, please call Ray Okazaki at 871-2340.

Sincerely,

Neal Shinyama
Manager, Engineering

NS:ro

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Gregorysenn Kauhi, Manager, Customer Operations
Maui Electric Company, Ltd.
P. O. Box 398
Kahului, Hawai`i 96733

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Kauhi:

Thank you for your company's letter dated August 28, 2006, commenting on the EISPN for the proposed Pu`unani Subdivision. On behalf of the applicants, we would like to provide the following information to help address your comments:

1. We acknowledge that MECO will require access and easements in order to provide service to the proposed project.

2. The project's electrical consultant will submit electrical drawings and a project time schedule, as early as is practicable, to facilitate the provision of service.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be submitted to your office for review and comment.

Should you require further information, please do not hesitate to contact me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of II Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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Wailuku Main Street Association, Inc.
Tri-Isle Main Street Resource Center
A Non-Profit Organization
2035 Main Street, Ste. 1 • Wailuku, Maui, HI 96793
Tel (808) 244-3888 • Fax (808) 242-2710

To: Munekiyo and Hiraga
Attn: Tara Nakashima, Planner

Project Review –Environmental Impact Statement Preparation Notice
Pu'unani Subdivision
Wailuku, Maui, Hawaii

The Wailuku Main Street Association, Inc. Structure and Design Committee met with the planning and design representatives of the proposed Pu'uanani project proposed for Wailuku, Maui. The review is based on the blueprint and information submittals received by their Planning Consultant, Munekiyo and Hiraga and other information supplied to the WMSA by various representatives of the property owners.

The WMSA/Tri-Isle Main Street Resource Center's Structure & Design Committee notes that Wailuku and Waikapu are joined by projects like this one. The gap between Wailuku and Waikapu is being filled with rural development to include R-0 and apartment zoning. Ideally, it would be open space or for continued Agricultural pursuits.

The fact that two towns have merged appears to be a sign of the times. However, changes such as these change the historical character of Waikapu to support converting prime AG land for residential use. Unfortunately, the project will contribute to urban sprawl.

The Main Street organization's focus is via the small towns and therefore we are disappointed the intended proposed use will absorb Waikapu into the urban fabric. Developing AG lots would help keep the two towns separated and encourage a historical use of the land. In conclusion, we appreciate the opportunity to review and offer our comments.

Sincerely,

WAILUKU MAIN STREET ASSOCIATION, INC.
-Tri-Isle Main Street Resource Center-

Jim Niess, AIA Chairman,
Structure & Design Committee

Jocelyn A. Perreira, Executive Director
Tri-Isle Main Street Program Coordinator

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Jocelyn Perreira, Executive Director
Wailuku Main Street Association, Inc.
Tri-Isle Main Street Resource Center
1942 Main Street
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Ms. Perreira:

Thank you for your letter, commenting on the EISPN for the proposed Pu`unani Subdivision. The applicants would like to note that the proposed project will entail development of rural land uses, to enable a smooth transition from the more urban Kehalani project area, north of the proposed project area, toward Wailuku, and the agricultural uses, south of the project area, toward Waikapu. To further enhance the transition to agricultural lands to the south, higher density single-family and multi-family uses will be located towards the Wailuku side of the project. This spatial configuration allows for a lower density land use pattern adjacent to the new single-family residences being constructed at the northern extent of Waikapu.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for your review and comment.

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305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

Should you have further comments or questions, please call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
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COUNTY COUNCIL
COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793
www.co.maui.hi.us/council/

August 14, 2006

Ms. Tara Nakashima
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Nakashima:

SUBJECT: **PROPOSED PU'UNANI SUBDIVISION**

Thank you for the opportunity to review the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Pu'unani Subdivision at TMKs (2) 3-5-02:02 and 03. After review of the document, I would like to recommend that a copy of EISPN be forwarded to:

Mr. Ken Nomura
Complex Area Superintendent
(Central/Upcountry Maui)
Department of Education
54 High Street, 4th Floor
Wailuku, Hawaii 96793

Although a copy was sent to the Superintendent for the Department of Education, I feel that a copy should also be sent to our district school office for comment.

Should you have any questions, please call me at 270-5501.

Sincerely,

JOSEPH PONTANILLA
Council Member

cc: Anthony Ching, Land Use Commission

Anthony P. Takitani
c/o 24 N. Church Street, Suite 409
Wailuku, Maui, Hawaii 96793

September 5, 2006

VIA TELECOPIER NO. (808) 523-1095 AND REGULAR MAIL
Christopher Lau
Towne Development of Hawaii, Inc.
Central Pacific Plaza
220 S. King Street, Ste. 2170
Honolulu, Hawaii 96813

RE: EISPN for Proposed Pu'unani Subdivision at Wailuku, Hawaii
Tax Map Key No. 3-5-02:02 and 03

Dear Mr. Lau:

I am the property owner at 689 S. Alu Street, Wailuku, Hawaii. I received a copy of your letter to "neighboring residents" dated August 7, 2006 regarding the proposed development of the agricultural lands and open space located below my longtime residence.

Given the size of the development being proposed by Towne Development of Hawaii, Inc., Endurance Investers, LLC and the Association of II Wai Hui, LP, I agree that a full and thorough environmental impact statement (EIS) is warranted.

The area proposed for urbanization has served as a primary buffer between the towns of Waikapu and Wailuku and has helped to maintain the longtime character of these two distinct communities. Along with other issues listed below, I request that the draft EIS address the effects on the character of the distinct communities and identify how the developers will deal with open space concerns.

Not many years ago, the area proposed for urbanization was planted in productive agriculture. Please address why this land does not qualify as important agricultural land that the State and the County are required by the Hawaii Constitution to preserve. I further request that the draft EIS address why these lands should be allowed to be taken out of agricultural use.

Wailuku town is prone to flooding and the drainage system is substandard. I understand that the drainage from the massive developments below Wailuku Heights are funneled into substandard drainage infrastructure in Wailuku town. I understand that

some drainage from the slopes below Wailuku Heights are being diverted along Waiale Road but that the capacity of that additional system was not designed to include the area covered by this application. I request that the draft EIS address drainage issues for Wailuku town, including the upgrading of the existing systems for Wailuku town and the new Spencer Homes development and the proposed commercial development off Honoapiilani Highway.

I also understand that sewer line capacity is limited in the Wailuku area. I request that the draft EIS also address sewerline construction and location, sewer hook ups and treatment and re-use of the treated effluent for landscape irrigation.

Honoapiilani Highway and Kuikahi Road are already busy and the County of Maui has failed to require the completion of Maui Lani Parkway. We understand that additional housing developments are proposed near the Waiolani development and that A&B Properties held meetings to discuss development of 800 acres on the Wailuku side of Kuihelani Highway (the "Waiale lands"). I've observed children walking along Honoapiilani Highway in areas that lack proper sidewalks and other safety improvements. I request that the draft EIS address traffic concerns, including the cumulative impact of all the developments proposed from Maalaea to Waikapu, the proposed A&B urbanization of its Waiale lands and additional homes at Waiehu Kou, Hale Mua and other projects towards Waihee town.

My children attended and attend local schools in the area. I am aware that all the schools are over-crowded, especially the Iao School and Maui Waena School. I am also aware that the additional homes built below Wailuku Heights already will be generating additional students. I request that the draft EIS address the location, design and concurrent or prior construction of additional schools, including but not limited to an additional Middle School in the Wailuku area.

I am also troubled about the aesthetics of any urban development below Wailuku Heights. Please address undergrounding of utilities in any new developments, including any proposed rural subdivisions. I understand that there has been some discussion of locating retirees in the proposed Pu'unani developments. The draft EIS should address the design and installation of infrastructure that preserves the aesthetics of this agricultural land while addressing the need to make the area fully accessible to and safe for both retirees and children.

I am also concerned about water. Given the *pilikia* over use of water from the Iao wells and the streams in this area, I request that the draft EIS address water sources, infrastructure, storage and capacity for any agricultural/rural uses and for any domestic uses.

I understand that full development of Pu'unani could take ten to fifteen years. Our community has already been suffering through years of noise, dust and other problems due to construction activity in Kehalani, Waiolani, Waiehu Kou, and other projects, including night work. The draft EIS should discuss the impacts of perhaps an additional decade or more of construction work on loss of sleep by neighbors and school-aged children and the resulting loss of productivity in the economy due to the years of disruptions.

Finally, I request that I be kept fully informed regard the progress of all land use entitlement processes related to this proposed project and the opportunity to provide comments on the draft EIS. Please send all correspondence to my office address above.

Sincerely,

ANTHONY P. TAKITANI

cc: DBEDT- Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

VIA TELECOPIER NO. (808) 244-8729 AND REGULAR MAIL
Tara Nakashima, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Office of Environmental Quality Control
Leiopapa A Kamehameha
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

December 31, 2008

Anthony Takitani
c/o 24 North Church Street,
Suite 409
Wailuku, Hawai`i 96793

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for Proposed Pu`unani Subdivision, Wailuku, Maui, Hawai`i, TMKs (2)3-5-002:002 and 003, Land Use Commission Petition (A06-766)

Dear Mr. Takitani:

Thank you for your September 5, 2006 letter, commenting on the EISPN for the proposed Pu`unani Subdivision. The applicants would like to note that on July 10, 2006, the State of Hawai`i Land Use Commission issued an order determining (1) the land use commission agrees to be the accepting authority pursuant to Chapter 343, Hawai`i Revised Statutes (HRS); and (2) that the proposed action may have a significant effect upon the environment to warrant the preparation of an Environmental Impact Statement (EIS). On behalf of the applicants, we would like to note the following, in the order presented in your letter, in response to your comments:

1. The applicants are committed to heeding the concerns of Wailuku, Waikapu, and Waiolani residents. They have met with the residents, once in February 2006 and again in April 2006 to introduce them to the project, obtain their feedback, note their concerns, and adjust their plans accordingly. Recently, they met with the community on October 29, 2008. The applicants believe that the plan they are proposing will enable maintenance of the character of the distinct communities. At the informational meetings, Waikapu residents requested that there be no roadway access through their community via the Old Waikapu Road. As such, the Old Waikapu Road segment traversing the project area will not be connected to that segment which now serves Waikapu residents. In order to enable a more smooth, visual transition between Wailuku Heights and the project area, the applicants have decided to pursue 1.0 acre lots at the western extent of the project area. They have also decided to create a 30-foot no-build zone and rural lots at the southern extent of the project area, adjacent to the agricultural uses of Waikapu. Project plans include a 25-foot setback along the southern extent of Honoapi`ilani Highway and

a 50-foot setback off of Kuikahi Drive. The Draft EIS will address community character, as well as open space and scenic resource considerations.

2. The applicants have contracted with Decision Analysts Hawaii for preparation of an Agricultural Impact Study, which will address issues relating to the loss of agricultural lands. The Draft EIS will include findings of the report and a copy of the study will be incorporated as part of the EIS document.

3. The applicants understand your concern with respect to the state of the drainage system that serves Wailuku town and the drainage system that serves some areas below Waiuku Heights, along Waiale Road. A Preliminary Drainage Report prepared by the project's civil engineer will be included in the Draft EIS. The drainage report will analyze pre-development and post-development stormwater flow conditions. The report will also identify drainage improvements needed to ensure that downstream properties are not adversely impacted.

4. The project engineer is preparing a Preliminary Engineering Report that will address wastewater infrastructure issues associated with the proposed development. The findings of the report will be included in the Draft EIS and a copy of the study will be attached as an appendix.

5. A Traffic Impact Analysis Report will be prepared for the proposed action. The traffic engineer will consider cumulative impacts of developments to include those projects in proximity to the Pu`unani Subdivision. The findings of the report will be included in the Draft EIS and a copy of the study will be attached as an appendix.

6. The applicants are coordinating with the Department of Education (DOE) to obtain their feedback on fair-share educational contribution requirements. The Draft EIS will include discussion of existing and proposed educational facilities, potential impacts associated with the proposed development, and mitigation acceptable to the DOE.

7. The applicant wishes to confirm that utilities will be located underground. Setbacks and buffers have been integrated into the project master plan. As the plan is further refined, landscape design criteria will be defined to ensure that buffer and setback areas, as well as other public spaces are appropriately landscaped. As a master planned project, aesthetics, accessibility, and safety needs will be considered to ensure the highest standards of living.

8. The project team has consulted with the County of Maui, Department of Water Supply to ensure that potable and non-potable water is available for the project.

Alternative water source development options are being studied and will be discussed in the Draft EIS. The Draft EIS will also address requirements relating to water infrastructure, including storage and transmission facilities. The applicants would like to note that they plan to undertake water conservation measures, where appropriate.

9. All construction work will be limited to daylight work hours. The applicants will utilize Best Management Practices where possible, to minimize construction-related impacts associated with dust and noise. The contractor's point of contact will be established during the construction phases to ensure that community concerns can be addressed with sensitivity, in a timely manner.

Again, thank you for your feedback. A copy of the Draft Environmental Impact Statement will be provided to your office for your review and comment.

Should you have further comments or questions, please call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
cc: Orlando "Dan" Davidson, State Land Use Commission
Chris Lau, Towne Development of Hawaii, Inc.
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC
Lloyd Sodetani, Association of Il Wai Hui, LP
Darren Unemori, Warren S. Unemori Engineering
Blaine Kobayashi, Carlsmith Ball, LLP
Bruce Plasch, Decision Analysts Hawaii
Phillip Rowell, Phillip Rowell & Associates
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XI. REFERENCES

XI. REFERENCES

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APPENDIX A.

Market Study and Economic Impact Analysis

PREPARED FOR:

Mr. Chris Lau, President
Towne Development of Hawaii
Central Pacific Plaza
220 S. King Street, Suite 2170
Honolulu, Hawaii 96813

Ms. Donna Clayton
Endurance Investors, LLC
c/o Pacific Rim Land
381 Huku Lii Place, Suite 202
Kihei, Hawaii 96753

Mr. Lloyd Sodetani
Association of Il Wai Hui, LP
c/o Maui Realty
1885 Main Street, Suite 404
Wailuku, Hawaii 96793

EFFECTIVE DATE: **June 30, 2006**

A MARKET STUDY & ECONOMIC IMPACT ANALYSIS OF THE PU`UNANI SUBDIVISION, WAILUKU, ISLAND OF MAUI, HAWAII

ACM CONSULTANTS, INC.

ACM CONSULTANTS, INC.

A Real Estate Appraisal, Research & Advisory Group

July 14, 2006 06-9061

Mr. Chris Lau, President
Towne Development of Hawaii
Central Pacific Plaza
220 S. King Street, Ste 2170
Honolulu, Hawaii 96713

Ms Donna Clayton
Endurance Investors
c/o Pacific Rim Land
381 Huku Lii Place, Ste 202
Kihei, Hawaii 96753

Mr. Lloyd Sodetani
Association of Il Wai Hui, LP
c/o Maui Realty
1885 Main Street, Ste 404
Wailuku, Hawaii 96793

Re: Market Analysis and Economic Impact Report for the proposed Pu`unani project district in Wailuku, Island and County of Maui

Dear Mr. Lau, Ms. Clayton, and Mr. Sodetani:

In accordance with your request, we have inspected the above-referenced property in order to provide a defined scope market study and economic impact analysis of the proposed Pu`unani Subdivision in Wailuku, Island and County of Maui. This *counseling report*, and the conclusions herein, are based on the on-site inspection of the property, a study of current political and economic conditions, and a historical review of the real estate market in Central Maui and on Maui overall. The effective date of this report is June 15, 2006.

The subject consists of approximately 208.6 acres of land and is currently zoned Agricultural District. The project, which is still in its preliminary planning stage, is identified as the Pu`unani Subdivision and will be located mauka of the Honoapiilani Highway and will possess views of the ocean and mountains.

The assignment will include the following reports:

Market Analysis The Consultant agrees to provide a market analysis for this proposed project by (1) defining and delineating the market area; (2) identifying and analyzing the current supply and demand conditions that comprise the specific real estate market segment; (3) identifying, measuring and forecasting the effect of anticipated developments or other changes on future supply in each market segment; and (4) to the extent possible, forecasting the effect of anticipated economic or other changes on future demand.

Economic Impact The Consultant also agrees to provide an Economic Impact Report estimating the general and specific economic effects arising from the development of Pu`unani. This report would likely address estimated construction costs, estimated employment, individual wages and income, taxes and other economic points of interest.

The following report presents a narrative review of the market study and our analysis of data along with other pertinent materials on which this report is predicated. It contains data and exhibits

gathered in our investigations, and will include a description of the analytical process and our conclusions.

Thank you for allowing us the opportunity to work on this interesting assignment.

Respectfully submitted,
ACM Consultants, Inc.

Glenn K. Kunihisa, MAI
Certified General Appraiser
State of Hawaii, CGA-039
Expiration: December 31, 2007

TABLE OF CONTENTS

TABLES

PART I – INTRODUCTION

A. EXECUTIVE SUMMARY

Background

The proposed Pu'unani development is located on the mauka side of Honoapiilani Highway and on the southern side of Kulkahi Drive in the District of Wailuku, Island and County of Maui. The subject consists of approximately 208.06 acres of land and is currently zoned Agricultural District. The project, which is still in its preliminary planning stage, will consist of 516 residential units which will be located at the base of the West Maui Mountains and will possess views of the ocean and mountains. The Consultant has been provided with a Conceptual Land Use Plan and has gleaned information from this plan for information regarding the subject project district. According to the plan, the land use allocations are:

Land Use	Acreage	Unit Count
Multi Family	17.61 Acres	274 Units
Rural (0.5 acre lots)	146.9 Acres	236 Lots
Rural (1.0 acre lots)	7.27 Acres	6 Lots
Major Roads	8.81 Acres	Not Applicable
Park	6.00 Acres	Not Applicable
Setbacks	5.14 Acres	Not Applicable
Retention	8.75 Acres	Not Applicable
Drainage & Open Space	7.58 Acres	Not Applicable

Study Objectives

ACM Consultants, Inc. has been retained by Mr. Chris Lau of Towne Development of Hawaii, Ms. Donna Clayton of Pacific Rim Land (representing Endurance Investors, LLC) and Mr. Lloyd Sodetani of Association of Ii Wai Hui, LP, to analyze the residential real estate market as it relates to this proposed project. In particular, the Consultants studied economic trends and demographics, and supply and demand factors for residential property which includes single family house lots, and residences, as well as condominium units. In the process, they gathered as much information as possible on real estate sales on Maui while focusing on the Central, West, and South Maui markets.

The objectives of the market analysis were as follows: (1) to define and delineate the market area; (2) to identify and analyze the current supply and demand conditions specific to the subject's market; and (3) identify, measure and forecast the effect of anticipated developments or other factors on future supply.

Conclusion

Maui in general has seen growth in its population, tourism and economy over the past two decades. Similar to many real estate markets on the mainland, Maui's real estate market has seen significant increases in the last few years. Median prices as well as

sales volume are at record highs and affordable housing is in very short supply. As a result, the county administration placed the affordable housing issue among its top priorities since 2004.

There are numerous ongoing residential projects that will provide the immediate supply for the next year or so. Of all the ongoing projects, there are approximately 1,354 units in Central Maui that are available. In addition to the projects currently under construction or in their financing phase, there are a few projects in Central Maui that may add inventory to the market in coming years but are still in the process of gaining governmental approvals. In addition to the subject, these projects include Maalaea Mauka and A&B Properties' Waiale Project. After five years, it becomes more difficult to determine which future projects will actually be brought to the market. Besides the subject, the Consultant has identified eleven (11) large developments that are expected to bring between 15,700 and 17,500 units to the Maui real estate market within the next 5 to 20 years. However, some of these potential projects have been met with governmental or community resistance, leading to long delays; meanwhile, others may never be completed for various reasons.

A survey of projects developed on Maui within the past 10 years indicated that a total of 4,633 new units have been sold within this period. This includes single family residences, condominium units, residential house lots as well as agricultural lots. The average number of units sold was approximately 463 units per year. However, this period also included years in which the real estate market was not strong. Based on this indicated absorption rate, the current short term supply of 2,107 new units (Page 27) will last approximately 4.5 years. When consideration is given to the anticipated increase of population on the Island of Maui and the intensified demand for housing, this supply will last only 2.6 years (See Page 54).

In this light, the short-term supply of single-family homes in Maui appears to be insufficient for the next 5 or so years. If economic conditions remain the same, it is probable that prices will continue to rise in the near-term, albeit at a slower pace than years past.

Meanwhile, demand for real estate in Maui has intensified over the past five years. These increases are being fueled by the population increases in this district, the high employment rate, and the lowest 30-year mortgage interest rates in decades. The strong demand has resulted in rapidly rising prices in all communities of Maui.

With additional inventory on the market, and assuming positive growth over the next decade, it is our opinion that bringing the subject's 516 units to the market would help to alleviate the supply problem being experienced today; and, it is anticipated that Pu'unani

Subdivision will be well accepted by the public. The local community possesses an intense desire for property in this neighborhood, proven by the rapid absorption of previous subdivisions there. In addition, the subject's multi-family units will provide affordable homes to 274 families on Maui. Furthermore, the subject's half-acre and one-acre rural lots will bring a new type of product to the market in Wailuku and should meet with excellent demand. Low density subdivisions in Central Maui, like the Wailuku Country Estates subdivision, have been well received by the market in past years because they offer larger rural lots in proximity to urban settings. Additionally, during the time that the subject is approved and construction begins, much, if not all of the existing supply in ongoing projects will most likely be depleted.

Although the exact product mix and pricing of the project have not been determined, this development will give market participants additional choices in single-family and multi-family living. In recent years demand has far outpaced supply in the real estate market, leading to dramatic increases in real estate prices across the board. The increased supply will give the consumer a broader variety of choices, provide a better balance in the supply and demand equation, and should lead to more affordable housing to Maui's residents.

B. PURPOSE OF THE REPORT

The purpose of this report, as of June 30, 2006, is to generate a market analysis and economic impact report with respect to the proposed Pu'unani Subdivision.

C. INTENDED USE OF THE REPORT

The intended use or function of this report is to provide real property information and real estate market data upon which internal decision making by our client may be based.

D. SCOPE OF THE REPORT

The Consultant has agreed to provide a current market analysis of this project by (1) defining and delineating the market area; (2) identifying and analyzing the current supply and demand conditions that make up the specific real estate market; and (3) identifying, measuring and forecasting the effect of anticipated developments or other changes on future supply. The market analysis will be developed and prepared in conformity with, and subject to, the requirements of the Code of Professional Ethics and the Standards of Appraisal Practice of the Appraisal Institute, and the Uniform Standards of Professional Appraisal Practice.

E. STATEMENT OF COMPETENCY

ACM Consultants, Inc. (formerly ACM, Real Estate Appraisers, Inc.) has been actively involved in the real estate appraisal business since 1982. Our business emphasis has focused mainly on the valuation of residential and commercial properties located within the State of Hawaii. The company considers itself competent to conduct a market and economic impact analysis for a proposed project district in Wailuku, Island and County of Maui.

F. EXTRAORDINARY ASSUMPTIONS AND HYPOTHETICAL CONDITIONS

As of June 2006, the subject was still in the preliminary stages of planning. A Conceptual Land Use Plan prepared by Warren Unemori Engineering provided a visual indication of the proposed layout of the development. The consultant is not liable for any changes in the project plan past this date, nor for information that has not been released or communicated to the Consultant.

The Consultant has no control over economic conditions and other international events that could have an affect upon Hawaii's economy and the Maui real estate market. As a result, this report has not made any assumptions regarding potential conflicts with other nations, or external factors affecting economic conditions here.

The counseling report is also subject to standard "Limiting and Contingent Conditions" located in the pages following.

G. CONFIDENTIALITY PROVISION

The contents of this market study and economic impact report are confidential. Release of this counseling report by ACM Consultants, Inc. is limited to you and for your preparation of an Environmental Impact Statement for the proposed Pu'unani subdivision. Any further release of this report, or portions herein, is strictly prohibited and you shall accept the risk and liability for any such release without the previous written consent of ACM Consultants, Inc. Further, you shall indemnify and defend ACM Consultants, Inc., and its individual consultants/appraisers, from any claims arising out of any such unauthorized disclosure.

H. CERTIFICATION

The undersigned does hereby certify that except as otherwise noted in this appraisal report:

1. The Consultant's compensation is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

2. The Consultant has no present or prospective interest in the property that is the subject of this report, and no personal interest or bias with respect to the parties involved. The "Estimate of Market Value" in the appraisal report is not based in whole or in part upon the race, color, or national origin of the prospective owners or occupants of the properties in the vicinity of the property appraised.

3. The Consultant has personally inspected the property, and is a signatory of this Certification.

4. To the best of the Consultants' knowledge and belief, all statements of fact and information in this report are true and correct, and the Consultant(s) have not knowingly withheld any significant information.

5. Shane S. Nishimoto, CGA-696, and Shane M. Fukuda, Appraiser Trainee, both provided significant professional assistance to the person(s) signing this report.

6. The reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal unbiased professional analyses, opinions and conclusions.

7. All analyses, opinions and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Appraisal Practice.

8. This counseling report is subject to and in conformance with the Code of Professional Ethics and Standards of Professional Conduct of the Appraisal Institute. The analyses, opinions and conclusions of this counseling report have been made in conformity with, and subject to, the requirements of Title XI of the Federal Financial Institutions Reform, Recovery, and Enforcement Act of 1989.

9. This counseling report is to be used only in its entirety and no part is to be used without the whole report. All conclusions and opinions concerning the real estate are set forth in the counseling report were prepared by the Consultant(s) whose signature(s) appears on the counseling report. No change of any item in the counseling report shall be made by anyone other than the Consultant, and the Consultant shall have no responsibility for any such unauthorized change.

10. The Appraisal Institute, of which this Consultant is a member, has a legal right to review this report.

11. The qualifications of this Consultant, including completed educational requirements of his/her candidacy are located in the Addendum to this report. Any member signing the report has completed the requirements of the Appraisal Institute's continuing education program.

ACM Consultants, Inc.

Glenn K. Kunihisa, MAI
Certified General Appraiser,
State of Hawaii, CGA-039
Expiration: December 31, 2007

I. LIMITING AND CONTINGENT CONDITIONS

1) This is a Counseling Report which is intended to comply with the reporting requirements set forth under Standards Rule 5 of the Uniform Standards of Professional Appraisal Practice for a Counseling Report. The information contained in this report is specific to the needs of the client and for the intended use stated in this report. The Consultant is not responsible for unauthorized use of this report.

This report has not been prepared for federally-related mortgage financing purposes, and has not been prepared in compliance with the requirements of Title XI of the Federal Financial Institutions Reform, Recovery, and Enforcement Act of 1989.

2) No responsibility is assumed for legal or title considerations. Title to the property is assumed to be good and marketable unless otherwise stated in this report.

3) The property analyzed is free and clear of any or all lines and encumbrances unless otherwise stated in this report.

4) Responsible ownership and competent property management are assumed unless otherwise stated in this report.

5) The information furnished by others is believed to be reliable. However, no warranty is given for its accuracy.

6) All engineering is assumed to be correct. Any plot plans and illustrative material in this report are included only to assist the reader in visualizing the property.

7) It is assumed that there are no hidden or unapparent conditions of the property, subsoil, or structures that render it more or less valuable. No responsibility is assumed for such conditions or for arranging for engineering studies that may be required to discover them.

8) It is assumed that there is full compliance with all applicable federal, state, and local environmental regulations and laws unless otherwise stated in this report.

9) It is assumed that all applicable zoning and use regulations and restrictions have been complied with, unless a nonconformity has been stated, defined, and considered in this counseling report.

10) It is assumed that all required licenses, certificates of occupancy or other legislative or administrative authority from any local, state, or national governmental or private entity or organization

have been or can be obtained or renewed for any use on which the value estimates contained in this report are based.

11) Any sketch in this report may show approximate dimensions and is included to assist the reader in visualizing the property. Maps and exhibits found in this report are provided for reader reference purposes only. No guarantee as to accuracy is expressed or implied unless otherwise stated in this report. No survey has been made for the purpose of this report.

12) It is assumed that the utilization of the land and improvements is within the boundaries or property lines of the property described and that there is no encroachment or trespass unless otherwise stated in this report.

13) The Consultant is not qualified to detect hazardous waste and/or toxic materials. Any comment by the Consultant that might suggest the possibility of the presence of such substances should not be taken as confirmation of the presence of hazardous waste and/or toxic materials. Such determination would require investigation by a qualified expert in the field of environmental assessment. The presence of substances such as asbestos, urea-formaldehyde foam insulation or other potentially hazardous materials may affect the value of the property. The Consultant's value estimate is predicated on the assumption that there is no such material on or in the property that would cause a loss in value unless otherwise stated in this report. No responsibility is assumed for any environmental conditions, or for any expertise or engineering knowledge required to discover them. The Consultant's descriptions and resulting comments are the result of the routine observations made during the analysis process.

14) Unless otherwise stated in this report, the subject property is evaluated without a specific compliance survey having been conducted to determine if the property is or is not in conformance with the requirements of the Americans with Disabilities Act. The presence of architectural and communications barriers that are structural in nature that would restrict access by disabled individuals may adversely affect the property's value, marketability, or utility.

15) Any proposed improvements are assumed to be completed in a good workmanlike manner in accordance with the submitted plans and specification.

16) The distribution, if any, of the total valuation in this report between land and improvements applies only under the stated program of utilization. The separate allocations for land and buildings must not be used in conjunction with any other appraisal and are invalid if so used.

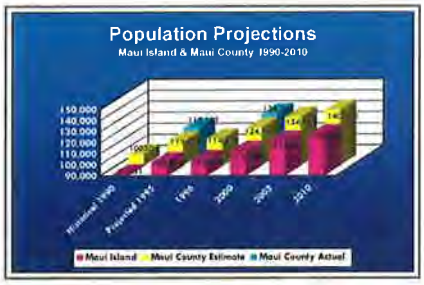
17) Possession of this report, or a copy thereof, does not carry with it the right of publication. It may not be used for any purpose by any person other than the party to whom it is addressed without the written consent of the consultant, and in any event, only with property written qualification and only in its entirety.

18) Neither all nor any part of the contents of this report (especially any conclusions as to value, the identity of the Consultant, or the firm with which the Consultant is connected) shall be disseminated to the public through advertising, public relations, news sales, or other media without prior written consent and approval of the Consultant.

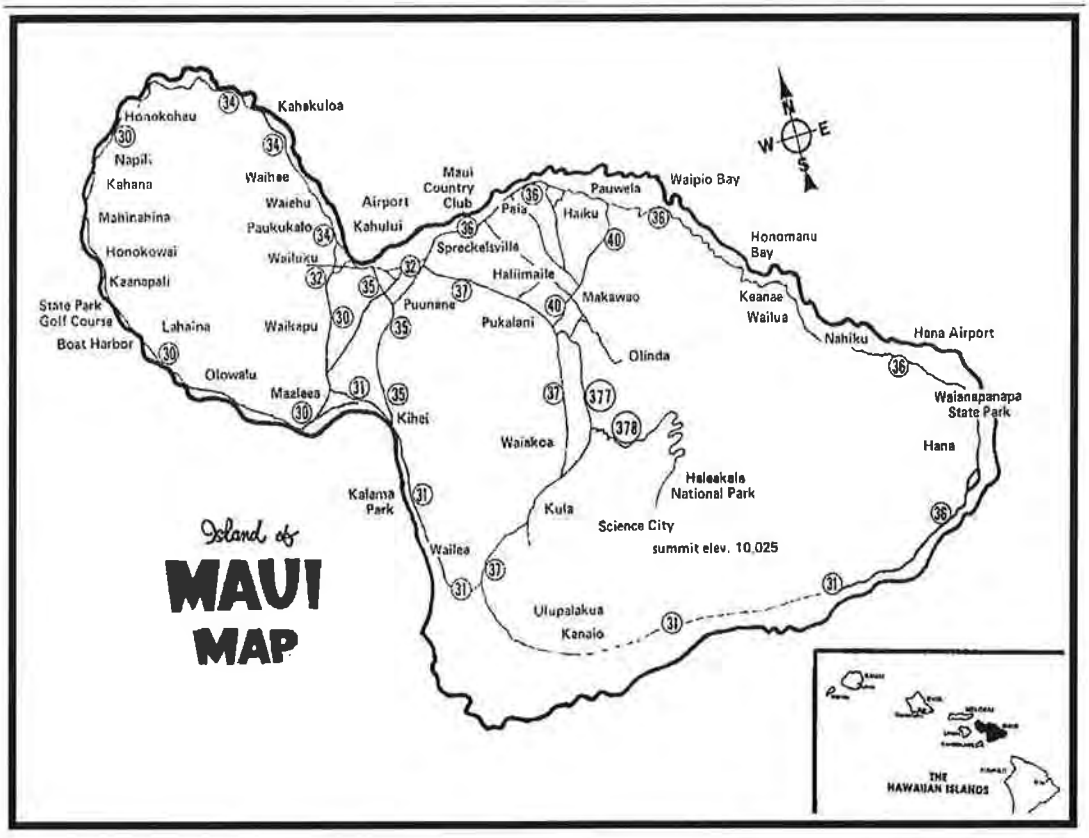
PART II – FACTUAL DATA

A. REGIONAL DATA - MAUI COUNTY

Maui County is the third most populous of the four counties of Hawaii, with a total resident population of 128,241 (2000 Census) and a change of 27.6 percent since 1990. Maui County consists of the islands of Maui, Molokai, Lanai, and Kahoolawe. Ninety percent (90%) of County residents live on Maui; the 2000 U.S. Census of Population reported 7,404 residents on Molokai and 3,193 on Lanai. The Island of Maui consists of a total of 734.5 square miles, or 470,080 acres. Population Projections for Maui County and the Island Maui are illustrated on the table below.



Like all the Hawaiian Islands, Maui, Molokai and Lanai are blessed by warm air temperatures year-round, and ocean waters that range from 72-77°F in winter to 77-81°F in summer. The islands' distance from other continents, the moderating effects of the surrounding water and the tropical location combine to create this pleasant climate. Hawaii's topography, particularly the mountains and valleys and location of each island, contributes to the great variety of microclimates within very small areas. On Maui, the West Maui Mountains and Haleakala are the primary geological features affecting the weather. Due in part to the above geographical factors, Maui has, for twelve years, been selected "Best Island in the World" by readers of Condé Nast Traveler magazine. Maui has clearly dominated the tourism competition between the neighbor islands (excluding Oahu), drawing more tourists than the other Neighbor Islands of Hawaii and Kauai



combined, and has consistently had the highest occupancy rates of all island (Oahu included). Furthermore, Maui also has preserved more of its original plantation economy than the rest of the state. More than half Hawaii's plantation economy comes from Hawaii Commercial & Sugar Co., a 37,000-acre plantation on Maui, and the nation's last canner of pineapple, Maui Pineapple Co.

Overall, Maui's performance has exceeded other counties during the state's ongoing string of job losses that began in late 1992. In 1999, Maui led the state's four counties in job creation, up almost 3% for the year. A falling Maui County unemployment rate corroborates the tightening labor market; since the mid 1990's, Maui's unemployment rate has steadily declined and is currently the lowest in the state.

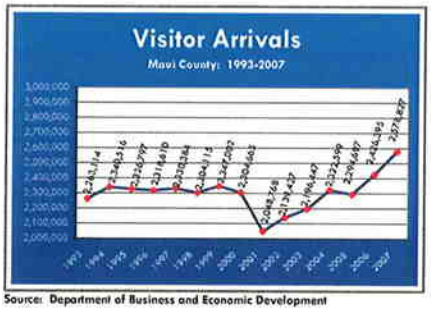
Visitor Industry

Lately, Maui hotel occupancies exceeded any area in the state with the exception of Waikiki. Its high rating is due to a number of factors. First, Maui receives the good fortune of location and climate. Second, Maui has the infrastructure in place to move tourists to a diverse variety of activities with a minimum of inconvenience and down time. The accommodations on Maui are another reason. Maui resort hotels have consistently ranked above other Hawaii resort destinations. In the same Conde Nast Traveler magazine, 9 of the "Top 30 Pacific Rim Resorts" were Maui County resorts. The Four Seasons Resort Maui at Wailea ranked highest, placing 3rd in the survey. Other Maui resorts garnering honors included: Ritz-Carlton Kapalua, Fairmont Kea Lani in Wailea, Kapalua Bay Hotel & Ocean Villas, Grand Wailea Resort, Renaissance Wailea Beach Resort, and Hotel Hana-Maui.

With the possible exception of Kauai, Maui is more dependent on tourism than any of Hawaii's four counties. That sector is treating Maui very well nowadays, but it is no accident. For years, Maui has worked very hard at cultivating a worldwide image as a premier, upscale tropical island destination. In fact, it is the only county government in Hawaii that spends money to support tourism. Its consistency in creating that image over the years has been the key its success today. The now affluent U.S. economy and that upscale image have dovetailed now, to award Maui with its own measure of affluence in today's world.

The leading edge of Maui expansion is tourism, which continues to be very healthy, despite the September 11 terrorist acts. From 1994 through 2000, visitor arrivals have consistently been between 2,300,000 and 2,350,000. The effects of the September 11, 2001 terrorist attacks had a drastic impact on the tourism industry. The final Maui visitor count for 2001 was 2,048,768. In 2002, the visitor count rebounded slightly to 2,139,427 as the visitors slowly returned during the mid to latter part of the year. Visitor totals for 2003 indicate an increase of 2.7 percent over 2002, 2004 total visitor arrivals

increased by 5.7 percent over 2003, while 2005 visitor totals showed a slight decrease of 0.3 percent, to 2,314,782. Maui's mainstay is visitors from California, and the county continues to benefit from the state's robust economy. Visitors from California alone account for about 38% of Maui's westbound visitor arrivals.



Source: Department of Business and Economic Development

Added airline seats from elsewhere on the U.S. Mainland are expected to bring even more tourists to Maui. Other factors are better airline equipment and frequent-flyer program benefits. The better equipment allows more, longer distance planes to come to Maui without the much debated Kahului runway extension. Even though plans to extend the runway have been shelved, there is a push for strengthening the existing runway to support heavier planes, such as Boeing's 777.

Further evidence of Maui's booming tourism is found in occupancy statistics, even though visitor arrivals do not translate directly to occupancy levels because time-share stays and day-trippers are not included in occupancy rates. Still, Maui Islands had the second highest occupancy rate of all the islands in 2005 at 79.6 percent. Oahu led the state with an average occupancy of 85.6 percent. However, Maui had the highest average daily room rate for 2005 at $214.41.

Historically, occupancies in Wailea, Kihei, and Kapalua have run about 8% to 10% below the established resort area of Kaanapali. That gap is closing, however, as Kaanapali approaches its capacity.

Visitor shopping opportunities have increased in recent years with the opening of The Maui Marketplace, a 275,000 square foot shopping

complex, modeled after Oahu's successful Waikele Center. The Maui Marketplace is now home to such retail superstores like Lowe's Hardware, Pier One Imports, Borders Books and Music, Sports Authority, Starbucks Coffee, and Office Max, as well as many small local retailers and restaurants. Also opening in the same Kahului area were Home Depot, Wal-Mart, K-Mart and Costco. In addition, the Shops at Wailea opened in December 2000 and added approximately 150,000 square feet of high-end retail space in the Wailea Resort. At about the same time, the 150,000 square foot Piilani Shopping Center opened in Kihei with Safeway as its anchor tenant.

Maui offers more than any other Neighbor Island in the way of proven vacation experiences. It has a larger tourism activities industry relative to the size of its economy than any other county. Such activities include ocean recreation, helicopter tours, biking down Haleakala, and golfing, among numerous other activities. Maui's well-developed ocean recreation industry ranges from windsurfing to snorkeling, scuba diving and sailing cruises which leave regularly from Lahaina and Maalaea Harbors.

Maui also has theme destinations, such as the Maui Tropical Plantation. But the premier theme destination on the island is the Maui Ocean Center. This center, featuring the marine environment of the Hawaiian Islands, is modeled after five other aquarium parks developed elsewhere in the world by Coral World International. This ocean center is located just behind the Maalaea Boat Harbor, and is easily accessible from Kahului/Wailuku, and the resort areas of Lahaina/Kaanapali and Kihei/Wailea. The Maui Ocean Center anchors the 18-acre Maalaea Harbor Village, which also includes a retail strip shopping center, restaurants and other services.

It appears that Maui will continue to be a strongly favored destination for Mainland tourists, with its large share of condominiums available for families and groups on a budget. The California recovery has begun to fuel higher demand for condominium rentals in the last three to five years.

Despite the improving visitor industry on Maui, hotels have not been adding much in the way of jobs. Tourism still dominates the labor force; however, the profitability problems the large resorts have experienced led managers to refine their operations. Tourism numbers are growing steadily, but job creation in the visitor industry is not matching that growth.

Real Estate

Residential real estate can be divided into three broad categories (single-family homes, condominiums and residential lots) and four important geographic regions. As a result, there are eight subsections

of the market that have proven capable of moving up and down with relatively little correlation with the others. Upcountry has virtually no condominium properties; and two other subsections, South Maui and Central Maui, have few leasehold condominiums. Only West Maui has all three types.

Of all the neighborhoods, several have virtually all luxury housing, such as Kapalua, Kaanapali, and Wailea. Kahului has no luxury housing and Wailuku only a little. All other areas have a mix.

Owner-occupied housing on Maui runs about 57.6 percent of all occupied housing units. The total housing stock has been growing at a rate of about 1,000 units a year in the 1980's. The total accelerated to 1,500-2,000 new units in the late 1980's, well short of demand. The Maui population has expanded tremendously for the past 10 to 12 years, but housing was not being built at the same pace as the 1980s. As a result, demand for housing has outpaced supply and homes prices and rents have risen dramatically. The median single-family home price on Maui in 2005 was $627,123. Meanwhile, interest rates have fallen to historical lows and have helped to make these higher prices achievable. At the same time, these low rates have stimulated new construction, new home buying and refinancing.

The following summarizes a sales volume history for Maui County from 1990 to 2005.

Year	Vacant Land	Single Family	Condominium
1990	298	560	1,459
1991	116	430	593
1992	120	382	496
1993	121	361	461
1994	148	404	592
1995	118	331	495
1996	126	451	577
1997	182	507	812
1998	276	641	999
1999	408	965	1,348
2000	372	951	1,456
2001	318	938	1,274
2002	402	997	1,578
2003	447	1,420	2,001
2004	477	1,228	1,935
2005	421	1,311	2,041

The real estate market remained strong, after increasing significantly over the previous six years in all categories. Single-family re-sales saw significant increases in 1999 and have been stable up to 2002. In 2003, however, the number of single-family sales increased

significantly by 44 percent. There was a slight 13 percent dip in 2004, followed by a rebound of almost 8 percent in 2005. Similarly, condominium re-sales have experienced significant increases since 1999 in terms of units sold, achieving a new high in 2002 and a slight decrease in 2003. In 1999, 1,338 condominium units were sold, registering a 38.8 percent increase from the prior year. In 2001, the number of sales fell slightly, but rebounded significantly in 2002. Sales in 2003 amounted to 1,414 units. In 2004, however, the total condominium sales skyrocketed to 1,933, which jumped to 2000 units in 2005.

Meanwhile, median prices rose significantly in 2005 for all categories of real estate. The monthly median prices in 2005, averaged over 12 months, for land parcels, single-family homes and condominium units, increased 22 percent, 13 percent and 17 percent, respectively.

Construction and Development

The construction industry, since 2000, has enjoyed a robust economy and building climate. Three new commercial centers were built in 2000. The Wailea Shopping Village had been demolished and was replaced with The Shops at Wailea, which includes 150,000 square feet of upscale retail and restaurant space. Also, the 150,000 square foot Piilani Village shopping center was built at the same time and is anchored by a 55,000 square foot Safeway store, considered to be the largest Safeway in the state. The Maalaea Harbor Village shopping complex, where the premier Maui Ocean Center presently stands, was also built during the same period.

Recently, Phase I of the Wailea Town Center was completed and sales of all he individual commercial condominium units closed escrow. The center will contain neighborhood services including retail and office owner-occupants such as Coldwell Banker and the Wailea branch of First Hawaiian Bank. The second phase is currently under construction with more commercial condominium units along with residential units on the second floor. This phase was also met with high demand as all of the units are reserved and under contract; and, the developer expects to have the second phase sold as soon as it is completed.

Residential properties continue to be built, primarily in new subdivisions throughout Maui. This sector of the market had been negatively affected by the poor Hawaii economy during the 1990s; however, properties today are appreciating rapidly and new projects are enjoying a large degree of success. In Central Maui, the Maui Lani and Kehalani project districts are being developed with several new subdivisions and condominium projects.

Kihei has also experienced an upswing in residential development brought upon by new single-family subdivisions between 2000 and

2005. All of these subdivisions were highly successful, receiving immediate reservations and contracts on all units prior to completion of construction. Construction of more residential subdivisions is still strong in Kihei, including Kamali'i Alayna, Moana Estates and Hokulani Estates to name a few.

Retailing

In retail, the most significant addition is the 275,000 square foot Maui Marketplace, which opened on Dairy Road. This site contains the likes of Lowe's Hardware, Office Max, Sports Authority, Borders Books & Music, Pier One Imports, Burger King and Starbucks Coffee.

Wal-Mart and Home Depot also completed their stores on Dairy Road, immediately west of the Maui Marketplace. These outlets joined earlier arrivals Costco and Kmart, as well as Alexander & Baldwin's neighboring Triangle Square, in carving up the Maui retail pie. However, the local malls are answering the challenge with more food and entertainment, and retailers that can compete in their niche. Maui's largest mall, Maui Land & Pine's Queen Kaahumanu Center in Kahului, has been challenged by the presence of these large box retailers and vacancies are very noticeable. The most recent and highly publicized closure was that of JC Penney in January 2003.

In Kaanapali, Whalers Village has taken a turn toward the luxury market popular with the Japanese. Recently completing a $3 million renovation and a change in its tenant mix, this oceanfront center now aims for both westbound and eastbound visitors. Japanese visitors are targeted with Duty Free Shoppers, Louis Vuitton, Prada, Loewe and other high-end shops.

The 150,000-square foot Shops at Wailea opened in 2000, offering upscale shopping in its high-end retail shops. Tenants include Louis Vuitton, Coach, Bally, Fendi, Tiffany & Co., Banana Republic, and Georgiou. Restaurants in this mall include Ruth Chris Steak House, Tommy Bahama Café and Emporium, and Longhi's. Other retailers include Crazy Shirts, Hot Topix, Gap, Wolf Camera, and Whalers General Store.

The newest addition to the retail market will be the Lahaina Gateway Center situated along Honoapiilani Highway across from the Lahaina Cannery Mall. It is being dubbed as a "lifestyle center" with specialty retail shops, services and restaurants. Expected to open in 2007, this 145,000 square foot center will include tenants such as Barnes and Noble Booksellers, Central Pacific Bank, Ohana Farms, and Cost Plus World Market.

Agriculture

Agriculture on Maui is dominated by larger operations like Maui Land and Pine and Alexander & Baldwin's Hawaii Commercial and Sugar (HC&S).

Pineapple now confronts more foreign competition from places like Thailand, but Maui Land and Pine has weathered the recent drought relatively well, with adequate irrigation systems. However, there have been some recent changes in top management of Maui Land and Pine as the company seeks profitability.

HC&S survives as one of Hawaii's few remaining sugar operations because of its economies of scale, its shape (a compact area in the isthmus of the Valley isle rather than being strung out along some coastline, which facilitates cane hauling), and its decisions over the years to reinvest and upgrade plant and equipment.

HC&S continues to upgrade. A completed $6 million modernization of Puunene Mill consists of a $2.5 million production facility to manufacture food grade sugar, and installation of an $8.5 million generator that will produce and additional 16 megawatts of power above 1998 and 1999 levels. The operation is also diversifying. A $10+ million fiberboard plant was recently completed at the end of 2000, and an ethanol plant is also being evaluated.

Maui's most recent casualty among sugar operations, Pioneer Mill in West Maui, is missed visibly. For years, proponents of maintaining and sustaining Hawaii's sugar industry argued that growing sugarcane imparted to this economy an important, if underestimated, non-pecuniary benefit; sugar kept the land green and attractive, for tourists and locals alike, even if it lost money. Economists call this situation an "externality," an activity that affects others for better or worse, without those others paying or being compensated for activity.

Anyone who doubts that logic now has only to drive the West Maui coast from Olowalu to Kaanapali and look mauka, at an entire mountain side of dry brush and unused fields. As with many cases where sugar plantations have shut down, most diversified agriculture crops are just not land intensive enough to utilize all the vacant land. Coffee and seed corn operations are possibilities, but they make only a small dent.

In addition to sugar and pineapple cultivation, Maui also offers rich opportunities for agricultural diversification by small farmers and large agribusinesses. Top among new agricultural products are: papaya, cut flowers, coffee, Kula onions and strawberries, and Chinese cabbage from Kula. Molokai offers its sweet potatoes, Molokai lettuce and alfalfa, as well as taro.

High-Tech

Maui's contribution to Hawaii's fledgling high-tech industry remains pre-eminent in the state. It also represents genuine diversification of the economy. The Maui Research and Technology Park in Kihei has all

of it's infrastructure in place, and has completed three major building projects. Most important, it houses one of the country's most powerful supercomputers. The park now hosts over 30 companies and over 300 employees on 415 acres.

With access to one of the most powerful supercomputers in the world, funded by the U.S. Air Force, the Maui Research and Technology Park is continuing its efforts to diversify the Maui economy into something fundamentally different from what exists in the county or anywhere else in the state.

Construction of a new project is nearly underway in Maui Research & Technology Park. This office building is being developed by the Maui Economic Development Board and will contain approximately 31,500 square feet of rentable area on a 2.8-acre site.

The park is sticking to its long-run strategic plan to capitalize on its location at the center of the Pacific Basin. Its extensive fiber-optic lines to the U.S. Mainland make it one of the most fiber-rich environments in the world, greater than many facilities actually located on the Mainland.

County Government

Maui County is unique in having several inhabited islands in its jurisdiction: Maui, Molokai, as well as Lanai, and the uninhabited island of Kahoolawe.

Maui County has an elected Mayor and County Council, and the Board of Water Supply and Liquor Control Commission are semi-autonomous with appointed directors. Although all courts are conducted by the State, the County is responsible for prosecution and the Mayor appoints the prosecutor. The council has nine members, each residing in one of nine districts; however, voters cast ballots for all nine seats.

Unlike other states, Hawaii has only two layers of government: State and County. The State is responsible for many functions that elsewhere come under the jurisdiction of municipalities, such as schools, hospitals, airports. Also, unlike other states, Hawaii has statewide zoning carried out by the State Land Use Commission. The County has zoning authority within the boundaries established by the commission.

The County of Maui is encountering a lack of affordable housing. Maui is the most expensive county for single-family home buyers, with an average monthly median sales price of $552,833 in 2004; and a record high median price of $780,000 in May 2005 for a single-family home. According to the latest State of Hawaii Data Book, 11.0 percent of the houses are overcrowded on Maui and 47.4 percent of the households pay more than the recommended limit of 30 percent of

their income on housing. In fact, 16.6 percent pay more than 40 percent on housing. The County administration has made the creation of affordable housing its priority and several new projects are either underway or in-process.

B. NEIGHBORHOOD DESCRIPTION

Since real estate is fixed in location, its marketability and rentability are strongly influenced by economic and social trends in its immediate environment. The continuing attractiveness of this neighborhood environment to potential users and tenants, and its competitive relation to those of substitute properties, must therefore be evaluated and forecast by the consultant. In particular, perceived neighborhood trends affect both the quality and quantity of the revenues the subject property can reasonably be expected to generate.

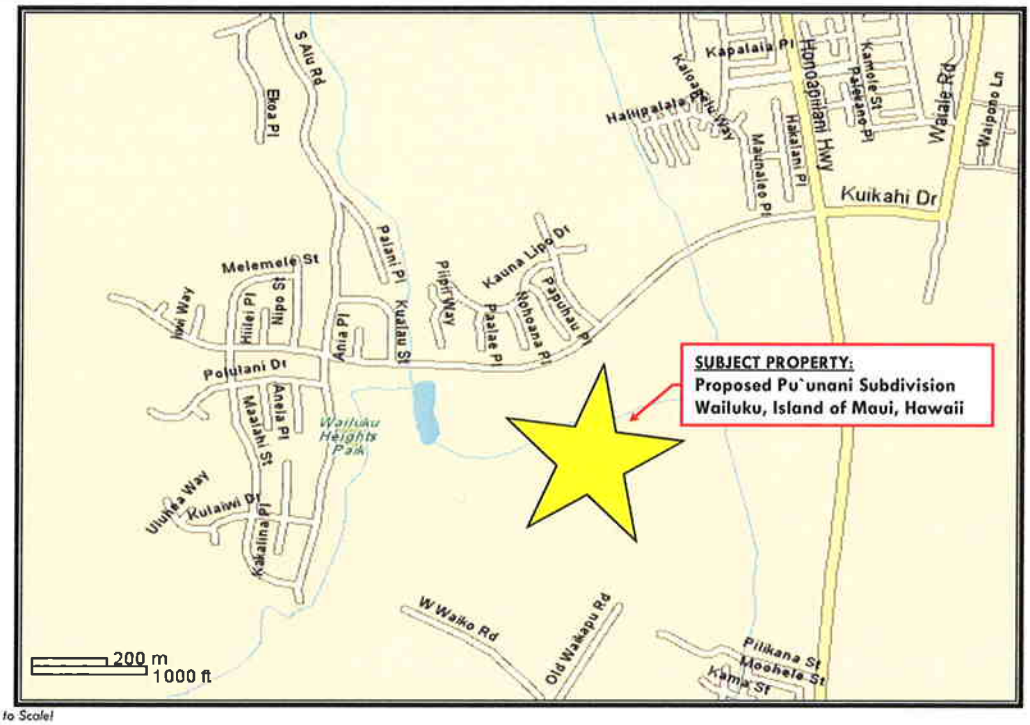
A neighborhood of income-producing properties is a geographic area characterized by similarity of uses and/or users, within which any change has a direct and immediate effect on the subject property and its value.

The geographic area surrounding the subject property is defined by physical and man-made boundaries, and encompasses an area known as Wailuku-Kahului. This region is located on the north shore of the Island of Maui and encompasses the civic and business centers of Wailuku and Kahului. The Island's major seaport and primary airport are also contained within the boundaries of this region. The surrounding agricultural land of Central Maui and the eastern half of the West Maui Mountains are also within the Wailuku-Kahului neighborhood.

The boundaries of the Wailuku-Kahului region are the northern shoreline from Poelua Bay to Baldwin Park on the north, Kailua Gulch and Lowrie Ditch on the east, Spanish Road to Waikapu Road to Honoapiilani Highway to Pohakea Gulch on the south, and the Wailuku Judicial District boundary on the west.

Population is concentrated in the urban centers of the region. Wailuku has maintained its role as the civic-financial-cultural center while Kahului has strengthened its role in recent years as the business and industrial center.

In addition to the urban centers of Wailuku-Kahului, the region also includes the more rural settlements of Waihee to the north and Waikapu and Puunene to the southeast. Agricultural lands are adjacent on the lower slopes of the West Maui Mountains and in the central plain south and east of Kahului. This green border is a significant part of the settlement pattern because of its open space and economic value. Kahului Harbor and Airport are major land users along the Kahului shoreline. As major ports of entry for people and goods, they serve as an important center of jobs and economic activity.



Not to Scale!

NEIGHBORHOOD MAP

The major thoroughfares through Kahului and Wailuku are Kaahumanu Avenue which begins in Kahului and provides primary access to Wailuku as well as Lahaina and Kihei; Hana Highway, which is actually a continuation of Kaahumanu Avenue, leads from Kahului to the eastern or "upcountry" portions of the island; and Puunene Avenue which provides access to all major areas in Kahului and ultimately leads to the new Kuihelani Highway which provides by-pass access to Lahaina and Kihei. The Kaahumanu Avenue also runs into Main Street, and via secondary access, runs into Waiehu Beach Road and Lower Main Street.

Kahului, adjacent to Wailuku, is situated on the northwest portion of the island of Maui, and is the central commercial, industrial and residential area of Maui. Kahului Town contains Maui's major shopping centers, centralized industrial areas, financial institutions, medical office facilities and business offices. Additionally, the Kahului Airport and Kahului Harbor are located in Kahului proper and centrally provides the majority of firms providing various goods and services throughout the island, as well as to Lanai and Molokai. Consistent with its central location, post office facilities, community library, parks, schools (elementary, intermediate, high school and a community college), churches of various denominations, entertainment facilities, food outlets and a fire station are located in Kahului.

Wailuku, at one time, was the heart of Maui's business activities. Decentralization of business to nearby Kahului and lack of maintenance and modernization of buildings to keep up with the new shopping habits brought about a gradual decline. However, since the creation of the municipal parking area in Wailuku, several new buildings have been built or renovated and a rejuvenation of the Wailuku Town is being experienced. The recently passed Community Plan envisions Wailuku as the "governmental, cultural and professional center of Maui". Located in Wailuku are the various government agencies, courts, hospital, major recreational facilities and police station.

Wailuku Fire Station sits in the heart of Wailuku Town, and until the opening of the Kahului Fire Station, was the only one in Central Maui. Kahului Fire Station is a 21,300 square foot facility that includes two main buildings and is situated on Dairy Road.

The Maui Memorial Medical Center, which is Maui's primary facility of medical and emergency service, is located between the connecting boundaries of Kahului and Wailuku. Work was recently completed on the addition of a new wing for the hospital. The Police Station is also conveniently located nearby.

Numerous pre-schools, elementary, grade and high schools are located throughout Kahului and Wailuku, with the Maui Community College located on Kaahumanu Avenue.

In order to fully understand and appreciate Kahului and Wailuku's potential for expansion, as well as factors that could limit the growth of this region, a brief summary of recent or proposed developments in central Maui, along with a few important issues facing future development are in order.

RESIDENTIAL

The residential districts surrounding these two centers are significantly different in character. Kahului residential areas are newer, with wide curvilinear streets. Wailuku Town, however, is comprised of older residential areas, intermixed with business uses, varying lot sizes, and a more haphazard street pattern representative of older subdivision practices. Only within the past three years has development at the Kehalani Project District really picked up.

Kahului

Currently in Kahului, the major residential area is represented by Alexander & Baldwin, Inc.'s Kahului Town Development. This subdivision consists of 14 increments that were built between 1951 and 1981. There are a total of 3,400 lots within the 14 increments. Kahului Town is distinguished as the first planned "new town" in Hawaii to provide quality housing at affordable prices.

Today, Kahului Town is a bustling residential community, and the ongoing Maui Lani project is generating a great deal of interest. This development will include up to 3,000 new residential units, ranging from executive golf homes to affordable units and will span 1,000 acres on the south side of Kahului and Wailuku. The Maui Lani development includes a golf course, churches, schools and a recreational center. Already, several phases have been sold over the past several years.

Wailuku

In Wailuku, the older residential homes are mixed with small businesses throughout central Wailuku. There are three primary residential subdivisions on the outskirts of the town including Wailuku Heights, Waiehu Terrace and Leisure Estates.

The older Wailuku Heights area was extended by two exclusive and prestigious phases. The first extension offers 270 lots while the second phase offers an additional 130 lots to the subdivision. Once verdant pastureland, Wailuku Heights is nestled in the West Maui Mountains and offers underground utilities, scenic views and a landscaped park.

The newest residential developments in Wailuku include the Ohia and Maunaleo subdivisions. These projects, by Towne Development and Stanford Carr Development, were sold strictly as house-and-lot packages. Kehalani Gardens and Iliahi at Kehalani, both condominium projects, were also built by the same developers and were completed in 2005. Another unique subdivision that was recently completed is the Wailuku Country Estates Subdivision which consisted of 184 agriculture lots located near the Puuohala Camp neighborhood.

Two other projects being constructed in Kehalani are The Cottages at Kehalani (14-lot single-family subdivision) being developed by Stanford Carr Development; and Akolea at Kehalani (97-lot single family subdivision), being developed by Towne Development on the north side of Kuikahi Drive. Another notable project underway is Jesse Spencer's 410-unit affordable housing project in nearby Waikapu, a small community in Wailuku proper.

COMMERCIAL

Commercial development in Kahului is concentrated along the major thoroughfares in strip fashion, while Wailuku's main commercial activity is concentrated in the central core of the town. Due to the central location of these communities, demand for commercial space is strong at this time, and vacancies within established projects in this region are very low.

Kahului

There are four major shopping centers in Kahului. Maui Mall, opened in late 1971 contains a gross leasable area of 181,500 square feet on a 25-acre site. It is anchored by tenants such as Longs Drug Store, Star Supermarket and the new Maui Mall Megaplex, by Wallace Theater Corporation. The largest center, Queen Kaahumanu Center, opened in 1973 and had 300,000 square feet of gross leasable area. Extensive renovations were completed in 1995, which includes a new two-level shopping wing, a six-screen movie theater, expanding the major stores, renovating the existing mall and adding a parking structure and access road. The project expanded the center to 500,000 square feet. It is currently anchored by Macy's and Sears. The Maui Marketplace on Dairy Road is home to a number of big-box retailers including Lowes Hardware, Borders Books and Music, Sports Authority, Office Max, Pier One Imports, Starbucks Coffee, Jamba Juice, Bank of Hawaii and Burger King. Finally, Kahului Shopping Center, the oldest major shopping center which opened in 1951, was partially destroyed by fire in 2005 and plans are underway to redevelop the entire block into Kahului Town Center. This development will consist of retail, office and condominium living.

In addition to these centers, Kahului is home to other large retailers including Costco, Home Depot and Kmart. All of the major financial

institutions and the large automobile dealerships are also located in Kahului. The Maui Arts and Cultural Center was built here in 1993 and includes a 1,150-seat theater, a 200-to 300-seat theater, an art gallery, administrative offices and a restaurant/gift shop on 12-acres at Maui Central Park, which is located between the Maui Community College and the former Maui Zoo.

Wailuku

The hub of commercial activity in Wailuku is concentrated in an area along Market Street and Main Streets. Known as Old Wailuku Town, this neighborhood is characterized by older, low-rise buildings consisting of small, individual shops and offices. Civic uses surrounding this area of Wailuku include the State Office Building, the County office buildings, and the judicial building.

Walluku's office market has rebounded in recent years and now experiences high occupancy rates and increasing rents. The town is home to numerous professionals in the fields of architecture, engineering, financial management real estate and banking. All of the major financial institutions have branches in Wailuku Town. Notable office buildings in Wailuku include One Main Plaza, Wailuku Executive Center, Maui Realty Suites, the Trask Building and Wells Professional Plaza.

INDUSTRIAL

Industrial space in Central Maui is very scarce with vacancy rates of three percent or less in most projects. In addition, vacant industrial land is also difficult to acquire due to the lack of inventory in the market. These factors have led to strong increases in warehouse rents and land prices.

Kahului

There are several industrial parks in Kahului, but the largest and most established of them all is the Maui (Kahului) Industrial Park, which is bordered by Hana Highway, Puunene Avenue, Dairy Road and Kamehameha Avenue. It includes low-rise warehouse and commercial uses and is occupied with a mixture of industrial, retail and office tenants.

Maui Business Park, Phase I-A and I-B is also establishing themselves to be active commercial and industrial subdivisions. Their developer, Alexander & Baldwin, Inc. plans to add on another 179 acres of light industrial land surrounding the first phase. However, delays in the entitlement process means that finished lots will probably not be available for building until about 2009.

Other industrial subdivisions include the Airport Triangle on about 13 acres, the 36-lot Kamehameha Parkway No. 2, and the Central Maui Baseyard on Mokulele Highway.

Wailuku

Existing industrial subdivisions in Wailuku include Wailuku Industrial Park, The Millyard, and Waiko Baseyard. Wailuku Industrial Park is an improved light industrial subdivision with 74 fee simple lots off of Lower Main Street in Wailuku. Lots range from 10,106 square feet to a parcel 3.089 acres in size. This subdivision is approximately 95 percent developed and includes the new Wailuku Town Center anchored by Sack 'n Save.

The Millyard was developed in 1985 as an improved light industrial subdivision located at the old Wailuku Sugar Mill site. This industrial subdivision contains 57 lots, and is home to the Wailuku Post Office which opened there during the late-1990s. Approximately 60 percent of this subdivision has been developed with a mixture of commercial and light industrial uses.

Completed in 2006, the Waiko Baseyard in Waikapu consists of 18 lots on approximately 15 acres of land. This subdivision was immediately sold prior to subdivision completion and will be home to relocating local businesses. Meanwhile, construction on Consolidated Baseyard is slated to begin in late-summer of 2006 and will consist of 35 lots on about 23 acres of land. Reports indicate a very strong interest in these lots and sales are expected to be brisk.

The Millyard Plaza is one of the largest additions to this subdivision. Also, several dentists have seen fit to build their own free-standing facilities in The Millyard, which has been developed into more of an office park than an industrial center.

CONCLUSION

All public utilities including electricity, water, telephone, and sewer service are available in Kahului and Wailuku, as is police, fire and ambulance services. Propane gas is not a public utility, however, is available. All charges for public services are standardized for Kahului as well as for the Island of Maui.

Although no public transportation exists on Maui, Kahului and Wailuku is easily accessible from most parts of the island. This and the fact that it is central to airport and harbor facilities, commercial and industrial establishments, properties located in this area are ideal.

Due to this region being the center of County, State and Federal offices, as well as community services, properties in these areas are anticipated to be in greater demand in the years ahead. Based on the desirability of this area and forecasted demand here, property values are expected to continue their appreciation in the foreseeable future.

C. PROJECT DATA

Environs

The subject is located on the mauka (mountain) side of Honoapiilani Highway on the southern side of Kuikahi Drive in Wailuku, Island and County of Maui. Honoapiilani Highway runs in a general north-south direction, in the vicinity of the subject, and connects Wailuku and Waikapu to the Ma`alaea neighborhood. It then continues westward to the communities lying within the West Maui region.

Along the subject's western boundary is the Wailuku Heights Subdivision while the area north of Kuikahi Drive and east of Honoapiilani Highway is the Kehalani Project District. Recently, the Kehalani Project District has seen much activity as several new single family subdivisions and condominium projects have been developed. These projects include the Olena Subdivision Phases I and II, Maunaleo and Kehalani Gardens by Stanford Carr Development as well as Koa, Ohia and Iliahi by Towne Development of Hawaii. These developers have also started construction on single family subdivisions called Akolea and The Cottages. There are also plans to develop a commercial site along Kuikahi Drive near its intersection with Waiale Road.

To the south of the subject, developer Scott Nunokawa is in the financing stages of Waiolani Mauka, which will consist of 105 single family house lots and will add to the existing Waiolani and Waiolani Elua Subdivisions.

There is a strong residential demand for the area between Waikapu and Wailuku Town as evidenced by the rapid absorption of homes in Kehalani's developments. The neighborhood rests along the lower slopes of the West Maui Mountains and its climate is slightly cooler than the central plain of Kahului. The area also offers ocean views and panoramic vistas across the central valley toward Haleakala.

The Pu`unani development, together with Waiolani Mauka to the south, will bridge the gap between the two towns. The subject's rural lots will provide a low density boundary between the two communities and will be an appropriate entry to the Wailuku Heights subdivisions further west along Kuikahi Drive.

Description of the Proposed Project

The proposed Pu`unani Subdivision is a 516-unit, project district located west of, and bordering, Honoapiilani Highway in Wailuku. The subject consists of approximately 210 acres of land and is currently zoned Agricultural District by the County of Maui. The subject, which is still in its preliminary planning stage, will be located mauka of the Honoapiilani Highway and will possess views of the ocean as well as the West Maui Mountains and Haleakala. According

to a Conceptual Land Use Plan, the subject will contain Rural zoned lots and multi-family units. The land use breakdown is as follows.

Land Use	Acreage	Unit Count
Multi Family	17.61 Acres	274 Units
Rural (0.5 acre lots)	146.9 Acres	236 Lots
Rural (1.0 acre lots)	7.27 Acres	6 Lots
Major Roads	8.81 Acres	Not Applicable
Park	6.00 Acres	Not Applicable
Setbacks	5.14 Acres	Not Applicable
Retention	8.75 Acres	Not Applicable
Drainage and Open Space	7.58 Acres	Not Applicable

Although development plans have not been finalized, it is expected that the multi-family units will be offered as the affordable housing component of this project.

From the subject's site, views of the ocean and Kahului Harbor should be visible to the north east while views of the West Maui Mountains will be available to the west.

PART III – ANALYSIS AND CONCLUSION

A. MARKET ANALYSIS

For the purpose of estimating the market response to this project, a market study was conducted to determine how current supply and demand for residential homes might be affected by the development of the subject's 516 units. The extent of our survey encompassed new, ongoing and proposed residential developments on Maui to give the reader the best perspective of the overall market.

OVERVIEW

One of the more difficult factors in determining the success of a proposed project is estimating future absorption rates. There are two components to this: First, is the design and pricing of the proposed project. This, of course, is well within the developer's control but has not yet been determined for the subject. Second, is the overall market environment at the time of pre-sale and project completion. This is, obviously, more difficult to define because it involves forecasting such variables as interest rates, overall market conditions, and general and specific sector real estate market conditions.

The added complication with most projects is the time frames and time lags involved. Since most subdivisions or condominium projects take several years between conception and completion, market and interest rate conditions can change significantly. Thus, a project may commence in a favorable environment and be completed in an unfavorable one (or vice versa). Furthermore, real estate is a cyclical industry and sales activity tends to move in spurts. It is not unusual for a new project to sell half its units in the first year of marketing and require 2 to 3 years (or longer) to sell the remaining half. Of course, these time periods could expand or contract depending upon market conditions. Thus, the notion of a linear sales rate may be deemed unrealistic for practical purposes, but is a useful and convenient tool for planning.

RESIDENTIAL SUPPLY CHARACTERISTICS

Pu`unani is centrally located and has relatively uniform travel times to each of Maui's major population centers. It follows that subject's primary market area is the Central Maui region, while South Maui and West Maui are expected to be secondary markets. Central Maui is home to the County and State government offices and is the industrial center of the island with convenient access to the major transportation facilities. South Maui has become a visitor destination with its expansive beaches and retail establishments targeted towards the tourist industry. West Maui is also a major tourist destination and is

home to the famous Front Street retail corridor which allows for pedestrian access to numerous retail establishments within Old Lahaina Town. Further north of Lahaina are the Kaanapali and Kapalua master planned resorts. Clearly, the subject's Wailuku location is highly convenient with respect to all of the major population centers

Due to robust economic conditions and a strong real estate market, there are numerous housing projects under construction or in various entitlement phases.

Available Residential Supply In New Maui Projects

Research was conducted in order to determine the number of housing units in new developments that are currently available in the market. According to this survey, there are 2,107 housing units which are currently for sale on the Maui market within recent, on-going projects and those developments which will be constructed within the next one to two years. It is noted that two large projects, Hale Mua and Spencer Home's The Waikapu Gardens subdivision will consist of approximately 37 percent of this total. Based solely on historical annual absorption rates of other new projects (463 units per year), the short-term market supply would be expected to last approximately 4.5 years. Of course, a multitude of other factors can influence the capture rate. For instance, the larger percentage of affordable units in the future supply guarantees a faster-than-normal absorption. Also, the number of buyers from the U.S. mainland and from foreign countries can fluctuate from year to year, and their presence in the market is not as predictable as the demand from local residents.

Shown in the table on the following page is the list of projects representing the short-term housing supply for the island of Maui. Many of these projects are currently under construction but have not actually closed on their units. Those that have not begun construction are undergoing their financing processes and are expected to commence construction within the next year. Included in this list are both single-family and condominium units from the island's four major population centers: Central Maui (Wailuku-Kahului); South Maui (Kihei-Wailea); Upcountry (Pukalani-Makawao-Kula) and West Maui (Lahaina to Kapalua). Of the projects named in the following table, Koa at Kehalani, Sand Hills, Maluhia at Wailea, Lanikeha and Mahanalua Nui Phase IV have already begun closing sales of their units.

Of the ongoing projects, those most similar to the subject are the Koa at Kehalani and Sandhills Estates at Maui Lani. Koa contains a total of 72 house lots with lot sizes ranging from 7,900 to 21,675 square

feet of land area. As of the effective date of this report, 48 lots have been sold under contract while a total of 24 remain available for sale. Thirty (30) house lots have closed while another 5 house and lots packages were closed. Lots began closing in October of 2005 while house and lot packages began closing in the first quarter of 2006. Most the Sandhills Estates subdivision has been sold and there are 11 lots remaining for sale ranging in price from $400,000 to $575,000.

The number of units indicated in the table below reflects the number of remaining units that are not under contract and are available for sale.

Table 1 - Available Supply in Ongoing Projects on Maui

Maui Projects 2006

Name	Location	# Units Remaining	Type of Development
CENTRAL MAUI			
Koa at Kehalani	Kehalani Proj Dist	24	Residential House Lots & SF Homes
Ohia at Kehalani Phase II	Kehalani Proj Dist	1	SF Homes
Sand Hills Estates	Maui Lani Proj Dist	11	Residential House Lots
Fairways at Maui Lani	Maui Lani Proj Dist	50	Residential House Lots
Legends Phase II	Maui Lani Proj Dist	71	SF Homes
Waikapu Affordable Homes	Waikapu	300	Affordable Homes
Cottages at Kehalani	Kehalani Proj Dist	114	SF Homes
Akolea at Kehalani	Kehalani Proj Dist	97	SF Homes
Waiolani Mauka	Waikapu	105	Residential House Lots
Na Mala O Waihee	Waihee	1	Agriculture Lots
Waiolani Pikake	Waikapu	11	Residential House Lots & SF Homes
Aina O Kane	Kahului	103	Lowrise Condominiums
Hale Mua	Waiehu	466	Mixed Lots & Affordable Homes
SOUTH MAUI			
Maluhia at Wailea	Wailea	2	Luxury Condominiums
Kilohana Waena	South Kihei	31	Residential House Lots
Kanani Wailea	Wailea	2	Luxury Condominiums
Moana Estates	South Kihei	34	SF Homes
Ke Alii Ocean Villas	South Kihei	101	Lowrise Condominiums
Liloa Village	South Kihei	65	SF Homes
Kai Malu Wailea	Wailea	28	Detached Luxury Condominiums
Hokulani Golf Villas	Central Kihei	120	SF Homes
Hoolei	Wailea	38	Luxury Condominiums
Papali	Wailea	12	Luxury Condominiums
Kamalii Alayna	North Kihei	90	SF Homes
UPCOUNTRY/EAST MAUI			
Kualono	Pukalani	49	Residential House Lots
Keawamaui	Kula	11	1/2 to 1-acre Residential Lots
E Paepae Ka Puko'a	Spreckelsville	16	1/2 to 1-acre Residential Lots
WEST MAUI			
Lanikeha	Kaanapali	60	Residential House Lots
Mahanalua Nui Phase IV	Launiupoko	4	Agriculture Lots
Kahekili Grove Condominiums	Honokowai	90	MF Condos
	Total units	2,107	

Maui's Potential Residential Projects

It is also important to discuss the developments on Maui that could be brought to the market over the next 5 to 20 years. As mentioned earlier, many external factors, such as economic or social factors, could affect the supply and demand for real estate in the future. These factors cannot be controlled by developers who must constantly assess market conditions for their prospective construction and sales periods. Many of these projects are still in the planning phases and must still complete governmental requirements before bringing their products to the market. Combine these factors with "internal" events that could affect a developer and predicting which developments will actually make it to market becomes more difficult. This list also includes long term projects that are under way such as the Kehalani and Maui Lani Project Districts.

Nevertheless, the paragraphs below name the projects that are in their preliminary stages of development, but are considered to be potential sources of additional supply to Maui's housing market.

Maui Lani consists of approximately 1,012 acres of land in the Central Maui plains that has approximately 800 units completed. Completed phases include the Greens, Grand Fairways North, Grand Fairways, The Island and The Bluffs. Presently, there is one project under construction, the Legends, Phase II. An upcoming project called Village/Mixed Use will consist of a mixed use product that will allow both residential and small scale commercial uses. This phase will consist of approximately 650 units. In addition to the phases already completed and the upcoming Village/Mixed Use phase, approximately 2,200 units remain to be developed within Maui Lani.

Kehalani is situated at the base of the West Maui mountain range in Wailuku and consists of approximately 550 acres of developable land area. Currently, there are numerous ongoing residential developments such as Koa at Kehalani, The Cottages at Kehalani and Akolea. There are approximately 1,100 units remaining within this project district.

Kapalua Mauka has announced plans to expand into the pineapple fields on the slopes above the existing West Maui destination. Their plan calls for development of about 690 units on more than 925 acres. Kapalua Mauka would be built around the Village Course, one of three championship courses there. It would also be expanded from 18 holes to 27 holes and given another clubhouse. Although the resort is zoned for an additional hotel, there are no plans to add one at this point in time. As part of the project, Kapalua will develop a 35-acre park, and pineapple cultivation north of Napili is expected to end.

Kaanapali 2020, on about 4,300 acres in Kaanapali, is currently in the planning stage. In 2002, the planning had already taken three years and the permit process is expected to take another four years. Construction is expected to begin around 2008 and will include a mix of products needed by both the community and Amfac. It was reported that the developer is dedicating approximately 60 to 70 percent to open space. This project will also include cluster housing, single-family residential, multi-family residential, commercial, schools, churches, medical facilities, a cultural center, golf course and transportation center. Preliminary plans call for a total of 2,810 housing units to be built out over the next 20 to 30 years. Pu'ukoli'i Village is a former plantation camp and is also part of the Kaanapali 2020 plan and is expected to be the first section of the plan that will be developed. It contains 260 acres of what was formerly a plantation camp and 940 of the 2,810 housing units in Kaanapali 2020 is proposed for Pu'ukoli'i Village. The developer, Kaanapali Development Corp. is in the process of revising the original Pu'ukoli'i approvals to allow for development before the construction of the by pass road. A revision to the affordable housing requirements is also in the works.

Waine'e will be located on the mauka side of Honoapiilani Highway. Situated along the eastern boundary of the Lahaina Aquatic Center and Recreation Center, this development will consist of approximately 240 acres of land once a plantation camp. It is currently undergoing the planning and entitlement process and is expected to begin construction in 2008. The development will contain approximately 1,100 housing units with approximately half being seta aside as affordable housing for the residents of West Maui.

Pulelehua will be developed by Maui Land and Pineapple Company and will be situated between Honoapiilani Highway and the Kapalua Airport on approximately 300 acres of land. This community will consist of single family and multi-family residential units, churches, schools, and other civic services. There will be a total of 882 residential units with approximately 50 percent being marked as affordable units targeted to buyers earning between 80 and 140 percent of the county's median income level. Preliminary designs of the community show that it will be "complete" and have a small town feel to it. Narrow roadways are expected to keep the development pedestrian oriented and naturally reduce traffic speeds within the neighborhood.

Hawaiian Homelands The Department of Hawaiian Home Lands (DHHL) has approximately 700+ acres of land under its stewardship located between the proposed Pulelehua and Kaanapali 2020 projects mentioned above. Plans for this project are so preliminary

that the owners do not know to what use, or to what extent, the proposed development will favor.

Villages of Lei`ali`i: The delay of this planned development is probably the most significant factor affecting the housing market in West Maui. This 1,120-acre, 4,813-unit community proposed by the State of Hawaii's Housing Finance and Development Corporation, was planned over a 15-year period. This project, however, was indefinitely shelved over a legal dispute over whether the State of Hawaii can sell ceded lands now held in trust for Native Hawaiians. The sale of the land from the State to the developer has not been completed due to litigation on behalf of native Hawaiian interests asserting claims and seeking to recover damages from the State. Conceptually, this project will develop 14 residential villages within 15 years. C. Brewer Homes, Inc. was marketing the housing in Village 1 known as Halelani in 1992 when the work was halted. Currently, only plans for Village 1A is in the works which will consist of 304 units.

Wailea 670 (Honua`ula): This project first surfaced in the late-1980s and, in 1982 it received a Maui Planning Commission recommendation for approval of the developer's request to rezone the land from an agricultural district to residential and commercial districts. The land use measure, however, has yet to be heard by the Maui County Council. Initially, the developers planned to build approximately 2,600 units of housing and resort lodging, along with two golf courses. Today, renamed Honua`ula, the new scaled-down version features 1,400 single-family homes and multi-family units, which amounts to only 2.1 units per acre. There will be only one golf course and approximately 80,000 square feet of commercial space. The developers of Honua`ula say they will address their own infrastructure needs with the construction of a water well on site, a sewage system, roads, pedestrian paths and bikeways. These new changes were announced in March 2005, which arose in part from changes in market conditions and public comments on the project made more than a decade ago. The developer has indicated that about 20 percent of the units will be dedicated to affordable housing. At this point in time, the estimated price range of the affordable units is from $225,000 to $340,000. At least two-thirds of the units are planned for construction on the Honua`ula site, with the remaining one-third of the units built elsewhere.

Hali`imaile has begun community meetings to discuss development and expansion of the existing town. The current land owners A&B Properties and Maui Land and Pineapple, are in the preliminary planning stages and it was rumored that 2,700 units are looking to be developed in this expansion.

A&B Waiale Project is a proposed 826 acre development that will be located off of Kuihelani Highway and Honoapiilani Highway just south of the existing Maui Lani Project District. It will also surround the existing industrial lands along East Waiko Road which was recently developed with the Waiko Baseyard Subdivision. The Consolidated Baseyard Subdivision has been granted County approvals and is expected to begin construction soon. Community meetings have been held to seek input into designing this area to best serve the island population. This proposed project district is expected to have approximately 1,900 to 3,700 housing units.

Maalaea Mauka is still in the planning and approval phase and may potentially bring a total of 1,150 housing units to the Maalaea neighborhood of Central Maui. Located on the mauka, or mountain, side of Honoapiilani Highway, the development is expected to consist of 50 percent market priced lots, 25 percent affordable units, and 25 percent high-end, or luxury, lots. Although, the property already is designated as a project district in the Central Maui Community Plan, a district boundary amendment and change is zoning at the County level is still needed before development can begin.

Central Maui's Residential Active Listings

Besides the properties available in the projects, the number of resale listings on Maui is a good indication of real estate market conditions. This market evidence is generally viewed as a "counter-cyclical" indicator, which means that it is typically lower in strong markets and higher in weak ones.

The Consultant researched listings of residential house lots, condominium and single-family homes in the Central Maui district and found that there are currently 322 active listings (See **Exhibit B** at the end of this report). The investigation of the Maui Multiple Listing Service revealed the following:

Single-Family

There were a total of 169 resale listings of residential properties in the Multiple Listing Service. This total was broken down as follows:

Range of Prices	No. of Listings	Average DOM
Below $400,000	1	90
$400,000 to under $650,000	58	106
$650,000 to under $900,000	62	103
$900,000 to under $1,200,000	38	116
$1,200,000 and Above	10	206

Clearly, the residential resale market supply of single-family homes is very low in the affordable bracket of "Below $400,000" where there

is only one listing. The lowest priced property at $350,000, was for a 59-year old, 780 square foot dwelling. The MLS information has indicated that the structure is in "tear down" condition which suggests that the value of the property may lie solely in the land. This listing is in the Waiale neighborhood in Wailuku.

According to the Affordable Sales Guidelines published by the Housing & Community Development Corporation of Hawaii the highest sales price of an affordable home in Maui is approximately $450,000, which is based on 140 percent of the 2006 median income as determined by HUD. According to this survey, there are only six (6) single family properties that are listed for sale at or below this price level.

The greatest supply was reflected in the $651,000 to $900,000 category. This segment is seen as the average market prices in Maui. It is noted that the median price for a single family property in Maui has ranged from approximately $600,000 to $780,000 in the past two years. Therefore, it is not surprising that this segment has the most abundant number of active listings on the market. Neighborhoods with prices in this range include the Kehalani and Maui Lani developments, Sand Hills in Wailuku Waiehu Heights, and Kahului Town. The average DOM in this category was noticeably higher at 103 days. At the $900,000 level, the prices border the "high-end" or "luxury" segment of the real estate market.

The survey of active single family homes found a total of forty eight (48) properties listed at $900,000 or higher with the highest price being $12,000,000 for a property in Kahakuloa. In Central Maui, there are very few new developments which will solely offer high-end properties over $900,000. The Fairways at Maui Lani will consist of 50 house lots along the Dunes at Maui Lani Golf Course. With prices expected to be in the mid-$400,000 for a lot, the finished homes are expected to be priced at about $850,000. Hale Mua will have nineteen (19) lots with areas greater than 2.00 acres. Once complete these, homes will probably be priced over $900,000. Developments or subdivisions with listings in the $900,000-and-above range include, Wailuku Heights, The Island and Bluffs, Grand Fairways North, Maluhia Country Ranches, and the recently completed Maunaleo at Kehalani.

Vacant House Lots

The number of vacant house lots on the market at this time appears to be plentiful with 73 listings in Central Maui; however, their market prices are prohibitive to developing an affordable product. For instance, the lowest priced house lot is $100,000, for a 2,085 square foot property on Vineyard Street. Based on a construction cost of

about $200 per square foot, a buyer could afford to build a 1,750 square foot home if he/she could only afford a total housing cost of $450,000. This benchmark price is based on 140 percent of the median household income as defined by HUD which is the upper limit of the affordable housing guidelines. Of course, this $100,000 price is an exception in the marketplace and the next lowest listing is offered at $300,000.

The majority of the lots offered for sale in Central Maui are located in the Sandhills Estates Subdivision in Maui Lani. These listings range from $350,000 to $600,000. Other notable developments with active listings include the Wailuku Country Estates, a recently completed 184-lot agriculture subdivision just outside of Wailuku Town.

Condominiums

This category typically dominates the number of sales in Maui. However, condominium listings in Central Maui total seventy seven (77), almost half the amount of single family listings in Central Maui. These listings of condominium units in Central Maui, range from $164,000 for a fee simple studio unit at Harbor Lights, to $600,000 for a 3 bedroom, 3.0 bath unit at Maui Realty Suites with most of the listings clustering in the $200,000 to $300,000 range. The most units available are located in the Harbor Lights project which has a total of 28 active listings. Other notable projects with numerous units listed include Iao Parkside and Kahului Ikena.

Condominiums have been in great demand as an alternative to single-family living, as home prices have been on the rise during the past few years.

Marketing Status for Kualono Subdivision

Although located in the Upcountry Maui neighborhood of Pukalani, the Consultant thought it would be appropriate to discuss Kualono, the only proposed residential project that will offer the most similar product to Pu'unani's Rural zoned lots. Kualono will consist of 49 half-acre rural lots in Pukalani at the intersection of Kula Highway and Old Pukalani Highway. As of June 2006, the developer has not begun formal marketing of the lots or a formal reservation list. However, when the project was first introduced to the public in 2005, there was significant interest in it due to its low density product of ½-acre lots. Based on this initial response, the developer feels the project will be sold immediately upon going to market.

It should be noted that most single family subdivisions in Central Maui consist of lots sizes between 6,000 and 10,000 square feet in size.

New Construction

According to the Maui County Data Book 2005, new single-family construction, which fell from its high in 1988, appears to be trending upward in the 2000's.

Table 2 - New Construction Island of Maui

Year	Number of New Single-Family Units	Five-Year Average
1980	803	
1981	398	
1982	530	
1983	547	
1984	638	
Subtotal	2,916	583
1985	984	
1986	911	
1987	1,119	
1988	1,453	
1989	1,136	
Subtotal	5,603	1,121
1990	1,068	
1991	694	
1992	810	
1993	660	
1994	673	
Subtotal	3,905	781
1995	473	
1996	601	
1997	532	
1998	574	
1999	647	
Subtotal	2,827	565
2000	904	
2001	778	
2002	787	
2003	877	
2004	1,104	
Subtotal	4,450	890

Source: Maui County Data Books 2002 through 2005

New single-family construction averaged 583 units during the five years between 1980 and 1984. During the next five years, 1985 to 1989, single-family housing starts increased significantly to an average of 1,121 per year. During 1990, house construction was also good at 1,068 units, but declined significantly following the Persian Gulf War and the economic slowdowns on the U.S. mainland and in Japan. Consequently, between 1990 and 1994, there was an average of 781 new single-family units built per year. From 1995 to 1999, construction of these units declined even more, with an average of only 565 units per year. In 2000, the number increased significantly to 904 units and then declined in 2001 to 778 units. The number of units remained nearly identical in 2002 with 787 units. In 2003 this number increased again to 877 units. Single family building permits in 2004 reached a total of 1,104, which is its highest level since the late 1980's. The average for the past 5 years is 890 units per year. (Refer to **Table 2** on the preceding page)

Without an adequate supply of new construction projects, the shortage of housing typically causes prices in general to move up. As a result, those at the bottom end of the income scale usually find it most difficult to purchase real estate. Historically, supply has lagged demand and is a significant limiting factor in the affordability of real estate in the Maui market.

Hawaii Housing Policy Study

In comparison, to the supply survey conducted by the Consultant, the Hawaii Housing Policy Study 2003 indicated that approximately 2,573 housing units will be built over the next five years, from 2006 to 2010, an average of 514.6 units per year. This was calculated from the projected total housing units as indicted by the Hawaii Housing Inventory Report. It is also similar to the average number of units absorbed by the market over the past 10 years. This count will be explained later in this report. This inventory report is based on the standing inventory of housing units in 2002 and forward projections of housing units. Over the next 19 years to 2024, the total resident housing supply will total 10,692 units.

RESIDENTIAL DEMAND CHARACTERISTICS

Demand is analyzed from two perspectives: The first is "demographic" demand, the number of units needed for a given market or employment base. Second is "effective" demand, the financial demand equation which involves looking at the number of buyers who would be qualified and interested in purchasing residential real estate.

Population

Population growth on Maui between 1980 and 1990 had been exceptionally high, and had outpaced the County's ability to provide adequate infrastructure and housing for this added number of people. Overall, population growth for the County of Maui during 1980 to 1990 was 41.67 percent. With this growth in population came a surge in real estate prices in the late-1980s. This increase, driven primarily by foreign and domestic investment and speculation, put the price of homes in Maui County well above the reach of many local residents, and affordable housing became a major concern to everyone.

The downturn in the economy between 1991 and 1997 led to the development of lower-priced housing as large land parcels became more affordable to developers. Zero-lot-line zoning was adopted by the County of Maui and the Meadowlands project in Kihei was among the first to be built. Three smaller zero-lot-line subdivisions were developed in West Maui between 1996 and 1998 and were highly successful. The only Zero Lot Line subdivisions in Central Maui were the Kaimana Subdivision in the Kehalani Project District and Luana Gardens in Kahului.

Meanwhile, the population of Maui County continued to grow during the 1990s. Between the 1990 and 2000 censuses the population increased by 28.5 percent, making Maui the fastest growing County in the State of Hawaii. According to Claritas Market Comparison Report (See **Exhibit A** at the end of this report), leading the growth on Maui was the South Maui region of Kihei which reflected growth of 51.3 percent increase over the 10-year period. The subject's Central Maui region of Kahului and Wailuku registered growth of 26.0 percent; while the West Maui region indicated a growth factor of 23.3 percent over the same 10-year period. The South Maui region grew by 51.3 percent. The growth trend has continued since the end of 2000. The 2006 population estimates have indicated growth rates for South and West Maui in the 13 percent range while growth in Central Maui has increased by approximately 11 percent over the respective population indicated in the 2000 census.

The growth in the number of households in these regions paralleled the population pattern. Household numbers grew in the south, west and

central regions at the respective rates of 53.5, 23.9 and 26.4 percent.

According to the Population and Economic Projections for the State of Hawaii to 2030, the projected population of Maui County is expected to be 199,550 by the year 2030. This represents a 54.7 percent increase over the 2000 census numbers.

Employment and Household Income

The unemployment rate in Maui has been on a decline since 1992 when unemployment was at 8.0 percent. In 1998 the unemployment rate was 6.2 percent while most recently in 2004 this rate was at 3.1 percent. (Maui County Data Book 2005, Page 173).

Household income figures have also been increasing. The estimated median household income in Maui in 2006 is $56,370 (Source: Claritas) annually, a rise of approximately 14 percent over the 1999 median household income of $49,489 (Source: US Census 2000) and a 45 percent increase over the 1989 figure of $38,771 (Source: US Census 1990). During the seven year period from 2000 to 2006, this represented an average increase of approximately 2 percent per year.

In comparison, and further described below, re-sales in the Wailuku Parkside Subdivision have indicated prices appreciating at a rate of approximately 24 to 40 percent per year during a similar time frame. With home prices increasing at a faster rate than household incomes, many potential buyers are quickly priced out of the market.

Mortgage Interest Rates

Mortgage rates steadily declined during the past six years and momentarily dipped to around 5.00 percent in 2003. As of June 20, 2006, the average interest rate on 30-year, fixed-rate mortgages was at 6.26 percent according to Bankrate.com

The recent rise in mortgage rates was spurred by rising yields in the long term Treasury bond market. In addition, short term interest rates have been rising due to concerns of inflation by the Federal Reserve Board. A constraint on oil production in the Middle East has led to a rise in fuel prices as well as prices for consumer goods. This has a considerable effect on Hawaii due to the increased cost of shipping.

Housing markets throughout the nation have risen in the past five years but have recently showed signs of stabilization due to the rising interest rate environment. The current mortgage rates are still at historically low levels which are still very conducive to home buying (See **Table 3** on the following page).

Table 3 - Historical Trend of 30 Year, Fixed Mortgage Rates

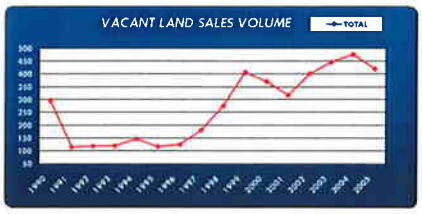
Source: Freddie Mac-Primary Mortgage Survey

General Residential Sales Activity
Island of Maui

The number of units sold is the most basic indicator of market activity and is useful in helping estimate the number of new units which a specific market segment may be capable of absorbing. The downturn in the economy between 1991 and 1998 led to development of low-priced housing on Maui. Zero-lot-line housing projects were popularized during this period as developers strived to make housing affordable to Maui residents. Since 1998, however, real estate began a strong recovery. As evidenced in the following section, prices and number of sales increased while marketing times decreased. The tables on the following pages illustrate the general market trends over the past 16 years on Maui as well as the year-to-date 2006 sales activity.

Vacant Land

Sales of vacant land fell sharply after 1990 (298) to a level wavering around 100 to 150 sales for the next 6 years. Weakest sales, in terms of units sold, occurred in 1991 when only 116 properties were sold. In 1998, the number of land sales increased to 276 and in 1999, increased again to 408, reflecting a gain of 48 percent. Sales have fallen slightly since 1999 with 372 sales in the year 2000 and 318 sales in 2001; however, these figures rebounded in 2002, 2003 and 2004 to 402, 447 and 477, respectively. Vacant land sales for 2005 showed a slight decrease at 421 transactions.



Meanwhile, median prices slowly regained ground from a low of $173,458 in 1999 to $272,483 in 2002, and then sharply increased to $330,075 in 2003, $452,604 in 2004, and $546,540 in 2005.

Median monthly days-on-market figures increased steadily from 67 in 1990 to 344 in 1997, but had fallen to 227 in 2002, to 170 days in 2003, increasing slightly to 173 days in 2004. This average escalated in 2005 to 291 days.

Single-Family

Sales of single-family properties exhibited a decrease after 1990 (560) to a level wavering around 350 to 450 sales for the next 6 years. Weakest sales, in terms of units sold, occurred in 1995 when only 331 properties were sold. In 1997, the number of single-family sales increased to 507 and in 1998, exceeded 1990 results with a figure of 641. The number of sales in 1999 (965 units) was 51 percent more than the number of sales in 1998 (641). Sales were slightly higher in 2000 at 951 units sold, but leveled off in 2001 at 938 units and increased to 997 units in 2002. Sales sharply increased in 2003 to 1,420 transactions, and then decreased slightly in 2004 to 1,228, before climbing to 1,311 transactions in 2005.

Median prices in 2001 showed a 9 percent increase from $275,958 in the year 2000, and reached a high for the past decade with a median of $301,886. In 2002, the median price increased even more to a level of $375,810, an enormous increase of 24 percent over 2001. Median prices for 2003 indicated an increase of about 17 percent to $441,062; then another large 25 percent increase to

$553,167 in 2004. This trend continued in 2005, with a median sales price of $678,321, translating into a 22 percent increase.

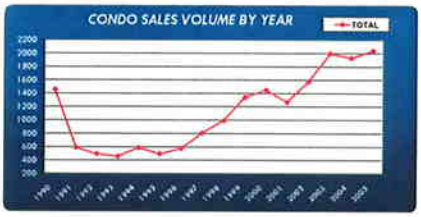
Average monthly days-on-market figures increased steadily from 67 in 1990 to 231 in 1997, but steadily fell to 137 in 2000. It has remained relatively level since that time, except in 2004 when that figure fell to 114 days, before rebounding to 121 days in 2005.

Condominiums

Sales of condominium units fell sharply after 1990 (1,459) to a level wavering between 400 to 600 sales for the next 6 years. Weakest sales, in terms of units sold, occurred in 1993 when only 461 properties were sold. In 1997, however, the number of sales increased to 812 and up to 2,001 units in 2003. 2004 showed a drop in sales, to 1,933 units. This was followed by a record setting year in 2005, with 2,041 units sold.

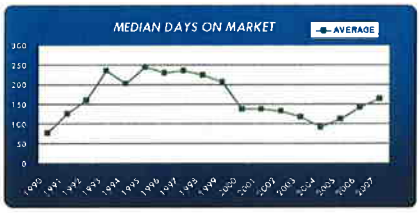
It should be noted that the spike in sales volume between 2003 and 2005 coincides with a flooding of new inventory. During this period,

new condominium projects such as Villas at Kenolio and Hale Kanani (Kihei), Villas at Kahana Ridge (Kahana), and Kehalani Gardens and Iliahi (Wailuku) closed on their units.



Median prices remained in a range from $154,296 to $180,392 between 1990 and 2000. However, since then, the average monthly median price increased 5 percent to $189,946 in 2001, 5 percent to $200,020 in 2002, and 19 percent in 2003 to $238,755. 2004 indicated a sharp increase of 31 percent, with an average median price of $314,448, followed by a 24 percent gain in 2005, to $392,314.

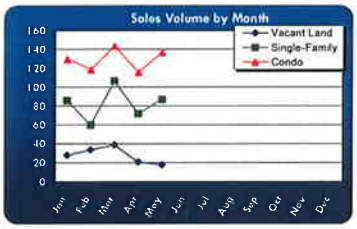
Average monthly days-on-market figures increased steadily from 77 days in 1990 to 230 days in 1996, but had decreased considerably to 133 days by the end of 2002. This figure fell to 118 days in 2003, then to 92 days in 2004, before rebounding to 113 days in 2005.



The Year-to-Date 2006 Maui sales figures for vacant land, single-family and condominium units are shown on the next page. While the median sales price for condominium unit continue their upward trend, prices for single family properties and vacant land have stabilized since reaching their peaks in mid-2005. Sales volume for all types of property has been on a decline since mid-2005; around the same time that mortgage rate started their latest push higher. Despite the short term volatility, the long term trends for median prices and sales volume should still show increases over a year-to-year basis. The average days on market had been on a steady decline since 2000, before increasing in late 2004 to early 2005, primarily for vacant land. It is noted that marketing times for vacant land have shown great volatility over the past 9 months, which may show its sensitivity to speculation. However, the stability of marketing times in 2005 for single-family and condominiums, still indicates a strong demand for owner occupant and rental properties.

SALES VOLUME BY MONTH

2006	Vacant Land	Single-Family	Condo
Jan	28	86	130
Feb	34	60	119
Mar	39	107	144
Apr	21	72	116
May	18	87	137
Jun			
Jul			
Aug			
Sep			
Oct			
Nov			
Dec			

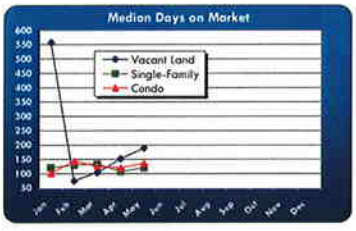


MEDIAN SALES PRICE

2006	Vacant Land	Single-Family	Condo
Jan	$430,000	$690,500	$433,870
Feb	$800,000	$669,500	$430,100
Mar	$701,000	$725,000	$527,625
Apr	$790,000	$700,000	$539,500
May	$657,500	$729,000	$600,000
Jun			
Jul			
Aug			
Sep			
Oct			
Nov			
Dec			

MEDIAN DAYS ON MARKET

2006	Vacant Land	Single-Family	Condo
Jan	558	121	102
Feb	75	130	144
Mar	104	134	126
Apr	152	108	121
May	169	121	136
Jun			
Jul			
Aug			
Sep			
Oct			
Nov			
Dec			



Historical Project Absorption

In addition to the absorption rates of the individual projects, research was also conducted to give a historical look at the total residential inventory absorbed on a year to year basis. This survey included large projects that are typically put on the open market. These projects included single family residential homes, residential house lots, condominium projects, as well as agricultural subdivisions. It is also known that individual property owners occasionally subdivide tracts of land and sell off the lots to relatives or to a private list of purchasers. These types of projects are difficult to track and have not been included in the survey. The intent of this survey was to provide an indication of the capacity that the real estate market has to absorb new inventory on an annual basis.

Within the past 5 years, the real estate market has been steadily increasing in terms of sales volume as well as sales prices. In 1999, 668 new units were purchased. This number dropped to 283 in 2000 and has been on a steady climb up to 2003. In 2003 year, the real estate market absorbed a total of 845 new housing units. In 2004, this number dropped again to 395 units. However, this drop proved to be temporary as numerous projects in Central and South Maui were completed and a total of 819 units closed. These projects included Ohia, Maunaleo, Iliahi, and Kehalani Gardens within the Kehalani Project District as well as the Sand Hills Estates and Legends in the Maui Lani Project District. In addition, Hale Kanani and Wailea Beach Villas were completed in South Maui. There were a few projects in West Maui that were completed in 2005 and included Mahanalua Nui Phase IV, Honolua Ridge and the Villas at Kahana Ridge. Lanikeha in Kaanapali closed a third of their lots in 2005 and has continued into 2006. This survey only included the original sales of units within new projects.

During the six year period between 2000 and 2005, there has been an average of approximately 626 units sold each year. By dividing the supply available in the market by this average, an estimate of the remaining years of current supply can be determined. This demand is expected to continue in the near future as the release of supply in the market has been met with great interest. However, due to the recent stabilization of the real estate market, it should be expected that sales may not be as brisk as in the past. The Cottages at Kehalani has approximately 470 interested parties for their 114 homes while Akolea at Kehalani has 120 names for their 97 homes. Both of these projects have just begun their marketing within the past two months. The Legends at Maui Lani, Phase II are selling their all of their homes as they are released for sale.

Table 4 - Units Absorbed Per Year (Central Maui)

	Type	Units	Year 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total Closed
GREENS	L	217	38	67	104	8							217
IAO PARKSIDE IV-B	C	52	11	14	14	5	6	1	1				52
IAO PARKSIDE IV-C	C	52		2	1	3	5	41					52
NANEA	S	90		20	70								90
GRAND FAIRWAYS	L	36			31	5							36
IAO PARKSIDE IV-A	C	13			4	7	2						13
GRAND FAIRWAYS NORTH	L	79				57	22						79
WAILUKU PARKSIDE	S	119				31	87	1					119
THE ISLAND SCHULER PHASE I	S	55				1	24	30					55
THE ISLANDMAUI LANI PHASE I	L	44				10	23	10	1				44
OLENA	S	31					7	24					31
THE ISLAND MAUI LANI PH II	L	35						35					35
THE ISLAND SCHULER PH II	S	53						9	44				53
WAILUKU COUNTRY EST	L	184							175	6			181
WAIOLANI ELUA	L	25							20	3			23
BLUFFS - Maui Lani	L	15							6	9			15
- Schuler	S	21								7	14		21
OLENA II	S	32								32			32
LEGENDS	S	143								47	90		137
OHIA AT KEHALANI	S	140									131		131
MAUNALEO AT KEHALANI	S	82									49	15	64
ILIAHI AT KEHALANI	C	92									57	24	81
KEHALANI GARDENS	C	132									83	37	120
KOA AT KEHALANI	L/S	72									14	21	35
SAND HILLS ESTATES	L	108									84	13	97
OHIA AT KEHALANI PH II	S	44										0	0

Table 5 - Units Absorbed Per Year (West Maui)

	Type	Units	Year 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total Closed
KAHANA RIDGE	L	228		32	195			1					228
KAUHALE MAHINAHINA	S	19			19								19
MAHANALUA NUI (I to III)	L	104			33	10	19		41	1			104
VINTAGE	C	73				3	70						73
KE ALII SUB'D III	L	12				7	1	4					12
PINEAPPLE HILL II	L	30				12	8	9	1				30
MAKILA I	L	19						19					19
OLOWALU MAKAI	L	5					1	4					5
OLOWALU MAUKA	L	14						8	6				14
COCONUT GROVE AT KAPALUA	C	36					36						36
PUUNOA SUBDIVISION	L	14					14						14
KAHANA NUI SUB'D (HUA NUI)	L	17					16	1					17
PINNACLE	C	33					5	8	8	12			33
SUMMIT													0
Phase I	C	18					5	11	2				18
Phase II (Pulled off Market)	C	17								17			17
Phase III	C	19							19				19
NAPILI VILLAS PH I	C	100						100					100
NAPILI VILLAS PH II	C	44						44					44
KE ALII SUB'D I	L	15						12	3				15
KAPUA VILLAGE	L	45						10	35				45
NAPILI VILLAS PHIII	C	40							40				40
MAKILA II	L	24								24			24
HONOLUA RIDGE	L	25								17	8		25
VILLAS AT KAHANA RIDGE	MF	117									87	27	114
MAHANALUA NUI IV	L	36							0		30	1	31
LANIKEHA	L	139									47	32	79

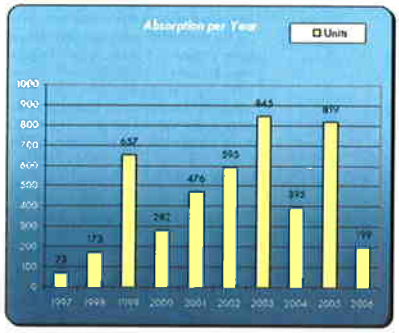
Table 6 - Units Absorbed Per Year (South Maui)

	Type	Units	Year 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total Closed
WAILEA PUALANI	L	92	2	10	19	29	5	1					66
WAILEA FAIRWAY ESTATES	L	50	2	2	2	2	1		1	26			36
MEADOWLANDS	L	32	20	5									25
MAKENA PLACE	C	10		1	2	2	2	2	1				10
KAMAOLE HEIGHTS	L	40			40								40
MEADOWLANDS II	L	88			63	25							88
WAILEA FAIRWAY VILLAS	C	118			56	62							118
PIILANI VILLAGE PHASE II	S	114					112	2					114
MALUHIA AT WAILEA	C	14					5		1	3	2	1	12
KE ALII KAI	S	96						61	35				96
KENOLIO (KAONOULU) ESTATES	S	51						45	6				51
NA HALE O MAKENA	C	40						13	24	3			40
KEAHOU AT MAKENA	L	7						6		1			7
PIILANI VILLAGE III	S	117							117				117
HONU ALAHELE	L	64							64				64
KILOHANA RIDGE	S	73							69	4			73
KILOHANA HEMA	L	29							28	1			29
VILLAS AT KENOLIO	C	140							61	77			138
ONE PALAUEA	L	17							1	8	8		17
ALII VILLAGE	L	27								27			27
KENOLIO MAUKA		12								12			12
HALE KANANI	C	72									70	2	72
WAILEA BEACH VILLAS	C	98									34	26	60

Table 7 - Units Absorbed Per Year (Upcountry/East Maui)

	Type	Units	Year 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total Closed
HAIKU MAKAI	L	27		20	4	3							27
MAUNAOLU PLANTATIONS	L	39						27	12				39
RESIDENCES AT KULAMALU	L	57						56	1				57
NORTH SHORE VILLAGE	S	23							22	1			23
RIDGE AT KULAMANU	L	57								57			57
KULAMALU HILLTOP (DOWLING)		11									11		11
E PAEPAE PUKOA		16											0

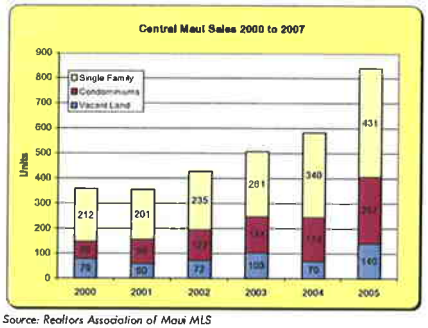
Table 8 - Total New Project Absorption 1997 to YTD 2006



Historical Resale Activity in Central Maui (Past 6 Years)

According to the Realtors Association of Maui, Multiple Listing Service, there has been an annual average of 567 sales of condominium, residential and vacant land properties in Central Maui (Wailuku and Kahului) over the past seven years. During this period, the number of vacant land sales ranged from 54 in 2006 to 140 in 2005, with an average of approximately 81 sales each year. Condominium units ranged from a low of 84 in 2007 to 267 units in 2005, with an average of 148 units sold each year. Single family properties ranged from 201 in 2001 to 519 in 2007. The dramatic increase was attributed to the closing of affordable priced units in the Waikapu Gardens subdivision. Single-family units averaged 337 sales per year during this period.

	2000	2001	2002	2003	2004	2005	Total
Vacant Land	79	60	72	103	70	140	524
Condo	68	95	122	144	174	267	870
Single Family	212	201	235	261	340	431	1,680
Total	359	356	429	508	584	838	3,074



Source: Realtors Association of Maui MLS

Judging from the previous years' numbers of sales, it appears that the real estate market has the capacity to absorb the subject's 516 units fairly easily. When compared to the sales volume for the entire Island of Maui, volume for Central Maui properties have been continually increasing while sales for the entire Island (Central Maui included) have stabilized. This is a good testament to the desirability of the Central Maui location.

Historical Resale Activity Central Maui (Past 12 Months)

Condominiums Units

Since the subject development will contain approximately 274 Multi Family units analysis of the market for condominium units in Central Maui was analyzed. The sales included all condominium units that were sold within the past year. This time frame was determined to be appropriate since it gives a current look at the market. There were a total of 259 sales of condominium units with prices ranging from $109,500 for a one bedroom/one bath unit at 341 North Market Street to $700,000 for a residential unit at the Maui Realty Suites. The median sales price was $276,000 while the average bedroom and count was approximately 2 bedrooms and 2 baths. The average living area for the units was 875 square feet not including lanai and porch areas. Of all the property types, condominium units had the lowest marketing time with 179 days on market.

Analysis of the results of this research indicated that 123 of these sales were original developer sales in the Kehalani Gardens project. Of the remaining sales the most abundant occurred in the Harbor Lights project in Kahului, located across of Kahului Harbor. There were 50 sales in this project with an average price of $190,830. In 2001, the average price of a unit in Harbor lights was approximately $45,000. Another active project was the Iao Parkside Condominiums, which had a total of 40 sales over the past year. The average price in this project was approximately $330,250.

Vacant Land

The subject's single family component will consist of rural lots containing half-acre and one-acre of land. In Central Maui, this mix of lot sizes is relatively untested. Over the past year there were 145 sales of vacant land with a median price of $389,000. The average land area was 30,553 square feet. Despite the lack of Rural (0.5 acre) subdivisions in Central Maui, there are numerous single family subdivisions with lots in the 10,000 square foot range as well as agriculture subdivisions with lots containing 2.00 acres or more of land area. Research on the MLS indicated a total of 145 sales of vacant land in the past year with 96 being in the Sandhills Estates Subdivision and all of these appear to be original developer sales. This subdivision is located along the Dunes at Maui Lani Golf Course off of Maui Lani Parkway. These sales ranged in price from $294,000 to $495,000 and ranged in size from 7,561 to 16,999 square feet in size, still slightly lower than the half-acre lots that will be offered by the subject. The lots with a similar size as the subject's rural lots are located off of River Road in Waihee approximately 3 miles north of Wailuku Town. One property in this subdivision sold for $450,000 and was exactly half-acre in size or 21,780 square feet.

The research also showed that there were a total of 24 agriculture lot sales within the Wailuku Country Estates Subdivision and another 3 sales in the Maluhia Country Ranches Subdivision. Wailuku Country Estates is a 184 lot agriculture subdivision at the overlooking Happy Valley and was completed in 2003. This subdivision was highly successful and sold out almost immediately while closing the majority of their lots in 2003. The most recent sales in this subdivision ranged from $545,000 to $750,000 over the past year with most in the $625,000 to $650,000 range. The sales in the Maluhia Country Ranches Subdivision consist of lots from 3.5 to 5.68 acres in size but are usually afforded good ocean views despite their usually irregular terrains. The subdivision is located approximately 7 miles north of Wailuku Town and access is somewhat difficult as the narrow road way winds along steep cliffs. Recent sales prices range from $600,000 to $825,000. Despite not having the exact size as the subject's rural lots, existing subdivisions such as the Wailuku Country

Estates and Sandhills subdivisions have been quite successful in the market. Although sales of Koa were not listed on the MLS, the project has sold 48 of its 72 lots under contract and has closed on thirty five of those lots between October 2005 and June 2006.

Single Family

Although the subject's Rural house lots will be sold as vacant lots, the Consultant found it important to look at sales of single family homes in the market. This is because finished home sales are an alternative to purchasing and developing a vacant lot. In general, the sales prices from $225,000 for a 616 square foot house on Momi Lane in Wailuku to $1,450,000 for a 2,948 square foot house with an ohana unit in the Maluhia Country Ranches subdivision in Kahakuloa. The median sales price was $600,000 with an average living area of approximately 1,625 square feet. The room count was about 3.4 bedrooms with an average of 2.3 baths. Further review of the data indicated that the original closings for the Maunaleo at Kehalani Subdivision were included in this list, in addition to 30 of the original closings for the Legends at Maui Lani.

Other notable subdivisions with activity include Wailuku Parkside, Greens, Grand Fairways North, the Island and Bluffs at Maui Lani, Waiehu Terrace, Waiehu Heights, and Kahului PUD.

Project Sales in Central Maui

The success of projects in Central Maui can be attributed to its location with respect to governmental agencies, transportation facilities, and commercial and professional services. New developments like the proposed subject often create excitement in the market, especially when the product is perceived to offer a particular value to the buyer. Project sales in Central Maui, at all price levels, have met good demand from the market in recent years. As shown in on the following page, absorption rates have been rapid in recent years. In many subdivisions, especially the lower-priced homes, the residences are immediately reserved and waiting lists are as long as the reservation list. Ohia at Kehalani and Maunaleo each had waiting list of approximately 300 names and closing rates were 9.42 and 6.69 homes per month, respectively.

Another example that stands out is Spencer Homes' affordable single-family subdivision in Waikapu. This project is planned for approximately 410 single-family homes, of which 50 percent will be affordably priced to those households earning up to 120 percent of the median household income. Prior to the start of construction, the developer had approximately 3,500 families on his waiting list.

The long waits in line to secure a spot on the reservation list and lottery systems are well-documented for recent Maui housing projects.

A schedule of absorption rates of new subdivisions and condominium projects in Central Maui appears on the following page. They show that recent developments have been very productive in the market. In many of the projects, most of the homes or lots were reserved and in escrow prior to the commencement of construction. Developers have been pressed to speed up the construction process due to the heavy demand. It goes without saying that supply is the limiting factor in the current real estate market. Release of more supply into the market such as those that are proposed by the subject's 516 units should be well received based on historical information. Additionally, the added competition in the market may have a secondary effect of stabilization or even lowering of prices in the region. This is turn will help make housing more affordable to Maui's residents.

Table 9 - Central Maui Projects

No.	Project Name Location	No. of Units	Project Type	Lot Size	Living Area of Dwellings	Price Range	Closing Time in Months	Units Sold	Units Sold Per Month
1	Olina at Kehalani Wailuku, Maui, Hawaii Towne Dev of Hawaii	140 House and Lot Packages	Single Family	3,739 to 12,534 SF	1,308 to 1,860 sf	$350,000 to $775,000 (2/05 to 4/06)	13.91	131	9.42
2	Maunalani at Kehalani Wailuku, Maui, Hawaii Stanford Carr Dev	83 House and Lot Packages	Single Family	6,301 to 16,082 SF	1,408 to 2,152 sf	$433,900 to $839,000 (6/05 to 4/06)	9.57	64	6.69
3	Hoolei at Kehalani Wailuku, Maui, Hawaii Towne Dev of Hawaii	92 Condominiums	Lowrise Condos	N/A	1,242 to 1,258 sf	$292,200 to $433,795 (8/05-2/06)	5.82	81	13.92
4	Kehalani Gardens Wailuku, Maui, Hawaii Stanford Carr Dev	132 Condominiums	Lowrise Condos	N/A	935 to 1,133 sf	$190,000 to $470,000 (9/04-10/07)	11.28	120	10.64
5	Kaa at Kehalani Wailuku, Maui, Hawaii Towne Dev of Hawaii	72 House Lots	Single Family	7,900 to 21,675 sf	N/A	$390,000 to $484,000 (10/05-6/06)	8	35	4.38
6	Olena at Kehalani Ph II Wailuku, Maui Stanford Carr Dev	32 House and Lot Packages	Single Family	6,040 to 8,816 sf	1,328 to 1,681 sf	$320,410 to $505,000 (7/04 to 11/04)	3.45	32	9.28
7	Maui Lani The Legends Schuler Homes	139 House and Lot Packages	Single Family	3,072 to 6,767 sf	1,286 to 1,930 sf	$321,000 to $633,000	11.94	137	11.47
8	Maui Lani The Bluffs	36 Lots and House and Lot Packages	Single Family	8,190 to 12,538 sf	N/A	$250,000 to $972,000	15.68	36	2.30
9	Iao Parkside IV-C Wailuku, Maui, Hawaii Schuler Homes	40 Condominiums	Lowrise Condos	N/A	543 to 1,111 sf	$100,000 to $165,000 (3/02 6/02)	3	40	13.33
10	Waiakoa Ekia Waikapu, Maui, Hawaii Wailuku Elua, Inc.	25 House Lots	Single Family	7,500 to 10,831 sf	N/A	$134,000 to $169,000 (6/03-3/04)	7	23	3.29
11	Olena at Kehalani Wailuku, Maui Stanford Carr Dev	31 Lots	Single Family	6,000 to 8,000	1,302 to 1,681 sf	$245,000 to $318,000	7	31	4.43
12	Honua at Kehalani Wailuku Spencer Homes	80 House and Lot Packages	Single Family	6,030 to 8,050 sf	1,144 to 1,717 sf	$179,900 to $255,793 (11/98 to 7/99)	8	78	9.75
13	Maui Lani (Maui Lani Dev.) Phase IV Maui Lani Development	House Lots	Single Family	5,647 to 12,522 sf	N/A	$79,000 to $92,800	12	75	6.25
14	Maui Lani (Schuler Homes) The Island Phase I Phase II	House and Lot Packages 56 93	Single Family			$339,500 to $410,500 (3/01 to 11/02) (9/02 to 8/03)	19 12	56 30	2.95 4.17
15	Wailuku Parkside Wailuku Stanford Carr Dev	119 House and Lot Packages	Single Family	6,000 to 11,502 sf	1,267 to 1,694 sf	$179,900 to $285,000	17 (12/99-5/01)	119	7.00

Price Appreciation/ Depreciation

The Consultant analyzed recently completed subdivision sales in Maui to illustrate the rate of price appreciation. We specifically focused on single family subdivisions, condominium projects, and residential house lot subdivisions in the Central Maui neighborhood to give an indication of the demand for housing and its affect on prices within these projects. These developments were selected knowing that these products represent moderately priced market developments.

In Central Maui, our focus on single family and condominium projects included resales in the Olena, and Wailuku Parkside Subdivisions as well as resales in the Iao Parkside Phase IV-C. These are among the most recently completed projects in Central Maui and the price appreciation of resales in these projects provides a good representation of the demand for residential units.

Wailuku Parkside - Original closings ranged from $183,585 to $313,019 between September 2000 and February 2002. Since then there have been many resales with the most recent reaching $699,000. Analysis of the individual sales indicate that the prices are about 70 to 185 percent greater than original sales prices on average, the increase was about **125 percent** more than the original sales prices. On a monthly basis, these sales indicated price increases of **1.96 to 3.35 percent per month**, or **24 to 40 percent per year**.

Olena Phase I - Further comparisons were made between the average sales price at Olena Subdivision Phase I within the Kehalani Project District. The original prices at Phase I averaged about $287,267 and all of the lots closed between October of 2001 and April 2002. In 2004, the most recent sales within this subdivision have seen gross increases ranging from **40 to 111 percent** higher than original prices. Calculated on a monthly basis, from the original sale to the most recent sale, the price increases ranged from **1.62 to 3.37 percent** per month.

Iao Parkside Phase IV-C - This is the most recently completed condominium project in Central Maui and original sales prices ranged from $100,000 to $$165,500. According to public records there have been numerous resales beginning in May of 2004. These resales indicated increases of approximately **77 to 169 percent** over the original prices. On a monthly basis, these resulted in increases of **2.42 to 3.59 percent** per month.

In addition to these well established projects, resales in recently completed Kehalani projects are showing even higher appreciation rates when looked at on a per month basis.

A resale at the Iliahi at Kehalani condominium project in April of 2006 showed a gross increase of **33 percent** over a three month period. This calculated to be an increase of **11 percent** per month.

Another resale of a condominium unit in the Kehalani Gardens project showed multiple sales of a unit over a 3.5 month period. The first resale occurred **less than a month** after the original close and indicated a sales price that was **50 percent** higher. The next sale occurred approximately 2.5 months later and indicated a price only **5.6 percent higher** than the previous sale. Despite the slower appreciation rate, the sales price of the last sale in February 2006 indicated a 57 percent increase over the original sales price, which calculated to an appreciation rate of **16 percent** per month.

Further evidence of the demand for Central Maui homes can be seen in the appreciation of properties at the Maunaleo project. Since the first closing in April of 2005, there have been 12 resales within this project. More significant is the appreciation of the prices. Although two properties were sold for modest gains of 6 percent each, the remaining 10 sold with gross increases of **26.6 to 64.2 percent**. Two of these sales closed almost immediately after the original closing for gains of 26 and 52 percent. The other resales indicated monthly appreciation rates of **8 to 45 percent per month**. Resales could have been researched for many older projects in Central Maui, but the emphasis of this analysis is the demand by purchasers of new homes.

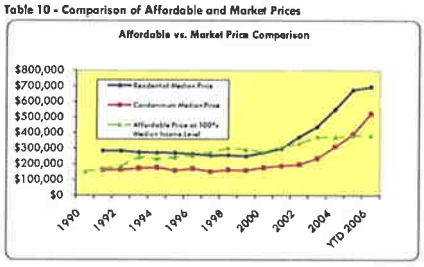
Resale prices in recently completed projects in the Kehalani Project district are increasing at a rapid pace despite original closings less than one year ago. Gross increases range from 6 to 64 percent with most clustering around the 30 to 40 percent range. On a per month basis, these increases are among the highest experienced at 3.6 to 17.5 percent per month, with some immediate sales showing increases of 25 to 50 percent. Typical monthly increases in this strong market are 2 to 3 percent per month. Resales in established single family subdivisions and condominium projects in Wailuku supported these increases and revealed annual appreciation rates of 40 to 140 percent between 2000 and 2005.

Comparison of Affordable And Market Prices

An analysis was done to compare the increase in affordable prices to the increase in the median prices for residential and condominium units. The affordable price is based on the median income level for the County of Maui and typical mortgage interest rates and loan requirements. This calculation assumed a typical 80 percent loan to value ratio and a 35 percent debt to income level. Since 1990, interest rates have dropped from 10.13% to 6.37% as of July 2006. In addition to the steady increase in the median income level, lower

interest rates allow housing to be more affordable. As shown in **Table 10**, the price which is affordable to earners of the median household income was compared to the median prices of residential and condominium prices in the market.

Table 10 - Comparison of Affordable and Market Prices



As income levels rose from 1990 to 2000, residential properties became more affordable to those earning the County's median income level, although it wasn't until 1999 that the median price for a residential property was actually lower than the price that can be afforded by a household earning the County's median income. During this period, the only option was to purchase a condominium unit, which for larger families can be less accommodating. In 2001, the nation's economy hit a recession, which was followed by the lowering of short term interest rates by the government. Consumer money flowed out of the stock market and into bonds and treasuries, which pushed long term interest rates lower. This caused a surge in demand for real estate, which sent prices skyrocketing within a few years.

By 2002, the soaring prices outpaced the County's median income level despite steadily falling interest rates. At the same time, condominium units were found to be a more feasible alternative and sales in this category started to pick up their pace.

From 2003 to today, sales prices for residential properties continue their climb to record levels, making it unaffordable for most of Maui's residents. Condominiums also began their record climb and by 2005 the median price surpassed the price that would be affordable to those earning the County's median income level.

By 2006, this situation has reached critical levels as prices for both residential and condominium units continue upwards. It does not help

that mortgage rates have also been trending slightly upwards, which lowers the affordability to buyers needing to finance their purchase.

In past few years, when demand far exceeded supply, prices were driven upwards and many of Maui's residents could not afford to buy or even rent homes. To help alleviate this situation, more housing units should be brought to the market. The added supply may help to slow the rising prices, especially in categories where Maui's residents are being priced out of the housing market.

Residential Demand Model
(Survey of Short Term Supply)

An effort was made to measure the effective demand for the subject's 516 units. A model was developed that considered the increase of population and the current competitive supply in the market. This model is illustrated below.

Table 11 - Residential Demand Model

Housing Demand -- Central Maui Study Period 2006 – 2011		
	Central Maui	Maui Island
1. Population change during period (Maui Island)		11,637
2. Population change during period (Central Maui)	3,955	
3. Average household size (Maui Island)		2.88
4. Average household size (Central Maui)	3.13	
5. Total new housing units demanded (Maui Island) [#1 ÷ #3]		4,041
6. Total new housing units demanded (Central Maui) [#2 ÷ #4]	1,264	
7. # of subject type units demanded each year [#6 ÷ 5 (yrs)]	253	808
8. Current market area supply of subject type units	1,354	2,107
9. Total market area residual demand [#6 – #8]	-90	1,934
10. Duration of existing supply without subject (years) [#8 ÷ #7]	5.4	2.6
11. Duration of existing supply with subject's remaining units (years) [(516 units + #8) ÷ #7]	7.4	3.2

Although the subject is situated in Wailuku and its primary market is Central Maui, the subject's secondary market area was determined to include the population centers of West and South Maui. Due to the island-wide demand for developable residential land on Maui, it was felt that interested buyers will come from all areas of the island. This is especially true because Central Maui is the center of employment for the island and Wailuku is home to the County seat. Furthermore, Kahului has the majority of the industrial lands on Maui as well as the airport and harbor facilities. The island's only full service hospital is also located in Kahului.

Island of Maui
Housing Demand Analysis

Over the next 5 years, the total population of Maui is expected to increase by 11,637 persons, while the expected average household size is projected to be approximately 2.88 persons per household. Based solely on this population increase, the total demand for housing units is projected to be 4,041 units over the next 5 years.

As mentioned earlier, the subject will consist of 274 multi-family units and 242 Rural zoned lots. It was determined that buyers of such a wide range of product will be prospects in both the single-family and multi-family residential markets.

Based on the projected population increase of Maui, there would be a demand for 4,041 housing units over the next 5 years. It is estimated that there will be a current and near-future supply of 2,107 units currently available on the market. Based on the average amount of demand for the next five years (808 units per year), this supply will last for 2.6 years. This resulted in a residual demand of 1,934 units over the next five years. This indicates that near term demand levels will exceed the supply for homes by nearly a 2 to 1 margin.

Central Maui
Housing Demand Analysis

Central Maui is a highly convenient location with respect to its proximity to government buildings, such as the County, State and Judicial Buildings, numerous shopping centers, as well as various professional services. In addition, Kahului is the center of industrial operations due to its proximity to transportation facilities such as the Kahului Airport and Harbor.

For these reasons, Central Maui has approximately 40 percent of the total jobs on the Island of Maui, according to the U.S Census Bureau (http://censtats.census.gov/cbpnaic/cbpnaic.shtml) and residential projects in Central Maui have been met with great demand and all have sold out within a short period. Due to the highly desirable location of Central Maui, a separate Housing Demand Analysis was completed based on the supply and demand factors of Central Maui.

During the 5 year study period, the projected population increase is expected to be 3,955 people, with an average household size of 3.13 persons per household. This amounts to a demand for 1,264 housing units that will be needed during this study period. Since the subject will contain a mixture of single-family lots, house and lot packages, and multi-family units, a wide range of prices are represented by this mix. When compared to the current supply in the market of 1,354 units, a slight oversupply of 90 units is calculated. Based on the average amount of demand for the next five years (253

units per year), this oversupply will last for 5.4 years. This indicates that the supply currently available in the market is greater than the demand over the next 5 years. Despite the oversupply as indicated by our housing model, it should be noted that this oversupply could be absorbed by the market in less than one year, based on historical absorption rates. It is not considered to be an excessive or significant amount of supply to affect the market. The construction of housing units in Central Maui could be a result of the desirability of the Central Maui region four housing and employment due to its highly convenient location. Because of this, it can be expected that the 90 units may also be absorbed by the influx of residents in other regions of Maui, migrating to Central Maui.

Buyer Profile

Up to this point, the demand model that has been presented only considers the demand from the increase in population over the specified time period. It does not consider the existing local residents who are potential participants in this market.

Most significantly, this model does not consider resident buyers who are moving up, or upgrading to higher priced homes. Over the past few years, prices have doubled in some Maui neighborhoods while the island wide median prices for single family homes has increased anywhere between 20 and 25 percent per year. These increases have built equity for existing homeowners just by the appreciation of their homes. This situation allows many current home owners to sell their existing homes at a profit and move their equity into another property. The demand model presented above does not account for this segment of the market, which may comprise a significant amount of the buyers of the subject's project.

In addition to upgrade buyers, there are also local investors and partnerships that purchase units for long term investment purposes. There is also the market segment that purchases property on the island as a second home or vacation property. Once again, this model does not account for these segments.

Evidence of this additional demand can be seen when looking at the number of re-sales of existing properties in Central Maui as indicated by the MLS, as well as the number of sales that have occurred at new projects over the past year.

According to the previously described Realtors Association of Maui MLS data, there has been an average of approximately 500 sales of existing single family, condominium and vacant land properties in Central Maui over the past 7 years.

Hawaii Housing Policy Study Update 2003

This study provides evidence of the need for additional housing in Maui (See **Exhibit C** at the end of this report). The balance between supply and demand has shifted greatly in recent years, as a result of the limited supply described herein as well as the low interest rate environment that makes home ownership easier for the consumer. This is evidenced by the rapid increase of prices of single-family homes and rental units on Maui. Prices for condominium and vacant land properties have also been on the increase. This most recent update of the study was completed in 2003.

Single-Family Home Prices

As mentioned before, it is a well known fact that single-family housing prices are increasing at a fast pace and have pushed prices for residential properties to historical highs. The Hawaii Housing Policy Study Update, 2003, revealed that 58 percent of the parties surveyed stated that the high prices are the reason why they do not want to purchase a home *(Source: Hawaii Housing Policy Study Update 2003 - Table IV D-8)*. The Kihei/Makena and Paia/Haiku residents had the lowest percentage of this response at 39.3 and 20.3 percent respectively. Among all the regions on Maui, Wailuku/Kahului residents had the highest percentage of this response at 73.5 percent.

County of Maui – Housing Demand Model

This study indicated that as of 2006, there was a current need for 3,755 resident housing units. This study also projected the effect of increasing population and the effect of decreasing household sizes on the supply and demand for residential units. The demand for housing units was calculated by comparing the increase in Maui's population to the average household size during a certain period. As population increases and household sizes remain the same or decrease, this would indicate the need for additional housing units. Conversely, if population decreases, while household sizes remain the same, this would indicate a softening in demand for housing units.

According to the projections by SMS for the Housing Policy Update 2003, the supply and demand model indicates that from 2006 to 2014, demand will be higher than the available supply in the market. However, from 2015 to 2023 this balance will shift and provide a slightly higher supply of product versus demand. Theoretically, only at this point would prices begin to fall due to the oversupply in the market. However, this relief will not come for another 10 years.

The total supply that will become available between 2005 and 2024 (the end of the study period) will be 11,593 units, compared with the demand for 11,589 units.

Through this study period, the balance between supply and demand does not significantly shift to either side. However, this indicates that the original deficit of 4,170 units will not be reduced. By the end of the study period there will still be a need for 4,156 additional resident housing units.

It is also noted that resident housing units (RHU) only account for 70 percent of the total housing units in any given year. According to the Hawaii Housing Policy Study 2003, the remaining units include vacant units which is generally 5 percent of the total and non-resident housing units which account for approximately 25 percent of the total housing unit inventory. Non-resident units are defined as units that are set aside for rental pools and are targeted to transient visitors. These units are not available for County residents on an ongoing basis.

Based on these allocations, the actual number of additional housing units that need to be built in order to remove the deficit of resident housing units in 2024 is 5,937 units.

EFFECTIVE DEMAND

Effective demand considers the ability of market participants to purchase a home. The Hawaii Housing Policy Study 2003 compared the profiles of potential buyers and renters from previous studies conducted in 1997 and 1992.

"Own Now" - The 2003 study indicated that approximately 48 percent of potential owners currently own housing unit. This is down from previous studies in 1992 and 1997 when the percentages were 50 and 53 percent respectively. Similarly, only 6 percent of potential renters have indicated that they currently own a housing unit, down from 12 and 14 percent in the past studies.

"Make Over $25,000 per Year" – Despite lower ownership numbers, buyers are earning more than they were in the past. The 2003 study indicated that 55 percent of the respondents make $25,000 or more per year. Past surveys in 1992 and 1997 showed only 23 and 30 percent were making that amount. In 1997, only 7 percent of potential renters were making $25,000 or more per year. This number jumped six fold in 2003 to 43 percent.

"Have Household Incomes of $75,000 or More" – Since 1992, this percentage for potential buyers has been steadily climbing from 10 percent in 1992 and 18 percent in 1997 to 30 percent in 2003. The rate for potential renters increased slightly since 1992 but has generally held steady at 7 percent.

"Currently Employed" – The employment rates for potential buyers has steadily increased from 93 percent in 1992 to 97 percent in 2003. However, employment rates for renters have fallen below 1992 levels. Most recently this rate was estimated at only 85 percent. Previous studies indicted employment rates of 87 percent in 1992 and 92 percent in 1997.

"Have More than $40,000 for Down Payment" – Despite, strong indicators of increasing effective demand by potential buyers, this category has slipped since the initial study in 1992, when 32 percent of respondents said that have more than $40,000 for a down payment. These numbers dropped to 22 percent in 1997 and to 18 percent in 2003. This number has remained level for potential renters, at 8 percent.

The survey conducted in 2003, has indicated that the effective demand by potential buyers has increased since earlier surveys conducted in 1992 and 1997. With the exception of down payment, potential buyers seem to have increased their ability to purchase a home as employment and income levels have made steady increases. Potential renters offer a mixed indication of effective demand as income has increased while employment rates have dropped.

CONCLUSION

Over the past decade, Maui has seen significant growth in virtually all aspects (e.g., population, visitor arrivals, economy) of the community. One of the most important issues facing Maui has been the need for affordable housing. Increasing population and the low interest rate environment has increased the demand for homes. This demand has led to record prices and sales volume for real estate. Many single family subdivisions and condominium projects have been sold out prior to the completion of construction. In recent years, a strong emphasis has been placed on the construction of affordable homes, as housing prices have outpaced increases in household incomes. The current County administration has set its sights on providing relief for island residents in this strong real estate market.

The following points summarize the supply of real estate in Maui at this time.

- As of June 2006, there are currently 2,300 active listings in the Realtors Association of Maui Multiple Listing Service for all types of residential properties on Maui.

- There are approximately 2,107 new housing units (single family residential, condominium and residential house lots) currently available in the market. This was determined to be the short term supply of new housing units or vacant lots available for purchase in the market. Of this total, approximately 1,354 units are located in Central Maui. 523 units are located in South Maui. West Maui has only 154 of the total short term supply.

- Based on historical annual absorption rates of the real estate markets, the current short term supply of units is expected to last approximately 4.5 years (2,107 units of supply ÷ 463 units of average absorption over 10 years). Equating the increase of households over the next five years with the required number of housing units, an average annual demand of 808 units per year is expected. Without additional inventory, the current supply will last 2.6 years (2,107 ÷ 808).

- In addition to the existing supply, potential supply on the entire island of Maui is estimated to be an additional 15,700 to 17,500 units. These units include remaining units in existing, entitled projects that have not been built or brought to the market yet. This count also includes projects that are in the planning phases and may be developed in the future. Although there is a chance that some of this potential supply

may be built soon, it is difficult to gauge the timing of these projects until construction actually begins.

Economic changes, community intervention, market conditions or internal issues with the developers may affect the feasibility of many of these projects. In reality, some of these projects may never be approved and some of the larger ones are expected to take 20 to 30 years to be built out. For this reason, the number of units of potential supply that will actually be developed is expected to be much lower than the 15,700 to 17,400 units on the list.

For example, in Central Maui, the Maalaea Mauka Project District with its 949 units and A&B Properties' Waiale project which may bring between 1,900 and 3,700 are two potential projects but both are still in their planning and entitlement stages and there is an uncertainty whether they will actually be brought to the market.

According to the Hawaii Housing Policy Study 2003, there will be a total of 10,692 resident housing units (RHU) available from 2006 to 2024. This does not include vacant units as well as units set aside for non-resident occupancy.

The following points summarize the demand for real estate in Maui at this time.

Population on Maui between 1990 and 2000 grew by 27.6 percent. Population is expected to increase by 44 percent from 2000 to 2025.

Mortgage rates remain at historical lows despite rising slightly since hitting a low in mid-2003. As of June 2006, the average interest rate on a 30-year, fixed-rate mortgage was approximately 6.5 percent. These lower rates typically mean that real estate becomes more affordable to a larger segment of the population. At the same time, however, prices tend to rise faster and at rates higher than increases in household incomes. This factor has quickly decreased the affordability of home ownership to many potential buyers.

Real estate sales activity in land, single-family and condominium properties has stabilized in terms of number of sales and median sales price since their peaks in mid-2005. However, the median sales price for single family homes is only 7 percent off its high while condominium the median price of a condominium unit continues its climb to record levels. The median sales price of vacant land which is the most speculative

type of property has seen some volatility in recent months. At the same time, marketing times or days-on-market for single family and condominium units remain at record lows while days on market for vacant land has been showing the same volatility as its median price.

There is a strong demand for real estate in the neighborhood to be occupied by Pu'unani. Research of sales performance of the new projects in Central Maui indicated rapid absorption of the new units and re-sales demonstrating very high appreciation rates. This is a good testament to the desirability of the Central Maui properties.

The Hawaii Housing Policy Study Update 2003 shows that there will be a demand for 11,103 new resident housing units (RHU) from 2006 to 2024.

The Hawaii Housing Policy Study Update 2003 also indicates that demand will outweigh supply until the year 2015 when supply will be slightly higher than demand. In theory, and assuming stable market conditions, only at this point will lower prices be realized in the market due to the slight oversupply. The higher demand up to 2015 means that there is no short term relief for high sales prices, meaning many of Maui's residents will remain out priced in this market.

The Hawaii Housing Policy Study Update 2003 also estimated a deficit of approximately 3,755 needed resident housing units as of 2005. By the end of the study in 2024, this deficit will increase by approximately 10 percent to 4,156 units.

The immediate availability of 2,107 housing units in the market has not done much to ease the historically high sales prices for real estate. A significant increase in supply in the market may have that desired effect on sales prices.

There is currently an imbalance between the supply and demand for residential real estate on Maui. Prices have increased significantly during the past few years and have made home ownership extremely difficult for residents of Maui, especially for those near the median income levels. Most of the development focus, both current and past, has been on market level, upper income brackets or the luxury resort market. There is a strong need for development to serve the general population and ultimately rebalance the supply and demand factors for residential properties.

In this light, the short-term supply of single-family homes in Maui appears to be insufficient for the next 5 or so years. If economic

conditions remain the same, it is probable that prices will continue to rise in the near-term, albeit at a slower pace than years past. On a long term basis, from 5 to 20 years, it is difficult to reliably estimate the number of projects that will be actually brought to the market. As mentioned before, many projects have been delayed or have met with resistance from the community for various reasons. Some face the lengthy and uncertain tasks of rezoning and Community Plan Amendments by the County, as well as District Boundary Amendments by the State of Hawaii. This would seem to indicate that of all the potential projects that have been identified, many may never be realized. It is also possible that given the higher risk in the entitlement process, developers may seek to put their money elsewhere instead of constructing homes for Maui's residents.

Meanwhile, demand for real estate on Maui has intensified over the past five years. These increases are being fueled by the population increases in this district, the high employment rate, and the lowest 30-year mortgage interest rates in decades. The strong demand has resulted in rapidly rising prices in all communities of Maui.

With additional inventory on the market, and assuming positive growth over the next decade, it is our opinion that bringing the subject's 516 units to the market would help alleviate the supply problem being experienced today and will be well accepted by the public due to the broad spectrum of real estate product that it will offer.

The proposed development is very attractive because the local community possesses an intense desire for property in this neighborhood. In addition, the subject's multi-family units will provide affordable homes to 274 families on Maui. Furthermore, the subject's half-acre and one-acre rural lots will bring a new type of product to the market in Wailuku should meet with excellent demand. Low density subdivisions in Central Maui, like the Wailuku Country Estates subdivision, have been well received by the market in past years because they offer larger rural lots in close proximity to urban settings. Additionally, during the time that the subject is approved and construction begins, much, if not all of the existing supply in ongoing projects will most likely be depleted.

The additional choices that buyers will have in the real estate market will provide healthy competition and allows for a more balanced market. Social issues generally associated with overcrowded living conditions in on Maui may also be indirectly addressed. Consequently, it is the Consultant's opinion that the development of the Pu'unani development will be well received based on historical absorption of developments in this high-demand neighborhood. It will

also add much needed supply to the market and will help alleviate the high cost of housing on Maui.

B. ECONOMIC IMPACT STUDY

The Consultant has also been asked to study the economic impacts of the proposed Pu`unani Subdivision. The economic impacts are expected to be felt at multiple levels starting with the individual workers and homeowners. At the governmental level, both the County of Maui and the State of Hawaii will benefit from the increased taxes that will be generated by the project.

Direct Construction Costs

The most direct impact that development of the Pu`unani Subdivision will have on the community is the construction spending for the build out of the infrastructure and residential improvements.

The Consultant was given estimates by the developer and also analyzed actual construction costs being experienced in the market as a guideline in determining the potential costs for the development.

Subdivision Infrastructure Costs

The costs of the infrastructure were broken into two categories based on housing type. The single family category is made up of the subject's half-acre and one-acre Rural lots as well as the R-0 Residential lots and will consider the per lot cost of the infrastructure and utilities. The multi-family category will consider the per unit costs, and is typically lower than single family costs since improvements such as utility connections and driveways need only be made for each building instead of each house lot.

Our records of numerous recently completed subdivision and multifamily projects indicated that the cost to improve a subdivision or multi-family project varies between the types of product that will be developed. This was confirmed by the project developer. A cost of $130,000 per lot was estimated for the Rural (0.5 acre) lots, while $150,000 per lot was estimated for the Rural (1.0 acre) lots. For the sites that will be improved with multi-family developments, a cost of $40,000 per multi-family unit was estimated. In addition, construction of a water tank on the site was expected to cost $750,000. As indicated in the calculations below, the total cost of infrastructure was estimated to be **$44,470,000**.

Table 12 - Cost of Infrastructure

Infrastructure costs	Cost per Unit	Number of Units	
Water tank	$ 750,000	1	$ 750,000
Single Family			
Rural (0.5 Ac)	$ 130,000	236	$ 30,680,000
Rural (1.0 Ac)	$ 150,000	6	$ 900,000
Multi Family	$ 40,000	274	$ 10,960,000
Total cost of infrastructure		516	$ **43,290,000**

The Consultant conducted his own survey to test the accuracy of the cost estimates provided by the developer. Based on historical and current construction costs for single family developments throughout the Maui region, the Consultant determined that an average cost of $100,000 per lot was appropriate for each of the 310 single family lots which will include Rural and R-0 Residential lots. A cost of $50,000 per unit was determined to be appropriate for the infrastructure of the multi family component. Separate costs for water tanks were not available, so the Consultant assumed that the cost of $750,000 was reliable. The resulting survey indicated a total cost of $43,750,000 for the infrastructure of the proposed subdivision. This was within 1.6 percent of the costs estimated by the developer which led the Consultant to conclude that the developer's estimates were reliable.

Vertical Construction Costs

Since the subject's 242 Rural lots are likely to be sold as vacant house lots, the revenue generated by their build out is considered to be a significant source of revenue for local contractors and related services. Therefore, the total revenue was considered to be a significant economic impact on Maui's building industry over the projected build out period. Vertical costs were based on a cost per square foot of building area for single family residences while a cost per multi-family unit was used for the multi family buildings. The final mix of single family housing units will be hard to estimate since each lot purchased and built on by individual owners. However, the Consultant surveyed surrounding subdivisions and developments in the subject's neighborhood and determined that these will most likely have an influence on the design and construction standards of the Pu`unani subdivision. As a comparison with the subject's single family homes, a market priced development in the nearby Kehalani project district was researched and indicated an average of 2,100 square feet of living area. Conversations with a developer's representative indicated that the rural lots will most likely have dwellings with an average of 2,500

square feet of living area. This was considered to be reasonable since the subject's rural lots will contain more land area than in recent subdivisions in Central Maui. The living areas were multiplied by their respective costs per square foot of living area to calculate the total direct construction costs for the singe family units. Conversations with the developer's representative indicated that the rural homes will be built for about $375,000, or $150 per square foot of living area. Review of construction costs for an ongoing project in the same neighborhood as the subject indicated a cost of $134 per square foot of living area, which is considered to be highly comparable to the estimates given by the developer. Additionally due to their larger lot sizes it is expected that the subject's homes may be of higher quality than the project that was reviewed.

The developer's the total direct costs for the multi-family units were based on a cost of $115 per square foot with the units having an average living area of 1,100 square feet. This calculates to a cost of approximately $126,500 per unit. The following table details the breakdown of direct construction costs by cost of infrastructure and vertical structures.

Table 13 - Construction Cost Estimates

Building Construction Costs	Cost per Unit or SF	Typical SF		
Single Family				
Rural	$ 150	2,500	242	$ 90,750,000
Multi Family	$ 115	1,100	274	$ 34,661,000
Total Cost of Buildings				$ 125,411,000
Total Direct Costs of Entire Development				$ 168,701,000
Average cost per 516 units				$ 326,940

The Consultant also surveyed current direct costs for residential construction projects in the market and found individual owners to be paying a range of $200 to $450 per square foot of building area. It should be noted that these costs included developers profit and are for individual dwellings only. Conversations with the developer has indicated that the construction costs given are for labor and materials only and the economies of scale further bring down the cost per square foot. The Consultant also estimated the cost of building multifamily projects and determined that $125,000 per unit is typical in the market for multi-family projects similar to the subject's. The Consultant has concluded that the developer's cost estimates for the single- and multi-family residential buildings appear to be reasonable when compared to actual costs seen in the market.

The total revenue to be generated through construction spending is expected to be **$168,701,000** for the entire project upon final build out of the subdivision.

Wages and Salaries

Conversations with contractors and developers have indicated that the breakdown of wages to direct costs can be viewed as a ratio of approximately 40 percent. The remaining 60 percent of the direct costs can be attributed to the cost of materials. By applying this ratio to the total direct construction costs, it is estimated that the wages generated by this project will total **$67,480,400** over the entire build-out period. Because the subject is still in its planning phase and a construction schedule has not been finalized, attempting to break down the wages into annual periods would be speculative. However, based on other projects in the area, it is expected that total build out of the project will take approximately 10 years to complete from the commencement of construction. This calculates to an average amount of $6,748,040 in wages per year.

Table 14 - Average Annual Wages

Total Wages	Total Build out (years)		Average Wages per year
$ 67,480,400	10	=	$ 6,748,040

State General Excise Tax

In addition to the revenues that will be taken in by the private contractors, taxes are expected to be paid to both the state and county levels of government. At the state level, this income will be in the form of the General Excise Tax. Based solely on the dollar value of the construction contracts that are expected to be generated by the build out of the proposed Pu`unani subdivision, the State of Hawaii is expected to receive approximately **$7,028,084.**

Table 15 - Projected General Excise Tax Revenue

Total Construction Costs	General Excise Tax Rate		G.E. Tax to State
$ 168,701,000	4.166%	=	$ 7,028,084

Maui County Real Property Tax

At the county level, the most significant economic benefit will come in the form of the Real Property Tax collected on the subject's 516 housing units. In the County of Maui, real property taxes are based on 100 percent of the assessed value of the property. The assessed value is then multiplied by the appropriate tax rate, which ranges from $2.50 per $1,000 of assessed value for homeowners, to $14.00 per $1,000 of assessed value for timeshare properties. At build out,

the subject's units are expected to fall into the owner occupant, and improved residential categories.

The subject is still in its planning phase and at the time of this report, only the total land areas and unit count for the Rural and Multi-Family components are known. For the multi-family component, details such as architectural style, construction quality, bedroom and bath counts, and amenities have yet to be determined.

Calculation of Assessed Values

Multi-Family Units

The subject's multi-family component will contain approximately 19 acres of land area. Assuming the completion of the infrastructure of the project, the assessed value of the multi-family component is expected to be approximately $4,600,000.

The multi-family units are expected to contain an average of approximately 1,100 square feet of living area which is larger than the average unit in Central Maui. The average room count for all of the condominium units sold in Central Maui was 2.2 bedrooms and 1.9 baths with an average living area of 875 square feet. The only units sold during the past year that contained more than 1,000 square feet of living area were from the Kehalani Gardens and Iliahi projects. Average prices in the projects were $310,000** according to the Realtors Association of Maui Multiple Listings Service. This was determined to be a rough estimate of the assessed value for a typical unit within the subject's multi-family component.

Rural Lots

In Central Maui, the only recent sale of a Rural zoned lot within the size of the subject's half-acre lots occurred in the Waihee Valley neighborhood in July 2005, almost one year ago. This property, located off of River Road, contained 21,780 square feet of land area and sold for $450,000. One recent sale of an 8,819 square foot lot on South Alu Road sold for $515,000 in March of 2006. This parcel is located in the Wailuku Heights neighborhood immediately west of the subject. Since these properties are considered the most similar to the subject's rural lots in terms of size and location, it was determined that a typical half-acre rural lot within the subject's subdivision would sell for, and be assessed at, $550,000**. The sales prices for the one-acre lots were estimated to be only slightly higher at $575,000 since their utility remains generally the same as the half-acre lots. This price was also used as the assessed value of the Rural (1.0 acre) lots.

To determine the assessed values of the rural lots assuming the complete build out of homes, an average price of sales in the Wailuku Heights subdivision was calculated from sales within the past year. Due to the similar location, these sales were assumed to be representative of the types of homes that will be constructed within the subject. As such, a price of $1,100,000** was determined to be typical in this market, and was used as the assessed value for a typical Rural property within Pu'unani.

****Note: The method used to derive this assessed value does not reflect methods used in standard appraisal practice. Since the subject's design, room count and living area has not been determined, the method only looks at what is considered average in the market and assigns an average price based on those criteria.**

Calculation of the Real Property Tax (assuming completion of house lots and multi-family site)

As shown on **Table 15**, the assessed values per unit were multiplied by the respective unit count, and multiplied by the appropriate tax rate. First, the tax benefits to the County of Maui after completion of the subdivision infrastructure as well as the multi-family units was calculated. This scenario reflects the point in time when the multifamily site and Rural house lots are complete with infrastructure and utility improvements.

The 17.61-acre multi-family site was assessed at the unimproved residential tax rate of $5.86 per $1,000 of assessed value. The Rural lots are also expected to be assessed at the unimproved residential rate of $5.86 per $1,000 of assessed value. At these assessed values and tax rates, the Real Property Tax to be collected by the County of Maui is estimated to be approximately $810,000 per year (rounded). Despite the full build out of the subdivision, the tax revenue will actually go down due to the owner occupant status of the majority of the homes. This scenario is further described below and is based on the premise that all of the multi-family units and all the single family homes have been built upon their respective sites.

Calculation of the Real Property Tax (assuming completion of all homes and multi-family units)

As mentioned above, the full tax benefit to the County of Maui will not be maximized until all the housing units are completed. This may not happen for quite a while despite the completion of the R-0 and Rural lots. For example, the second phase of the Wailuku Heights

Subdivision was completed in the mid to late 1980's, but to this day, there are still unimproved house lots within the subdivision.

Based on the assumption that all of the housing units have been built, the multi-family units were assessed at the same typical value of $310,000. However, since they are expected to be owner occupied, a $300,000 exemption was applied to all the multi-family units. Applying the owner occupant tax rate ($2.50 per $1,000 of assessed value) to the remaining $10,000 of assessed value would result in an annual tax of $25.00. Therefore, in the case of the multi-family units, the County's minimum tax of $60.00 is employed.

An estimated assessed value of $1,100,000 was applied to each of the Rural lots which were then broken down into homeowner and improved residential categories. Analysis was done on the nearby Wailuku Heights Subdivision, which indicated that approximately 74 percent of the lots were being assessed as homeowner. Since the subject's Rural properties were considered comparable to properties in Wailuku Heights, a similar ratio of homeowner to improved residential assessments was applied. It was expected that 75 percent of the subject's lots would be owner occupied therefore, assessed at this lowest rate. Additionally, these properties would also qualify for the current homeowner's exemption of $300,000. The remaining 25 percent of the Rural zoned homes would be assessed at the improved residential rate of $5.00 per $1,000 of assessed value. The resulting Real Property Taxes that will be collected based on the full build out of the subdivision was calculated to be approximately $848,315 per year.

Since the subject is still in preliminary stages of planning, a construction timeframe was not available, and thus it is difficult to determine the absorption rate and build out for the subdivision. It was concluded that between the initial build out of the multi family units and the house lots and the final build out of all of the homes within the Rural sections of the subdivision, the annual real property taxes due to the County of Maui will be between **$810,000 and $850,000 (rounded) per year.**

Table 16 - Estimated Real Property Taxes (at completion of house lots and multi-family site)

Unit Type	Reproduction Cost of Dwelling	# of Units	Est. Assessed Value per unit	Homeowner Exemption	Total Assessed Value	Rate per $1,000		Est Taxes
Multi Family Site (17.61 acres)					$ 4,600,000	$ 5.86	$ 1,000	$ 26,956
Rural Lots (lots only)								
0.5 acre		236	$ 550,000		$ 129,800,000	$ 5.86	$ 1,000	$ 760,628
1.0 acre		6	$ 575,000		$ 3,450,000	$ 5.86	$ 1,000	$ 20,217
Total		242			$ 137,850,000			$ 807,801
							(rounded)	**$ 810,000**

Table 17 - Estimated Real Property Taxes (assuming build out of subdivision and all improvements)

Unit Type		# of Units	Est. Assessed Value per unit	Homeowner Exemption	Total Assessed Value	Rate per $1,000		Est Taxes
Multi Family Units		274	$ 310,000	$ 300,000			$ 1,000	$ 16,440
Rural Lots (after build out of homes)								
0.5 acre	Homeowner	177	$ 1,100,000	$ 300,000	$ 194,700,000	$ 2.50	$ 1,000	$ 486,750
	Improved Res	59	$ 1,100,000		$ 64,900,000	$ 5.00	$ 1,000	$ 324,500
1.0 acre	Homeowner	4.5	$ 1,100,000	$ 300,000	$ 4,950,000	$ 2.50	$ 1,000	$ 12,375
	Improved Res	1.5	$ 1,100,000		$ 1,650,000	$ 5.00	$ 1,000	$ 8,250
Total		516			$ 264,550,000			$ 848,315
							(rounded)	**$ 850,000**

Summary of Economic Impacts

The Consultant has also been requested to analyze the economic effects that the proposed Pu'unani Subdivision will have on the community. Besides providing housing for Maui's growing population, the Pu'unani Subdivision will generate revenue for local businesses as well as the State and County governments.

Local businesses related to the building and construction industry will benefit from direct and indirect costs that will be incurred by the developer. Direct costs are related to the actual build out of the infrastructure and vertical construction of the homes or buildings. Indirect costs include professional and consulting fee such as archaeological assessments, soils testing, various engineering fees, surveys, legal fees, insurance, planning, and accounting. The County of Maui and State of Hawaii may also receive permitting and application fees, education assessment, and utility fees.

Development of the project will also mean years of work for contractors and laborers working in the building and construction industry on Maui. Although the single family homes will not be built at one time, the eventual build out of all the rural lots will create work in the construction industry. This economic impact will be seen in the form of wages to the individual workers over the build out period. In turn, the income to the individuals and their households will result in increased spending at the retail and service levels. Complimentary businesses in the neighborhood should also see a pick up in sales with the increase in population.

The State of Hawaii will collect general excise taxes from the revenue generated by the numerous businesses related to the subject. At the county level real property taxes on an annual basis for each of the subject's rural lots and multi-family units.

It is clear that aside from the social impacts of developing housing in the area of the subject, there will also be economic impacts from the neighborhood level up to the state level. The construction industry has been one of the driving forces of the Maui's economy with the past decline in agriculture. The development of the Pu'unani Subdivision will contribute to Maui's economy and at the same time provide much needed housing for its growing population.

EXHIBIT A
Demographic Reports - Claritas, Inc.

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
Population		
2011 Projection	153,367	
2006 Estimate	141,730	
2000 Census	128,095	
1990 Census	100,372	
Growth 2006-2011	8.21%	
Growth 2000-2006	10.64%	
Growth 1990-2000	27.62%	
2006 Est. Population by Single Race Classification	141,730	
White Alone	50,669	35.75
Black or African American Alone	748	0.53
American Indian and Alaska Native Alone	616	0.43
Asian Alone	42,033	29.66
Native Hawaiian and Other Pacific Islander Alone	14,131	9.97
Some Other Race Alone	2,097	1.48
Two or More Races	31,436	22.18
2006 Est. Population Hispanic or Latino by Origin*	141,730	
Not Hispanic or Latino	129,519	91.38
Hispanic or Latino:	12,211	8.62
Mexican	3,636	29.78
Puerto Rican	3,896	31.91
Cuban	74	0.61
All Other Hispanic or Latino	4,605	37.71
2006 Est. Hispanic or Latino by Single Race Class.	12,211	
White Alone	3,040	24.90
Black or African American Alone	34	0.28
American Indian and Alaska Native Alone	154	1.26
Asian Alone	1,124	9.20
Native Hawaiian and Other Pacific Islander Alone	678	5.55
Some Other Race Alone	1,870	15.31
Two or More Races	5,311	43.49

CLARITAS MARKETPLACE

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Pop. Asian Alone Race by Category*	42,033	
Chinese, except Taiwanese	1,256	2.99
Filipino	23,320	55.48
Japanese	13,418	31.92
Asian Indian	114	0.27
Korean	846	2.01
Vietnamese	339	0.81
Cambodian	10	0.02
Hmong	0	0.00
Laotian	48	0.11
Thai	85	0.20
Other Asian	299	0.71
Two or more Asian categories	2,298	5.47
2006 Est. Population by Ancestry	141,730	
Pop, Arab	214	0.15
Pop, Czech	182	0.13
Pop, Danish	331	0.23
Pop, Dutch	772	0.54
Pop, English	4,792	3.38
Pop, French (except Basque)	1,526	1.08
Pop, French Canadian	350	0.25
Pop, German	6,804	4.80
Pop, Greek	227	0.16
Pop, Hungarian	184	0.13
Pop, Irish	4,533	3.20
Pop, Italian	2,482	1.75
Pop, Lithuanian	124	0.09
Pop, United States or American	1,967	1.39
Pop, Norwegian	1,043	0.74
Pop, Polish	1,066	0.75
Pop, Portuguese	5,543	3.91
Pop, Russian	592	0.42
Pop, Scottish	1,178	0.83
Pop, Scotch-Irish	942	0.66
Pop, Slovak	11	0.01
Pop, Subsaharan African	106	0.07
Pop, Swedish	899	0.63
Pop, Swiss	210	0.15
Pop, Ukrainian	206	0.15
Pop, Welsh	218	0.15
Pop, West Indian (exc Hisp groups)	69	0.05

CLARITAS MARKETPLACE

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Population by Ancestry		
Pop, Other ancestries	86,564	61.08
Pop, Ancestry Unclassified	18,595	13.12
2006 Est. Pop Age 5+ by Language Spoken At Home	132,043	
Speak Only English at Home	100,312	75.97
Speak Asian/Pacific Islander Language at Home	26,472	20.05
Speak IndoEuropean Language at Home	2,197	1.66
Speak Spanish at Home	2,868	2.17
Speak Other Language at Home	194	0.15
2006 Est. Population by Sex	141,730	
Male	71,183	50.22
Female	70,547	49.78
Male/Female Ratio	1.01	
2006 Est. Population by Age	141,730	
Age 0 - 4	9,687	6.83
Age 5 - 9	9,136	6.45
Age 10 - 14	9,493	6.70
Age 15 - 17	6,356	4.48
Age 18 - 20	5,254	3.71
Age 21 - 24	7,548	5.33
Age 25 - 34	17,237	12.16
Age 35 - 44	20,444	14.42
Age 45 - 49	11,616	8.20
Age 50 - 54	11,447	8.08
Age 55 - 59	9,659	6.82
Age 60 - 64	7,209	5.09
Age 65 - 74	8,386	5.92
Age 75 - 84	5,862	4.14
Age 85 and over	2,396	1.69
Age 16 and over	111,345	78.56
Age 18 and over	107,058	75.54
Age 21 and over	101,804	71.83
Age 65 and over	16,644	11.74
2006 Est. Median Age	38.01	
2006 Est. Average Age	37.78	

Pop-Facts: Demographic Snapshot Comparison Report
Prepared For:
Project Code:
Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Male Population by Age	71,183	
Age 0 - 4	4,887	6.87
Age 5 - 9	4,600	6.46
Age 10 - 14	4,818	6.77
Age 15 - 17	3,216	4.52
Age 18 - 20	2,727	3.83
Age 21 - 24	3,977	5.59
Age 25 - 34	9,129	12.82
Age 35 - 44	10,408	14.62
Age 45 - 49	5,795	8.14
Age 50 - 54	5,794	8.14
Age 55 - 59	4,937	6.94
Age 60 - 64	3,614	5.08
Age 65 - 74	3,942	5.54
Age 75 - 84	2,455	3.45
Age 85 and over	884	1.24
2006 Est. Median Age, Male	37.15	
2006 Est. Average Age, Male	37.00	
2006 Est. Female Population by Age	70,547	
Age 0 - 4	4,800	6.80
Age 5 - 9	4,536	6.43
Age 10 - 14	4,675	6.63
Age 15 - 17	3,140	4.45
Age 18 - 20	2,527	3.58
Age 21 - 24	3,571	5.06
Age 25 - 34	8,108	11.49
Age 35 - 44	10,036	14.23
Age 45 - 49	5,821	8.25
Age 50 - 54	5,653	8.01
Age 55 - 59	4,722	6.69
Age 60 - 64	3,595	5.10
Age 65 - 74	4,444	6.30
Age 75 - 84	3,407	4.83
Age 85 and over	1,512	2.14
2006 Est. Median Age, Female	38.90	
2006 Est. Average Age, Female	38.57	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Population Age 15+ by Marital Status*	113,414	
Total, Never Married	33,711	29.72
Married, Spouse present	54,857	48.37
Married, Spouse absent	6,007	5.30
Widowed	6,439	5.68
Divorced	12,400	10.93
Males, Never Married	19,224	16.95
Previously Married	7,643	6.74
Females, Never Married	14,487	12.77
Previously Married	12,665	11.17
2006 Est. Pop. Age 25+ by Educational Attainment*	94,256	
Less than 9th grade	7,036	7.46
Some High School, no diploma	8,500	9.02
High School Graduate (or GED)	27,721	29.41
Some College, no degree	22,452	23.82
Associate Degree	7,358	7.81
Bachelor's Degree	14,828	15.73
Master's Degree	3,917	4.16
Professional School Degree	1,927	2.04
Doctorate Degree	517	0.55
Households		
2011 Projection	53,006	
2006 Estimate	48,684	
2000 Census	43,508	
1990 Census	33,145	
Growth 2006-2011	8.88%	
Growth 2000-2006	11.90%	
Growth 1990-2000	31.27%	
2006 Est. Households by Household Type	48,684	
Family Households	33,458	68.72
Nonfamily Households	15,226	31.28
2006 Est. Group Quarters Population	1,425	
2006 Households by Ethnicity, Hispanic/Latino	2,997	6.16

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Households by Household Income	48,684	
Income Less than $15,000	5,193	10.67
Income $15,000 - $24,999	4,538	9.32
Income $25,000 - $34,999	4,835	9.93
Income $35,000 - $49,999	7,153	14.69
Income $50,000 - $74,999	10,295	21.15
Income $75,000 - $99,999	6,611	13.58
Income $100,000 - $149,999	6,326	12.99
Income $150,000 - $249,999	2,633	5.41
Income $250,000 - $499,999	788	1.62
Income $500,000 and more	312	0.64
2006 Est. Average Household Income	$72,554	
2006 Est. Median Household Income	$56,370	
2006 Est. Per Capita Income	$25,144	
2006 Est. Household Type, Presence Own Children*	48,684	
Single Male Householder	5,475	11.25
Single Female Householder	5,473	11.24
Married-Couple Family, own children	11,454	23.53
Married-Couple Family, no own children	13,363	27.45
Male Householder, own children	1,474	3.03
Male Householder, no own children	1,358	2.79
Female Householder, own children	3,230	6.63
Female Householder, no own children	2,579	5.30
Nonfamily, Male Householder	2,616	5.37
Nonfamily, Female Householder	1,662	3.41
2006 Est. Households by Household Size*	48,684	
1-person household	10,948	22.49
2-person household	15,102	31.02
3-person household	8,325	17.10
4-person household	6,720	13.80
5-person household	3,666	7.53
6-person household	1,906	3.92
7 or more person household	2,017	4.14
2006 Est. Average Household Size	2.88	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Households by Presence of People*	48,684	
Households with 1 or more People under Age 18:		
Married-Couple Family	12,866	26.43
Other Family, Male Householder	1,802	3.70
Other Family, Female Householder	4,017	8.25
Nonfamily, Male Householder	181	0.37
Nonfamily, Female Householder	74	0.15
Households no People under Age 18:		
Married-Couple Family	11,951	24.55
Other Family, Male Householder	1,030	2.12
Other Family, Female Householder	1,792	3.68
Nonfamily, Male Householder	7,910	16.25
Nonfamily, Female Householder	7,061	14.50
2006 Est. Households by Number of Vehicles*	48,684	
No Vehicles	3,030	6.22
1 Vehicle	17,507	35.96
2 Vehicles	18,954	38.93
3 Vehicles	6,194	12.72
4 Vehicles	1,927	3.96
5 or more Vehicles	1,072	2.20
2006 Est. Average Number of Vehicles*	1.81	
Family Households		
2011 Projection	36,426	
2006 Estimate	33,458	
2000 Census	29,899	
1990 Census	23,537	
Growth 2006-2011	8.87%	
Growth 2000-2006	11.90%	
Growth 1990-2000	27.03%	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Family Households by Household Income	33,458	
Income Less than $15,000	2,167	6.48
Income $15,000 - $24,999	2,336	6.98
Income $25,000 - $34,999	2,769	8.28
Income $35,000 - $49,999	4,563	13.64
Income $50,000 - $74,999	7,684	22.97
Income $75,000 - $99,999	5,672	16.95
Income $100,000 - $149,999	5,202	15.55
Income $150,000 - $249,999	2,205	6.59
Income $250,000 - $499,999	614	1.84
Income $500,000 and more	246	0.74
2006 Est. Average Family Household Income	$81,538	
2006 Est. Median Family Household Income	$65,922	
2006 Est. Families by Poverty Status*	33,458	
Income At or Above Poverty Level:		
Married-Couple Family, own children	12,039	35.98
Married-Couple Family, no own children	11,646	34.81
Male Householder, own children	1,540	4.60
Male Householder, no own children	826	2.47
Female Householder, own children	2,812	8.40
Female Householder, no own children	1,838	5.49
Income Below Poverty Level:		
Married-Couple Family, own children	710	2.12
Married-Couple Family, no own children	422	1.26
Male Householder, own children	362	1.08
Male Householder, no own children	104	0.31
Female Householder, own children	1,031	3.08
Female Householder, no own children	128	0.38
2006 Est. Pop Age 16+ by Employment Status*	111,345	
In Armed Forces	104	0.09
Civilian - Employed	70,655	63.46
Civilian - Unemployed	3,709	3.33
Not in Labor Force	36,877	33.12

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Civ Employed Pop 16+ Class of Worker*	70,655	
For-Profit Private Workers	49,038	69.40
Non-Profit Private Workers	3,780	5.35
Local Government Workers	2,828	4.00
State Government Workers	6,357	9.00
Federal Government Workers	1,058	1.50
Self-Emp Workers	7,311	10.35
Unpaid Family Workers	283	0.40
2006 Est. Civ Employed Pop 16+ by Occupation*	70,655	
Management, Business, and Financial Operations	7,798	11.04
Professional and Related Occupations	10,897	15.42
Service	18,626	26.36
Sales and Office	18,496	26.18
Farming, Fishing, and Forestry	1,451	2.05
Construction, Extraction and Maintainance	6,772	9.58
Production, Transportation and Material Moving	6,615	9.36
2006 Est. Pop 16+ by Occupation Classification*	70,655	
Blue Collar	13,387	18.95
White Collar	36,480	51.63
Service and Farm	20,788	29.42
2006 Est. Workers Age 16+, Transportation To Work*	68,791	
Drove Alone	49,005	71.24
Car Pooled	11,779	17.12
Public Transportation	545	0.79
Walked	1,917	2.79
Motorcycle	432	0.63
Bicycle	818	1.19
Other Means	938	1.36
Worked at Home	3,357	4.88
2006 Est. Workers Age 16+ by Travel Time to Work*	65,434	
Less than 15 Minutes	24,954	38.14
15 - 29 Minutes	20,966	32.04
30 - 44 Minutes	11,273	17.23
45 - 59 Minutes	5,050	7.72
60 or more Minutes	3,191	4.88
2006 Est. Average Travel Time to Work in Minutes*	24.24	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040524
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Tenure of Occupied Housing Units	48,684	
Owner Occupied	28,077	57.67
Renter Occupied	20,607	42.33
2006 Occ Housing Units, Avg Length of Residence	10	
2006 Est. All Owner-Occupied Housing Values	28,077	
Value Less than $20,000	80	0.28
Value $20,000 - $39,999	154	0.55
Value $40,000 - $59,999	88	0.31
Value $60,000 - $79,999	124	0.44
Value $80,000 - $99,999	170	0.61
Value $100,000 - $149,999	984	3.50
Value $150,000 - $199,999	1,999	7.12
Value $200,000 - $299,999	5,407	19.26
Value $300,000 - $399,999	6,259	22.29
Value $400,000 - $499,999	4,789	17.06
Value $500,000 - $749,999	4,702	16.75
Value $750,000 - $999,999	1,329	4.73
Value $1,000,000 or more	1,992	7.09
2006 Est. Median All Owner-Occupied Housing Value	$380,399	
2006 Est. Housing Units by Units in Structure*	62,493	
1 Unit Attached	3,841	6.15
1 Unit Detached	35,070	56.12
2 Units	1,134	1.81
3 to 19 Units	10,233	16.37
20 to 49 Units	3,115	4.98
50 or More Units	8,933	14.29
Mobile Home or Trailer	121	0.19
Boat, RV, Van, etc.	46	0.07

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Housing Units by Year Structure Built	62,493	
Housing Units Built 1999 to 2006	8,183	13.09
Housing Unit Built 1995 to 1998	4,264	6.82
Housing Unit Built 1990 to 1994	7,873	12.60
Housing Unit Built 1980 to 1989	13,941	22.31
Housing Unit Built 1970 to 1979	16,262	26.02
Housing Unit Built 1960 to 1969	5,459	8.74
Housing Unit Built 1950 to 1959	2,678	4.29
Housing Unit Built 1940 to 1949	1,591	2.55
Housing Unit Built 1939 or Earlier	2,242	3.59
2006 Est. Median Year Structure Built **	1982	

*In contrast to Claritas Demographic Estimates, "smoothed" data items are Census 2000 tables made consistent with current year estimated and 5 year projected base counts.

**1939 will appear when at least half of the Housing Units in this reports area were built in 1939 or earlier.

Pop-Facts: Demographic Snapshot Comparison Report
Prepared For:
Project Code:
Order #: 964040524
Site: 01

Appendix: Area Listing

Area Name:

Type: List - Area ZIP Codes Reporting Detail: Aggregate Reporting Level: Area ZIP Codes

Geography Code	Geography Name	Geography Code	Geography Name
96708	Haiku	96713	Hana
96729	Hoolehua	96732	Kahului
96748	Kaunakakai	96753	Kihei
96757	Kualapuu	96761	Lahaina
96763	Lanai City	96768	Makawao
96770	Maunaloa	96779	Paia
96790	Kula	96793	Wailuku

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
Population		
2011 Projection	50,300	
2006 Estimate	46,345	
2000 Census	41,655	
1990 Census	33,059	
Growth 2006-2011	8.53%	
Growth 2000-2006	11.26%	
Growth 1990-2000	26.00%	
2006 Est. Population by Single Race Classification	46,345	
White Alone	7,341	15.84
Black or African American Alone	138	0.30
American Indian and Alaska Native Alone	160	0.35
Asian Alone	21,255	45.86
Native Hawaiian and Other Pacific Islander Alone	4,987	10.76
Some Other Race Alone	612	1.32
Two or More Races	11,852	25.57
2006 Est. Population Hispanic or Latino by Origin*	46,345	
Not Hispanic or Latino	42,077	90.79
Hispanic or Latino:	4,268	9.21
Mexican	859	20.13
Puerto Rican	1,753	41.07
Cuban	8	0.19
All Other Hispanic or Latino	1,648	38.61
2006 Est. Hispanic or Latino by Single Race Class.	4,268	
White Alone	755	17.69
Black or African American Alone	7	0.16
American Indian and Alaska Native Alone	51	1.19
Asian Alone	489	11.46
Native Hawaiian and Other Pacific Islander Alone	246	5.76
Some Other Race Alone	553	12.96
Two or More Races	2,167	50.77

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Pop. Asian Alone Race by Category*	21,255	
Chinese, except Taiwanese	496	2.33
Filipino	11,299	53.16
Japanese	7,581	35.67
Asian Indian	29	0.14
Korean	471	2.22
Vietnamese	136	0.64
Cambodian	2	0.01
Hmong	0	0.00
Laotian	24	0.11
Thai	24	0.11
Other Asian	125	0.59
Two or more Asian categories	1,068	5.02
2006 Est. Population by Ancestry	46,345	
Pop, Arab	56	0.12
Pop, Czech	24	0.05
Pop, Danish	6	0.01
Pop, Dutch	56	0.12
Pop, English	571	1.23
Pop, French (except Basque)	201	0.43
Pop, French Canadian	83	0.18
Pop, German	845	1.82
Pop, Greek	0	0.00
Pop, Hungarian	19	0.04
Pop, Irish	562	1.21
Pop, Italian	284	0.61
Pop, Lithuanian	7	0.02
Pop, United States or American	261	0.56
Pop, Norwegian	143	0.31
Pop, Polish	102	0.22
Pop, Portuguese	1,833	3.96
Pop, Russian	39	0.08
Pop, Scottish	113	0.24
Pop, Scotch-Irish	110	0.24
Pop, Slovak	1	0.00
Pop, Subsaharan African	23	0.05
Pop, Swedish	116	0.25
Pop, Swiss	5	0.01
Pop, Ukrainian	0	0.00
Pop, Welsh	21	0.05
Pop, West Indian (exc Hisp groups)	15	0.03

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Population by Ancestry		
Pop, Other ancestries	35,239	76.04
Pop, Ancestry Unclassified	5,610	12.10
2006 Est. Pop Age 5+ by Language Spoken At Home	42,983	
Speak Only English at Home	30,052	69.92
Speak Asian/Pacific Islander Language at Home	11,824	27.51
Speak IndoEuropean Language at Home	318	0.74
Speak Spanish at Home	741	1.72
Speak Other Language at Home	48	0.11
2006 Est. Population by Sex	46,345	
Male	23,058	49.75
Female	23,287	50.25
Male/Female Ratio	0.99	
2006 Est. Population by Age	46,345	
Age 0 - 4	3,362	7.25
Age 5 - 9	3,079	6.64
Age 10 - 14	3,229	6.97
Age 15 - 17	2,064	4.45
Age 18 - 20	1,823	3.93
Age 21 - 24	2,589	5.59
Age 25 - 34	5,746	12.40
Age 35 - 44	6,275	13.54
Age 45 - 49	3,288	7.09
Age 50 - 54	3,219	6.95
Age 55 - 59	2,833	6.11
Age 60 - 64	2,247	4.85
Age 65 - 74	3,024	6.52
Age 75 - 84	2,514	5.42
Age 85 and over	1,053	2.27
Age 16 and over	36,002	77.68
Age 18 and over	34,611	74.68
Age 21 and over	32,788	70.75
Age 65 and over	6,591	14.22
2006 Est. Median Age	37.04	
2006 Est. Average Age	37.96	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:
Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Male Population by Age	23,058	
Age 0 - 4	1,704	7.39
Age 5 - 9	1,558	6.76
Age 10 - 14	1,657	7.19
Age 15 - 17	1,042	4.52
Age 18 - 20	1,006	4.36
Age 21 - 24	1,366	5.92
Age 25 - 34	3,017	13.08
Age 35 - 44	3,247	14.08
Age 45 - 49	1,655	7.18
Age 50 - 54	1,590	6.90
Age 55 - 59	1,432	6.21
Age 60 - 64	1,066	4.62
Age 65 - 74	1,326	5.75
Age 75 - 84	1,026	4.45
Age 85 and over	366	1.59
2006 Est. Median Age, Male	35.55	
2006 Est. Average Age, Male	36.58	
2006 Est. Female Population by Age	23,287	
Age 0 - 4	1,658	7.12
Age 5 - 9	1,521	6.53
Age 10 - 14	1,572	6.75
Age 15 - 17	1,022	4.39
Age 18 - 20	817	3.51
Age 21 - 24	1,223	5.25
Age 25 - 34	2,729	11.72
Age 35 - 44	3,028	13.00
Age 45 - 49	1,633	7.01
Age 50 - 54	1,629	7.00
Age 55 - 59	1,401	6.02
Age 60 - 64	1,181	5.07
Age 65 - 74	1,698	7.29
Age 75 - 84	1,488	6.39
Age 85 and over	687	2.95
2006 Est. Median Age, Female	38.64	
2006 Est. Average Age, Female	39.32	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Population Age 15+ by Marital Status*	36,675	
Total, Never Married	11,049	30.13
Married, Spouse present	17,450	47.58
Married, Spouse absent	2,330	6.35
Widowed	2,633	7.18
Divorced	3,213	8.76
Males, Never Married	6,255	17.06
Previously Married	2,176	5.93
Females, Never Married	4,794	13.07
Previously Married	4,175	11.38
2006 Est. Pop. Age 25+ by Educational Attainment*	30,199	
Less than 9th grade	3,582	11.86
Some High School, no diploma	3,369	11.16
High School Graduate (or GED)	9,547	31.61
Some College, no degree	6,076	20.12
Associate Degree	2,279	7.55
Bachelor's Degree	3,941	13.05
Master's Degree	893	2.96
Professional School Degree	478	1.58
Doctorate Degree	34	0.11
Households		
2011 Projection	15,789	
2006 Estimate	14,524	
2000 Census	12,998	
1990 Census	10,281	
Growth 2006-2011	8.71%	
Growth 2000-2006	11.74%	
Growth 1990-2000	26.43%	
2006 Est. Households by Household Type	14,524	
Family Households	10,695	73.64
Nonfamily Households	3,829	26.36
2006 Est. Group Quarters Population	831	
2006 Households by Ethnicity, Hispanic/Latino	997	6.86

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Households by Household Income	14,524	
Income Less than $15,000	1,681	11.57
Income $15,000 - $24,999	1,371	9.44
Income $25,000 - $34,999	1,383	9.52
Income $35,000 - $49,999	2,041	14.05
Income $50,000 - $74,999	3,163	21.78
Income $75,000 - $99,999	2,018	13.89
Income $100,000 - $149,999	1,931	13.30
Income $150,000 - $249,999	703	4.84
Income $250,000 - $499,999	183	1.26
Income $500,000 and more	50	0.34
2006 Est. Average Household Income	$69,145	
2006 Est. Median Household Income	$56,214	
2006 Est. Per Capita Income	$21,924	
2006 Est. Household Type, Presence Own Children*	14,524	
Single Male Householder	1,390	9.57
Single Female Householder	1,643	11.31
Married-Couple Family, own children	3,718	25.60
Married-Couple Family, no own children	4,014	27.64
Male Householder, own children	397	2.73
Male Householder, no own children	472	3.25
Female Householder, own children	1,056	7.27
Female Householder, no own children	1,038	7.15
Nonfamily, Male Householder	454	3.13
Nonfamily, Female Householder	342	2.35
2006 Est. Households by Household Size*	14,524	
1-person household	3,033	20.88
2-person household	3,888	26.77
3-person household	2,509	17.27
4-person household	2,207	15.20
5-person household	1,333	9.18
6-person household	683	4.70
7 or more person household	871	6.00
2006 Est. Average Household Size	3.13	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Households by Presence of People*	14,524	
Households with 1 or more People under Age 18:		
Married-Couple Family	4,250	29.26
Other Family, Male Householder	508	3.50
Other Family, Female Householder	1,377	9.48
Nonfamily, Male Householder	33	0.23
Nonfamily, Female Householder	19	0.13
Households no People under Age 18:		
Married-Couple Family	3,482	23.97
Other Family, Male Householder	361	2.49
Other Family, Female Householder	717	4.94
Nonfamily, Male Householder	1,811	12.47
Nonfamily, Female Householder	1,966	13.54
2006 Est. Households by Number of Vehicles*	14,524	
No Vehicles	1,198	8.25
1 Vehicle	5,120	35.25
2 Vehicles	5,234	36.04
3 Vehicles	1,976	13.61
4 Vehicles	640	4.41
5 or more Vehicles	356	2.45
2006 Est. Average Number of Vehicles*	1.80	
Family Households		
2011 Projection	11,663	
2006 Estimate	10,695	
2000 Census	9,517	
1990 Census	7,728	
Growth 2006-2011	9.05%	
Growth 2000-2006	12.38%	
Growth 1990-2000	23.15%	

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For:
Project Code:

Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Family Households by Household Income	10,695	
Income Less than $15,000	722	6.75
Income $15,000 - $24,999	712	6.66
Income $25,000 - $34,999	858	8.02
Income $35,000 - $49,999	1,480	13.84
Income $50,000 - $74,999	2,607	24.38
Income $75,000 - $99,999	1,821	17.03
Income $100,000 - $149,999	1,696	15.86
Income $150,000 - $249,999	600	5.61
Income $250,000 - $499,999	156	1.46
Income $500,000 and more	43	0.40
2006 Est. Average Family Household Income	$77,637	
2006 Est. Median Family Household Income	$65,107	
2006 Est. Families by Poverty Status*	10,695	
Income At or Above Poverty Level:		
Married-Couple Family, own children	3,980	37.21
Married-Couple Family, no own children	3,447	32.23
Male Householder, own children	466	4.36
Male Householder, no own children	294	2.75
Female Householder, own children	825	7.71
Female Householder, no own children	751	7.02
Income Below Poverty Level:		
Married-Couple Family, own children	196	1.83
Married-Couple Family, no own children	109	1.02
Male Householder, own children	103	0.96
Male Householder, no own children	6	0.06
Female Householder, own children	449	4.20
Female Householder, no own children	69	0.65
2006 Est. Pop Age 16+ by Employment Status*	36,802	
In Armed Forces	36	0.10
Civilian - Employed	21,072	58.53
Civilian - Unemployed	1,202	3.34
Not in Labor Force	13,692	38.03

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Civ Employed Pop 16+ Class of Worker*	21,072	
For-Profit Private Workers	15,006	71.21
Non-Profit Private Workers	1,172	5.56
Local Government Workers	1,200	5.69
State Government Workers	2,198	10.43
Federal Government Workers	305	1.45
Self-Emp Workers	1,120	5.32
Unpaid Family Workers	71	0.34
2006 Est. Civ Employed Pop 16+ by Occupation*	21,072	
Management, Business, and Financial Operations	1,880	8.92
Professional and Related Occupations	2,828	13.42
Service	5,126	24.33
Sales and Office	6,282	29.81
Farming, Fishing, and Forestry	511	2.43
Construction, Extraction and Maintainance	2,032	9.64
Production, Transportation and Material Moving	2,413	11.45
2006 Est. Pop 16+ by Occupation Classification*	21,072	
Blue Collar	4,445	21.09
White Collar	10,919	51.82
Service and Farm	5,708	27.09
2006 Est. Workers Age 16+, Transportation To Work*	20,616	
Drove Alone	14,836	71.96
Car Pooled	4,169	20.22
Public Transportation	162	0.79
Walked	414	2.01
Motorcycle	63	0.31
Bicycle	103	0.50
Other Means	371	1.80
Worked at Home	498	2.42
2006 Est. Workers Age 16+ by Travel Time to Work*	20,118	
Less than 15 Minutes	8,724	43.36
15 - 29 Minutes	5,230	26.00
30 - 44 Minutes	3,383	16.82
45 - 59 Minutes	1,900	9.44
60 or more Minutes	881	4.38
2006 Est. Average Travel Time to Work in Minutes*	23.89	

Pop-Facts: Demographic Snapshot Comparison Report
Prepared For:
Project Code:
Order #: 964040407
Site: 01

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Tenure of Occupied Housing Units	14,524	
Owner Occupied	8,874	61.10
Renter Occupied	5,650	38.90
2006 Occ Housing Units, Avg Length of Residence	12	
2006 Est. All Owner-Occupied Housing Values	8,874	
Value Less than $20,000	5	0.06
Value $20,000 - $39,999	92	1.04
Value $40,000 - $59,999	46	0.52
Value $60,000 - $79,999	52	0.59
Value $80,000 - $99,999	26	0.29
Value $100,000 - $149,999	249	2.81
Value $150,000 - $199,999	643	7.25
Value $200,000 - $299,999	2,230	25.13
Value $300,000 - $399,999	2,452	27.63
Value $400,000 - $499,999	1,697	19.12
Value $500,000 - $749,999	1,062	11.97
Value $750,000 - $999,999	162	1.83
Value $1,000,000 or more	158	1.78
2006 Est. Median All Owner-Occupied Housing Value	$344,619	
2006 Est. Housing Units by Units in Structure*	15,416	
1 Unit Attached	1,339	8.69
1 Unit Detached	9,886	64.13
2 Units	154	1.00
3 to 19 Units	2,536	16.45
20 to 49 Units	585	3.79
50 or More Units	863	5.60
Mobile Home or Trailer	53	0.34
Boat, RV, Van, etc	0	0.00

Trade Area: ZIP, (see appendix for geographies), aggregate

Description	Total ZIP	%
2006 Est. Housing Units by Year Structure Built	15,416	
Housing Units Built 1999 to 2006	2,083	13.51
Housing Unit Built 1995 to 1998	1,352	8.77
Housing Unit Built 1990 to 1994	1,604	10.40
Housing Unit Built 1980 to 1989	2,451	15.90
Housing Unit Built 1970 to 1979	3,103	20.13
Housing Unit Built 1960 to 1969	2,307	14.96
Housing Unit Built 1950 to 1959	1,341	8.70
Housing Unit Built 1940 to 1949	504	3.27
Housing Unit Built 1939 or Earlier	671	4.35
2006 Est. Median Year Structure Built **	1979	

*In contrast to Claritas Demographic Estimates, "smoothed" data items are Census 2000 tables made consistent with current year estimated and 5 year projected base counts.

**1939 will appear when at least half of the Housing Units in this reports area were built in 1939 or earlier.

Pop-Facts: Demographic Snapshot Comparison Report

Prepared For: **Order #: 964040407**
Project Code: **Site: 01**

Appendix: Area Listing

Area Name:

Type: List - Area ZIP Codes Reporting Detail: Aggregate Reporting Level: Area ZIP Codes

Geography Code	Geography Name	Geography Code	Geography Name
96732	Kahului	96793	Wailuku

EXHIBIT B

Active Listings in the Central Maui Region
Vacant Land, Single-Family and Condominiums

MLS #	Class	District	LT	Zone	Sec	Plat	Par	CPR	Address	Land SQFT	Baths	Beds	Liv A SF	Original Price	List Price	DOM	Status Date	List Date	Ohana Liv A SF
318115	CO	Wailuku	FS	3	4	11	17	28	1885 Main Street	35,719	3.0	3	1,881	$ 660,000	$ 660,000	43	5/8/2006	5/7/2006	
317553	CO	Wailuku	FS	3	4	13	26	23	2158 Main Street	23,938	1.5	2	730	$ 350,000	$ 350,000	77	4/3/2006	4/3/2006	
318362	CO	Wailuku	FS	3	4	16	007	013	2180 Vineyard St.	35,284	1.0	1	511	$ 225,000	$ 225,000	35	5/22/2006	5/15/2006	
316324	CO	Wailuku	FS	3	4	16	07	009	2180 Vineyard St.	35,284	2.0	2	839	$ 285,000	$ 259,500	140	6/2/2006	1/30/2006	
316198	CO	Wailuku	FS	3	4	16	7	5	2180 Vineyard Street	35,284	2.0	2	839	$ 295,000	$ 295,000	146	2/17/2006	1/24/2006	
314549	CO	Wailuku	FS	3	4	16	7	21	2180 Vineyard Street	43,560	2.0	2	839	$ 395,000	$ 370,000	230	11/1/2005	11/1/2005	
315766	CO	Wailuku	FS	3	4	30	14	51	31 Kopi Ln.	396,396	1.0	1	543	$ 300,000	$ 285,000	166	1/5/2006	1/4/2006	
317564	CO	Wailuku	FS	3	4	30	13	7	940 Eha Street	396,570	1.0	2	657	$ 329,000	$ 319,000	77	4/4/2006	4/3/2006	
318576	CO	Wailuku	FS	3	4	30	17	60	55 Waiaka Lane	396,570	1.0	2	655	$ 320,000	$ 320,000	14	6/5/2006	6/5/2006	
318481	CO	Wailuku	FS	3	4	30	16	51	1060 Eha Street	396,570	2.0	2	843	$ 349,000	$ 349,000	20	5/30/2006	5/30/2006	
317990	CO	Wailuku	FS	3	4	30	16	38	1110 Eha Street	396,396	2.0	2	807	$ 360,000	$ 349,000	52	4/28/2006	4/28/2006	
312365	CO	Wailuku	FS	3	4	30	13	56	1050 EHA ST. Apt 24-104	396,570	2.0	2	754	$ 380,000	$ 355,000	359	6/26/2005	6/25/2005	
318478	CO	Wailuku	FS	3	4	30	16	68	1140 Eha Street	396,570	2.0	2	807	$ 359,000	$ 359,000	20	5/30/2006	5/30/2006	
318643	CO	Wailuku	FS	3	4	30	14	3	91 Kopi Lane	396,570	2.0	2	754	$ 369,000	$ 369,000	13	6/9/2006	6/6/2006	
316884	CO	Wailuku	FS	3	4	30	16	39	1110 Eha Street	396,570	2.0	2	843	$ 379,000	$ 379,000	110	3/1/2006	3/1/2006	
313871	CO	Wailuku	FS	3	4	30	14	56	31 Kopi Lane	396,570	2.0	3	960	$ 425,000	$ 379,000	265	9/27/2005	9/27/2005	
317202	CO	Wailuku	FS	3	4	30	14	40	51 Kopi Lane	396,570	2.0	3	960	$ 429,000	$ 399,000	96	3/15/2006	3/15/2006	
316474	CO	Wailuku	FS	3	4	30	17	41	70 Waiaka Lane	396,570	2.0	3	960	$ 429,000	$ 415,000	132	2/7/2006	2/7/2006	
318787	CO	Wailuku	FS	3	4	30	16	19	1080 Eha St.	396,396	2.0	3	960	$ 415,000	$ 415,000	3	6/17/2006	6/16/2006	
316733	CO	Wailuku	FS	3	4	30	18	37	25 Waipoa Lane	396,396	2.0	3	934	$ 430,000	$ 415,000	118	2/21/2006	2/21/2006	
317418	CO	Wailuku	FS	3	4	33	009	09	349 N Market	16,117	1.0	1	392	$ 189,900	$ 199,900	84	3/27/2006	3/27/2006	
315617	CO	Wailuku	FS	3	4	033	009	01	341 N Market Sigreet	16,117	1.0	2	567	$ 225,500	$ 225,500	174	3/4/2006	12/27/2005	
315620	CO	Wailuku	FS	3	4	033	009	02	341 N Market Street	16,117	1.0	2	567	$ 225,500	$ 225,500	174	4/27/2006	12/27/2005	
315626	CO	Wailuku	FS	3	4	033	009	06	341 N Market Street	16,117	1.0	2	567	$ 235,500	$ 235,500	174	12/30/2005	12/27/2005	
315628	CO	Wailuku	FS	3	4	033	009	07	341 N Market Street	16,117	1.0	2	567	$ 235,500	$ 235,500	174	12/30/2005	12/27/2005	
315634	CO	Wailuku	FS	3	4	033	009	10	341 N Market Street	16,117	1.0	2	710	$ 469,500	$ 369,500	174	12/30/2005	12/27/2005	
315632	CO	Wailuku	FS	3	4	033	009	11	341 N Market Street	16,117	1.0	2	815	$ 499,500	$ 399,500	174	12/30/2005	12/27/2005	
316932	CO	Kahului	FS	3	7	2	18	94	111 Kahului Beach Road	327,266	1.0	1	610	$ 175,000	$ 164,000	109	3/3/2006	3/2/2006	
317019	CO	Kahului	FS	3	7	2	18	167	111 Kahului Beach Road	327,266	1.0	1	610	$ 175,500	$ 175,500	102	3/9/2006	3/9/2006	
316648	CO	Kahului	FS	3	7	2	18	131	111 Kahului Beach Road	327,266	1.5	2	787	$ 215,000	$ 185,000	124	2/16/2006	2/15/2006	
318397	CO	Kahului	FS	3	7	2	18	229	111 Kahului Beach Road	327,266	1.5	2	787	$ 199,000	$ 185,000	26	5/24/2006	5/24/2006	
316464	CO	Kahului	FS	3	7	2	18	302	111 Kahului Beach Rd	328,050	1.5	2	787	$ 245,000	$ 198,900	135	2/7/2006	2/4/2006	
317776	CO	Kahului	FS	3	7	2	18	308	111 Kahului Beach Rd	327,136	1.5	2	787	$ 225,000	$ 199,000	63	4/17/2006	4/17/2006	
317329	CO	Kahului	FS	3	7	2	18	72	111 Kahului Beach Road	327,266	1.5	2	787	$ 219,000	$ 200,000	89	3/22/2006	3/22/2006	
316707	CO	Kahului	FS	3	7	2	18	288	111 Kahului Beach Road	327,266	1.5	2	787	$ 219,000	$ 209,000	123	2/20/2006	2/16/2006	
318093	CO	Kahului	FS	3	7	2	18	209	111 Kahului Beach Road	327,266	1.5	2	787	$ 237,500	$ 215,000	45	5/5/2006	5/5/2006	
317605	CO	Kahului	FS	3	7	2	18	63	111 Kahului Beach Rd	326,700	1.5	2	787	$ 255,000	$ 218,000	77	4/5/2006	4/3/2006	
317609	CO	Kahului	FS	3	7	2	18	199	111 Kahului Beach Rd. Apt. C-207	327,266	1.5	2	787	$ 228,500	$ 218,500	75	4/6/2006	4/5/2006	
317020	CO	Kahului	FS	3	7	2	18	165	111 Kahului Beach Road	327,266	1.5	2	787	$ 219,500	$ 219,500	102	3/9/2006	3/9/2006	
316475	CO	Kahului	FS	3	7	2	18	77	111 Kahului Beach Road	327,266	1.5	2	787	$ 229,000	$ 220,000	132	2/7/2006	2/7/2006	
316359	CO	Kahului	FS	3	7	2	18	142	111 Kahului Beach Road	327,136	1.5	2	787	$ 220,000	$ 220,000	139	2/1/2006	1/31/2006	
315392	CO	Kahului	FS	3	7	2	18	249	111 Kahului Beach Road	327,266	1.5	2	787	$ 247,000	$ 225,000	186	5/25/2006	12/15/2005	
317619	CO	Kahului	FS	3	7	2	18	2	111 Kahului Beach Road	327,136	1.5	2	787	$ 230,000	$ 230,000	74	4/6/2006	4/6/2006	
317604	CO	Kahului	FS	3	7	2	18	29	111 Kahului Beach Road #A-202	327,266	1.5	2	787	$ 225,000	$ 230,000	75	4/5/2006	4/5/2006	
317285	CO	Kahului	FS	3	7	2	18	316	111 Kahului Beach Road	327,266	1.5	2	787	$ 240,000	$ 232,750	92	3/20/2006	3/19/2006	
317164	CO	Kahului	FS	3	7	2	18	214	111 KAHULUI BEACH ROAD	327,266	1.5	2	787	$ 235,000	$ 235,000	96	3/15/2006	3/15/2006	
315343	CO	Kahului	FS	3	7	2	18	81	111 Kahului Beach Rd	43,560	1.5	2	787	$ 239,900	$ 239,900	189	12/13/2005	12/12/2005	
316776	CO	Kahului	FS	3	7	2	18	91	111 Kahului Beach Road	174,240	1.5	2	787	$ 275,000	$ 245,000	115	2/24/2006	2/24/2006	
316760	CO	Kahului	FS	3	7	2	18	163	111 Kahului Beach Road	327,266	1.5	2	787	$ 250,000	$ 245,000	117	2/23/2006	2/22/2006	
314565	CO	Kahului	FS	3	7	2	18	352	111 Kahului Beach Rd #D428	327,266	1.5	2	787	$ 250,000	$ 250,000	229	11/2/2005	11/2/2005	
318271	CO	Kahului	FS	3	7	2	18	109	111 Kahului Beach Road	326,700	1.5	2	787	$ 252,000	$ 252,000	35	5/17/2006	5/15/2006	
315341	CO	Kahului	FS	3	7	2	18	301	111 Kahului Beach Road	327,266	1.5	2	787	$ 265,000	$ 265,000	189	12/13/2005	12/12/2005	
317104	CO	Kahului	FS	3	7	2	18	246	111 Kahului Beach Road	327,266,280	1.5	2	784	$ 275,000	$ 275,000	101	3/13/2006	3/10/2006	
317296	CO	Kahului	FS	3	7	2	18	245	111 Kahului Beach Road	327,266,280	1.5	2	784	$ 275,000	$ 275,000	91	3/21/2006	3/20/2006	
318340	CO	Kahului	FS	3	7	2	18	88	111 Kahului Beach Road A 405	326,700	1.5	2	787	$ 275,000	$ 275,000	32	5/20/2006	5/18/2006	
315018	CO	Wailuku	FS	3	8	37	39	27	493 Pio Drive	46,174	1.0	1	586	$ 228,000	$ 198,900	201	5/31/2006	11/30/2005	
317262	CO	Wailuku	FS	3	8	37	39	62	493 Pio Drive	46,130	1.0	1	586	$ 210,000	$ 199,000	91	3/20/2006	3/20/2006	
312942	CO	Wailuku	FS	3	8	37	39	13	493 Pio Drive	46,115	1.0	1	586	$ 219,500	$ 209,000	319	11/16/2005	8/4/2005	
316173	CO	Wailuku	FS	3	8	37	39	54	493 Pio Drive	46,130	1.0	1	586	$ 220,000	$ 212,000	147	1/23/2006	1/23/2006	
314561	CO	Wailuku	FS	3	8	37	39	65	493 Pio Drive	46,115	1.0	1	586	$ 220,000	$ 220,000	230	4/3/2006	11/1/2005	

MLS #	Class	District	LT	Zone	Sec	Plat	Par	CPR	Address	Land SQFT	Baths	Beds	Liv A SF	Original Price	List Price	DOM	Status Date	List Date	Ohana Liv A SF
315083 CO		Wailuku	FS	3	8	37	50	86	1063 Lower Main Street	130,680	1.5	2	757	$ 299,000	$ 274,000	200	3/23/2006	12/1/2005	
315057 CO		Wailuku	FS	3	8	37	50	55	1063 Lower Main Street	130,680	1.5	2	757	$ 280,000	$ 280,000	201	6/12/2006	11/30/2005	
317730 CO		Wailuku	FS	3	8	37	50	59	1063 Lower Main St.	130,680	1.5	2	757	$ 285,000	$ 285,000	68	4/12/2006	4/12/2006	
315980 CO		Wailuku	FS	3	8	37	50	71	1063 Lower Main Street	130,680	1.5	2	757	$ 305,000	$ 289,000	158	1/13/2006	1/12/2006	
314327 CO		Wailuku	FS	3	8	37	50	58	1063 Lower Main	130,680	1.5	2	757	$ 295,000	$ 295,000	242	10/20/2005	10/20/2005	
318350 CO		Wailuku	FS	3	8	37	20	23	495 Lihaliha Street	27,521	1.5	2	724	$ 297,000	$ 297,000	31	5/22/2006	5/19/2006	
318351 CO		Wailuku	FS	3	8	37	20	22	495 Lihaliha Street	27,326	1.5	2	724	$ 297,000	$ 297,000	31	5/22/2006	5/19/2006	
318778 CO		Wailuku	FS	3	8	37	50	54	1063 Lower Main Street	130,680	2.0	3	1,156	$ 460,000	$ 460,000	3	6/16/2006	6/16/2006	
318607 CO		Kahului	FS	3	8	46	10	18	7 Kaiola Lane	213,444	1.0	1	589	$ 259,000	$ 259,000	12	6/7/2006	6/7/2006	
317341 CO		Kahului	FS	3	8	46	10	12	11 Kaiola	213,444	2.0	2	772	$ 360,000	$ 330,000	90	3/23/2006	3/21/2006	
318468 CO		Wailuku	FS	3	8	46	10	7	7 Kaiola Ln.	43,560	2.0	2	749	$ 360,000	$ 360,000	24	5/30/2006	5/26/2006	
317439 CO		Kahului	FS	3	8	046	010	0031	40 Kunihi Lane	213,444	2.0	2	749	$ 369,000	$ 369,000	83	3/28/2006	3/28/2006	
316764 CO		Kahului	FS	3	8	46	10	55	60 Kunihi Street	213,444	2.0	2	749	$ 400,000	$ 380,000	116	2/23/2006	2/23/2006	
318561 CO		Kahului	FS	3	8	46	10	45	44 Kunihi Lane	24,829	2.0	2	772	$ 380,000	$ 380,000	14	6/5/2006	6/5/2006	
318792 CO		Kahului	FS	3	8	46	10	06	11 KOIULA LN	213,444	2.0	3	900	$ 495,000	$ 495,000	1	6/18/2006	6/18/2006	
318797 CO		Wailuku	FS	3	9	037	050	0068	1063 Lower Main Street	130,680	1.5	2	757	$ 295,000	$ 295,000	3	6/18/2006	6/16/2006	
316353 CO		Wailuku	FS	3	9	37	50	77	1063 Lower Main Street	130,680	1.5	2	757	$ 296,000	$ 296,000	139	2/1/2006	1/31/2006	
318180 LD		Wailuku	FS	3	4	14	75		2265 Vineyard Street	2,085				$ 100,000	$ 100,000	40	5/11/2006	5/10/2006	
318168 LD		Wailuku	FS	3	2	4	5		000 Waihee Valley Rd.	58,501				$ 300,000	$ 300,000	40	5/10/2006	5/10/2006	
316331 LD		Wailuku	FS	3	8	7	137 por.		Lot #61 Sandhills Estates	8,033				$ 350,000	$ 350,000	139	1/31/2006	1/31/2006	
314725 LD		Wailuku	FS	3	2	3	47		8 River Road	21,780				$ 400,000	$ 380,000	221	3/9/2006	11/10/2005	
318663 LD		Wailuku	FS	3	5	001	067		23 Papakapu Pl	9,583				$ 395,000	$ 395,000	8	6/11/2006	6/11/2006	
316737 LD		Kahului	FS	3	8	81	101		380 Kuwaloha Street	6,307				$ 395,000	$ 395,000	118	3/8/2006	2/21/2006	
317594 LD		Wailuku	FS	3	2	20	60		1367 Kakae Place	7,405				$ 410,000	$ 399,000	76	4/5/2006	4/4/2006	
317443 LD		Wailuku	FS	3	8	7	por. 137		Lot #6 Sandhills Estates	8,189				$ 399,000	$ 399,000	83	3/28/2006	3/28/2006	
314220 LD		Wailuku	FS	3	4	21	36		0 KOWALI PLACE (317 AINAHOU)	5,227				$ 320,000	$ 400,000	251	10/14/2005	10/11/2005	
314743 LD		Wailuku	FS	3	8	7	137		Lot 28 Sandhills Estates	10,019				$ 549,000	$ 405,000	222	4/3/2006	11/9/2005	
317991 LD		Wailuku	FS	3	2	19	52		1357 Owaka St.	6,055				$ 410,000	$ 410,000	52	4/28/2006	4/28/2006	
316332 LD		Wailuku	FS	3	8	7	137 por.		Lot #63 Sandhills Estats	9,228				$ 410,000	$ 410,000	139	1/31/2006	1/31/2006	
314371 LD		Wailuku	FS	3	8	7	por. 137		Lot #41 Sandhills Estates	9,901				$ 460,000	$ 425,000	238	10/24/2005	10/24/2005	
317854 LD		Wailuku	FS	3	8	7	137		Lot 22 Sandhills Estates	10,454				$ 435,000	$ 435,000	59	4/21/2006	4/21/2006	
318025 LD		Kahului	FS	3	8	7	137		0 Sand Hills Estates	9,245				$ 435,000	$ 435,000	48	5/2/2006	5/2/2006	
314703 LD		Wailuku	FS	3	8	7	137		#36 Sandhills Estate Lot #36	8,712				$ 490,000	$ 445,000	221	11/10/2005	11/10/2005	
313962 LD		Kahului	FS	3	8	7	P...		LOT 93 SANDHILL ESTATE	11,565				$ 530,000	$ 450,000	266	9/30/2005	9/26/2005	
310788 LD		Wailuku	FS	3	2	16	22		0 Malaihi Road	21,780				$ 469,000	$ 459,000	475	6/13/2006	3/1/2005	
316227 LD		Wailuku	FS	3	8	007	137		0 Sandhills Estate Lot 88	10,842				$ 528,000	$ 463,000	145	1/26/2006	1/25/2006	
317110 LD		Wailuku	FS	3	8	7	TBD		Lot 3 Sandhills Estates	8,058				$ 505,000	$ 475,000	99	3/14/2006	3/12/2006	
317106 LD		Wailuku	FS	3	8	7	137		#42 Sandhill Estates	10,884				$ 475,000	$ 475,000	98	3/13/2006	3/13/2006	
316224 LD		Wailuku	FS	3	8	00	---		LOT #34 SANDHILLS ESTATE	9,337				$ 485,000	$ 485,000	147	1/25/2006	1/23/2006	
317892 LD		Kahului	FS	3	8	86	22		115 kamalei circle	10,454				$ 499,000	$ 487,000	56	4/24/2006	4/24/2006	
313465 LD		Wailuku	FS	3	8	007	136		Lot #9 Sandhills Estates	10,658				$ 528,880	$ 488,000	290	9/2/2005	9/2/2005	
318349 LD		Wailuku	FS	3	5	11	74		85 Wilikona Place	6,359				$ 495,000	$ 495,000	31	5/22/2006	5/19/2006	
315649 LD		Wailuku	FS	3	8	007	137		0 Sandhills Estates at Maui Lani 106	10,019				$ 520,000	$ 495,000	171	12/30/2005	12/30/2005	
314578 LD		Wailuku	FS	3	8	7	000		31 W Kapueone Place	8,889				$ 539,000	$ 495,000	230	4/27/2006	11/1/2005	
317515 LD		Wailuku	FS	3	8	0007	137		LOT 40 Sandhills	8,756				$ 495,000	$ 495,000	81	3/31/2006	3/30/2006	
316355 LD		Wailuku	FS	3	8	7	137		Lot 49 Sandhills Estates	9,978				$ 519,000	$ 519,000	139	2/1/2006	1/31/2006	
314691 LD		Wailuku	FS	3	8	7	137		54 Sandhills Estates	9,533				$ 519,000	$ 519,000	222	11/9/2005	11/9/2005	
314891 LD		Kahului	FS	3	8	87	92	9019	Lot 19 Kamaila Circle	10,019				$ 520,000	$ 520,000	210	11/21/2005	11/21/2005	
316107 LD		Wailuku	FS	3	8	7	137		0 Sandhills Estate Lot 108	13,068				$ 545,000	$ 524,000	151	1/20/2006	1/19/2006	
314392 LD		Wailuku	FS	3	8	7	137		Lot 12 Sandhill Estates at Maui Lani	8,754				$ 600,000	$ 525,000	240	10/24/2005	10/22/2005	
318774 LD		Wailuku	FS	3	8	7	137		Lot #82 Sandhills Estates	12,632				$ 529,000	$ 529,000	3	6/16/2006	6/16/2006	
313116 LD		Wailuku	FS	3	8	7	TBA		Lot # 75 New Sandhills	10,301				$ 550,000	$ 535,000	306	8/17/2005	8/17/2005	
317109 LD		Wailuku	FS	3	8	7	TBD		Lot 74 Sandhills Estates	10,301				$ 549,000	$ 535,000	99	3/14/2006	3/12/2006	
317686 LD		Wailuku	FS	3	8	7	por 137		Lot 99 Sandhills Estates	10,125				$ 545,000	$ 545,000	70	4/10/2006	4/10/2006	
318692 LD		Wailuku	FS	3	5	001	067	0000	10 Papuhau Place	12,116				$ 548,000	$ 548,000	7	6/13/2006	6/12/2006	
317043 LD		Wailuku	FS	3	8	7	137		Lot 8 Sandhill Estates at Maui Lani	7,867				$ 549,000	$ 549,000	106	3/10/2006	3/5/2006	
315013 LD		Wailuku	FS	3	8	TBD	TBD		Lot #30 Sandhills Estate	10,019				$ 549,000	$ 549,000	202	11/30/2005	11/29/2005	
314250 LD		Kahului	FS	3	8	007	137		Lot 16 Sandhills Estate	9,517				$ 550,000	$ 550,000	248	10/15/2005	10/14/2005	

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316523 LD		Wailuku	FS	3	8	007	137		00 E Kapueone Pl.	8,276				$ 600,000	$ 550,000	129	2/10/2006	2/10/2006	
317622 LD		Wailuku	FS	3	8	07	137		Lot 46 Sandhills Estates	15,682				$ 575,000	$ 575,000	74	4/6/2006	4/6/2006	
315368 LD		Wailuku	FS	3	8	7	por 137		Lot 47 Sandhills Estate	10,019				$ 575,000	$ 575,000	187	12/14/2005	12/14/2005	
318413 LD		Wailuku	FS	3	5	1	67		46 Papuhau Place	10,890				$ 579,000	$ 579,000	26	5/24/2006	5/24/2006	
314990 LD		Wailuku	FS	3	2	15	39		0 Hiahia Place	13,504				$ 619,000	$ 585,000	203	11/28/2005	11/28/2005	
315385 LD		Wailuku	FS	3	5	1	67		8 Nohoana Place Lot 26	19,936				$ 650,000	$ 595,000	188	12/15/2005	12/13/2005	
316970 LD		Wailuku	FS	3	8	7	136		Lot #89 Sanhills Estates	10,759				$ 595,000	$ 595,000	105	3/6/2006	3/6/2006	
313380 LD		Kahakuloa	FS	3	1	7	47		Maluhia Country Estates	128,676				$ 635,000	$ 599,000	293	3/3/2006	8/30/2005	
316629 LD		Kahului	FS	3	8	7	TBA		Lot 103 Sandhill Estates	8,712				$ 600,000	$ 600,000	124	2/15/2006	2/15/2006	
317257 LD		Wailuku	FS	3	3	17	4		Lot 4 Wailuku Country Estates	99,840				$ 650,000	$ 629,000	91	3/20/2006	3/20/2006	
316758 LD		Wailuku	FS	3	5	1	6		28 Papakapu Place	9,148				$ 650,000	$ 650,000	117	2/23/2006	2/22/2006	
318747 LD		Wailuku	FS	3	3	17	52		2011 Puuahala Road	147,538				$ 675,000	$ 675,000	13	6/16/2006	6/6/2006	
317938 LD		Wailuku	FS	3	3	17	108		Lot 108 Wailuku Country Estates	88,862				$ 685,000	$ 685,000	54	4/26/2006	4/26/2006	
313068 LD		Kahakuloa	FS	3	1	7	17		51 Labaole Place	271,379				$ 795,000	$ 695,000	312	8/14/2005	8/11/2005	
317975 LD		Wailuku	FS	3	3	2	180		2347 Kamaile Street (Lot 180)	100,188				$ 750,000	$ 740,000	53	4/28/2006	4/27/2006	
316049 LD		Kahakuloa	FS	3	1	7	54		#398 Maluhia Country Estates	163,786				$ 750,000	$ 750,000	157	1/17/2006	1/13/2006	
317923 LD		Wailuku	FS	3	3	17	159		0 Wailuku Country Estates	101,930				$ 750,000	$ 750,000	55	4/25/2006	4/25/2006	
317289 LD		Wailuku	FS	3	3	17	93		Lot 93 Mahinalani Place	98,446				$ 795,000	$ 750,000	91	3/21/2006	3/20/2006	
317945 LD		Wailuku	FS	3	3	17	49		2004 Puuohala Road	92,826				$ 750,000	$ 750,000	54	4/26/2006	4/26/2006	
317212 LD		Wailuku	FS	3	3	17	0080		2850 Kamaile St.	100,362				$ 795,000	$ 769,000	103	3/16/2006	3/8/2006	
317858 LD		Wailuku	FS	3	3	17	81	---	2832 Kamaile Pl. (Lot #81)	99,186				$ 789,000	$ 789,000	59	4/21/2006	4/21/2006	
312983 LD		Kahakuloa	FS	3	1	1	62		00 Kaukini Loop/ Haku Hee way	191,664				$ 825,000	$ 799,000	315	8/9/2005	8/8/2005	
317701 LD		Kahakuloa	FS	3	1	7	35		Kahakalua Maluhia Country Estates	155,509				$ 799,000	$ 799,000	69	4/11/2006	4/11/2006	
312806 LD		Kahakuloa	FS	3	1	7	37		45 Hulumanu Pl.	246,550				$ 885,000	$ 835,000	332	7/26/2005	7/22/2005	
318117 LD		Wailuku	FS	3	3	17	22		Lot 22 Wailuku Country Estates	124,930				$ 875,000	$ 875,000	45	5/8/2006	5/5/2006	
318402 LD		Wailuku	FS	3	2	13	25		0 Lower Waiehu Beach Road	71,874				$ 900,000	$ 900,000	28	5/24/2006	5/22/2006	
317022 LD		Kahakuloa	FS	3	1	1	Portion of		0 Kahekili Hwy	130,680				$ 1,600,000	$ 1,200,000	103	3/9/2006	3/8/2006	
312932 LD		Wailuku	FS	3	4	30	10		00 Pihana Road	124,582				$ 1,200,000	$ 1,200,000	322	8/4/2005	8/1/2005	
313354 LD		Wailuku	FS	3	2	16	7,8,11,26,	Por 27,28	9498,967 Malaihi Rd	229,561				$ 2,500,000	$ 2,500,000	294	8/29/2005	8/29/2005	
318589 LD		Kahului	FS	3	8	80	9		0 Ala Makani St	20,038				$ 2,850,000	$ 2,850,000	13	6/6/2006	6/6/2006	
310679 LD		Kahului	FS	3	7	2	5		65 Kahului Beach Road	195,149				$ 4,500,000	$ 5,500,000	486	6/14/2005	2/18/2005	
307107 LD		Wailuku	FS	3	5	4	22		440 W Waiko Road	848,070				$ 10,000,000	$ 8,750,000	740	6/27/2004	6/9/2004	
314432 MD		Kahului	FS	3	8	72	36		292 MOHALU STREET	8,390				$ 995,000	$ 995,000	236	10/26/2005	10/26/2005	
318261 MD		Wailuku	FS	3	4	16	02		2114 vineyard	4,200				$ 750,000	$ 750,000	34	5/16/2006	5/16/2006	
318260 MD		Wailuku	FS	3	4	16	02		2114 vineyard	4,200				$ 750,000	$ 750,000	34	5/16/2006	5/16/2006	
317324 RS		Wailuku	FS	3	4	004	073		438 Makahaiki Place	7,847	1.0	3	780	$ 350,000	$ 350,000	90	6/19/2006	3/21/2006	
317947 RS		Wailuku	FS	3	4	17	46		270 North Market Street	2,831	1.0	2	665	$ 400,000	$ 400,000	54	4/26/2006	4/26/2006	
317993 RS		Wailuku	FS	3	4	8	75		2073A Wells Street	3,963	1.0	2	688	$ 445,000	$ 400,000	52	4/28/2006	4/28/2006	
314630 RS		Wailuku	FS	3	4	12	58		1835 Lola Street	4,687	1.0	2	816	$ 474,000	$ 409,000	226	11/7/2005	11/5/2005	
314296 RS		Wailuku	FS	3	4	17	136		1994 Lika Lane	4,738	1.0	2	600	$ 475,000	$ 447,000	244	10/18/2005	10/18/2005	
318722 RS		Wailuku	FS	3	4	17	132		1970 LIKO PLACE	3,875	1.0	3	864	$ 449,990	$ 449,990	5	6/14/2006	6/14/2006	
317170 RS		Wailuku	FS	3	4	5	30		440 Lanane St.	3,102	1.0	3	904	$ 474,000	$ 464,000	104	3/15/2006	3/7/2006	
313960 RS		Wailuku	FS	3	4	16	35		2265 Holowai Place	11,600	1.5	3	960	$ 650,000	$ 485,000	262	9/30/2005	9/30/2005	
318363 RS		Wailuku	FS	3	4	18	65		1816 Nani Street	3,684	1.5	4	992	$ 485,000	$ 485,000	31	5/22/2006	5/19/2006	
315702 RS		Wailuku	FS	3	4	28	7		605 Kaikoo St.	6,877	1.0	2	824	$ 569,000	$ 485,000	167	6/10/2006	1/3/2006	432
313861 RS		Wailuku	FS	3	2	11	44		59 Halewaiu Rd	4,588	1.0	2	720	$ 525,000	$ 485,000	266	9/26/2005	9/26/2005	
318347 RS		Wailuku	FS	3	4	35	22		2214 Mokuhau	7,512	1.0	3	976	$ 485,000	$ 485,000	31	5/22/2006	5/19/2006	
313209 RS		Wailuku	FS	3	4	28	15		592 Kaikoo Street	6,877	1.0	3	975	$ 495,000	$ 495,000	301	8/22/2005	8/22/2005	
318780 RS		Wailuku	FS	3	4	33	78		2032 Kahawai Street	6,621	2.0	2	823	$ 495,000	$ 495,000	3	6/16/2006	6/16/2006	
317315 RS		Wailuku	FS	3	4	4	55		1727 KALAWI DRIVE	2,813	2.0	3	1,196	$ 550,000	$ 499,000	94	3/22/2006	3/17/2006	
314735 RS		Wailuku	FS	3	3	01	65		1822 Pihana Road	4,313	2.0	4	1,368	$ 499,000	$ 499,000	224	4/3/2006	11/7/2005	
317424 RS		Wailuku	FS	3	3	12	71		862 Upaiki Street	3,854	2.0	3	960	$ 510,000	$ 510,000	84	6/1/2006	3/27/2006	
314384 RS		Wailuku	FS	3	4	45	49		1600 Akaka Street	3,365	2.0	3	1,248	$ 589,000	$ 520,000	238	1/26/2006	10/24/2005	
318806 RS		Kahului	FS	3	8	28	26		93 Kona Place	10,509	1.0	3	760	$ 525,000	$ 525,000	0	6/19/2006	6/19/2006	500
318798 RS		Wailuku	FS	3	3	013	053		917 Hoomau Street	3,585	2.0	2	836	$ 525,000	$ 525,000	1	6/19/2006	6/18/2006	
318296 RS		Wailuku	FS	3	3	12	26		808 Makaala Drive	4,512	2.0	3	1,033	$ 525,000	$ 525,000	32	5/18/2006	5/18/2006	

MLS #	Class	District	LT	Zone	Sec	Plat	Par	CPR	Address	Land SQFT	Baths	Beds	Liv A SF	Original Price	List Price	DOM	Status Date	List Date	Ohana Liv A SF
318762 RS		Wailuku	FS	3	3	13	42		973 Haomau Street	4,091	2.0	3	1,104	$ 529,000	$ 529,000	4	8/16/2006	6/15/2006	
316929 RS		Wailuku	FS	3	3	12	42		865 MAKAALA DRIVE	4,128	2.0	3	980	$ 699,000	$ 535,000	110	3/3/2006	3/1/2006	
317768 RS		Wailuku	FS	3	4	4	92		2086 HELENA PLACE	6,322	1.0	3	916	$ 549,000	$ 549,000	65	4/15/2006	4/15/2006	
318430 RS		Wailuku	FS	3	6	7	33		20 Ola Place	7,479	1.0	3	1,140	$ 560,000	$ 560,000	28	5/25/2006	5/22/2006	
317163 RS		Wailuku	FS	3	3	14	107		1148 Hoaku Place	6,697	2.0	3	1,224	$ 575,000	$ 575,000	96	4/24/2006	3/15/2006	
315002 RS		Wailuku	FS	3	2	11	12		2072 KAHEKILI HWY	14,989	1.0	2	600	$ 725,000	$ 575,000	203	11/29/2005	11/28/2005	
318467 RS		Kahului	FS	3	8	27	3		382 Kea Street	7,800	1.0	3	720	$ 595,000	$ 580,000	25	5/30/2006	5/25/2006	
316700 RS		Wailuku	FS	3	4	45	13		1610 Wili Place	6,945	1.5	2	960	$ 580,000	$ 580,000	122	2/17/2006	2/17/2006	
317124 RS		Wailuku	FS	3	4	014	025		2350 Main Street	3,954	1.5	3	976	$ 589,000	$ 589,000	108	3/14/2006	3/3/2006	
315776 RS		Wailuku	FS	3	4	28	65		619 Linekona Pl.	7,364	2.0	4	1,152	$ 649,000	$ 590,000	165	1/5/2006	1/5/2006	
317839 RS		Kahului	FS	3	8	81	106		352 Ku'ualoha St.	5,755	2.0	3	1,190	$ 649,500	$ 592,000	63	4/20/2006	4/17/2006	
318758 RS		Wailuku	FS	3	4	8	84		2089 Pakahi Street	4,326	3.5	6	1,846	$ 594,900	$ 594,900	3	6/16/2006	6/16/2006	
318808 RS		Kahului	FS	3	8	33	33		401 Ano Street	8,466	1.5	3	1,288	$ 595,000	$ 595,000	0	6/19/2006	6/19/2006	
317097 RS		Kahului	FS	3	8	82	83		267 Kuualoha	6,142	2.0	3	1,122	$ 630,000	$ 599,000	132	6/6/2006	2/7/2006	
318110 RS		Wailuku	FS	3	3	13	52		923 Hoomau St	4,091	2.0	4	1,600	$ 599,000	$ 599,000	47	5/7/2006	5/3/2006	
311694 RS		Wailuku	FS	3	4	24	19		242 KONI PL	7,123	1.0	2	583	$ 650,000	$ 599,000	415	5/30/2006	4/30/2005	
318541 RS		Kahului	FS	3	8	38	35		328 Hilu Place	10,464	1.5	3	1,367	$ 615,000	$ 615,000	17	6/2/2006	6/2/2006	
318034 RS		Kahului	FS	3	8	82	75		241 Ku'ualoha Street	6,276	3.5	3	1,486	$ 650,000	$ 620,000	48	5/2/2006	5/2/2006	
316594 RS		Wailuku	FS	3	5	18	90		87 Poniu Circle	3,960	2.0	3	1,185	$ 624,900	$ 624,900	125	2/14/2006	2/14/2006	
315206 RS		Wailuku	FS	3	4	028	084		595 Linekona St.	6,838	2.0	2	912	$ 625,000	$ 625,000	195	12/6/2005	12/6/2005	
318000 RS		Kahului	FS	3	8	82	9		262 Kuualoha St.	5,705	2.0	3	1,243	$ 625,000	$ 625,000	52	4/28/2006	4/28/2006	
311690 RS		Kahului	FS	3	8	051	073		739 S KEI PLACE	7,659	1.5	3	960	$ 625,000	$ 625,000	414	5/5/2005	5/1/2005	
317699 RS		Waiehu	FS	3	4	35	73		352 NENEA ST	6,119	1.0	3	1,008	$ 625,000	$ 625,000	71	4/11/2006	4/9/2006	
318725 RS		Kahului	FS	3	8	054	009		600 Pohai St	8,176	2.0	3	1,538	$ 630,000	$ 630,000	6	6/15/2006	6/13/2006	
318496 RS		Wailuku	FS	3	3	12	1		800 Hoomau St.	8,100	2.0	3	1,124	$ 630,000	$ 630,000	19	5/31/2006	5/31/2006	
317696 RS		Wailuku	FS	3	5	21	78		757 Papua Street	7,026	2.0	3	1,404	$ 655,000	$ 635,000	69	4/11/2006	4/11/2006	
316449 RS		Wailuku	FS	3	4	6	9		388 A High Street	7,530	1.0	2	861	$ 699,000	$ 635,000	133	2/6/2006	2/6/2006	400
317485 RS		Kahului	FS	3	8	38	41		360 Hilu Place	9,020	1.5	3	931	$ 638,000	$ 638,000	81	3/30/2006	3/30/2006	
318008 RS		Wailuku	FS	3	5	18	71		31 Poniu Circle	3,960	2.5	3	1,521	$ 639,000	$ 639,000	49	5/1/2006	5/1/2006	
317707 RS		Wailuku	FS	3	5	18	4		614 Akolea Street	3,960	2.0	3	1,521	$ 640,000	$ 640,000	69	4/11/2006	4/11/2006	
316930 RS		Kahului	FS	3	8	007	004		48 Hoohana Street	4,168	2.5	4	1,421	$ 680,000	$ 647,500	109	3/3/2006	3/2/2006	
317875 RS		Kahului	FS	3	8	35	30		307 Ohua Street	7,626	1.0	2	760	$ 649,000	$ 649,000	59	4/23/2006	4/21/2006	
318405 RS		Wailuku	FS	3	5	18	37		530 Akolea Place	3,960	2.5	3	1,521	$ 649,000	$ 649,000	26	5/24/2006	5/24/2006	
317317 RS		Wailuku	FS	3	4	004	064		435 Makahala Place	14,402	1.5	3	1,514	$ 650,000	$ 650,000	90	5/25/2006	3/21/2006	
318048 RS		Kahului	FS	3	8	81	50		14 Kuuohana Way	7,653	2.0	3	1,312	$ 650,000	$ 650,000	48	5/3/2006	5/2/2006	
317088 RS		Wailuku	FS	3	4	8	9		2047 Palua Street	3,364	1.5	2	1,432	$ 650,000	$ 650,000	99	3/12/2006	3/12/2006	686
314644 RS		Kahului	FS	3	8	27	10		428 KEA STREET	10,748	2.0	4	1,446	$ 675,000	$ 650,000	224	11/7/2005	11/7/2005	
315553 RS		Wailuku	FS	3	4	2	26		216 Naniloa Drive	6,307	2.0	2	1,350	$ 725,000	$ 650,000	178	6/1/2006	12/23/2005	
318332 RS		Wailuku	FS	3	5	22	10		22 Hapua Place	6,674	2.5	3	1,525	$ 677,000	$ 657,000	31	5/19/2006	5/19/2006	
318532 RS		Kahului	FS	3	8	007	13		39 Papahi Loop	4,493	2.5	4	1,421	$ 659,000	$ 659,000	56	6/2/2006	4/24/2006	
318365 RS		Kahului	FS	3	8	69	19		651 Kaulu Place	6,618	2.0	3	1,934	$ 695,000	$ 659,000	28	5/22/2006	5/22/2006	
318056 RS		Wailuku	FS	3	5	16	34		1366 Kawika Street	6,014	2.0	3	1,105	$ 661,000	$ 661,000	47	5/3/2006	5/3/2006	
318520 RS		Wailuku	FS	3	5	19	21		135 Poniu Circle	4,978	2.0	3	1,600	$ 669,000	$ 669,000	18	6/1/2006	6/1/2006	
316902 RS		Wailuku	FS	3	4	33	68		357 Lani Place	4,000	4.0	6	1,176	$ 675,000	$ 670,000	109	3/2/2006	3/2/2006	
318735 RS		Kahului	FS	3	8	027	051		61 Kaiemi Street	8,125	1.0	3	680	$ 675,000	$ 675,000	5	6/15/2006	6/14/2006	392
318017 RS		Wailuku	FS	3	2	11	16		2042 KAHEKILI HIGHWAY	7,492	2.0	3	1,350	$ 675,000	$ 675,000	49	5/1/2006	5/1/2006	496
317213 RS		Wailuku	FS	3	5	17	5		1292 Kawika Street	7,416	2.0	3	1,105	$ 699,000	$ 679,000	96	5/22/2006	3/15/2006	
315506 RS		Kahului	FS	3	8	28	69		67 S PAPA	7,931	1.5	5	1,465	$ 680,000	$ 680,000	180	12/21/2005	12/21/2005	
318472 RS		Wailuku	FS	3	5	21	7		1910 Koae Place	6,079	2.5	3	1,712	$ 685,000	$ 685,000	20	5/30/2006	5/30/2006	
318694 RS		Wailuku	FS	3	3	24	57		10 Malunawai Street	6,970	2.0	3	1,408	$ 689,000	$ 689,000	6	6/13/2006	6/13/2006	
318566 RS		Wailuku	FS	3	3	9	31		744 Aukai Street	6,796	2.5	3	1,648	$ 698,000	$ 698,000	14	6/6/2006	6/5/2006	
315555 RS		Kahului	FS	3	8	85	34		11 Apa'a Pl	9,834	2.0	4	1,675	$ 710,000	$ 698,000	179	12/23/2005	12/22/2005	0
314851 RS		Wailuku	FS	3	3	9	88		890 Lekeona Loop	7,990	2.0	3	1,950	$ 749,000	$ 699,000	213	11/18/2005	11/18/2005	
317928 RS		Wailuku	FS	3	2	5	40		130 Waihee Valley Road	4,176	2.0	2	1,292	$ 699,000	$ 699,000	56	4/25/2006	4/24/2006	
317047 RS		Wailuku	FS	3	5	22	30		42 Kolopua Pl.	7,012	2.5	3	1,525	$ 699,000	$ 699,000	101	6/13/2006	3/10/2006	
314293 RS		Wailuku	FS	3	2	20	34		160 Hacuna Place	7,855	2.0	3	1,368	$ 815,000	$ 699,000	244	2/24/2006	10/18/2005	
316654 RS		Wailuku	FS	3	4	17	147		179 Central Ave.	7,179	2.0	4	1,616	$ 699,000	$ 699,000	124	2/16/2006	2/15/2006	
318407 RS		Wailuku	FS	3	4	16	012		2294 Vineyard St.	10,600	1.0	2	596	$ 700,000	$ 700,000	28	5/24/2006	5/22/2006	596
318713 RS		Kahului	FS	3	8	53	51		507 Waikola Street	7,503	2.0	3	1,909	$ 705,000	$ 705,000	6	6/14/2006	6/13/2006	
313362 RS		Wailuku	FS	3	5	1	67		21 Hakalani Place	8,118	2.0	3	1,408	$ 1,088,044	$ 707,707	297	8/29/2005	8/26/2005	

MLS #	Class	District	LT	Zone	Sec	Plat	Par	CPR	Address	Land SQFT	Baths	Beds	Liv A SF	Original Price	List Price	DOM	Status Date	List Date	Ohana Liv A SF
318608 RS		Wailuku	FS	3	4	28	23		670 Kaiha'o Street	6,877	1.8	3	1,334	$ 715,000	$ 715,000	12	6/7/2006	6/7/2006	399
314655 RS		Wailuku	FS	3	4	41	34		187 Ku Drive	11,167	2.0	3	1,494	$ 825,000	$ 718,000	223	11/8/2005	11/8/2005	
316156 RS		Wailuku	FS	3	3	16	32		1173 Omaha Place	7,973	3.0	3	1,938	$ 769,000	$ 719,000	151	1/22/2006	1/19/2006	
318800 RS		Wailuku	FS	3	4	5	2		480 Kamani Place	8,001	2.0	3	1,488	$ 725,000	$ 725,000	2	6/19/2006	6/17/2006	
315597 RS		Kahului	FS	3	8	7	131		12 Papahi Loop	4,978	3.0	4	1,768	$ 775,000	$ 725,000	173	12/29/2005	12/28/2005	
310917 RS		Wailuku	FS	3	4	1	38		208 Halenani Drive	11,979	2.0	3	2,238	$ 746,000	$ 725,000	466	11/4/2005	3/10/2005	
316158 RS		Wailuku	FS	3	3	16	34		1181 W Onaha Place	10,069	3.0	4	1,832	$ 769,500	$ 734,500	151	1/22/2006	1/19/2006	
317931 RS		Wailuku	FS	3	5	19	75		148 Poniu Circle	3,960	3.0	4	1,628	$ 749,900	$ 735,000	55	4/25/2006	4/25/2006	
313936 RS		Wailuku	FS	3	2	20	32		1409 Hahia Street	6,890	3.0	3	1,361	$ 745,000	$ 745,000	263	9/29/2005	9/29/2005	
314989 RS		Wailuku	FS	3	8	36	48		670 Pio Drive	9,226	2.0	3	1,434	$ 875,000	$ 749,000	206	11/28/2005	11/25/2005	400
315094 RS		Wailuku	FS	3	5	24	58		6 Mafunawai St.	6,975	3.0	4	1,809	$ 849,000	$ 750,000	200	6/17/2006	12/1/2005	
314613 RS		Wailuku	FS	3	4	17	34		2092 Church Street	8,146	1.5	3	1,128	$ 850,000	$ 750,000	226	11/6/2005	11/5/2005	
317901 RS		Wailuku	FS	3	4	18	9		1757 Mill Street	14,596	1.5	4	1,592	$ 750,000	$ 750,000	56	4/24/2006	4/24/2006	
318242 RS		Wailuku	FS	3	5	21	56		1902 Pohakea Place	9,330	3.0	4	1,817	$ 750,000	$ 750,000	35	5/15/2006	5/15/2006	
317538 RS		Wailuku	FS	3	4	07	028		281 awapuhi pL	10,896	2.0	4	1,500	$ 750,000	$ 750,000	78	6/16/2006	4/2/2006	600
316356 RS		Wailuku	FS	3	3	11	101		854 Hauoni Place	7,460	2.0	3	1,486	$ 759,000	$ 759,000	138	2/1/2006	2/1/2006	
318600 RS		Kahului	FS	3	8	18	38		281 W. Kamehameha Ave.	12,267	2.0	3	1,757	$ 759,500	$ 759,500	12	6/7/2006	6/7/2006	600
318665 RS		Wailuku	FS	3	5	001	067		Obia Phase 2 Lot 39	8,784	3.5	5	2,137	$ 765,000	$ 765,000	8	6/11/2006	6/11/2006	
318360 RS		Wailuku	FS	3	5	7	15		462 Palani Place	17,050	2.0	3	1,857	$ 799,000	$ 775,000	28	5/22/2006	5/22/2006	
318277 RS		Wailuku	FS	3	5	018	019		576 Akolea	3,960	3.0	4	1,656	$ 779,000	$ 779,000	33	5/17/2006	5/17/2006	
318039 RS		Wailuku	FS	3	2	20	65		1382 Kakae Place	6,106	2.0	4	1,838	$ 799,000	$ 779,000	49	5/3/2006	5/1/2006	
317900 RS		Wailuku	FS	3	5	18	48		547 Akolea Place	4,500	3.0	4	2,213	$ 779,000	$ 779,000	56	4/24/2006	4/24/2006	
317690 RS		Kahului	FS	3	8	87	67		15 Puu Ehu PL	9,871	2.0	4	1,804	$ 800,000	$ 785,000	70	4/11/2006	4/10/2006	
318248 RS		Wailuku	FS	3	3	9	37		883 Lekeona Loop	6,890	3.0	6	1,798	$ 785,000	$ 785,000	35	5/16/2006	5/15/2006	
315070 RS		Wailuku	FS	3	4	29	26		467 A Lilihua Place	22,400	2.0	4	1,674	$ 899,000	$ 789,000	200	6/1/2006	12/1/2005	
318466 RS		Wailuku	FS	3	3	10	29		952 Puuloa Street	6,369	1.5	3	1,000	$ 790,000	$ 790,000	23	5/30/2006	5/27/2006	1646
317755 RS		Wailuku	FS	3	4	42	4		42 Nakoa Drive	9,750	2.0	3	1,095	$ 899,000	$ 795,000	66	4/14/2006	4/14/2006	1012
313526 RS		Wailuku	FS	3	4	43	29		351 Waiehu Beach Road	11,250	1.0	3	1,334	$ 920,000	$ 800,000	289	9/7/2005	9/3/2005	605
318287 RS		Kahului	FS	3	8	87	54		26 Inoa Po Place	8,686	3.0	4	1,773	$ 820,000	$ 820,000	33	5/17/2006	5/17/2006	
317750 RS		Kahului	FS	3	8	86	52		18 Puuaina Place	7,671	3.0	4	2,198	$ 899,000	$ 839,000	66	4/14/2006	4/14/2006	
315991 RS		Wailuku	FS	3	5	001	--		43 HAKALANI STREET	9,595	3.0	4	1,809	$ 845,000	$ 845,000	138	1/14/2006	1/12/2006	
316128 RS		Kahului	FS	3	8	83	31		11 Kuukama St.	7,519	3.5	3	1,464	$ 850,000	$ 850,000	150	1/20/2006	1/20/2006	
317977 RS		Wailuku	FS	3	3	8	28		746 OLENA	6,825	2.5	5	2,100	$ 1,100,000	$ 850,000	53	4/28/2006	4/27/2006	
318346 RS		Wailuku	FS	3	8	36	15		551 Liholiho Street	10,010	2.0	4	2,546	$ 850,000	$ 850,000	31	5/22/2006	5/19/2006	528
317462 RS		Wailuku	FS	3	2	20	52		1367 Kilou St	7,163	2.0	3	1,896	$ 895,000	$ 859,900	85	3/29/2006	3/26/2006	
313125 RS		Kahului	FS	3	8	87	38		7 Loihi Place	7,560	2.5	4	1,971	$ 810,000	$ 879,000	306	9/9/2005	8/17/2005	
317886 RS		Wailuku	FS	3	5	14	28		610 Maalahi Street	8,400	3.0	3	2,084	$ 895,000	$ 895,000	56	4/24/2006	4/24/2006	
314886 RS		Wailuku	FS	3	4	5	21		2131 Kahookele St.	14,373	2.0	4	2,504	$ 895,000	$ 895,000	210	11/21/2005	11/21/2005	
318764 RS		Kahului	FS	3	8	082	56		151 Kuualoha St.	7,150	3.0	4	1,865	$ 899,000	$ 899,000	5	6/16/2006	6/14/2006	
318723 RS		Wailuku	FS	3	5	06	08		337 S Alu Road	10,313	2.0	3	1,644	$ 899,000	$ 899,000	5	6/14/2006	6/14/2006	231
315756 RS		Kahului	FS	3	8	86	50		21 Puuaina Place	9,638	3.0	4	2,008	$ 916,000	$ 916,000	165	1/5/2006	1/5/2006	
317467 RS		Kahului	FS	3	8	86	77		25 Puukoi Place	6,456	2.5	4	2,453	$ 925,000	$ 925,000	82	4/18/2006	3/29/2006	
317573 RS		Kahului	FS	3	8	87	80		8 Pahe'e Place	7,943	3.0	5	2,198	$ 927,000	$ 927,000	76	4/4/2006	4/4/2006	
314461 RS		Kahului	FS	3	8	87	76		29 Pahee Pl.	8,758	3.0	4	2,002	$ 899,000	$ 929,000	235	1/13/2006	10/27/2005	
317983 RS		Kahului	FS	3	8	087	070		14 Puuehu Place	7,535	2.5	4	1,632	$ 939,000	$ 939,000	52	4/28/2006	4/28/2006	
317588 RS		Kahului	FS	3	8	82	58		165 Kuualoha	7,322	2.0	3	1,598	$ 950,000	$ 950,000	76	4/5/2006	4/4/2006	
316948 RS		Kahului	FS	3	8	48	22		453 Kaulana Street	7,920	3.0	8	2,275	$ 950,000	$ 950,000	109	3/6/2006	3/2/2006	
318457 RS		Wailuku	FS	3	5	001	067		31 Pa'alae Pl	10,414	3.0	4	2,400	$ 950,000	$ 950,000	23	5/27/2006	5/27/2006	
316931 RS		Wailuku	FS	3	5	1	77		42 Maunaleo Place	7,452	3.0	4	2,152	$ 975,000	$ 950,000	108	3/3/2006	3/3/2006	
312762 RS		Wailuku	FS	3	5	14	79		656 S ALU STREET	8,560	3.0	4	2,428	$ 950,000	$ 950,000	333	7/22/2005	7/21/2005	
318488 RS		Kahului	FS	3	8	85	20		210 Puumakani St.	10,275	2.5	4	2,028	$ 960,000	$ 960,000	20	5/31/2006	5/30/2006	
315513 RS		Wailuku	FS	3	5	1	67		lot#83 Maunaleo at Kehalani	8,907	3.0	4	2,152	$ 875,000	$ 975,000	180	12/21/2005	12/21/2005	
316303 RS		Wailuku	FS	3	2	19	47		1205 Kilou Loop	7,116	5.0	4	3,241	$ 975,000	$ 975,000	140	1/30/2006	1/30/2006	
317759 RS		Wailuku	FS	3	4	39	99		355 Liholiho Street	10,000	3.5	3	2,690	$ 1,100,000	$ 975,000	66	4/14/2006	4/14/2006	
318571 RS		Wailuku	FS	3	8	37	3		504 Liholiho St.	10,344	2.0	3	1,744	$ 989,000	$ 989,000	14	6/5/2006	6/5/2006	480
314431 RS		Kahului	FS	3	8	72	36		292 MOHALU STREET	8,390	4.0	10	3,464	$ 995,000	$ 995,000	236	10/26/2005	10/26/2005	
316122 RS		Kahului	FS	3	8	71	51		105 Palani St.	7,551	3.0	5	2,640	$ 1,100,000	$ 1,000,000	150	1/20/2006	1/20/2006	504
318298 RS		Kahului	FS	3	8	85	26		150 Puumakani Street	10,083	3.0	4	2,328	$ 1,000,000	$ 1,050,000	33	5/18/2006	5/17/2006	
318650 RS		Wailuku	FS	3	6	5	68		970/980 Honoapiilani Highway	114,799	2.0	3	902	$ 1,050,000	$ 1,050,000	11	6/9/2006	6/8/2006	600
313914 RS		Wailuku	FS	3	4	1	21		34 NANILUNA PL	14,535	2.0	4	2,332	$ 1,200,000	$ 1,094,000	264	9/28/2005	9/28/2005	

MLS #	Class	District	LT	Zone	Sec	Plat	Par	CPR	Address	Land SQFT	Baths	Beds	Liv A SF	Original Price	List Price	DOM	Status Date	List Date	Ohana Liv A SF
316322	RS	Kahului	FS	3	8	86	86		383 Kamalei Circle	10,112	3.0	4	1,898	$ 1,195,000	$ 1,095,000	141	1/31/2006	1/29/2006	
317828	RS	Wailuku	FS	3	5	1	67		30 Pa'alae Place	10,100	3.0	3	1,687	$ 979,000	$ 1,098,000	60	4/20/2006	4/20/2006	
316341	RS	Kahului	FS	3	8	70	76		80 Puukani Street	7,671	4.0	8	4,304	$ 1,100,000	$ 1,100,000	139	1/31/2006	1/31/2006	
316064	RS	Wailuku	FS	3	5	15	17		744 Alu Road	8,712	3.0	4	2,386	$ 1,200,000	$ 1,100,000	152	1/18/2006	1/18/2006	
318459	RS	Wailuku	FS	3	3	17	162		2222 Kamaile Street	112,733	2.0	2	974	$ 1,100,000	$ 1,100,000	23	5/27/2006	5/27/2006	
318345	RS	Kahului	FS	3	8	54	56		491 S Papa Avenue	8,656	4.5	6	4,278	$ 1,195,000	$ 1,145,000	32	5/20/2006	5/18/2006	
312811	RS	Kahului	FS	3	8	7	portion 13		111 Kamaiki Circle	12,384	3.0	3	2,112	$ 1,200,000	$ 1,149,000	329	7/27/2005	7/25/2005	
316917	RS	Wailuku	FS	3	5	8	15		2623 W Main Street	19,040	3.0	3	1,288	$ 1,400,000	$ 1,190,000	108	3/3/2006	3/3/2006	
318531	RS	Kahului	FS	3	8	82	81		257 Kuualoha St	6,770	3.0	4	2,200	$ 1,195,000	$ 1,195,000	21	6/2/2006	5/29/2006	
314484	RS	Wailuku	FS	3	4	18	77		83 Mission Street	13,182	2.0	4	1,956	$ 1,200,000	$ 1,200,000	233	10/30/2005	10/29/2005	732
318355	RS	Wailuku	FS	3	5	13	123		512 Kuikahi Drive	9,617	3.5	4	3,751	$ 1,295,000	$ 1,245,000	28	3/22/2006	3/22/2006	
317852	RS	Kahului	FS	3	8	87	8		189 Kamalei Circle	10,027	3.0	4	2,964	$ 1,250,000	$ 1,250,000	59	4/21/2006	4/21/2006	
318036	RS	Wailuku	FS	3	5	013	143		566 Kuikahi Dr.	9,974	3.5	5	2,700	$ 1,315,000	$ 1,315,000	48	5/2/2006	5/2/2006	
318645	RS	Wailuku	FS	3	1	7	33		355 Kaukini Loop	101,494	4.0	4	1,900	$ 1,339,000	$ 1,339,000	10	6/9/2006	6/9/2006	912
315342	RS	Wailuku	FS	3	4	2	13		386 Naniloa Drive	27,856	3.0	4	1,600	$ 1,635,000	$ 1,400,000	188	12/13/2005	12/13/2005	1000
316345	RS	Kahului	FS	3	8	035	055		419 S Papa Ave	14,962	4.5	6	2,968	$ 1,400,000	$ 1,400,000	139	2/1/2006	1/31/2006	600
314647	RS	Kahului	FS	3	8	85	12		252 Puunakani St.	11,130	3.5	4	2,525	$ 1,475,000	$ 1,475,000	224	11/7/2005	11/7/2005	
317069	RS	Wailuku	FS	3	5	13	70		475 Nipa Street	8,915	4.5	4	4,396	$ 1,498,000	$ 1,498,000	101	3/11/2006	3/10/2006	
316406	RS	Wailuku	FS	3	4	2	32		309 Naniloa Drive	45,738	1.5	3	1,988	$ 1,575,000	$ 1,575,000	137	2/3/2006	2/2/2006	1132
316129	RS	Kahakuloa	FS	3	1	1	36		425 Kaukini Loop	149,062	2.0	2	2,200	$ 2,000,000	$ 1,595,000	150	1/20/2006	1/20/2006	
318331	RS	Kahului	FS	3	8	87	18		251 Kamalei Circle	9,085	3.5	4	3,253	$ 1,675,000	$ 1,675,000	31	5/19/2006	5/19/2006	
318604	RS	Kahakuloa	FS	3	1	1	60		535 Kaukini Loop	103,673	2.5	4	2,840	$ 1,775,000	$ 1,775,000	17	6/7/2006	6/2/2006	
318286	RS	Wailuku	FS	3	5	4	53		376 W Waiko Road	36,546	2.5	3	2,510	$ 2,195,000	$ 2,195,000	35	5/17/2006	5/15/2006	
314100	RS	Kahakuloa	FS	3	1	7	13		33 Lohoole Place	279,655	2.5	3	2,800	$ 2,795,500	$ 2,495,500	256	10/6/2005	10/6/2005	
313358	RS	Wailuku	FS	3	2	16	7,8,11,26,		949&967 Molohi Rd.	229,361	1.0	3	768	$ 2,500,000	$ 2,500,000	294	8/29/2005	8/29/2005	
313170	RS	Kahakuloa	FS	3	1	007	009		15 Lohoole Place	135,599	6.5	9	8,000	$ 4,700,000	$ 4,700,000	304	8/19/2005	8/19/2005	
312200	RS	Wailuku	FS	3	5	4	22		440 W Waiko Road	848,070	2.0	3	1,888	$ 10,500,000	$ 8,750,000	740	6/12/2005	6/9/2004	500
316716	RS	Kahakuloa	FS	3	1	1	37		4933 Kahekili Highway	2,221,560	3.0	2	5,000	$ 12,000,000	$ 12,000,000	124	2/21/2006	2/15/2006	700

EXHIBIT C
2003 Hawaii Housing Study
Select Tables

Table IV-D-8. Housing Issues, County of Maui by District, 2003

	District of Residence																	
	Molokai		Lanai		West Maui		Wailuku/Kahului		Kihei/Makena		Paia/Haiku		Makawao/Pukalani/Kula		Hana		Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
TOT HOUSING UNITS*	235	100.0	182	100.0	1,467	100.0	2,331	100.0	2,436	100.0	421	100.0	2,677	100.0	86	100.0	9,625	100.0
WHY DON'T YOU WANT TO BUY?**																		
too expensive	82	41.0	93	66.8	532	61.7	1,662	73.5	352	39.3	168	20.3	597	68.7	75	64.8	3,551	58.0
not stay long enough	17	8.3	11	8.0	44	5.1			125	14.0							197	3.2
prefer to rent	6	2.9	3	1.8	24	2.8											32	0.5
down paymnt too high	17	8.6	3	2.3	37	4.3	121	5.4			168	20.3	38	4.3	14	11.7	388	6.3
not want tied down			7	4.9	20	2.3	127	5.6	59	6.6							213	3.5
can't qualify loan	20	9.9	4	2.6					76	8.6			187	21.5	8	6.6	296	4.8
mortgage too high	21	10.6	3	2.3	41	4.8					100	12.9					166	2.7
no job security			5	8.7			175	7.8					92	10.5			275	4.5
market is bad now	8	3.9	4	2.6	46	5.4			76	8.6							134	2.2
other	40	20.2	33	23.4	326	38.0	297	13.1	206	22.9	72	9.3	145	16.7	27	23.5	1,146	18.8
don't know	16	8.1			24	2.8	175	7.8			289	37.2					505	8.2
TOT HOUSING UNITS***	621	100.0	350	100.0	2,515	100.0	5,227	100.0	3,650	100.0	1,564	100.0	4,067	100.0	211	100.0	18,206	100.0
WHY ARE YOU MOVING OUT OF STATE?+																		
mentioned housing	8	16.0	4	15.2	46	14.5	127	10.8	59	9.9					10	24.9	256	10.0
no mention	41	84.0	24	84.8	283	85.5	1,044	89.2	538	90.1	100	100.0	235	100.0	29	75.1	2,292	90.0
TOT HOUSING UNITS+*	2,305	100.0	1,160	100.0	6,111	100.0	12,832	100.0	7,572	100.0	3,819	100.0	9,298	100.0	593	100.0	43,687	100.0
WILL ANOTHER FROM HOUSEHOLD MOVE?+**																		
yes	209	9.1	49	4.2	414	6.8	1,230	9.6	589	7.8	655	17.2	1,025	11.0	94	15.8	4,266	9.8
no	1,567	68.0	790	68.1	4,121	67.4	8,598	67.0	4,998	66.0	2,246	58.8	6,048	65.0	354	59.7	28,714	65.7
not sure	54	2.3	17	1.5	200	3.3	375	2.9			115	3.0	365	3.9	9	1.6	1,136	2.6
one-person household	475	20.6	304	26.2	1,376	22.5	2,630	20.5	1,987	26.2	803	21.0	1,860	20.0	136	22.9	9,571	21.9
OTHER MEMBERS PREFERRED LOCATION																		
remain in Hawaii	144	21.1	35	9.8	359	20.1	849	22.0	429	16.7	598	41.0	882	30.6	86	37.5	3,364	24.5
move out of state	34	6.0	7	1.9	43	2.4	254	6.6	49	1.9	57	3.9	143	5.0	8	3.3	596	4.3
some stay, some leave	14	2.0															14	0.1
not sure	17	2.4	7	2.0	12	0.0	127	3.3	111	4.3							273	2.0
no others are moving	475	65.4	304	86.2	1,376	78.9	2,630	68.1	1,987	77.1	803	55.1	1,860	64.5	136	59.1	9,571	69.2

NOTE: COUNTS MAY NOT SUM TO TOTAL UNITS DUE TO WEIGHTING. PERCENTAGES MAY NOT SUM TO 100% DUE TO ROUNDING
* Based on those who will or may move and are not planning to own their next home
** Percentages sum to more than 100% due to multiple response
*** Based on those who will or may move
+ Results are not comparable with 1992 due to a change in the question structure
+* Based on all surveys
+** Within the next three years

Table IV-A-13. Financial Profile of Potential Buyers and Renters by County, 1992, 1997 and 2003

Location	Type	Percent 1992	1997	2003	Category
Honolulu	Potential Owners	49%	52%	47%	Own now
		38%	34%	55%	Make over $25,000/year
		22%	23%	25%	Have HH incomes of $75,000 or more
		91%	98%	96%	Currently employed
		21%	31%	14%	Have more than $40,000 for down payment
	Potential Renters	5%	9%	11%	Own now
		22%	20%	39%	Make over $25,000/year
		8%	7%	12%	Have HH incomes of $75,000 or more
		74%	88%	87%	Currently employed
		9%	8%	16%	Have more than $40,000 for down payment
Maui	Potential Owners	50%	53%	48%	Own now
		23%	30%	55%	Make over $25,000/year
		10%	18%	30%	Have HH incomes of $75,000 or more
		93%	95%	97%	Currently employed
		32%	22%	18%	Have more than $40,000 for down payment
	Potential Renters	12%	14%	6%	Own now
		21%	7%	43%	Make over $25,000/year
		5%	7%	7%	Have HH incomes of $75,000 or more
		87%	92%	85%	Currently employed
		8%	6%	8%	Have more than $40,000 for down payment
Hawaii	Potential Owners	54%	62%	55%	Own now
		17%	19%	47%	Make over $25,000/year
		9%	12%	25%	Have HH incomes of $75,000 or more
		75%	90%	93%	Currently employed
		25%	22%	20%	Have more than $40,000 for down payment
	Potential Renters	13%	19%	20%	Own now
		13%	6%	21%	Make over $25,000/year
		5%	3%	2%	Have HH incomes of $75,000 or more
		59%	78%	75%	Currently employed
		3%	4%		Have more than $40,000 for down payment
Kauai	Potential Owners	48%	48%	55%	Own now
		43%	13%	59%	Make over $25,000/year
		16%	9%	33%	Have HH incomes of $75,000 or more
		95%	94%	93%	Currently employed
		22%	29%	23%	Have more than $40,000 for down payment
	Potential Renters	5%	6%	10%	Own now
		11%	11%	20%	Make over $25,000/year
		1%	6%	6%	Have HH incomes of $75,000 or more
		80%	89%	79%	Currently employed
		6%		7%	Have more than $40,000 for down payment

Note: The 1992 and 1997 figures for "Currently Employed" are not directly comparable. In 1992 the question was "Is the respondent employed?" In 1997 the question was "How many adults in this household are currently employed?" The 2003 question was formatted to match the 1997 version of the question.

IA-MAUI-2: HOUSING MODEL CALCULATIONS

County of Maui Housing Model Calculation Sheet, 2003
Modeled to Eliminate 2002 Pent-up Demand in 20 Years

	ECONOMIC		REAL ESTATE MODEL						HOUSING DEMAND MODEL										
Year	Interest Rate	Employment	Sales	Appreciation Rate	Actual Price	Affordable Price	[illegible]	Median Income	Population	HH Size	Households (HH)	Housing Units (HU)	Vacant HU	Nonres HU	Resident HU (RHU)	Change in RHU "Supply"	Change in # HH "Demand"	Annual RHU Deficit or (Surplus)	RHU Deficit or (Surplus)
1981	14.42%	35,200	2,207	#VALUE!	$154,500	$79,346	51%	$28,874	74,000	3.10	23,871	37,843	1,887	12,890	23,136				735
1982	13.74%	35,800	1,564	-15.47%	$130,600	$80,702	68%	$28,523	77,100	3.09	24,951	38,271	1,884	13,240	24,057	922	1080	158	894
1983	12.70%	37,800	1,042	-1.07%	$129,200	$92,899	72%	$29,446	80,100	3.06	26,096	38,738	1,887	13,633	24,129	80	1145	842	1,580
1984	12.73%	38,800	770	-2.32%	$126,200	$96,797	77%	$30,717	83,000	3.07	27,036	38,477	1,889	13,632	24,061	(68)	1029	1098	2,685
1985	11.48%	41,100	811	-13.55%	$109,100	$104,189	95%	$31,811	85,100	3.06	27,810	39,900	1,995	13,921	23,984	(81)	773	842	3,526
1986	9.92%	42,500	1,789	14.67%	$125,100	$119,138	95%	$32,402	87,400	3.04	28,750	40,578	2,029	14,012	24,530	546	943	294	4,221
1987	9.34%	45,100	2,972	2.72%	$129,500	$135,458	98%	$33,346	90,500	3.03	29,868	41,968	2,098	13,633	26,027	1496	1114	(382)	3,647
1988	9.17%	48,100	2,533	20.08%	$154,200	$134,873	87%	$34,974	93,800	3.02	31,060	43,119	2,156	13,189	27,775	1548	1162	(386)	3,260
1989	9.32%	51,900	3,058	9.64%	$169,200	$135,217	80%	$36,371	96,800	3.01	32,159	44,774	2,239	12,792	29,743	968	1100	132	3,418
1990	9.74%	59,700	3,181	22.84%	$207,800	$139,835	67%	$37,790	101,100	3.03	33,567	47,994	2,400	13,728	31,866	4122	1408	(1713)	1,702
1991	9.60%	58,200	2,397	9.29%	$224,700	$150,589	69%	$38,837	105,599	3.02	34,879	49,879	2,494	15,337	32,048	182	1411	1229	2,930
1992	8.74%	60,250	2,490	-1.77%	$220,800	$162,279	82%	$39,818	108,503	3.01	34,098	51,275	2,570	15,816	33,486	1438	1127	(314)	2,616
1993	8.35%	62,300	1,755	.081%	$222,200	$190,789	89%	$40,009	111,944	3.00	37,342	52,829	2,625	14,850	35,660	2187	1253	(944)	1,672
1994	8.33%	61,300	1,946	-4.64%	$211,457	$144,890	68%	$30,950	114,756	2.99	38,831	53,606	2,680	14,678	36,651	371	1079	707	2,380
1995	7.31%	61,900	1,472	-1.53%	$208,219	$131,077	63%	$30,243	117,695	2.99	39,428	54,240	2,712	14,507	37,232	1131	1148	17	2,396
1996	7.17%	63,000	1,650	3.53%	$214,312	$166,574	78%	$36,125	122,899	2.96	40,718	54,658	2,732	14,251	37,646	414	1090	676	3,072
1997	7.38%	64,380	1,926	-10.47%	$192,004	$180,836	89%	$44,296	123,772	2.96	41,575	58,179	2,769	13,686	38,722	1086	857	(224)	2,844
1998	6.99%	65,200	2,118	5.69%	$203,260	$188,189	93%	$41,621	124,648	2.94	42,388	55,718	2,786	13,407	39,525	798	798	(0)	2,844
1999	7.21%	67,300	2,977	2.71%	$208,868	$201,158	96%	$45,386	126,162	2.93	43,043	58,258	2,813	13,462	40,042	518	675	157	3,000
2000	7.74%	69,300	2,867	12.41%	$234,792	$185,226	82%	$45,337	128,868	2.92	44,167	58,797	2,940	13,730	40,237	194	1124	329	3,330
2001	7.91%	72,650	2,747	9.31%	$256,643	$223,080	87%	$49,811	132,094	2.92	45,233	57,787	2,889	14,809	40,379	91	1066	1014	4,344
2002	6.64%	68,380	2,880	4.77%	$268,687	$208,184	78%	$44,227	134,138	2.92	45,888	58,800	2,940	14,943	40,917	628	757	128	5,035
2003	[illegible]	69,421	2,384	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.92	46,445	59,880	2,993	14,924	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2004	[illegible]	70,872	[illegible]	[illegible]	[illegible]	$212,000	80%	$48,206	[illegible]	[illegible]	46,920	60,718	3,037	14,846	[illegible]	[illegible]	481	(543)	[illegible]
2005	[illegible]	72,320	2,346	-1.31%	$260,540	$206,580	79%	$48,703	[illegible]	[illegible]	47,411	61,732	3,087	14,890	[illegible]	[illegible]	496	(415)	[illegible]
2006	[illegible]	73,801	2,185	1.09%	[illegible]	$200,594	76%	$46,251	[illegible]	[illegible]	47,887	62,443	3,123	15,066	[illegible]	[illegible]	585	(12)	[illegible]
2007	[illegible]	76,085	2,214	-0.24%	$262,751	[illegible]	72%	[illegible]	[illegible]	[illegible]	[illegible]	63,060	3,153	15,162	[illegible]	460	583	103	[illegible]
2008	[illegible]	76,122	2,164	-1.07%	[illegible]	$205,457	79%	$47,368	[illegible]	[illegible]	48,180	63,720	3,186	15,275	45,269	524	600	76	[illegible]
2009	7.00%	77,071	2,207	-1.55%	[illegible]	$210,037	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	64,330	3,217	[illegible]	45,725	487	607	151	[illegible]
2010	8.00%	78,487	2,249	-1.23%	$251,225	$227,008	[illegible]	[illegible]	[illegible]	[illegible]	50,411	65,008	3,250	[illegible]	46,229	504	615	111	[illegible]
2011	7.00%	[illegible]	2,449	0.24%	[illegible]	$221,064	[illegible]	[illegible]	148,311	[illegible]	[illegible]	65,670	3,283	[illegible]	46,717	[illegible]	572	84	[illegible]
2012	7.50%	[illegible]	[illegible]	1.01%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	66,373	3,319	15,817	47,237	521	570	50	[illegible]
2013	8.00%	[illegible]	3,587	2.07%	$264,011	[illegible]	[illegible]	$50,130	151,882	[illegible]	52,147	67,122	[illegible]	15,974	47,781	[illegible]	585	31	[illegible]
2014	7.50%	84,088	2,375	1.01%	[illegible]	$210,309	[illegible]	[illegible]	163,250	[illegible]	[illegible]	67,818	3,386	16,141	48,380	[illegible]	[illegible]	4	[illegible]
2015	7.00%	[illegible]	2,561	-0.10%	$266,140	$230,842	[illegible]	$61,230	[illegible]	[illegible]	53,537	68,723	3,436	16,315	48,972	592	598	6	[illegible]
2016	8.50%	87,311	2,607	-0.94%	[illegible]	$242,798	[illegible]	$51,781	[illegible]	[illegible]	[illegible]	[illegible]	3,477	16,486	49,570	[illegible]	542	[illegible]	[illegible]
2017	7.00%	[illegible]	[illegible]	0.07%	[illegible]	$230,692	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70,172	3,518	[illegible]	50,172	[illegible]	[illegible]	[illegible]	[illegible]
2018	7.50%	[illegible]	2,736	3.32%	$271,634	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	71,108	[illegible]	16,873	50,761	[illegible]	583	[illegible]	[illegible]
2019	8.00%	91,200	2,738	3.16%	$280,283	$222,872	79%	$53,310	161,220	[illegible]	[illegible]	72,021	3,601	17,085	51,346	[illegible]	[illegible]	(24)	[illegible]
2020	7.50%	[illegible]	2,710	1.11%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	72,867	3,643	[illegible]	51,981	[illegible]	575	(21)	[illegible]
2021	7.00%	[illegible]	2,676	-0.16%	$283,143	$246,150	[illegible]	[illegible]	164,417	[illegible]	[illegible]	73,708	3,686	[illegible]	52,581	[illegible]	581	(12)	[illegible]
2022	8.50%	[illegible]	2,717	[illegible]	[illegible]	$257,732	[illegible]	[illegible]	166,122	[illegible]	[illegible]	74,548	3,727	17,663	53,160	[illegible]	587	(12)	[illegible]
2023	7.00%	[illegible]	2,850	[illegible]	[illegible]	$280,078	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	76,314	3,770	[illegible]	53,760	[illegible]	583	(7)	[illegible]
2024	7.50%	[illegible]	2,856	[illegible]	[illegible]	[illegible]	84%	[illegible]	[illegible]	[illegible]	[illegible]	76,226	3,811	18,087	54,347	587	[illegible]	[illegible]	[illegible]

ADDENDUM

DEFINITIONS

The purpose of this Glossary is to assist the reader in understanding specific terminology used in this report.

Appraisal	(noun) the act or process of estimating value; an estimate of value. (adjective) of or pertaining to appraising and related functions, e.g. appraisal practice, appraisal services.
Binding Requirement	All or part of a standards rule of the Uniform Standards of Professional Appraisal Practice (USPAP) from which departure is not permitted (See Departure Provision).
Cash Equivalent	A price expressed in terms of cash, as distinguished from a price expressed totally or partly in terms of the face amounts of notes or other securities that cannot be sold at their face amounts.
Counseling	Providing competent, disinterested, and unbiased advice and guidance on diverse problems in the broad field of real estate; may involve any or all aspects of the business such as merchandising, leasing, management, acquisition/disposition planning, financing, development, cost-benefit studies, feasibility analysis, and similar services. Counseling services are often associated with evaluation, but they are beyond the scope of appraisal.
Discounting	The procedure used to convert periodic income and reversions into present value; based on the assumption that benefits received in the future are worth less than the same benefits received now.
Extraordinary Assumption	An assumption, directly related to a specific assignment, which, if found to be false, could alter the appraiser's opinions or conclusions. Extraordinary assumptions presume as fact otherwise uncertain information about physical, legal, or economic characteristics of the subject property; or about conditions external to the property such as market conditions or trends; or about the integrity of data used in an analysis. An extraordinary assumption may be used in an assignment only if: • It is required to properly develop credible opinions and conclusions; • The appraiser has a reasonable basis for the extraordinary assumption; • Use of the extraordinary assumption results in a credible analysis; and • The appraiser complies with the disclosure requirements set forth in USPAP for extraordinary assumptions.
Fair Value	The cash price that might reasonably be anticipated in a current sale under all conditions requisite to a fair sale. A fair sale means that buyer and seller are each acting prudently, knowledgeably, and under no necessity to buy or sell-, i.e., other than in a forced or liquidation sale. The appraiser should estimate the cash price that might be received upon exposure to the open market for a reasonable time, considering the property type and local market conditions. ***When a current sale is unlikely (i.e., when it is unlikely that the sale can be completed within 12 months) the appraiser must discount all cash flows generated by the property to obtain the estimate of fair value.*** These cash flows include, but are not limited to, those arising from ownership, development, operating, and sale of the property. The discount applied shall reflect the appraiser's judgment of what a prudent, knowledgeable purchase under o necessity to buy would be willing to pay to purchase the property in a current sale.
Fee Simple Estate	Absolute ownership encumbered by any other interest or restate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.
Hawaiian Terms	The Hawaiian words "mauka" and "makai" are commonly used in the islands as indicators of direction. The word "mauka" means toward the mountain, and "makai" means toward the ocean.
Highest and Best Use	The reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum profitability.
Highest and Best Use of Land or a Site as Though Vacant	The use of a property based on the assumption that a parcel of land is vacant or can be made vacant through demolition of any improvements.
Highest and Best Use of Property as Improved	The use that should be made of a property as it exists.
Hypothetical Condition	That which is contrary to what exists, but is supposed for the purpose of analysis. Hypothetical conditions assume conditions contrary to known facts about physical, legal, or economic characteristics of the subject property; or about conditions external to the property, such as market conditions or trends; or about the integrity of data used in an analysis. A hypothetical condition may be used in an assignment only if: • Use of the hypothetical condition is clearly required for legal purposes, for purposes of reasonable analysis, or for purposes of comparison; • Use of the hypothetical condition results in a credible analysis; and • The appraiser complies with the disclosure requirements set forth in USPAP for hypothetical conditions
Leased Fee Estate	An ownership interest held by a landlord with the right of use and occupancy conveyed by lease others; the rights of lessor or the leased fee owner and leased fee are specified by contract terms contained within the lease
Leasehold Estate	The right to use and occupy real estate for a stated term and under certain conditions; conveyed by a lease.
Market Rent	The rental income that a property would most probably command in the open market.
Market Value	Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. Continual refinement is essential to the growth of the appraisal

profession. The current economic definition of market value can be stated as follows:

"The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self-interest, and assuming that neither is under undue duress."

The current economic definition of "market value" as stated in the Uniform Standards of Professional Practice, published by The Appraisal Foundation in 1990, is as follows:

"The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

1. buyer and seller are typically motivated.
2. both parties are well informed or well advised, and acting in what they consider their best interests;
3. a reasonable time is allowed for exposure in the open market;
4. payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and
5. the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale."

Prospective Market Value Upon Completion of Construction

The prospective future value of a property on the date that construction is completed, based upon market conditions forecast to exist as of the completion date.

Prospective Value Estimate

A forecast of the value expected at a specified future date. A prospective value estimate is most frequently sought in connection with real estate projects that are proposed, under construction, or under conversion to a new use, or those that have not achieved sellout or a stabilized level of long-term occupancy at the time the appraisal report is written.

Report

Any communication, written or oral, of an appraisal, review, or consulting service that is transmitted to the client upon completion of an assignment. The types of written reports listed below apply to real property appraisals:

Self-Contained Appraisal Report: A written report prepared under Standards Rule 2-2(a) of the Uniform Standards of Professional Appraisal Practice.

Summary Appraisal Report: A written report prepared under Standards Rule 2-2(b) or 8-2(b).

Restricted Use Appraisal Report: A written report prepared under Standards Rule 2-2(c), 8-2(c), or 10-2(b).

Uniform Standards of Professional Appraisal Practice

Current standards of the appraisal profession, developed for appraisers and the users of appraisal services; the USPAP deal with the procedures to be followed in developing an appraisal, analysis, or opinion and the manner in which an appraisal, analysis, or opinion is communicated. The USPAP are endorsed by the Appraisal Institute and other professional appraisal organizations.

LIMITING AND CONTINGENT CONDITIONS
ACM Consultants, Inc.

LIMITING AND CONTINGENT CONDITIONS: The certification of the Consultant appearing in the appraisal report is subject to the following conditions and to such other specific and limiting conditions as are set forth by the Consultant in the report. By this notice, all persons and firms reviewing, utilizing or relying on the report in any manner bind themselves to accept these assumptions and limiting conditions. Do not use this report if you do not so accept. These conditions are a part of the appraisal report, they are a preface to any certification, definition, fact or analysis, and are intended to establish as a matter of record that the Consultant's function is to provide a present market value indication for the subject property based upon the Consultant's observation as to the subject property and real estate market. This appraisal report is an economic study to estimate value as defined in it. It is not an engineering, construction, legal or architectural study nor survey and expertise in these areas, among others, is not implied.

1. CONFIDENTIALITY. The contents of the appraisal are confidential. Release of this appraisal by ACM Consultants, Inc. to you is limited to and solely for your business use only. Any further release of this appraisal by you or any of your agents is strictly prohibited and you shall accept the risk and liability for any such release without the previous written consent of ACM Consultants, Inc. Further, you shall indemnify and defend ACM Consultants, Inc. from any claims arising out of any such unauthorized disclosure.

2. LIMIT OF LIABILITY. The liability of ACM Consultants, Inc. and employees and affiliated independent contractors is limited to the fee actually received by Consultant (total per appraisal). Further, there is no accountability, obligation, or liability to any third party. If this report is placed in the hands of anyone other than client, the client shall make such party aware of all limiting conditions and assumptions of the assignment and related discussions. The Consultant is in no way to be responsible for any costs incurred to discover or correct any deficiencies of any type present in the property, physically, financially, and/or legally. In the case of limited partnerships or syndication offerings or stock offerings in real estate, client agrees that in case of lawsuit (brought by lender, partner or part owner in any form of ownership, tenant, or any other party), any and all awards, settlements of any type in such suit, regardless of outcome, client will hold Consultant harmless in any such action.

3. INFORMATION USED. No responsibility is assumed for accuracy of information furnished by work of or work by others, the client, his designee, or public records. We are not liable for such information or the work of possible subcontractors. The comparable data relied upon in this report has been confirmed with one or more parties familiar with the transaction or from affidavit or other source though reasonable; all are considered appropriate for inclusion to the best of our factual judgment and knowledge. An impractical and uneconomic expenditure of time would be required in attempting to furnished unimpeachable verification in all instances, particularly as to engineering and market-related information. It is suggested that the client consider independent verification as a prerequisite to any transaction involving sale, lease, or other significant commitment of funds of subject property.

4. TESTIMONY, CONSULTATION, COMPLETION OF CONTRACT FOR APPRAISAL SERVICES. The contract for appraisal, consultation or analytical service is fulfilled, and the total fee is payable upon completion of the report.

   The Consultant(s) or those assisting in preparation of the report will not be asked or required to give testimony in court or hearing because of having made the appraisal, in full or in part, nor engage in post appraisal consultation with client or third parties except under separate and special arrangement and at additional fee. If testimony or deposition is required because of subpoena, the client shall be responsible for any additional time, fees, and charges regardless of issuing party.

5. LEGALITY OF USE. The appraisal is based on the premise that, there is full compliance with all applicable federal, state and local environmental regulations and laws unless otherwise stated in the report; further, that all applicable zoning, building, use regulations and restrictions of all types have been complied with unless otherwise stated in the report; further, it is assumed that all required licenses, consents, permits, or other legislative or administrative authority, local, state, federal and/or private entity or organization have been or can be obtained or renewed for any use considered in the value estimate.

6. COMPONENT VALUES. The distribution of the total valuation in this report between land and improvements applies only under the existing program of utilization. The separate valuations for land and building must not be used in conjunction with any other appraisal and are invalid if so used.

7. AUXILIARY AND RELATED STUDIES. No environmental or impact studies, special market study or analysis, highest and best use analysis or feasibility study has been requested or made unless otherwise specifically stated in an agreement for services or in the report.

8. DOLLAR VALUES, PURCHASING POWER. The market value estimated, and the costs used, are as of the date of the estimate of value. All dollar amounts are based on the purchasing power and price of the dollar as of the date of the value estimate.

9. INCLUSIONS. Furnishings and equipment or personal property or business operations except as specifically indicated and typically considered as a part of real estate, have been disregarded with only the real estate being considered in the value estimate unless otherwise stated.

10. ENVIRONMENTAL DISCLAIMER. The value estimated in this report is based on the assumption that the property is not negatively affected by the existence of hazardous substances or detrimental environmental conditions. The Consultant is not an expert in the identification of hazardous substances or detrimental environmental conditions. The Consultant's routine inspection of and inquiries about the subject property did not develop any information that indicated any apparent significant hazardous substances or detrimental environmental conditions which would affect the property negatively. It is possible that tests and inspections made by a qualified hazardous substance and environmental expert would reveal the existence of hazard material and environmental conditions on or around the property that would negatively affect its value.

11. LEGAL, ENGINEERING, FINANCIAL, STRUCTURAL, OR MECHANICAL NATURE, HIDDEN COMPONENTS, SOIL. The Consultant and/or firm has no responsibility for matters legal in character or nature, nor of any architectural, structural, mechanical, or engineering nature. No opinion is rendered as to the title, which is presumed to be good and merchantable. The property is appraised as if free and clear, unless otherwise stated in particular parts of the report.

    The legal description is assumed to be correct as used in this report as furnished by the client, his designee, or as derived by the Consultant.

    Note that no advice is given regarding mechanical equipment or structural integrity or adequacy, no soils and potential for settlement, drainage, and such (seek assistance from qualified architect and/or engineer) nor matters concerning liens, title status, and legal marketability (seek legal assistance), and such. The lender and owner should inspect the property before any disbursement of funds; further it is likely that the lender or owner may wish to require mechanical or structural inspections by a qualified and licensed contractor, civil or structural engineer, architect, or other expert.

    The Consultant has inspected as far as possible, by observation, the land and the improvements; however, it was not possible to personally observe conditions beneath the soil or hidden structurally or by other components. We have not critically inspected mechanical components within the improvements and no representations are made herein as to these matters unless specifically stated and considered in the report. The value estimate considers there being no such conditions that would cause a loss of value. The land or the soil of the area being appraised appears firm, however, subsidence in the area is unknown. The Consultant(s) do not warrant against this condition or occurrence of problems arising from soil conditions.

    The appraisal is based on there being no hidden, unapparent, or apparent conditions of the property site, subsoil, or structures or toxic material which would render it more or less valuable. The Consultant and firm have no responsibility for any such conditions or for any expertise or engineering to discover them. All mechanical components are assumed to be in operable condition and status standard for properties of the subject type. Conditions of heating, cooling, ventilation, electrical and plumbing equipment is considered to be commensurate with the conditions of the balance of the improvements unless otherwise stated. No judgment may be made by us as to adequacy of insulation, type of insulation, or energy efficiency of the improvements or equipment which is assumed standard for subject and type.

    If the Consultant has not been supplied with a termite inspection, survey or occupancy permit, no responsibility or representation is assumed or made for costs associated with obtaining same or for any deficiencies discovered before or after they are obtained. No representation or warranties are made concerning obtaining the above mentioned items.
    The Consultant has no responsibility for any costs or consequences arising due to the need, or the lack of need for flood hazard insurance. An Agent for the Federal Flood Insurance Program should be contacted to determine the actual need for Flood Hazard Insurance.

12. PROPOSED IMPROVEMENTS, CONDITIONED VALUE. Improvements proposed, if any, on or off-site, as well as any repairs required are considered, for purposes of the appraisal to be completed in good and workmanlike manner according to information submitted and/or considered by the Consultant(s). In cases of proposed construction, the appraisal is subject to change upon inspection of property after construction is completed. This estimate of market value is as of the date shown, as proposed, as if completed and operating at levels shown and projected. On all appraisals, subject to satisfactory completion, repairs, or alterations, the appraisal report and value conclusion are contingent upon completion of the improvements in a workmanlike manner.

13. VALUE CHANGE, DYNAMIC MARKET, INFLUENCES, ALTERATION OF ESTIMATE BY CONSULTANT. The estimated market value, which is defined in the report, is subject to change with market changes over time; value is highly related to exposure, time, promotional effort, terms, motivation, and conditions surrounding the offering. The value estimate considers the productivity and relative attractiveness of the property physically and economically in the marketplace.

    Appraisal report and value estimate subject to change if physical or legal entity or financing is different than that envisioned in this report.

14. EXHIBITS. The sketches and maps in this report are included to assist the reader in visualizing the property and are not necessarily to scale. Various photos, if any, are included for the same purpose as of the date of the photos. Site plans are not surveys unless shown from separate surveyors. All documents, materials, photographs, negatives, and other items provided to or obtained by the Consultant becomes the property of the Consultant unless other arrangements have been previously made therefore.

15. CHANGES, MODIFICATION. The Consultant(s) and/or officers of ACM Consultants, Inc., reserve the right to alter statements, analysis, conclusion or any value estimate in the appraisal if there becomes known to us facts pertinent to the appraisal process which were unknown to us when the report was completed.

16. DISCLOSURE. Disclosure of the contents of the appraisal report is governed by the Bylaws and Regulations of the professional appraisal organizations with which the Consultant is affiliated. Neither all, nor any part of the content of the report, or copy thereof (including conclusions as to the property value, the identity of the Consultant, professional designations, reference to any professional appraisal organizations, or the firm with which the Consultant is connected, shall be used for any purpose by anyone but the client specified in the report, without the previous written consent of the Consultant; nor shall it be conveyed by anyone to the public through advertising, public relations, news sales, or other media, without the written consent and approval of the Consultant. The Consultant may not divulge the material (evaluation) contents of the report, analytical findings or conclusions, or give a copy of the report to anyone other than the client or his designee as specified in writing except as may be required by the Appraisal Institute as they may request in confidence for ethics enforcement, or by a court of law or body with the power of subpoena.

17. CONTINUING EDUCATION. The Appraisal Institute conducts a voluntary program of continuing education for its designated members. As of the date of this report, Glenn Kunihisa has completed the requirements of the continuing education program of the Appraisal Institute.

    ACCEPTANCE OF, AND/OR USE OF THIS APPRAISAL REPORT BY CLIENT OR ANY THIRD PARTY CONSTITUTES ACCEPTANCE OF THE ACM CONSULTANTS, INC., CERTIFICATION, LIMITING AND CONTINGENT CONDITIONS. CONSULTANT LIABILITY EXTENDS ONLY TO STATED CLIENT, NOT SUBSEQUENT PARTIES OR USERS OF ANY TYPE, and the total liability of Consultant(s) and firm is limited to the amount of fee received by Consultant.

APPRAISAL QUALIFICATIONS
Glenn K. Kunihisa, MAI

STATE LICENSING

State Certified General Appraiser,
State of Hawaii, License No. CGA 39, July 17, 1991
Expiration: December 31, 2007

PROFESSIONAL AFFILIATIONS

Member, Appraisal Institute, MAI Designation, Hawaii Chapter No. 67
Member, International Right of Way Association
Appraiser-Realtor, National Association of Realtors, Maui Board of Realtors

PROFESSIONAL INVOLVEMENT

Education Chairperson – Hawaii Chapter of the Appraisal Institute – 2004 and 2005
Former Island of Maui Representative – Hawaii Chapter of the Appraisal Institute
Former Multiple Listing Service (MLS) Committee Member – Realtors Association of Maui

COMMUNITY AFFILIATIONS

St. Anthony Parish School Board
Board Member 1995 to Present
Board President 1997 and 1998
Alii Community Care, Inc. – A non-profit corporation
Board Member 2004 to Present

EMPLOYMENT

President
ACM Consultants, Inc.
May, 1997 to present

Previously associated with the following:
ACM, Real Estate Appraisers, Inc. - 1986 to 1997
A&B Commercial Company; a division of Alexander & Baldwin, Inc. - 1979 to 1985
Bank of Hawaii - 1976 to 1979

GENERAL EDUCATION

University of Hawaii at Manoa
Master of Business Administration (MBA) - Executive MBA Program V, 1988
Bachelor of Business Administration (BBA), 1976
Iolani School, 1971

LEGAL

Qualified as an expert witness in the Second Circuit Court of the State of Hawaii

APPRAISAL EDUCATION

Appraisal Institute

Seminar	*California Conservation Easements* Sacramento, California – November 2005
Course 400	*7-Hour National USPAP Update Course* Honolulu, Hawaii – October 2005
Seminar	*Case Studies in Limited Partnership and Partial Interest Valuation* Honolulu, Hawaii – May 2005
Seminar	*Appraisal Consulting: A Solutions Approach for Professionals* Honolulu, Hawaii – February 2005

Seminar	*Real Estate Finance, Value and Investment Performance* Honolulu, Hawaii – February 2005
Seminar	*Fannie Mae Residential Presentation* Honolulu, Hawaii - July 2004
Seminar	*Subdivision Analysis* Chicago, Illinois - August 2003
Seminar	*Supporting Capitalization Rates* Chicago, Illinois - August 2003
Seminar	*The Technology Assisted Appraiser* Chicago, Illinois - August 2003
Seminar	*Scope of Work: Expanding Your Range of Services* Chicago, Illinois - August 2003
Course 400	*National Uniform Standards of Professional Practice* Honolulu, Hawaii - May 2003
Course 420	*Business Practices and Ethics* Honolulu, Hawaii - May 2003
Seminar	*The Private Conservation Market* Honolulu, Hawaii - July 2002
Seminar	*Finance Reporting Valuations Parts I and II* Honolulu, Hawaii - July 2002
Seminar	*Future of Appraisal Profession from a Global Perspective* Honolulu, Hawaii - July 2002
Seminar	*Appraisal Office Management* Honolulu, Hawaii - July 2002
Course 540	*Report Writing* Denver, Colorado - December 2000
Seminar	*Partial Interests: Theory and Case Law* Las Vegas, Nevada - July 2000
Seminar	*Easement Valuation* Las Vegas, Nevada - July 2000
Seminar	*Bridging the Gap: Marketability Discounts for Real Estate Interests* Las Vegas, Nevada - July 2000
Course 430	*Standards of Professional Practice, Part C* Honolulu, Hawaii - September 1999
Seminar	*Litigation Skills for the Appraiser: An Overview* Honolulu, Hawaii - May 1998
Seminar	*Special Purpose Properties* Honolulu, Hawaii - September 1997
Seminar	*Highest and Best Use Applications* Honolulu, Hawaii - September 1997
Seminar	*Detrimental Conditions* Honolulu, Hawaii - July 1997
Seminar	*The Appraiser As Expert Witness* Honolulu, Hawaii - August, 1995
Seminar	*How to Appraise FHA-Insured Property* Los Angeles, California - January, 1995
Seminar	*Understanding Limited Appraisals and Reporting Options* Honolulu, Hawaii - August, 1994
Seminar	*Valuation of Leasehold Interests* Honolulu, Hawaii - May, 1993

Seminar	*Valuation of Leased Fee Interests*	Honolulu, Hawaii - May, 1993
Seminar	*Valuation Considerations: Appraising Non-Profits*	Boston, Massachusetts - July, 1992
Seminar	*Americans With Disabilities Act*	Boston, Massachusetts - July, 1992
Seminar	*Valuation in Today's Capital and Financing Markets*	Honolulu, Hawaii - June 1992
Seminar	*Arbitration Principles, Procedures and Pitfalls*	Honolulu, Hawaii - June, 1992
Seminar	*Institutional Real Estate in the 1990's*	Honolulu, Hawaii - June, 1992
Seminar	*FIRREA and its Impact on Appraisers*	Honolulu, Hawaii - June, 1992
Course 410/420	*Standards of Professional Practice, Parts A & B*	Honolulu, Hawaii - April, 1991

Society of Real Estate Appraisers

Course 101	*Introduction to Appraising Real Property*	Dallas, Texas - 1987
Course 102	*Applied Residential Property Valuation*	Honolulu, Hawaii - July 1990
Course 201	*Principles of Income Property Appraising*	Chicago, Illinois, 1987
Course 202	*Applied Income Property Valuation*	San Diego, California - 1988
Seminar	*Professional Practice and the Society of Real Estate Appraisers*	Honolulu, Hawaii - 1988
Seminar	*Appraisal Standards Seminar - Federal Home Loan Bank Board Guidelines, Regulations and Policies*	Honolulu, Hawaii - April, 1988

American Institute of Real Estate Appraisers

Seminar	*Rates, Ratios and Reasonableness*	Honolulu, Hawaii - 1989
Seminar	*Discounted Cash Flow Analysis*	Honolulu, Hawaii - 1989
Seminar	*Highest and Best Use*	Honolulu, Hawaii - 1989
Seminar	*Capitalization Overview - Part A*	Honolulu, Hawaii - 1990
Seminar	*Capitalization Overview - Part B*	Honolulu, Hawaii - 1990
Seminar	*Accrued Depreciation*	Honolulu, Hawaii - 1990

International Right of Way Association

Course 101	*Appraisal*	Las Vegas, Nevada - October, 1998
Course 101	*Negotiation*	

Las Vegas, Nevada - October 1998

National Business Institute, Inc.

Seminar	*Commercial Real Estate Leasing In Hawaii*	Honolulu, Hawaii - 1989

American Arbitration Association

Seminar	*Real Estate Dispute Resolution - Mediation and Arbitration*	Kahului, Maui, Hawaii - October, 1990

APPENDIX B.

Agricultural Impact Study

DECISION ANALYSTS HAWAI'I, INC.

PROPOSED PU'UNANI SUBDIVISION: IMPACT ON AGRICULTURE

PREPARED FOR:

Towne Development of Hawai'i
Endurance Investors, LLC
Association of II Wai Hui, LP

PREPARED BY:

Decision Analysts Hawai'i, Inc.

December 2006

CONTENTS

EXECUTIVE SUMMARY

1. PROPOSED DEVELOPMENT

Towne Development of Hawai'i, Endurance Investors, LLC and Association of II Wai Hui, LP propose to develop Pu'unani Subdivision ("the Project") on a 210-acre site ("the Project Area") in Wailuku, Maui, Hawai'i. The entire Project Area is currently within the State Agricultural District; about 178.5 acres are designated "Agricultural" in the Wailuku-Kahului Community Plan; and the entire area is zoned "Agricultural." The planned development will require a State Land Use District Boundary Amendment, changes in the Community Plan, and changes in zoning.

2. AGRICULTURAL CONDITIONS

The Project Area has good- to high-quality soils for cultivating crops, although about 76% of the area has soils that are cobbly and about 58% of the area is subject to erosion due to slopes of 7 to 15%. The lands in the Project Area are suited to growing low-elevation crops.

3. LOCATIONAL ADVANTAGES AND DISADVANTAGES FOR CROP PRODUCTION

Farmers in Central Maui are well-located for supplying the small Maui Island market. And compared to other farmers in Hawai'i, they can also compete reasonably well in supplying mainland markets, as long as their products have long shelf-lives and so can be shipped by surface vessel.

However, compared to farmers on O'ahu, they are at a disadvantage in supplying the Honolulu market. Furthermore, they are at a disadvantage in supplying mainland markets if their products have short shelf-lives and so must be shipped by air. Also, farmers in Central Maui are at a disadvantage in competing against the low-cost producers who supply mainland markets.

4. SURROUNDING LAND USES

Existing and planned urban uses are located to the north, west and—at lower elevations—south of the Project Area. Agricultural lands are located to

the east and—at higher elevations—south of the Project Area. The lands to the east are farmed while those to the south are fallow.

5. IMPACT ON EXISTING AGRICULTURAL OPERATIONS

a. Farm Operations in the Project Area

The Project will have no impact on existing agricultural operations in the Project Area because none exist.

b. Nearby Farm Operations and Nuisance Issues

For future residents of the Project, nearby farm operations located to the east of the Project are not likely to cause significant nuisance problems (e.g., occasional noise, dust, and chemical spraying) because the Project will be (1) separated from fields by Honoapi'ilani Highway; and (2) on the Project site, separated and buffered by an additional 25 feet to 200 feet of open space along Honoapi'ilani Highway. Also, residents will not be downwind of farm areas during prevailing tradewinds since these winds blow across the isthmus roughly parallel to Honoapi'ilani Highway. Furthermore, before new residents purchase homes and lots, they will be informed that they will be living near farming areas. This point will be highlighted in promotional brochures and will be spelled out in the sales contracts. Under these circumstances, buyers are more likely to accept that nearby farm operations are part of the ambiance and lifestyle of the area.

In any case, Hawai'i's Right-to-Farm Act gives farmers who were operating before neighboring properties were developed the right to farm even if they cause a nuisance, provided that the farm activity does not threaten public health or safety.

In view of the above, no additional measures are needed to mitigate potential nuisance problems.

6. IMPACT ON THE GROWTH OF DIVERSIFIED CROP FARMING

a. Potential Acreage Requirements for Diversified Crops

Crops to Replace Imports of Fruits and Vegetables

For low-elevation fruits and vegetables that have a history of profitable production in Hawai'i, potential land requirements in 2010 for 100% import substitution for the Hawai'i and Maui County markets is estimated at 12,700 acres and 1,700 acres, respectively, plus some additional acreage for fallowing land between crops. When allowing for competition from imports, these estimates drop to about half.

Since Hawai'i farmers already supply a portion of the Hawai'i market, land requirements for increased import substitution are a fraction of the above estimates.

Export Crops

The many entrepreneurial agricultural efforts being undertaken on former plantation lands may lead to one or more major new export crops over the next 20+ years. However, the history of agricultural efforts in Hawai'i reveals that developing major new export crops that are successful in overseas markets is difficult. For example, over the past 50 years in Hawai'i, farmers have explored numerous possibilities for export crops, but they have developed overseas markets for just one diversified crop that requires more than 10,000 acres (macadamia nuts at 18,000 acres in 2004); one additional crop that requires more than 5,000 acres (coffee at 7,300 acres); and only five additional crops or crop categories that require more than 1,000 acres each.

Feed Crops

If feed crops could be grown in Hawai'i and priced competitively against mainland imports, they could replace some of the grains and hay that are now being imported to the State. Unfortunately, a number of commercial attempts in Hawai'i to grow grains and alfalfa have been unsuccessful.

Biofuel Crops

Crops can be grown to produce biomass to fuel a boiler, or as feedstock to produce fuels. In Hawai'i, the common practice is to produce biomass as a by-product of some principal crop. However, O'ahu Ethanol Corporation plans to build an ethanol plant at Campbell Industrial Park using conventional technology but, at least initially, using imported molasses as the feedstock. For the longer term, this company is exploring the economics of growing sweet sorghum on O'ahu to supply feedstock to its ethanol plant. Acreage requirements for a new sorghum biofuel plantation on O'ahu would range from about 6,000 acres for viability to 15,000 to replace all imported molasses.

However, a number of substantial difficulties must be overcome to develop a sorghum biofuel plantation on O'ahu. For example, it will be difficult to lease the 6,000+ acres required for economic viability. Most major landowners will be reluctant to lease their land at comparatively low rents for the approximately 30-year period desired by O'ahu Ethanol. Also, emerging technology that is in the early stages of commercialization promises a more plentiful and cheaper source of feedstock for ethanol. Instead of producing ethanol using sugars from conventional sources, the sugar would come from "cellulosic" sources. This would include green waste for which there would be no land rent and no grow-

ing costs, but there could be a disposal fee paid to the processor. In the long term, this less expensive source of feedstock could result in an unprofitable biofuel plantation.

These and other difficulties and risks suggest that the probability of successfully developing and sustaining a sorghum biofuel plantation on O'ahu is low.

Recent Trends

For all diversified crops—i.e., all crops other than sugarcane and pineapple, including crops to replace imports and crops for export—Statewide land requirements grew by an average of 240 acres per year from 1984 through 2004, or less than 2,400 acres per decade.

b. Land Available for Diversified Crops

State of Hawai'i

Statewide, a vast amount of land has been released from plantation agriculture: about 249,900 acres between 1968 and 2004—an average decrease of over 6,940 acres per year over a 36-year period. The 2006 closure of Del Monte's pineapple plantation in Kunia, O'ahu increased this acreage by about 5,100 acres, resulting in a total release of at least 255,000 acres from plantation agriculture between 1968 and 2007.

Over this same period, the demand for land for diversified crops increased by about 26,500 acres, or an average of about 740 acres per year. Since 1984, the growth has slowed to an average of 240 acres per year, as previously mentioned.

As the above indicates, the release of land from plantation agriculture has far outpaced the demand for land for diversified crops. The net decrease in crop land amounted to 223,400 acres, and will amount to 228,500 acres after adding the land fallowed by Del Monte. While some of the released land has been converted or is scheduled to be converted to urban uses and tree plantations, an estimated 160,000+ acres remain available for diversified crops.

Once the Superferry begins operations in 2007, cultivating crops on the Neighbor Islands for the Honolulu market, and vice versa, will become more economically feasible. This will increase the importance of the Statewide availability of agricultural land vis-a-vis the island-wide availability.

The above indicates that ample land is available in Hawai'i to accommodate the growth of diversified crops, whether demand is based on potential or recent trends. In other words, the limiting factor to the growth of diversified crops is *not* the *land supply*, but rather the *size of the market* for crops that can be grown *profitably* in Hawai'i.

Maui Island

These findings also apply to Maui. Since 1977, the contraction and eventual closure of Wailuku Sugar Co. and Pioneer Mill released about 11,200 acres from sugarcane production. In addition, the contraction of pineapple operations released about 5,000 acres since 1993.

During the 1980s, about 4,700 acres of sugarcane land in Central Maui was made available for other uses. Some of this land was developed; some was planted in macadamia nuts which continued until 1999; some was planted in pineapple; some was transferred to Hawaiian Commercial & Sugar Co. (HC&S); and some remains fallow.

During the 1990s, the reduction in sugarcane acreage occurred in West Maui, including about 6,000+ acres released in 2000. Similarly, most of the recent reduction in pineapple acreage occurred in West Maui, including about 3,200 acres that were released in 2003. Some of this former plantation land in West Maui was developed and some was converted to other crops, but most of it remains fallow or is used for grazing cattle.

In summary, considerable land remains available on Maui for diversified agriculture, although most of it is in West Maui.

c. Potential Loss of Agricultural Land on Maui to Development

If all of the committed, designated and proposed residential and resort projects on Maui Island were approved, built and sold, they would supply about 45,900 homes. At the projected demand of about 1,380 new homes per year, this potential supply of homes could be absorbed in about 33 years.

Development of all of these projects--including the 210-acre Pu'unani Subdivision—would result in about 11,800 acres that are now in the Agricultural District being lost to potential agricultural uses. This estimate includes prime agricultural land, low-quality land that is suitable for grazing but not farming, and gulch land. It represents less than 5% of the 244,600 acres on Maui Island that are in the State Agricultural District.

After a period in 33 years or so, this would leave about 232,800 acres on Maui Island available for agricultural uses.

d. Cumulative Impact on the Growth of Diversified Crop Farming

The Project will commit about 210 acres of good agricultural land to a non-agricultural use. If this land were used to grow a typical vegetable or fruit crop, then it could support about 26 farm jobs. In practice, the agricultural land in the Project Area has already been removed from the inventory of farm land due the existing and planned urban uses surrounding the Project Area.

Furthermore, development on this agricultural land—combined with other developments in Hawai'i and on Maui Island—involves the loss of too little agricultural land to significantly affect (1) the availability of land to farmers in Hawai'i, (2) agricultural land rents, (3) the growth of diversified crops, or (4) potential agricultural employment. This conclusion is based on the finding that, as a result of the contraction of plantation agriculture, ample land is available for diversified crops, with the available supply far exceeding likely or potential demand.

However, in Central Maui, the Project might adversely affect the growth of diversified agriculture somewhat since the market for agricultural land is tighter there than it is in most other areas of the State.

e. Mitigating Measures

In view of the small impact of the Project on the growth of diversified agriculture, mitigation measures for the loss of agricultural land are not recommended.

7. OFFSETTING BENEFITS

The loss of 210 acres of good agricultural land will be offset by the following benefits of the Project:

- 550 new homes;
- a 14.6-acre park;
- jobs supported by development activity, including (1) direct construction jobs and other jobs involved with development, and (2) indirect jobs supported by purchases of goods and services by construction companies and their employees;
- jobs supported by purchases of goods and services by those living in Project Area homes; and
- tax revenues (excise taxes, personal income taxes, corporate income taxes, property taxes, etc.) paid by (1) companies and employees directly and indirectly supported by development activities, (2) residents living in Project Area homes, and (3) companies and employees directly and indirectly supported by purchases of goods and services by those living in Project Area homes.

8. CONSISTENCY WITH STATE AND CITY POLICIES

a. Availability of Lands for Agriculture

The *Hawai'i State Constitution*, the *Hawai'i State Plan*, the *State Agriculture Functional Plan*, the *County of Maui General Plan 1990*, and the County's *Wailuku-Kahului Community Plan* call directly or implicitly for preserving the economic

viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured.

With regard to plantation agriculture, the Project Area is no longer part of a sugarcane or pineapple plantation.

With regard to diversified agriculture, the Project will reduce the availability of agricultural land by a relatively small amount. However, the Project will not limit the Statewide growth of diversified agriculture since ample agricultural land is available. This is due to the enormous supply of agricultural land that is now available as a result of the contraction of plantation agriculture. But the growth of diversified agriculture might be limited in Central Maui due to the tighter agricultural land market.

b. Conservation of Agricultural Lands

In addition to the above, State and County policies call for conserving and protecting prime agricultural lands, including protecting agricultural lands from urban development.

However, these policies—many of which were written before the major contraction of plantation agriculture in the 1990s—assume implicitly that profitable agricultural activities will be available to utilize these agricultural lands. This has proven to be a questionable assumption in view of the enormity of the contraction of plantation agriculture, the abundant supply of land that came available for diversified agriculture, and the slow growth in the amount of land being utilized for diversified agriculture.

Furthermore, discussions in the Agriculture portion of the *State Functional Plan* recognize that redesignation of lands from Agricultural to Urban should be allowed "... upon a demonstrated change in economic or social conditions, and where the requested redesignation will provide greater benefits to the general public than its retention in ...agriculture;" that is, when an "overriding public interest exists." The enormous contraction in plantation agriculture, resulting in the supply of agricultural land far exceeding demand, constitutes a major change in economic conditions. Moreover, development of the Project will provide community benefits (homes, a park, jobs, and tax revenues) that far exceed that which could be provided by diversified agriculture (about 26 jobs). In practice, development of the Project will not result in a loss of existing or potential Statewide agricultural employment given that the Project Area is fallow and crop land is available elsewhere.

PROPOSED PU'UNANI SUBDIVISION:
IMPACT ON AGRICULTURE

1. INTRODUCTION[1]

Towne Development of Hawai'i, Endurance Investors, LLC and Association of Il Wai Hui, LP propose to develop Pu'unani Subdivision ("the Project") on a 210-acre site ("the Project Area") in Wailuku, Maui, Hawai'i—see Figures 1, 2 and 3 for the location of the Project, and Figure 4 for the proposed development (the figures follow the body of the report). The entire Project Area is currently within the State Agricultural District; about 178.5 acres are designated "Agricultural" in the Wailuku-Kahului Community Plan; and the entire area is zoned "Agricultural." The planned development will require a State Land Use District Boundary Amendment, changes in the Community Plan, and changes in zoning (see Figures 5 to 9).

This report addresses the impacts on agriculture of developing the Project. The material below gives the following information on the Project: its location; a description of the Project; the agricultural conditions of the Project Area, along with supporting Figures 10 to 13; potential crops; locational advantages and disadvantages for crop production; surrounding land uses; past and current agricultural uses of the land; the impact of the Project on existing agricultural operations in or near the Project Area; the impact the Project on the growth of diversified crop farming, along with supporting Figure 14; benefits of the Project that would offset adverse agricultural impacts; and consistency of the Project with State and County agricultural policies.

Two appendices are at the end of the report. Appendix A provides a listing of planned and proposed projects on Maui and the amount of agricultural land that would be affected. Appendix B provides a summary of State and County goals, objectives, policies and guidelines related to agricultural lands.

2. LOCATION OF THE PROJECT [1]

As shown in Figure 1, Pu'unani Subdivision is located in Central Maui between Wailuku to the north and Waikapu to the south. The Project Area is bordered on the east by Honoapi'ilani Highway, on the north by Kuikahi Drive, on the west by Wailuku Heights Subdivision, and on the south by fallow agricultural fields.

As shown in Figure 2, the Project Area is also defined by two Tax Map Key (TMK) parcels: TMK 3-5-02:02 (60.08 acres) and TMK3-5-02:03 (147.98 acres).

3. PROJECT DESCRIPTION[1]

Pu'unani Subdivision, which is still in the conceptual stage, is envisioned to contain 550 homes, including single-family homes on 4,000 square-foot (sf) lots, multifamily units, and rural homes on half-acre and one-acre lots (see Table 1 and Figure 4). Development could begin as early as 2009, with full build-out anticipated by 2020.

4. AGRICULTURAL CONDITIONS

a. Soil Types[2]

As shown in Figure 11, the Project Area contains four soil types. Their acreages are shown in Table 2 by their quality as rated by the Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service.

Table 1. Pu'unani Subdivision: Summary of Land-Use Plan

Land Use	Acres	Homes
Residential		
Single-Family, 4,000 sf lots	10.00	90
Multi-Family	19.00	240
Rural, half-acre lots	119.50	214
Rural, one-acre lots	6.00	6
Park/Stormwater Retention	14.60	–
Major roads	9.45	–
Open Space, Water Tanks, and Irrigation Ditch	31.45	–
TOTAL	**210.00**	**550**

For each of the four soil types, the complete name, range of slopes, and soil descriptions are:

— IbB: Iao cobbly silty clay, 3 to 7% slopes

The Iao series consists of well-drained soils on valley fill and alluvial fans. These soils developed in alluvium derived from basic igneous rock. The surface is dark brown cobbly silty clay about 15 inches thick. The subsoil, about 45 inches thick, is very dark brown and very dark grayish-brown clay and silty clay. The substratum is clayey alluvium. The soil is neutral in the surface layer and subsoil. Permeability is moderately slow. Runoff is medium, and the erosion hazard is slight to moderate.

— IcB: Iao clay, 3 to 7% slopes

This series is similar to IbB, except for the texture of the surface layer and the absence of cobblestones.

— IbC: Iao cobbly silty clay, 7 to 15% slopes

This soil is similar to IbB, except that the slope is steeper, and the erosion hazard is moderate.

— IcC: Iao Clay 7 to 15% slopes

This series is similar to IcB, except that the slope is steeper, and the erosion hazard is moderate.

Table 2. Pu'unani Subdivision: Soil Types and NRCS Ratings

Soil Types	Acres		NRCS Ratings
Higher-Quality Soils			
IbB	64.4	30.6%	IIe
IcB	24.4	11.6%	IIe
Moderate-Quality Soil			
IbC	95.9	45.7%	IIIe
IcC	25.4	12.1%	IIIe
Total	210.0	100.0%	

b. Soil Ratings

Three classification systems are commonly used to rate Hawai'i soils: (1) Land Capability Grouping, (2) Agricultural Lands of Importance to the State of Hawai'i, and (3) Overall Productivity Rating.

Land Capability Grouping (NRCS Rating)[2]

The 1972 Land Capability Grouping by the U.S. Department of Agriculture, NRCS rates soils according to eight levels, ranging from the highest classification level "I" to the lowest "VIII."

As shown in Table 2, about 88.8 acres (42.2%) of the Project Area have soils that are rated IIe. Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices. The subclassification "e" indicates that the limitation is due to erosion.

About 121.3 acres (57.8%) acres have soils rated IIIe. Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Agricultural Lands of Importance in the State of Hawai'i (ALISH)[3]

ALISH ratings were developed in 1977 by the NRCS, UH College of Tropical Agriculture and Human Resources, and the State of Hawai'i, Department of Agriculture. This system classifies land into three broad categories: (a) "Prime" agricultural land which is land that is best suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (b) "Unique" agricultural land which is non-Prime agricultural land used for the production of specific high-value crops; and (c) "Other" agricultural land which is non-Prime and non-Unique agricultural land that is important to the production of crops.

Nearly all of the Project Area has soils that are rated Prime (see Figure 12).

Overall Productivity Rating (LSB Rating)[4]

In 1972, the University of Hawai'i (UH) Land Study Bureau (LSB) developed the Overall Productivity Rating, which classifies soils according to five levels, with "A" representing the class of highest productivity and "E" the lowest.

When irrigated, about 171.5 acres (81.7%) of the Project Area have soils rated A, and about 38.5 acres (18.3%) have soils rated B (see Figure 13).

Summary Evaluation of Soil Quality

The Project Area has good- to high-quality soils for cultivating crops, although about 76% of the area has soils that are cobbly and about 58% of the area is subject to erosion due to slopes of 7 to 15%.

c. Soil Characteristics[2,4]

Consistent with the above soil ratings, the land in the Project Area exhibits a number of favorable characteristics for farming: the soil depth exceeds 30 inches, the texture is moderately fine to course although cobbly in parts, the soils are tillable and are well-drained, and the erosion hazard is slight to moderate.

d. Elevation[1]

The elevation of the Project Area ranges from 350 feet near Honoapi'ilani Highway, to 815 feet at the mauka extent of the property.

e. Slopes[1,2]

Slopes within the Project Area range from about 3% to 15%, and average about 11%.

f. Climatic Conditions

Like other areas in Hawai'i, Central Maui has a mild *semi*tropical climate that is due primarily to three factors: (1) Hawai'i's mid-Pacific location near the Tropic of Cancer, (2) the surrounding warm ocean waters that vary little in temperature between the winter and summer seasons, and (3) the prevailing northeasterly tradewinds that bring air having temperatures which are close to those of the surrounding waters.

Solar Radiation[5]

The Project Area receives considerable sunshine, with average daily insolation of nearly 450 calories per square centimeter.

Rainfall[6]

Average annual rainfall in the Project Area is 20 to 30 inches. Most of this rainfall occurs during the winter rainy season (October through April), while the summer months (May through September) are hot and dry.

Temperatures[1]

Average temperatures range from the low 60s in the winter to the high 80s in the summer.

Winds and Storms[6]

The prevailing surface winds are tradewinds that blow from a northeasterly direction across the isthmus and out to sea.

g. Irrigation Water[1]

Historically, the sugarcane fields in the Project Area were irrigated with surface water from Waihee Ditch which passes through the property at an elevation of about 450 feet and roughly paralleling Honoapi'ilani Highway (see Figures 8 and 9).

h. Road Access

The fields in the Project Area are reached via plantation roads, including Old Waikapu Road which follows Waihee Ditch. In turn, the plantation roads connect to Kuikahi Drive and Honoapi'ilani Highway.

i. Summary

The Project Area has agronomic conditions that are suited to growing low-elevation crops.

5. POTENTIAL CROPS[7]

Based on the above agronomic conditions, the Project Area is suitable for low-elevation crops commercially grown in Hawai'i, including but not limited to: asparagus, beans (green, bush, and snap), bell peppers, bittermelon, cantaloupe, Chinese peas, cucumbers, daikon, dry onions, eggplant, flowers/nursery products, ginger root, green onions, green peppers, head and semi-head lettuces, herbs, honeydew melons, limes, lotus root, lychee, Manoa lettuce, mango, mustard cabbage, Oriental squash, parsley, pineapple, pumpkins, seed crops, sugarcane, sweet corn, sweet potatoes, tangerines, and watermelons.

6. LOCATIONAL ADVANTAGES AND DISADVANTAGES FOR CROP PRODUCTION

a. Maui Island Market

Farmers in Central Maui are well-located for supplying the Maui Island market because of the short trucking distance to Kahului, which is the island's commercial, industrial, distribution and transportation center. While the Maui Island market is significant, it is comparatively small: in 2000, Maui had a *de facto* population of about 156,170 residents and visitors.[8]

b. Honolulu Market

All farmers on Maui are at a disadvantage in competing against farmers on O'ahu for supplying the Honolulu market due to the interisland shipping costs, delays and extra handling. Comparing barge and air-cargo service, shipping by barge is less expensive and larger loads can be shipped, but the shipments are

slow and infrequent. Air service is faster and frequent, but it is far more expensive and capacities are limited. A planned new ferry system, if successful, will increase the speed and frequency of surface shipments, and costs will be lower than air-freight. In turn, this will allow Maui farmers to be more competitive in O'ahu produce markets, and vice versa.

In 2000, O'ahu had a *de facto* population of about 927,170 residents and visitors.[8] Thus, the Honolulu market is nearly six-times larger than the Maui market.

c. Mainland Market

Compared to Hawai'i, the mainland market is enormous: in 2000, the U.S. had a total population of 281.4 million people.[9] In supplying this market with products that can be carried by container ship because they have long shelf-lives (e.g., canned fruit), farmers on Maui are competitive with farmers on O'ahu and other islands. Even though freight from Maui must first be barged to Honolulu then transferred onto a container ship, Matson's overseas shipping service includes interisland barge service at no additional fee: except for some minor port charges, Matson charges a common fare for all islands.[10]

In the case of fresh products that must be shipped by air to the mainland because of their short shelf-lives, farmers on Maui are at a disadvantage compared to farmers on O'ahu because most mainland air cargo is shipped via Honolulu International Airport. Compared to farmers on O'ahu, Maui farmers encounter additional costs, delays and handling for interisland air-cargo service and for transferring the fresh products from small interisland aircraft to large overseas aircraft.

However, overseas air-cargo service from Maui has improved somewhat because the current generation of aircraft can depart from the short runway at Kahului with a full load of passengers and a full load of cargo in the hold. This direct service allows farmers on Maui to be more competitive in mainland markets. However, the lift capacity from Maui is limited by the number of direct flights.

In the U.S. mainland market, farmers in Hawai'i must also compete against farmers on the mainland and in Mexico, Central and South America, the Caribbean, Australia, New Zealand, Southeast Asia, etc. Most of the competing farm areas have lower production and delivery costs than Hawai'i does. Competing against Mexico is particularly difficult given the North America Free Trade Agreement (NAFTA) and Mexico's proximity to major U.S. markets.

d. Summary

In terms of location, farmers in Central Maui are well-located for supplying the small Maui Island market. And compared to other farmers in Hawai'i, they

can also compete reasonably well in supplying mainland markets, as long as their products have long shelf-lives and so can be shipped by surface vessel.

However, compared to farmers on O'ahu, they are at a disadvantage in supplying the Honolulu market. Furthermore, they are at a disadvantage in supplying mainland markets if their products have short shelf-lives and so must be shipped by air. Also, farmers in Central Maui are at a disadvantage in competing against the low-cost producers who supply mainland markets.

7. SURROUNDING LAND USES

As shown in Figures 4, 6, 8 and 9, existing and planned urban uses are located to the north, west and, at lower elevations, south of the Project Area.

Agricultural lands are located to the east and—at higher elevations—south of the Project Area. The lands to the east are farmed, while those to the south are fallow (see Figure 3).

8. PAST AND CURRENT AGRICULTURAL LAND USES

a. Historic Agricultural Uses[1,4,11,12]

Fields within the Project Area were cultivated in sugarcane as part of Wailuku Agribusiness Co. Inc., which operated a sugarcane plantation in the area from 1862 to 1988. After sugar, the fields were leased to Maui Pineapple until 2003 for part of their pineapple plantation. More recently, the land was used for grazing cattle.

b. Current Agricultural Use[1]

Currently, none of the fields in the Project Area are used for agriculture.

9. IMPACT ON EXISTING AGRICULTURAL OPERATIONS

a. Farm Operations in the Project Area

The Project will have no impact on existing agricultural operations in the Project Area because none exist.

b. Nearby Farm Operations and Nuisance Issues

Nuisances arising from nearby farm operations can become an issue for residents as well as for farm operators. Some residents who are close to and downwind from farming operations may complain about occasional noise, dust, chemical spraying, etc. In turn, farmers may have to change their operations in order to address these complaints.

However, for future residents of the Project, nearby farm operations located to the east of the Project are not likely to cause significant nuisance problems because the Project will be (1) separated from fields by Honoapi'ilani Highway; and (2) on the Project site, separated and buffered by an additional 25 feet to 200 feet of open space along Honoapi'ilani Highway. Also, residents will not be downwind of farm areas during prevailing tradewinds since these winds blow across the isthmus roughly parallel to Honoapi'ilani Highway. Furthermore, before new residents purchase homes and lots, they will be informed that they will be living near farming areas. This point will be highlighted in promotional brochures and will be spelled out in the sales contracts. Under these circumstances, buyers are more likely to accept that nearby farm operations are part of the ambiance and lifestyle of the area.

In any case, Hawai'i's Right-to-Farm Act gives farmers who were operating before neighboring properties were developed the right to farm even if they cause a nuisance, provided that the farm activity does not threaten public health or safety.[13]

In view of the above, no additional measures are needed to mitigate potential nuisance problems.

10. IMPACT ON THE GROWTH OF DIVERSIFIED CROP FARMING

The Project will commit agricultural land to a non-agricultural use. The impact of this commitment on the growth of diversified crop farming is addressed below. The material covers the (1) amount of land required for the future growth of diversified crops, (2) availability of land for diversified crops, (3) potential loss of agricultural land on Maui to development, (4) cumulative impact of the Project and other projects on the growth of diversified crop farming, and (5) mitigating measures.

a. Potential Acreage Requirements for Diversified Crops

Crops to Replace Imports of Fruits and Vegetables[14]

For low-elevation fruits and vegetables that have a history of profitable production in Hawai'i, potential land requirements in 2010 for 100% import substitution for the Hawai'i and Maui County markets are estimated at 12,700 acres and 1,700 acres, respectively, plus additional acreage for fallowing land between crop plantings. When allowing for competition from imports, these estimates drop to about half. These estimates take into account estimated consumption, production trends, seasonal and annual market shares, yields, and the number of crops per year. Also, these figures are for acreage in crop—not harvested acreage as is typically reported in government publications.

Market shares for Hawai'i growers are limited by the following factors: (1) local varieties are not perfect substitutes for all imports (e.g., premium-priced

sweet Maui onions versus inexpensive storage onions); (2) some crops cannot be produced profitably in the summer due to competition from low-cost imports of fruits and vegetables from California, other states, and Mexico; and (3) overproduction must be avoided in order to maintain profitable price levels.

Since Hawai'i farmers already supply a portion of the Hawai'i market, land requirements for increased import substitution are a fraction of the above estimates.

Export Crops[7,8,9]

The potential market for export crops is far larger than the Hawai'i market. In 2005, the U.S. population was 296.41 million, compared to Hawai'i's resident-plus-visitor population of 1.45 million. To take advantage of this large potential, Hawai'i farmers are exploring various export crops on lands released from plantation agriculture. Over the next 20+ years, one or more of these crops may prove to be successful and may grow into a major export crop.

However, the history of agricultural efforts in Hawai'i reveals that the successful development of major new export crops requiring large amounts of land is infrequent. For example, over the past 50 years in Hawai'i, farmers have explored numerous possibilities for export crops, but they have developed overseas markets for just one diversified crop that requires more than 10,000 acres (macadamia nuts at 18,000 acres in 2004); one additional crop that requires more than 5,000 acres (coffee at 7,700 acres); and only five additional crops or crop categories that require more than 1,000 acres each (papaya at 2,105 acres, bananas at 1,360 acres, tropical specialty fruits at 1,260 acres, flowers/nursery products at 3,874 acres, and seed crops at 3,870 acres). Tropical specialty fruits include longan, lychee, mango, rambutan, star-fruit, etc.

Feed Crops[15]

If feed crops could be grown in Hawai'i and priced competitively against mainland imports, they could replace some of the grains and hay that is now being imported to the State. Unfortunately, a number of commercial attempts in Hawai'i to grow grains and alfalfa have been unsuccessful. The major problems have been (1) pests, particularly birds that eat the grains before they are harvested; (2) humidity that is too high for drying alfalfa properly; and (3) high production costs compared to those of mainland farms.

Biofuel Crops[16-22]

Crops can be grown to produce biomass to fuel a boiler, or as feedstock to produce fuels. Examples of the latter include sugarcane, corn or sorghum used to produce ethanol. In turn, the ethanol is used to produce E-10 gasohol (90% gasoline and 10% ethanol).

In Hawai'i, the common practice is to produce biomass as a by-product of some principal crop. For example, at HC&S on Maui and at Gay & Robinson on Kaua'i, the sugarcane by-product bagasse is burned to help fuel their respective power plants. In addition, the biofuel company Maui Ethanol plans to use the sugarcane by-product, molasses, from the two sugarcane plantations as a feedstock to produce ethanol. Using conventional technology, the sugar in the molasses will be fermented to produce ethanol, followed by distillation to extract the alcohol.

However, O'ahu Ethanol Corporation plans to build an ethanol plant at Campbell Industrial Park using conventional technology but, at least initially, using imported molasses as the feedstock. The rated capacity will be 15 million gallons of ethanol per year. For the longer term, this company is exploring the economics of growing sweet sorghum to supply feedstock to its ethanol plant. The sorghum would have to be grown on O'ahu because it would be too expensive to ship the sorghum juice from a Neighbor Island to O'ahu. Sorghum juice is mostly water having a low concentration of sugar compared to molasses.

Acreage requirements for a new sorghum biofuel plantation on O'ahu would range from about 6,000 acres for viability to 15,000 if it were to replace all imported molasses. This acreage comprises a substantial share or all of the estimated 14,700 acres of crop land that is available on O'ahu at year end 2006. But it is a small share of the 160,000+ acres of crop land that will be available Statewide (see Section 11.b).

A number of substantial difficulties must be overcome in order to develop a biofuel plantation for supplying feedstock for ethanol production, including:

— Long-term leases

In many areas of the State, it will be difficult to lease the large amount of land required for a biofuel plantation at low lease rents for the 30 or so years required to capitalize the investment in a new plantation. Over time, other farmers and other users of land are likely to make higher offers for lease rents or land purchases. In view of this potential, the current market value of available agricultural lands is likely to be higher if the lands are not committed long-term at rents that would be low enough to be affordable for a biofuel plantation.

— Capital

Substantial investment capital will be required to cover the cost of a mill to extract the juice from a biofuel crop, a generating plant to provide power, improvements and upgrades to irrigation systems that are in disrepair, trucks and equipment to harvest and haul the sorghum to the mill and haul the sorghum juice to the ethanol plant, etc.

— Short-term Profitability

Annual revenues from selling the ethanol plus direct subsidies are estimated by the consultant at about $2,700 per acre (based on an estimated 900 gallons per acre per year of ethanol at about $3 per gallon). Even with subsidies, this is low compared to revenues from other crops in Hawai'i.

Furthermore, the cost of importing molasses for feedstock or importing ethanol may prove less expensive than growing a biofuel crop in Hawai'i. For similar crops (e.g., feed crops), importing has proven to be less expensive than growing and processing crops locally. Also, the U.S. Department of Agriculture has found sorghum to be an expensive feedstock for producing ethanol—about 3.7 times as expensive as corn and 63% more expensive than molasses.

As ethanol production increases on the mainland and in Hawai'i, there is a risk that the combined Federal and State subsidies for ethanol (nearly $1 per gallon) could be reduced, thereby compromising the profitability of a biofuel crop.

— Long-term Profitability

In the long-term, emerging technology promises a cheaper source of feedstock for ethanol than growing a biofuel crop on a plantation. Instead of producing ethanol using sugars from conventional sources (e.g., molasses, sugarcane, grains, fruits, etc.), the sugar would come from "cellulosic" sources. Using new technology that is in the early stages of commercialization, sugar that is locked in complex carbohydrates of plants is separated into fermentable sugars. Feedstock would include agricultural wastes, yard clippings, discarded paper, wood waste, etc.—i.e., the green waste that is now used for composting. This new technology promises (1) much higher ethanol yields per ton of biomass because the entire plant can be used as feedstock, and (2) lower costs, particularly if there are no growing costs when waste product is used, and if the operator is paid a fee to dispose of municipal and agricultural waste.

O'ahu's municipal waste could produce an estimated 160 million gallons of ethanol compared to annual consumption of about 400 million gallons of gasoline. This would allow far higher use of ethanol in gasohol than is needed in E-10. In Hawai'i, this new technology is being explored by ClearFuels Technology Inc. Eventually, this less expensive source of feedstock could result in unprofitable biofuel plantations.

The above difficulties and risks suggest that the probability of successfully developing and sustaining a biofuel plantation in Hawai'i is low. The more likely scenario is ethanol produced as a by-product from sugar operations and, in the long-term, ethanol produced from green waste.

Recent Crop-acreage Trends[7]

For all diversified crops—i.e., all crops other than sugarcane and pineapple, including crops to replace imports and crops for export—Statewide land requirements grew by an average of 240 acres per year from 1984 through 2004, or about 2,400 acres per decade (see Figure 14).[1]

From 1999 to 2004, acreage increased for just three of the major export crop categories: tropical specialty fruits up 350 acres, flowers/nursery products up 1,162 acres, and seed crops up 1,420 acres. During this same period, acreage declined for three of the major export crops: macadamia nuts down 1,900 acres, papaya down 1,395 acres, and bananas down 400 acres. Coffee remained unchanged. The net change was a decrease of 763 acres.

Factors Limiting the Growth of Diversified Crops[14]

A great many crops can be grown in Hawai'i's year-round subtropical climate, and a number of them can be grown profitably in volumes that require a few hundred acres. However, the modest growth in land requirements for diversified crops reflects the fact that few crops can be grown profitably on a large scale. The primary factors that have limited the growth of diversified agriculture in Hawai'i are given below.

- — Hawai'i's subtropical climate is not well-suited to the commercial production of major crops that grow better in the temperate mainland climates.
- — For certain crops, special hybrids adapted to Hawai'i's subtropical climate are yet to be developed.
- — Crop pests are more prevalent and more expensive to control in Hawai'i than they are on the mainland where the cold winters kill many pests.
- — Fruit-fly infestations prevent exports of many crops, or require expensive treatment.
- — Most soils in Hawai'i have low nutrient levels and therefore require high expenditures for fertilizer.

1. In Figure 14, the temporary bump in diversified-crop acreage that occurred in the late 1990s reflects the fact that some former sugarcane fields were newly planted with grasses for future cattle grazing. After cattle grazing began in 2000, much of this acreage was recategorized from crop land to grazing land.

- — Hawai'i suffers from high farm-labor costs, largely because the agriculture industry must compete against the visitor industry and related industries for its labor.
- — Compared to many other farm areas that supply U.S. markets, the cost of shipping agricultural supplies and equipment to Hawai'i is high, as is the cost of exporting produce from Hawai'i to mainland markets. High shipping costs are due to Hawai'i's remote location and to Federal regulations that require use of American-built ships and U.S. crews between U.S. ports.
- — For a number of crops, consumption volumes in Hawai'i are too small to support large, efficient farms (i.e., the volumes are too small to realize economies of scale).
- — Trends towards crops that are certified as safe and towards a single supplier of many food items favor large farms.
- — Hawai'i farmers must compete against highly efficient mainland and foreign farms which, in a number of cases, can deliver produce to Hawai'i more cheaply than it can be produced locally. This is due to economies of scale and, in comparison to Hawai'i, low costs for land, labor, supplies, fertilizer, pest control, equipment, etc.

b. Statewide Availability of Land for Diversified Crops

Statewide, a vast amount of land has been released from plantation agriculture: about 249,900 acres between 1968 and 2004—an average decrease of over 6,940 acres per year over a 36-year period (see Figure 14).[7,23] The 2006 closure of Del Monte's pineapple plantation in Kunia, O'ahu increased this acreage by about 5,100 acres, resulting in a total release of at least 255,000 acres from plantation agriculture between 1968 and 2007.[24]

Over this same period, the demand for land for diversified crops increased by about 26,500 acres, or an average of about 740 acres per year. Since 1984, the growth has slowed to an average of 240 acres per year, as previously mentioned.

As the above indicates, the release of land from plantation agriculture has far outpaced the demand for land for diversified crops. The net decrease in crop land amounted to 223,400 acres, and will amount to 228,500 acres after adding the land fallowed by Del Monte. While some of the released land has been converted or is scheduled to be converted to urban uses and tree plantations, an estimated 160,000+ acres remain available for diversified crops.[22] Because of the increased availability of agricultural land, a number of landowners report lower per-acre land rents on O'ahu and the Neighbor Islands compared to rents that were charged before the major contraction of plantation agriculture.[21]

Once the Superferry begins operations in 2007, cultivating crops on the Neighbor Islands for the Honolulu market, and vice versa, will become more economically feasible. For a full load carried in a large pick-up truck, the one-way fare will be about 2¢ per pound.[25] This will increase the importance of the Statewide availability of agricultural land vis-a-vis the island-wide availability.

The above indicates that ample land is available in Hawai'i to accommodate the growth of diversified crops, whether demand is based on potential or recent trends. In other words, the limiting factor to the growth of diversified crops is *not* the *land supply*, but rather the *size of the market* for crops that can be grown *profitably* in Hawai'i.

c. Maui Island Availability of Land for Diversified Crops

The above findings also apply to Maui. Since 1977, the contraction and eventual closure of Wailuku Sugar Co. and Pioneer Mill released about 11,200 acres from sugarcane production. In addition, the contraction of pineapple operations released about 5,000 acres since 1993.

During the 1980s, about 4,700 acres of sugarcane land in Central Maui were made available for other uses. Some of this land was developed; some was planted in macadamia nuts which continued until 1999; some was planted in pineapple; some was transferred to Hawaiian Commercial & Sugar Co. (HC&S); and some remains fallow.

During the 1990s, the reduction in sugarcane acreage occurred in West Maui, including about 6,000+ acres released in 2000. Similarly, most of the recent reduction in pineapple acreage occurred in West Maui, including about 3,200 acres that were released in 2003. Some of this former plantation land in West Maui was developed and some was converted to other crops, but most of it remains fallow or is used for grazing cattle.

In summary, considerable land remains available on Maui for diversified agriculture, although most of it is in West Maui.

d. Potential Loss of Agricultural Land on Maui to Development[8,26-28]

Based on information provided by the Maui County Planning Department, Appendix A provides a summary of 202 major residential, resort, commercial, and industrial development projects on Maui Island that will (1) increase the number of residential and visitor units, or (2) involve agricultural land. The listing, which reflects known projects as of April 2006, excludes projects having fewer than six dwelling units, and subdivisions having fewer than four lots.

The projects are organized by District, entitlements, then alphabetically. Entitlements are defined as follows:

— Committed projects include (1) those having 201G approval, (2) those having Project District zoning, (3) Department of Hawaiian

Home Lands (DHHL) projects, (4) approved agricultural subdivisions, and (5) other projects for which the land is zoned for development.

— Designated projects include those having (1) urban Community Plan designation, and (2) Project District zoning but no Phase 2 approval.

— Proposed projects include those lacking urban Community Plan designations.

To the extent that information was provided and is relevant, the information on each project listed in Appendix A includes:

— its entitlements;

— the number of homes (single-family and multi-family homes), the number of visitor units (hotel rooms and time-share units), and the total number of units;

— its total area (if provided and needed only for projects that involve agricultural land), along with the average acreage per unit (i.e., the reciprocal of the density, which applies only to projects that have residential or visitor units); and

— the acreage that is within the State Agricultural District, along with an acreage adjustment (explained below).

If all of the committed, designated and proposed residential and resort projects on Maui Island were approved, built and sold, they would supply about 45,900 homes, including about 30,900 single-family homes and 15,000 multi-family homes (see the last page of Appendix A).

Economic projections prepared by the Maui County Planning Department (June 2006) for the Maui County General Plan 2030 forecast that the number of homes on Maui Island will increase from about 49,870 in 2005 to about 84,350 in 2030, resulting in an increase of about 34,480 homes over this 25-year period. Over time, the pace of development is expected to follow a linear trend, fluctuating above and below the average of about 1,380 new homes per year (34,480 homes ÷ 25 years). At the projected demand of about 1,380 new homes per year, the potential supply of homes listed in Appendix A could be absorbed in about 33 years (a total of 45,900 homes ÷ 1,380 homes per year).

Altogether, the projects listed in Appendix A would affect about 19,900 acres on Maui Island that are now in the State Agricultural District (see the last page of Appendix A). Although this accounting includes some agricultural subdivisions where most of the land will be lost to homes, it also includes other agricultural subdivisions where most of the land will remain available for agriculture. In practice, an estimated 11,800 acres in the Agricultural District would be lost to agriculture if all of these projects were approved and built (see the last page of Appendix A). This estimate is based on the assumption that agricul-

tural subdivisions having at least 2.5 acres per home will remain available for agriculture.

The estimated 11,800 acres of agricultural land includes prime agricultural land, low-quality land that is suitable for grazing but not farming, and gulch land. It represents less than 5% of the 244,600 acres on Maui Island that are in the State Agricultural District.

In summary, the eventual development over a period of about 33 years of all the committed, designated and proposed projects listed in Appendix A, including the loss of 210 acres for the Pu'unani Subdivision, would leave about 232,800 acres on Maui Island available for agricultural use (244,600 acres – 11,800 acres).

e. Cumulative Impact on the Growth of Diversified Crop Farming

The Project will commit about 210 acres of good agricultural land to a non-agricultural use. If this land were used to grow a typical vegetable or fruit crop, then it could support about 26 farm jobs (based on about 12.5 jobs per 100 acres). In practice, the agricultural land in the Project Area has already been removed from the inventory of farm land due the existing and planned urban uses surrounding the Project Area.

Furthermore, development on this agricultural land—combined with other developments in Hawai'i and on Maui Island—involves the loss of too little agricultural land to significantly affect (1) the availability of land to farmers in Hawai'i, (2) agricultural land rents, (3) the growth of diversified crops, or (4) potential agricultural employment. This conclusion is based on the finding that, as a result of the contraction of plantation agriculture, ample land is available for diversified crops, with the available supply far exceeding likely or potential demand.

However, in Central Maui, the Project might adversely affect the growth of diversified agriculture somewhat since the market for agricultural land is tighter there than it is in most other areas of the State.

f. Mitigating Measures

In view of the small impact of the Project on the growth of diversified agriculture, mitigation measures for the loss of agricultural land are not recommended.

11. OFFSETTING BENEFITS

The loss of 210 acres of good agricultural land will be offset by the following benefits of the Project:

— 550 new homes;

— a 14.6-acre park;

— jobs supported by development activity, including (1) direct construction jobs and other jobs involved with development, and (2) indirect jobs supported by purchases of goods and services by construction companies and their employees;

— jobs supported by purchases of goods and services by those living in Project Area homes; and

— tax revenues (excise taxes, personal income taxes, corporate income taxes, property taxes, etc.) paid by (1) companies and employees directly and indirectly supported by development activities, (2) residents living in Project Area homes, and (3) companies and employees directly and indirectly supported by purchases of goods and services by those living in Project Area homes.

12. CONSISTENCY WITH STATE AND COUNTY POLICIES[29]

a. Availability of Lands for Agriculture

The *Hawai'i State Constitution*, the *Hawai'i State Plan*, the *State Agriculture Functional Plan*, the *County of Maui General Plan 1990*, and the County's *Wailuku-Kahului Community Plan* call directly or implicitly for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured.

With regard to plantation agriculture, the Project Area is no longer part of a sugarcane or pineapple plantation.

With regard to diversified agriculture, the Project will reduce the availability of agricultural land by a relatively small amount. However, the Project will not limit the Statewide growth of diversified agriculture since ample agricultural land is available. This is due to the enormous supply of agricultural land that is now available as a result of the contraction of plantation agriculture (see Figure 14). But the growth of diversified agriculture might be limited in Central Maui due to the tighter agricultural land market.

b. Conservation of Agricultural Lands

In addition to the above, State and County policies call for conserving and protecting prime agricultural lands, including protecting agricultural lands from urban development.

However, these policies—many of which were written before the major contraction of plantation agriculture in the 1990s—assume implicitly that profitable agricultural activities will be available to utilize these agricultural lands. This has proven to be a questionable assumption in view of the enormity of the con-

traction of plantation agriculture, the abundant supply of land that came available for diversified agriculture, and the slow growth in the amount of land being utilized for diversified agriculture (see Section 10 and Figure 14).

Furthermore, discussions in the Agriculture portion of the *State Functional Plan* recognize that redesignation of lands from Agricultural to Urban should be allowed "... upon a demonstrated change in economic or social conditions, and where the requested redesignation will provide greater benefits to the general public than its retention in ...agriculture;" that is, when an "overriding public interest exists."[30] The enormous contraction in plantation agriculture, resulting in the supply of agricultural land far exceeding demand, constitutes a major change in economic conditions. Moreover, development of the Project will provide community benefits (homes, a park, jobs, and tax revenues) that far exceed that which could be provided by diversified agriculture (about 26 jobs). In practice, however, development of the Project will not result in a loss of existing or potential Statewide agricultural employment given that the Project Area is fallow and crop land is available elsewhere.

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[14] Decision Analysts Hawai'i, Inc. "State Lands at Kalepa, Kaua'i: Assessment of Agricultural Potential and Recommendations." Prepared for the Department of Land and Natural Resources. Honolulu, Hawai'i. February 2002.

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[26] Maui County Planning Department. Data on planned and proposed projects. 2006.

[27] Maui County Planning Department. Socio-Economic Forecast: *The Economic Projections for the Maui County General Plan 2030.* June 2006.

[28] Appendix A. Maui Island Development Projects: April 2006.

[29] Appendix B. "Selected State and County Goals, Objectives, Policies and Guidelines Related to Agricultural Lands."

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FIGURES

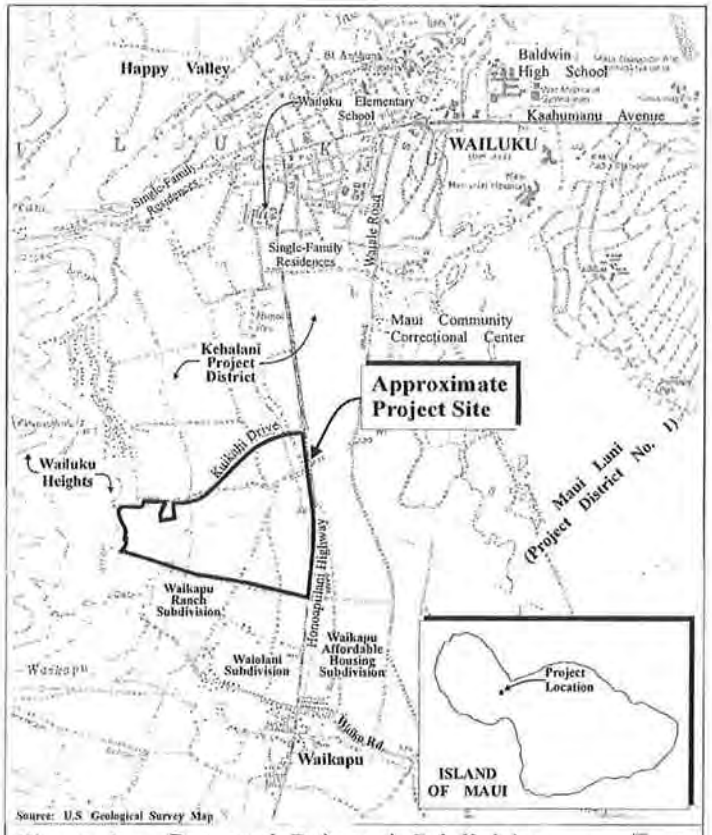
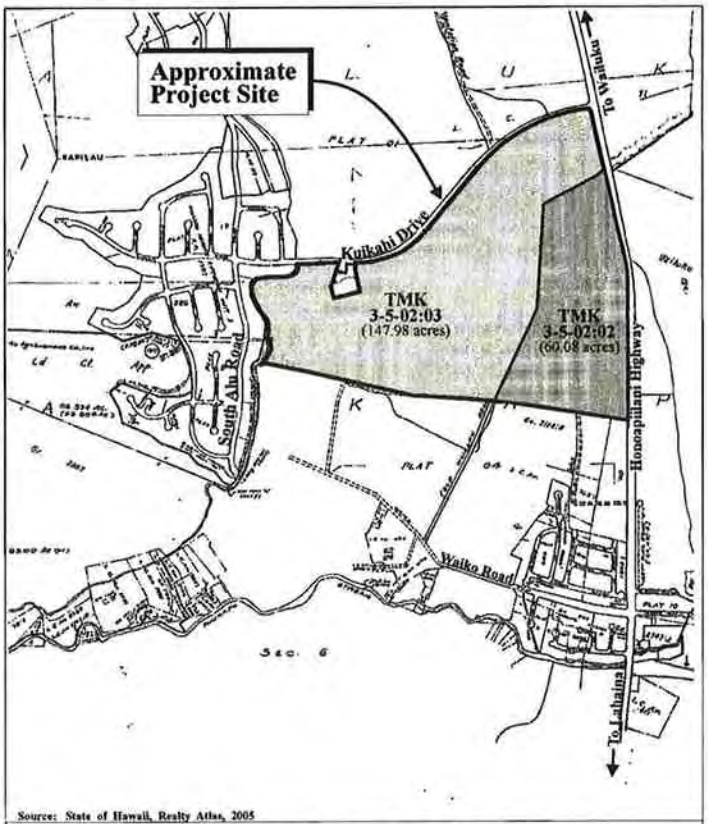


Figure 1 Proposed Pu`unani Subdivision
Regional Location Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

HUNEMOYD & HIRAGA, INC.



Source: State of Hawaii, Realty Atlas, 2005

Figure 2 Proposed Pu`unani Subdivision
Tax Parcel Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Il Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

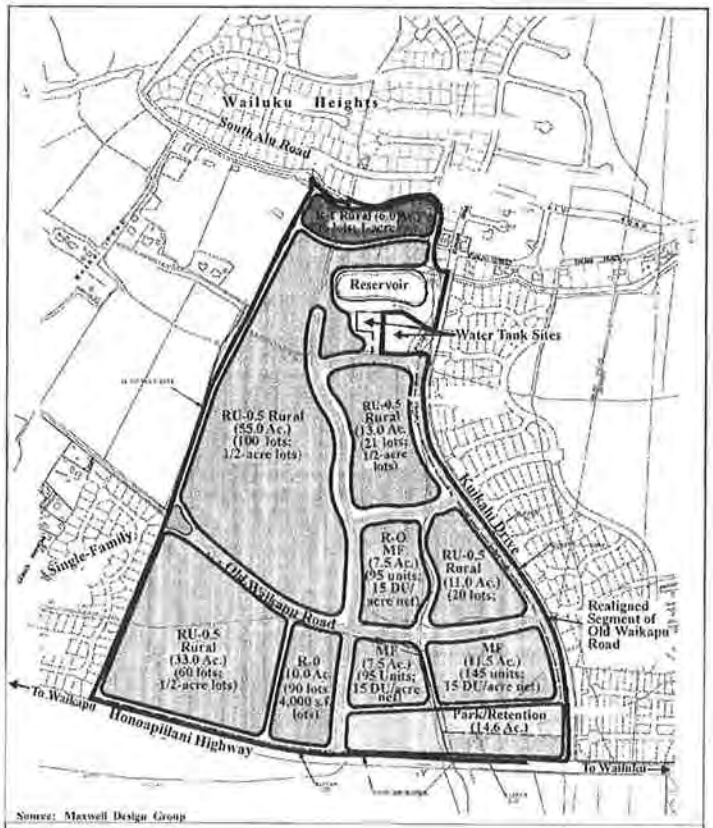
Source: Endurance Investors, LLC/Association of Il Wai Hui, LP

Figure 3 Proposed Pu`unani Subdivision
Aerial Photograph of Property

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Il Wai Hui, LP

MUNEKIYO & HIRAGA, INC.



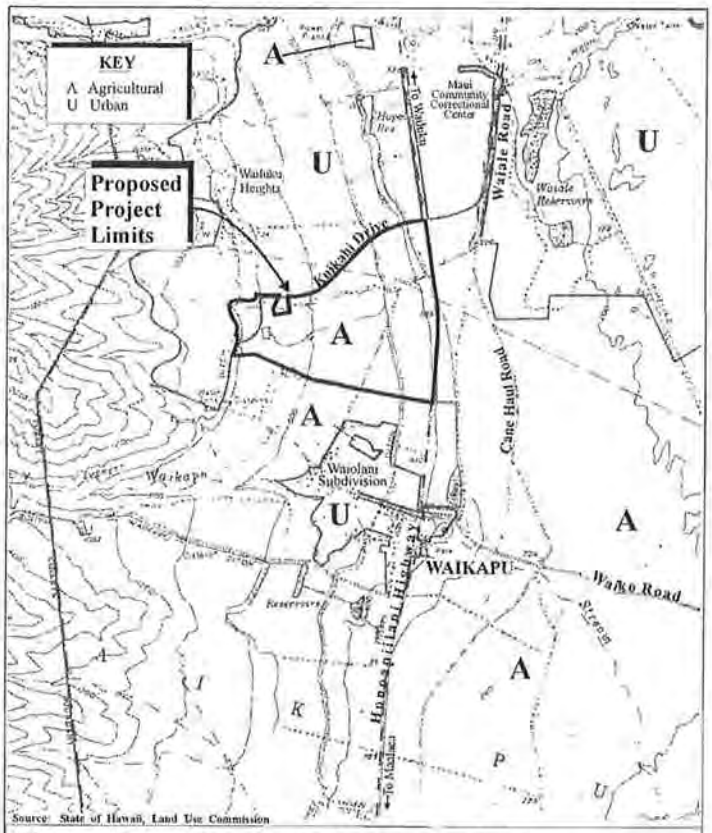
Source: Maxwell Design Group

Figure 4 Proposed Pu`unani Subdivision
Conceptual Land Use Map

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

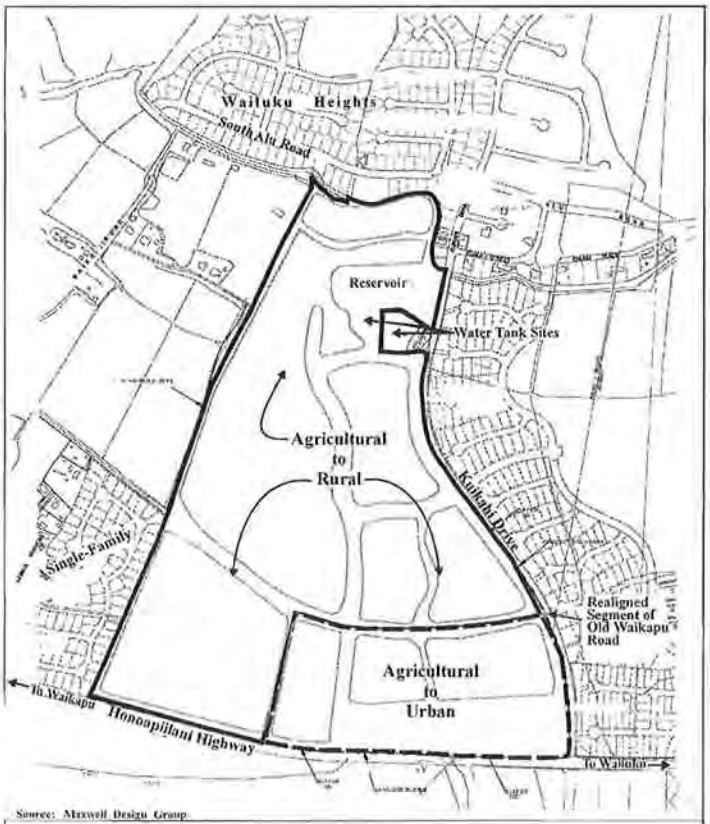


Source: State of Hawaii, Land Use Commission

Figure 5 Proposed Pu`unani Subdivision
Existing State Land Use Classifications

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

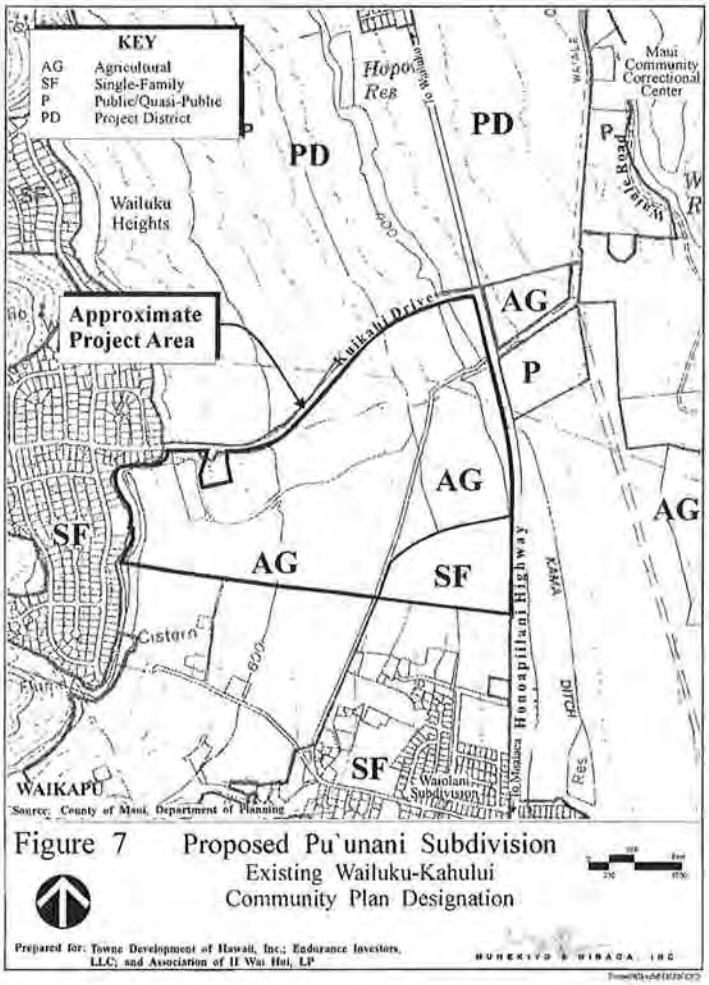


Source: Maxwell Design Group

Figure 6 Proposed Pu`unani Subdivision
Proposed State Land Use Designations

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP



Source: County of Maui, Department of Planning

Figure 7 Proposed Pu`unani Subdivision
Existing Wailuku-Kahului
Community Plan Designation

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

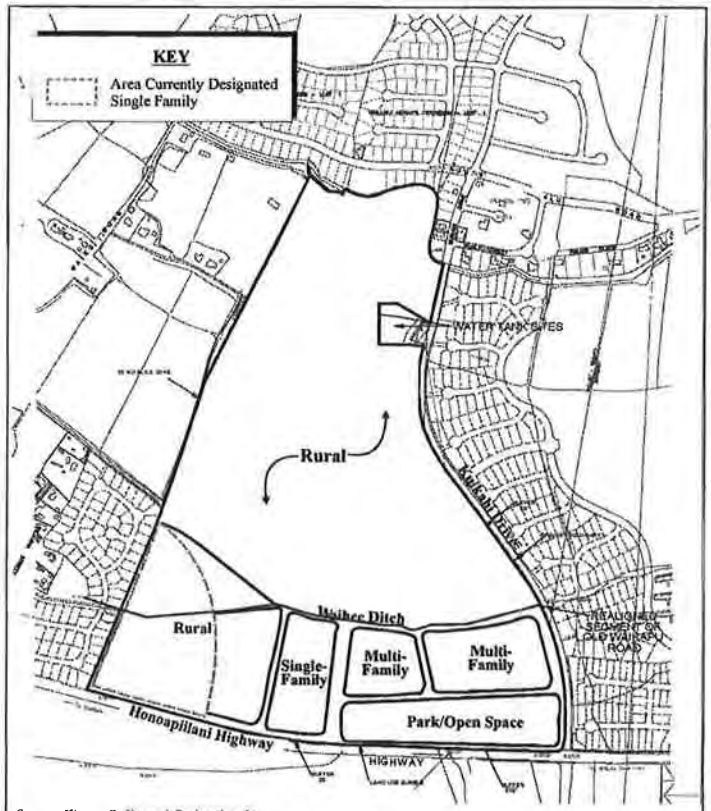


Figure 8 Proposed Pu`unani Subdivision
Proposed Community Plan Map Amendment

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Ii Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

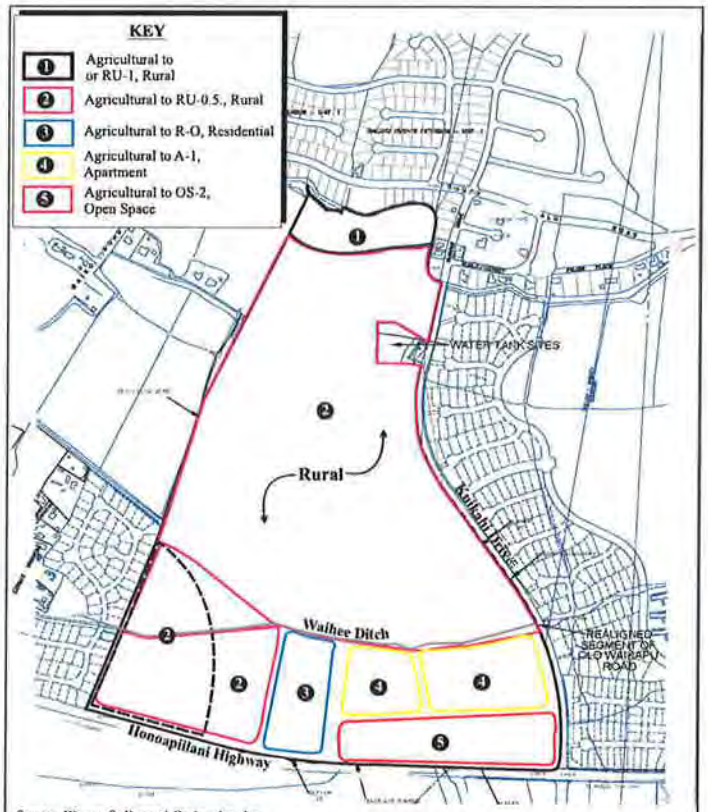


Figure 9 Proposed Pu`unani Subdivision
County Zoning Changes

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Ii Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

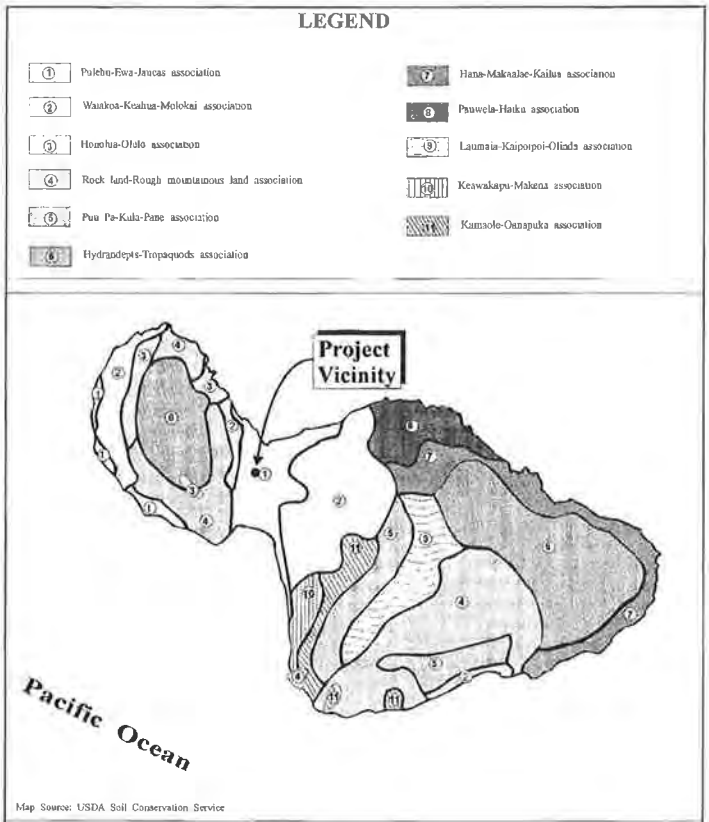


Figure 10 Proposed Pu`unani Subdivision NOT TO SCALE
Soil Association Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and H Wai Hui, LLC

MUNEKIYO & HIRAGA, INC.

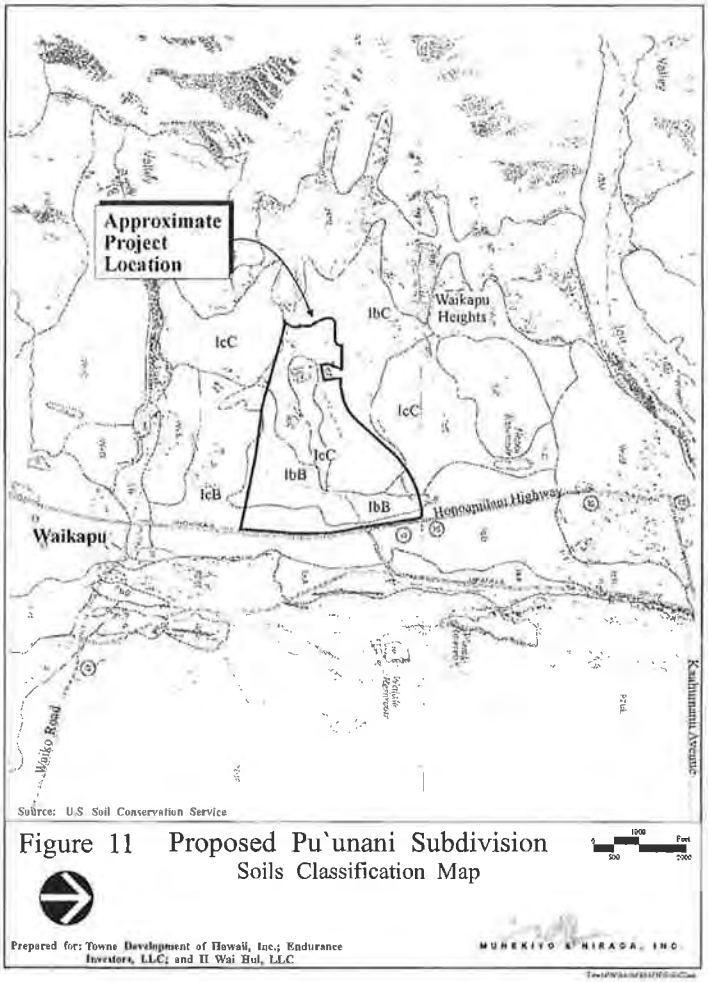


Figure 11 Proposed Pu`unani Subdivision
Soils Classification Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and H Wai Hui, LLC

MUNEKIYO & HIRAGA, INC.

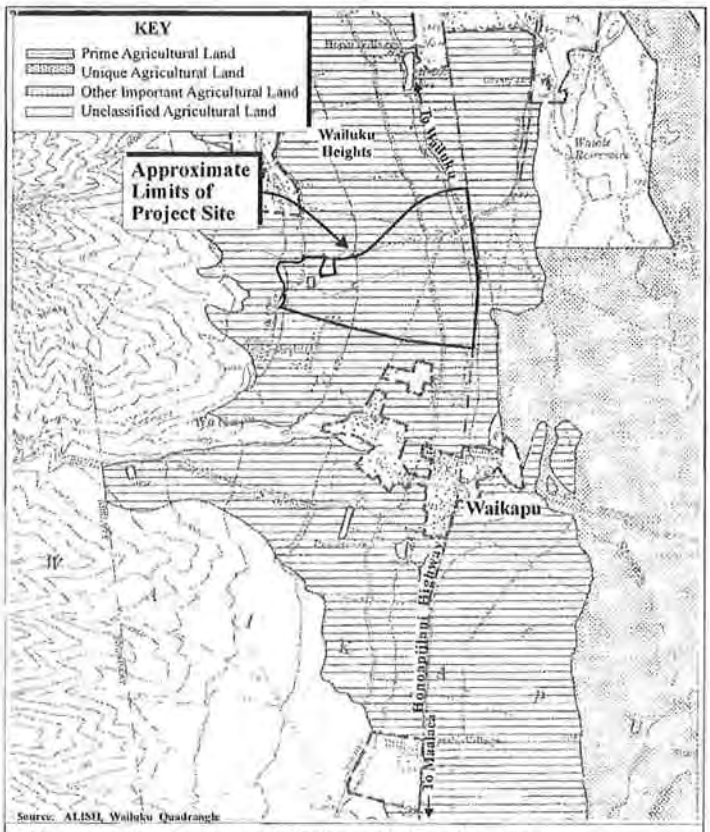


Figure 12 Proposed Pu`unani Subdivision
Agricultural Lands of Importance to the State of Hawaii

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and II Wai Hui, LLC

MUNEKIYO & HIRAGA, INC.

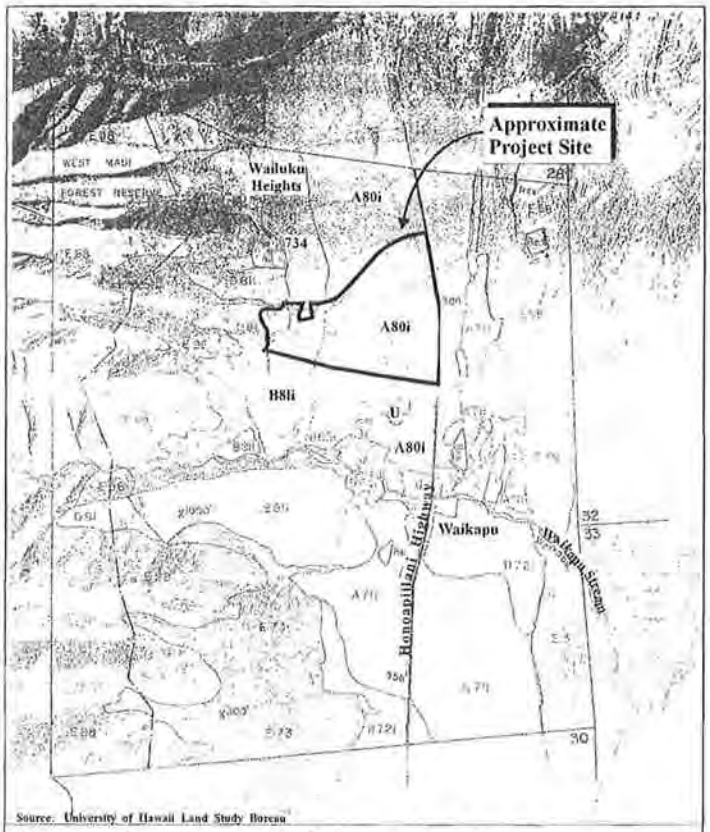


Figure 13 Proposed Pu`unani Subdivision NOT TO SCALE
Productivity Classification Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

Figure 14 - Statewide Acreage in Crop: 1960 to 2004

Appendix A. Maui Island Development Projects: April 2006

Project Location and Name	Entitlements	Homes or Units				Project Area		State Ag District	
		Single-family Homes	Multi-family Homes	Hotel & Time-share Units	Total	Total Project (acres)	Acres per Unit	Total (acres)	Adjusted (acres)
West Maui									
Honokowai DHHL	Committed	1,250			1,250	780	0.62	780	780
Honolua Ridge Ph 1&2	Committed	50			50	441	8.82	439	
Intrawest Honua Kai (North Beach Lot 4)	Committed		700		700	n.e.	n.e.		
Ka'anapali Coffee Farms	Committed	58			58	336	5.79	336	
Kaanapali Residences - Landtech Parcel 10-H	Committed	18			18	n.e.	n.e.	-	
Kahana Ridge Villas	Committed		117		117	n.e.	n.e.	-	
Kapalua Bay	Committed			155	155	n.e.	n.e.	-	
Kapalua Mauka Master Plan: PD 2	Committed	690			690	1,085	1.57	1,085	1,085
Kapalua - Master Plan PD 1	Committed	900		1,050	1,950	249	0.13	-	
Kapalua Mauka Residential	Committed	690			690	n.e.	n.e.	-	
Kapua Village ML&P employees	Committed	45			45	n.e.	n.e.	-	
Laipoa Point Homesites	Committed	40			40	n.e.	n.e.	-	
Launupoko: Mahanalua Nui 1	Committed	131			131	438	3.34	438	
Lokahi Kuhua	Committed	12			12	n.e.	n.e.	-	
Mahanalua Nui Ph 5	Committed	9			9	n.e.	n.e.	-	
Makila Plantation: Ph 1 & 2	Committed	52			52	465	8.94	465	
Makila Ridge - Large Lots	Committed	11			11	458	41.64	458	
Marriott Maui Ocean Club - Sequel Towers	Committed			148	148	n.e.	n.e.	-	
Na Hale O Wainee Ph 2	Committed		26		26	5	0.19	5	5
Napili Kahuna (Ka Noe Subdiv)	Committed	10			10	n.e.	n.e.	-	
North Beach - Starwood (Lot 2)	Committed			516	516	n.e.	n.e.	-	
North Beach - Weston (Lot 1)	Committed			399	399	n.e.	n.e.	-	
Plantation Inn	Committed			14	14	n.e.	n.e.	-	
Pu'unoa Ph 1 & 2	Committed	24			24	168	7.00	168	
Royal Lahaina Resort revitalization	Committed			455	455	n.e.	n.e.	-	
Sunstone	Committed	5			5	n.e.	n.e.	-	
Ukumehame Homes Ph 1 2+Ohanas	Committed	46			46	280	6.09	280	
Ukumehame Park	Committed				-	111	n.a.	111	111
Villages of Leiali'i Ph 1A	Committed	104			104	n.e.	n.e.	-	
Villages of Leiali'i Ph 1B	Committed	253			253	99	0.39	-	
West Maui Breakers 1	Committed		90		90	n.e.	n.e.	-	
Hyatt Regency Maui Timeshare Project	Proposed			806	806	n.e.	n.e.		
Ka anapali 2020 - Residences	Proposed	1,257	1,553		2,810	2,004	0.71	1,695	1,695
Kahoma Employee Housing	Proposed	60	12		72	17	0.24	17	17
Kahoma - Lots	Proposed	53			53	876	16.53	874	
Kamehameha Schools Ku'ia Residential Infill	Proposed	900			900	211	0.23	211	211
Lipoa Point Homes	Proposed	25			25	247	9.88	244	
Makila Farms - Large Lots	Proposed	38			38	1,292	34.00	1,291	
Napili Mauka Residences	Proposed	10			10	n.e.	n.e.	-	
Olowalu Mauka & Makai Plan - Master	Proposed	1,500			1,500	631	0.42	609	609
Pineapple Ridge	Proposed	24			24	9	0.38	-	
Puiehua: Master, Proposed PD	Proposed	533	349		882	309	0.35	309	309
Villages of Leiali'i - Master	Proposed	2,006	2,840		4,846	n.e.	n.e.	-	
Wainee Villages	Proposed	401	464		865	193	0.22	184	184
Total West Maui		11,205	6,151	3,543	20,899	10,704		9,999	5,006

Appendix A. Maui Island Development Projects: April 2006

Project Location and Name	Entitlements	Homes or Units				Project Area		State Ag District	
		Single-family Homes	Multi-family Homes	Hotel & Time-share Units	Total	Total Project (acres)	Acres per Unit	Total (acres)	Adjusted (acres)
North Maui									
Kahui Pono Subdivision III	Committed	3			3	4	1.33	4	4
Krauss Subdivision	Committed	4			4	9	2.25	9	9
Mahiko Bay Homes	Committed	8			8	45	5.63	45	
Mahiko Ranch - Lots	Committed	3			3	10	3.33	10	
Masaaki Doi Subdivision	Committed	3			3	36	12.00	33	
Pe'ahi Farms at Opana Point	Committed	16			16	270	16.88	270	
Pe'ahi Hui Lands	Committed	3			3	1	0.33	1	1
Puu o Malee Rural Subdivision	Committed	3			3	n.e.	n.e.	-	
Ross Subdivision	Committed	5			5	11	2.20	11	11
Wagner Subdivision	Committed	3			3	5	1.67	5	5
Pwe School Community: Project District 1	Designated	330			330	n.e.	n.e.	-	
Kuau Residential A&B	Proposed	140			140	67	0.48	-	
Total North Maui		521	-	-	521	458		388	30
Central Maui									
Central Maui Landfill Phase IV	Committed				-	29	n.a.	29	29
Consolidated Baseyards	Committed				-	21	n.a.	21	21
E Paepae Ka Puikoa Sprackelsville	Committed	16			16	45	2.81	-	
Hale Kapili Project	Committed		4		4	n.e.	n.e.	-	
Iao Valley Large Lot Subdivision	Committed	7			7	n.e.	n.e.	-	
Kahului Town Center Redevelopment	Committed		302		302	n.e.	n.e.	-	
Kane Street Condos and Shops	Committed		90		90	n.e.	n.e.	-	
Kehalani Master Plan Project District 3	Committed	1,403	829		2,232	n.e.	n.e.	-	
Lokenani Hale: Sr. Affordable Housing	Committed		62		62	n.e.	n.e.	-	
Malaihi Ag Subdivision	Committed	10			10	72	7.20	69	
Malaihi Mauka Ag Subdivision	Committed	2			2	n.e.	n.e.	-	
Marriott Courtyard Hotel Kahalua Airport	Committed			140	140	n.e.	n.e.	-	
Maui Lani Master Plan PD 1	Committed	3,163	502		3,665	1,085	0.30	76	76
Maui Student Housing	Committed		400		400	n.e.	n.e.	-	
Piihana - Project District 2	Committed	95	440		535	73	0.14	5	5
Waiehu Aina	Committed	17			17	279	16.41	261	
Waiehu Kou - Phase 3	Committed	115			115	42	0.37	20	20
Waihee Mauka Ag Subdivision	Committed	16			16	113	7.06	113	
Waihee Valley Large Lot Subdivision	Committed	24			24	373	15.54	373	
Waikapu Gardens	Committed	410			410	95	0.23	95	95
Waiko Mauka Ag Subdivision	Committed	2			2	22	11.00	22	
Wailuku Country Estates	Committed	184			184	452	2.46	449	449
Waiolani - Elua	Committed	37			37	n.e.	n.e.	-	
Waiolani - Mauka	Committed	104			104	n.e.	n.e.	-	
Winn 4lot	Committed	4			4	152	38.00	152	
Waiehu Kou - Phase 4	Committed	96			96	n.e.	n.e.	-	
Waiolani - Pakalu	Committed	38			38	n.e.	n.e.	-	
Hale Hoomanu - Mental Health Kokua	Designated		6		6	n.e.	n.e.	-	
Hale Mua	Designated	466			466	234	0.50	227	227

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		Single-family Homes	Multi-family Homes	Hotel & Time-share Units	Total	Total Project (acres)	Acres per Unit	Total (acres)	Adjusted (acres)
Maui Business Park Phase II	Designated				-	245	n a	232	232
Maui Expo Systems (Eko Systems)	Designated				-	58	n a	58	58
Meo B E S T House	Designated		12		12	n e	n e	-	
Betsill Bros Mixed Use	Proposed		5		5	n e.	n e	-	
Central Maui Senior Housing	Proposed		40		40	n e	n e	-	
Free Church of Tonga	Proposed				-	9	n a	9	9
Kaiuchi Residential at Wai`ale	Proposed	500			500	154	0.31	154	154
Na Mala O Waihee Homes	Proposed	35			35	11	0 31	11	11
Pu unani	Proposed	310	240		550	210	0 38	210	210
Spreckelsville Mauka A&B	Proposed	380			380	228	0 60	228	228
Wai`ale	Proposed	1,065	2 715		3,780	847	0 22	846	846
Waikapu Mauka Towne	Proposed	190	190		380	n e	n e	-	
Total Central Maui		8,689	5,837	140	14,666	4,849		3,660	2,670
South Maui									
Ale Village Subdiv	Committed	27			27	n e	n e	-	
Aloha Village	Committed		78		78	n e	n e	-	
Ameron Hawaii	Committed				-	2	n a	2	2
Central Maui Baseyard	Committed				-	451	n a	-	
Chambers Apartments	Committed		18		18	n e	n e	-	
Club World Mark Kihei	Committed			200	200	n e	n e	-	
Cove Beach Villas	Committed		32		32	n e	n e	-	
Hale Mahaolu Ehiku 1 Phase 1	Committed		54		54	n e	n e	-	
Hale Mahaolu Ehiku 2: Phase 2	Committed		58		58	n e	n e	-	
Hokulani Golf Villas	Committed	182	58		240	n e	n e	-	
Honu Ala Hele	Committed	62			62	n e	n e	-	
Hoohana Subdivision	Committed	28			28	n e	n e	-	
Hoolei Wailea MF-9	Committed		120		120	n e	n e	-	
Ilikai Condos	Committed		4		4	n e	n e	-	
Kai Ani Village MF Residential Project	Committed		99		99	n e	n e	-	
Kai Makani	Committed		112		112	n e	n e	-	
Kai Malu Wailea Master	Committed		150		150	n e	n e	-	
Kalama Heights: Phase 2	Committed		80		80	n e	n e	-	
Kalama Hills	Committed	12			12	n e	n e	-	
Kamali`alayna Estates (Waipuilani Estates)	Committed	92			92	n e	n e	-	
Kanani Wailea	Committed	38			38	n e	n e	-	
Ke Alii Homes	Committed	96			96	n e	n e	-	
Ke Alii Ocean Villas	Committed	14	144		158	n e	n e	-	
Kenolio Leilani Sub	Committed	7			7	n e	n e	-	
Kenolio Place	Committed	12			12	n e	n e	-	
Kihei Hanalei Condominiums	Committed		4		4	n e	n e	-	
Kihei Kauhale	Committed	26			26	n e	n e	-	
Kiohana: Hema	Committed	31			31	n e	n e	-	
Landry Apts	Committed		18		18	n e	n e	-	
Liloa Village Subdivision	Committed	65			65	n e	n e	-	

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Project Location and Name	Entitlements	Homes or Units				Project Area		State Ag District	
		Single-family Homes	Multi-family Homes	Hotel & Time-share Units	Total	Total Project (acres)	Acres per Unit	Total (acres)	Adjusted (acres)
Maluhia at Wailea Condos	Committed		15		15	n e	n e	-	
Maui Lu Timeshare	Committed		388	400	788	n e	n e	-	
Maui Research & Tech Park _Project District 6	Committed				-	387	n a	234	234
MF21 Subdivision _PD 8	Committed	7			7	22	3 14	22	
Moana Estates	Committed	90			90	n e	n e	-	
One Palauea Bay: PD 8	Committed	17			17	n e	n e	-	
One Wailea Dev	Committed	20			20	n e	n e	-	
Oslerslock Subdivision 7 lot	Committed	7			7	n e	n e	-	
Papaanui Lots	Committed	16			16	5	0 31	3	3
Papaanui Subdivision	Committed	8			8	n e	n e	-	
Paradise Ridge Estates	Committed		32		32	n e	n e	-	
Wailea Beach Villas	Committed		105		105	n e	n e	-	
Wailea MF-10	Committed		144		144	n e	n e	-	
Wailea MF-10 Subdivision	Committed		9		9	n e	n e	-	
Wailea MF-11	Committed	12			12	n e	n e	-	
Wailea Villas (MF-4) (Papa'i)	Committed	25			25	n e	n e	-	
Garcia Makena Residences	Designated	10			10	5	0 50	5	5
Hale Pama Condos	Designated		6		6	n e	n e	-	
Kiohana: Mauka	Designated	73			73	n e	n e	-	
Kilohana Waena	Designated	31			31	n e	n e	-	
Ma'alaea Mauka Residential _Project District 12	Designated	1 150			1,150	257	0 22	257	257
Ma'alaea Village A&B _Project District 11	Designated	2 000			2,000	805	0 40	765	765
Pu'unene Airstrip _Project District 10	Designated				-	558	n a	558	558
Wailea 670 (Honua`ula) _Project District 9	Designated	1,400			1,400	584	0 42	584	584
Ka Ono Ulu _Industrial Park	Proposed				-	96	n a	96	96
Kalani Condos Makena	Proposed		4		4	1	0 25	1	1
Kamaole Heights	Proposed		98	24	122	n e	n e	-	
Kihei Kaiwahine Res A&B	Proposed	600			600	114	0 19	114	114
Makena Resort Hotel & Condos	Proposed		1,105	545	1,650	718	0 44	31	31
Total South Maui		6,158	2,935	1,169	10,262	4,008		2,672	2,650
Upcountry Maui									
A L & P Phillips Subdivision	Committed	3			3	11	3 67	11	
Abner Delima Subdivision	Committed	3			3	6	2 00	6	6
Bayong Subdivision	Committed	3			3	8	2 67	8	
Blackburn Subdivision	Committed	5			5	n e	n e	-	
Cameron Kaluanui Subdivision	Committed	3			3	n e	n e.	-	
DeRego Subdivision	Committed	7			7	59	8 43	59	
Emihwon Estates Subdivision	Committed	7			7	40	5.71	40	
Freitas Subdivision	Committed	4			4	3	0 75	-	
Haleakala Homesteads 1 & 2	Committed	15			15	81	5 40	67	
Hali imaile _Residential	Committed	148			148	69	0 47	8	8
Jacaranda Hill	Committed	3			3	2	0 67	2	2
Joan Feiteira Subdivison	Committed	3			3	24	8 00	24	
Kealahou 1 & 2 Homesteads	Committed	7			7	16	2 29	7	7

Project Location and Name	Entitlements	Homes or Units: Single-family Homes	Multi-family Homes	Hotel & Time-share Units	Total	Project Area: Total Project (acres)	Acres per Unit	State Ag District: Total (acres)	Adjusted (acres)
Keokea/Waiohuli Subdivision DHHL	Committed	406			406	445	1.10	445	445
Kulamalu: Mauka Res	Committed	14			14	n.e.	n.e.	-	
Kulamanu Estates: Phase 1	Committed	40			40	n.e.	n.e.	-	
Kulamanu Estates: Phase 2 Jacaranda Grove	Committed	13			13	n.e.	n.e.	-	
Kulumanu Ridge Ridge at Kulumanu	Committed	57			57	n.e.	n.e.	-	
Maha Village Subdivision	Committed	24			24	n.e.	n.e.	-	
Mary Decambra Subdivision	Committed	3			3	n.e.	n.e.	-	
MauiWikoi Subdivision	Committed	3			3	7	2.33	7	7
Piiholo Farms Subd	Committed	10			10	23	2.30	23	23
Slice Subdivision	Committed	3			3	n.e.	n.e.	-	
Waiohuli Hikina Subdivision (Kula Res 1-2) DHHL	Committed	36			36	261	7.25	261	
Waiohuli Lot 134 (Kula Res 1-2) DHHL	Committed	4			4	200	50.00	200	
Waiohuli Uka Subdivision (Kula Res 1-2) DHHL	Committed	56			56	192	3.43	192	
Wilfred "Hoopai" Phillips Subd	Committed	3			3	2	0.67	2	2
Barlo Project Crook Estate Project District 3	Designated		64		64	n.e.	n.e.	-	
Kauhale Lani: _Pukalani Makai	Designated	155			155	81	0.52	81	81
Kula Lodge Project District 1	Designated			15	15	n.e.	n.e.	-	
Silversword Inn: Project District 2	Designated			12	12	n.e.	n.e.	-	
Hali imaile Expansion _A&B400	Proposed	1,200			1,200	353	0.29	351	351
Hali imaile Expansion _ML&P348	Proposed	1,500			1,500	441	0.29	421	421
Ka Ono Ulu Lots	Proposed	2			2	3	1.50	-	
Kualono by Hanohano	Proposed	49			49	14	0.29	14	14
Kula Ridge Affordable Housing Subdivision	Proposed	116			116	48	0.41	48	36
Kula Senior Housing	Proposed		36		36	n.e.	n.e.	-	
Total Upcountry Maui		3,905	100	27	4,032	2,389		2,297	1,403
East Maui									
Hamoa Beach Subdivision	Committed	3			3	2	0.67	1	1
Hana Com. Health Ctr Exp	Committed		20		20	n.e.	n.a.	-	
Hana Ranch Affordable Housing	Committed	288			288	38	0.13	38	38
Hana Ranch Store	Committed				-	39	n.a.	3	3
Hana Substation Subdivision	Committed	3			3	25	8.33	20	
Honomaele Subdivision	Committed	8			8	42	5.25	42	
Waiku Hana Homes DHHL	Committed	102			102	724	7.10	724	
Garden of Eden Arboretum	Proposed	3			3	30	10.00	30	
Hana Gardens 2 Self Help Housing Corp	Proposed	14			14	6	0.43	6	6
Total East Maui		421	20	-	441	906		864	48
TOTAL MAUI ISLAND		30,899	15,043	4,879	50,821	23,314		19,880	11,807

n.e. not estimated (i.e., acreages were not estimated for projects that do not involve agricultural land)
n.a. not applicable (i.e., units per acre were not calculated for industrial and commercial projects)
Source: Maui County Planning Department, 2006

APPENDIX B:
SELECTED STATE AND MAUI COUNTY GOALS, OBJECTIVES, POLICIES, AND GUIDELINES RELATED TO AGRICULTURAL LANDS

1. **HAWAI'I STATE CONSTITUTION** (Article XI, Section 3):

   ...to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands...

2. **HAWAI'I STATE PLAN** (Chapter 226, Hawaii Revised Statutes, as amended):[1,2]

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

   (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:

   (1) Viability in Hawaii's sugar and pineapple industries.

   (2) Growth and development of diversified agriculture throughout the State.

   (3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.

   (b) To achieve the agricultural objectives, it shall be the policy of the State to:

   (2) Encourage agriculture by making best use of natural resources.

   (10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.

   (16) Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.

   Section 226-103 Economic priority guidelines.

   (c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:

   (1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.

(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:

(1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.

(10) Support the continuation of land currently in use for diversified agriculture.

Section 226-104 Population growth and land resources priority guidelines.

(b) Priority guidelines for regional growth distribution and land resource utilization:

(2) Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

Section 226-106 Affordable Housing

Priority guidelines for the provision of affordable housing:

(1) Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.

3. AGRICULTURAL STATE FUNCTIONAL PLAN (1991)[3]

(Functional plans are guidelines for implementing the State Plan. They are approved by the Governor, but not adopted by the State Legislature.)

Objective H: Achievement of Productive Agricultural Use of Lands Most Suitable and Needed for Agriculture.

Policy H(2): Conserve and protect important agricultural lands in accordance with the Hawaii State Constitution.

Action H(2)(a): Propose enactment of standards and criteria to identify, conserve, and protect important agricultural lands and lands in agricultural use.

Action H(2)(c): Administer land use district boundary amendments, permitted land uses, infrastructure standards, and other planning and regulatory functions on important agricultural lands and lands in agricultural use, so as to ensure the availability of agriculturally suitable lands and promote diversified agriculture.

4. COUNTY OF MAUI GENERAL PLAN 1990[4]

Theme No. 1: PROTECT MAUI COUNTY'S AGRICULTURAL LAND AND RURAL IDENTITY

Amendments to the General Plan will preserve agricultural lands for the continuing pursuits of both land intensive and labor intensive agricultural pursuits. This action will also achieve preservation of an open space resource.

I. POPULATION, LAND USE, THE ENVIRONMENT AND CULTURAL RESOURCES

B. LAND USE

Objective

3. To preserve lands that are well suited for agricultural pursuits.

Policies

a. Protect prime agricultural lands from competing nonagricultural land uses.

b. Promote the use of agricultural lands for diversified agricultural pursuits by providing public incentives and encouraging private initiative.

c. Support the right to farm consistent with the identification of productive agricultural lands.

d. Discourage the conversion, through zoning or other means, of productive or potentially productive agricultural lands to nonagricultural uses, including but not limited to golf courses and residential subdivisions.

e. Provide adequate irrigation water and access to agricultural lands.

II. ECONOMIC ACTIVITY

C. AGRICULTURE

Objective

1. To foster growth and diversification of agriculture and aquaculture throughout Maui County.

Policies

a. Support programs to maintain the viability of the sugar and pineapple industry.

b. Support and promote programs to maintain the viability of diversified agriculture, specialty crops, forestry and aquaculture.

Objective

2. To maximize the use and yield of productive agricultural land throughout the County.

Policies

a. Ensure the availability of land that is well suited for agricultural production.

b. Encourage the development of agricultural parks throughout Maui County.

f. Support "right-to-farm" provisions in the event potential conflicts arise from adjacent residential uses.

g. Discourage establishment of pseudo-agricultural subdivisions.

5. COUNTY OF MAUI, WAILUKU-KAHULUI COMMUNITY PLAN (2002)[5]

B. Intended Effects of the Wailuku-Kahului Community Plan

... The plan seeks to balance future growth and development in a manner reflective of the urban/agricultural character of the region. ... the protection of agricultural lands is an inherent part of the plan.

C. Goals, Objectives, Policies and Implementing Actions

ECONOMIC ACTIVITY

Goal

A stable and viable economy that provides opportunities for growth and diversification to meet long-term community and regional needs and in a manner that promotes agricultural activity and preserves agricultural lands and open space resources.

Objectives and policies

1. Support agricultural production so agriculture can continue to provide employment and contribute to the region's economic well-being.

9. Support the establishment of agricultural parks for truck farming, piggery operations, bee keeping and other diversified agricultural operations within larger unsubdivided agricultural parcels and in locations that are compatible with residential uses.

ENVIRONMENT

Objectives and policies

1. Preserve agricultural lands as a major element of the open space setting that which borders the various communities within the planning region ...

HOUSING

Objectives and policies

3. Seek alternative residential growth areas within the planning region, with high priority given to the Wailuku and Kahului areas. This action

should recognize that crucial issues of maintaining important agricultural lands ...

LAND USE

Objectives and policies

1. Ensure that adequate lands are available to support the region's present and future agricultural activities.

2. Identify prime or productive agricultural lands, and develop appropriate regulations for their protection.

3. The direct and cumulative impacts of agricultural subdivisions and the impacts on the community shall be assessed and considered.

4. Establish administrative procedures and standards ... to ensure that agricultural subdivisions shall not be approved unless their uses are expressly permitted by Chapter 205, Hawaii Revised Statutes.

5. Encourage traditional Hawaiian agriculture, such as taro cultivation, within the agricultural district, in areas which have been historically associated with this cultural practice.

6. REFERENCES

[1] State of Hawaii, Office of State Planning, Office of the Governor. *The Hawaii State Plan, 1991*. Honolulu, Hawaii. 1991.

[2] Act 25, S.B. No. 1158, April 15, 1993.

[3] Hawaii Department of Agriculture. *The Hawaii State Plan: Agriculture, State Functional Plan*. Honolulu, Hawaii. 1991.

[4] County of Maui. *The General Plan of the County of Maui, 1990 Update*. Adopted by Ordinance No. 2039, as amended by Ordinance No. 2234. April 23, 1993

[5] County of Maui. *Wailuku-Kahului Community Plan*. Kahului, Maui. 2002.

APPENDIX C.

Biological Resources Survey

BIOLOGICAL RESOURCES SURVEY

for the

WAIKAPU TMK 3-5-02:3 (por.) 154.7 Acres

WAIKAPU, MAUI, HAWAII

by

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ENVIRONMENTAL CONSULTANT
Kokomo, Maui
August 2005

Prepared for: Towne Development of Hawaii, Inc.

BIOLOGICAL RESOURCES SURVEY
WAIKAPU TMK 3-5-02:3 (por.) 154.7 Acre Project

INTRODUCTION

The Waikapu project lies on 154.7 acres of undeveloped land TMK 3-5-02:03 (por.) between Waikapu and Wailuku, West Maui. It is bounded on the east by open grassland and about 500 feet of Honoapiilani Highway, on the north by Kuikahi Street, on the West by a portion of Wailuku Heights single family homes, and on the south by open grasslands. The entire area is former agricultural land that now stands idle.

SITE DESCRIPTION

The property slopes moderately upward toward the West Maui Mountains from the Honoapi'ilani Highway. Elevations range from 375 ft. at the bottom to 810 feet at the top. The area is primarily a grassland with a scattering of shrubs and small trees. There is an old plantation reservoir and ditch system within the property. Soils are of the Iao Cobbly Silty Clay and Iao Clay series that are deep and well drained soils developed from volcanic basalt alluvium (Foote et al, 1972). Rainfall averages about 25 inches per year with the bulk occurring between November and April (Armstrong, 1983).

BIOLOGICAL HISTORY

The project area once contained a diverse dryland native forest in pre-contact times that would have been dense, multi-layered and species rich. Hawaiians would have practiced scattered dryland agriculture and would have made extensive use of the forest resources, although the main population centers were in Waikapu and Wailuku along those major stream courses.

The land was cleared for sugar cane production in the late 1800s and was plowed, planted, irrigated, burned and harvested in a cyclic manner for over 100 years. For the past 10 years since the cessation of sugar production the land has stood idle. These land uses have resulted in the near elimination of native plant species and their replacement by hardy weed species that now dominate the site.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Waikapu Project TMK 3-5-02:3 (por.) (154.7 acre) which was conducted during August 2005. The objectives of the survey were to:

1. Document what plant, bird and mammal species occur on the property or may likely occur in the existing habitat.
2. Document the status and abundance of each species.
3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.
5. Note which aspects of the proposed development pose significant concerns for plants or for wildlife and recommend measures that would mitigate or avoid these problems.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used following a route to ensure complete coverage of the area. Areas most likely to harbor native or rare plants such as gullies were more intensively examined. Notes were made on plant species, distribution and abundance as well as terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation throughout most of this 154.7 acre area is an open grassland consisting primarily of Guineas grass (*Panicum maximum*) and a few scattered small trees of *Macaranga tanarius* (no common name) and koa haole (*Leucaena leucocephela*), and some common shrubs and herbs; hairy horseweed (*Conyza bonariensis*), telegraph plant (*Heterotheca grandiflora*) and hairy abutilon (*Abutilon grandifolium*).

A total of 65 plant species were identified on the property. Of this total only two native species were seen, the uhaloa (*Waltheria indica*) and koali awahia (*Ipomoea indica*) common and widespread indigenous species found in much of the Pacific and tropical America. One Polynesian introduction, Kukui (*Aleurites moluccana*),

was found. The other 62 were non-native species consisting primarily of hardy weed species.

DISCUSSION AND RECOMMENDATION

The vegetation throughout the project area is dominated by non-native species. This is a result of over a century of intensive agricultural activity. Only two common indigenous species were found. No federally listed Threatened or Endangered species (USFW, 1999) are found on the site, nor do any plants proposed as candidate for such status occur on the property. There are no unique or special habitats on the property.

No wetlands occur on the site. There are no essential criteria of hydrophytic vegetation, hydric soils or wetland hydrology to be found on the property.

As a result of the above findings it has been determined that there is little of botanical concern and that the proposed project is not expected to have a significant negative impact on the botanical resources in this part of Maui.

No recommendations are deemed necessary or appropriate regarding the botanical resources on this property.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups: Monocots and Dicots. Taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation
2. Common English or Hawaiian name.
3. Bio-geographic status. The following symbols are used:
   endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
   indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   non-native = all those plants brought to the islands intentionally or accidentally after western contact.
4. Abundance of each species within the project area:
   abundant = forming a major part of the vegetation within the project area.
   common = widely scattered throughout the area or locally abundant within a portion of it.
   uncommon = scattered sparsely throughout the area or occurring in a few small patches.
   rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MONOCOTS			
MUSACEAE (Banana Family)			
Musa x paradisiaca L.	banana	non-native	rare
POACEAE (Grass Family)			
Arundo donax L.	Spanish reed	non-native	rare
Digitaria insularis (L.) Mez ex Ekman	sourgrass	non-native	rare
Eleusine indica (L.) Gaertn.	wiregrass	non-native	rare
Melinis minutiflora P. Beauv	molasses grass	non-native	rare
Melinis repens (Willd.) Zizka	Natal redtop	non-native	rare
Panicum maximum Jacq.	Guinea grass	non-native	abundant
Pennisetum purpureum Schumach.	Napier grass	non-native	uncommon
PONTEDERIACEAE (Pickerel Weed Family)			
Eichornia crassipes (Mart.) Solms	water hyacinth	non-native	rare
DICOTS			
ACANTHACEAE (Acanthus Family)			
Asystasia gangetica (L.) T. Anderson	Chinese violet	non-native	rare
Thunbergia fragrans Roxb.	sweet clock-vine	non-native	rare
AMARANTHACEAE (Amaranth Family)			
Amaranthus spinosus L.	spiny amaranth	non-native	uncommon
Amaranthus viridis L.	spleen amaranth	non-native	rare
ANACARDIACEAE (Mango Family)			
Schinus terebinthifolius Raddi.	Christmas berry	non-native	rare
ASCLEPIADACEAE (Milkweed Family)			
Asclepias physocarpa (E.Mey.) Schlecter	balloon plant	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Calotropis procera (Ait.) Ait.f.	small crown flower	non-native	rare
ASTERACEAE (Sunflower Family)			
Cirsium vulgare (Savi) Ten.	bull thistle	non-native	rare
Conyza bonariensis (L.) Cronq.	hairy horseweed	non-native	common
Conyza canadensis (L.) Cronq.	horseweed	non-native	rare
Emilia fosbergii Nicolson	red pualele	non-native	rare
Heterotheca grandiflora Nutt.	telegraph weed	non-native	common
Lactuca serriola L.	prickly lettuce	non-native	rare
Pluchea carolinensis (Jacq.) G. Don	sourbush	non-native	rare
Pluchea indica (L.) Less.	Indian fleabane	non-native	rare
Sonchus oleraceus L.	*pualele*	non-native	rare
Tridax procumbens L.	coat buttons	non-native	uncommon
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
Xanthium strumarium L.	*kikania*	non-native	rare
BIGNONIACEAE (Bignonia Family)			
Spathodea campanulata P. Beauv.	African tulip tree	non-native	rare
BRASSICACEAE (Mustard Family)			
Sisymbrium officinale (L.) Scop.	hedge mustard	non-native	rare
CARICACEAE (Papaya Family)			
Carica papaya L.	papaya	non-native	rare
CASUARINACEAE (She-oak Family)			
Casuarina equisetifolia L.	common ironwood	non-native	rare
CONVOLVULACEAE (Morning Glory Family)			
Ipomoea alba L.	moonflower	non-native	uncommon
Ipomoea indica (J.Burm.) Merr.	*koali awahia*	indigenous	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Ipomoea triloba L.	little bell	non-native	rare
EUPHORBIACEAE (Spurge Family)			
Aleurites moluccana (L.) Willd.	kukui	Polynesian	rare
Chamaecyce hirta (L.) Millsp.	hairy spurge	non-native	rare
Chamaecyce hyssopifolia (L.) Small	----------	non-native	rare
Macaranga tanarius (L) Mull. Arg.	----------	non-native	uncommon
Ricinus communis L.	Castor bean	non-native	uncommon
FABACEAE (Pea Family)			
Chamaecrista nictitans (L.) Moench	partridge pea	non-native	rare
Crotalaria incana L.	fuzzy rattlepod	non-native	uncommon
Crotalaria pallida Aiton	smooth rattlepod	non-native	rare
Desmanthus pernambucanus (L.) Thellung	slender mimosa	non-native	uncommon
Erythrina crista-galli L.	coral tree	non-native	rare
Erythrina variegata L.	fastigiate wiliwili	non-native	rare
Falcataria moluccana (Miq.) Barneby&Grimes	albizia	non-native	rare
Indigofera hendecaphylla Jacq.	creeping indigo	non-native	rare
Indigofera suffruticosa Mill.	*'iniko*	non-native	uncommon
Leucaena leucocephala (Lam.) deWit	*koa haole*	non-native	common
Macroptilium atropurpureum (DC) Urb.	----------	non-native	rare
Macroptilium lathyroides (L.) Urb.	wild bean	non-native	rare
Neonotonia wightii (Wight & Arnott) Lackey	tineroo	non-native	uncommon
Pithecellobium dulce (Roxb.) Benth.	*'opiuma*	non-native	uncommon
LAMIACEAE (Mint Family)			
Leonotis nepetifolia (L.) R.Br.	lion's ear	non-native	rare
MALVACEAE (Mallow Family)			
Abutilon grandifolium (Willd.)Sweet	hairy abutilon	non-native	common

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
Malvastrum coromandelianum (L.) Garcke	false mallow	non-native	rare
Sida rhombifolia L.	Cuban jute	non-native	rare
MORINGACEAE (Horseradish Tree Family)			
Moringa oleifera Lam.	horseradish tree	non-native	rare
MYRTACEAE (Myrtle Family)			
Syzygium cumini (L.) Skeels	Java plum	non-native	rare
NYCTAGINACEAE (Four-o'clock Family)			
Boerhavia coccinea Mill.	----------	non-native	uncommon
PASSIFLORACEAE (Passion Flower Family)			
Passiflora edulis Sims.	*liliko'i*	non-native	rare
SOLANACEAE (Nightshade Family)			
Solanum lycopersicum L.	cherry tomato	non-native	rare
Solanum torvum Sw.	----------	non-native	rare
STERCULIACEAE (Cacao Family)			
Waltheria indica L.	*'uhaloa*	indigenous	uncommon

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species abundance, activities and location as well as observations of trails, tracks scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Two non-native species were recorded from the property during two site visits. Taxonomy and nomenclature follow Tomich (1986).

Axis deer (*Axis axis*) – An axis deer was heard in the vicinity of the reservoir during the evening survey. Deer hide and sleep during the day and become active at dusk when they come out to feed under cover of darkness

Dog (*Canis familiaris*) – Dog were seen near the properties above the project area.

Other mammals one could expect to see here include Rats (*Rattus rattus*) and mice (*Mus Musculus*) which feed on seeds and herbaceous vegetation and cats (*Felis catus*) and mongoose (*Herpestes auropunctatus*) which follow to hunt these rodents as well as birds.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey of the area. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. No evidence of such activity was observed though visibility was excellent. This area does not represent ideal bat habitat and there have been no reports of bat sightings in the vicinity.

BIRDS

Birdlife was rather sparse on the property due to the dry summer conditions and the subsequent scarcity of food sources. Nine species of non-native birds, one migratory bird and one indigenous bird were observed during two site visits. Taxonomy and nomenclature follow American Ornithologist's Union (2005).

Zebra dove (*Geopelia striata*) – Zebra dove were fairly common throughout the property. Small flocks frequented roads and other openings in the vegetation.

House finch (*Carpodacus mexicanus*) – Two flocks of house finches were seen feeding on insects in small trees on the property.

Gray francolin (*Francolinus pondicerianus*) – Several familes of Gray francolins were seen and heard within openings in the grasslands.

Spotted dove (*Streptopelia chinensis*) – Several of these large doves were seen flying through the property and landing in the trees.

Common myna (*Acridotheres tristis*) – Several pairs and individuals were seen flying through the property and feeding in openings.

Japanese white-eye (*Zosterops japonica*) – Several of these small, busy, green birds were seen flitting about and feeding on insects in the trees.

Black francolin (*Francolinus francolinus*) – Two individuals were flushed from the grasslands in the upper part of the property.

Cattle egret (*Bubulcus ibis*) – Two egrets were seen foraging for insects in low grasslands by the roads.

Kolea, Pacific golden plover (*Pluvialis fulva*) – Two plovers were seen during the evening survey. These migratory birds have just arrived from the arctic where they travel to breed and raise their young.

Northern cardinal (*Cardinalis cardinalis*) – Two individuals were seen and heard near the reservoir during the evening survey.

Auku'u, Black-crowned night–heron (*Nycticorax nycticorax hoactli*) – These indigenous waterbirds are usually solitary around ditches, reservoirs and streams where they eat fish, crustaceans and snails.

INSECTS

While insects in general were not tallied, they were abundant throughout the area and fueled the elevated bird activity observed. Although not found on the project site one native Sphingid moth, Blackburn's sphinx moth (*Manduca blackburni*), has been put on the Federal Endangered species list and this designation requires special focus (USFWS 2000). Blackburn's sphinx moth occurs on Maui although it has not been found in this area. Its native host plants are species of 'Aiea (*Nothocestrum*) and a non-native alternative host plant is tree tobacco (*Nicotiana glauca*). There are no 'aiea on or near the project area and no tree tobacco plants were observed during the survey. No Blackburn's sphinx moth or their larvae were observed.

CONCLUSIONS AND RECOMMENDATIONS

Fauna surveys are seldom comprehensive due to the short windowS of observation, the seasonal nature of animal activities and the usually unpredictable nature of their daily movements. This survey was limited in this way due to the dry summer conditions and the lack of food items.

All of the birds species observed were common non-native, migratory or indigenous species in Hawaii. The habitat on this property is not suitable for most native bird species. No Threatened or Endangered mammals, bird or insects were found on the property, and no special or unique habitats occur here.

As a result of the above findings it has been determined that there is little of wildlife concern and that the proposed project is not expected to have a significant negative impact on the fauna resources in this part of Maui.

No recommendations are deemed appropriate or necessary regarding the fauna resources on the property.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within two groups: Mammals and Birds. For each species the following information is provided:

1. Common name
2. Scientific name
3. Bio-geographical status. The following symbols are used:
   - endemic = native only to Hawaii; not naturally occurring anywhere else in the world.
   - indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
   - non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.
   - migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.
4. Abundance of each species within the project area:
   - abundant = many flocks or individuals seen throughout the area at all times of day.
   - common = a few flocks or well scattered individuals throughout the area.
   - uncommon = only one flock or several individuals seen within the project area.
   - rare = only one or two seen within the project area.

COMMON NAME	SCIENTIFIC NAME	STATUS	ABUNDANCE
MAMMALS			
Axis deer	*Axis axis*	non-native	uncommon
Dog	*Canis familiaris*	non-native	rare
BIRDS			
Zebra dove	*Geopelia striata*	non-native	common
House finch	*Carpodacus mexicanus*	non-native	common
Gray francolin	*Francolinus pondicerianus*	non-native	common
Spotted dove	*Streptopelia chinensis*	non-native	uncommon
Common myna	*Acridotheres tristis*	non-native	uncommon
Japanese white-eye	*Zosterops japonica*	non-native	uncommon
Black francolin	*Francolinus francolinus*	non-native	rare
Cattle egret	*Bubulcus ibis*	non-native	rare
Kolea, Pacific golden plover	*Pluvialis fulva*	migratory	rare
Northern cardinal	*Cardinalis cardinalis*	non-native	rare
'Auku'u/Black-crowned night-heron	*Nycticorax nycticorax hoactli*	indigenous	rare

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APPENDIX D.

Archaeological Inventory Survey

SCS Project Number 607-1

ARCHAEOLOGICAL INVENTORY SURVEY REPORT ON 215.800 ACRES LOCATED IN WAIKAPU AHUPUA'A, WAILUKU DISTRICT, MAUI ISLAND, HAWAI'I [TMK (2) 3-5-02: 02 and 03]

Prepared by:
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October 2005

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ABSTRACT

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "'Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc.

Seven historic sites were documented during this Inventory Survey, two of which were previously recorded in the State Index of Historic Places (SIHP). All seven sites relate to historic sugarcane agriculture; the project area is 100 percent covered by abandoned cane land. Sites include two major concrete irrigation ditches; two lesser, more localized ditches; a reservoir; erosion-control earthen berms; and a cane-haul dirt road.

State Site Number 50-50-04-5197 represents the previously recorded Waihee Ditch, and State Site Number 50-50-04-5493 represents the previously recorded Waikapu Ditch. Five new sites were added to the SIHP during Inventory Survey. State Site Number 50-50-04-5729 represents a lesser, un-named, rock and mortar ditch. Likewise, State Site Number 50-50-04-5726 represents a second lesser, un-named, earthen ditch/drainage. Site 50-50-04-5727 is a large, un-named reservoir—the terminus of Waikapu Ditch. State Site Number 50-50-04-5728 is a sugar field erosion-control site comprised of 14 cross-slope, earthen berms of varying length that are positioned regularly throughout the project area. Finally, State Site Number 50-50-04-5730 represents "Old Waikapu Road", a cane-haul transport, dirt road that spans the border of parcels 02 and 03.

Excavation consisted of twenty-one backhoe-dug stratigraphic trenches evenly spread across the project area. Extensive pedestrian survey and this representative subsurface testing did not yield artifacts or cultural deposits.

All seven sites (all representing historic period sugarcane agriculture activities) were assessed as significant under Criterion D of Hawai'i's State Historic Preservation criteria. Based on the results of this project and depth of documentation, all seven sites have yielded all potential information important to this historic period and no additional archaeological mitigation is recommended within this project area.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc. The Inventory Survey included historic background research and settlement pattern analysis prior to fieldwork, a complete pedestrian survey of the project area, representative subsurface testing via backhoe, and reporting (Figures 1 and 2).

Fieldwork, primarily consisting of systematic pedestrian survey, recordation, and representative subsurface backhoe testing, was conducted between August 16, 2005 and August 25, 2005 by SCS personnel Ian Bassford, B.A.; Randolph Ogg, B.A.; and Jon Wilson, B.A. The Principle Investigator for this project was Michael Dega, Ph.D.

Archaeological Inventory Survey of the project area was conducted to determine the presence/absence of archaeological deposits in surface and subsurface contexts through complete systematic survey and representative subsurface testing. The ultimate goals were to determine if historically significant archaeological sites occurred on the parcel and to provide recommendations to the State Historic Preservation Division (SHPD) concerning site mitigation during future land use of the project area.

ENVIRONMENTAL SETTING

LOCATION

The large survey area lies between coastal flats to the east and more mountainous terrain to the west along the medial reaches of the Maui isthmus between Wailuku and Mā'alaea (Figure 3). The project area is located between Wailuku (2 km north) and Waikapu to the south. Roughly ten percent of the project area (the northeast corner) lies within Wailuku Ahupua'a; the remainder is in the *ahupua'a* to the south—Waikapu (see Figure 1). The project area is composed of two adjacent parcels: TMK parcel 02 is located in the southeast quadrant of the project area and is less than half the size of parcel 03. The eastern perimeter of the project area abuts Honoapi'ilani Highway as it traverses from Wailuku toward Waikapu across the central Maui isthmus. The western border is defined by Wailuku Heights, an existing residential neighborhood. The northern boundary of the survey area is the curving Kuikahi Drive; the southern boundary is an arbitrary TMK line through abandoned cane lands (Figure 4).

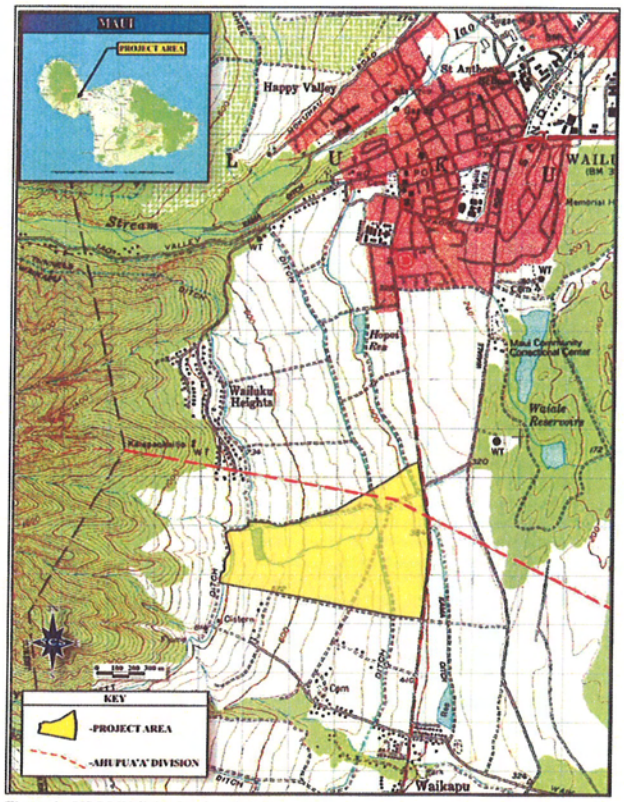

Figure 1: USGS Wailuku Quadrangle Map.

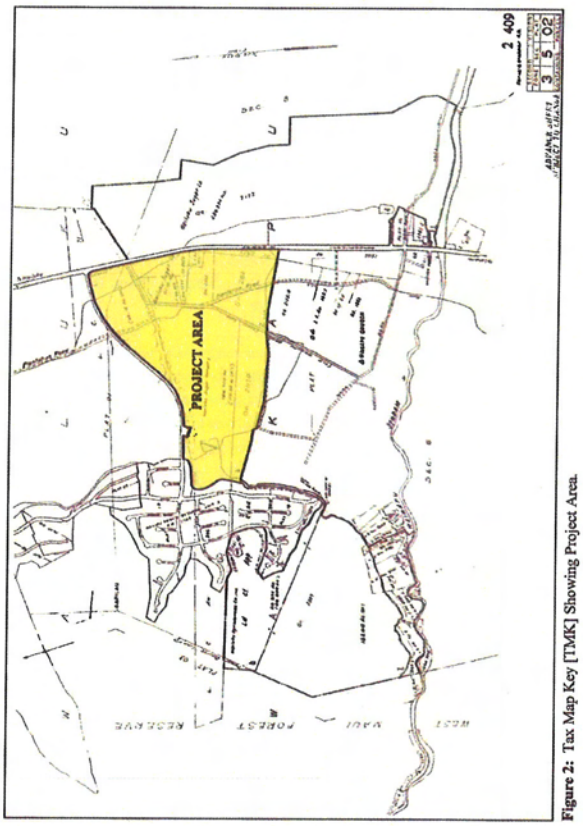

Figure 2: Tax Map Key [TMK] Showing Project Area.

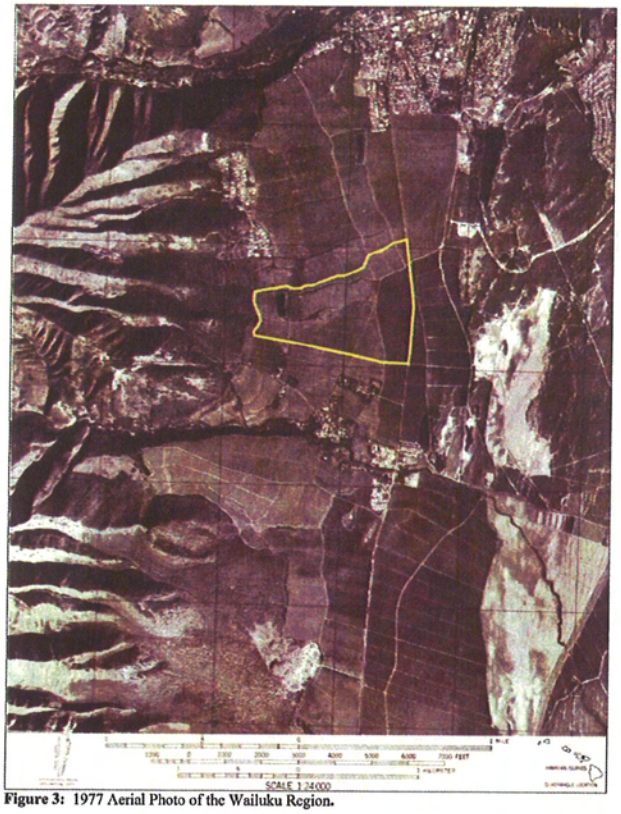

Figure 3: 1977 Aerial Photo of the Wailuku Region.

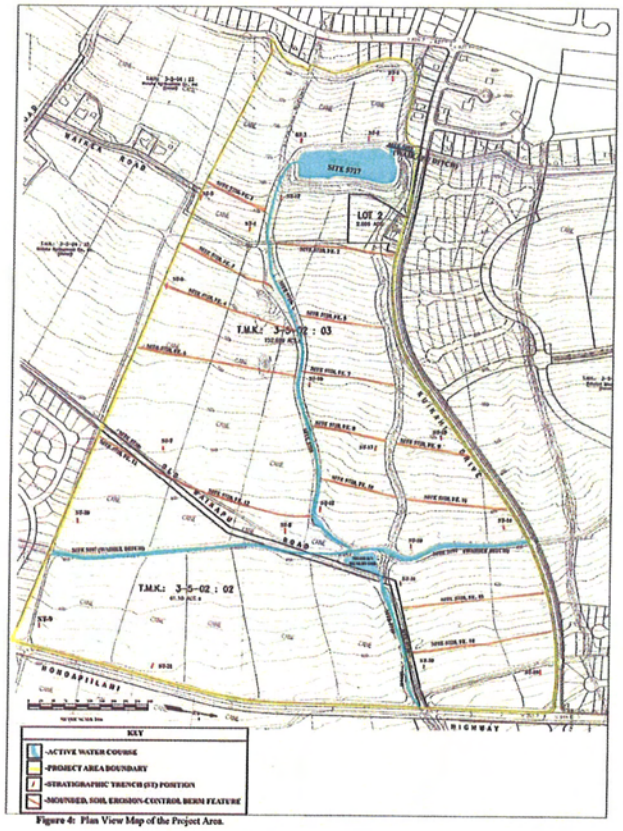

Figure 4: Plan View Map of the Project Area.

PROJECT AREA LANDFORM

Both archeological field survey and a review of geotechnical reports for the parcel reveal that the slightly sloping project area lies in locations previously utilized for the cultivation of now-abandoned sugar cane. According to Cavanaugh (1995:2), who conducted geotechnical studies on the 450-acre Kehalani Mauka Subdivision (the parcel that borders Kuikahi Drive to the north), "site topography slopes down moderately toward the east at a gradient of 10 percent." This accurately describes the slope of the current project area, which is steeper at its western (*mauka*) perimeter, and relatively flat near Honoapi'ilani Highway (Figure 5). Ground elevations range from approximately 115 meters (380 feet) above mean sea level (amsl) to 200 meters (660 feet) amsl. Various historic and modern dirt roads transect the surveyed area. As is discussed more below, project area exclusively consists of tilled zone, fill, and alluvial sediments. To the east, near the Maui Lani development, sandy matrices were identified. Sandy matrices were not identified in the current study area. Likewise, neither archaeological nor geotechnical subsurface testing detected any sandy matrices in areas immediately to the east of Honoapi'ilani Highway (Monahan 2003) or north of Kuikahi Drive during the Kehalani Mauka Subdivision (Dega 2004).

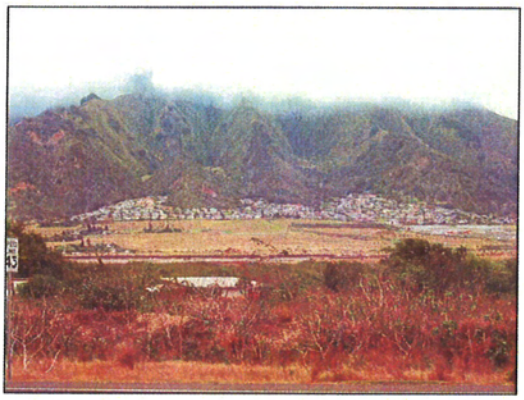

Figure 5: Distant Photograph of Project Area (lighter colored grass at center roughly defines boundaries). View to West.

Hydrology within the relatively dry project area is mostly in the form of historic irrigation modifications. Some of these modifications were the creation of a larger web of water conduits, drainages, and reservoirs, some built as early as 1905. No perennial streams run directly through the project area, and thus artificial ones had to be created for proper irrigation. By comparison, 'Iao Stream runs west-east to the north of the proposed development while Waikapu Stream runs west-east to the south of the project area. Being located near these two major streams appears to have been beneficial for cultivation on the present parcel, at least during historic times. Several still-utilized irrigation ditches (*i.e.*, Waihee Ditch, Site -5197) transect the project area, and a still-active larger reservoir is linked to one of these ditches. The remnant irrigation ditches and reservoir not only point to massive landscape modification in the area during historic times but also strongly infer the aridness of the area, which required large-scale water importation. The water table was not encountered in any of the 21 stratigraphic trenches excavated within the project area (maximum depth of 2.60 meters). Soil borings conducted during geotechnical analyses in a nearby project area failed to reveal the presence of the area's water table to at least 25 feet below the surface (Shimamoto 1995:4).

The project area has seen significant modern activity. A 25 meter high cinder/ soil pile has been consistently mined (or imported) via truck traffic into the western half of the project area from a dirt road linking Kuikahi Drive. Modern rubbish is scattered over the surface of each quadrant; nearly a dozen abandoned cars are located in the southeast quadrant. Land owners have a construction trailer and small, dirt parking lot at the northeast corner of parcel 03. Consistent, daily vehicle traffic across the parcel indicates the modern maintenance efforts related to the irrigation systems (necessary to serve locations outside of the project area).

VEGETATION AND SOILS

Vegetation in the project area is dominated by the presence abandoned cane that has been overtaken by non-native secondary growth shrubs and various introduced grasses (Figure 6). Several ironwood trees (*Casuarina glauca*) dot the landscape. *Haole koa (Leucaena leucocephala)* are fairly common especially bordering the eastern highway perimeter and near irrigation conduits. Native vegetation was not documented within the project area.

According to Foote *et al.* (1972:46–47, 100), soils in the project area fall into four sub-classifications of the 'Iao soil series. These soils consist of well-drained soils on valley fill and alluvial fans that have developed from igneous rock and are nearly level to moderately sloping. The 'Iao Series derivatives are similar to each other, yet primarily differ by the slope of the surface layer and inclusions of a higher content of cobblestones, such as in 'Iao cobbly silty clay

Figure 6: Project Area Vegetation and Topography. View to Northeast.

(classified as both IbB and IbC). The IbC soil (7 to 15 percent slopes) is distributed along the Kuikahi Drive area; whereas the IbB soil forms the central region. Also occurring within the project area (in roughly equal percentages) are ʻĪao clay, on lesser slopes (IcB), and ʻĪao clay on steeper slopes (IcC). Figure 7 shows the project area distribution of these derivatives.

The presence of these soil types was confirmed through geotechnical studies in bordering parcels and archaeological testing during the current project. Important to emphasize again, no sandy sediment was identified in the project area. Sandy sediment (sand dunes) and mixed coastal-terrigenous sediments occur to the east of the current parcel (*i.e.*, Maui Lani).

The fairly homogenous nature of soils in the project area does provide contrast to soil regimes occurring more to the east (coastal-terrigenous and coastal) and to the north and south (dynamic stream valleys). The current project area occurs in a medial or intermediate environmental zone, both on a north-south and east-west axis. Along a north-south axis, the property lies in a very dry, open area between two perennial streams (ʻĪao and Waikapu). On an east-west axis, the project parcel lies above the influence of the coastal plain and below the wetter uplands. The current parcel thus lies in a fairly non-dynamic environmental zone that is practically surrounded on all sides by contrastingly vibrant areas (see Figure 5). That this

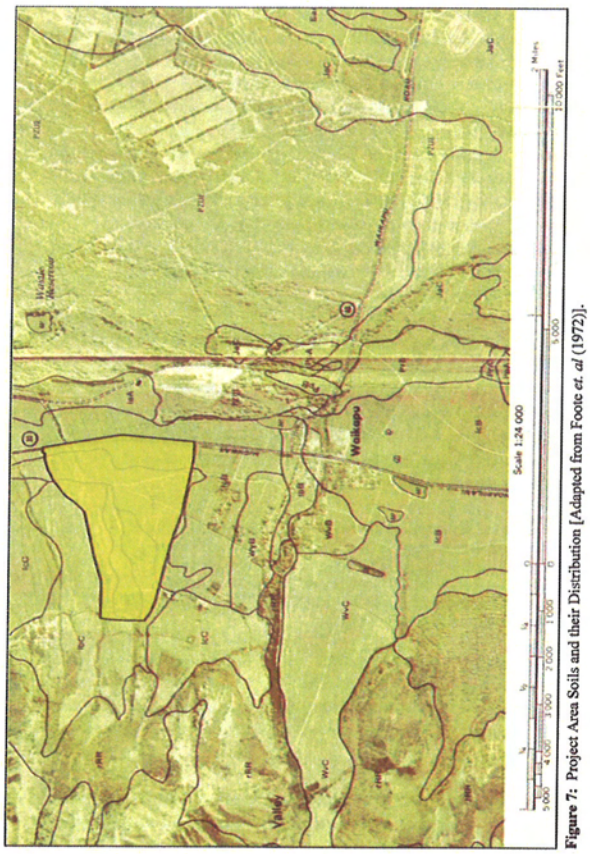

Figure 7: Project Area Soils and their Distribution [Adapted from Foote *et. al* (1972)].

intermediate area, occurring between more dynamic zones, required artificial controls is well-observed throughout the project area in the form of irrigation ditches and reservoirs.

CLIMATE

Rainfall in this intermediate environment is very modest. The project area receives an average annual rainfall of only 33 to 44 centimeters (Price 1983:63), with much of this rainfall occurring during the winter months (November–April). Seasonal variation in rainfall amount follows normal orographic patterns for leeward-type areas of Maui. The project area occurs just to the south of what may be considered the leeward-windward boundary. At higher elevations within Wailuku Ahupua'a, the amount of rainfall doubles and triples that of the project area. To the north, from 'Iao Stream Valley area toward Waihee Valley, rainfall is much more intensive, with combined rainfall and geographic patterns being more conducive to traditional types of agricultural cultivation (*i.e.*, *lo'i*, sweet potato). The rainfall in this gently sloping project area drains downhill to the east and provides an additional water source for traditional Hawaiian agriculture in the lowland flats to the east of the project area (see Handy and Handy 1972).

TRADITIONAL AND HISTORIC SETTING

Wailuku District inhabits the eastern side of the West Maui Mountains (Mauna Kahalawai) and occupies the isthmus through the center of the island to coastal reaches in Kahului and Mā'alaea. Wailuku, together with Waikapū, Waihee, and Waiehu, is one of the *Na Wai 'Eha*, or "the four waters," known for the occupancy of chiefly individuals (Kame'eleihiwa 1992; Pukui and Elbert 1992; and Creed 1993). Wailuku District and Wailuku Ahupua'a are frequently mentioned in historical texts and oral traditional accounts as being politically, ceremonially, and geographically important areas during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of *'Īao* Valley and lower Wailuku. The many *heiau* constructed in the Wailuku area point to its ceremonial and religious importance during pre-Contact times. During historic times, after numerous battles in the area, the large concentration of Land Commission Awards granted in Wailuku, particularly in lower *'Īao* Valley, also attest to a sizeable population base and the importance of the lands for cultivation through time. More recent land use in the area included sugar cane cultivation and use of the land for pasture.

THE TRADITIONAL SETTING OF WAILUKU

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations

eventually settling into drier leeward areas at later periods (Kirch 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-dates accepted ranges gleaned from palynological data. A more secure estimate for initial occupation of the islands is the A.D. 9th century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihee and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O'ahu, has yielded dates of occupation, albeit controversial, from A.D. 300 to 600 [Pearson *et al.* 1971], one of the earliest dated sites in the Hawaiian Islands. For the most part, these dates have now been diagnosed as very problematical and are no longer valid.) More recent research within Wailuku Ahupua'a indicates that the area was likely settled between *c.* A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996).

To the north of the current project area lies 'Īao Valley, one of the most important locations in the area for prehistoric activity. Connolly (1974:5) states that the pre-Contact valley [*'Īao*] had a large population base with "most people residing in a settlement near *'Īao* Needle," just north of the project area. Supposedly, the subsistence base of this population consisted of fish and taro, with Kahului Harbor and the coast close by and *lo'i* systems lining *'Īao* Valley's stream banks. Prehistoric ditches or *'auwai* were utilized in taro cultivation (Connolly 1974:5). Sterling (1998:86) adds that two *'auwai* within the valley:

> have existed immemorially and were evidently constructed for the purpose of irrigating *kalo* on the plains which stretch away to the northward and southward of the [*'Īao*] river. Several minor *'auwai* have, since ancient times, tapped the river at different points lower down and spread the water through the lands in the gulch on either side of the river bed.

Handy in Sterling (1998:63) further notes that "From Waihee and Wailuku Valley, in ancient times, was the largest continuous area of wet taro cultivation in the islands." Cheever (1851:124) writes: "the whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it."

Recent archaeological research (Fredericksen and Fredericksen 1996:52) has revealed that habitation sites along what is now Lower Main Street in Wailuku, "are associated with the

rich taro producing lands in the Lower `Iao River flood plain, and the extensive cultivation systems present in `Iao Valley." These habitation sites have been dated to the A.D. 15th through 17th centuries. The `Iao Valley area was not only renowned for its agricultural base during prehistoric times but its ceremonial and political base as well (see also Cordy 1996; Donham 1996).

No discussion of Wailuku is complete without mentioning the important *heiau* complex above `Iao Valley near its seaward terminus. During the mid to late 18th century, the Halekii-Pihana *heiau* complex was supposedly designed by a Hawaiian named Kiha (Sterling 1998:89). These monuments, designated as State Site Number 50-50-04-522 and occurring along the northwest flank of the current project area, are described as very important *heiau* within Hawaiian history. Yent (1983:7) notes the life cycle of the *ali`i* was represented here. It was the place where Kamehameha I's wife was born, Kahekili lived, and Kekaulike died. Thrum (1909:46) reported that Kamehameha I evoked his war god at Pihana Heiau after his warriors defeated Kalanikupuli's forces during the Battle of `Iao in 1790. The two *heiau* are primarily associated with Kahekili, who is connected with the Halekii-Pihana complex between *c.* A.D. 1765 and 1790, and Kamehameha, during his conquering of Maui in 1792 (Yent 1983:18). Halekii and Pihana Heiau are the only remaining pre-Contact Hawaiian structures of religious and historical importance in the Wailuku-Kahului area that are easily accessible to the public (Estioko-Griffin and Yent 1986:3). As stated, the area within and adjacent to the current project is known not only for its religious and/or ceremonial significance, but for its political prominence as well.

The Fredericksens' (1996:52) report states that politically, Wailuku [village] was known as a central settlement for high ranking chiefs and their retinue. The Wailuku area was also witness to many battles, from the Battles of `Iao and Sand Hills to the Battles of Kepaniwai and Kakanilua. The most famous battle was that of Kepaniwai where Kamehameha I, in July 1790, finally wrested control of Maui Island. Kamehameha I and his warriors landed at the Kawela portion of Kahului Bay and proceeded up `Iao and other valleys to score a decisive victory. Wailuku, meaning water of destruction, succinctly describes the area in which many of these major battles occurred. Of additional note is that in the Kauahea area of `Iao Valley (southeast of `Iao Stream below Pihana Heiau-supposedly within the current project area), warriors apparently dwelt and were "trained in war skills and there was a boxing site in the time of Kahekili" (Sterling 1998:89).

TRADITIONAL SETTING OF THE PROJECT AREA

Creed (1993) has written extensively on the traditional background of the Waikapu area, much of which directly applies to the open landscape of the current project area just to the north of Waikapu. Many classes of sites are found or may have existed in the Waikapu-Wailuku area during traditional times. Creed (1993:19–21) provides an extensive list, including some site types that would not apply to the current parcel due to its distance from major drainages, the coastline, and its open land classification. Traditional sites that would apply include agricultural sites (*kula* lands, *wauke* patches, *hala* trees, pigs, and potato patches), boundary walls, burials (sometimes located in habitation terraces), feather gathering areas (particularly in the mountains to the west), habitation loci, and *pohaku* (an adze stone marks the border between Wailuku and Waikapu). While populations were predominantly centered in `Iao Valley and Waikapu Valley, there was agricultural and habitation activity in the open grasslands of the current project area above the coastal flats. Much evidence for such activities has not yet been found through archaeological means, a situation that places much culpability on historic land use that may have erased or scattered this evidence. As such, there is much more evidence for historic activities occurring in the area.

HISTORIC SETTING OF THE PROJECT AREA

Current project area lands were first assigned to the district formerly known as Kula. Taken literally, *Kula* refers to open land or plains (Pukui and Elbert 1992:70). Kula District is known for its dry, arid lands being vacant of perennial streams. Kula was always an arid region, throughout its long, low seashore, vast stony *kula* lands, and broad uplands. There are exceptions in Wailuku as one proceeds along Iao Stream Valley and further to the west/northwest past Waihee and Waiehu. However, even the vast stony *kula* lands were utilized during traditional and historic times. Most evidence for such land utilization has come in the form historic records.

THE GREAT M~HELE

In 1848, during the late historic period, commissioners of the Great M~hele instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The M~hele was based upon the principles of western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Kuykendall Vol. I 1938:145 footnote 47 *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among

other things. Case in point, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I 1938: 145 *et passim*; Kame'eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`~inana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*. However, in the case of commoners, they would only make claims only if they had first been made aware of the foreign procedures (*kuleana* lands, land commission awards). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame'eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming houselots in Honolulu, Hilo, and L~hian~ were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

Wailuku District was declared Crown Land during the Great Māhele and numerous Land Commission Awards, approximately 180, were awarded within Wailuku Ahupua`a while approximately 100 were awarded for Waikapu Ahupua`a (Creed 1993). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugarcane. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38).

During the Great M~hele of 1848, a total of three land claims were awarded in the current project area (Waihona `Aina 2005): LCA 433, 3201, and 3525—all of which are located in parcel 02, in the central area of the eastern border near Honoapi`ilani Highway (Figure 8). Table 1 summarizes archival research of these three LCAs.

Table 1: LCA and Land Grant Data for [TMK:(2) 3-5-02: 02].[1]

LCA No.	Awardee	Land Use	Comments
00433	William Crowningburgh and wife Maile	*lo`i* – 21 *`apana* – 4	Stream also on property. Crowningburgh surrounded this land with a fence and raised animals on the property. Plot of land was referred to as *Pili Pili* at the time.
03201	Wm. A. McLane	*`apana* – 2	One ditch on piece of land. Plot of land was referred to as *Awakamanu* at the time.
03525	Keliiolelo	*lo`i* – 3 *`apana* – 3 House lot – 1	Stream on property. Plot of land was referred to as *Awakamanu* at the time.

[1] Source: Waihona Aina website (www.waihona.com), information obtained in September, 2005.

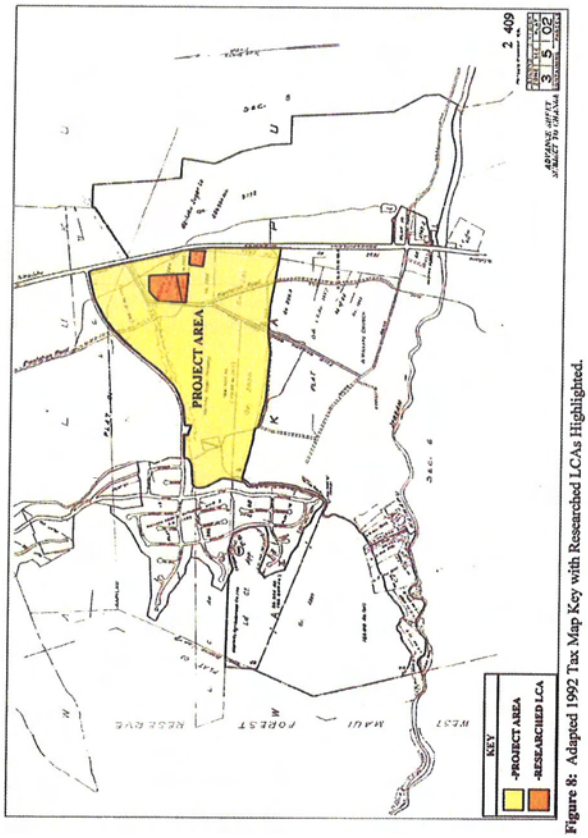

Figure 8: Adapted 1992 Tax Map Key with Researched LCAs Highlighted.

This LCA record keeps with the overall LCA pattern of the Waikapu-Wailuku area intimating taro cultivation in association with permanent residences. Such a pattern is historically documented from 1848, but likely extended deeper into the past. *Lo`i* (irrigated taro patches or planted terraces) and evidence of smaller, private land plot divisions, *`apana*, are no longer detectable within this surface or subsurface landscape.

Similarly, the Wailuku Ahupua`a parcel north of Kuikahi Drive predominantly lists among its LCA records 'property for raising cattle' and 'pasture grounds for cattle' (Dega 2004). There also is some mention of stone walls, *kalo* patches, and *kauhala* trees on the landscape. Perhaps the most significant structures on this adjacent land were built by the American Board of Commissioners for Foreign Missions (A.B.C.F.M.) which consisted of two house lots with adobe walls. The lots occurred "near pasture land," a common theme for the area (Waihona `Aina 2005). In Waikapu, to the south, the LCAs reflect *lo`i* cultivation, *kula* lands, and house sites. However, much or all of the evidence related to such settlement of the Waikapu area has been effaced by late-historic and modern cultivation. The current project area is a prime example of this trend.

Land use in Wailuku and Waikapu Ahupua`a in the mid 19th and early 20th century was largely devoted to the sugar industry. During the 1860s, the sugar business was growing, with plantations and mills at Wailuku, Waihe`e, Waikapu, and Haiku. Many of the plantation camps associated with these mills were centered in the Pu`unene, Kahului, and Wailuku area (see Denham *et al.* 1992:16). Historic utilization of the Waikapu-Wailuku landscape within and near the project area focused on industrial-levels of cultivating sugar cane and pineapple. Water was channeled from traditional sources (*e.g.*, Waikap© Stream, western aquifers or springs) through plantation lands. Both local and imported workers operated on these plantation lands and the area maintained fair population density. Evidence for expansive landscape modifications to accommodate the industrial-level of production is very evident across the current subject parcel in the form of the north-south oriented known historic ditches. The significant amount of plastic and tubing and sheeting found within Layer I of excavations attests to even more recent utilization of the open landscape for cultivation. These former sugarcane lands are now being reclaimed through residential developments.

PREVIOUS ARCHAEOLOGY

IMMEDIATE VICINITY OF PROJECT AREA

Intensive research within the State Historic Preservation Division (SHPD) archives concluded that no previous archaeological study was conducted within the present project area. However, of primary importance for the present study are the results from three projects recently conducted within and bordering the 348-acre subdivision to the north (Figure 9). First, Archaeological Inventory Survey was conducted on approximately 100 acres of land that included five separate lots and a proposed road corridor in the Kehalani Mauka Subdivision (Dega 2003). Three historic sites were documented during this Inventory Survey. State Site Number 50-50-04-5473 has been assigned to Hopoi Reservoir. This reservoir predates Hopoi Camp and was present at least by 1922 (see Dega 2003). Occurring to the immediate east of Hopoi Reservoir and running north-south to Waikapu is Kama Ditch (State Site No. 50-50-04-5474), a water conduit carrying the precious commodity to dry southern lands. A single basalt adze (Site 50-50-04-5478) was recovered from the northern flank of Lot 21 along the eastern flank of the parcel. Extensive survey and testing in the area of the isolated find failed to produce additional artifacts or cultural deposits. Representative subsurface testing (18 trenches) on the lots only revealed highly homogenous soil matrices across the open, barren intermediate area.

A second SCS Inventory Survey Report dealing with these same Kehalani Mauka lands (Dega 2004) documented lots not surveyed in the first study. This survey recorded six additional sites, all historic. Similar to the present project area, a series of un-named, lesser ditches was found within Kehalani Mauka, represented by State Site Numbers 50-50-04-5490 and 50-50-04-5493. Waihee Ditch (Site -5197) flows from this former SCS project area into the present project area. Historic-modern roadways (50-50-04-5489), a historic surface artifact scatter (50-50-04-5491), and several plantation-era clearing mounds (50-50-04-5492).

In summary, the results of the Kehalani Mauka Subdivision Inventory Survey roughly duplicate the present project area's findings. Aside from a lone traditional artifact (an adze)—which could remain despite a century of cultivation—larger traditional sites were destroyed during the sugar-era.

An Archaeological Assessment Report was published based on a negative results survey on Kehalani lands just to the east of Honoapi`ilani Highway (Monahan 2003). This survey did not produce any structures or artifact scatters. Trench excavation demonstrated a fairly consistent subsurface stratigraphy with a thick layer of dark brown silt (Layer II) inclusive of historical

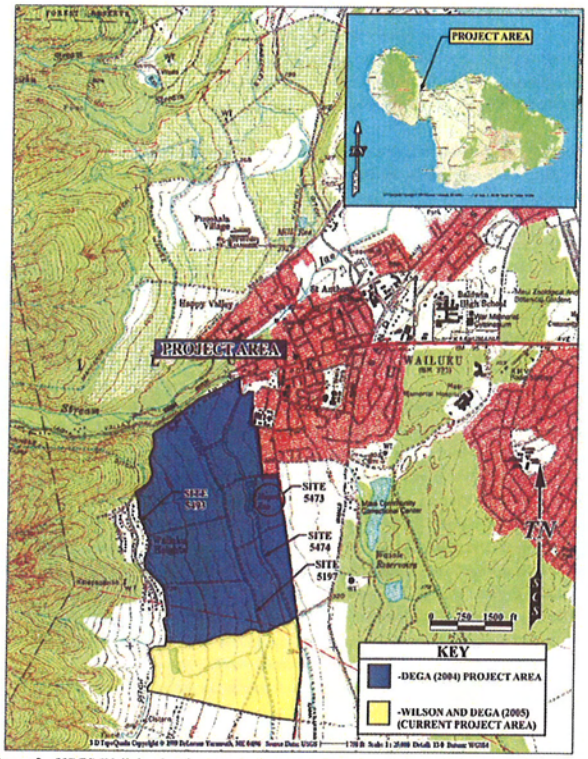

Figure 9: USGS Wailuku Quadrangle Map Showing Adjacent Areas of Archaeological Study.

garbage (*i.e.,* black plastic and rubber tubing, white plastic irrigation pipes, and black plastic sheeting) over an undisturbed very dark grayish-brown silty clay subsurface (Layer III). A dark brown, silty root mat-layer (Layer I) was present in some units. No undisturbed sandy deposits were encountered, although a few trenches close to the eastern boundary of the project area did contain thin lenses of yellowish-brown sand. These sand lenses were clearly introduced as recent fill.

GENERAL WAIKAPU AREA

In terms of general projects in the Wailuku-Waikapu environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). None of their archaeological finds directly pertain to the current project area; however, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapu area.

In an area south of the project area, within open lands similar to what is being researched herein, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikap©, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the M~`alaea Complex) was identified by Walker (1931) to the west of M~`alaea. Chronology for these sites has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at M~`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

Recent archaeological work in Waikap© Ahupua`a (Kennedy 1988, 1989; Folk and Hammatt 1989; Haun 1989; Brisbin *et al.* 1991; Donham 1991; Titchenal 1996) has revealed a low density of sites ranging in function from habitation to agriculture. Radiocarbon dating results in these studies have produced dates ranging from the A.D. 1100s to modern times. Together, their collective data suggests a "general trend toward development of large, densely settled populations between A.D. 1200 and about 1800, and the expansion and intensification of dryland field systems, particularly during the latter two centuries of this period" (Creed 1993:33).

Other recent archaeological work just to the south and/ or east of the current project area has been limited to two field inspections (Donham 1991, 1995) and near the eastern boundary line of the current project location, two archaeological Inventory Survey-level investigations

(Kennedy 1988, 1989; Buffum and Dega 2001). The conclusions offered by these few projects primarily indicate that any surface and/or subsurface features of cultural value that were once present within the area have most likely since been destroyed by intensive agricultural use of the land (*i.e.*, sugar cane and/or pineapple cultivation); this pattern was also confirmed by subsurface examination. As such, a broader background for Wailuku District is offered herein (see below).

WAILUKU DISTRICT OVERVIEW

The following section provides a brief overview of archaeological research in Wailuku District itself and is presented in two arbitrary sections: Upper Wailuku and Lower Wailuku District. Upper Wailuku is considered to be the lands above Kuihelani Highway while Lower Wailuku encompasses the lands below Kuihelani Highway and extends to Mā'alaea Bay in Waikapu Ahupua'a. The following district-specific research appears in its entirely as first published in Dega (2004).

UPPER WAILUKU DISTRICT

The majority of archaeological work is associated with the Pu'u One region in the northern most section of Wailuku District. Prior archaeological work in the Pu' One region indicates an emerging pre-Contact settlement pattern for this region. SCS (Dunn and Spear 1995) conducted research at the intersection of Naniloa and Waiale Roads where habitation features and a cultural layer interspersed with hearth and pit features were identified during a monitoring project. These features all occurred in sandy substrate. Radiocarbon dates submitted from these features yielded dates ranging from A.D. 1434 to A.D. 1807, dates suggesting pre-Contact sites and early historic land use. SCS (Burgett and Spear 1995) conducted Archaeological Inventory Survey in the sand hills along lower Main Street. One habitation site (50-50-04-4004) located in a remnant of a once larger cultural deposit was identified. Radiocarbon samples dated the site to A.D. 1420 and A.D. 1640, or to the early to mid-prehistoric time range.

SCS (Morawski and Spear 2001) conducted Archaeological Monitoring during the installation of a water pipeline and fire hydrants on Naniloa, Helenani, Leilani, Kainani, Naniluna, and Ka'ahumanu Highway roads with the town of Wailuku. During the research, a historic refuse dump was discovered, as were the remains of previously disturbed human burials. SCS (Buffum and Spear 2001; Zachman and Spear 2002) conducted Archaeological Monitoring at the Maui Medical Center. Due to extensive landscape modifications, no archaeological or traditional materials were identified during excavation.

Pantaleo and Sinoto (1996) conducted archaeological work at the Maui Lani Development to the east of the present project area. As of the 1996 publication, only one concentration of multiple burials was discovered while the remainder were isolated individual burials at the tip of the dune (at the highest elevations). A more contemporary report documenting additional burial finds at Maui Lani should aid in clarifying the overall results of that project. Research conducted by Fredericksen and Fredericksen (1997) indicated that this section of dunes was primarily used during prehistoric times as an interment area, a contention easily supported by the previous year's study. Habitation sites (several with associated burials) have been found mostly in the dune area associated with the Lower Main Street/Waiale Road Corridor. Conversely, studies east of this corridor have yielded only human burials (Fredericksen and Fredericksen 1998). Fredericksen and Fredericksen (1998) lists many of the archaeological studies conducted in the Lower Main Street/Waiale Road Corridor and Central Maui area.

LOWER WAILUKU DISTRICT

A limited number of archaeological projects have been conducted in this particular land section, much of which was disturbed during the massive sugar cane cultivation. The fair amount of archaeological work conducted along Lower Main Street is summarized elsewhere (see Morawski and Dega 2003). In comparison, Sinoto and Pantaleo (1992) conducted Archaeological Inventory Survey of a proposed location for the Kihei Gateway complex, on the *makai* side of the Piilani-Mokulele Highway junction. One historic site, the remains of concrete footings from a bridge across Waiakoa stream, was identified (Site 50-50-09-31).

SCS (Burgett and Spear 1997) conducted large-scale Archaeological Inventory Survey of the Puunene Bypass/Mokulele Highway improvements stretching across the majority of Wailuku District. Although no sites were identified, this absence may account for the lack of archaeological remains: extensive disturbance associated with prior sugar cane cultivation, highway and private construction activities, and little or no prehistoric occupation of the area. However, *lo'i* cultivation was reported to be intensively cultivated in this area (Handy and Handy 1972). The replacement of *lo'i* with sugar cane during historic times would be the most likely cause for the destruction of all traditional sites related to prehistoric cultivation in the area.

Fredericksen and Fredericksen (1998) conducted archaeological research on 232 acres northeast of Puunene Avenue stretching to Haleakala Highway. No formalized traditional or prehistoric sites were discovered. Several sites consisting of volcanic-glass surface scatters were identified in the former sugar cane fields along with a historic irrigation ditch.

SETTLEMENT PATTERN

Archaeological investigations within the currently studied portion of Wailuku-Waikapū have revealed relatively little regarding traditional settlement patterns due to the dearth of supporting empirical evidence. Archival research and analyses of the generalized settlement pattern for Wailuku District have been the foremost sources for discerning an established settlement pattern for the current project area.

Archaeological evidence suggests that early settlement in the Hawaiian Islands occurred along windward shoreline areas between the A.D. 4th and 11th centuries. Pollen evidence suggests a settlement date of the A.D. 9th century (see Athens 1997). For the most part, these populations used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* zones. Greater population expansion to inland areas did not occur until the *c.* A.D. 12th century but continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c.* A.D. 1600.

Nearer the coast in intermediate lands such as the current project area (*c.* 60–85 meters amsl), taro was cultivated along stream courses, dryland taro was grown on *kula* lands such as the project area, and populations were settled. It is possible that the *kalo* patches described in the aforementioned LCA accounts originated during the "Expansion Period" of A.D. 1400 to 1600, perpetuating through historic times (Kirch 1985). However, most of the LCAs for the area describe almost no cultivation occurring in the area during the 1850s as pasture land and sugar cane cultivation were already dominating the use of the land (Creed 1993:74). Primary settlement and resource zones lay outside the current medial environmental zone in Wailuku proper, near perennial water sources (Iao Valley, Waihee, Waiehu). The only substantial settlement along this medial isthmus zone between 300 and 600 feet amsl was at Waikapu, to the south of the current project area, near the base of Waikapu Stream Valley (see Creed 1993). As the current project area does not contain a perennial water source and is primarily open grassland, the area is considered to lie at the periphery of the more resource-rich zones in Wailuku.

Historic utilization of the Wailuku-Waikapu landscape was dominated by the cash cropping of sugar cane and pineapple, made possible by water channeled from traditional sources (*e.g.*, Waikapu Stream) through plantation lands. Historic features associated with this period are represented as water features in the form of reservoirs (Hopoi Reservoir) and water channels (Waikapu Ditch, Waihee Ditch). This area was also an important transportation corridor linking both the south and north flanks of the Maui isthmus, with Honoapi'ilani Highway having been demarcated as a Government Road on area maps by 1882 (Creed 1993:20).

PROJECT AREA EXPECTATIONS

Prior to commencing archaeological fieldwork, a review of archival resources and the results of previous archaeological work conducted in the area was undertaken to assess possible findings during fieldwork. Based on previous archaeological work—primarily north and east of this intermediate landscape—and on LCA information, site patterns prior to intensive historic land alteration activities show systematic use of the terrain as taro planting areas, limited habitation, and divisions of pastureland. Previous archaeological investigations within this portion of the Wailuku-Waikapū corridor have revealed very little data to confirm these patterns, this not surprising considering the impact that long and intensive agricultural exploitation has had on the surface of the area and subsurface strata. Traditional site components expected prior to these land-altering activities consist of dryland taro patches, associated agricultural components such as *'auwai* and/or terracing, house sites, boundary walls, and pasture walls. Expectations for identifying such data sets were low, however, due to the aforementioned historic land uses.

Traditional sites that may once have been present within the current project area were not expected to remain unaltered. Given LCA testimony and general settlement patterns for this inland, intermediate area, land use patterns for the current project area were thought to be most obviously related to historic-period settlement and cultivation—but on a very limited scale. At present, an empirically-based chronology of this area has yet to be provided, given intensive historic land modifications and the lack of datable archaeological evidence. According to Creed (1993:77):

> . . . we have no carbon dates to indicate the possible beginnings for this wetland agriculture in Waikapū Valley. Moreover, this area has been in constant use for crops and habitations at least since the time of the *Mahele*, if not long before and modern uses may have destroyed all traces of prehistoric uses. However, the LCA records and early maps document the extent of the *lo'i* agriculture in the

1850s. The stream valley in its upper reaches may have some remnants of these *M~hele* period *lo`i* or *`auwai*.

Expectations for this project area rested on several assumptions, some of which were proven valid at the end of fieldwork. First, the project area, lying in an open, intermediate zone containing hard soil composed of silty clay with cobbles was not intensively occupied during traditional times. Traditional and early historic-period populations were focused elsewhere in areas such as Waikapu, `Iao Valley, Waihee Valley, and Waiehu Valley. Thus, there were low expectations for identifying larger, intact sites or deposits; they simply were not constructed in this area. Secondly, there was the possibility that sand sediment could be present along the eastern flank of the project area. The association of sand and traditional/historic burials and cultural deposits has been well documented (see Kirch 1985). Thus, if sandy deposits did occur along the eastern flank, cultural deposits could be present. Third, the area was heavily modified for industrial cultivation. Remnants of such modifications, such as fill strata, excavated areas, reservoirs, and earth mounds/ berms were expected throughout the project area. A cursory study of the USGS Wailuku Quadrangle Map showed that irrigation ditches crossed the current project area. Finally, based on the primarily negative results from other archaeological projects conducted along the intermediate Wailuku-Waikapu corridor, there were limited expectations for identifying intact traditional-period architectural structures or intact cultural deposits lying beneath the tilled surface. However, historic structures related to irrigation and were likely, considering they were previously documented near the parcel (see Dega 2003). In all, some of these expectations were met during the current study.

METHODOLOGY

FIELD METHODS

Fieldwork consisted of systematic pedestrian survey of the entire 215.800 acre parcel and mechanical subsurface testing across representative portions of the parcel. Written and photographic documentation occurred during each phase of research. First, 100 percent systematic pedestrian survey was conducted to assess the presence/absence of surface features and artifacts as well as to assess soil deposits amenable to testing. As visibility was moderate within fifty percent of the project area (*makai* half), and low-to-moderate in the *mauka* half, 100 percent surface survey was conducted by two to three crewmembers spaced closely together (5 meters apart), walking parallel along north-south transects. When any structures, artifacts, or intriguing topographical changes were identified, they were plotted on an overall site map and flagged. Surface artifact assemblages, surface features, or anomalies were assigned temporary

site numbers. Temporary site numbers were converted to State Site Numbers upon a cursory project review by SHPD following the completion of fieldwork.

After survey, the crew returned to each flagged location to fully investigate the area and assess excavation potential. Representative areas were demarcated for subsurface testing. All subsurface testing was done mechanically by backhoe. Following excavation each trench was thoroughly documented via stratigraphic layer profiles, soil analysis, photography, and location plotting on a project area map (see Figure 4). A vast area was tested with these intermittent trenches, however, excavation produced negative results in terms of subsurface cultural material of interest to the archaeological record.

While no cultural materials were collected from any trench, soil samples were taken from each trench and analyzed in the field. The results revealed a fairly homogenous soil matrix. None of the excavated soil was screened, but all trench walls were thoroughly inspected. Photographs were taken first of trench locations prior to excavation, secondly of at least one profile (or multiples) of each trench, and thirdly, overview shots were taken of the respective trench at the base of excavation. Representative photographs are offered in Appendix A.

LABORATORY METHODS

As the results of survey and excavation were negative in terms of collected artifact classes and samples, laboratory work was not necessary. Because none of the soils analyzed in the field were deemed to be associated with past habitation surfaces, traditional agricultural levels, or cultural deposits, no samples were submitted for specialized analysis (*e.g.*, radiocarbon, pollen, phytolith analysis). Subsurface charcoal was an extremely rare commodity, and when found it was in association with modern debris from modern agricultural activity or dumping. Drafting of stratigraphic profiles, mapping illustration, and section drawings, were the primary components to laboratory work. All field notes, maps, photographs, and artifacts pertaining to this project are being curated at the SCS laboratory in Honolulu.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

A 100-percent pedestrian survey of the project area revealed the presence of a network of historic-period surface structures that are represented as the seven sites described below. The previously documented (Dega 2004) Waikapu Ditch (State Site No. 50-50-04-5493) and Waihee Ditch (State Site No. 50-50-04-5197) were subject to additional documentation during this survey. No traditional Hawaiian cultural material was found.

DITCHES

Four ditches are present within the project area. All four ditches originate outside of the project area and/ or extend beyond the project area's limits; no ditch exists as a segment contained strictly within the project area. Two of these ditches are of a larger historic context within Maui's sugarcane era. These are named ditches and some limited information regarding their construction and use appears within the historic record. It is important to note that up to as recently as 1983 (the publication of one series of USGS maps) two more of these significant, longer range water courses flowed into the project area. The Everett Ditch and Kama Ditch, however, have since been diverted or destroyed and no longer appear within the project area. Additionally, two lesser ditches served a more localized role within the project area. Only one lesser ditch, a possibly historic drainage from upslope, did not flow consistently at the time of survey.

State Site Number 50-50-04-5197 (Waihee Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (1905–1907 construction)
DIMENSIONS:	Length: 960.00 m; Width: 2.40m; Depth: 1.70 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	The Waihee Ditch is a flowing, concrete water conduit. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 10). Concrete cross-braces reinforce the relatively thin (0.10 m) concrete sides. The curving ditch flows into the project area from the north and roughly keeps a north-south orientation as it transects parcels 03 then 02 (see Figure 4). A smaller ditch (Site - 5729) that serviced only the locality of the project area, flows into the Waihee ditch from the west (pictured in Figure 10).

Modern alterations and maintenance to the Waihee Ditch are evidenced within the project area in the form of fortifications, a watergate near a modern reservoir, and foot and car bridges over the ditch. Additionally, nearby surface deposits of freshwater clam shells and *kukui* nuts are evidence of modern maintenance in the form of regular cleaning of the ditch. These finds are also a testament to the Waihee Ditches length and volume (Figure 11), as neither of these species exists within the project area; they traveled here via the ditch from environments north and *mauka*. In terms of historic information regarding a single project area site, the most available for

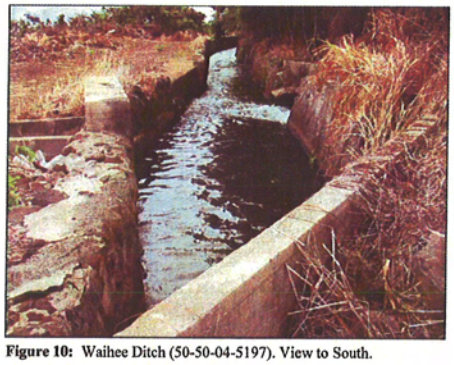

Figure 10: Waihee Ditch (50-50-04-5197). View to South.

Figure 11: Waihee Ditch (50-50-04-5197) paralleling Old Waikapu Road (50-50-04-5730). View to South.

the area pertains to Waihee Ditch. This history is worth noting in detail as it lends to an understanding of project area utilization around the turn of the century.

According to Wilcox's *Sugar Water: Hawai'i's Plantation Ditches* (1996:124), the Waihee "Canal" was started in June 1905 and was completed in May 1907. The entire canal cost $160,000 to construct and was used by Wailuku Sugar Company (founded 1862) and HC&S. The Waihee Canal was built under the leadership of an engineer named James T. Taylor. The canal, or ditch as it is now known, represents a monumental effort to carry water to dry areas of Maui. Wilcox's research emphasizes this display of manpower for the purpose of sugar irrigation:

> this 50-mgd-capacity ditch tapped the Waihee stream at the 650 foot elevation, just below the Aliele falls. . . . Its 10.62 miles included twenty-two tunnels totaling 16,539 feet; thirty-nine flumes totaling 2764 feet; 35,549 feet of open, cement-lined ditch; and a 1253-foot-long, 3-foot-diameter siphon to cross Iao Valley. Ditch grade averaged 2/5 feet per 1000. The longest tunnel (2246 feet) was especially challenging, as much of it went through hard close-grained rock and it required compressed air and percussion drills. This tunnel took eighteen months to cut. The contract price for the labor ranged from 85 cents to $5 per foot, depending on the material cut, the location, and the length of the tunnel. (1996:124)

The Waihee Ditch represents the oldest securely dated site on the project area landscape. Three other ditches are also located within the project area: two lesser, more localized ditches run from west to east; the Waikapu Ditch parallels the Waihee Ditch as it enters the project area from the north.

State Site Number 50-50-04-5493 (Waikapu Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (in use by 1913)
DIMENSIONS:	Length: 61.00 m; Width: 1.70m; Depth: 1.00 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	The Waikapu Ditch is a flowing, concrete water conduit that taps the Iao Stream at upper elevations within Iao Valley. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 12)

Figure 12: Waikapu Ditch (50-50-04-5493) at point where it enters Project Area. View to South.

—and is very similar in appearance to Waihee ditch. The concrete sides of the ditch measure 0.20 m thick. The curving ditch flows into the *mauka* fifth of the project area from the north and roughly keeps a north-south orientation. Unlike, the Waihee Ditch, the Waikapu Ditch does not transect the project area, rather it enters and then ceases.

The Waikapu Ditch flows into the Site -5727 reservoir where it terminates (although this may not have been the historic termination point of this ditch). The out-flow of this reservoir is a smaller, localized ditch that runs *makai* (Site -5729) and does not resemble the Waikapu ditch. Modern alterations and maintenance to the Waikapu Ditch are evidenced within the project area in the form of fortifications and a car bridge over the ditch. Wilcox (1996:124-125) notes that the ditch was in use prior to 1913 and was built by Wailuku Sugar Company.

State Site Number 50-50-04-5729 (un-named ditch)

FORM	Rock and concrete mortar water-course
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 1200.00 m; Width: 0.90m; Depth: 0.75 m (within P. Area)
CONDITION:	Fair

SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, flowing ditch was almost certainly built after Waihee and Waikapu Ditch construction. Site -5729 serves as a *mauka-makai* link between these two major sources of imported water. Site -5729 is constructed of basalt rock walls, specifically small boulders that are often welded together with concrete mortar (Figures 13 and 14). The walls of this U-shaped ditch are four to six courses high, and average 0.20 m thick. The bottom of the ditch is a concave, roughly-molded concrete basin. This construction material is an indicator of a localized irrigation effort, as the cost of labor and materials was a significantly smaller undertaking than the major ditches flowing in from the north. The origin of the Site -5729 ditch is the outflow of the Site -5727 reservoir (which gathers its water from the Waikapu Ditch terminus). Site -5929 then flows into the Waihee Ditch (Figure 15). The Site -5729 ditch is controlled by modern mechanisms in its flow into and out of the modern, smaller reservoir, and eventually downslope toward Honoapi'ilani Highway and out of the project area.

Figure 13: Site 50-50-04-5729 Ditch. View to West.

Figure 14: Site 50-50-04-5729 Ditch, Showing Rock and Mortar Construction of Side Walls. View to Northwest.

Figure 15: Site 50-50-04-5729 Ditch (at center) flowing into Waihee Ditch (50-50-04-5197). View to West.

State Site Number 50-50-04-5726 (un-named ditch)

FORM	Earthen berm ditch
FUNCTION:	Sugarcane irrigation
AGE:	Possibly historic
DIMENSIONS:	Length: 215.00 m; Width: 7.00m; Depth: 2.50 m (within P. Area)
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	This un-named, intermittently flowing ditch was possibly

constructed within the historic sugar era. It is a wider U-shape than the other ditches, and is choked with thick introduced grasses that stand over two meters tall. Like the Site -5729 ditch, this is a localized irrigation effort. The possibility exists that this is not a sugar cane agriculture feature, but a modern widening of a natural watershed drainage. However, its earthen berm sides resemble the historic, machine-created berms (Site -5728) constructed on the project area as erosion control during the sugar era. This ditch / drainage runs downslope, approximately west to east.

State Site Number 50-50-04-5727 (un-named reservoir)

FORM	Rectangular reservoir
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 229.00 m; Width: 76.00m; Depth: undetermined
CONDITION:	Excellent (currently maintained)
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	This un-named, large reservoir is currently active and maintained

by modern pumping equipment and fencing (Figure 16). It is surrounded by machine-created earthen berms of the same construction seen elsewhere on the project area in association with historic agriculture. Waikapu Ditch flows from the north and empties into Site -5727 (see Figure12). Everett Ditch, flowing downslope from the *mauka* West Maui Mountains, also once terminated at this reservoir (however, this ditch no longer exists within the project area). The out-flow for Site -5727 is the Site -5729 localized, lesser ditch. The length of this reservoir is oriented north-south.

The size, construction, elevation, position, and shape of Site -5727 resembles that of Hopoi Reservoir (State Site 50-50-04-5473), a documented sugar era irrigation site. Hopoi Reservoir is located 1 kilometer northeast of the Site -5727 reservoir and the latter is likely of the same construction period as the former. Hopoi Reservoir, although empty and abandoned during

Figure 16: Site 50-50-04-5727 Reservoir. View to North.

initial recordation (see Dega 2004), also was a collection point of a known major water course (Kama Ditch, Site 50-50-04-5474).

Note: A smaller, modern reservoir is located within the *makai* third of the project area (Figure 17). A 1977 aerial map of the Kahului isthmus (see Figure 3) clearly shows the Site -5727 reservoir, and also shows that this smaller reservoir was not yet constructed.

State Site Number 50-50-04-5728 (erosion-control berms)

FORM	Earthen berms (n = 14)
FUNCTION:	Sugarcane field erosion control
AGE:	Likely historic
DIMENSION RANGE:	Length: 132 to 456 m; Width: 5.0 to 17.0 m; Height: 1.0 to 1.8 m
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	ST-6
DESCRIPTION:	Fourteen soil berms comprise Site -5728 (Figure 18). This historic

method of machine-piled earthen mounds was used within cane fields to prevent topsoil erosion. As depicted by Figure 4, the positions of the fourteen berm segments vary slightly from a general north-south orientation. What is consistent, however, is that the position of each individual

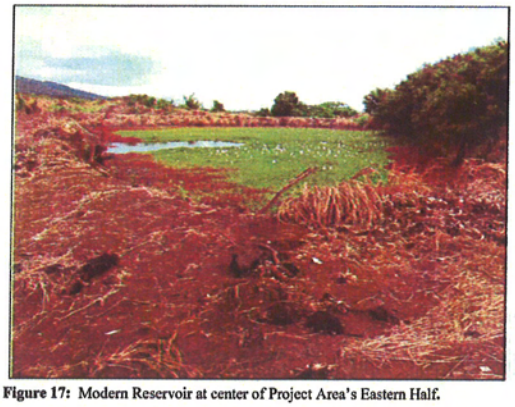

Figure 17: Modern Reservoir at center of Project Area's Eastern Half.

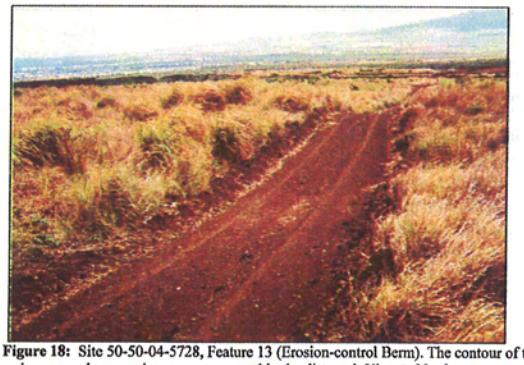

Figure 18: Site 50-50-04-5728, Feature 13 (Erosion-control Berm). The contour of the berm running cross-slope can be seen as a mound in the dirt road. View to Northeast.

segment runs perpendicular to the sloping terrain within that specific locality of the project area. The mounded soil acted to block rainwater runoff, preserving both moisture and topsoil. To a lesser degree, it is possible that the berms also prevented some wind blown soil erosion, as some of the berms were mounded to a height of 1.80 m. State Site Number 50-50-04-5522 provides a documented case of such berms in the nearby former cane fields of Waiehu, Maui (Wilson and Dega 2004).

Stratigraphic Trench 6

One stratigraphic trench (ST-6) was backhoe excavated through a single soil berm segment of Site -5728. The Feature 4 berm ran north-south at the center of the project area's south perimeter (see Figure 4). ST-6 perpendicularly transected the Feature 4 berm with the intent to explore its interior construction and subsurface depth. A cross sectional profile of ST-6 (Figures 19 and 20) indicates Site -5728 berms are 100 percent made up of naturally occurring soils that have been machine mounded in the past. No imported rock or other substance was used in the construction of these berms. The soil disturbance extends into Layer II (to a maximum depth of 50 cmbs) as evidenced by the mounded subsurface contour in shown in Figure 20. This simply means that the plow mechanism that created these berms cut deeper into the natural landscape in this berm building effort than was generally used when tilling the surrounding fields. (The surrounding fields consistently display an undisturbed Layer II.) Subsurface content is explored further under the heading "Subsurface Testing."

State Site Number 50-50-04-5730 (Old Waikapu Road)

FORM	Dirt road
FUNCTION:	Probable cane-haul route
AGE:	Likely historic
DIMENSIONS:	Length: 945.00 m; Width: 3.50m
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	A dirt road that enters the project area from the eastern perimeter (Honoapi'ilani Highway)—and then turns southwest before crossing the southern perimeter—forms the boundary between parcels 02 and 03. On a 1992 Tax Map Key the following words are printed in association with this road: "(Old Waikapu Road) County Road". At the time of survey, this road continued to see infrequent pedestrian and vehicle traffic—reserved for those transecting this undeveloped swath of land as a possible shortcut between paved roads. For this reason, this dirt road remains free of vegetation (Figure 21).

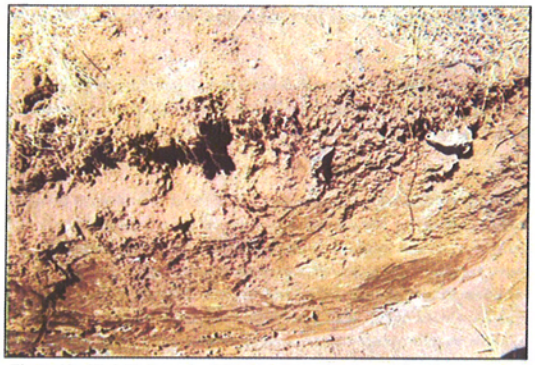

Figure 19: ST-6 (Photograph of North Wall) Profile Shows Subsurface Contour of Machine-mounded Site -5728, Feature 4 Berm. View to North.

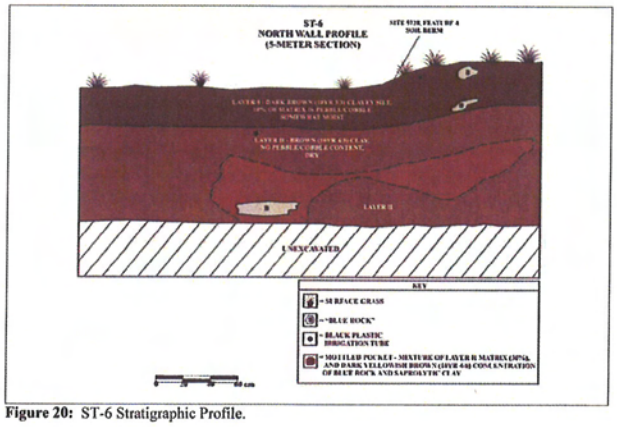

Figure 20: ST-6 Stratigraphic Profile.

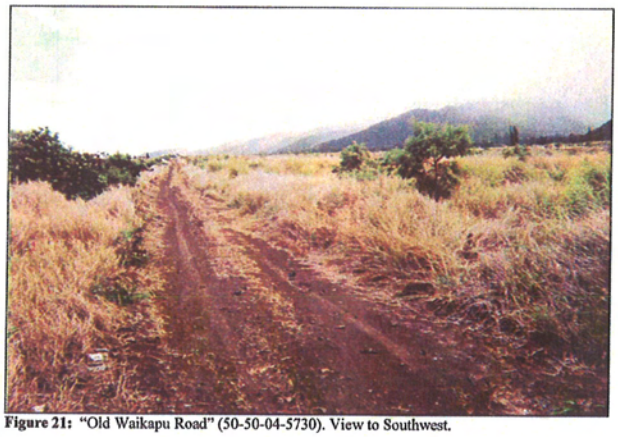

Figure 21: "Old Waikapu Road" (50-50-04-5730). View to Southwest.

Exactly how old "Old" Waikapu Road is difficult to determine precisely. However it is safe to assume that this newly recorded State Site Number (50-50-04-5730) originated in the same sugar period as the other six sites within the project area. A Cultural Impact Assessment (CIA) within the same project area provides further detail backing a historic origin to the Old Waikapu Road. Author of the CIA, Kalei Tsuha, interviewed a local resident who, as a child in 1922, remembers traveling across the project area on this same road by horse (K. Tsuha, personal communication 9/25/05).

SUBSURFACE TESTING

Twenty-one stratigraphic trenches (STs) were mechanically excavated by backhoe to test for the presence/absence of subsurface cultural deposits in a variety of project area locations. Excavation took place over a three-day period, August 22–24, 2005. Of these trenches, only one (the previously described ST-6) revealed any kind of subsurface cultural material. ST-6 was placed through an existing soil berm in order to document construction technique of these historic agricultural features. ST-6 documented the subsurface extent of the Site -5728, Feature 4 soil berm (the base of which does extend into the otherwise undisturbed Layer II matrix) (see

Figure 20). None of the 21 trenches revealed any type of artifact, charcoal deposit, or midden deposit.

Testing was spread evenly across the project area with the intent of documenting soil stratigraphy trends by project area location. In total, 21 stratigraphic trenches (ST-1 through ST-21) were excavated and documented. The trenches averaged 7.86 m long, 0.70 m wide, and 1.58 m deep.

Calculating the above averages, an approximate area of 155 m^2 and volume of 183 m^3 of soil was excavated during testing. These sampling figures are primarily indicative of the limited positive results achieved for each trench; if significant cultural resources were documented during the project, it is likely that less geographic space would have been excavated as documentation and sampling of such cultural resources would have been more time consuming. In the amount of time allowed for the project, testing was geared toward obtaining the most information available to assess the presence/absence of subsurface cultural deposits (as it was fairly quickly determined that all surface sites were historic).

STRATIGRAPHIC TRENCH LAYER ANALYSIS

As expected, excavation within the former sugarcane fields resulted in a consistent stratigraphy of culturally sterile soils. Trenching revealed no more or less than two distinct layers in each ST. The variation between trenches was even less than expected, as in each, Layer I represented soil that had been disturbed by historic and modern agricultural practices, and Layer II represented undisturbed soil. The minimal variation between trenches was threefold: the thickness of Layer I varied by 41 centimeters at most; the soil color and qualities variety slightly in among some trenches; and the pebble, cobble, and or saprolytic rock content within Layer II somewhat varied. Otherwise, the project area is extremely homogenous in subsurface content. This can be credited primarily the effects of decades of agricultural use, and also the fact that the Iao Series soils existing here show only minor variation. The following two examples, ST-7 and ST-9, display the typical slight range of stratigraphic variation within the project area (Figure 22).

ST-9 is the standard project area stratigraphy. Layer I has a surface cover of thick, dried grass. Layer I is 65 cm deep and consists of a moderately moist, very dark grayish-brown (10YR 3/2) clayey silt, of which less than ten percent is pebble/ cobble. Layer I contains evidence of the modern agricultural practices in the form of plastics. Only two of the 21 STs excavated did not

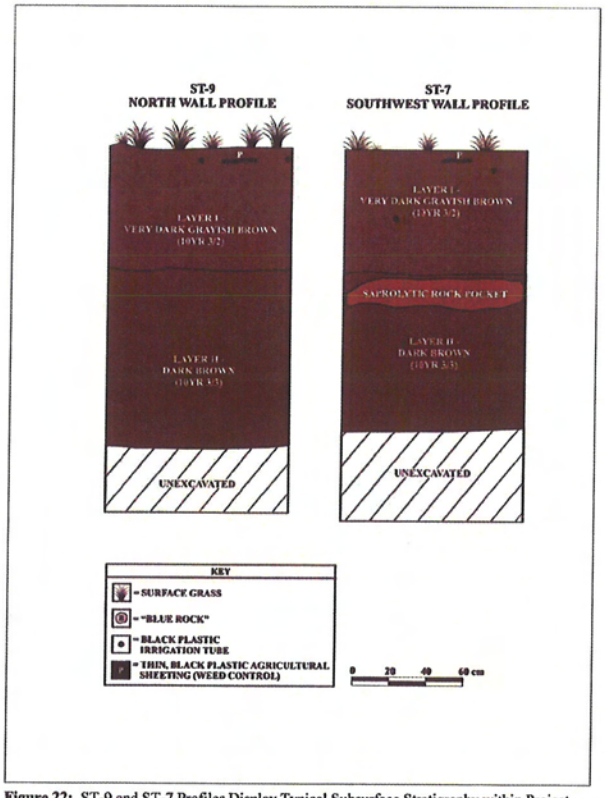

Figure 22: ST-9 and ST-7 Profiles Display Typical Subsurface Stratigraphy within Project Area.

contain either drip line irrigation tubing or black plastic weed-control sheeting in Layer I (see Appendix A). In the majority of STs, Layer I contained both of these plastics at varying depths.

Layer II, as evidenced in ST-9, was often a very compact, moderately dry, dark brown (10YR 3/3) clay, of zero pebble or cobble content. Often, however, a pocket of saprolytic (decomposing) rock or "blue" rock could be found in Layer II (as shown in the ST-7 profile). Layer II thickness remains undetermined as this layer proved too deep to find bedrock, even with the reach of a large backhoe. ST-20 was excavated to a maximum depth of 2.60 m in an unsuccessful attempt to reach bedrock. It is safe to assume that Layer II of the project area is at least 2.00 m thick, but probably much thicker.

DISCUSSION AND CONCLUSIONS

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Inventory Survey included archival research, systematic pedestrian survey of the project area, and representative subsurface testing. While the landscape did not yield traditional Hawaiian archaeological sites, it did reveal a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road—forming seven sites. Five of these sites are new additions to the State's rich historic record of turn-of-the century sugar industry in Hawai`i.

WATER CIRCUITRY

In his 2004 Inventory Survey Report of the Kehalani Mauka Development lands Dr. M. Dega initiated three hypotheses regarding historic water circuitry within this Wailuku / Waikapu landscape. Aside from the small area of land covered by the pre-existing Kuikahi Drive that acts to separate the two surveys—the 348.613 acres in Dega's study and the 215.800 to the south (the present survey) may be viewed as 564.413 contiguous acres for the archaeological record. This is not an arbitrary relationship, as the *ahupua`a* division separating these fields did not individualize their historic utilization. The following text is from *An Intermediate Zone Archaeology Inventory Survey [TMK (2) 3-5-001:portion of 001]* (Dega 2004:41–42):

> Several intriguing patterns emerge as one focuses upon the empirical, historic-period evidence at hand. One of these patterns is the direction in which the historic ditches have been constructed and utilized across the parcel. Case in

> point: three main ditches or canals run north-south, or *[perpendicular]* to the slope, across the project area and beyond. Waihee Ditch, Kama Ditch, and the westernmost ditch of Site T-24 (Site -5493) [*Waikapu Ditch*] are the most well-constructed on the parcel. These ditches were water conduits across these dry zones. Typically they could be used to water areas along their course or would simply empty into large retention basins (reservoirs) at selected points.
>
> However, there is also a network of ditches, mostly earthen berms and small channels, that run *[parallel]* to the slope on a west (upslope)-east (downslope) axis. These ditches are commonly non-formalized like the north-south ditches and tend to be more localized. Site T-16 (Site -5490), built on an east-west axis for instance, runs a total of 1,000 meters while the north-south Waihee Ditch runs for more than 16 kilometers. The important point is that there is a functional difference between the north-south oriented ditches and the east-west coursing ditches. The more formalized [and costly] north-south ditches are actually water conduits wherein water may be carried long distances to irrigate such water-poor locales as the present project area. The less conventional ditches situated on an east-west axis are simply drainages and do not fulfill an irrigation role on these dry parcels. These smaller ditches appear to be more naturally formed by erosion and were simply modified to accommodate excess water and sediment flow so as not to interfere with the main purpose of cultivation. This pattern appears valid for the present project area but requires additional information from other locales to be proven, negated, or amended.

Thus, we propose two hypotheses that remain to be examined:

1. All north-south canals or ditches along central Maui that run *[perpendicular]* to the slope are water conduits and inherently contain an irrigation function.

2. All east-west bearing canals or ditches along Central Maui that run *[parallel]* to the slope are only drainages that do not disseminate water for irrigation purposes but function to remove overflow so as not to curtail cultivation potential.

DISCUSSION POINTS

The current study provides a second example within the archaeological record confirming Dega's first hypothesis. Both the Waihee Ditch and Waikapu Ditch (numbered, but not named in Dega 2004) were identified as running north to south. These major irrigation conduits continue this flow direction into the current project area. These are large, long, costly, historic structures that were designed to carry stream waters great distances. These ditches run cross-slope within the project area.

The current project area findings expand upon, but do not necessarily confirm Dega's second hypothesis. Two lesser, localized ditches do indeed follow the same orientation as those in the Kehalani lands. Both of these lesser ditches run with the slope contour (perpendicularly linking the major ditches, at times). However, the hypothesis of a functional difference is not soundly reinforced. The Site -5726 ditch is a subtle, earthen feature that may have filled a drainage role rather than an irrigation role. But there is no proof that the more elaborately constructed Site -5729 ditch (stacked basalt boulders that are mortared with concrete) did not in fact serve as a *mauka* to *makai* irrigation artery. This ditch may have served as an outlet to the reservoir's (Site 5727) spill-over, however, this function should not exclude a dual purpose of localized irrigation.

Finally, like in Dega's (2004) study, four points contribute to the current project's lack of traditional Hawaiian cultural material. First, and most obviously for this location, historic impacts have dramatically altered the landscape so much as to erase larger archaeological traces of traditional-period activities. Second, the lack of traditional-period evidence suggests that these open lands were probably not intensively utilized during prehistoric times. The current project area may have not been selected as a habitation zone as it is an open area without perennial water resources—and more preferable lands were readily available. Third, the types of traditional activities conducted within and near the project area may not have left archaeological signatures. Fourth, as is the case for all archaeological projects, testing may have failed to coincide with the existing subsurface cultural materials. This is unlikely but always a possibility as 100 percent of any parcel is rarely ever fully excavated.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

Seven archaeological sites were documented in the project area: Waihee Ditch (50-50-04-5197); Waikapu Ditch (50-50-04-5493); an un-named, lesser ditch (50-50-04-5729); a second un-named, lesser ditch (50-50-04-5726); a large, un-named reservoir (50-50-04-5727); a series of fourteen sugarcane-field erosion-control, soil berms (50-50-04-5728); and a County dirt road named "Old Waikapu Road" (50-50-04-5730).

These sites have been evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five criteria are classified below:

Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Site is associated with the lives of persons significant to our past

Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in prehistory or history

Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places

All seven of these historic sites have been assessed as significant under Criterion D.

Based upon the results of this Inventory Survey and the results of archaeological work on adjacent parcels that have also produced primarily negative results (see Dega 2003, 2004; Monahan 2003; Buffum and Dega 2001), it appears as though additional archaeological research on the subject parcels would not contribute a significant volume of additional data to the interpretation of the area or region, or to Hawaiian prehistory/history. Archaeological Monitoring is not recommended during construction within the project area. The seven sites documented herein have yielded their information to the historical record and no additional archaeological work is recommended.

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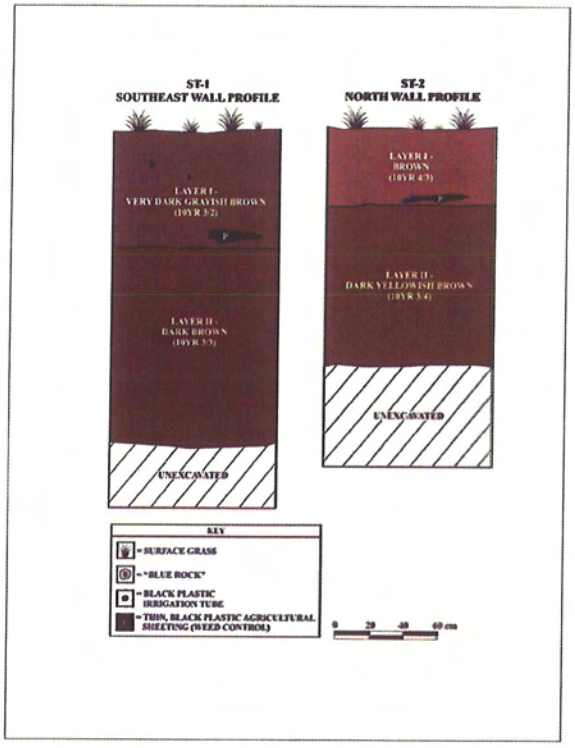
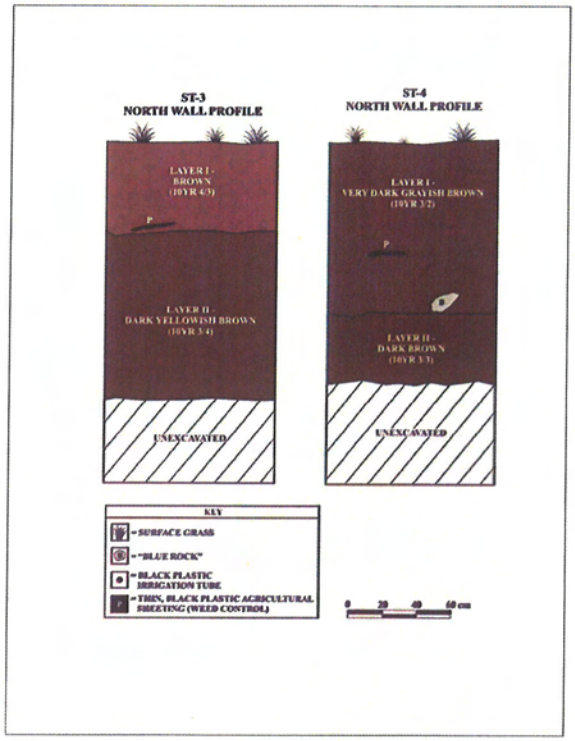
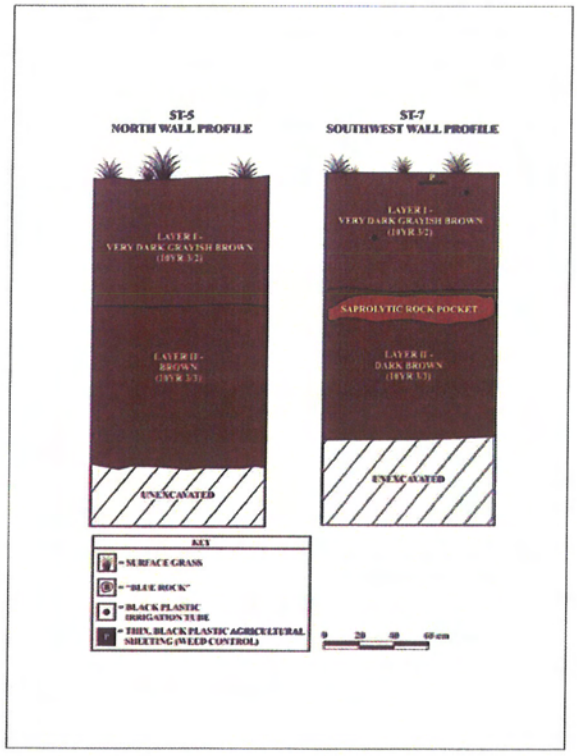
APPENDIX A: STRATIGRAPHIC PROFILES

A

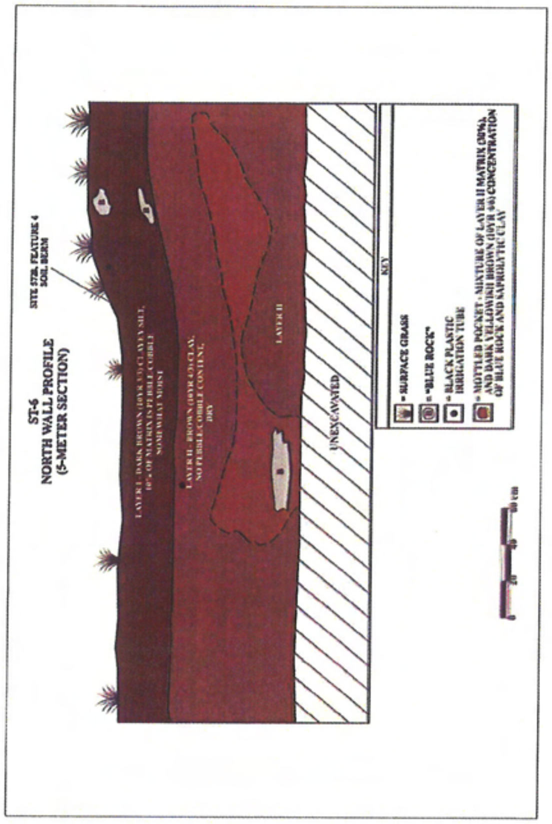



ST-3
NORTH WALL PROFILE
LAYER I -
BROWN
(10YR 4/3)
P
LAYER II -
DARK YELLOWISH BROWN
(10YR 3/4)
UNEXCAVATED
ST-4
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

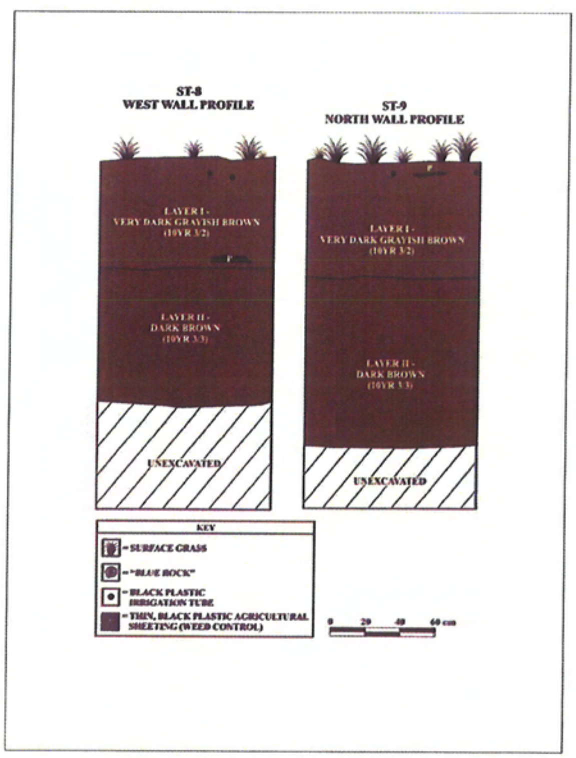
A: 2

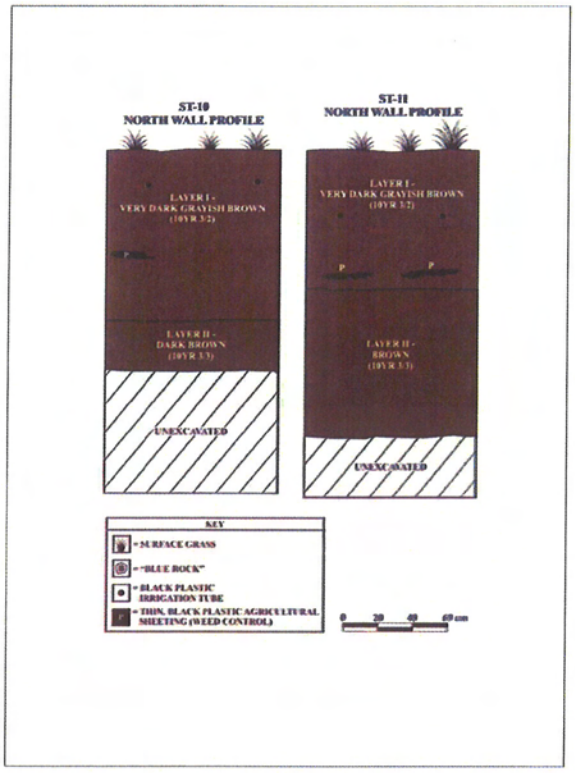

ST-5
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
ST-7
SOUTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
SAPROLYTIC ROCK POCKET
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

A: 3

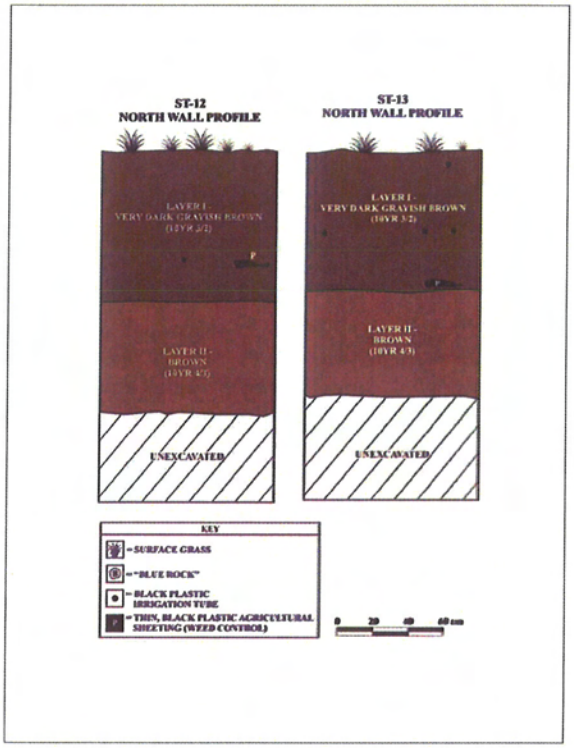

ST-6
NORTH WALL PROFILE
(5-METER SECTION)
LAYER II
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE

A: 4


ST-8
WEST WALL PROFILE
ST-9
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-10
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-11
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
P
LAYER II -
BROWN
(10YR 5/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

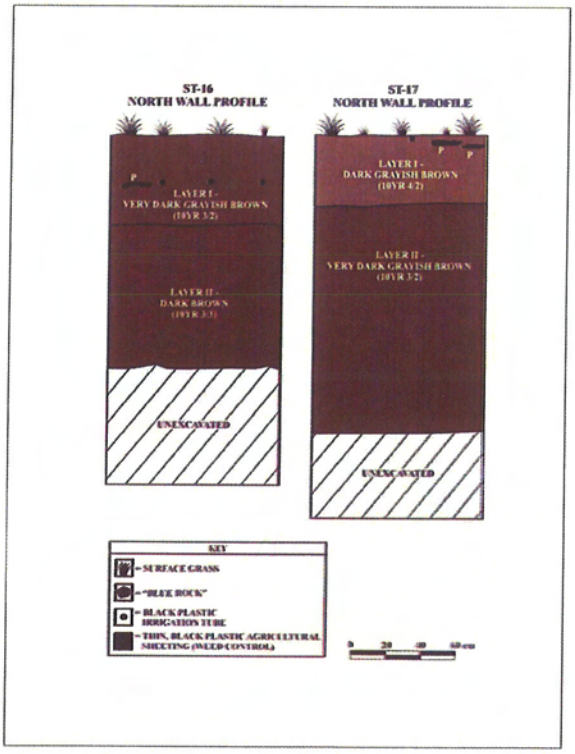
A: 6


ST-12
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
ST-13
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

A: 7


ST-14
NORTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-15
NORTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

A: 8


ST-16
NORTH WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-17
NORTH WALL PROFILE
P P
LAYER I -
DARK GRAYISH BROWN
(10YR 4/2)
LAYER II -
VERY DARK GRAYISH BROWN
(10YR 3/2)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

A: 9

APPENDIX D-1.

State Historic Preservation Division Approval Letter

LINDA LINGLE
GOVERNOR OF HAWAII

(652)

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI HAWAII 96707

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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FIRST DEPUTY

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

November 18, 2005

Michael Dega, Ph.D.
Scientific Consultant Services
711 Kapiolani Blvd. Suite 975
Honolulu, HI 96813

LOG NO: 2005.2398
DOC NO: 0511MK22

Dear Dr. Dega:

SUBJECT: Historic Preservation Review - 6E-42 - Archaeological Inventory Survey On 215.800 Acres for Towne Development of Hawaii and Endurance Investors, LLC
Waikapu Ahupua'a, Wailuku District, Maui
TMK (2) 3-5-002:002 and 003

Thank you for the opportunity to review this report which our staff received on October 14, 2005 (Wilson and Dega 2005, *Archaeological Inventory Survey Report on 215.800 Acres Located in Waikapu Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03]*...Scientific Consultant Services, Inc., ms.

The background section acceptably establishes the ahupua'a settlement pattern and predicts the likely site pattern in the project area. The historical information provided summarizes the history of the post-contact period land uses. The summary of previous archaeological work in the area provides a baseline for the current work. The subject parcel has formerly been utilized for commercial agriculture, and consists 100% of abandoned cane land. Three small Land Commission Awards are situated within the subject parcel, in an area through which a stream and/or ditch formally ran.

The survey has adequately covered the project area documenting five new historic properties in the project area, and re-identifying two previously identified historic properties. Previously identified sites, SIHP 50-50-04-5197 and -5493, consist of the Waihe'e and Waikapu Ditches. Newly identified SIHP sites 50-50-5729 and -5726 represent an unnamed rock and mortar ditch and an unnamed earthen ditch/drainage. A large unnamed reservoir, SIHP 50-50-04-5727, is situated at the terminus of the Waikapu Ditch (-5493). SIHP 50-50-04-5728 is a sugar field erosion control site, incorporating 14 earthen berms cross slope. These are clearly identified topographically. One additional site, SIHP 50-50-04-5730, the

"Old Waikapu Road" was identified as spanning the border of Parcels 002 and 003. Subsurface testing (twenty-one backhoe trenches) were also negative for evidence of cultural deposits. These were distributed evenly across the project area.

We concur that all seven sites are significant under Criterion "D" and have the potential to yield information important to understanding the history of the region. The sites have been adequately documented.

We also agree that no further archaeological mitigation is necessary.

We find this report to be acceptable. The historic preservation review process is concluded Development of the project areas will have "no effect" on significant historic sites. As always, if you disagree with our comments or have questions, please contact Dr. Melissa Kirkendall (Maui/Lana'i SHPD 243-5169) as soon as possible to resolve these concerns.

Aloha,

MELANIE A. CHINEN, Administrator
State Historic Preservation Division

MK: kf

c: Bert Ratte, DPWEM, County of Maui
Michael Foley, Director, Dept of Planning, 250 S. High Street, Wailuku, HI 96793
Maui Cultural Resources Commission, Dept. of Plng, 250 S. High St., Wailuku, HI 96793

APPENDIX E.

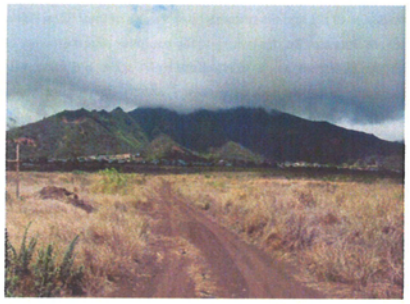
Cultural Impact Assessment Report

APPENDIX E.

Cultural Impact Assessment Report

FINAL DRAFT REPORT

CULTURAL IMPACT ASSESSMENT
ON
[TMK: (2) 3:5:02:02] & [TMK: (2) 3:5:02:03]
WAIKAPŪ, WAILUKU, HAWAIʻI



Prepared by:

Kalei Tsuha,
Cultural Consultant
P.O. Box 38
Wailuku, HI 96793

Prepared for:
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Cultural Impact Assessment

ABSTRACT

Upon the request by Munekiyo & Hiraga, Inc. of Wailuku, this Cultural Impact Assessment was conducted on approximately 210 acres of land. The area of concentration is located at the foothills of the central *puʻu* (hill) of the West Maui Mountains known as Mauna Liʻo in the *ahupuaʻa* (land division) and *moku* (large land district) of Wailuku, Maui Island, Hawaiʻi [TMK: (2) - 3 - 5 - 02:02] & [TMK: (2) 3 - 5-02:03].

Research included an in depth archival/background research with the description of known land use. The intent of the assessment is to define information relating to the practices and beliefs of indigenous Hawaiians within and surrounding the region of Mauna Liʻo. The main goal is to provide information on traditional customary practices that were, and perhaps still are, being practiced within the area, and to acknowledge these cultural methodologies in order to preserve them regarding the possible impact from the proposed plans. Customary practices are related, but not limited to access driven subsistence, agricultural, recreational, healing, burial practices, and religious or spiritual traditions.

The information obtained during the research depicted the project area as an area that was historically part of an important agricultural center for indigenous Hawaiians and battle fields for various wars between Kalaniʻōpuʻu, *aliʻinui* (chief) of Hawaiʻi Island, and Kahekilinuiʻahumanu, *aliʻinui* for Maui. Over 100 years of heavy sugar cane production has wiped out nearly all of the evidence of the historical period prior to this sugar cane era. Proposed plans will subdivide parts of the area for various development plans.

Six interviews were conducted, four of which were taped. Those interviewees who signed release forms authorizing Kalei Tsuha to use the knowledge garnered in those interviews were used within this assessment. Those interviewees that did not sign any release forms were not. Four other interviews were conducted without tape recording or to which a verbal approval was obtained for use within this assessment. All individuals were given a copy of the written assessment and allotted time for comments or changes.

ACKNOWLEDGEMENTS

I would like to thank the individuals who allowed me their time and patience in order for me to conduct this study. Mahalo nui to those who have passed on and left us small traces of their contributions and existence so that the present day and future generations can come to understand and value the past.

Mahalo nui to Aunty "Jo Jo" Apo for sharing such wonderful recollections and memoirs of her life and beautiful time of Wailuku's past; mahalo also to Kahu Charles K. Maxwell, Sr. for sharing his stories of his and his grandfather's stories of their "One Hānau;" mahalo nui to Bernard Bulawan Sr., for indulging his daughter with memories of entertaining in Wailuku during his youth; to Hōkūlani Holt-Padilla and Aunty Kahili Cummings for their time, to the old time families of Waikapū, the Rogers 'ohana, Mr. and Mrs. Ted Harders, Mr. Kamasaki, Ann Wakamatsu, Ann Spencer Vida and finally, a special thank you to a happenstance meeting of an individual who wishes to remain anonymous yet was willing to "talk-story" with me about the area.

As always, mahalo nui to my family for all of their help, patience, and support.

TABLE OF CONTENTS

INTRODUCTION

The goals of Cultural Impact Assessments are to define information relating to the practices and beliefs of any particular ethnic group for a specific geographic area. The impact assessment attempts to determine if proposed actions will have an affect on cultural practices and to ensure mediation measures occur so that all parties are satisfied with the proposed recommendations. The types of customary access driven practices may be related to spiritual customs. For the current phase of work, background research was conducted in order to provide information relative to the past uses of the land through historical and archival research and oral interviews. The project area is located *ma uka* (upland) of the Honoapi'ilani Highway on the foothills of Mauna Li'o, which is in the *ahupua'a* and *moku* of Wailuku, Maui Island, Hawai'i [TMK: (2) - 3 - 5 - 02:02] & [TMK: (2) - 3 - 5 - 02:03].

To gather information on the intangibles associated with the project area, interviews with traditional cultural practitioners as well as elders who are kama'āna (natives) to Wailuku, and *kupa* (locals & long-time residents) of Waikapū were conducted. The sections entitled *Nā Papahana Hawai'i* (Hawaiian Practices) and *No Waikapū Mai Au* (I Am From Waikapū), contains the information gathered during these interviews.

Through out this assessment the term "Joint Venture" refers to Towne Development of Hawai'i, Inc./Endurance Investors, LLC/Association of Il Wai Hui; and the word "Project" refers to the proposed development.

METHODS

The first portion of this Cultural Impact Assessment concentrated on the background research that was compiled from the Bailey House Museum, Hawai'i State Archives, Mission House Museum, Hamilton Library, and Hawai'i State Bureau of Conveyance. The second portion of this Assessment is information that was gathered during the oral interviews. The final section will attempt to synthesize the background research in light of the oral interviews, and define any traditional practices including any cultural resources that may be affected by the proposed project, and will determine any necessary mitigation measures or alternatives to the proposed action. Unless otherwise noted, all Hawaiian word definitions are from Pukui & Elbert et al. *Hawaiian Dictionary* (1986) and *Place Names of Hawai'i* (1974).

An attempt was made to contact various knowledgeable people about the Mauna Li'o area itself or of the surrounding areas such as Wailuku and Waikapū. The people who were contacted are either currently or previously cultural practitioners,[1] long-time residents of the area, or were elders who lived in/near the area and were raised with traditional cultural practices, which range from, but are not limited to, fishing, farming, animal husbandry, medicinal gathering, healing, burial practices, and other practices associated with customary subsistence and daily survival.

Many Hawaiian terms are used throughout this report and I will attempt to explain most of these terms, however I do apologize if certain Hawaiian terms are not translated in its entirety as English is not always able to express the complete meaning and depth of these Hawaiian words or terms. Some terms are left in their Hawaiian form rather than translating them into English. These words will be translated at their first use.

Three of the interviews were conducted and recorded on a digital recorder, and one was conducted with a micro-recorder in settings that were comfortable. Another was done via phone followed by a visit to the residence to which neither of these interviews were recorded and the final was done "impromptu" during one of my on-site visits on the property. This last interview had not been recorded and the informant wishes to remain anonymous.

[1] The term practitioners refer to people who practice the various customs and/or traditions of *Kānaka Maoli* [Native Hawaiians].

The same general questions were asked during the interviews and were conducted in the local "talk-story" fashion. An aerial photo and Tax Map Key was presented to the interviewees to use for reference purposes. The "talk-story" style of interview is a comfortable way for the interviewee to lead the discussion so that he or she would be able to express what was most important to them about the project area. The recordings were not transcribed. The interviewees that agreed to be recorded signed a release form so that their information could be included within this assessment. Those who did not sign releases are listed as interviewees, but their information was not included within this assessment. There were some individuals who did not want to be taped and had agreed that their information could be included within this assessment.

PEOPLE CONTACTED

The individuals who consented to an interview are associated with the Wailuku and Waikapū areas. The following individuals were contacted to participate in the interviews:

Charldine "JoJo" Josephine Kekuikuiloaikapōmaika'i Ledward Apo and her family have been living on their family land for the last five generations. She descends from a long line of the Cockett family. They were a fishing family that also lived by raising taro, breadfruit as well as other plants for subsistence. Her father and uncles would go up into the mountains to gather fiber [most likely 'olonā] to make strong twine for fishing line. She is a retired Maui County lifeguard of 37 years who has taught nearly all of the children on the island of Maui, including the writer of this assessment, how to swim. Aunty Jojo was born and raised in the Wailuku area on Kaho'okele Street during a time when the area was a rural region located on the fringe of a booming and busy Wailuku town. She has raised her five children in Wailuku and continues to reside in the same family home, raising her grandchildren with the same Hawaiian values as was taught to her by her grand parents.

Kahu Charles Kauluwehi Maxwell, Sr. is a cultural practitioner who is also the Hawaiian Cultural Specialist at the Maui Aquarium. He also presides over the Maui & Lāna'i Burial Council as the Chairperson and is the Kahu who has been involved with the proper repatriation of displaced or disturbed human remains for the last 20 years. Kahu Maxwell was born in Lahaina, raised in Kula, and visited his grandparents who lived in Waikapū. Both he and his grandfather refer to Waikapū as the sacred waters and their "*One Hānau*," sands of their birth.

Bernard Nu'uhiwa Bulawan, Sr., was born and raised in Lahaina. He comes from a

fishing family and remembers when there wasn't a harbor in Ma'alaea. He was an entertainer for Emma Sharpe and her Hula Revue who would entertain weekly in the Wailuku Hotel, now known as the Maui Medical Group in the late 40s and 50s. He is also the writer of this assessment's father.

Hōkūlani Holt-Padilla was born and raised in Wailuku, but specifically in the Paukūkalo area. She is a renowned kumu hula, Hawaiian historian & practitioner. She currently works at the Maui Arts and Cultural Center as their Cultural Advisor. She formerly worked at the Bailey House Museum as the Cultural Resource Manager, she then became the Director for the Pūnana Leo o Maui Hawaiian Language Preschool, she then worked for the Kaho'olawe Island Reserve Commission. All of these jobs were within the Wailuku District, but much of her Wailuku history comes from her family who has been residents in the Wailuku District for at least 7 generations.

Thelma Kāhili Cummings was born and raised in Wailuku. Her father was the Prison Warden for the Paukukalo prison. Aunty Kāhili was also a Kumu Hula and has lived in Paukukalo for 70 of her 87 years of life.

Ann "Annie" Spencer Vida was born in Wailuku near the Sand Hills area. She was married to Leslie Vida and had raised their five children on a part of the Vida's 9-acre land adjacent to the proposed project site. Ms. Vida explained that she has resided on the Vida property for 54 years. Her ex-husband's family had the largest hog farm on the island of Maui for over 50 years. Ms. Vida explained that the land has been in the Vida possession for many generations, perhaps close, if not more than 80 years. Their country parcel of land still raises horses, chickens, a few hogs, and a few other farm animals. Ms. Vida had also retired from working at Ka Lima O Maui for many years.

Ann Nakamoto Wakamatsu is a current resident of Waikapū. Her father started a dairy in Waikapū in 1926. They produced and sold milk, cream, and butter during the plantation era.

Ted & Zelie (Rogers) Harders are current residents of Waikapū. The Rogers 'ohana had a large ranch that raised cattle near the area now known as Waiolani. The Ranch was in operation from the 1940's until the development of the Waiolani homes. The Rogers family is well known to old-time Waikapū and Wailuku residents. They still own quite a few homes and land in the Waikapū area.

Wally Rogers is a current resident of Waikapū and is Zelie Harders younger brother. He recounted country living and working on the ranch during the interview.

Mr. Teruo Kamasaki is also a current resident of Waikapū. He is 82 years old and has

a lot of historical information about the pre and post WWII days of Waikapū. Mr. Kamasaki remembers the old government road when it was in operation as well as water issues during the sugar plantation era. He also remembers the larger reservoir above the Project area breaking and flooding out the fields many times in his lifetime.

One anonymous individual, this individual had been interviewed on-site during a visit to the property of the proposed project. The individual informs me that he and his family have been involved with farming near the area for at least three generations and remembers when Waikapū was known as "out in the country" and had miles and miles of sugar cane fields.

BACKGROUND RESEARCH

Upon the request of Munekiyo & Hiraga, Inc., Kalei Tsuha conducted the background research and oral history interviews. Information was gathered from the Bailey House Museum, the State of Hawai'i Archives in Honolulu and from two Hawaiian Language Newspaper Archival Websites know as:
www.Ulukau.org and http://liweb.hawaii.edu/hnp/newspapers.htm.

BRIEF SUMMARY

The results of this study show that the proposed project plans of development should not have any impact on any Hawaiian cultural practices in the area. However, based on the information gathered during the oral traditions and the project area's close proximity to the sand dunes *ma kai* (seaward) of Honoapi'ilani Highway, which are known traditional areas for Hawaiian burials and also historically known as famous battle grounds; A cultural or archaeological monitor should be present during any grubbing or removal of earth as the potential for discovering burials is quite possible. Also, practices of farming and animal husbandry continue to occur on the Vida property, as it has been for nearly 80 years. A recommendation that these practices should be allowed to occur without interruption is also being suggested.

PHYSICAL SETTING

TRADITIONAL DESCRIPTION

Traditionally, land was separated into various land divisions that was commonly portioned off by geological features such as mountains, ravines, ridges, streams, or prominent land features. The *ali'i 'aimoku* was the highest ranking chief before the

monarchy era. He governed the entire island in a complex, feudalistic hierarchal system. Traditionally the island was sectioned off into large land divisions called *moku* on the island of Maui, which were governed by high-ranking chiefs. These *moku* traditionally started in a centralized area of the tallest peak of a large mountain and was divided from the tip of the mountain and continued in a large pie-shaped piece down towards the coastline. All the resources within the *moku* belonged ultimately to the *ali'i 'aimoku* and had been governed by the chosen high-ranking chiefs. The various *moku* would be sectioned into smaller pie-shaped pieces called *ahupua'a*, which were further sectioned off into smaller land divisions called *'ili*, and continued being sectioned into smaller pieces until the smallest land division known as *ko'ele* which were either very small sweet potato mounds or the small section between taro fields. Each land section was administered by lower-ranking *ali'i* (chiefs) known as *konohiki* who would manage the *maka'āinana (*commoners) so that his or her land section was productive and contributed to the overall well being of their district.

At one time, the island of Maui had twelve *moku*. Wailuku was one of these twelve *moku*. This *moku* started as far north as Kapuna Valley, now known as Waihe'e Valley and stretched as far south as the coastline of Ma'alaea. The entire isthmus of Maui is in this Wailuku *moku*. The tallest peak of Mauna Kahālāwai (West Maui Mountains) is Pu'u Kukui. Mauna Li'o, which is also known as Mauna Leo, is encompassed by Mauna Kahālāwai and seems at times to be the center of the larger mountain. See Figure 1.

Other traditional names for the area include *Nā Wai 'Ehā*, or the Four Waters, and *Nā Poko*, or the small land divisions[2], which are the poetic names that refers to the four large streams within the *moku* of Wailuku. Wealth was measured by the amount of water resources you had within your district. Therefore, other chiefs from other islands wanted the control over Maui due to the abundance of the large resources *Nā Wai 'Ehā* produced for the Wailuku communities.

Kahekili had his main residence as well as his luakini heiau built in the area where One Main Plaza and Ka'ahumanu Church now stand. This land had a prominent view of the surrounding landscape, of the entire isthmus of Maui and more importantly of the sacred burial grounds for the *ali'i* near 'Īao. Strategically, it was a great fort for an *ali'inui*. Because of the project's location, some of the surrounding areas will be included in this

[2] Also, sometimes the personal lands of a chief.

assessment, as it will help to illustrate and establish some of the historical significance of the area.

PROJECT AREA

The project is situated at the foothills of Mauna Li'o, which is approximately at the 500 foot elevation on its upper boundary and meets the Honoapi'ilani Highway at approximately the 385 foot elevation on its lower boundary. See Figure 2.

Figure 1

Mauna Li'o with slight views of both Wailuku and Waikapū Valleys

Mauna Li'o was known to have been a large agricultural area that traditionally farmed taro, banana, and 'ulu fields. The lower end was known to be the place where various battles and skirmishes had occurred.

Prior to the large sugar cane production, the mountain's forest had been lower than what currently exists today. Gathering of necessary plant materials for subsistence purposes

probably had taken place historically.

Wheat (Gutmanis notes to Ashdown, 1978) had also been cultivated for a short time in 1878 near the "Kalua" ditch, but soon gave way to the mass cultivation of sugar cane. A few water disputes had also materialized due to the varying types of crops being cultivated. There was as many as twenty sugar mills at one time on Maui. The first one of these mills started its sugar production in 1862 in Wailuku. There are a few plantation ditches and reservoirs within the project area that are most likely not traditional. See Figures 9 & 10. The land had been heavily cultivated for over 100 years in the production of sugar cane. Any trace of old *lo'i* (wet taro ponds) or *mala 'ai* (traditional gardens) had probably been plowed under or buried.

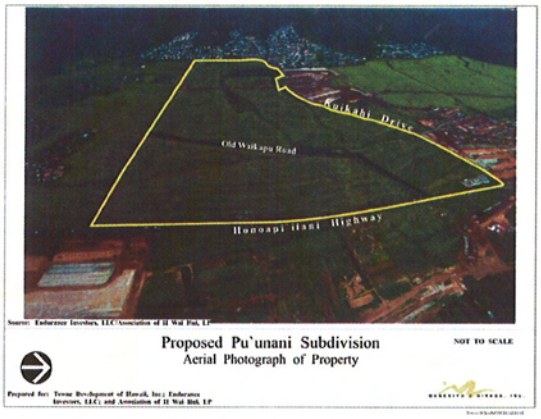


Figure 2

Aerial map of Project Area
(Courtesy of Munekiyo & Hiraga, Inc.)

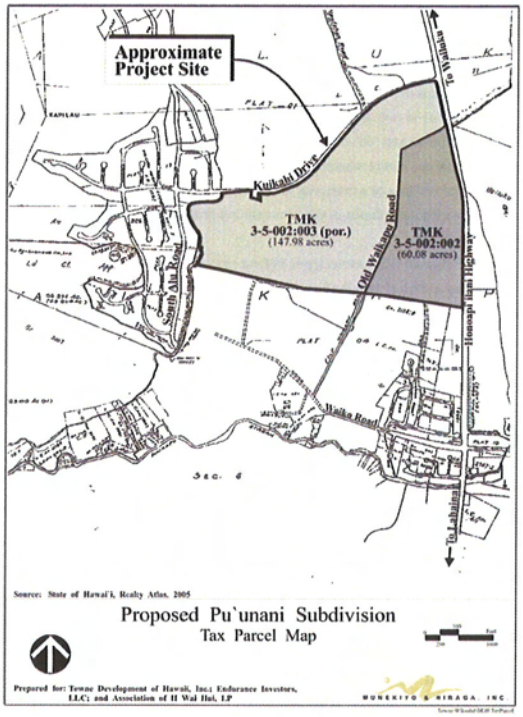


Figure 3

Tax Parcel Map
(Courtesy of Munekiyo & Hiraga, Inc.)

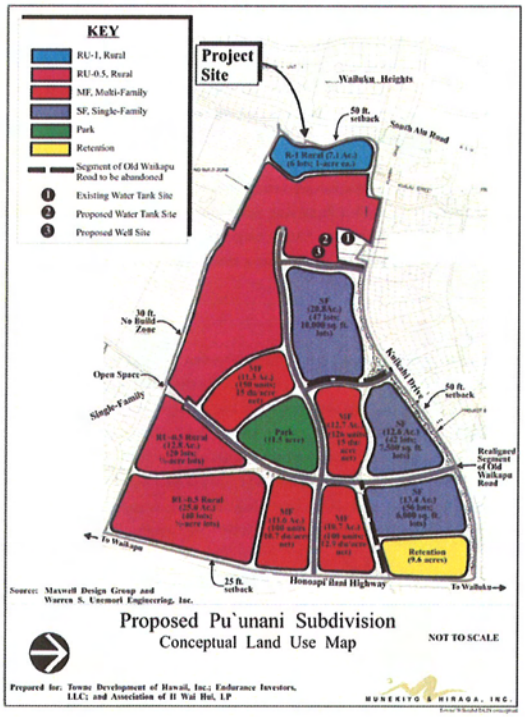


Figure 4

Conceptual Land Use Map
(Courtesy of Munekiyo & Hiraga, Inc.)

DESCRIPTION OF THE 'ILI AND AHUPUA'A

WAILUKU

Pukui et al. (1974:225) translates Wailuku as, "water [of] destruction." There are several references to at least five battles that had occurred in Wailuku. Kamakau explains that Kalani'ōpu'u desired to rule over Maui and had at one point taken Hāna. Kahekili and his ferocious Po'ouahi and Niu'ula warriors annihilated Kalani'ōpu'u's troops a total of five times. Kalani'ōpu'u kept returning. Both he and Kamehameha referred to drinking the cold water of Wailuku as a metaphor for conquering the island. Most of these battles take place along the sand dunes of Wailuku near the project area, within 'Īao, and upland of Mauna Li'o.

Wailuku was cultivated with various types of food crops and was known to have had the largest continuous area of *lo'i kalo* [taro fields] cultivation in the entire Hawaiian kingdom. All of the interviewees mentioned *lo'i kalo* that had been cultivated in Wailuku. Most of these *lo'i* were located in the vicinity of the "Koa Sub-division" and are presently gone due to development.

In her interview, Jojo Apo explained that there was at one time large *mala 'ai* of *'ulu* or Breadfruit trees, banana fields, and occasional Java plum trees. The anonymous informant also referred to *'ulu* trees near the old Waikapū plantation road before Honoapi'ilani Highway was built. The informant also talked about families being allowed to plant their vegetables and fruit plants such as bananas in the sugar cane fields alongside the sugarcane or near the reservoirs. "Castle & Cooke used to let my father plant his tomatoes and eggplants in the fields. Every body had one section and no one stole from anybody or *hana 'ino* (made trouble [to]) the sugar cane."

'ĪAO VALLEY

One of the most sacred sites near the project area is 'Īao Valley which is currently a state park. This entire area is considered *kapu* (sacred) and as Kahu Maxwell said during his interview, "is a *wahi pana* (storied place) to the Hawaiian people as it is a place that had been designated as burial grounds for high ranking *ali'i*." An *ali'i* would designate his or her burial spot and choose an individual or individuals to hide their prepared and bundled bones. When an *ali'i* died, the chosen individual(s) would ensure that the bones were cared for properly and would fulfill the wishes of his or her *ali'i*. Often times these individuals would not return from their pilgrimage preferring death over relinquishing the location of the resting place of their beloved chief. Only high ranking

ali'i, ali'iwahine, and *kāhuna* were allowed to be in the hallowed land of 'Īao. Kamakau explains that there were no individuals during his time, in the 1800s, who knew where these entrances to the burials were located within 'Īao. Conversely, there may have been and perhaps still are families who possess such knowledge but choose respectively to remain unidentified.

Two infamous battles occurred within the sacred walls of 'Īao. The first was called 'Ua'upali and the second and final battle was called Kepaniwai. These battles were led by Kamehameha after Kahekili had left Maui, bequeathing it to the hands of his son Kalanikupule but secretly advising Kamehameha to take Maui after Kahekili has died on O'ahu.

MAUNA LI'O

Mauna Li'o is the central outstanding *pu'u* (peak) between the two large valley's of Wailuku and Waikapu. In Inez Ashdown's notes (1977) she refers to the hill as both Mauna Leo and Mauna Lio. The writer prefers to add an *'okina* (diacritical mark). Li'o means, "bright dazzling light" especially when the sun is either rising or setting. When the sun sets behind Kahālāwai, the sunlight shines behind the peak and bursts out from the sides of the hill. Other references to light are also found in the area. Pu'u Kukui refers to the highest peak on the West Maui Mountains or Kahālāwai. Pukui translates this name as, "Candlenut hill" or "Light Hill." 'Īao means, "Supreme Light."

Within the ahupua'a of Kapilau and Pohakuokauhi are many *'ili* names. These *'ili* names are listed below, but sadly the writer was unable to relocate most of their actual locations. There was also a reference to a salt pound that once was within the area.

'Ili names:

Kapalaokailio	Pu'uloa	Pu'uohuila	Kalua	Pa'uniu
Pohakoi	Kukuimakanunu	Iililoa	Kapilau	
Pualinapao	Keahuaiwi	Elimakole	Nukuhiwa	
Wahineomaili	Naelemakulelololoa	Kaluaalalea	Kealaawe	

Ms. Holt-Padilla recalled seeing the name, "Hopoe Camp" on some notes that Inez Ashdown had written. She could not recall the exact location of the camp, but thought that the area may have been somewhere between the Wailuku and Waikapū area.

WAIKAPŪ

This *ahupua'a* is basically located within the large valley and follows the river also named Waikapū. This *ahupua'a* continues south until the white sands of Kealia in Ma'alaea. Pukui et al translates the name as, "water [of] the conch." She also explains that a famous *pū*(conch shell) named Kihapū was once located in Waikapū. There are a few stories about the famous conch shell. Most stories refer to thieves who were "hired" to steal the powerful Kihapū conch. Kahu Maxwell recounted a story of Kihapū being stolen by an infamous thief named Puapualenalena. Please refer to the section named *Mele, Mo'olelo, A Me 'Olelo No'eau* for more details.

Waikapū is the final valley that is part of *Nā Wai 'Ehā* or *Nā Poko*. Historically it was a heavily settled valley that had *kauhale* (houses), *lo'i, loko i'a* (fishponds), animal pens, *heiau* (temples), and *mala 'ai*.

Both Mr. Bulawan and Kahu Maxwell referred to the undulating and shifting sand dunes between Wailuku and Waikapū below the old plantation road. Kahu Maxwell said that his grandfather, George Washington Maxwell whose residence was in Waikapū, likened the movement of the shifting sand dunes to that of a giant *mo'o* (mythological lizard being). When asked about the landscape between Wailuku and Waikapū, Ms. Apo explained that it had been a place with sand dunes, hills, and kiawe trees. See Figures 5 and 6.

Waikapū also became one of the large sugar cane plantation camps that had housed a large population of field workers. There had also been a few cattle ranchers as well as a dairy in the immediate Waikapū area. Please refer to the section called *"No Waikapū Mai Au"*[3] for further information.

[3] Meaning: I Am From Waikapū.

Figure 5

View of the sand dunes in Pa'uniu from project area

Figure 6

Sand dunes of Kalua from Project area

MELE, MO'OLELO A ME 'ŌLELO NO'EAU

This next section contains excerpts of traditional songs/chants, stories, and proverbs pertaining to the surrounding lands and the project area.

This chant[4] refers to a battle that started in Wailuku and went as far east at Ha'ikū.

Haluapo Wailuku i ka makani,
Hiki au ola kula me Hanamau'u,
Hopu ke 'ole i ka luna o Hala'abui,
Hui e, hui la,
Hue hakau au hono ua malie,
Me he kuku 'upena luelue ia Kahului,
Me he hana malolo la i kai,
I Pa'ia mai e Hamakualoa
I kapeku 'ia e Pu'u Koa'e,
He 'uhia loko ka i'a iki ma waena,
Ua he-i, hei ihola i ka makau Kili'o'opu,
He 'o'opu ho'opaio ho'okolohe.
E ho'onalulu ana i ka makani nui,
I mohai mai ka inaina o ke ae,
Halakau ka malie a Ha'iku,
A laila ku'u ka luhi o ka makani,
Moe ihola i ka po a ao hele,
Hele ho'i kua, ho'i hope i Wailuku…

[5]Wailuku lies darken in the wind,
Time of life at Hanamau'u plains have arrived,
The conch was taken by Halabui,
Turning here, turning there,
Sea shelves of the bay are exposed, it is calm,
Kahului is like the beam of the luelue net,
Like the malolo net at sea,
As far as Pa'ia in Hamakualoa,

[4] The following chants do not have macrons or diacritical marks due to uncertainty of actual meanings.
[5] This section was translated by writer of assessment.

Strewn about by Pu'u Koa'e
Trapped within as small fish,
Bound, entangled indeed by goby hooks,
A fierce and cunning goby fish.
The strong wind is being shaken
The masses will be sacrificed
Ha'iku's calmness is disturbed
Life is released by the wind
In the fleeting light sleeping in eternal darkness
Retreating, returning to Wailuku……

"Kokololio mai 'o Waikapū
He i'a iki ko Wailuku
He 'o'opu ko Waihe'e…"
"The Kokololio comes form Waikapū,
Wailuku has the I'aiki wind
And Waihe'e the 'o'opu wind…."

I Waikapū ke aloha, ka makani Kokololio,
Pili i ka poli nahenahe, he 'inikiniki mālie,
I Wailuku iho 'oe, i ka piko a 'o 'Īao,
Lihilihi o ka pua rose; he 'inikiniki mālie,
I Wai'ehu iho 'oe, ka makani Ho'eha'ili,
Me ka wai a 'o uka; he 'inikiniki mālie,
I Lahaina iho 'oe; ka makani
Me ka malu 'Ulu a 'o Lele; he 'inikiniki mālie,
Ha'ina mai ka puana, no Nā Wai 'Ehā he inoa.
E ho'i nō e pili; he 'inikiniki mālie.
In Waikapū is the gusty wind,
Held in warm arms-gently pinching,
Petals of the roses-gently pinching,
You were in Wai'ehu; the wind that pierces the skin
With the fog of the upland-pinching,
We were in Waihe'e with the Kili'o'opu wind,

With the water of Eleile-gently pinching
You were in Lahaina with the Kaua'ula wind
Under the shelter of the breadfruit trees of Lele-gently pinching,
Here ends my song of the Four Waters
Return and be together-gently pinching.

The following is an excerpt from a chant that honors the last kind of Hawai'i, David Kalākaua.

Ku'u pua lilia lā i Wailuku,
Ua 'inu i ka wai o 'Īao
Ua ao kaua e ka 'inuwai
Ua pā ka makani he Kilipohe...
My beloved lily flower of Wailuku,
Who drank the water of 'Īao,
We learned to drink the water
The Kilipohe wind blew...

MO'OLELO PERTAINING TO BATTLES

Upon investigation of traditional occurrences, there were many writings about the wars and battle grounds that had happened within or close proximity to the project area. The abundant indications of warfare in the area conclude that the project area had been in close proximity of Kahekili's (as well as other *ali'i* who preceded him), political, religious, and wealthy stronghold.

Pukui et al. (1951:188-189) provided this mo'olelo regarding a battle of owls in Wailuku. It seems that a woman was searching for food and had located a nest filled with eggs. She presumed that these eggs were duck eggs and collected them all in her gourd. She took them home and showed her husband who identified them as owl eggs. He hastily told her that they were not good to eat and demanded to know why she had brought them home. The owl was perched in a nearby tree and voiced her claim to the eggs, then begged that the eggs be returned to her. The woman felt horrible when she realized that the eggs belonged to the owl and she immediately wanted to take them back to their nest. The malicious husband had other plans. He proceeded to throw each egg against some stones and smashed the shells, which stained the stones yellow.

"Now you have them all!" He laughed at the owl and guided his wife away. The owl cried and thought of her babies that did not survive. She gathered the fragmented shells and told the account to her mate who became very angry and vowed to punish the man. The mother owl wondered what two owls could do against a man. Her mate had a plan to fly though out the island to tell all the owls of the cruel deed. The owls of every island came to aid the Wailuku owls. Those of Ni'ihau and Kaua'i met the owls of O'ahu and flew together in a great flock. The joined the owls of Moloka'i, Lāna'i, and Kaho'olawe; then united with flocks from Hawai'i and Maui. Countless owls filled the sky and even proceeded to shut out the sun's light. A fierce battle followed where the cruel man was punished and the battle place still bears the name Wailuku, "Water of killing."

In the Hawaiian language newspaper, Kū'oko'a (1866:Helu 6), Kamakau writes about the detailed events of at least five major battles that had taken place in the Wailuku district. Three of which had occurred either on or near the project area. The following excerpts are translated by the writer:

1. Pertaining to a battle between Kihapi'ilani and his elder brother Lonoapi'ilani. A war party had not yet reached Wailuku. As soon as Kihapi'ilani heard of Lono's death he quickly went to Wailuku. When Kihapi'ilani and 'Umialiloa arrived in their war canoe, Lono's corpse had been removed. Kihapi'ilani sought hard to find the corpse so that he could desecrate it but was unable to locate it. A psychic from Kaua'i was brought to find the location of the burial. The psychic explained that the body had been buried in Wailuku on a land named **Pa'uniu**[6]. It had been secretly removed again and so the bones of Lonoapi'ilani had disappeared. The Hawai'i men hunted, searched, and vehemently dug about the lands of Wailuku and **Pa'uniu** for naught.
2. "Kahekili was at his residence Kalanihale, located seaward of Kihahale which is above the foundation of Ka'ilipoe, Pohakuokauhi. Kaleopu'upu'u said to Kahekili, "the fish have entered the sluice gate, surrounded by the net." Kalani'ōpu'u's 'Alapa warriors were trapped like a dark flood had come over them, they piled up on all of the sand dunes of Kahului[.] Kahekili's warriors, the Po'ouahi and Niu'ula surrounded them and cut them off. The 'Alapa were annihilated on the sand dunes south east of **Kalua**[7], like kukui branches. The corpses were heaped up in death piles inexplicably slaughtered like fish caught in a net. This battle was named Ahulaukapi'ipi'i i Kakanilua."

[6] One of the land names within the project area found during research.
[7] Another land name near the project area that had been pointed out to the writer by Ms. Apo.

Kalani'ōpu'u was boasting that his warriors were drinking the sweet water of Wailuku when the only two survivors arrived to report that everyone had been utterly obliterated.
3. The second massive charge materialized on the next day [it] happened between Waikapu and Wailuku and continued on to **Kalua** in Wailuku [.] This is what Kalani'ōpu'u believed, but, Kahekili's forces had awakened early dawn that day and had filled the sand dunes of Kama'oma'o with their ranks. One warrior of Kahekili's had discovered the location of Kalani'ōpu'u's troops in Waikapū during the battle of Kakanilua. Like water from a bath the short spears, long spears, and swift spears rained down on them like the cloudless Nāulu rain destroying the ocean as a sea squall.....Kalani'ōpu'u's warriors were like mullet trapped in a fishpond pulverized by huge storm swells.

The following words were believed to have been uttered in the gardens of Kahekili on the project site.
"Wehe i ka mākāhā i komo ka i'a." Open the sluice gate that the fish may enter.
This was uttered by Kaleopu'upu'u, the priest of Kahekili, to Kahekili to trap the second invasion from Kalani'ōpu'u's troops.

Joseph M. Poepoe's article *No Kamehameha 'Ekahi, Ka Na'i Aupuni*, in the Hawaiian language newspaper, Ka Na'i Aupuni, also tells of the battles of Kakanilua. The following is translated by the writer:
"The 'Alapa and Pi'ipi'i regiments proceeded up to the fields of Kama'oma'o where they met with no challenge at all until they came upon the southeastern area of **Kalua**, near the current Wailuku village. As soon as the 'Alapa arrived there, Kahekili's warriors pounced upon them from all sides as sand crabs dashing across sand. A vicious battle took place between Kalani'ōpu'u's 'Alapa and Pi'ipi'i warriors and the well prepared warriors of Maui who had combined forces with those of O'ahu under their leader Kahahana overwhelmed the Hawai'i island foes."

Kahu Maxwell also talked about Kamehameha sending a messenger to Kahekili while he was warring with chiefs in Ha'ikū, Maui. This messenger was given two stones inquiring whether Kahekili wanted to battle with Kamehameha. The black stone meant war. The white stone meant peace. Kahekili received the stones from the messenger and replied by sending the messenger back to Kamehameha to relay the following:

"E nānā mai a uhi kapa 'ele'ele iā Maui, a kau ka pua'a i ka nuku, ki'i mai i ka 'āina a lawe aku." *Or,* Watch until the black cloth covers Maui and the sacrificial hog is offered, then come and take the land. Meaning: Wait until I am dead and all the rites performed, before you invade and take the island of Maui. As the messenger relayed the message he handed over to Kamehameha one of the stones. It had been wrapped in a special white tapa and within it was the white stone. Kamehameha wept as he understood that the tapa symbolized that Kahekili was near death and that he had just revealed to Kamehameha that Kahekili was his true father.

In Inez Ashdown's notes (1977) Mauna Leo/Lio is mentioned.
"The Hawai'i army attacked from the slopes of Mauna Kane, firing upon the people of Maui who fled in terror from the 'red mouthed guns.' In confusion and fear, the Mauians tried to escape by climbing the steep slopes of Mauna Leo, only to be destroyed. At that time the name of the mountain changed from Leo to Lio[8] meaning terror. The cliffs of Mauna Li'o were named Pali Kaua'u, or "clawing frantically."

Kamakau's writings somewhat contradicts Ashdown's notes. Kamakau writes[9],
"Kamehameha lands in Kahului with his immense fleet of canoes. For two days there was fighting with large casualties on the Hawai'i side. On the third day, the final canoes arrived as a huge tidal wave makes for shore. Kamehameha commands his foreign advisors to man the cannon named, Lopaka. He also leaves with them a few guards trained in arms warfare to fire guns and to help pull the cannon; many lives were taken from the other side. It has been said, 'Had it been the usual warfare, face to face, hand to hand, they would have been equal'. The war ended up in a narrow ravine in 'Īao where gunfire from both the rifles and Lopaka forced everyone up into the valley. The steep cliffs blocked the fleeing people frightened by the awful red thundering fire. Some tried to escape by climbing the steep cliffs, only to be picked off by the guns' accuracy and the winning combatants.
Here is something to consider. No one of high rank had died in this battle. Only the large numbers of commoners fleeing for their lives had been slaughtered. The battle had been named *'Ua'upali* [clawing cliffs] and *Kepaniwai* [dammed waters]."

[8] Asdown's spelling Lio is erroneous. According to Pukui et al, Lio means rope, to tie taut, or a knot at the end of a bag. Pukui et al further translate the following spelling of Li'o with macros over the i and o as to act wild, as a frightened animal; to open the eyes wide in terror; to quiver, leap away, shy, as a frightened horse.
[9] translated by writer of assessment

KIHAPŪ & WAIKAPŪ

Stories of the famous Kihapū are told about the Waikapū *ahupua'a*.
It was known that Wailuku's famous wind Kokololio circles around the base of Mauna Li'o where a special cave is located. The wind produced a whistling sound that once housed a famous conch shell named Kihapū that had supernatural powers. According to Fornander's writings, "the conch could be heard throughout the entire archipelago of Hawai'i." Waikapū warriors would always be on the lookout for invading armies from the outer islands. Waikapū's height has an optimum view of the two ocean entrances from the north and south isthmus of Maui. It is a prime surveillance point of most of Maui's central land. Sentinels would warn the populace of invading enemies by blowing Kihapū inside the cave, which was heard by everyone. No one could invade the island without being noticed. Kahu Maxwell explained, "As long as Kihapū was in the hands of the Maui chiefs, no outsider could usurp the island and claim it under their jurisdiction."

In some children's books, Puapualenalena is depicted as a dog. But in older mo'olelo he is one of the most infamous "thieves-for-hire" during 'Umialiloa's time. Puapualenalena, after careful observation, would "appropriate" items for those who paid for his services. Puapualenalena was hired by 'Umi to steal Kihapū from Waikapū and take it to Waipi'o believing that once 'Umi had Kihapū the island of Maui would be easily taken under his ruler-ship. The story goes on to say that Puapualenalena had been successful in stealing Kihapū from Waikapū and giving it to 'Umi whose residence was in Waipi'o valley on Hawai'i island. Once this occurred the shell was no longer heard from Waikapū's cave during the Kokololio winds.

Other stories have another thief by the name of Halabui as the perpetrator of removing Kihapū from its cave and blowing it when Kamehameha had taken the Maui chiefesses as his wives symbolizing that the island of Maui had been conquered by Kamehameha. What is believed to be the actual Kihapū conch is currently on display at the Bishop Museum.

'ŌLELO NO'EAU

1029 - *Ho'i hou ka wai i uka o Ao.*
A Maui expression referring to a person who goes upland for water. This saying came from the battle of Ka`uwa`upali, when Kamehameha defeated the warriors

of Maui in `Iao. The stream was dammed with bodies, and the water ran red with blood. The people had to travel far inland to find uncontaminated water.

1237 - *I mua nā pōki'i a inu i ka wai 'awa'awa.*
Forward, my siblings, until you drink the bitter water [of battle].
Uttered by Kamehameha as he rallied his forces in the battle of 'Īao.

1473 - *Ka malu ao o nā pali kapu o Kāka'e.*
The cloud shelter of the sacred cliffs of Kāka'e.
Kāka'e, an ancient ruler of Maui, was buried in 'Īao Valley, and the place was given his name. It was known as NāpalikapuoKāka'e (Kāka'e's sacred precipice).
Many high chiefs have shared his burial place.

1529 - *Ka pali kāohi kumu ali'i o 'Īao.*
The cliff of 'Īao that embraces the chiefly sources.
'Īao, Maui, was the burial place of many chiefs of high rank who were the ancestors of living chiefs.

2207 - *Nae iki 'Īao i ka uhiwai.*
'Īao is barely breathing in the heavy mist.
Said of one who is in dire distress with trouble pressing on all sides.

2300 - *Nā Wai 'Ehā.*
The four waters.
A poetic term for these places on Maui: Waiłuku, Wai'ehu, Waihe'e, & Waikapū each have flowing water (wai).

2647 - *Pili ka hanu o Wailuku.*
Wailuku holds her breath.
Said of one who is speechless or petrified with either fear or extreme cold.
There is a play on the word luku (destruction). Refers to Wailuku, Maui.

2912 - *Wailuku i ka malu he ku awa.*
Wailuku in the shelter of the valleys.
Waiłuku, Maui, reposes in the shelter of the clouds and the valley.

NĀ PAPAHANA HAWAI'I

MAHINA 'AI - FARMING

Jojo Apo, Kahu Maxwell, Bernard Bulawan, as well as the anonymous informant spoke about the various types of farming and vegetable gardens that had stretched from

Waikapū to Wailuku.

Both Jojo Apo and the unnamed informant spoke about Breadfruit trees, banana fields, Java plum trees, and mango trees.

Ms. Apo explained that there were many trees *ma uka* of Kalua and along the old plantation road. She clarifies that her family always had an abundance of food from their gardens. "We used to always have something. Us young kids used to dig a section from the bark of the 'ulu tree before we went to school so by the time we came home there'd be sap formed on the exposed bark. We used to chew it like gum." She further explains, "Everyone had their tree and their own area to collect their gum." The unnamed informant also talked about riding his horse along the old plantation road and admiring the 'ulu trees. He would collect the 'ulu from his horse's back for the old "tutu man" neighbor who favored the flavor of nearly rotten 'ulu.

They also both explained that there were seasons for food and that they always had some kind of fruit to eat. Ms. Apo describes that they also cultivated coconut trees, Hawaiian cane, strawberries, grapes, and guava.

All informants remembered taro growing near the entrance to Wailuku town. Ms. Apo remembers the *lo'i kalo* near the "Koa Subdivision." She said that there used to be small streams and springs that would feed the taro patches. "We used to open all the flumes when we were young to play in the water."

The unnamed informant spoke of residents from the area that often grew vegetables like corn, tomatoes, sweet potatoes, eggplants, as well as various types of beans in the sugar cane fields. Even large plants such as bananas were allowed to be planted near the reservoirs. "Castle & Cooke used to let my father plant his tomatoes and eggplants in the fields. Every body had one section and no one stole from anybody or *hana 'ino* (made trouble [to]) the sugar cane." See Figure 10.

He goes on to say that when the plantation began using pesticides this practice discontinued.

GATHERING PRACTICES

All informants talked about various gathering practices that had occurred at one time or another. Ms. Apo, Kahu Maxwell, Ms. Holt-Padilla, the Rogers, Mr. Kamasaki and the unnamed informant spoke about various types of gathering practices.

The unnamed informant talked about his "tutu man" neighbor gathering medicine from

the area. "He used to gather that plant for sore throat. *Loa*[10] I think they called it. Looked like one weed to me, but when you get sore throat he work. Taste like gasoline but."

Figures 7 & 8
Plantation ditches

Figures 9 & 10
Bananas growing next to this plantation reservoir.

Another mention of medicinal gathering and use was of coconuts. Ms. Apo talked about one of her uncle's who would use coconut to clear eye problems. She did not remember which part of the coconut was used, but said that it was a medicine that worked.

Ms. Apo, Ms. Holt-Padilla, & Mrs. Cummings all talked about gathering *'opae* (Palaemon spp.) a fresh water shrimp, *hihiwai* (Neritina granosa) a fresh water shellfish,

[10] Writer believes this to be the *'ahaloa* [Waltheria indica] plant

and *'o'opu nākea* (Awaous [Chonophorous] stamineus) a fresh water goby from the streams and plantation ditches when the Kalua ditch was running. Ms. Holt-Padilla also recalls 'o'opu being gathered in the Waikapū river, but did not know if this practice still occurs today. Ms. Apo also spoke about her uncles' gathering a fiber[11] from the mountain which was made into very strong fishing line. After they made it, one uncle would take one end as far as Ka'ohu Street while the other end was held or tied onto something at their home on Kaho'okele Street. He would then lean and pull the line, stretching it in preparation for use. Ms. Apo said, "They knew they had enough line if they went that far after stretching it."

Both Wally Rogers and Zelie Harders talked about fishing for trout that used to live in the plantation reservoirs.

Sadly, none of these cultural practices continues today.

Various types of garden vegetables are still farmed on the Vida property for home consumption.

KNOWN BURIALS

There were two mentions of known burials and two individuals who mention their concern for unknown burials. The two that mentioned known burials spoke about a small family plot of a dozen or so individuals who are from the Cockett family. They are not located on the project's parcel, but are in a close proximity near the Vida's land. Ms. Apo is a descendant of these individuals as well as the Rogers and Vida families. She explains that the first Cockett who came to Hawai'i was Charles Cockett from England and that they visit the family's plot at least annually.

Kahu Maxwell is also related to the Cockett family and mentioned the graves. But, both his, as the Chairman of the Burial Council, and Ms. Holt-Padilla's main concern regarding burials is that the project lower boundary is a close proximity to the sand dunes. The highway now separates the sand dunes from the project area, but as Ms. Holt-Padilla suggests,

> *"The highway is an unfortunate dividing line but one that cannot restrict the research of the use area. One must look on both sides of the highway because they are all related to one another."*

[11] Writer believes this fiber to be olonā (Touchardia latifolia) which was commonly used as fishing line before the introduction of cotton and other synthetic materials. Olonā is one of the strongest natural fibers in the world and when twined and stretched became an extremely sound rope.

Both strongly suggest that a cultural or archaeological monitor be on site whenever grubbing, excavation, or digging occurs on the lower end of the project's parcel. Specifically on TMK: (2) 3 - 5 - 02:02. Please refer to Recommendations.

All interviewees had great concern for the maltreatment of any human remains that may be discovered during the development of the project.

This burial concern stems from the cultural belief and practice that it is disrespectful and even disastrous to the living to leave the bones of your ancestors exposed to the elements.

A consequence to a chief's ill-treatment of his subjects was to leave his or her bones exposed to the elements after death. It was a sign of disrespect to the bad chief. The following *`ōlelo no`eau* (poetic saying) explains: *'A'ohe e nalo ka iwi o ke ali'i 'ino, 'o ko ke ali'i maika'i nalo. The bones of an evil chief will not be concealed, but the bones of a good chief will.* Meaning, when an evil chief died, the people did not take the trouble of the proper care for concealing his or her bones.

Therefore, to leave human remains exposed is to say that no one cares for the individual.

NO WAIKAPŪ MAI AU

RANCHING & DAIRY

Historically, Waikapū had been a booming town prior WWII and even up until the mid 60s. The longtime Waikapū residents spoke about the thriving dairy and ranching businesses. They also talked about the other businesses in Waikapū town. There had been the Sakamoto Store & Gas Station; three other stores, a barbershop, Shimizu fish market, and even a theater. At the decline of the sugar plantation era, shops and businesses moved elsewhere or closed up all together.

CHURCHES

During the interview with the Waikapū residents, Mr. Kamasaki thought that he remembered that there had been a church on or near the project area. Ms. Vida did not remember a church near their home, but said that she had only lived on the property for 54 years and suggested that the writer should contact the other Vida members. Ms. Vida did remember an older church near the Rogers property on Waikō Road, because she had lived next to it when she and her ex-husband rented an apartment from the Rogers' rental units. After research at the Hawai'i Mission House Museum, two churches

were indeed near the area. After further research the following had been discovered:

1. Unpublished Survey of Church Locations by TMKs
   May 6, 1963
   pg. 33
   TMK 3-5-04-29 7,107 sq ft.
   Waikapū, Wailuku
   Name of Church: Waikapū Parsonage
   Land/Parsonage
   Title held by HEA
   "Tax Receipts have been going to Mrs. Elaine Mullaney on Church – Kahului Union Church handles property (1963) – have asked for title – we approve it for church purposes with regular Reversionary Clause. LIBER 629 – page 4.
2. TMK 3-5-04-30
   1.07 acres
   Waikapū/Kuaiwa – Wailuku
   Waikapū Protestant Church
   Land, Church
   Title held by Church
   Church is run by Kahului Union at Kahului – (1963) Kahului has been asked to take title to this as all Waikapū Church members now go to Kahului Union. It can be run as a branch – if title is transferred together with parsonage – HEA is requesting Reversionary Clause.

3. "Sold" File
   TMK 3-4-14-5
   2.8 Acres
   Wailuku/Wailuku
   Wailuku Union Parsonage
   Land/Parsonage
   Title held by Church
   Reverts to HEA – deed to church in 1956

4. *Fruitful Fields* - American *Missionary Churches in Hawaii*
   DLNR-SHPD
   Published 1993
   Waikapū Church on Maui
   pg. 21
   "An outstation of the mother church Ka'ahumanu at Wailuku first built with adobe walls c. 1850; present stone walls constituted the second church. Erected in 1875, late enough for the windows to be pointed in the then Gothic Revival style. The church was closed in 1956..."
   pg. 35
   "When the chapel at Waikapū on Maui was closed in 1956 its 1853 bell was transferred to Kahului Union church as an emblem of continuity.

RESIDENTS EXPRESSED CONCERNS

All the Waikapū residents expressed that they were worried about the various development projects which would change Wailuku and Waikapū from two unique and

different towns into one merged city. They all expressed their concern over the future increase in traffic. They all wanted their concerns to be taken into consideration when the Joint Venture begins implementing their plans of development.

EXECUTIVE SUMMARY

The purpose of this project was to investigate the impact the Joint Venture's project would have on the cultural practices and customs of the area through oral traditions and background research. The background research report combined with the ethnographic and cultural research done in this report complete this Cultural Impact Assessment. Due to the time constraints of this project, the emphasis was placed on both the immediate and surrounding districts of the project area. All interviewees pointed out that in order to obtain the entire representation of the various stories about the area, one would have to go and speak with many more individuals from theses districts. One interviewee pointed out that there weren't too many *"kama'āina"* left who currently reside in Wailuku or Waikapū. Such a task was beyond the scope of work for this project.

RECOMMENDATIONS

The results of this study show that the Joint Venture's project will not have any immediate impact on any cultural use or practices of the area. The study concludes that there are currently no known Hawaiian cultural customs or practices being performed on or near the project area at this time. However, the Vida family has been living on their 9 acre parcel for perhaps over 80 years and will continue to practice animal husbandry and farming. The one spokesperson did not believe that the family will be changing these practices even after the development occurs.

Pertaining to Unknown Human Burials, the writer is strongly recommending that a cultural or archaeological monitor be on hand during all grubbing, excavating, and digging of the lower parcel known as TMK: (2) 3 - 5 - 02:02. This is to ensure that any possible discoveries of unknown burials are treated in a proper manner according to HRS Chapter 6E 43.5 & 43.6 and HAR§ Chapter 300 all of which pertain to burial discovery and treatment.

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PHOTO REFERENCES

INTERVIEWS

Bernard N. Bulawan, Sr., July 22, 2005

Jojo Apo, September 17, 2005

Kahu Charles K. Maxwell, September 18, 2005

One individual, July 23, 2005.

Hōkūlani Holt-Padilla, January 3, 2006

T Kāhili Cummings, January 4, 2006

Ted & Zelie Harders, January 24, 2006

Wally Rogers, January 24, 2006

Ann Nakamoto Wakamatsu, January 24, 2006

Teruo Kamasaki, January 24, 2006

Ann Spencer Vida, February 11, 2006

APPENDIX F.

Environmental Site Assessment Phase I Investigations

Vuich Environmental Consultants, Inc.

Environmental Site Assessment:
Phase I Investigation

Property: KUIKAHI DRIVE
Wailuku, Hawaii 96793
T.M.K. (2) 3-5-02:03

Prepared for: TOWNE REALTY OF HAWAII
255A E. Waiko Road
Wailuku, Hawaii 96793
Attn: Mr. Thomas Behnke

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared by the investigator under direct supervision and provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

Joseph Beaulieu, Site Investigator — Date: 5/4/04
- B.A. (Environmental Science and Geography)

Jeffrey E. Kermode, Project Manager — Date: 5/5/04
- B.A. (Geography), B.Tech. (Environmental Engineering)
- Lead-Based Paint Inspector (EPA Accredited Course) EPA Certification No. HI-03-0920045008
- Asbestos Building Inspector (AHERA Accredited Course) State of Hawaii Certification No. HIASB-0351

John S. Vuich, M.S., Project Supervisor — Date: 5/05/04
- Registered Environmental Assessor Registration No. 1433 (State of California)

Rev. 3/00

Table of Contents

Disclosure

This document contains the results of services performed on this Project by **Vulch Environmental Consultants, Inc. (VEC)** pursuant to Agreement. The results represent the application of a variety of scientific and analytical disciplines that have been rendered using the standard of care, skill, and diligence normally provided by professionals in the performance of similar services under similar circumstances.

VEC assessments are intended to reduce, but not eliminate, uncertainty regarding recognized environmental conditions in connection with the Subject Site, as conducted within reasonable limits of time and cost. A general consensus of EPA's guidance on landowner liability is that *no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property.*

The use of this document and the results reported are limited to the services performed and areas examined as described in this document and no inferences are intended with respect to anything not described herein.

VEC is not responsible for conditions or consequences arising from relevant data, facts, and information that were concealed, missing, withheld, not fully disclosed, or not reasonably available at the time these services were performed. VEC is not responsible for any indirect, incidental, or consequential damages of any nature arising from any cause.

VEC has no beneficial economic interest in the Project other than as an independent professional organization performing the agreed services. VEC's warranties are as described above and there are no other warranties of any kind, expressed or implied, regarding the services.

Executive Summary

Introduction

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. Thomas Behnke and was conducted pursuant to Vuich Environmental Consultants, Inc.'s (VEC's) written proposal and contract accepted by Mr. Behnke on March 24, 2004. This investigation and report format follows the guidelines of the American Society of Testing and Materials (ASTM) Publication E1527-00.

Site Description

The subject site is located in the community of Wailuku Heights, Maui, Hawaii. The property lies on the west (mauka) side of Honoapiilani Highway at the intersection of Kuikahi Drive. The property consists of one (1) parcel of land, irregular in shape, measuring approximately one hundred and fifty-five (155) acres in total area. The site is further described on the Tax Maps of the State of Hawaii as Division 2, Zone 3, Section 5, Plat 02, Parcel 03 (See Tax Map, Appendix B). Property access is from Kuikahi Drive.

The property is essentially undeveloped land. The predominant vegetation consists of grasses and limited mature trees. A network of unpaved roads has been established on the property. (See Figure 2, Appendix A). No commercial or industrial activities are currently taking place on the subject site.

Historically, the land has been used for agricultural purposes. Surrounding land use consists of residential and fallow fields.

Wailuku Heights is located on the east side of West Maui and lies approximately one (1) mile south of the community of Wailuku. (See Figure 1, Appendix A).

Records Review

The purpose of a records review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The services of Environmental Data Resources, Inc. were utilized to compile the database listings.

Our records review did not discover any current investigation of the subject site under any programs conducted by a federal, state, or local environmental agency.

Site Reconnaissance

A site investigation focuses on obtaining information indicating the likelihood of identifying physical ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site facilities.

On April 15 and 16, 2004, VEC personnel, Mr. Jeffrey Kermode and Mr. Joseph Beaulieu, conducted an overall site inspection of the subject site. Accessible areas of the property were visually and physically inspected.

The following are significant observations of field conditions: (See Site Plan, Figure 2)

- Evidence of historical agricultural land use was noted;
- A moderate amount of miscellaneous and landscape debris dumping was noted;
- Two (2) small abandoned dirt/fill piles were noted on the subject parcel;
- An irrigation settling tank setup and overhead stand pipes were noted;
- One (1) empty abandoned metal tank was noted;
- One (1) pad-mounted electrical transformer is located on the subject property;
- Dense ground vegetation limited the investigators' ability to effectively observe the surface soils;
- Two (2) reservoirs are located on site;
- An unpaved road network and an irrigation (flume) network have been established on-site.

Conclusions

Recognized environmental conditions, as defined by ASTM Standard E1527-00, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

VEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-00 for the property located at the intersection of Honoapiilani Highway and Kuikahi Drive in the community of Wailuku Heights, Maui (TMK Number (2) 3-5-02:03), defined as the subject property. Any exceptions to or deletions from this practice are described in Section 1.4, Limitations and Exceptions, of this report. **This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property, except for the following:**

- ***Database Listings*** *(See Section 4.0 & EDR Report, Appendix B).*

  The subject site is <u>not</u> listed. It is VEC's opinion that the one (1) nearby listed site and another site located within a ¼ mile do not have a reasonable potential to adversely impact the environmental condition of the subject property.

- ***Current and Historic Use or Storage of Hazardous and Regulated Substances*** *(See Section 5.3.2).*

  There is no evidence of any historic misuse or significant spills of hazardous or regulated substances on the subject property.

  Sugarcane and pineapple agriculture had been previously active on and adjacent to the subject property for several decades. Both pesticide and fertilizer use are related to the above noted activities.

  While the use of pesticides and fertilizers on a property does not necessarily result in an adverse impact to the environmental condition of the subject site, it is possible (yet unlikely) for residual amounts of these substances to accumulate to concentrations that present a potential threat to human health or the environment. Soil and groundwater sampling and laboratory testing would provide additional information to evaluate potential environmental effects from these historic agricultural activities. There is, however, no regulatory requirement to conduct this sampling.

  The concerns listed below may not be considered ***recognized environmental conditions*** *by ASTM definition, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.*

- ***Solid Waste Management*** *(See Section 5.5.4)*

  A limited amount of historical dumping (landscaping and miscellaneous debris including special waste) was evident on the subject property. Management of these wastes should be performed in a manner that complies with all local, state, and federal regulations as applicable to the waste type.

  Due to dumping of landscaping debris and heavily vegetated areas, the entire subject site and underlying soils were not visibly inspected. It is important to ensure that if additional clearing of the property commences and large amounts of construction debris or unidentifiable substances (containers) are further discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

- ***Surface Waters and Area Aquifer Protection (See Section 5.5.5)***

  If future land use includes developing the land for residential or commercial use, the developer and property owner should be aware of the potential for contaminants to run off-site and into nearby water courses (including adjacent storm drains and ditches). Products of concern relating to any future development project or land-clearing activity would be earthen material (silt), paints, oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

  Future land clearing of greater than one (1) acre will likely require both a County of Maui grading/grubbing permit and a National Pollution Discharge Elimination System (NPDES) General Permit (State of Hawaii, Department of Health).

The conclusions stated above should not be construed to mean that any regulatory agency would have the same opinion as this author, nor is any implication proposed therefrom. The results of this environmental assessment are intended for general reference purposes only and are not intended as legal advice. The advice of legal counsel should be sought in regard to individual facts, circumstances and interpretation of environmental liability.

Environmental Site Assessment

Phase 1 Investigation

1.0 INTRODUCTION

A Phase I Environmental Site Assessment (ESA) is conducted to determine if a site may be contaminated with hazardous or toxic substances or wastes resulting from current or past site activities, unauthorized dumping or disposal, or migration of contaminants from adjacent or nearby properties. Its goal is to identify ***recognized environmental conditions*** on a property that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products. These release conditions apply to structures on the property as well as the soil, groundwater, or surface water of the property. The American Society of Testing and Materials (ASTM) Standard 1527-00, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, is used to "...define good commercial and customary practices for conducting an environmental site assessment of a parcel of commercial real estate".

1.1 Purpose

The study objectives are to characterize the environmental setting of the subject property, to identify any obvious activity of environmental concern that may have occurred at or near the site, and to evaluate potential migration pathways for any identified contaminants. It may also address any activities that affect future considerations for potential environmental impairment to the property.

Another function of this Phase I ESA is to conduct an *appropriate environmental inquiry* in response to the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, its amendments, and similar state and local regulations. An ESA "appropriate inquiry" may provide the buyer, receiver, or lender making a loan secured by the subject real property with a basis to qualify for the *innocent landowner defense* should any legal action be initiated for environmental impairment to the property.

1.2 Detailed Scope of Services

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. Thomas Behnke and was conducted pursuant to Vuich Environmental Consultants, Inc.'s (VEC's) written proposal and contract accepted by Mr. Behnke on March 24, 2004.

There were no other additional services requested of VEC by the Client other than the request for an executive summary as soon as it becomes available. This executive summary was delivered to the Client.

1.3 Significant Assumptions

The assessment of ***recognized environmental conditions*** relies on: 1) sources of actual knowledge, 2) thorough appropriate inquiry, 3) reviewing reasonably ascertainable documents and records, and 4) conducting a visual and olfactory reconnaissance. In conducting this ESA, VEC has relied on the truthfulness of its inquiry sources and the validity of reviewed records. If obvious indications or VEC actual knowledge contradicted the reported/reviewed information sources, it has been so stated in the appropriate sections of this report.

1.4 Limitations and Exceptions

The investigation performed for this report includes the components of an *appropriate inquiry* regarding the potential for contamination to exist or have occurred at this site. This investigation is also the basis of

an *appropriate inquiry* into the presence or likely presence, release or threatened release, of hazardous substances and petroleum products at this real property. This Phase I Environmental Site Assessment was prepared according to guidelines presented in the American Society of Testing and Materials Document entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E-1527-00).

Since no ESA can eliminate uncertainty regarding the potential for ***recognized environmental conditions*** in connection with a property, the limiting intent of this investigation is to reduce the uncertainty to an appropriate level. Minimal requirements for the Phase I ESA include a review of historical records, a review of files and databases compiled by regulatory agencies, interviews with current owners and/or occupants of the property, and a field reconnaissance of the subject site and adjacent areas.

This ESA also takes into consideration the evaluation of other substances and products that are or may be interpreted as excluded under CERCLA. Commonly, these substances are of concern in commercial real estate transactions under current custom and usage and may include, but are not limited to, Radon, Lead-in-Drinking Water and Special Environmental Resources. Where appropriate, VEC has considered environmental concerns of other federal, state, and local regulations.

Some data base resources developed for Maui County are in their infancy or are not cross-referenced in a manner as to be readily discernible. The Maui County Fire Department maintains historical file material that is not on a database.

Databases and records utilized for this investigation were limited to those that are reasonably ascertainable; that is, they had to be publicly available, obtainable from its source within reasonable time and cost constraints, and practically reviewable with regard to volume, sorting, and organization. Additionally, the services of *Environmental Data Resources, Inc.* (EDR) were utilized to compile the environmental database listings. (See Appendix B).

1.5 Special Terms and Conditions

As a standard practice, a confidential client privilege was initiated by VEC for the work performed and contents of this report. VEC shall ensure that its officers, employees, agents, and independent contractors do not disclose this report or any information contained therein to any person without the proper knowledge and written consent from the Client (or as otherwise required by law). VEC shall ensure that each of its officers, employees, agents, and independent contractors understand and obey these requirements.

The information and opinions provided herein are intended as background data and planning guidance to interested parties. This should not be construed to mean that any regulatory agency would have the same opinion as VEC, nor is any implication proposed.

VEC has performed this study in a competent and professional manner. Since there may be hidden or unknown conditions that may be missed during this inspection, VEC cannot warrant the actual site conditions described in this report.

2.0 SITE AND REGIONAL DESCRIPTION

Refer to Figure 1, Regional Setting Map, in Appendix A, for a depiction of the general site setting of the subject site in relation to topographic features. Also depicted are the projected groundwater flows, regional surface water flows, and locations of other significant physical features or structures.

2.1 Location and Legal Description

The subject site is located in the community of Wailuku Heights, Maui, Hawaii. The property lies on the west (mauka) side of Honoapiilani Highway at the intersection of Kuikahi Drive. The site is further described on the Tax Maps of the State of Hawaii as Division 2, Zone 3, Section 5, Plat 02, Parcel 03 (See Tax Map, Appendix B). Property access is from Kuikahi Drive and Honoapiilani Highway.

2.2 Site and Vicinity General Characteristics

The property consists of one (1) parcel of land, irregular in shape, measuring approximately one hundred and fifty-five (155) acres in total area. The property is essentially undeveloped land. The predominant vegetation consists of tall grasses and limited mature trees. No commercial or industrial activities are currently taking place on the subject site.

The northern adjacent property consists of fallow fields beyond Kuikahi Drive. The Honoapiilani Highway is located along the eastern property boundary beyond which is agricultural land. The southern adjoining property consists of fallow fields with limited residential development to the southwest. The western adjoining property consists of a development of single family homes and a playground. (See Figure 2, Appendix A).

Wailuku Heights is a mountainside residential area located between Wailuku and Waikapu on the eastern slopes of the West Maui Mountains. (See Figure 1, Appendix A). Kahului Bay on the Pacific Ocean is located more than two (2) miles northeast of the subject property.

2.3 Description of Structures, Roads, Other Improvements

A network of unpaved former agricultural roads has been established on the property. Two (2) overhead water stand pipes were noted on-site as well as an irrigation settling apparatus on a concrete slab. No building structures were located on-site at the time of VEC's site reconnaissance. Two (2) reservoirs are located on the subject property. (See Figure 2 and Photo # 12, 14, and 23, Appendix A).

2.4 Current Use of the Property

The subject site consists primarily of heavily vegetated fallow agricultural land. No commercial, industrial or residential activities are currently being conducted on-site. The Maui County Planning Department currently describes the land's zoning as "Agricultural".

2.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties as observed by the investigator during the site reconnaissance are as follows (see also Figure 2, Site Plan, in Appendix A):

▪ *Northern Adjacent Property:*	Kuikahi Drive, beyond which is fallow agricultural land.
▪ *Eastern Adjacent Property:*	Honoapiilani Highway, beyond which is agricultural land.
▪ *Southern Adjoining Property:*	Fallow agricultural land.
▪ *Western Adjoining Property:*	Residential – Single family homes.

3.0 USER PROVIDED INFORMATION

As a standard of practice, the following information was requested from the Client during the preliminary phases of this investigation:

- Title records and knowledge of environmental liens;
- Personal, specialized knowledge or experience in regard to ***recognized environmental conditions*** concerning the property; and
- If applicable, actual knowledge of a significant, low purchase price for the property, and explanation for the lower price.

The purpose of this information is to help identify the possibility of ***recognized environmental conditions*** in connection with the property. These tasks do not require the technical expertise of an environmental professional and are generally not performed by environmental professionals performing the Phase I ESA. VEC submits a Preliminary Environmental Investigation questionnaire to the Client for this information. The completed questionnaire is attached in Appendix B.

According to information provided by the Client in the Preliminary Environmental Investigation, the Client is not aware of any environmental liens, proceedings, or investigations against the subject property as of the date of this ESA.

4.0 RECORDS REVIEW

The purpose of a record review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The service of Environmental Data Resources, Inc. (EDR) was utilized to compile the database listings.

4.1 Standard Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources (see below). Risk sites, if any, that may be located on or adjacent to the subject property, or are within close proximity to the subject site are described. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and government agency database release dates.

The EDR Report bases the location of the listed risk sites on longitude/latitude information provided by the respective government agency. VEC confirms the locations of risk sites within close proximity to the subject site during the site visit. When the VEC site visit contradicts the EDR Report, it has been so stated.

THE SUBJECT SITE IS NOT LISTED ON ANY OF THE FOLLOWING FEDERAL OR STATE DATABASE LISTINGS OF THE EDR REPORT.

Federal Database Listings

▼ **National Priorities List (NPL or Superfund) and Proposed NPL, EPA.** The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program.

- *The EDR database report indicates no listings within the one-mile search radius of the subject site.*

▼ **Comprehensive Environmental Response, Compensation and Liability Information System List (CERCLIS), EPA.** The CERCLIS list contains data on potentially hazardous waste sites that have been reported to EPA by states, municipalities, private companies and private persons, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites that are either proposed to or on the NPL and sites, which are in the screening and assessment phase for possible inclusion on the NPL.

- *The EDR Report indicates no listing within the 1/2-mile search radius of the subject site.*

▼ **CERCLIS – No Further Remedial Action Planned (NFRAP), EPA.** NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.

- *The EDR Report indicates no listing within the ¼-mile search radius of the subject site.*

▼ **Corrective Action Report (CORRACTS), EPA.** The CORRACTS report lists hazardous waste handlers with RCRA corrective action activity.

- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Resource Conservation and Recovery Information System (RCRIS), EPA/NTIS.** RCRIS includes selective information on sites that generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

- *The EDR Report indicates no listings of RCRIS treatment, storage and disposal (TSD) site within the ½-mile search radius of the subject site.*

- *The EDR Report indicates no listing for the subject property and no listing for a RCRIS large quantity generators within the ¼-mile search radius of the subject site. Large quantity generators*

are entities that generate at least 1,000 kg/month of non-acutely hazardous waste or 1.0 kg/month of acutely hazardous waste (Lg. Quan. Gen. - LQG).

- *The EDR Report indicates no listing for the subject property and no listings for a RCRIS small quantity generator (Sm. Quan. Gen. - SQG) within 1/4-mile of the subject site. RCRIS small quantity generators are entities that generate less than 1,000 kg/month of non-acutely hazardous waste.*

▼ **Emergency Response Notification System (ERNS), EPA/NTIS.** Records and stores information on reported releases of oil and hazardous substances.

- *The subject site is not listed.*

State of Hawaii Database Listings

► **Sites List (SHWS), DOH.** A list of facilities, sites, or areas in which the Office of Hazard Evaluation and Emergency Response (HEER) has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

- *The subject site is not listed.*
- *The EDR Report indicates one (1) listing within the 1-mile search radius of the subject site.*

The Waiale Ash Pile is located northeast of the subject property (See EDR report, Appendix B). It is our opinion, based on the distance and down gradient location from the subject property, that this site has no reasonable potential to adversely impact the environmental condition of the subject property.

► **Permitted Landfills in the State of Hawaii (SWF/LF), DOH.** An inventory of solid waste disposal facilities or landfills in the State of Hawaii. These may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

- *The subject site is not listed.*
- *The EDR Report indicates no listing within the ½-mile search radius of the subject site.*

However, the former Waikapu Landfill is located within ½ mile east of the subject site. It is our opinion, based on the distance and down gradient location from the subject property, that this site has no reasonable potential to adversely impact the environmental condition of the subject property.

▼ **Leaking Underground Storage Tank (LUST) database, DOH.** An inventory of reported leaking underground storage tank incidents.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within a 1/2-mile radius of the subject site.*

▼ **Underground Storage Tank (UST) database, DOH.** USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with DOH.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within ¼-mile of the subject property.*

4.2 Additional Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and database release dates.

Federal Database Listings

▼ **Superfund (CERCLA) Consent Decrees (CONSENT), EPA Regional Offices.** Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Records of Decisions (ROD), EPA.** ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **National Priority List Delctions (De-listed NPL), EPA.** A list of sites that have been deleted from the NPL where no further response is appropriate.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Facility Index System/Facility Identification Initiative Program Summary Report (FINDS), EPA.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*

▼ **Hazardous Materials Information Reporting System (HMIRS) DOT.** A list of hazardous material spill incidents reported to DOT.

- *The subject site is not listed.*

▼ **Material Licensing Tracking System (MLTS), Nuclear Regulatory Commission (NRC).** A list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements.

- *The subject site is not listed.*

▼ **Mines Master Index File (MINES), Department of Labor, Mine Safety and Health Administration.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the ¼-mile search radius of the subject site.*

▼ **Federal Superfund Liens (NPL Liens), EPA.** A list of properties whereby the EPA has filed liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability.

- *The subject site is not listed.*

▼ **PCB Activity Database System (PADS).** Identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify EPA of such activities.

- *The subject site is not listed.*

▼ **RCRA Administrative Action Tracking System (RAATS), EPA.** A historical archived database containing records on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by EPA. The database was discontinued on September 30, 1995.

- *The subject site is not listed.*

▼ **Toxic Chemical Release Inventory System (TRIS), EPA.** A list of facilities which release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313.

- *The subject site is not listed.*

▼ **Toxic Substances Control Act (TSCA), EPA.** Identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list.

- *The subject site is not listed.*

▼ **Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/TSCA Tracking System (FTTS INSP and FTTS), EPA – Office of Prevention, Pesticides and Toxic Substances.** FTTS tracks administrative cases, pesticide enforcement actions, and compliance activities related to FIFRA, TSCA, and Emergency Planning and Community Right-to-Know Act (EPCRA).

- *The subject site is not listed.*

State of Hawaii Database Listings

▼ **Release Notifications (SPILLS), DOH.** Releases of hazardous substances to the environment reported to the HEER Office. The following databases are included in the HEER Spill List:

Release Notification Report: a compilation of releases reported to HEER.

Hawaii Emergency Planning and Community Right-to-Know Act (HEPCRA): a list of facilities that have submitted Tier II and Form Rs as a reporting requirement.

- *The subject site is not listed.*

▼ **Registered Wells and Dry Wells, DLNR.** (See Section 5.5.6). There are no registered wells listed for the subject property. *(2002 DLNR data).*

▼ **Air Quality Permit, DOH.** Current activities conducted on-site do not require an air quality permit.

▼ **Storm Water Discharge (NPDES) Permit, DOH.** Current activities conducted on-site do not require a NPDES permit.

County and Other Database Listings

Other local records of environmental interest that were reviewed or considered for review by VEC included:

▼ **Fire Department, County of Maui.** The Maui County Fire Department (MCFD) maintains file material that is not on a database. MCFD was contacted for an inquiry on the subject property.

▼ **Former Manufactured Gas (Coal Gas) Sites.** EDR provides exclusive information regarding the existence and location of Coal Gas sites.

- The EDR Report indicates no listings within the one-mile search radius.

▼ **Grading/Grubbing Permit, County of Maui.** The current activities being conducted on-site do not require a grading/grubbing permit.

▼ **Hazardous Waste Disposal Documents.** VEC did not review any hazardous waste disposal documents.

▼ **Maui Electric Company.** Maintains records on county power transformers regarding PCB-containing equipment and equipment maintenance. One (1) pad-mounted electrical transformer was observed on the subject property near the northeast property corner on Kuikahi drive (See Site Plan, Figure 2, Appendix A).

▼ **Other Environmental Reports.** Environmental site assessment reports that were previously completed by VEC in close proximity to the subject site were reviewed.

▼ **Planning & Zoning, County of Maui.** According to the Maui County Department of Planning, the subject site's zoning is "Agricultural" and **is not** within the boundaries of the Special Management Area (SMA).

▼ **Property Tax Office, County of Maui.** The Maui County Property Tax Office maintains records of past ownership, maps, sketches and other information as it pertains to the subject property. (See also Section 7.1). The property owner is listed as Wailuku Sugar Company.

▼ **Wastewater Discharge Permit, County of Maui.** VEC did not identify any wastewater discharge permits registered to the subject property.

4.3 Physical Setting Source(s)

The following sources were reviewed for physical setting information (refer to Section 7.0 for a complete listing):

- Atlas of Hawaii;
- Civil Defense Tsunami Evacuation Map;
- Geologic and Topographic Map (Hawaii Atlas & Gazetteer);
- Groundwater Map and Water Quality Plan for State of Hawaii;
- U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, HI;
- U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku Quadrangle, 1983.

These data sources were used to provide information regarding physical characteristics of the subject site and surrounding area. This information is typically used in analysis of potential geological trends, which might impact environmental conditions of the subject site. Note that this investigation is not intended to identify geologic hazards associated with the subject property.

4.4 Historical Use Information Regarding the Property and Adjoining Properties

The following historical data sources were reviewed for this report (refer to Section 7.0 for a complete listing):

- Aerial Photographs;
- Department of Planning and Zoning, County of Maui;
- Maui County Fire Department (Fire Prevention Bureau / Hazardous Materials Division);
- Maui County Real Property Tax Records;
- Personal Interviews;
- Sanborn Maps (no coverage);
- State of Hawaii, Department of Health, Environmental Management Division;
- Environmental Date Resources (EDR).

Historic Aerial Photographs

A series of aerial photographs with coverage of the subject property and surrounding area were examined. See Figure 2, Appendix A, for clarification of specific location.

Table 6.0 Historical Aerial Photograph Analysis		
Date	Aerial Photo Analysis	
12/20/50	SS: N, E, S W: RG:	Agricultural land with one (1) reservoir and numerous unpaved roads. Agricultural land. Limited residential in the south. Undeveloped vegetated land. Agricultural land use.
6/2/64	SS: N: E, S, W: RG:	Uncultivated area in the center of the site has been cultivated. Residential development to the northwest. No changes noted. No changes noted.
1/30/77	SS: N, E, S, W: RG:	On-site reservoir expanded. No changes noted. Water tower and Landfill noted to the east.
9/11/85	SS: N: E, S: W: RG:	Second smaller reservoir noted. Kukahi Drive added. No changes noted. New subdivision roads noted. Agricultural land with increasing residential growth.
10/8/90	SS: N: E, S: W: RG:	Crop changed from sugarcane to pineapple. Water tower noted. Crop changed from sugarcane to pineapple. Homes noted on subdivision streets. Agricultural land with increasing residential.
5/3/97	SS: N, S: E: W: RG:	No changes noted. No changes noted. Agricultural use has changed to small fields with banana shacks evident. Increased residential development. Agricultural use with increased residential development.
Notes: SS = Subject Site N = Northern Adjoining Property E = Eastern Adjoining Property		S = Southern Adjoining Property W = Western Adjoining Property RG = Regional Area

VEC did not observe any features on aerial photographs examined that would suggest the presence of significant vegetative stress, soil staining, or bulk storage of chemicals such as drums or tanks.

5.0 SITE RECONNAISSANCE

Information regarding the storm water flow, property layout, physical characteristics, and adjoining property conditions are presented in Figure 2, Site Plan, and site photographs. (See Appendix A).

5.1 Methodology and Limiting Conditions

A site investigation focuses on obtaining information indicating the likelihood of identifying ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site building structures.

On April 15 and 16, 2004, VEC personnel, Mr. Jeffrey Kermode and Joseph Beaulieu conducted an overall site inspection of the subject site. The method used to observe the subject property included: (1) walking the perimeter of the subject property; (2) conducting random and non-random traverses across the property; (3) walking along all noted access roads; and (4) thoroughly inspecting all areas of observed dumping. The property boundaries were not clearly defined, and the VEC investigator made estimates based on the property TMK map and aerial photography.

Certain physical obstructions limited the investigators from total property observations of native surface soils. Approximately twenty percent (20%) of the subject property's native surface soils were obscured by the presence of dense vegetation. The majority of the remaining property is covered with tall grass.

Any environmental conditions reported here are not intended to include minimal conditions that 1) generally do not present a material risk of harm to public health or the environment and 2) generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies.

5.2 General Site Setting

5.2.1 Current and Past Use(s) of the Property

Current Uses

According to the Maui County Tax Office, the current owners are listed as Wailuku Sugar Company. At the time of the site reconnaissance, the property was in escrow to Town Development of Hawaii.

The property is essentially fallow fields and is currently not being used for commercial, residential, or industrial purposes. (See Figure 2, Appendix A).

Information presented here represents those items visually or physically observed or identified in the interviews or records review.

Past Uses

County Tax records indicate that historically the subject property was owned by Wailuku Sugar Company. In addition to sugarcane cultivation the land was leased for several years to Maui Pineapple Company who used the land for pineapple cultivation.

The knowledge of past uses of the property was primarily made from aerial photographs and interviews. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.2 Current and Past Uses(s) of the Adjoining Properties and Surrounding Area

VEC has researched current uses of adjoining properties and at its discretion, past uses of the adjoining properties and the surrounding areas. Information presented here represents those items visually or physically observed or identified in the interviews or records review. The information is described herein as items that may indicate ***recognized environmental conditions*** with adjoining properties and those

conditions that may indicate a high probability of migration of hazardous substances or petroleum products to the subject property.

Adjoining Property	Status	Land Property Use	Concerns	Comments
North of Subject Site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	Sugarcane and then pineapple cultivation have been active on this site for several years up until the late 1990's. During this time agricultural pest control chemicals and fertilizers, which have been long recognized by the U.S. Environmental Protection Agency (EPA) for contributing to the potential contamination of surface soils and groundwater systems have been used. Although chemicals used for sugarcane and pineapple crops could have been regularly used in significant quantities, they degrade with time in soil. Most agricultural chemical concerns typically arise when bulk (full strength) products leak or are spilled onto soils. However, it is possible that chemicals in long-term use remain at, or above, regulated levels.
	Present	Residential and fallow fields and a Maui County Water Tank.	None.	None.
East of subject site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	See comments above.
	Present	Residential and fallow fields.	None.	None.
South of subject site	Past	Sugarcane and pineapple cultivation.	Historical pesticide and fertilizer application on sugarcane and pineapple crops leading to possible soil and groundwater contamination.	See comments above.
	Present	Residential and fallow fields.	None.	None.
West of subject site	Past	Undeveloped land.	None.	None.
	Present	Residential, single family homes.	None.	None.

The development of past uses of the adjoining properties was primarily made from interviews, VEC site reconnaissance, and aerial photographs. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.3 Topography

The regional area lies on the eastern lower slopes of the West Maui Mountains. Its physiographic type feature is named Kahului Isthmus. An isthmus is described as a low land link between former islands.

Locally, the elevation ranges from approximately three hundred and eighty (380) feet to eight hundred and twenty (820) feet above mean sea level and is characterized by moderate topographic relief (10% slope) towards the east. On-site relief directs storm water towards the eastern portion of the property (See Figure

2). Storm water flow along Honoapiilani Highway is in a southerly direction. Flow along Kuikahi Drive is in an easterly direction.

The nearest prominent natural feature is the Iao Stream located approximately one (1) mile to the north.

5.2.4 Geology and Soils

According to the U.S. Department of Agriculture, the following soil series underlies the subject site:

- Iao cobbly silty clay, 3 to 7 percent slope (IbB) and Iao Clay, 7 to 15 percent slopes (IoC). Iao series soils consist of well-drained soils on alluvial fans and valley fill. These soils developed in alluvium derived from basic igneous rock. Permeability is moderately slow. Runoff is described as medium, and the erosion hazard is slight to moderate.

Other common, surface geologic phenomena investigated in an environmental site assessment are faults, landslides, rock falls, and volcanic eruptions. After examination of the relevant data, it has been determined by VEC that these geologic phenomena are not a factor to the subject site.

In 1992, the USGS reevaluated the seismic hazards for the State of Hawaii, and Maui County was classified as Zone 2B. This indicates that in any given year within a 50-year period (average building life span) there is a 10% chance that a .20g (force of gravity) horizontal ground acceleration may take place during the peak wave of an earthquake. Engineering design codes for this area should have considered this acceleration prior to construction. Buildings not in compliance with the Uniform Building Code (UBC) seismic provisions may be subject to some level of damage from earthquakes that exceed the .20g acceleration.

However, it should be noted that this is not an investigation for geological hazards.

5.2.5 Hydrology

The subject site area has an annual average rainfall of approximately 30 inches. The average temperature range from the annual high to the annual low is 81 degrees and 64 degrees Fahrenheit, respectively. The pre-development vegetation zone within this temperature and rainfall range is characterized as Lantana-koa haole shrubs. Characteristic plants consist of Lantana, koa haole, klu, panini, ilima and Natal redtop grass.

On-site drainage is in an easterly direction toward Honoapiilani Highway. A large reservoir (upper) and a small reservoir (lower) are located on site. A manmade, concrete lined ditch transects the eastern portion of the property from north to south and flows inside the eastern property line to the southeast property corner and beyond. A manmade, concrete lined flume runs through the center of the property from the upper reservoir in an easterly direction to an intersection with the ditch described above (See Figure 2, Appendix A).

The pertinent Federal Insurance Rate Map (FEMA FIRM MAP #150003 0170 B dated map on June 1, 1981) depicts the area as minimal flooding (Zone C).

The Civil Defense Tsunami Evacuation Maps indicate the subject property **is not** within the Tsunami reach-zone. The Pacific Ocean is located approximately two (2) miles northwest of the subject site.

5.2.6 Hydrogeology

As with all islands of the United States, Maui is regulated by the Coastal Zone Management Act of the Clean Water Act. These two designations require protective comprehensive plans for groundwater management and limit the extent of certain types of development and land use. One important management criterion is the disposal of wastewater. The Water Resources Research Center has designated the groundwater management area as the *Iao Aquifer System* within the *Wailuku Aquifer Sector.* The groundwater underlying the subject site is defined as follows:

Table 4.0. Aquifer Classification of the subject site.						
Aquifer	Aquifer Type: Hydrology & Geology:	Development Status:	Status of Groundwater: Utility:	Salinity (mg/l Cl)	Uniqueness	Vulnerability to Contamination
Upper	Unconfined basal aquifer occurring in horizontally extensive lavas (Flank)	Currently Used	Drinking	Fresh	Irreplaceable	High

The following are descriptions of the aquifer classification codes, according to Water Quality Plan of 1992:

Aquifer Type Hydrogeology (basal, high level, unconfined, confined, or confined/unconfined: basal – freshwater in contact with seawater; *high level* – freshwater not in contact with seawater; *unconfined* – water table is the upper surface of the saturated aquifer; *confined* – aquifer is bounded by impermeable or poorly permeable formations; and *confined or unconfined* – the actual condition is uncertain.

Aquifer Type Geology: flank, dike, flank/dike, perched, dike/perched, and sedimentary.

Development Stage – currently used, potential use, no potential use: Aquifers are differentiated according to those already being used (currently used), those with potential utility (potential use), and those having no potential for development.

Utility – drinking, ecologically important, neither: Identifies aquifers by use.

Salinity – fresh, low, moderate, high and seawater: The gradation of groundwater from fresh to seawater is a feature of all basal aquifers in Hawaii. The upper limit of the standard for drinking water is 250 mg/l Chlorine (Cl^-) (fresh) and true seawater has a chloride content of 18,980 mg/l.

Uniqueness – irreplaceable and replaceable: The classes irreplaceable and replaceable are direct EPA derivatives. Virtually all-potable water in the state of Hawaii should be considered irreplaceable over the long term.

Vulnerability to Contamination – high, moderate, low, none: Because of the geographical limits of resources, interconnection among groundwater sources and the relatively rapid time of groundwater travel, aquifers can be described as being either vulnerable or not vulnerable to contamination.

The estimated depth to the basal groundwater ranges from approximately 360 to 750 feet below the ground surface, depending on the location on the subject property. The flow direction is expected to be in an easterly direction.

The subject site is located mauka (above) of the Underground Injection Control (UIC) line. The UIC line is the designated boundary that divides protected inland areas situated over drinking water sources from seaward areas located over non-potable water sources. Sites mauka of the UIC line are considered drinking water sources and permit limitations are imposed by Maui County, Clean Water Branch (CWB).

5.2.7 Potable Water Supply and Sewage Disposal System

The property is undeveloped at this time. This section does not apply.

5.3 Interior and Exterior Observations

5.3.1 Hazardous/Regulated Substances and Petroleum Products in Connection with Identified Uses.

There were no active operations identified on the subject site at the time of the site visit. Therefore, VEC did not identify any hazardous/regulated substances and/or petroleum products in connection with identified current uses as visually and physically observed on the property at the time of the site visit.

5.3.2 Hazardous/Regulated Substances and Petroleum Products/Containers (not in connection with identified current uses).

VEC did not identify any hazardous/regulated substances and/or petroleum products that are not in connection with identified current uses as visually and physically observed on the property at the time of the site visit. There is no evidence of any historic misuse, improper bulk storage, or significant spills of hazardous or regulated substances on the subject property.

A review of the historical information identified the subject property to be part of the Wailuku Sugar Company's Plantation that has been operating in this area for several decades. It was also discovered that Maui Land and Pineapple company leased the property for pineapple cultivation for several years up until 1998. Hazardous materials potentially associated with sugarcane and pineapple cultivation include pesticides and herbicides. The U.S. Environmental Protection Agency (EPA) has long recognized these chemicals as a contaminant to surface soils and ground water.

5.3.3 Unidentified Substance Containers

VEC did not observe any unidentified substances suspected of being possible hazardous/regulated substances or petroleum products as visually and physically observed on the property at the time of the site visit.

5.3.4 Storage Tanks

No indication regarding the historic or current presence of underground storage tanks (USTs) on the subject site was obtained through our review of regulatory databases, interviews or through VEC's site reconnaissance.

One (1) empty, abandoned tank (approximate 1000-gallon capacity) was found above ground in the northwestern portion of the subject property (See Figure 2 and Photo # 24, Appendix A). The historic use of this tank is unknown. No petroleum odor or staining was noted by the investigator. VEC contacted Wailuku Agribusiness regarding this tank, however, to date, VEC has not received any related information. In VEC's opinion this tank is not a significant concern.

5.3.5 Odors

VEC identified no suspect odors on the subject property.

5.3.6 Pools of Liquid

The investigators did not observe any pools or sumps of liquids likely to be hazardous substances or petroleum products to the extent visually and/or physically observed on the subject property at the time of the site visit or from interviews or records review.

5.3.7 Indications of PCBs

Pole or pad-mounted transformers which are numbered 7777 or above are considered non-PCB containing by the Maui Electric Company. One (1) pad mounted electrical transformer was observed on the subject property's northern boundary line. The transformer appeared to be in good condition with no signs of leakage (See Figure 2, Appendix A). No numeric identification was evident, therefore, VEC can not confirm whether this transformer contains PCBs, however, due to it's appearance and condition it is unlikely.

Background Information:

Polychlorinated biphenyls (PCBs) are groups of manufactured organic chemicals that contain 209 individual chlorinated chemicals (known as congeners) and were introduced in 1929. PCBs have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Products containing PCBs are old fluorescent lighting fixtures, electrical appliances containing PCB capacitors, old microscope oil, and hydraulic fluids.

The manufacture of PCBs stopped in the United States in 1977 because of evidence that they build up in the environment and cause harmful effects. The distribution in commerce of PCB containing items was banned in 1979 (40 CFR 761.20). The EPA aggressively enforces regulations concerning PCB manufacturing, use, distribution, release and disposal under the Toxic Substance Control Act (TSCA). This federal agency extensively regulates the use, servicing, and disposal of PCBs in electrical equipment by enforcing marking, notification, inspection, and record keeping requirements.

5.4 Interior Observations

5.4.1 Heating and Cooling Systems of On-site Building Structures

The subject property is undeveloped. This section does not apply.

5.4.2 Stains and Corrosion

The subject property is undeveloped. This section does not apply.

5.4.3 Indoor Wastewater Drains, Sumps and Grease Interceptors

The subject property is undeveloped. This section does not apply.

5.5 Exterior Observations

5.5.1 Pits, Ponds, and Lagoons

There were no areas identified as man-made or natural depressions that are, or would have been, likely to hold waste liquids or sludge from industrial operations or other activities. There are two (2) freshwater reservoirs located on site (See Figure 2, Appendix A). These reservoirs and the concrete lined irrigation ditch and flume described in section 5.2.5 are part of an extensive island wide irrigation network that redirects freshwater from the highlands to the dryer lowlands for agricultural use.

5.5.2 Stained Soil or Pavement

No significant petroleum-like staining was noted on the subject property.

5.5.3 Stressed Vegetation

There were no areas of stressed vegetation identified on the subject property at the time of the site visit that are, or would have been, likely caused from something other than insufficient water (or flooding).

5.5.4 Solid Waste

There were no indications of significant solid waste dumping or suspect fill materials, mounds, depressions or excavations, observed on this property during the site reconnaissance, nor on historic aerial photographs. Historical on-site disposal practices are unknown. Agricultural tilling and grading has taken place on the subject property.

The following solid wastes were noted during the site reconnaissance (See Photos #17 though #21):

- Landscape debris (i.e. tree limbs, palm fronds, grasses, shrubs, etc.);
- Construction debris (i.e. concrete, lumber, metal, plastics);
- Small soil stockpiles of less than 10 square meters (no odors or staining were detected);
- White goods (discarded washers, dryers or refrigerators, etc.);
- Limited amounts of litter.

Some wastes may be considered "Special Wastes" according to the Hawaii Administrative Rules (HAR) on Solid Waste, Title 11, Chapter 58.1. Special wastes are those wastes that do not fit in the mixed municipal solid waste (MMSW) category, either by general nature or because of special handling requirements. Special waste categories include: asbestos, sludge, medical waste, used oil, batteries, agricultural wastes, tires, derelict vehicles and white goods (i.e., appliances). Locally, the County of Maui, Department of

Public Works, Solid Waste Division administers the disposal of these materials. These wastes need to be disposed of in a permitted solid waste landfill such as the Maui County Central Landfill. Special wastes' management needs to be performed in a manner that complies with all local, state, and federal regulations as applicable to the specific waste type.

5.5.5 Wastewater or Storm Water – Discharge Drains, Dry Wells, Drainage Ways, and Retention Basins

VEC identified a storm water drain located along the northern property boundaries on Kuikahi Drive. (See Photo #4 and Figure 2, Appendix A).

Any future grubbing or grading activity that may take place on the subject site (especially if > 1 acre of soil disturbance) will likely require, both a Maui County Grading Permit and a Department of Health, Clean Water Branch, NPDES (National Pollutant Discharge Elimination System) permit.

5.5.6 Wells

From VEC's observations and database search, there are no production, domestic, abandoned, irrigation or monitor wells located on the subject site.

Wells located near the subject property are mainly used for irrigation purposes or are unused at this time.

5.5.7 Septic and Cesspool Systems

The subject property is undeveloped. This section does not apply. VEC did not obtain evidence of any historic septic or cesspool system located on the subject site.

5.6 Non-Scope Considerations

The concerns listed below are not normally considered relevant under CERCLA, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

5.6.1 Asbestos-Containing Materials (ACM)

There are presently no structures on the subject site that may contain asbestos-containing building materials. VEC did not note any significant quantities of construction debris that may contain asbestos.

Background Information:

Asbestos was widely used in building materials and in fire retardant applications up through the 1980s. Asbestos use in the United States did not start to decline until the EPA banned the spray-applied materials during 1973-1978. Further restrictions on U.S. manufactured asbestos products continued into the 1990s. The EPA ban rule and phase-out of all asbestos-containing materials (ACMs) was to be implemented in stages from 1990 to 1997, but the Rule was overturned in federal court.

Asbestos is a known health hazard causing progressive lung scaring and cancer. Asbestos related conditions usually develop within 15 to 40 years after exposure. Exposed smokers have an increased risk factor of 50 to 90 times that of the non-smoking population.

State and federal rules have established standards for the use and control of ACM. These standards apply to worker protection, notification procedures, renovation/demolition activities, and construction debris (waste) management.

Under the EPA's Asbestos Hazard Emergency Response Act (AHERA), 40CFR763, asbestos-containing material (ACM) is defined as any substance whose asbestos content exceeds one percent (1%) of the total volume as determined by Polarized Light Microscopy (PLM) analysis. Building inspector training, sampling procedures and laboratory analysis are also addressed under this rule. Some aspects of this rule have been extended to public and commercial buildings. The Hawaii Administrative Rules 11-502 have essentially adopted EPA's AHERA standard.

Current OSHA regulations for occupational exposure to asbestos hazards require commercial building owners to *presume* all thermal system insulation, sprayed or textured surfacing materials and asphaltic and vinyl flooring installed in buildings constructed before 1981 to contain ACM. The Federal Occupational Safety and Health Act (OSHA) Construction Standard for Asbestos requires that building owners communicate any potential or actual asbestos hazards (29CFR1926.1101(k)). Owner/Operators must inform in-house employees and any outside contractor (workers) who apply or bid for work in or adjacent to areas known or *presumed* to contain asbestos. Included asbestos materials are Thermal system insulation (TSI), sprayed or troweled-on surfacing materials, and asphalt or vinyl flooring material installed prior to 1981. Hawaii Occupational Safety and Health (HIOSH) under HAR 12-141.1 has adopted the federal standard.

Under EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) 40CFR Part 61, are requirements for renovation and demolition work involving ACM.

5.6.2 Lead-Based Paint

There are presently no structures on the subject site which may contain lead-based paints. VEC did not note any significant quantities of construction debris that may contain lead-based paint.

Background Information:
Lead is a metal element in pure form but is found in other chemical compounds used within manufactured and formulated products. Among these are pipe solder, paint and other coatings and water pipes - items commonly found in older buildings and homes.

Lead becomes toxic to the human body even in low levels by chronic over exposure. The exposure may occur by breathing dust, eating dust (on food, tobacco, fingers, or eating paint chips (children)). Lead poisoning affects the brain and central nervous system; especially susceptible are young children. Lead is also known to impact kidney and liver functions.

The EPA/HUD defines lead-based paint as paint or other coatings containing lead equal to or in excess of 0.5% lead by weight or 1.0 mg/cm^2. The prevalence of lead-based paint in housing built before 1940 is especially high according to research conducted by the U.S. Department of Housing and Urban Development (HUD). After 1940, its use diminished until 1972 when U.S. manufactured housing paint became regulated at 0.5 percent lead by weight and "banned" in 1978; this means that paint could not be manufactured and sold for housing use if it contained lead above the U.S. Consumer Products Safety Commission's (CC) 0.06 percent by weight. The "ban" provided a basis for using the cut-off date of 1978 when disclosing the possibility of lead-containing paint in sales and rentals of housing units.

Any detected lead-level in paint below HUD and the CPSC's criteria remains an environmental concern under the U.S. Occupational Safety and Health Administration's (OSHA) Lead Standard for Construction Workers, 29CFR1926.62 and the HIOSH equivalent, HAR 12-148.1. Communication of lead-levels in paint is required for worker safety, when conducting renovation or demolition, and for construction debris (waste) management.

5.6.3 Arsenic-Containing Substances

There are presently no structures on the subject site, which may contain arsenic. VEC did not note any significant quantities of construction debris that may contain elevated levels of arsenic. Pesticides historically used on-site could have included arsenic-containing compounds.

Background Information

Arsenic, like several other heavy metals, tends to accumulate in the body. Ingestion of a small dose may seemingly exert no adverse effect at all, while ingestion of multiple small doses could cause death. In lesser amounts, arsenic-containing compounds cause other health problems, like mottling of the skin, skin

lesions, nervous disorder, and severe, irreversible liver damage. Arsenic is a human carcinogen, causing skin tumors when ingested and lung tumors when inhaled.

Arsenic-containing compounds were once used as components of some inorganic pesticides. In the 1940s, these pesticides were used to control insects and rodents.

To protect against exposure to high arsenic concentrations, OSHA requires workers to use air-purifying respirators and to wear protective clothing in areas where airborne arsenic compounds are known to exist.

The Resource Conservation and Recovery Act (RCRA), Subtitle C lists arsenic and arsenic-containing compounds as a hazardous waste. Therefore, construction/demolition debris (waste) management should be conducted in accordance with all Federal, State, and Local regulations. This typically requires waste segregation into construction material and dust/debris waste. Sampling using the Toxicity Leach Characteristic Procedure (TCLP) for arsenic is required for hazardous waste determination.

5.6.4 Radon

VEC did not identify any man-made products on the subject property that are known or suspected to emit radioactive decay elements.

Background Information:

Radon is a colorless and odorless radioactive gas that can produce health effects such as cellular injury. Radon gas can occur in the natural environment as concentrations from certain rocks and geologic conditions have a high radon-emanation potential.

These surface rock types are not known to occur in Hawaii. It is possible that increased concentrations of Radon could occur in regions where geologic fault and volcanic rift zones may release gases from deeper earth sources. However, the State of Hawaii, Department of Health (DOH) has not addressed concerns for any significant levels of gas to occur anywhere in Hawaii. This was based on the 1992 and 1996 DOH investigations conducted in elementary schools throughout the State.

5.6.5 Lead in Drinking Water

The subject property is undeveloped. This section does not apply.

5.6.6 Ecological Resources, Endangered Species, Cultural and Historic Resources, and Wetlands

There are no known wetlands, critical habitats, or threatened and endangered species designated for the subject site. The subject site is not located within the County of Maui's Special Management Area (SMA).

5.6.7 Indoor Air Quality

The subject property is undeveloped. This section does not apply.

5.6.8 High Voltage Transmission Lines

Transmission and or distribution lines are located along the eastern property boundary. These lines are not a concern to the subject property at this time and would unlikely be a concern for any future development on site. However, an EMF (Electromagnetic Frequency) survey can be conducted by MECO (Maui Electric Company) if there is client concern.

6.1 Recognized Environmental Conditions

Recognized environmental conditions, as defined by ASTM Standard E1527-00, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

VEC has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-00 for the property located at the intersection of Honoapiilani Highway and Kuikahi Drive in the community of Wailuku Heights, Maui (TMK Number (2) 3-5-02:03, defined as the subject property. Any exceptions to or deletions from, this practice are described in Section 1.4, Limitations and Exceptions, of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property, except for the following:

6.1.1 Database Listings (See Section 4.0 & EDR Report, Appendix B)

Findings/Concerns:

The subject site is not listed on any Federal, State or County databases as a site with any recognized environmental concerns. There is one (1) nearby listed site (Waiale Ash Pile), as indicated by the EDR Report, within the appropriate search distance from the subject property. In addition, a former county landfill is located to the east within ½ mile of the subject property (See Figure 2, Appendix A and EDR Report, Appendix B). These sites are located down gradient of the subject site.

Opinions and Conclusions:

It is our opinion that the above listed sites do not have reasonable potential to adversely impact the environmental condition of the subject property.

6.1.2 Current and Historic Use or Storage of Hazardous and Regulated Substances (See Section 5.3.2)

Findings/Concerns:

There is no evidence of any historic or current significant misuse of hazardous or regulated substances on the subject property. Historically, pineapple and sugarcane agriculture had been occurring on, and adjacent to, the subject property for several decades. These operations have been associated with the application of pesticides and fertilizers.

Opinions and Conclusions:

While the use of pesticides and herbicides on and near the property does not necessarily result in adverse impacts to the environmental condition of the subject site, it is possible (yet unlikely) for residual amounts of these substances to accumulate to concentrations that present a potential threat to human health or the environment. Soil sampling and laboratory testing would provide additional information to evaluate potential environmental effects from these agricultural activities. A standard, pro-active procedure would be to conduct such a survey prior to future development at this site. There is, however, no regulatory requirement to conduct this sampling.

6.2 Other Environmental Concerns

The concerns listed below may not be considered ***recognized environmental conditions*** by ASTM definition. However, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

6.2.1 Solid Waste Management (See Section 5.5.4)

Findings/Concerns:

A moderate amount of "wildcat" dumping has taken place on-site. Some items noted include regulated items (white goods). Due to some heavily vegetated areas, the entire subject site and underlying soils were not visibly inspected.

Opinions and Conclusions:

Any waste disposal should be in a permitted solid waste landfill or recycled in a manner that complies with all local, state, and federal regulations as applicable to the specific waste type with special attention given to regulated items.

It is important to note that if additional clearing of the property commences and large amounts of construction debris or unidentifiable substances (containers) are further discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

6.2.2 Surface Waters and Area Aquifer Protection (See Section 5.5.5)

Findings/Concerns:

Development may be planned for the subject site. For any future grubbing and grading and construction activities planned for the site, the property owner should be aware of the potential for contaminants to run off-site and into on-site watercourses or adjacent storm water drains. Products of concern relating to any future development activity would be earthen material (silt), oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

Opinions and Conclusions:

Future land clearing projects will likely require a County of Maui grading/grubbing permit and if the size of a project creates greater than one (1) acre of soil disturbance, the developer will also require a National Pollution Discharge Elimination System (NPDES) General Permit (State of Hawaii, Department of Health, Clean Water Branch).

In order to minimize any potential regulatory profiling of the subject site as a potential responsible party for any newly discovered groundwater or surface water contamination, future management may consider practicing conservative, proactive environmental policies. These policies might include written environmental protection contracts with any future special-use commercial tenants and posted notices regarding any use, storage and handling of hazardous substances and/or petroleum product. Special attention should be addressed to storm water entering the nearby storm drains or drainageways.

Vuich environmental End of Section

The conclusions stated above should not be construed to mean that any regulatory agency would have the same opinion as this author, nor is any implication proposed therefrom. The results of this environmental assessment are intended for general reference purposes only and are not intended as legal advice. The advice of legal counsel should be sought in regard to individual facts, circumstances and interpretation of environmental liability.

7.1 Published References

1. American Standard of Testing and Materials, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E1527-00, 2000.
2. "Atlas of Hawaii", 2nd Edition, Department of Geography, University of Hawaii at Hilo, 1983, University of Hawaii Press.
3. "Atlas of Hawaii", 3rd Edition, Department of Geography, University of Hawaii at Hilo, 1998, University of Hawaii Press.
4. County of Maui, Real Property Tax Division, Historical Records for TMK Number (2) 3-5-02:03. April 21, 2004.
5. Hawaii Administrative Rules, Title 11, Department of Health, Chapter 58.1, Solid Waste Management Control.
6. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Leaking Underground Storage Tank Release Sites, August 2003.
7. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Underground Storage Tank Facilities, August 2003.
8. State of Hawaii, Department of Health, Voluntary Response Program (VRP), List of Voluntary Response Program Sites, October 2003.
9. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Release Notifications, September 2000.
10. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Sites List, July 2001.
11. State of Hawaii, Department of Land and Natural Resources, Registered Wells and Dry Wells, 2002.
12. State of Hawaii, Department of Land and Natural Resources, "State of Hawaii Water Quality Plan and Groundwater Map", June 1990, Revised December 1991.
13. U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii", 1972.
14. U.S. Environmental Protection Agency, Office of Air and Radiation et al., Indoor Air Facts No. 4 (revised) Sick Building Syndrome, April 1991.
15. U.S. Environmental Protection Agency, Building Air Quality: A Guide for Building Owners and Facility Managers, 1991.

7.2 Map and Other References

1. Environmental Data Resources, Inc., "The EDR Field Check Report", May 4, 2004.
2. Federal Emergency Management Agency, "Flood Insurance Rate Map", Number #150003 0170B dated June 1, 1981.
3. R.M. Towill Corporation, Aerial Photographs, Honolulu, Hawaii.
4. Air Survey Hawaii, Aerial Photographs, Honolulu, Hawaii.
5. Sanborn Maps (no coverage)
6. U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku Quadrangle, Hawaii 1983.
7. Site plan map provided by Towne Realty of Hawaii.

7.3 Record of Personal Communications

Table 3.0 List of persons interviews conducted by VEC

Date	Interviewee	Title & Organization	Address	Phone Number
4/14/04	Mr. Thomas Behnke	Civil Manager, Towne Development of Hawaii	255 Waiko Rd Wailuku, HI 96793	(808)243-5354
4/22/04	Mr. Clayton Suzuki	Land Manager, Wailuku Agribusiness	255 Waiko Rd Wailuku, HI 96793	(808)244-2208
4/22/04	Ms. Jackie Takamoto	Information Specialist Maui County Dept. of Water Supply	200 South High Street Wailuku, HI 96793	(808) 270-8048
4/26/04	Mr. Randall Moore	Manager, Hawaii Commercial & Sugar Company	Puunene, HI	(808) 877-6988
4/28/04	Mr. Derrick Heafey	Environmental Manager, Hawaii Commercial & Sugar Company	Puunene, HI	(808) 877-2958

Appendix A:

Maps, Plans, and Photographs

FIGURE 1: REGIONAL SETTING MAP

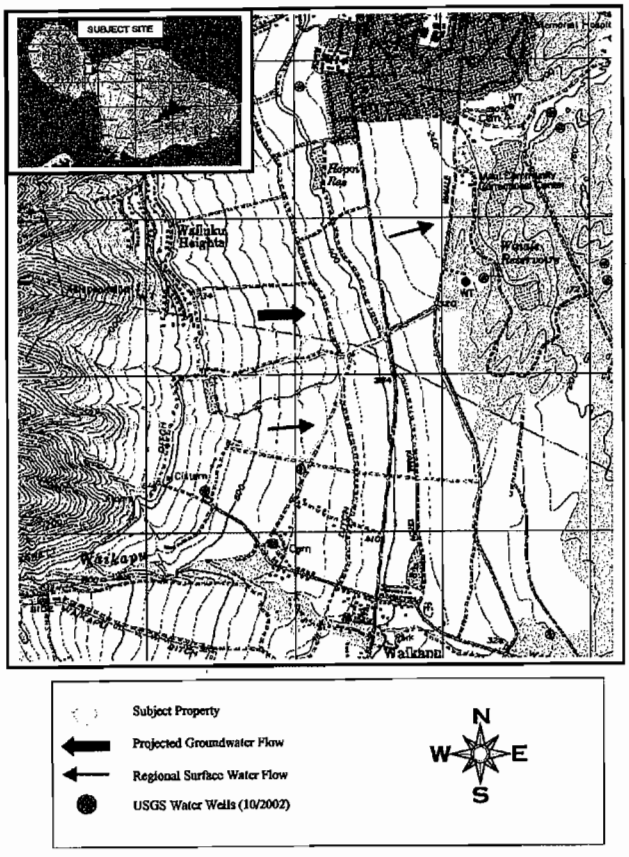


FIGURE 2: SITE PLAN

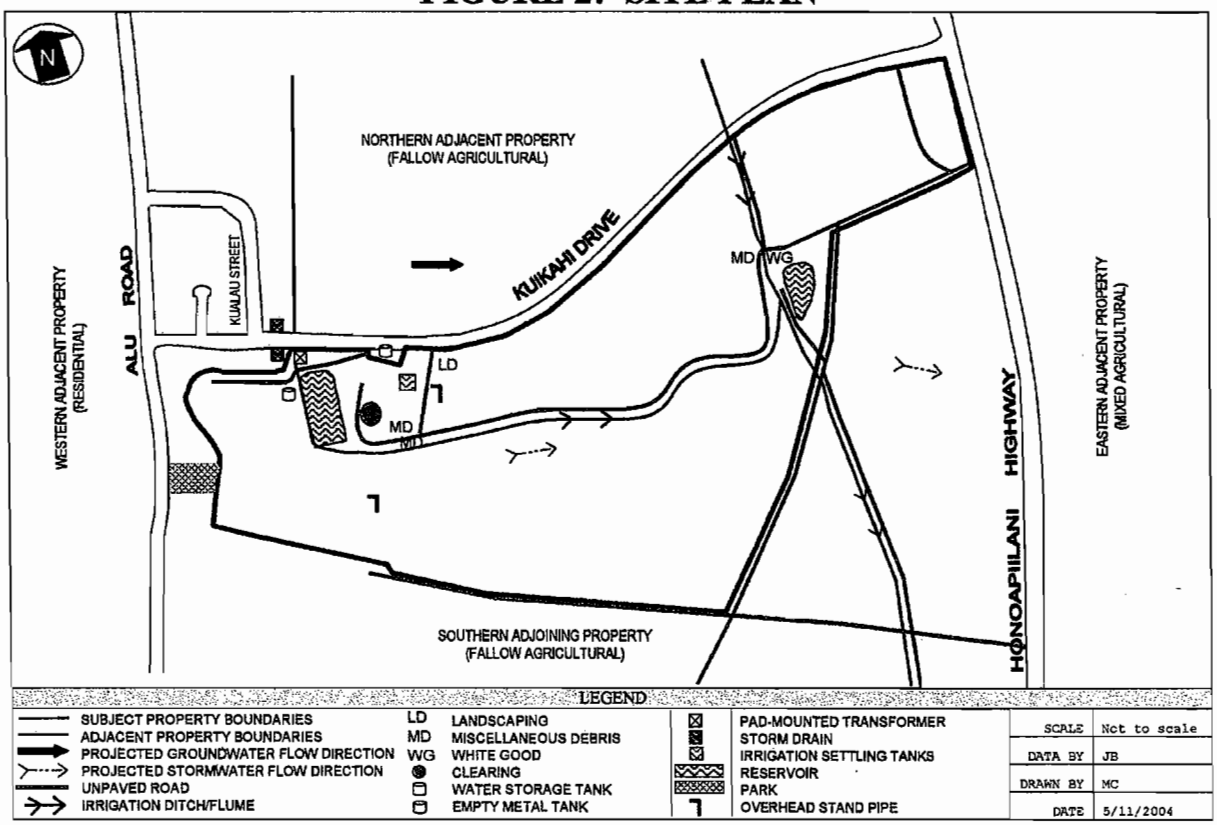
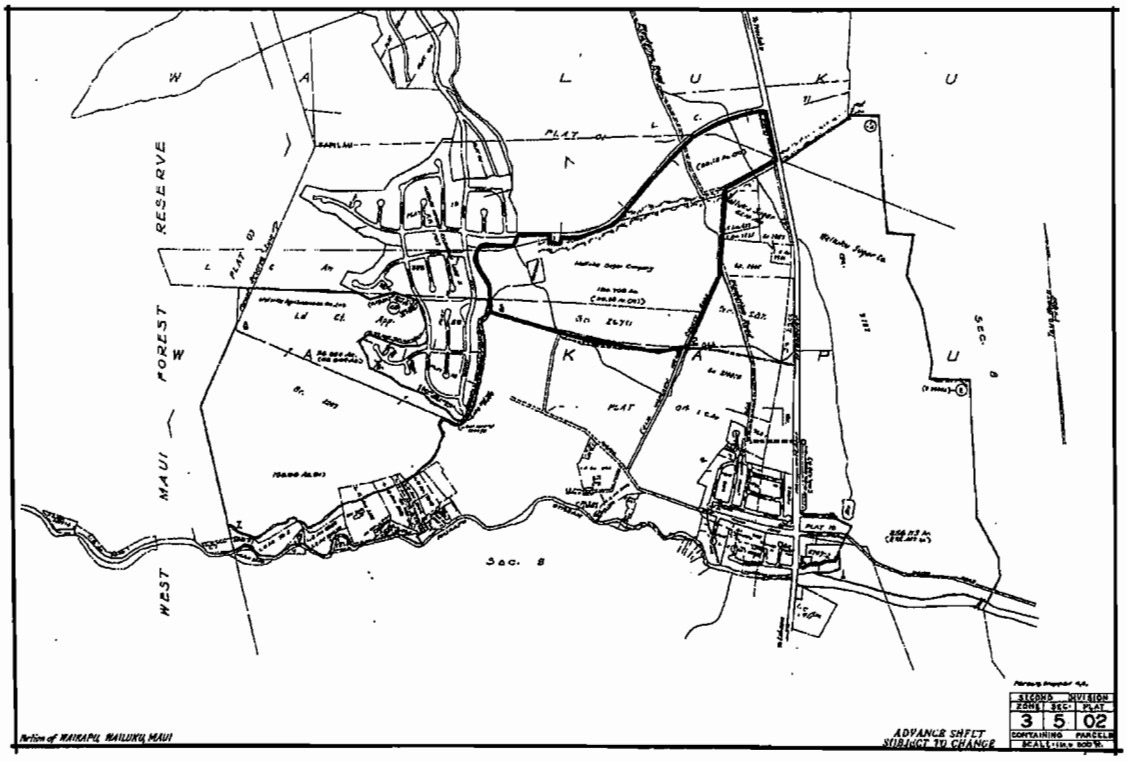


FIGURE 3: TAX MAP KEY



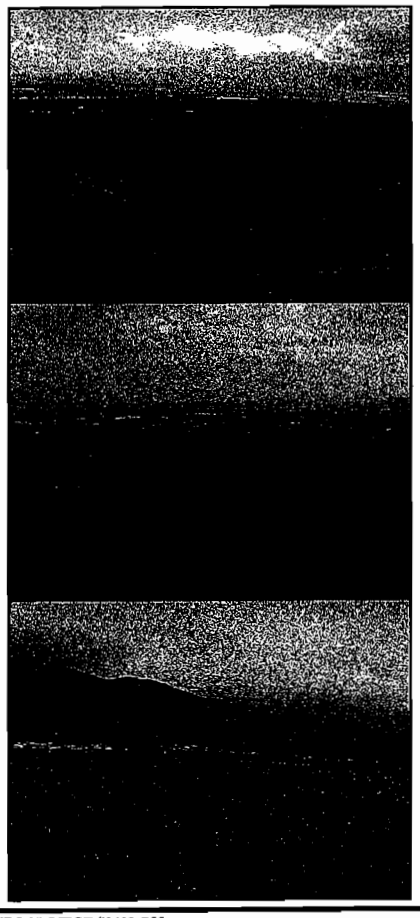


PHOTO 1

Southeasterly view of the eastern portion of the subject property. Photo is taken from the middle of the northern property line.

PHOTO 2

Northeasterly view of the southeastern portion of the subject property.

PHOTO 3

Northwesterly view of the western portion of the subject property. Photo is taken from the middle of the southern property line.

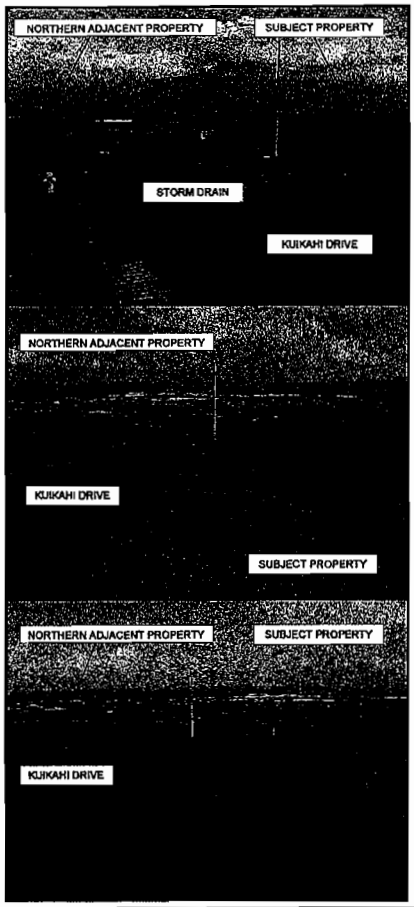


PHOTO 4

Easterly view along the subject property's northern boundary line from near the northwest property corner.

PHOTO 5

Easterly view of the subject property's northern boundary line from the middle of the property.

PHOTO 6

Northeasterly view of the eastern portion of the property's northern boundary line.

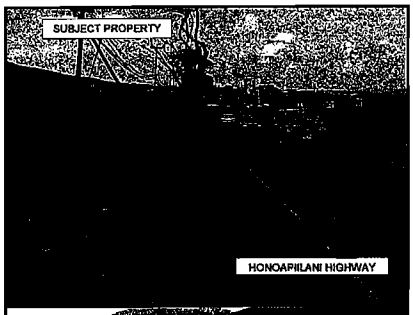


PHOTO 7

Northerly view along the subject property's eastern boundary line from the southeast property corner.

PHOTO 8

Westerly view along the subject property's southern boundary line near the southeast corner.

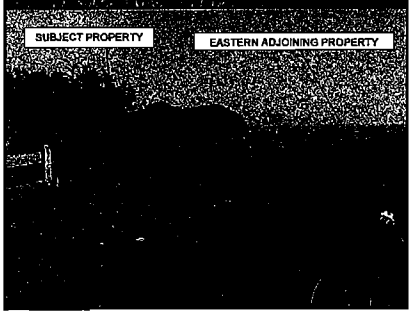


PHOTO 9

Northern view along the subject property's central eastern property line.

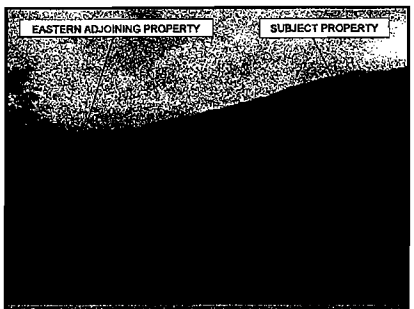


PHOTO 10

Southwesterly view along the subject property's eastern boundary line, middle portion.

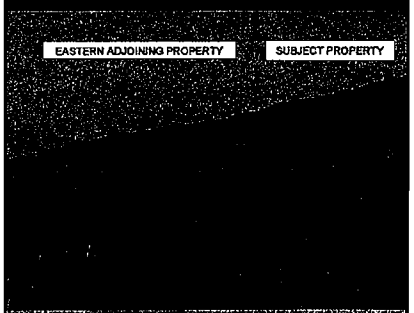


PHOTO 11

Southwesterly view along the subject property's eastern boundary line, south portion.

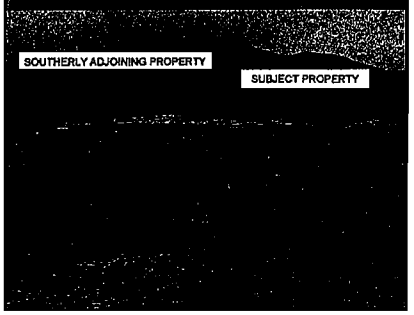


PHOTO 12

Westerly view along the subject property's southern boundary line from the southeast property corner.

MEV, LLC
MALAMA ENVIRONMENTAL

Environmental Site Assessment:
Phase I Investigation

Property: WAIKAPU UNDEVELOPED LAND
(60.08 ACRES)
OFF HONOAPIILANI HIGHWAY
WAILUKU, MAUI, HAWAII
T.M.K. (2) 3-5-02:002

Prepared for: ENDURANCE INVESTORS, LLC
P.O. BOX 220
KIHEI, HI 96753
ATTN: MR. JOHN MALONEY

&

ASSOCIATION OF II WAI HUI LP
1885 MAIN STREET, SUITE 404
WAILUKU, HI 96793
ATTN: MR. LLOYD SODETANI

We declare that, to the best of our professional knowledge and belief, we meet the definition of *Environmental professional* as defined in 312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a *property* of the nature, history, and setting of the *subject property*. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR part 312.

Jeffrey L. Kermode, Site Investigator — Date: 3/20/07

- Registered Environmental Assessor
  Registration No. 08202 (State of California)
- Lead-Based Paint Risk Assessor
  EPA Certification No. HI-R-6127-1
- Asbestos Building Inspector (AHERA Accredited Course)
  State of Hawaii Certification No. HIASB-0351

John S. Vuich, M.S., Project Supervisor — Date: 03/20/07

- Registered Environmental Assessor
  Registration No. 1433 (State of California)

Rev. 7/06

Table of Contents

Disclosure

This document contains the results of services performed on this Project by **Malama Environmental (MEV, LLC)** pursuant to Agreement. The results represent the application of a variety of scientific and analytical disciplines that have been rendered using the standard of care, skill, and diligence normally provided by professionals in the performance of similar services under similar circumstances.

MEV assessments are intended to reduce, but not eliminate, uncertainty regarding recognized environmental conditions in connection with the Subject Site, as conducted within reasonable limits of time and cost. A general consensus of EPA's guidance on landowner liability is that *no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property.*

The use of this document and the results reported are limited to the services performed and areas examined as described in this document and no inferences are intended with respect to anything not described herein.

MEV is not responsible for conditions or consequences arising from relevant data, facts, and information that were concealed, missing, withheld, not fully disclosed, or not reasonably available at the time these services were performed. **MEV** is not responsible for any indirect, incidental, or consequential damages of any nature arising from any cause.

MEV has no beneficial economic interest in the Project other than as an independent professional organization performing the agreed services. **MEV's** warranties are as described above and there are no other warranties of any kind, expressed or implied, regarding the services.

Executive Summary

Introduction

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. John Maloney of Endurance Investors, LLC and Mr. Lloyd Sodetani of Association of Il Wai Hui LP, and was conducted pursuant to Malama Environmental's (MEV's) written proposal and contract accepted by Mr. John Maloney on October 10, 2006. This investigation and report format follows the guidelines of the American Society of Testing and Materials (ASTM) Publication E1527-05, which is recognized by 40 CFR Part 312 as an acceptable guidance document for satisfying the EPA's final "*All Appropriate Inquiries*" rule.

Site Description

The subject site is located just north of the community of Waikapu, Maui, Hawaii. The site consists of one (1) parcel of land, irregular in shape, measuring 60.08 acres in total area. The site is further described on the Tax Maps of the State of Hawaii as Division 2, Zone 3, Section 5, Plat 2, Parcel 2. The land parcel consists of fallow agricultural fields.

Surrounding land use consists of residential and undeveloped land (fallow agricultural fields). The community of Waikapu is situated on the southeastern slopes of West Maui.

Records Review

The purpose of a records review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The services of Environmental Data Resources, Inc. were utilized to compile the database listings.

Our records review did not discover any current investigation of the subject site under any programs conducted by a federal, state, or local environmental agency.

One (1) risk site was identified in the vicinity of the subject property, however, MEV does not expect this site to negatively impact the environmental condition of the subject property due to their down gradient locations.

Site Reconnaissance

A site investigation focuses on obtaining information indicating the likelihood of identifying physical ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site facilities.

On February 23 and 26, 2007, MEV personnel, Mr. Jeffrey Kermode, conducted an overall site inspection of the subject site. Accessible areas of the property were visually and physically inspected.

The following are significant observations of field conditions:

- The land parcel consists of fallow agricultural fields;
- A temporary construction baseyard is located on the subject property;
- No bulk fuel/regulated substances are stored in the construction baseyard;
- A limited number of 5-gallon containers of non-toxic construction materials are being stored on-site;
- Limited amounts of construction debris and miscellaneous dumping was noted;
- One (1) waste container and one (1) portable washroom are located within the construction baseyard on-site.

Conclusions

Recognized environmental conditions, as defined by ASTM Standard E1527-05, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property, or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

MEV has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-05 for the subject property, located 0.25 miles south of the intersection of Honoapiilani Highway and Kuikahi Drive (TMK 2-3-5-02:2) near the community of Waikapu, Maui, defined as the subject property. Any exceptions to or deletions from this practice are described in Section 1.4, Limitations and Exceptions, of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property.

- ***Database Listings***

  The subject site is <u>not</u> listed. The listed, nearby risk site unlikely poses a significant concern to the subject property.

- ***Current and Historic Use or Storage of Hazardous and Regulated Substances***

  There is no evidence of any historic or current misuse or significant spills of hazardous or regulated substances on the subject property.

  Sugarcane and pineapple agriculture had been previously active on and adjacent to the subject property for several decades. Both pesticide and fertilizer use are related to the above noted activities. MEV obtained no evidence of any dedicated pesticide storage or mixing sites on the property or of any chemical misuses.

  According to Hawaii Administrative Rules, Chapter 128D Environmental Response Law, the presence of agricultural chemicals, resulting from the legal application of a pesticide product, does not constitute a release of a hazardous substance and is not considered a recognized environmental condition.

  However, it is common practice to conduct a limited soil sampling program on former agricultural lands to ensure residual pesticide concentrations (if any) are at acceptable levels. This is recommended if residential development is to be undertaken.

*The concerns listed below may not be considered **recognized environmental conditions** by ASTM definition, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.*

- ***Surface Waters and Area Aquifer Protection***

  For any future development activities planned for the subject property, the owner should be aware of the potential for contaminants to migrate into nearby drainageways. Products of concern relating to any future development project or land-clearing activity would be earthen material (silt), paints, oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

- *Solid Waste Management*

  A limited amount of dumping (construction and miscellaneous debris including special waste) was evident on the subject property. Management of these wastes should be performed in a manner that complies with all local, state, and federal regulations as applicable to the waste type.

  Due to presence of heavily vegetated areas, the entire subject site and underlying soils were not visibly inspected. It is important to ensure that if additional clearing of the property commences and large amounts of construction debris or unidentifiable substances (containers) are further discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

The conclusions stated above should not be construed to mean that any regulatory agency would have the same opinion as this author, nor is any implication proposed therefrom.

The results of this environmental assessment are intended for general reference purposes only and are not intended as legal advice. The advice of legal counsel should be sought in regard to individual facts, circumstances and interpretation of environmental liability.

Environmental Site Assessment

Phase 1 Investigation

1.0 INTRODUCTION

A Phase I Environmental Site Assessment (ESA) is conducted to determine if a site may be contaminated with hazardous or toxic substances or wastes resulting from current or past site activities, unauthorized dumping or disposal, or migration of contaminants from adjacent or nearby properties. Its goal is to identify ***recognized environmental conditions*** on a property that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products. These release conditions apply to structures on the property as well as the soil, groundwater, or surface water of the property. The American Society of Testing and Materials (ASTM) Standard 1527-05, Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process, is used to "...define good commercial and customary practices for conducting an environmental site assessment of a parcel of commercial real estate".

1.1 Purpose

The study objectives are to characterize the environmental setting of the subject property, to identify any obvious activity of environmental concern that may have occurred at or near the site, and to evaluate potential migration pathways for any identified contaminants. It may also address any activities that affect future considerations for potential environmental impairment to the property.

Another function of this Phase I ESA is to conduct an *all appropriate environmental inquiry* in response to the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, the EPA's final rule (40 CFR Part 312), and similar state and local regulations. An ESA "all appropriate inquiry" may provide the buyer, receiver, or lender making a loan secured by the subject real property with a basis to qualify for the *innocent landowner, contiguous property owner, or bona fide prospective purchaser defense* should any legal action be initiated for environmental impairment to the property.

ASTM Publication E1527-05 is recognized by 40 CFR Part 312 as an acceptable guidance document for satisfying the EPA's final "*All Appropriate Inquiries*" rule.

1.2 Detailed Scope of Services

This Phase I Environmental Site Assessment (ESA) has been prepared for Mr. John Maloney of Endurance Investors, LLC and Mr. Lloyd Sodetani of Association of Il Wai Hui LP, and was conducted pursuant to Malama Environmental's (MEV's) written proposal and contract accepted by Mr. John Maloney on October 10, 2006

There were no other additional services requested of MEV by the Client.

1.3 Significant Assumptions

The assessment of ***recognized environmental conditions*** relies on: 1) sources of actual knowledge, 2) thorough appropriate inquiry, 3) reviewing reasonably ascertainable documents and records, and 4) conducting a visual and olfactory reconnaissance. In conducting this ESA, MEV has relied on the truthfulness of its inquiry sources and the validity of reviewed records. If obvious indications or MEV actual knowledge contradicted the reported/reviewed information sources, it has been so stated in the appropriate sections of this report.

1.4 Limitations and Exceptions

The investigation performed for this report includes the components of an *all appropriate inquiry* regarding the potential for contamination to exist or have occurred at this site. This investigation is also the basis of an *all appropriate inquiry* into the presence or likely presence, release or threatened release, of hazardous substances and petroleum products at this real property. This Phase I Environmental Site Assessment was prepared according to guidelines presented in the American Society of Testing and Materials Document entitled *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E-1527-05).

Since no ESA can eliminate uncertainty regarding the potential for ***recognized environmental conditions*** in connection with a property, the limiting intent of this investigation is to reduce the uncertainty to an appropriate level. Minimal requirements for the Phase I ESA include a review of historical records, a review of files and databases compiled by regulatory agencies, interviews with current owners and/or occupants of the property, and a field reconnaissance of the subject site and adjacent areas.

This ESA also takes into consideration the evaluation of other substances and products that are or may be interpreted as excluded under CERCLA. Commonly, these substances are of concern in commercial real estate transactions under current custom and usage and may include, but are not limited to, Radon, Lead-in-Drinking Water, and Special Environmental Resources. Where appropriate, MEV has considered environmental concerns of other federal, state, and local regulations.

Some database resources developed for Maui County are in their infancy or are not cross-referenced in a manner as to be readily discernible. The Maui County Fire Department maintains an electronic database that dates back to January 2000. Information and records prior to 2000 exist on file, as hardcopies, at the Department of Fire and Public Safety Office.

Databases and records utilized for this investigation were limited to those that are reasonably ascertainable; that is, they had to be publicly available, obtainable from its source within reasonable time and cost constraints, and practically reviewable with regard to volume, sorting, and organization. Additionally, the services of *Environmental Data Resources, Inc.* (EDR) were utilized to compile the environmental database listings. See Appendix B.

1.5 Data Gaps

MEV did not encounter any significant *data gaps* during the course of this Phase I ESA Investigation that would affect the ability of the *Environmental Professional* to identify *recognized environmental conditions* pertaining to the subject property. MEV did not receive requested historical information from the previous land owner, Wailuku Sugar Co. (Wailuku Agribusiness). See Appendix B.

1.6 Special Terms and Conditions

As a standard practice, a confidential client privilege was initiated by MEV for the work performed and contents of this report. MEV shall ensure that its officers, employees, agents, and independent contractors do not disclose this report or any information contained therein to any person without the proper knowledge and written consent from the Client (or as otherwise required by law). MEV shall ensure that each of its officers, employees, agents, and independent contractors understand and obey these requirements.

The information and opinions provided herein are intended as background data and planning guidance to interested parties. This should not be construed to mean that any regulatory agency would have the same opinion as MEV, nor is any implication proposed.

MEV has performed this study in a competent and professional manner. Since there may be hidden or unknown conditions that may be missed during this inspection, MEV cannot warrant the actual site conditions described in this report.

End of Section

2.0 SITE AND REGIONAL DESCRIPTION

Refer to Figure 1, Regional Setting Map, in Appendix A, for a depiction of the general setting of the subject site in relation to topographic features. Also depicted are the projected groundwater flows, regional surface water flows, and locations of other significant physical features or structures.

2.1 Location and Legal Description

The subject site is located on Honoapiilani Highway, 0.25 miles south of the intersection of Kuikahi Drive and Honoapiilani Highway near the community of Waikapu, Maui, Hawaii. The site is further described on the Tax Maps of the State of Hawaii as Division 2, Zone 3, Section 5, Plat 2, Parcel 2. See Figure 3, Tax Map, Appendix A.

2.2 Site and Vicinity General Characteristics

The site consists of one (1) parcel of land, irregular in shape, measuring 60.08 acres in total area. The site consists of fallow agricultural land.

The community of Waikapu is situated on the southeastern slopes of West Maui. The subject property is located approximately ½-mile north of Waikapu. See Figure 1, Appendix A. The property is located below the residential community of Wailuku Heights.

Surrounding land use consists of residential and fallow agricultural lands. See Figure 2, Appendix A.

2.3 Description of Structures, Roads, Other Improvements

The subject property consists of fallow agricultural land. The southeastern corner of the property has undergone initial grading work to accommodate a temporary construction baseyard. Unpaved roads and a concrete-lined irrigation ditch also exist on-site. No permanent structures are located on-site. See Figure 2, Appendix A.

2.4 Current Use of the Property

As noted above, the subject property is fallow agricultural land. A small area of the southeastern corner of the property is used as a temporary construction baseyard. The baseyard belongs to the builders of the residential development located on the southern adjoining property. The baseyard appeared to be run efficiently and was kept very clean.

2.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties as observed by the investigator during the site reconnaissance are as follows (see also Figure 2, Site Plan, in Appendix A):

• *Northern Adjoining Property:*	Fallow agricultural land.
• *Eastern Adjoining Property:*	Honoapiilani Highway, beyond which lies residential land use and fallow agricultural lands.
• *Southern Adjoining Property:*	Initial grading activity for a residential subdivision.
• *Western Adjoining Property:*	Fallow agricultural lands.

End of Section

3.0 USER PROVIDED INFORMATION

As a standard of practice, the following information was requested from the Client during the preliminary phases of this investigation:

- Title records and knowledge of environmental liens or activity and land use limitations (AULs);
- Personal, specialized knowledge or experience in regard to ***recognized environmental conditions*** concerning the property; and
- If applicable, actual knowledge of a significant, low purchase price for the property, and explanation for the lower price.

The purpose of this information is to help identify the possibility of ***recognized environmental conditions*** in connection with the property. These tasks do not require the technical expertise of an environmental professional and are generally not performed by environmental professionals performing the Phase I ESA. MEV submits a Preliminary Environmental Investigation questionnaire to the Client for this information. The completed questionnaire is attached in Appendix B.

According to information provided by the Client in the Preliminary Environmental Investigation, the Client is not aware of any environmental liens, proceedings, or investigations against the subject property as of the date of this ESA.

End of Section

4.0 RECORDS REVIEW

The purpose of a record review is to obtain and review records that will help identify ***recognized environmental conditions*** in connection with the subject property. The service of Environmental Data Resources, Inc. (EDR) was utilized to compile the database listings.

4.1 Standard Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources (see below). Risk sites, if any, that may be located on or adjacent to the subject property, or are within close proximity to the subject site are described. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and government agency database release dates.

The EDR Report bases the location of the listed risk sites on longitude/latitude information provided by the respective government agency. MEV confirms the locations of risk sites within close proximity to the subject site during the site visit. When the MEV site visit contradicts the EDR Report, it has been so stated.

THE SUBJECT SITE IS NOT LISTED ON ANY OF THE FOLLOWING FEDERAL OR STATE DATABASE LISTINGS OF THE EDR REPORT.

Federal Database Listings

▼ **National Priorities List (NPL or Superfund) and Proposed NPL, EPA.** The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program.

- *The EDR database report indicates no listings within the one-mile search radius of the subject site.*

▼ **Comprehensive Environmental Response, Compensation and Liability Information System List (CERCLIS), EPA.** The CERCLIS list contains data on potentially hazardous waste sites that have been reported to EPA by states, municipalities, private companies and private persons, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites that are either proposed to or on the NPL and sites, which are in the screening and assessment phase for possible inclusion on the NPL.

- *The EDR Report indicates no listing within the 1/2-mile search radius of the subject site.*

▼ **CERCLIS – No Further Remedial Action Planned (NFRAP), EPA.** NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.

- *The EDR Report indicates one (1) listing within the 1/2-mile search radius of the subject site.*

  The former Maui County Waikapu Dump site is located approximately 0.5 miles southeast of and down gradient from the subject site. According to EDR, this site is not on the National Priorities List (NPL). Due to the listings' down gradient positioning and distance relative to the subject site, this site is not anticipated to negatively impact the environmental condition of the subject property.

▼ **Corrective Action Report (CORRACTS), EPA.** The CORRACTS report lists hazardous waste handlers with RCRA corrective action activity.

- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Resource Conservation and Recovery Information System (RCRIS), EPA/NTIS.** RCRIS includes selective information on sites that generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

- *The EDR Report indicates no listings within the ½-mile search radius of the subject site, which treat, store, and/or dispose of hazardous waste (TSD).*
- *The EDR Report indicates no listings within the ¼-mile search radius of the subject site, which generate at least 1,000 kg/month of non-acutely hazardous waste or 1.0 kg/month of acutely hazardous waste (Lg. Quan. Gen. - LQG).*
- *The EDR Report indicates no listings within the ¼-mile search radius of the subject site, which generates less than 1,000 kg/month of non-acutely hazardous waste (Sm. Quan. Gen. - SQG).*

▼ **Emergency Response Notification System (ERNS), EPA/NTIS.** Records and stores information on reported releases of oil and hazardous substances.

- *The subject site is not listed.*

State of Hawaii Database Listings

▼ **Sites List (SHWS), DOH.** A list of facilities, sites, or areas in which the Office of Hazard Evaluation and Emergency Response (HEER) has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

- *The subject site is not listed.*
- *The EDR Report indicates one (1) listing within the ½-mile search radius of the subject site.*

  The former Maui County Waikapu Dump site is located approximately 0.5 miles southeast of and down gradient from the subject site. According to EDR, this site's status is 'No Further Action" (NFA). Due to the listings' down gradient positioning and distance relative to the subject site, this site is not anticipated to negatively impact the environmental condition of the subject property.

▼ **Permitted Landfills in the State of Hawaii (SWF/LF), DOH.** An inventory of solid waste disposal facilities or landfills in the State of Hawaii. These may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

- *The EDR Report indicates no listings within the ½-mile search radius of the subject site.* See Site List (SHWS) above.

▼ **Leaking Underground Storage Tank (LUST) database, DOH.** An inventory of reported leaking underground storage tank incidents.

- *The subject site is not listed.*
- *The EDR Report indicates no listing within the ½-mile search radius of the subject site.*

▼ **Underground Storage Tank (UST) database, DOH.** USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with DOH.

- *The subject site is not listed.*
- *The EDR Report indicates no listing within a 1/4-mile radius of the subject site.*

4.2 Additional Environmental Record Sources

The subject property and properties within the minimum search distances were reviewed from the following record sources. Refer to Appendix B, EDR Radius Map Report, for a complete listing and description of all sites located within the designated search distances, details, and database release dates.

Federal Database Listings

▼ **Superfund (CERCLA) Consent Decrees (CONSENT), EPA Regional Offices.** Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Records of Decisions (ROD), EPA.** ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **National Priority List Deletions (De-listed NPL), EPA.** A list of sites that have been deleted from the NPL where no further response is appropriate.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the one-mile search radius of the subject site.*

▼ **Facility Index System/Facility Identification Initiative Program Summary Report (FINDS), EPA.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*

▼ **Hazardous Materials Information Reporting System (HMIRS) DOT.** A list of hazardous material spill incidents reported to DOT.

- *The subject site is not listed.*

▼ **Material Licensing Tracking System (MLTS), Nuclear Regulatory Commission (NRC).** A list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements.

- *The subject site is not listed.*

▼ **Mines Master Index File (MINES), Department of Labor, Mine Safety and Health Administration.** Contains both facility information and 'pointers' to other sources that contain more detail.

- *The subject site is not listed.*
- *The EDR Report indicates no listings within the ¼-mile search radius of the subject site.*

▼ **Federal Superfund Liens (NPL Liens), EPA.** A list of properties whereby the EPA has filed liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability.

- *The subject site is not listed.*

▼ **PCB Activity Database System (PADS).** Identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify EPA of such activities.

- *The subject site is not listed.*

▼ **RCRA Administrative Action Tracking System (RAATS), EPA.** A historical archived database containing records on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by EPA. The database was discontinued on September 30, 1995.

- *The subject site is not listed.*

- **Toxic Chemical Release Inventory System (TRIS), EPA.** A list of facilities which release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313.
  - *The subject site is not listed.*
- **Toxic Substances Control Act (TSCA), EPA.** Identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list.
  - *The subject site is not listed.*
- **Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/TSCA Tracking System (FTTS INSP and FTTS), EPA – Office of Prevention, Pesticides and Toxic Substances.** FTTS tracks administrative cases, pesticide enforcement actions, and compliance activities related to FIFRA, TSCA, and Emergency Planning and Community Right-to-Know Act (EPCRA).
  - *The subject site is not listed.*

State of Hawaii Database Listings

- **Release Notifications (SPILLS), DOH.** Releases of hazardous substances to the environment reported to the HEER Office. The following databases are included in the HEER Spill List:

  Release Notification Report: a compilation of releases reported to HEER.

  Hawaii Emergency Planning and Community Right-to-Know Act (HEPCRA): a list of facilities that have submitted Tier II and Form Rs as a reporting requirement.
  - *The subject site is not listed.*
- **Registered Wells and Dry Wells, DLNR.** (See Section 5.5.6) There are no registered wells for the subject property. *(DLNR data).* Nearby listed wells are used for irrigation purposes or are unused at this time. See Figure 1, Appendix A for nearest well locations.
- **Air Quality Permit, DOH.** Current activities conducted on-site do not require an air quality permit.
- **Storm Water Discharge (NPDES) Permit, DOH.** Current activities conducted on-site do not require a NPDES permit.

County and Other Database Listings

Other local records of environmental interest that were reviewed or considered for review by MEV included:

- **Fire Department, County of Maui.** The Maui County Fire Department (MCFD) maintains file material that is not on a database. MCFD was contacted for an inquiry on the subject property. No incidents were reported to MEV on the subject site. Controlled burning was likely historically conducted on the subject site for agricultural purposes.
- **Former Manufactured Gas (Coal Gas) Sites.** EDR provides exclusive information regarding the existence and location of Coal Gas sites.
  - *The EDR Report indicates no listings within the one-mile search radius.*
- **Grading/Grubbing Permit, County of Maui.** No grading permit is currently open for the subject property.
- **Hazardous Waste Disposal Documents.** MEV was not supplied with any hazardous waste disposal documents.
- **Maui Electric Company.** Maintains records on county power transformers regarding PCB-containing equipment and equipment maintenance. No pole or pad-mounted electrical transformers were observed on the subject property. See Section 5.3.7.

- **Other Environmental Reports.** MEV reviewed a Phase I ESA conducted on the northern adjoining property by Vuich Environmental in 2004.
- **Planning & Zoning, County of Maui.** According to the Maui County Department of Planning, the subject site's zoning is AG, "Agricultural" and **is not** within the boundaries of the Special Management Area (SMA).
- **Property Tax Office, County of Maui.** The Maui County Property Tax Office maintains records of past ownership, maps, sketches and other information as it pertains to the subject property. (See also Section 8.0). The current property owners are Endurance Investors, LLC & Association of II Wai Hui LP.
- **Wastewater Discharge Permit, County of Maui.** MEV did not identify any wastewater discharge permits registered to the subject property.

4.3 Physical Setting Source(s)

The following sources were reviewed for physical setting information (refer to Section 7.0 for a complete listing):

- Atlas of Hawaii;
- Civil Defense Tsunami Evacuation Map;
- Geologic and Topographic Map (Hawaii Atlas & Gazetteer);
- Groundwater Map and Water Quality Plan for State of Hawaii;
- U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, HI;
- U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku, HI, 1983 & 1998.

These data sources were used to provide information regarding physical characteristics of the subject site and surrounding area. This information is typically used in analysis of potential geological trends, which might impact environmental conditions of the subject site. Note that this investigation is not intended to identify geologic hazards associated with the subject property.

4.4 Historical Use Information Regarding the Property and Adjoining Properties

The following historical data sources were reviewed for this report (refer to Section 7.0 for a complete listing):

- Aerial Photographs;
- Department of Planning and Zoning, County of Maui;
- Maui County Fire Department (Fire Prevention Bureau / Hazardous Materials Division);
- Maui County Real Property Tax Records;
- Personal Interviews;
- Sanborn Maps (not available for this location);
- State of Hawaii, Department of Health, Environmental Management Division;
- Environmental Data Resources (EDR).

Historic Aerial Photographs

A series of aerial photographs with coverage of the subject property and surrounding area were examined. See Figure 2, Appendix A, for clarification of specific location.

Table 1.0 Historical Aerial Photograph Analysis

Date	Aerial Photo Analysis	
12/20/50	SS:	Agricultural land (sugarcane) with perimeter unpaved roads (including the Old Waikapu Road) noted. The Waihee Ditch traverses the subject site. A natural drainage system runs along the northern boundary.
	N, E, S, W:	Agricultural land. Honoapiilani Highway runs along the eastern property boundary.
	RG:	Extensive agriculture with very limited residential development in the area.

6/2/64	SS: N, E,S, W: RG:	No significant changes noted. A former irrigation ditch (Kama Ditch) is visible in the northeastern portion of the subject site. No significant changes noted. A reservoir is located on the western adjoining property just west of the subject site's northwestern boundary. Region remains in extensive agriculture. The Waikapu dump is visible to the southeast. Limited residential growth in Waikapu located to the south.
1/30/77	SS: N, E, S, W: RG:	No significant changes noted. No significant changes noted. A small reservoir is located on the southern adjoining property. A small area of cleared land (possible well shack) is located immediately to the southwest of the subject site. No significant changes noted.
9/11/85	SS: N, E, S, W: RG:	No significant changes noted. No significant changes noted. New subdivision roads for Wailuku Heights noted. Kuikahi Road established slightly to the north.
2/20/88	SS: N, E: S: W: RG:	Crop changed from sugarcane to pineapple. Sugarcane cultivation, possibly in fallow. Partial crop change from sugarcane to pineapple. Remaining sugarcane may be in fallow. Crop changed from sugarcane to pineapple. Reservoir remains active. Noticeable shift in agricultural land use from sugarcane to pineapple. Significant residential development in Wailuku Heights.
5/3/97	SS: N,W: S: E: RG:	Fallow agricultural fields. Fallow agricultural fields. Not visible in photo. Fallow agricultural fields and limited small crops noted. Increased residential development noted to the north.
Mid 2000 (See Photo 19, App. B)	SS: N, S, W: E: RG:	No significant changes noted. Fallow agricultural fields. Fallow agricultural fields and limited small crops noted. The beginnings of a new residential subdivision are located to the southeast. Continued residential development noted to the north.

Notes:
SS: Subject Site
N: Northern Adjoining Property
E: Eastern Adjoining Property
S: Southern Adjoining Property
W: Western Adjoining Property
RG: Regional Area

MEV did not observe any features on aerial photographs examined that would suggest the presence of significant vegetative stress, soil staining, or bulk storage of chemicals such as drums or tanks.

End of Section

5.0 SITE RECONNAISSANCE

Information regarding the storm water flow, property layout, physical characteristics, and adjoining property conditions are presented in Figure 2, Site Plan, and site photographs located in Appendix A.

5.1 Methodology and Limiting Conditions

A site investigation focuses on obtaining information indicating the likelihood of identifying ***recognized environmental conditions*** in connection with the property and assessing the subject property in relation to surrounding land uses and natural surface features. It includes a physical inspection of the real property and any on-site building structures.

On February 23 and 26, 2007, MEV personnel, Mr. Jeffrey Kermode, conducted an overall site inspection of the subject site. The method used to observe the subject property included: (1) walking the entire perimeter of the subject property and along any on-site roads, (2) thoroughly inspecting the on-site construction baseyard (3) thoroughly inspecting any areas of dumping noted (4) conducting random and non-random traverses of the subject property. The property boundaries were not effectively defined. MEV made boundary estimates based on a Maui County Real Property Tax map and a map supplied to MEV by the Client.

Certain physical obstructions limited the investigators from total property observations of native surface soils. Several areas of very dense vegetation obscured the underlying surface soils. Exposed soils that were observable did not exhibit any evidence of gross surface contamination.

Any environmental conditions reported here are not intended to include minimal conditions that 1) generally do not present a material risk of harm to public health or the environment and 2) generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

5.2 General Site Setting

5.2.1 Current and Past Use(s) of the Property

Current Uses

The current owners of the subject property are Endurance Investors, LLC & Association of II Wai Hui LP. The property consists of one (1) parcel, (2) 3-5-02: 002.

The majority of the property is currently undeveloped, fallow agricultural land. A small area (less than two acres) is used as a temporary construction baseyard by PB Sullivan during the construction of the residential development located immediately to the south. An active irrigation ditch also traverses portions of the subject site.

Information presented here represents those items visually or physically observed or identified in the interviews or records review.

Past Uses

Based on historical aerial photographs and Client supplied information, the subject property was owned by Wailuku Sugar Company (Wailuku AgriBusiness) and was involved in sugarcane cultivation for several decades up until from the late 1980's. Maui Land & Pineapple Co. leased the land from the late 1980's to 2003 for pineapple cultivation. Since 2003 or earlier, this land has been fallow.

The knowledge of past uses of the property was primarily obtained from aerial photographs, Client supplied information, interviews and property tax records. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.2 Current and Past Uses(s) of the Adjoining Properties and Surrounding Area

MEV has researched current uses of adjoining properties and at its discretion, past uses of the adjoining properties and the surrounding areas. Information presented here represents those items visually or physically observed or identified in the interviews or records review. The information is described herein as items that may indicate ***recognized environmental conditions*** with adjoining properties and those conditions that may indicate a high probability of migration of hazardous substances or petroleum products to the subject property.

Adjoining Property	Period	Land/Property Use	Concerns	Comments
North of Subject Site	Past	Sugarcane cultivation.	Historical pesticide application leading to possible soil and groundwater contamination. Soil contamination is more likely in areas of chemical misuse or spillage.	Sugarcane cultivation had been active on this site for several decades up to the late 1980's. During this time, there may have been the use of agricultural pest control chemicals and fertilizers, which has been long recognized by the U.S. Environmental Protection Agency (EPA) for contributing to the potential contamination of surface soils and groundwater systems. However, it is unlikely that the chemicals underlying the subject property (within the soil) would be above regulated levels. Groundwater sampling should be undertaken if this resource is to be utilized. Areas of chemical misuse, spillage or mixing were not identified by MEV.
	Present	Fallow agricultural lands.	As above.	As above.
East of subject site	Past	Sugarcane cultivation.	Historical pesticide application leading to possible soil and groundwater contamination.	See "north of subject site" explanation above. This site is located down gradient of the subject site and would likely have less of an impact on the subject site.
	Present	Fallow agricultural lands and residential development.	None.	None.
South of subject site	Past	Sugarcane cultivation.	Historical pesticide application leading to possible soil and groundwater contamination.	See "north of subject site" explanation above.
	Present	On-going residential development.	None.	None.
West of subject site	Past	Sugarcane cultivation.	Historical pesticide application leading to possible soil and groundwater contamination.	See "north of subject site" explanation above.
	Present	Fallow agricultural lands.	As above.	As above.

The development of past uses of the adjoining properties was primarily made from interviews, MEV site reconnaissance, and aerial photographs. Topographic maps and the Hawaii Atlas provided limited regional information.

5.2.3 Topography

The project site lies on the southeastern slopes of West Maui (Kahalewai). The physiographic type feature of the subject site is described as Kahului Isthmus, just below Iao Cliff and Valley.

The site elevation ranges from approximately 380 feet to 510 above mean sea level. Regional topography is characterized by easterly trending slopes of approximately 6 percent. On-site relief for the property is estimated to be approximately 80 feet, descending from a high point along the western lot boundary to a low point along the eastern lot boundary.

The nearest prominent natural feature is Waikapu Valley and Stream, located approximately 0.5 miles south of the southern property boundary. See Figure 1, Appendix A.

5.2.4 Geology and Soils

The West Maui Volcanics have been divided into three series. The oldest series are the Wailuku Volcanics, which are the basaltic flows that built the bulk of the West-Maui island shield. The Honolua Volcanic Series overlies the Wailuku Volcanics with thin, discontinuous andesitic and trachytic flows, domes and pyroclastic deposits. After a long period of erosion, renewal activity included the flows and cones of the Lahaina Volcanic Series.

According to the U.S. Department of Agriculture, the following soil series underlies the subject site:

- Iao Clay, 3 to 7% slopes (IcB). Iao series consists of well-drained soils occurring on valley fill and alluvial fans. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Permeability is moderately slow. Runoff is medium, and the erosion hazard is slight to moderate.
- Iao Cobbly Silty Clay, 3 to 7% slopes (IbB). This soil has a profile like that of Iao Clay (above) except for the texture of the surface layer and the content of cobblestones.

Other common, surface geologic phenomena investigated in an environmental site assessment are faults, landslides, rock falls, earthquake zones and volcanic eruptions. In 1992, the USGS reevaluated the seismic hazards for the State of Hawaii, and Maui County was classified as Zone 2B. This indicates that in any given year within a 50-year period (average building life span) there is a 10% chance that 1/5 the force of gravity (ground acceleration) during an earthquake will be exceeded.

After examination of the relevant data, it has been determined by MEV that these geologic phenomena are not a factor to the subject site. However, it should be noted that this is not an investigation for geological hazards.

5.2.5 Hydrology

The subject site area has an annual average rainfall of approximately 25 inches. The average temperature range from the annual high to the annual low is 82 degrees and 65 degrees Fahrenheit, respectively. The pre-development vegetation zone within this temperature and rainfall range is characterized as lantana-koa haloe shrubs. Characteristic plants consist of lantana, koa haloe shrubs, panini and ilima grasses.

On-site drainage is generally directed from the higher property elevations along the western boundary to the lower elevations of the eastern boundary. Waihee Ditch (concrete lined) runs along a portion of the subject property's western boundary prior to traversing the property. The ditch flows in a southerly direction. A natural drainage system is located along the northern property boundary. No flow was noted in this drainage system at the time of MEV's site reconnaissance. See Figure 2 and Photo 7, Appendix A.

A former ditch system (Kama Ditch) historically traversed a portion of the subject site's northeastern boundary.

The pertinent Federal Insurance Rate Map (FEMA FIRM MAP #150003 0190D dated March 16, 1995) depicts the area as minimal flooding (Zone C).

The Civil Defense Tsunami Evacuation Maps indicate the subject property is not within the Tsunami reach-zone. The Pacific Ocean (Kahului Harbor) is located approximately 4.0 miles northeast of the subject site.

5.2.6 Hydrogeology

As with all islands of the United States, Maui is regulated by the Coastal Zone Management Act of the Clean Water Act. These two designations require protective comprehensive plans for groundwater management and limit the extent of certain types of development and land use. One important management criterion is the disposal of wastewater. The Water Resources Research Center has designated the groundwater management area as the *Iao Aquifer System* within the *Wailuku Aquifer Sector*. The groundwater underlying the subject site is defined as follows:

Table 2.0: Aquifer Classification of the subject site.

Aquifer Name / Aquifer Level	Aquifer Type - Hydrology & Geology	Status of Groundwater: Development Stage	Utility	Salinity (mg/l Cl)	Uniqueness	Vulnerability to Contamination
Upper	Unconfined, basal aquifer comprised of non-volcanic sediments.	Potential Use	Ecologically Important	Low	Irreplaceable	High
Lower	Confined basal aquifer occurring in horizontally extensive lavas (Flank)	Potential Use	Useful as a Drinking Water Source.	Fresh	Irreplaceable	Low

The following are descriptions of the aquifer classification codes, according to Water Quality Plan: *basal* – freshwater in contact with seawater; *high level* – freshwater not in contact with seawater; *unconfined* – water table is the upper surface of the saturated aquifer; *confined* – aquifer is bounded by impermeable or poorly permeable formations; and *confined or unconfined* – the actual condition is uncertain.

Aquifer Type Geology: flank, dike, flank/dike, perched, dike/perched, and sedimentary.

Development Stage – currently used, potential use, no potential use: Aquifers are differentiated according to those already being used (currently used), those with potential utility (potential use), and those having no potential developability.

Utility – drinking, ecologically important, neither: Identifies aquifers by use.

Salinity – fresh, low, moderate, high, and seawater: The gradation of groundwater from fresh to seawater is a feature of all basal aquifers in Hawaii. The upper limit of the standard for drinking water is 250 mg/l Chlorine (Cl^-) (fresh) and true seawater has a chloride content of 18,980 mg/l.

Uniqueness – irreplaceable and replaceable: The classes irreplaceable and replaceable are direct EPA derivatives. Virtually all potable water in the state of Hawaii should be considered irreplaceable over the long term.

Vulnerability to Contamination – high, moderate, low, none: Because of the geographical limits of resources, interconnection among groundwater sources and the relatively rapid time of groundwater travel, aquifers can be described as being either vulnerable or not vulnerable to contamination.

The estimated depth to the basal groundwater is approximately 370 feet below the surface. The flow direction is expected to be in an east-northeasterly direction.

The subject site is located mauka (mountainside) of the Underground Injection Control (UIC) line. The UIC line is the designated boundary that divides protected inland areas situated over drinking water sources from seaward areas located over non-potable water sources. Sites mauka of the UIC line are considered drinking water sources and permit limitations are imposed by Maui County, Clean Water Branch (CWB).

5.2.7 Potable Water Supply and Sewage Disposal System

Currently, this property remains undeveloped and, therefore, no sewage is generated or potable water supplied.

5.3 Interior and Exterior Observations

5.3.1 Hazardous/Regulated Substances and Petroleum Products in Connection with Identified Uses.

MEV did not identify any hazardous substances and/or petroleum products that are in connection with identified current uses as visually and physically observed on the property at the time of the site visit. Small quantities of non-toxic, regulated building supplies were being stored at the temporary construction baseyard located on-site. See Photo 15, Appendix B. According to the construction foreman for the on-site baseyard, no fuels or petroleum products are stored on-site, except for the amounts stored in the heavy equipment that are parked on-site.

5.3.2 Hazardous/Regulated Substances and Petroleum Products/Containers (not in connection with identified current uses).

MEV did not identify any hazardous/regulated substances and/or petroleum products that are not in connection with identified current uses as visually and physically observed on the property at the time of the site visit. There is no evidence of any historic misuse of hazardous or regulated substances on the subject property.

However, historic land use included agricultural activities (sugarcane and pineapple cultivation). This activity may be associated with pesticide use. There is no evidence of any historic misuse of pesticides, dedicated mixing or storage areas or zones of dedicated stormwater retention located on-site.

5.3.3 Unidentified Substance Containers

MEV did not observe any unidentified substances suspected of being possible hazardous/regulated substances or petroleum products as visually and physically observed on the property at the time of the site reconnaissance.

5.3.4 Storage Tanks

No indications regarding the current presence or historic use of underground storage tanks (USTs) on the subject site were obtained through our review of regulatory databases, interviews, or through MEV's site reconnaissance.

One (1) former steel tank (use unknown) was abandoned on-site. No petroleum or suspect odors or staining were associated with this tank. It did not appear that this tank was used at its current location. See Photo 18, Appendix B.

5.3.5 Odors

MEV identified no suspect odors on the subject property.

5.3.6 Pools of Liquid

MEV did not observe any pools or sumps of liquids likely to be hazardous substances or petroleum products to the extent visually and/or physically observed on the subject property at the time of the site visit or from interviews or records review.

5.3.7 Indications of PCBs

Pole or pad-mounted transformers numbered 7777 or above are considered non-PCB containing by the Maui Electric Company. No pole or pad-mounted electrical transformers (non-PCB) were observed on the subject property.

Background Information:

Polychlorinated biphenyls (PCBs) are groups of manufactured organic chemicals that contain 209 individual chlorinated chemicals (known as congeners) and were introduced in 1929. PCBs have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Products

containing PCBs are old fluorescent lighting fixtures, electrical appliances containing PCB capacitors, old microscope oil, and hydraulic fluids.

The manufacture of PCBs stopped in the United States in 1977 because of evidence that they build up in the environment and cause harmful effects. The distribution in commerce of PCB containing items was banned in 1979 (40 CFR 761.20). The EPA aggressively enforces regulations concerning PCB manufacturing, use, distribution, release and disposal under the Toxic Substance Control Act (TSCA). This federal agency extensively regulates the use, servicing, and disposal of PCBs in electrical equipment by enforcing marking, notification, inspection, and record keeping requirements.

5.4 Interior Observations

The subject property is undeveloped with no permanent building structures. This section does not apply.

5.5 Exterior Observations

5.5.1 Pits, Ponds, and Lagoons

There were no areas identified as any man-made or natural depressions that are, or would have been, likely to hold waste liquids or sludge from industrial operations or other activities.

5.5.2 Stained Soil or Pavement

No areas of soil staining were noted by MEV.

5.5.3 Stressed Vegetation

There were no areas of stressed vegetation identified on the subject property at the time of the site visit that are, or would have been, likely caused from something other than insufficient water (or flooding).

5.5.4 Solid Waste

There were no indications of significant solid waste dumping or suspect fill materials, mounds, depressions or excavations observed on this property during the site reconnaissance, nor on historic aerial photographs.

The solid waste items that were identified by MEV on the subject site at the time of the site reconnaissance consisted of the following:

- Very limited amounts of miscellaneous debris dumping including household waste, construction debris, one (1) steel tank, and regulated items (vehicle tires). See Photo 17 & 18, Appendix A.

5.5.5 Wastewater or Storm Water – Discharge Drains, Dry Wells, Drainage Ways, and Retention Basins

MEV did not note any wastewater discharge drains, dry wells, or retention basins located on-site.

One (1) large diameter drain pipe is located in the northeastern property boundary and drains onto the northern adjoining property. This pipe may have been part of the former Kama Ditch previously located on-site. See Figure 2 Appendix A.

5.5.6 Wells

From MEV's observations and database search, there are no production, domestic, abandoned, irrigation or monitor wells located on the subject site. Wells located near the subject property are used for irrigation purposes or are unused at this time. See Figure 1, Appendix A for the nearest well locations.

5.5.7 Septic and Cesspool Systems

The subject property has no operational cesspool or septic system located on-site.

The temporary construction baseyard located on-site maintains a portable washroom ("porta-potty").

5.6 Non-Scope Considerations

The concerns listed below are not normally considered relevant under CERCLA, however, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

5.6.1 Asbestos-Containing Materials (ACM)

The subject property did not have any permanent on-site building structures that would consist of asbestos-containing materials. No suspect asbestos-containing debris was noted.

5.6.2 Lead-Based Paint

The subject property did not have any permanent on-site building structures that would consist of lead-based paint. No suspect lead-based paint debris was noted.

5.6.3 Arsenic-Containing Substances

MEV did not observe any suspect arsenic-containing building materials or waste materials at the time of the site visit.

5.6.4 Radon

MEV did not identify any man-made products on the subject property that are known or suspected to emit radioactive decay elements.

Background Information:

Radon is a colorless and odorless radioactive gas that can produce health effects such as cellular injury. Radon gas can occur in the natural environment as concentrations from certain rocks and geologic conditions have a high radon-emanation potential.

These surface rock types are not known to occur in Hawaii. It is possible that increased concentrations of Radon could occur in regions where geologic fault and volcanic rift zones may release gases from deeper earth sources. However, the State of Hawaii, Department of Health (DOH) has not addressed concerns for any significant levels of gas to occur anywhere in Hawaii. This was based on the 1992 and 1996 DOH investigations conducted in elementary schools throughout the State.

5.6.5 Lead In Drinking Water

The subject property is undeveloped. This section does not apply.

5.6.6 Ecological Resources, Endangered Species, Cultural and Historic Resources, and Wetlands

There are no known critical habitats or threatened and/or endangered species on the project site. The subject site is not located within the County of Maui's Special Management Area (SMA).

MEV was not made aware of any cultural or historic resources being located on-site.

5.6.7 Indoor Air Quality

The subject property is undeveloped. This section does not apply.

5.6.8 High Voltage Transmission Lines

MEV did not identify any high voltage transmission lines on the subject site. Transmission lines located on east side of Honoapiilani Highway are not expected to have a significant impact on the subject site.

End of Section

6.0 INTERVIEWS

MEV conducts interviews with persons that may have specific knowledge on the subject property and any land use activities that may have operated on-site in the past or continue to currently operate on the subject property. Interviews are also an effective tool to better understand the overall historical regional and local setting of the subject site. Whenever possible, MEV attempts to interview the present and past owner(s), site manager, occupants, local government officials and other relevant contacts. See also Section 8.3.

6.1 Interview with Property Owner / Client Representative

Property owner/Client representative, Donna Clayton, provided MEV with limited information on the subject property's history and boundaries.

6.2 Interviews with Property Lessee Representative

MEV discussed the activities of the construction baseyard (PB Sullivan) located on-site with the construction company's representative, Mr. Justin Sullivan. Mr. Sullivan informed MEV that no significant spill has taken place on-site and that no bulk petroleum products are stored on-site.

Mr. Sullivan also informed MEV that no suspect waste debris was noted on-site during the initial grading/grubbing activities for the baseyard.

6.3 Former Property Owner Representative

MEV attempted (via fax and telephone) to contact and acquire information from the former property owner, Wailuku AgriBusiness (Wailuku Sugar Company). However, by the completion of this report, MEV had not been able to make contact with the represenstative for this company, Mr. Clayton Suzuki.

End of Section

7.0 FINDINGS, OPINIONS, AND CONCLUSIONS

7.1 Recognized Environmental Conditions

Recognized environmental conditions, as defined by ASTM Standard E1527-05, are the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. ***Recognized environmental conditions*** are described with regard to (1) the nature and extent of the environmental condition, (2) potential or actual environmental threat, (3) potential for transport (migration) of any environmental conditions, and (4) consideration for further investigation. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

MEV has performed this Phase I Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice E 1527-05 for the subject property located 0.25 miles south of the intersection of Honoapiilani Highway and Kuikahi Drive (TMK 2-3-5-02:2) near the community of Waikapu, Maui, defined as the subject property. Any exceptions to or deletions from this practice are described in Section 1.4, Limitations and Exceptions, of this report.

This assessment has revealed no evidence of *recognized environmental conditions* in connection with the property.

7.1.1 Database Listings (See Section 4.0 & EDR Report, Appendix B)

Findings/Concerns:

The subject site is not listed.

The listed nearby site was reviewed for environmental concerns relative to the subject site.

Opinions and Conclusions:

The nearby risk site reviewed by MEV would not likely have had a significant impact on the environmental condition of the subject site, nor is there any expected impact therefrom. This conclusion is based on the distance and down gradient location of the risk site relative to the subject site.

7.1.2 Current and Historic Use or Storage of Hazardous and Regulated Substances (See Sections 5.3.1 & 5.3.2)

Findings:

There is no evidence of any historic or current misuse of hazardous or regulated substances on the subject property.

Historically, agriculture (sugarcane and pineapple cultivation) occurred on the subject property for several decades. This operation was most likely associated with the application of pesticides and fertilizers. MEV obtained no evidence of any dedicated pesticide storage or mixing sites on the property or of any chemical misuses.

Opinions and Conclusions:

According to Hawaii Administrative Rules, Chapter 128D Environmental Response Law, the presence of agricultural chemicals, resulting from the legal application of a pesticide product, does not constitute a release of a hazardous substance and is not considered a *recognized environmental condition.*

While the use of pesticides on the subject and adjoining properties will not necessarily result in adverse impacts to the environmental condition of the subject site, it is possible for residual amounts of these

substances to accumulate to concentrations that present a potential threat to human health or the environment.

MEV's experience with soil sampling on former agricultural lands on Maui has generally indicated elevated levels of pesticides and/or herbicides in areas of storage, mixing, or stormwater retention. Sampling of crop areas typically did not have contaminants at levels of concern. Water stations, where mixing may have occurred, and retention basins were not identified on-site. Soil sampling and laboratory testing would provide additional information to evaluate potential environmental effects from the agricultural activities historically conducted on the subject property. A standard proactive procedure would be to conduct such a survey prior to future development of this site, especially any residential development. There is, however, no regulatory requirement to conduct this sampling. Groundwater sampling should be conducted if groundwater resources are to be developed.

7.2 Other Environmental Concerns

The concerns listed below may not be considered ***recognized environmental conditions*** by ASTM definition. However, they may be considered regulated under other environmental laws and ordinances and may present a potential liability to the property owner.

7.2.1 Surface Waters and Area Aquifer Protection

Findings/Concerns:

If future land use includes developing the land for residential or commercial use, the developer and property owner should be aware of the potential for contaminants to run off-site and into nearby water courses. Products of concern relating to any future development project or land-clearing activity would be earthen material (silt), paints, oils, antifreezes and other fluids from automobile or on-site machinery, or leaks from on-site stocked items.

Opinions and Conclusions:

In order to minimize the regulatory profiling of the subject site as a potential responsible party for any newly discovered groundwater or surface water contamination, future developers should consider implementing conservative, proactive environmental policies during the development planning phase.

Construction managers and developers of any future, on-site development activities should consider implementing aggressive, proactive environmental policies during the development-planning phase. Incorporating best management practices including the use of silt fencing and wind fences, etc. will reduce the possibility of negatively impacting the surface soils, surface waters and/or groundwater resources in the region.

Future land clearing of greater than one (1) acre will likely require both a County of Maui grading/grubbing permit and a National Pollution Discharge Elimination System (NPDES) General Permit (State of Hawaii, Department of Health).

7.2.2 Solid Waste Management (See Section 5.5.4)

Findings/Concerns:

A very limited amount of dumping (miscellaneous and construction debris) is evident on the subject property. Some of the materials were regulated items (automobile tires and steel tank) that require proper management and disposal procedures.

Opinions and Conclusions:

Any waste disposal should be in a permitted solid waste landfill or recycled in a manner that complies with all local, state, and federal regulations as applicable to the specific waste type with special attention given to regulated items.

Due to areas of dense vegetation cover, the entire subject site was not visibly inspected. Therefore, it is important to note that if land clearing commences and unidentifiable substances (containers) are discovered, proper waste identification, testing and applicable waste handling/disposal procedures are followed.

8.0 REFERENCES

8.1 Published References

1. American Standard of Testing and Materials, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E1527-05, 2005.
2. "Atlas of Hawaii", 2nd Edition, Department of Geography, University of Hawaii at Hilo, 1983, University of Hawaii Press.
3. "Atlas of Hawaii", 3rd Edition, Department of Geography, University of Hawaii at Hilo, 1998, University of Hawaii Press.
4. County of Maui, Real Property Tax Division, Historical Records for TMK Number (2) 3-5-002:002.
5. Hawaii Administrative Rules, Title 11, Department of Health, Chapter 58.1, Solid Waste Management Control.
6. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Leaking Underground Storage Tank Release Sites, August 2006.
7. State of Hawaii, Department of Health, Solid and Hazardous Waste Branch, Underground Storage Tank Section, List of Underground Storage Tank Facilities, August 2006.
8. State of Hawaii, Department of Health, Voluntary Response Program (VRP), List of Voluntary Response Program Sites, July 2006.
9. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Release Notifications, July 2006.
10. State of Hawaii, Department of Health, Office of Hazard Evaluation and Emergency Response, List of Sites List, July 2006.
11. State of Hawaii, Department of Land and Natural Resources, Registered Wells and Dry Wells.
12. State of Hawaii, Department of Land and Natural Resources, "State of Hawaii Water Quality Plan and Groundwater Map", June 1990, Revised December 1991.
13. U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii", 1972.
14. U.S. Environmental Protection Agency, Office of Air and Radiation et al., Indoor Air Facts No. 4 (revised) Sick Building Syndrome, April 1991.
15. U.S. Environmental Protection Agency, Building Air Quality: A Guide for Building Owners and Facility Managers, 1991.

8.2 Map and Other References

1. Environmental Data Resources, Inc., "The EDR Field Check Report", March 13, 2007.
2. Federal Emergency Management Agency, "Flood Insurance Rate Map", Number 150003 0190D dated March 16, 1995.
3. R.M. Towill Corporation, Aerial Photographs, Honolulu, Hawaii.
4. Air Survey Hawaii, Aerial Photographs, Honolulu, Hawaii.
5. Sanborn Maps (no coverage)
6. U.S. Geological Survey, 7.5 Minute Topographic Map, Wailuku, Hawaii 1983 & 1997.
7. Phase I ESA completed by Vuich Environmental Consultants, Inc. for the northern adjoining property on 2004.

8.3 Record of Personal Communications

Table 3.0: List of personal interviews conducted by MEV.

Date	Interviewee	Title & Organization	Address	Phone Number
2/23/07	Donna Clayton	Client/property owner representative, Pacific Rim Land, Inc.	P.O. Box 220 Kihei, HI 96753	(808) 874-5263
2/26/07	Mr. Justin Sullivan	Foreman, PB Sullivan	P.O. Box 734 Kihei, HI 96753	(808) 357-8790

End of Section

Appendix A:

Maps, Plans, and Photographs

FIGURE 1: REGIONAL SETTING MAP

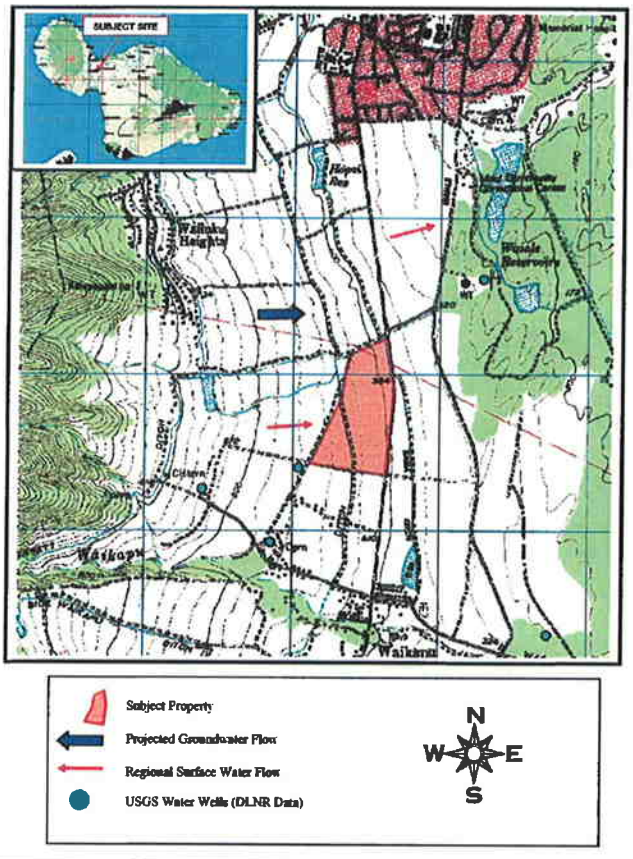


FIGURE 3: TAX MAP KEY

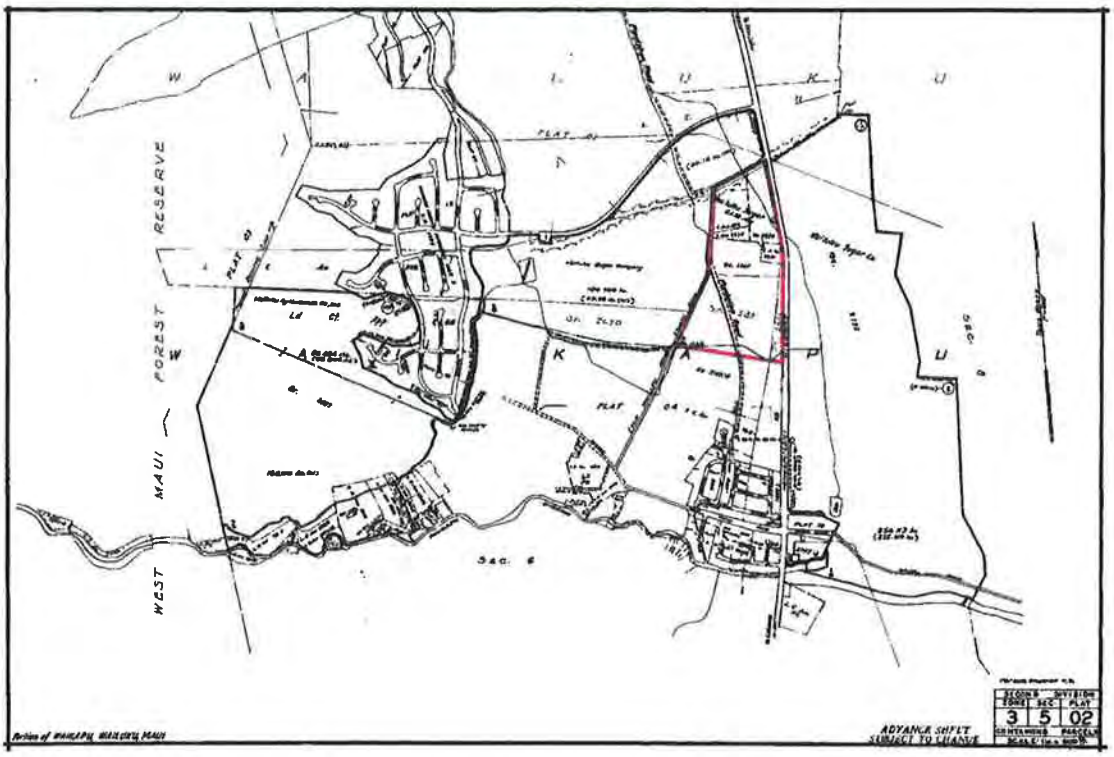


PHOTO 1

Southerly view, along Honoapiilani Highway, of the subject property's eastern boundary.

PHOTO 2

Westerly view along the subject property's northern boundary. The unpaved road approximates the northern boundary of the subject property.

PHOTO 3

Easterly view along the subject property's northern boundary. The unpaved road approximates the northern boundary of the subject property.

PHOTO 4

Southerly view along the subject property's western boundary. The road visible is the Old Waikapu Road.

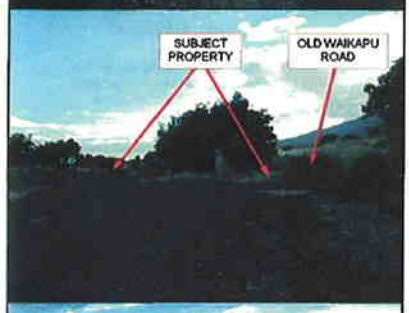


PHOTO 5

Southerly view along the subject property's western boundary. The road veering to the right is the Old Waikapu Road and is the western limit of the subject property. The road veering to the left follows the irrigation ditch located on-site.

This photo is taken near the west-central property boundary.

PHOTO 6

Northerly view along the subject property's western boundary. The unpaved road approximates the western boundary of the subject property.

PHOTO 7

Northerly view along the irrigation ditch located on-site. The ditch flow is southerly.

PHOTO 8

Easterly view along the subject property's southern boundary. The unpaved road is the southern limit of the subject property.

The southern adjoining property is undergoing initial site development for a residential subdivision. The baseyard for this development is located in the southeastern corner of the subject site. See Photos 13 and 14.

PHOTO 9

Westerly view, across Honoapiilani Highway, along the subject property's southern boundary.

PHOTO 10

Northerly view, along Honoapiilani Highway, of the subject property's eastern boundary.

PHOTO 11

Northeasterly view across the subject property. The property currently consists of fallow agricultural land.

PHOTO 12

Northerly view across the subject property. The property currently consists of fallow agricultural land.

PHOTO 13

A temporary construction baseyard is located in the southeastern corner of the subject property. The baseyard is used for heavy equipment and materials' storage.

No surface staining or storage of bulk fuel/regulated substances was noted in this area.

PHOTO 14

See Photo 13.

PHOTO 15

Very limited amounts of containers of regulated items (non-toxic) are stored on-site.

PHOTO 16

One (1) waste container is located in the construction baseyard area. The improper disposal of regulated items into the container was not noted by MEV.

PHOTO 17

Limited amounts of construction debris is located in the construction baseyard area. No regulated items were not noted by MEV.

PHOTO 18

Limited amounts of miscellaneous debris were noted on the subject property. Items noted that require proper disposal were a former steel tank and vehicle tires.

No suspect odors were associated with the tank noted in this photo.

PHOTO 19

Aerial photograph of the subject site. At the time of this photo, the residential development on the southern adjoining property had not commenced and the construction baseyard on-site was not established.

Appendix B:

Regulatory Records Documentation
Site Specific Documentation

EDR FieldCheck® Report

Undevelopped Land - Waikapu
Honoapiilani Highway
Waikapu, HI 96793

Inquiry Number: 1876416.1s

March 13, 2007

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06461

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of the environmental records was conducted by Environmental Data Resources, Inc. (EDR). MEV, LLC used the EDR FieldCheck System to review and/or revise the results of this search, based on independent data verification by MEV, LLC. The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

HONOAPIILANI HIGHWAY
WAIKAPU, HI 96793

COORDINATES

Latitude (North):	20.866000 - 20° 51' 54.0"
Longitude (West):	156.503800 - 156° 30' 13.7"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	759725.4
UTM Y (Meters):	2309086.5
Elevation:	416 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	20156-G5 LAHAINA, HI
Most Recent Revision:	Not reported
North Map:	20156-H5 NAPILI, HI
Most Recent Revision:	Not reported
Northeast Map:	20156-H4 KAHAKULOA, HI
Most Recent Revision:	Not reported
East Map:	20156-G4 WAILUKU, HI
Most Recent Revision:	Not reported

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No sites were identified in following databases

FEDERAL RECORDS

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites

EXECUTIVE SUMMARY

Delisted NPL	National Priority List Deletions
NPL RECOVERY	Federal Superfund Liens
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS	Corrective Action Report
RCRA-TSDF	Resource Conservation and Recovery Act Information
RCRA-LQG	Resource Conservation and Recovery Act Information
RCRA-SQG	Resource Conservation and Recovery Act Information
ERNS	Emergency Response Notification System
HMIRS	Hazardous Materials Information Reporting System
US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
US BROWNFIELDS	A Listing of Brownfields Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
ODI	Open Dump Inventory
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
LUCIS	Land Use Control Information System
US CDL	Clandestine Drug Labs
RADINFO	Radiation Information Database
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
MINES	Mines Master Index File
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System

STATE AND LOCAL RECORDS

SWF/LF	Permitted Landfills in the State of Hawaii
LUST	Leaking Underground Storage Tank Database
UST	Underground Storage Tank Database
SPILLS	Release Notifications
INST CONTROL	Sites with Institutional Controls
VCP	Voluntary Response Program Sites
DRYCLEANERS	Permitted Drycleaner Facility Listing
BROWNFIELDS	Brownfields Sites
AIRS	List of Permitted Facilities

TRIBAL RECORDS

INDIAN RESERV	Indian Reservations
INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
INDIAN UST	Underground Storage Tanks on Indian Land

EDR PROPRIETARY RECORDS

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

EXECUTIVE SUMMARY

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL RECORDS

CERCLIS-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

An online review and analysis by MEV, LLC of the CERC-NFRAP list, as provided by EDR, and dated 12/20/2006 has revealed that there is 1 CERC-NFRAP site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Dist / Dir	Map ID	Page
WAIKAPU DUMP-MAUI COUNTY DUMP	CENTRAL MAUI	1/4 - 1/2 SE	A2	6

STATE AND LOCAL RECORDS

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

An online review and analysis by MEV, LLC of the SHWS list, as provided by EDR, and dated 07/24/2006 has revealed that there is 1 SHWS site within approximately 1 mile of the target property.

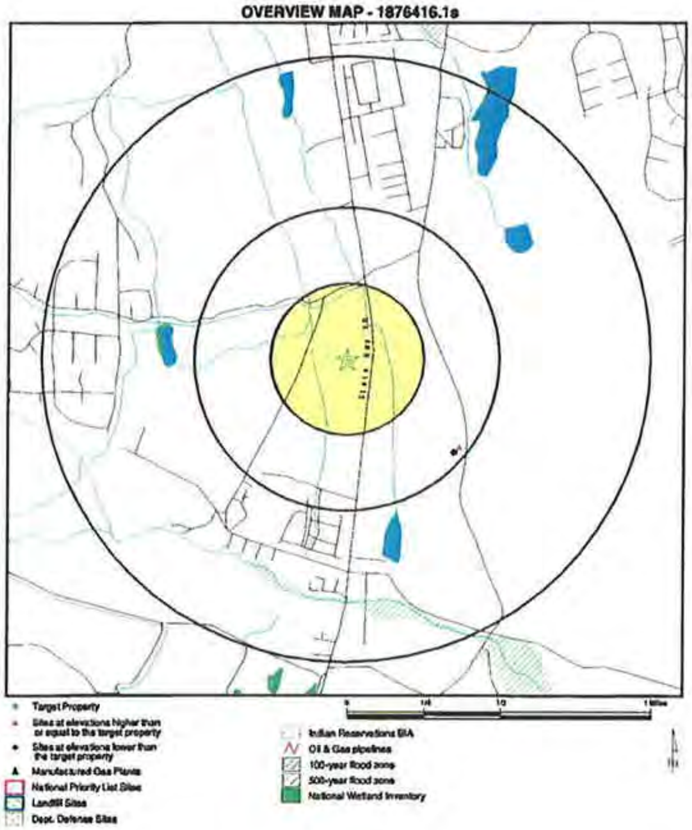
Lower Elevation	Address	Dist / Dir	Map ID	Page
WAIKAPU DUMP-MAUI COUNTY DUMP	***WAIKAPU RD***	***1/4 - 1/2 SE***	***A1***	***6***

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

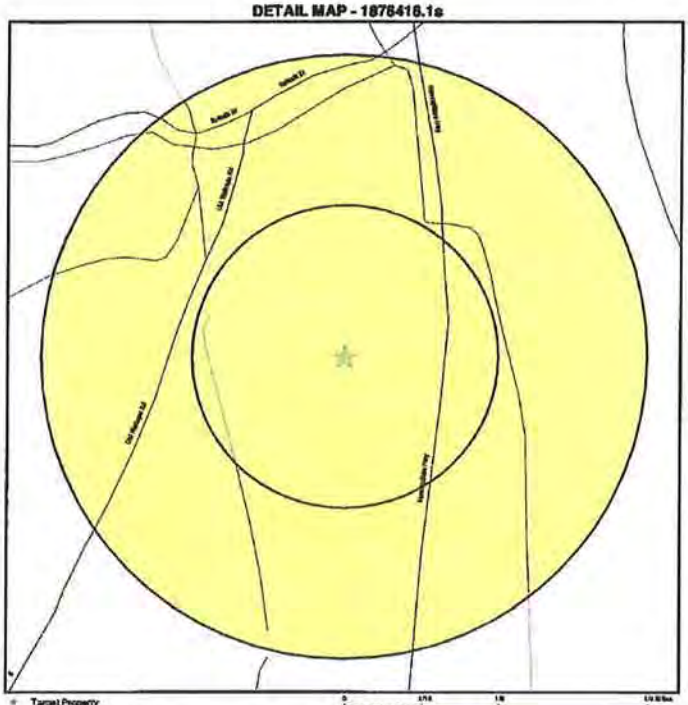
Site Name	Database(s)
KANAHA POND EAST	CERC-NFRAP, SHWS
SMILE'S AUTO SPECIALISTS	SHWS
RAINBOW HAULING	FINDS, SHWS
KING'S TOWING	SHWS
F & M CONTRACTORS	SHWS
BIRD BUILDERS	SHWS
E & E BLACK CONTRACTORS	FINDS, SHWS
VECTOR CONTROL BRANCH, MAUI	SHWS
HOBRON AVE AREA (KAHULUI)	SHWS, FINDS
MAUI PETROLEUM HOBRON AVENUE	SHWS
FONG CONSTRUCTION	SHWS
MCC-AUTOMOTIVE TECHNOLOGY BUILDING CONTAMINATION	FINDS, SPILLS, SHWS
MAUI PALMS HOTEL UST	SHWS
A&B DUMP SITE	FINDS, SHWS
MAUI MEAT COMPANY FACILITY (FORMER), UST CLOSURE	SPILLS, SHWS
KALAMAULA LANDFILL	SHWS
Y HATA- MAUI	SHWS
HANA LANDFILL	SWF/LF
CENTRAL MAUI LANDFILL	SWF/LF
FAA - AIRPORT TRAF CONT TOWER (PMID OGG005126)	LUST
DAVID PICO CESSPOOL DIGGING	LUST, FINDS
HAWAIIAN CEMENT - WAIKAPU QUARRY	LUST, FINDS
VACANT LAND TMK NO (2) 3-8-7:101	RCRA-SQG
WAIKAPU SANITARY LANDFILL	FINDS
VACANT LAND TMK NO (2) 3-8-7:101	FINDS
WAIKAPU AFFORDABLE HOUSING PRO	FINDS
WAIKAPU & SANDALWOOD GOLF COUR	FINDS
HOAPILI HALE - MAUI JUDICIARY BUILDING	FINDS

OVERVIEW MAP - 1876416.1s



SITE NAME:	Undevelopped Land - Waikapu	CLIENT:	MEV, LLC
ADDRESS:	Honoapiilani Highway Waikapu HI 96793	CONTACT:	J. Karmosle
		INQUIRY #:	1876416.1s
LAT/LONG:	20.8650 / 156.5038	DATE:	March 13, 2007 12:23 pm

DETAIL MAP - 1876416.1s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

SITE NAME: Undeveloped Land - Waikapu ADDRESS: Honoapiilani Highway Waikapu HI 96793 LAT/LONG: 20.8850 / 156.5039	CLIENT: MEV, LLC CONTACT: J. Kermode INQUIRY #: 1876416.1s DATE: March 13, 2007 12:23 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL RECORDS								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
NPL RECOVERY		TP	NR	NR	NR	NR	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.500	0	0	1	NR	NR	1
CORRACTS		1.000	0	0	0	0	NR	0
RCRA TSD		0.500	0	0	0	NR	NR	0
RCRA Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRA Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
CDL		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
STATE AND LOCAL RECORDS								
SHWS		1.000	0	0	1	0	NR	1
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
SPILLS		TP	NR	NR	NR	NR	NR	0
INST CONTROL		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
DRYCLEANERS		0.250	0	0	NR	NR	NR	0
BROWNFIELDS		0.500	0	0	0	NR	NR	0
AIRS		TP	NR	NR	NR	NR	NR	0
TRIBAL RECORDS								
INDIAN RESERV		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST		0.500	0	0	0	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
EDR PROPRIETARY RECORDS								
Manufactured Gas Plants		1.000	0	0	0	0	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID / Direction / Distance / Distance (ft.) / Elevation | Site | Database(s) | EDR ID Number / EPA ID Number

A1
SE
1/4-1/2
2423 ft.

WAIKAPU DUMP-MAUI COUNTY DUMP
WAIKAPU RD
KAHULUI, HI 96732

SHWS 1006819647
FINDS 110013774870

Site 1 of 2 in cluster A

Relative: Lower
Actual: 327 ft.

SHWS:

File Under:	County of Maui, Department of Public Works and Waste Management, Solid Waste Division
Supplement:	Not reported
Restricted Use:	Not reported
Restricted Use Comm:	Not reported
Ic Relied On In Remedy:	Not reported
Unit:	Waikapu Dump
Fod Id:	HI0050340843
Funding:	Not reported
Agreement/program:	State Site
Sitelist Name:	Waikapu Dump
Activity Type:	ISST
Assignment Date:	12/31/1984
Activity Lead:	Unknown
Assignment End Date:	4/29/1996
End fd:	4/29/1996
Result fd:	ISST Ranked NFA
Overall Status:	SDAR NFA

FINDS:

Other Pertinent Environmental Activity Identified at Site

HEER-FRS

The HI-ECS (Hawaii Environmental Compliance Program) is the Hawaii state regulatory program relating to environmental compliance and hazardous materials that ensures that program areas and facilities are in compliance with environmental regulations

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A2
SE
1/4-1/2
2459 ft.

WAIKAPU DUMP-MAUI COUNTY DUMP
CENTRAL MAUI
KAHULUI, HI 96732

CERC-NFRAP 1003879111
HI0050340843

Site 2 of 2 in cluster A

Relative: Lower
Actual: 325 ft.

CERC-NFRAP:

Site ID:	0902842
Federal Facility:	Not a Federal Facility
NPL Status:	Not on the NPL
Non NPL Status:	NFRAP

CERCLIS-NFRAP Site Contact Name(s):

Contact Name:	Matt Millguard
Contact Tel:	(415) 972-3096
Contact Title:	Site Assessment Manager (SAM)
Contact Name:	Eugenia Chow
Contact Tel:	(415) 972-3160
Contact Title:	Site Assessment Manager (SAM)

WAIKAPU DUMP-MAUI COUNTY DUMP (Continued) 1003879111

Site Description: Not reported

CERCLIS-NFRAP Assessment History:

Action:	DISCOVERY
Date Started:	Not reported
Date Completed:	11/01/1979
Priority Level:	Not reported
Action:	PRELIMINARY ASSESSMENT
Date Started:	10/01/1984
Date Completed:	01/01/1985
Priority Level:	NFRAP (No Futher Remedial Action Planned
Action:	ARCHIVE SITE
Date Started:	Not reported
Date Completed:	01/01/1985
Priority Level:	Not reported

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HANA, MAUI	S106401332	HANA LANDFILL	HANA MAUI	96793	SWF/LF
KAHULUI	1001475718	KANAHA POND EAST	AMALA PLACE	96732	CERC-NFRAP, SHWS
KAHULUI	S106820468	SMILE'S AUTO SPECIALISTS	AMALA PL	96732	SHWS
KAHULUI	1006819968	RAINBOW HAULING	AMALA PL	96732	FINDS, SHWS
KAHULUI	S106819550	KING'S TOWING	AMALA PL	96732	SHWS
KAHULUI	S106817019	F & M CONTRACTORS	AMALA PL	96732	SHWS
KAHULUI	S106816558	BIRD BUILDERS	AMALA PL	96732	SHWS
KAHULUI	1006820295	E & E BLACK CONTRACTORS	AMALA PL	96732	FINDS, SHWS
KAHULUI	S106982451	FAA - AIRPORT TRAF CONT TOWER (PMID OGG005128)	EENA RD KAHULUI AIRPORT	96732	LUST
KAHULUI	S106820852	VECTOR CONTROL BRANCH, MAUI	54 HIGH ST, 841 MUA ST, KAHALE DR / PALAPALA ST	96793	SHWS
KAHULUI	1006820577	HOBRON AVE AREA (KAHULUI)	HOBRON AVE	96732	SHWS, FINDS
KAHULUI	1006819819	MAUI PETROLEUM HOBRON AVENUE	HOBRON AVE	96732	SHWS
KAHULUI	S106817098	FONG CONSTRUCTION	HUKILIKI ST	96732	SHWS
KAHULUI	1006819999	MCC-AUTOMOTIVE TECHNOLOGY BUILDING CONTAMINATION	310 KAAHUMANU AVE	96732	FINDS, SPILLS, SHWS
KAHULUI	S104534290	MAUI PALMS HOTEL UST	150 KAAHUMANU AVE	96732	SHWS
KAHULUI	1006841969	DAVID PICO CESSPOOL DIGGING	OLD HALEAKALA HWY	96732	LUST, FINDS
KAHULUI	1006820345	A&B DUMP SITE	W PAPA AVE	96732	FINDS, SHWS
KAHULUI	S106819004	MAUI MEAT COMPANY FACILITY (FORMER), UST CLOSURE	601 2ND ST	96732	SPILLS, SHWS
KALAMAULA	S106818091	KALAMAULA LANDFILL	HOAWA RD	96793	SHWS
PUUNENE, MAUI	S103763652	CENTRAL MAUI LANDFILL	PUNENE, MAUI	96793	SWF/LF
WAIKAPU	1006170757	WAIKAPU SANITARY LANDFILL	925 CEDAR ST	96793	FINDS
WAIKAPU	1006230988	VACANT LAND TMK NO (2) 3-8-7:101	KUIHELANI HWY NEAR WAIKO RD	96793	FINDS
WAIKAPU	1006194655	VACANT LAND TMK NO (2) 3-8-7:101	KUIHELANI HWY NEAR WAIKO RD	96793	RCRA-SQG
WAILUKU	1006842014	HAWAIIAN CEMENT - WAIKAPU QUARRY	HONOAPIILANI HWY	96793	LUST, FINDS
WAILUKU	1006919671	WAIKAPU AFFORDABLE HOUSING PRO	HONOAPIILANI HIGHWAY	96793	FINDS
WAILUKU	1006919581	WAIKAPU & SANDALWOOD GOLF COUR	WEST OF HONOAPIILANI HIGHWAY	96793	FINDS
WAILUKU	S106006644	Y HATA- MAUI	200 WAIEHU BEACH RD AND KAHULU BEACH RD	96793	SHWS
WAILUKU	1006844265	HOAPILI HALE - MAUI JUDICIARY BUILDING	110 WELLS ST	96793	FINDS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NPL RECOVERY: Federal Superfund Liens
Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: No Update Planned

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 11/28/2006
Date Data Arrived at EDR: 12/19/2006
Date Made Active in Reports: 01/25/2007
Number of Days to Update: 41

Source: EPA
Telephone: 703-603-8850
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Quarterly

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 12/20/2006
Date Data Arrived at EDR: 01/29/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 29

Source: EPA
Telephone: 703-603-8960
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Quarterly

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 01/04/2007
Date Data Arrived at EDR: 01/16/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 40

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/05/2007
Next Scheduled EDR Contact: 06/04/2007
Data Release Frequency: Quarterly

RCRA: Resource Conservation and Recovery Act Information

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS). The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 05/13/2006
Date Data Arrived at EDR: 06/28/2006
Date Made Active in Reports: 08/23/2006
Number of Days to Update: 56

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/27/2007
Next Scheduled EDR Contact: 04/16/2007
Data Release Frequency: Quarterly

ERNS: Emergency Response Notification System
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 01/24/2007
Date Made Active in Reports: 03/12/2007
Number of Days to Update: 47

Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Last EDR Contact: 01/24/2007
Next Scheduled EDR Contact: 04/23/2007
Data Release Frequency: Annually

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 11/28/2006
Date Data Arrived at EDR: 01/17/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 41

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/17/2007
Next Scheduled EDR Contact: 04/16/2007
Data Release Frequency: Annually

US ENG CONTROLS: Engineering Controls Sites List
A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or affect human health.

Date of Government Version: 10/18/2006
Date Data Arrived at EDR: 12/14/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 28

Source: Environmental Protection Agency
Telephone: 703-603-8905
Last EDR Contact: 01/02/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls
A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 01/24/2007
Date Data Arrived at EDR: 01/31/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: 703-603-8905
Last EDR Contact: 01/02/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

DOD: Department of Defense Sites
This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 02/08/2007
Next Scheduled EDR Contact: 05/07/2007
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 09/29/2006
Date Made Active in Reports: 11/22/2006
Number of Days to Update: 53

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 01/02/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Varies

US BROWNFIELDS: A Listing of Brownfields Sites
Included in the listing are brownfields properties addressed by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 10/17/2006
Date Data Arrived at EDR: 10/20/2006
Date Made Active in Reports: 12/13/2006
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/12/2007
Next Scheduled EDR Contact: 06/11/2007
Data Release Frequency: Semi-Annually

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/14/2004
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 04/25/2005
Number of Days to Update: 68

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 02/06/2007
Next Scheduled EDR Contact: 04/23/2007
Data Release Frequency: Varies

ROD: Records Of Decision
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/10/2007
Date Data Arrived at EDR: 01/24/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 34

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 01/22/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UMTRA: Uranium Mill Tailings Sites
Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/06/2006
Date Made Active in Reports: 01/26/2007
Number of Days to Update: 82

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 06/09/2004
Date Made Active in Reports: 06/17/2004
Number of Days to Update: 38

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

TRIS: Toxic Chemical Release Inventory System
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2004
Date Data Arrived at EDR: 06/22/2006
Date Made Active in Reports: 08/23/2006
Number of Days to Update: 62

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2002
Date Data Arrived at EDR: 04/14/2006
Date Made Active in Reports: 05/30/2006
Number of Days to Update: 46

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 01/15/2007
Next Scheduled EDR Contact: 04/16/2007
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 10/27/2006
Date Made Active in Reports: 11/22/2006
Number of Days to Update: 26

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 10/27/2006
Date Made Active in Reports: 11/22/2006
Number of Days to Update: 26

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 12/18/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2004
Date Data Arrived at EDR: 05/11/2006
Date Made Active in Reports: 05/22/2006
Number of Days to Update: 11

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/29/2007
Next Scheduled EDR Contact: 04/16/2007
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 02/13/2006
Date Data Arrived at EDR: 04/21/2006
Date Made Active in Reports: 05/11/2006
Number of Days to Update: 20

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 01/15/2007
Next Scheduled EDR Contact: 04/16/2007
Data Release Frequency: Quarterly

COL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 12/01/2006
Date Data Arrived at EDR: 01/08/2007
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 3

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 01/08/2007
Next Scheduled EDR Contact: 03/26/2007
Data Release Frequency: Quarterly

LUCIS: Land Use Control Information System
LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 03/12/2007
Next Scheduled EDR Contact: 06/11/2007
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/30/2007
Date Data Arrived at EDR: 01/31/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/31/2007
Next Scheduled EDR Contact: 04/30/2007
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/17/2006
Date Data Arrived at EDR: 11/29/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 43

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 03/02/2007
Next Scheduled EDR Contact: 05/07/2007
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/11/2007
Date Data Arrived at EDR: 01/26/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 32

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/02/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Quarterly

MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/15/2006
Date Data Arrived at EDR: 12/28/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 32

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 12/28/2006
Next Scheduled EDR Contact: 03/26/2007
Data Release Frequency: Semi-Annually

FINDS: Facility Index System/Facility Registry System
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 01/18/2007
Date Data Arrived at EDR: 01/23/2007
Date Made Active in Reports: 02/27/2007
Number of Days to Update: 35

Source: EPA
Telephone: N/A
Last EDR Contact: 01/02/2007
Next Scheduled EDR Contact: 04/02/2007
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 03/05/2007
Next Scheduled EDR Contact: 06/04/2007
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2003
Date Data Arrived at EDR: 06/17/2005
Date Made Active in Reports: 08/04/2005
Number of Days to Update: 48

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/06/2007
Next Scheduled EDR Contact: 06/11/2007
Data Release Frequency: Biennially

STATE AND LOCAL RECORDS

SHWS: Sites List
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 07/27/2006
Date Made Active in Reports: 08/30/2006
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/22/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Semi-Annually

SWF/LF: Permitted Landfills in the State of Hawaii
Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/15/2004
Date Data Arrived at EDR: 05/20/2004
Date Made Active in Reports: 06/22/2004
Number of Days to Update: 33

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 02/08/2007
Next Scheduled EDR Contact: 04/23/2007
Data Release Frequency: Varies

LUST: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/30/2007
Date Data Arrived at EDR: 02/13/2007
Date Made Active in Reports: 03/12/2007
Number of Days to Update: 27

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 02/13/2007
Next Scheduled EDR Contact: 03/26/2007
Data Release Frequency: Semi-Annually

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/11/2006
Date Data Arrived at EDR: 08/14/2006
Date Made Active in Reports: 09/20/2006
Number of Days to Update: 37

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 02/13/2007
Next Scheduled EDR Contact: 03/26/2007
Data Release Frequency: Semi-Annually

SPILLS: Release Notifications
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 07/27/2006
Date Made Active in Reports: 08/30/2006
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/22/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Varies

UST CONTROL: Sites with Institutional Controls
Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 07/27/2006
Date Made Active in Reports: 08/30/2006
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/22/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites
Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 07/27/2006
Date Made Active in Reports: 08/30/2006
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/22/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing
A listing of permitted drycleaner facilities in the state.

Date of Government Version: 02/14/2007
Date Data Arrived at EDR: 02/15/2007
Date Made Active in Reports: 03/12/2007
Number of Days to Update: 25

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 02/12/2007
Next Scheduled EDR Contact: 04/30/2007
Data Release Frequency: Varies

BROWNFIELDS: Brownfields Sites
With certain legal exclusions and additions, the term 'brownfield site' means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 07/27/2006
Date Made Active in Reports: 08/30/2006
Number of Days to Update: 34

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/22/2006
Next Scheduled EDR Contact: 03/19/2007
Data Release Frequency: Varies

AIRS: List of Permitted Facilities
A listing of permitted facilities in the state.

Date of Government Version: 09/07/2006
Date Data Arrived at EDR: 09/08/2006
Date Made Active in Reports: 10/13/2006
Number of Days to Update: 35

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 02/12/2007
Next Scheduled EDR Contact: 04/30/2007
Data Release Frequency: Varies

TRIBAL RECORDS

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 02/06/2007
Next Scheduled EDR Contact: 05/07/2007
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 12/01/2006
Date Data Arrived at EDR: 12/01/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 59

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 01/04/2005
Date Data Arrived at EDR: 01/21/2005
Date Made Active in Reports: 02/28/2005
Number of Days to Update: 38

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Minnesota, Mississippi and North Carolina.

Date of Government Version: 08/24/2006
Date Data Arrived at EDR: 09/11/2006
Date Made Active in Reports: 11/08/2006
Number of Days to Update: 58

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 11/30/2006
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 52

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/21/2006
Date Data Arrived at EDR: 12/06/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 52

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 12/19/2006
Date Data Arrived at EDR: 12/19/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 41

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 09/06/2006
Date Data Arrived at EDR: 10/04/2006
Date Made Active in Reports: 11/08/2006
Number of Days to Update: 35

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

INDIAN UST R4: Underground Storage Tanks on Indian Land

Date of Government Version: 08/24/2006
Date Data Arrived at EDR: 09/11/2006
Date Made Active in Reports: 11/08/2006
Number of Days to Update: 58

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

Date of Government Version: 09/06/2006
Date Data Arrived at EDR: 10/04/2006
Date Made Active in Reports: 11/08/2006
Number of Days to Update: 35

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

Date of Government Version: 11/30/2006
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 52

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

INDIAN UST R5: Underground Storage Tanks on Indian Land

Date of Government Version: 12/02/2004
Date Data Arrived at EDR: 12/29/2004
Date Made Active in Reports: 02/04/2005
Number of Days to Update: 37

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

Date of Government Version: 11/21/2006
Date Data Arrived at EDR: 12/06/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 52

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land
A listing of underground storage tank locations on Indian Land.

Date of Government Version: 12/01/2006
Date Data Arrived at EDR: 12/01/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 59

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

Date of Government Version: 01/11/2007
Date Data Arrived at EDR: 01/12/2007
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 17

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land

Date of Government Version: 12/19/2006
Date Data Arrived at EDR: 12/19/2006
Date Made Active in Reports: 01/29/2007
Number of Days to Update: 41

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 02/19/2007
Next Scheduled EDR Contact: 05/21/2007
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR PROPRIETARY RECORDS

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whole oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

MEV, LLC
MALAMA ENVIRONMENTAL

PRELIMINARY INFORMATION
FOR ENVIRONMENTAL INVESTIGATION

According to ASTM Standard 1527-05, the user's (or client's) responsibility in this investigation is to help identify the possibility of recognized environmental conditions in connection with the property. In order to qualify for one of the *Land Owner Liability Protections* (LLPs) offered by the small Business Liability Relief and Brownfields Revitalization Act of 2001 *(the "Brownfields Amendments")*, the user must provide the following information (if available) to the environmental professional. Failure to provide this information could result in a determination that *"all appropriate inquiry"* is not complete. Please assist us by responding to the following request for ASTM required data and other MEV requested information you may have, or of which you may have some specialized knowledge. This questionnaire will be included in the Appendices of the final report as an indication of user assistance.

Project Name: 60.08 Acres Undeveloped Land - Waikapu MEV Project No: 0701-0038

Please supply as many of the following documents as possible:

A. ☒ Tax Map Key Number/Tax Code Number TMK 3-5-2:02
B. ☐ Title Information *(Current, and any previous ownership.)*
C. ☐ Property Legal Description *(If Title Information is not available)*
D. ☐ Tax Map and/or Site Development Drawing/Plat
E. ☐ Special Property Information *(Well-development data, endangered species listings, historical registration or environmental deed restrictions.)*
F. ☐ Real Estate Appraisal Report
G. ☐ Special Management Area Permit Report (SMA)- N/A

Please provide the following information to the best of your ability:

1. Environmental clean-up liens that are filed or recorded against the site (40 CFR 312.25)
   Are you aware of any environmental clean up liens against the *property* that are filed or recorded under federal, tribal, state or local law?
   None Known

2. Activity and land use limitations (AULs) that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26).
   Are you aware of any AULs, such as *engineering controls*, land use restrictions or *institutional controls* that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state, or local law?
   None Known

3. Specialized knowledge or experience of the person seeking to qualify for the LLP (40 CFR 312.28).
   As the user of this *ESA*, do you have any specialized knowledge or experience related to the *property* or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?
   No

P.O. Box 880487, Pukalani, Hawaii 96788-0487 ▲ Phone: (808) 573-0200 ▲ Fax: (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

4. Relationship of the purchase price to the fair market value of the *property* if it were not contaminated (40 CFR 312.29).
   Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*?
   Purchase price reflected fair market value.

5. Commonly known or *reasonably ascertainable* information about the property if it were not contaminated (40 CFR 312.30).
   Are you aware of commonly known or *reasonably ascertainable* information about the property that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as *user*,
   a) Do you know the past uses of the *property*? sugar cane and pineapple crops
   b) Do you know of specific chemicals that are present or *once* were present at the *property*? no
   c) Do you know of spills or other chemical releases that have taken place at the *property*? no
   d) Do you know of any environmental cleanups that have taken place at the *property*? no

6. The degree of obviousness of the presence or likely presence of contamination at the *property*, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).
   As the *user* of this *ESA*, based on your knowledge and experience related to the *property*, are there any obvious indicators that point to the presence or likely presence of contamination at the *property*?
   None known other than crops.

Additional Information Request:

1. Name of Current Owner: Endurance Investors, LLC and Association of II Wai Hui LP
2. Name of Former Owner: Wailuku Agribusiness Co., Inc.
3. Environmental Site Assessments (ESA): Are you aware of any previous assessments: Phase I/II ESAs *Cleanup Closure Reports, Permit Characterization Reports*, etc. conducted on the subject site or *within the immediate area*? If yes, please supply details. none known
4. Local-State-Federal Inspections: Are you aware of any environmental inspections *conducted by any regulatory agency*, i.e., Hawaii Dept. of Health (Environmental Health Services), OSHA, U.S. Army Corps of Engineers, Department of Land & Natural Resources, Fish & Wildlife Services, HUD, EPA, or County Wastewater or Solid Waste Division of the Public Works/Waste Management Department etc.? If yes, please supply details.
   None known
5. Structures/Buildings: Are there any as-built or other construction drawings available for review? *Contact Name and Telephone Number:* None
6. Site Improvements? *(Renovation Date & Extent)* N/A - vacant land
7. Proceedings Against the Property: Are you aware of any administrative or legal proceedings against the property for environmental concerns i.e., Compliance Orders, Notices of Violation? If yes, please supply details. None known

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8. Specialized Historic Information: Are you aware of any previous owner, neighbor, business affiliate or other individual who might have knowledge of any special or unusual historic use of, and/or previous operations conducted on the subject property? *Contact Name and Telephone Number:*

9. Manufacturing or Processing: If there are manufacturing or processing activities conducted on-site, is there an operation flow chart, diagram or procedures manual available for review? *Contact Name and Telephone Number.* N/A

This Report is Prepared For: *(Please Print)*
Attention: John Maloney
Organization: Endurance Investors LLC
Address: P.O. Box 220, Kihei, HI 96753
Phone no.: 808/874-5263 Fax no.: 808/879-2557

Please List Other Organizations (Lenders) Who Will Require a Listing as "Also Prepared For:" on the report cover and signature page.
(1) Attention: Lloyd Sodetani
Organization: Association of Ii Wai Hui LP
Address: 1885 Main St., Suite 404, Wailuku, HI 96793
(2) Attention:
Organization:
Address:

We will submit 2 signed reports for each project. If additional copies are required, an additional fee will be charged for processing.
Who Prepared This Starter Package Information?

Print Name:	Donna Clayton	Title:	Project Coordinator
Company:	Pacific Rim Land, Inc.		
Address:	P.O. Box 220, Kihei, HI 96753		
Tel No.:	808/874-5263	Fax No.:	808/879-2557
Signature:	Donna Clayton	Date:	2/12/07

P.O. Box 880487, Pukalani, Hawaii 96788-0487 ▲ Phone: (808) 573-0200 ▲ Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

RECEIVED
DEPARTMENT OF HEALTH
2007 FEB -8 P 2:49
HEER OFFICE

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 206
Honolulu, HI 96814
Phone: (808) 586-4249
Via Fax: (808) 586-7537
Attn: Office of Hazard Evaluation & Emergency Response (HEER)

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	0701-0038	No record.
Tax Map Key No.:	(2) 3-5-02: 002	
Address:	60.08 Acres Undeveloped Land – Waikapu Off Honoapiilani Hwy, Waikapu, Maui, HI	S. Deus 2/13/07 Date
Current Owner:	Wailuku Sugar Company	
Former Owner:	As above.	
Current Occupant:	None.	
Type of Business:	Undeveloped Land.	

Truly yours,

Jeffrey Kermode

Project Manager

2/6/07
Date

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME LEINAALA FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EMD / WB

RFI-MEV.wpd

February 28, 2007

Mr. Jeffrey Kermode
MEV, LLC
Malama Environmental
P.O. Box 880487
Pukalani, Hawaii 96788-0487

Dear Mr. Kermode:

Subject: Your Request for Public Records
TMK: (2) 3-5-02:002

In response to your request, our Wastewater Branch does not have any records of pending environmental permits, licenses, citations, releases, or other information for the subject property.

Should you have any questions, please call Marshall Lum at telephone 586-4294.

Sincerely,

HAROLD K .YEE, CHIEF
Wastewater Branch

ML/mt

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O.BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD/SDWB

February 14, 2007

Mr. Jeffrey Kermode
MEV, LLC
Malama Environmental
P.O. Box 880487
Pukalani, Hawai`i 96788-0487

Dear Mr. Kermode:

SUBJECT: UNDERGROUND INJECTION CONTROL (UIC);
REPLY TO YOUR INFORMATION REQUEST FOR
1. TMK: (2) 3-5-02:002
60.08 ACRES UNDEVELOPED LAND - WAIKAPU
OFF HONOAPI`ILANI HWY, WAIKAPU, MAUI, HI
2. [redacted]

Based on your submitted information, there are no UIC permits associated with the subject properties.

If a well is found at any property, please contact us so that we can determine if the injection well regulations are applicable.

If you have any questions about this subject, please call Chauncey Hew at (808) 586-4258 (Honolulu) or call direct toll free from Maui at 984-2400, ext. 64258.

Sincerely,

STUART YAMADA, P.E., CHIEF
Safe Drinking Water Branch
Environmental Management Division

CH:cb

MALAMA ENVIRONMENTAL (MEV, LLC)

P.O. Box 880487, Pukalani, Maui, Hawaii 96788-0487

Fax

Attn:	Clayton Suzuki	**From:**	Jeff Kermode
Company:	Wailuku Agribusiness	**Of:**	Malama Environmental
Fax:	242-7068	**Pages:**	02
Phone:	244-2208	**Date:**	2/22/07
Re:	Information request	**CC:**	

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Notes:

Aloha Clayton,

As requested by the prospective property owner, Malama Environmental (MEV) is conducting an Environmental Site Assessment (ESA) on the following parcel of land, TMK (2) 3-5-02:02. Please see attached TMK.

Site specific information (if it applies to the subject property) that would be useful includes:

- knowledge of on-site equipment maintenance locations;
- presence of former or current underground or above-ground fuel storage tanks (UST/AST);
- location of bulk fertilizer/pesticide storage and/or mixing areas;
- knowledge of any significant spills (petroleum or pesticides);
- location of on-site landfills (waste dumps), cesspools and/or septic tanks;
- location of any on-site groundwater wells,

Mahalo for your time. Please call me if you have any questions.

Jeff Kermode

Phone: (808) 573-0200 • Fax: (808) 573-0210

MEV, LLC

MALAMA ENVIRONMENTAL

February 6, 2007

Maui County Fire Department
Fire Prevention Bureau
21 Kinipopo Street
Wailuku, Hawaii 96793
Attn: Capt. Neal Bal
Via Fax No: 270-7889

RE: Request for Public Records

Dear Capt. Bal:

MEV is requesting any past or present information of environmental concern pertaining to the subject site and adjacent sites from the Maui County Fire Department's database. This could include information on environmental releases (spills), permits, citations, inspections, fires, etc.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Thank you for your assistance.

Sincerely yours,

Jeffrey Kermode

Attachment: TMK map

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

Maui County Fire Department
Hazardous Materials Division
200 Dairy Road
Kahului, Hawaii 96732
Attn: Mr. Jeffrey M. Kihune
Acting Officer
Via Fax No: 270-7919

RE: Request for Public Records for

Dear Mr. Kihune:

MEV is requesting any past or present information of environmental concern pertaining to the subject site and adjacent sites from the Maui County Fire Department's database. This could include information on environmental releases (spills), permits, citations, inspections, fires, etc.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Thank you for your assistance.

Sincerely yours,

Jeffrey Kermode

Attachment: TMK map

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

Hawaii State Department of Health
919 Ala Moana Blvd., Room 203
Honolulu, HI 96814
Attn: Wastewater Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Tax Map Key is enclosed.

Truly yours,

Jeffrey Kermode

P.O. Box 880487, Pukalani, Hawaii 96788-0487 ▲ Phone: (808) 573-0200 ▲ Fax: (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 308
Honolulu, HI 96814
Phone: (808) 586-4258
Fax: (808) 586-4370
Attn: Safe Drinking Water Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Tax Map Key is enclosed.

Truly yours,

Jeffrey Kermode

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 301
Honolulu, HI 96814
Phone: (808) 586-4309
Attn: Clean Water Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Tax Map Key is enclosed.

Truly yours,

Jeffrey Kermode

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 212
Honolulu, HI 96814
Phone: (808) 586-4226
Attn: Solid & Hazardous Waste Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Tax Map Key is enclosed.

Truly yours,

Jeffrey Kermode

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 206
Honolulu, HI 96814
Phone: (808) 586-4249
Via Fax: (808) 586-7537
Attn: Office of Hazard Evaluation
& Emergency Response (HEER)

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Truly yours,

Jeffrey Kermode

_____ _____
Project Manager *Date*

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

MEV, LLC
MALAMA ENVIRONMENTAL

February 6, 2007

State of Hawaii Department of Health
Environmental Management Division
919 Ala Moana Boulevard, Room 309
Honolulu, HI 96814
Phone: (808) 586-4200
Fax: (808) 586-5800
Attn: Clean Air Branch

Subject: REQUEST FOR PUBLIC RECORDS

Dear Sir/Madam:

We are requesting a search for any past or pending environmental permits, licenses, citations, releases, or other information pertaining to the site(s) described below.

SITE INFORMATION:

Project Number:	**0701-0038**
Tax Map Key No.:	**(2) 3-5-02: 002**
Address:	**60.08 Acres Undeveloped Land – Waikapu** **Off Honoapiilani Hwy, Waikapu, Maui, HI**
Current Owner:	**Wailuku Sugar Company**
Former Owner:	**As above.**
Current Occupant:	**None.**
Type of Business:	**Undeveloped Land.**

Tax Map Key is enclosed.

Truly yours,

Jeff Kermode

PO Box 880487, Pukalani, Hawaii 96788-0487 • Phone (808) 573-0200 • Fax (808) 573-0210

Appendix C:

Qualifications of Environmental Professionals

MEV, LLC
Malama Environmental

STATEMENT OF QUALIFICATIONS
for
Jeffrey E. Kermode, Environmental Projects' Manager

Company Position Environmental Projects Manager

Responsibilities and Duties:
- Phase I & II Environmental Site Assessments/Investigations
- Phase III Remediation Projects
- Underground Storage Tank (UST) Closures
- Asbestos Inspections, Air Monitoring and Supervision of Removal
- Lead-Based Paint Inspections, Risk Assessments and Supervision of Removal
- Indoor Air Quality Investigations and Mold Remediation Project Management
- Erosion Control Plan (BMP) Development
- Site Safety Officer for Sampling/Remediation Projects

Experience:
- Soil and Groundwater Investigations/Remediation
- UST Removal and Closure
- Hazardous Materials Management
- Asbestos and Lead-Based Paint Projects (Inspections, Monitoring, Removal)
- Air Quality Sampling for Particulate and Microbiological Contaminants
- Wetland Delineation
- Erosion Control and Pollution Prevention Planning and Implementation for Large Scale Construction Projects
- Underground Injection Control (UIC) Permitting
- Environmental Report Writing and Compilation
- Conducted On-Site Oil Spill Response Training Courses, Assessed Clients' Response Preparedness, and Assisted in the Development of Oil Spill Contingency Plans
- Oil Spill Clean-Up Operations
- Pelagic and Coastal Fisheries Research as a Scientific Observer

Training & Education
- Registered Environmental Assessor I, State of California
- Bachelor of Technology Program, Environmental Engineering, B.C.I.T. Burnaby, B.C., 1997-1999.
- Bachelor of Arts, Geography, University of B.C., Vancouver, Canada, 1989
- AHERA (Asbestos Hazard Emergency Response Act) Inspector for Asbestos, US EPA Certified
- OSHA HAZWOPER Certification (40 Hr)
- Lead-Based Paint Risk Assessor, US EPA Certified
- Lead-Based Paint Contractor Supervisor, US EPA Certified

P.O. Box 880487, Pukalani, HI 96788-0487 • (808) 573-0200 Phone (808) 573-0210 Fax

MEV, LLC
Malama Environmental

STATEMENT OF QUALIFICATIONS:

JOHN S. VUICH
President & CEO

M. S. Geological Engineering, University of Arizona
B. S. Geological Engineering, University of Arizona
Registered Geologist (California)
Registered Environmental Assessor (California)
Certified Environmental Manager (Nevada)

AREAS OF EXPERTISE

ENVIRONMENTAL
- Site Assessments, Phase I, II, III Investigations
- Underground Storage Tank Closure
- Asbestos Inspection and Monitoring, Management Planning, and Abatement Project Design and Removal
- Lead-Containing Paint Surveys and Inspections, and Disturbance Design and Removal
- Site Characterization for Remedial Investigations
- Facility Operation Compliance Audits-ISO 14000 Audits
- Soils/Groundwater Remediation
- Hazardous Waste Management
- Risk Assessment Investigations
- RCRA Compliance and Closure Projects
- Expert Witness/Litigation Support
- Industrial Hygiene Qualified/Competent Person
- Mold/Fungi Sampling, Remediation and Abatement Design and Removal

GEOLOGICAL
- Hydrogeology
- Geologic Hazards Analysis
- Subsurface Excavations and Drilling Investigations and Sampling

P.O. Box 880487, Pukalani, HI 96788-0487 • (808) 573-0200 Phone (808) 573-0210 Fax

Abbreviation	Definition
AST	Aboveground Storage Tank
AHERA	(Federal) Asbestos Hazard Emergency Response Act
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BLM	Bureau of Land Management
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAA	Clean Air Act: Regulates Air Quality
CAMU	Corrective Action management Unit
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act: Federal Superfund for Cleanup of Environmental Contamination (1980, 1986)
CERCLIS	CERCLA Information System (data base)
CESQG	Conditionally Exempt SQG: Hazardous Waste Generator less than 100 kg/mo.
C.F.R.	Code of Federal Regulations: National Standard Regulations
COLIWASA	Composite Liquid Waste Sampler
CRC	Chlorofluorocarbon
CMU	Concrete Masonry Unit
CWA	Clean Water Act: Regulates Water Quality (1972, 1987)
CZMA	Coastal Zone Management Act
DLNR	Department of Land and Natural Resources
DOT	Department of Transportation: Administers hazardous Waste Containers-Marking-Labeling-Placarding and Transportation Procedures.
DOH	Department Of Health (State Of Hawaii)
DRASTIC	EPA Standardized System for Evaluating Groundwater Pollution Potential Using Hydrogeologic Settings.
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency: Administers CERCLA, RCRA and SARA
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act: Regulates Pesticides (1972, 1988)
FSP	Field Sampling Plan
FWPCA	Federal Water Pollution Control Act
HAP	Hazardous Air Pollutant
HCS	(OSHA) Hazard Communication Standard
HSWA	(Federal) Hazardous and Solid Waste Amendments of 1984
LEL	Lower Explosive Limit
LQG	Large Quantity Generators; Hazardous Waste Generator in Excess of 100 kg/mo.
LUST	Leaking Underground Storage Tank.
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MSDS	Material Safety Data Sheets: Hazard Information Required for Chemical Substances by OSHA
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants (Under CAA Regulations)
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operating and Maintenance
OCS	Outer Continental Shelf
OSHA	Occupational Safety and Health Act: Established Hazard Communication Program and Employee Right-to-Know Law (1970)
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyls: Toxic Substance Used in Electric-Device Cooling.
PCi/l	Picocuries Per Liter
PEL	Permissible Airborne Exposure Level
PID	Photoionization Detector

POTW	Publicly Owned Treatment Works
ppb	parts per billion
ppm	parts per million
PWP	Project Work Plan
PRPs	Potentially Responsible Parties
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RBCA	Risk Based Corrective Action and Decision-Making at Sites with Contaminated Soil and Groundwater. (Hawaii DOH)
RCRA	Resource Conservation and Recovery Act: Federal Hazardous Waste Management Law. Regulates Waste Generation, Transportation, Treatment, Storage or Disposal Sites (1976, 1984)
RQ	Reportable Quantity
RUST	Registry of Underground Storage Tanks
SAP	Sampling & Analysis Plan
SARA	Superfund Amendments and Reauthorization Act: Amends CERCLA and includes Community Right to Know Law. Requires facilities report their chemical inventories and emissions (1986).
SDWA	Safe Drinking Water Act: Establishes maximum contaminant levels for drinking water (1974, 1986).
SHSP	Site Health & Safety Plan
SIC	Standard Industrial Classification
SIP	State implementation plan
SPCC	Spill Prevention Control and Countermeasure
SQG	Small Quantity Generator: Hazardous Waste Generator between 100-1000 kg/mo.
TCLP	Toxicity Characteristic Leaching Procedure: A toxicity test for certain substances declared hazardous by the EPA.
TMK	(Hawaii) Tax Map Key
TPH	Total Petroleum Hydrocarbons
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act: Regulates PCBs in electrical devices and chromium in evaporative cooling towers, asbestos in schools. (1976)
TSD	Treatment, Storage, and Disposal
UEL	Upper Explosive Limit
UIC	Underground Injection Control
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analyses
VOC	Volatile Organic Compound: EPA listed toxic or carcinogenic organic substances.
Minimal, Minor or Not Significant	1) An unlikely or remote event, i.e., possible, but not anticipated under current conditions and observed features. 2) Insignificant when compared to regulatory acceptance levels, guideline action levels or when compared to background and/or baseline conditions of the local environment. 3) Any potential effect or impact attributed to the subject factor may be considered as the least likely source among a number of potentially responsible factors. 4) Any potential effect may not be measurable or detected by current technology. 5) Education, experience, and background of the investigator were utilized to conclude the situation or condition as trifle.

Appendix B:

Regulatory Records Documentation
Site Specific Documentation

EDR FieldCheck™ Report

Kuikahi Drive
Corner of Honoapiilani Hwy
Wailuku, HI 96793

Inquiry Number: 01184251.1r

May 04, 2004

The Standard in Environmental Risk Management Information

440 Wheelers Farms Road
Milford, Connecticut 06460

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

At the request of VUICH ENVIRONMENTAL, a search of the environmental records covering the area detailed herein was conducted by Environmental Data Resources, Inc. (EDR). This report was derived from the results of such search, which, as conducted by EDR, met the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances were per ASTM standard or custom distances requested by the user.

NOTE: ALL MAPS AND TEXT INCLUDED HEREIN MAY HAVE BEEN MODIFIED BY VUICH ENVIRONMENTAL BASED ON SITE VISITS, INDEPENDENT DATA VERIFICATION AND/OR OTHER ACTIONS TAKEN OR DECISIONS MADE BY VUICH ENVIRONMENTAL. EDR HAS NOT TAKEN ANY ACTION TO VERIFY ANY OF SUCH MODIFICATIONS, AND THIS REPORT AND THE FINDINGS SET FORTH HEREIN MUST BE READ IN LIGHT OF THIS FACT. VUICH ENVIRONMENTAL SHOULD BE CONTACTED FOR INFORMATION CONCERNING ALL SUCH MODIFICATIONS.

TARGET PROPERTY INFORMATION

ADDRESS

CORNER OF HONOAPIILANI HWY
WAILUKU, HI 96793

COORDINATES

Latitude (North):	20.866600 - 20° 52' 7.0"
Longitude (West):	156.503100 - 156° 30' 11.2"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	769792.1
UTM Y (Meters):	2309466.5
Elevation:	381 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	20156-G5 LAHAINA, HI
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No sites were found in an online review and analysis by VUICH ENVIRONMENTAL of EDR's search of available ("reasonably ascertainable") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System

CERC-NFRAP..... CERCLIS No Further Remedial Action Planned
CORRACTS..... Corrective Action Report
RCRIS-TSD..... Resource Conservation and Recovery Information System
RCRIS-LQG..... Resource Conservation and Recovery Information System
RCRIS-SQG..... Resource Conservation and Recovery Information System
ERNS..... Emergency Response Notification System

STATE ASTM STANDARD

SWF/LF..... Permitted Landfills in the State of Hawaii
LUST..... Leaking Underground Storage Tank Database
UST..... Underground Storage Tank Database
VCP..... Voluntary Response Program Sites

FEDERAL ASTM SUPPLEMENTAL

CONSENT..... Superfund (CERCLA) Consent Decrees
ROD..... Records Of Decision
Delisted NPL..... National Priority List Deletions
FINDS..... Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS..... Hazardous Materials Information Reporting System
MLTS..... Material Licensing Tracking System
MINES..... Mines Master Index File
NPL Liens..... Federal Superfund Liens
PADS..... PCB Activity Database System
FUDS..... Formerly Used Defense Sites
INDIAN RESERV..... Indian Reservations
US BROWNFIELDS..... A Listing of Brownfields Sites
DOD..... Department of Defense Sites
RAATS..... RCRA Administrative Action Tracking System
TRIS..... Toxic Chemical Release Inventory System
TSCA..... Toxic Substances Control Act
SSTS..... Section 7 Tracking Systems
FTTS INSP..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

SPILLS..... Release Notifications

EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas..... Former Manufactured Gas (Coal Gas) Sites

BROWNFIELDS DATABASES

US BROWNFIELDS..... A Listing of Brownfields Sites
BROWNFIELDS..... Brownfields Sites
VCP..... Voluntary Response Program Sites

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

EXECUTIVE SUMMARY

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STATE ASTM STANDARD

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

An online review and analysis by VUICH ENVIRONMENTAL of the SHWS list, as provided by EDR, and dated 07/12/2001 has revealed that there is 1 SHWS site within approximately 1 mile of the target property.

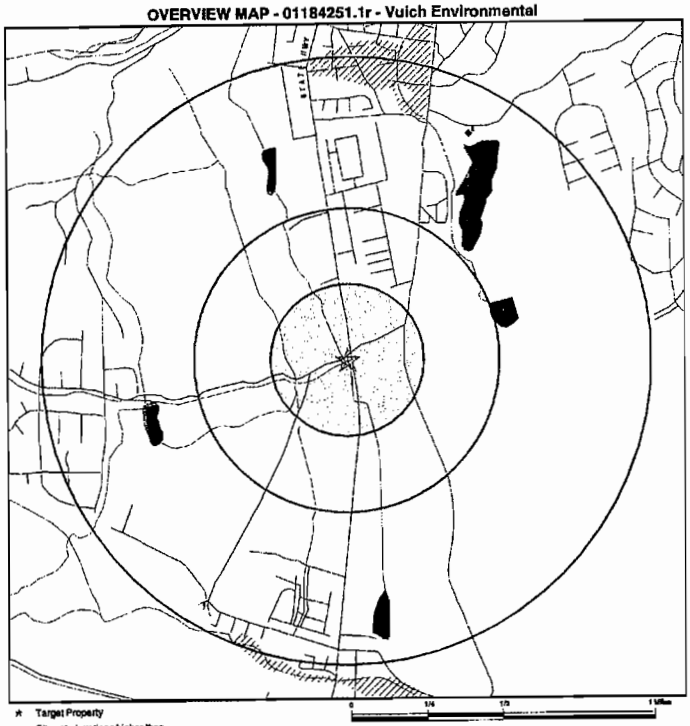
Lower Elevation	Address	Dist / Dir	Map ID	Page
WAIALE ASH PILE	WAIALE STREET	1/2 - 1 NNE	1	6

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

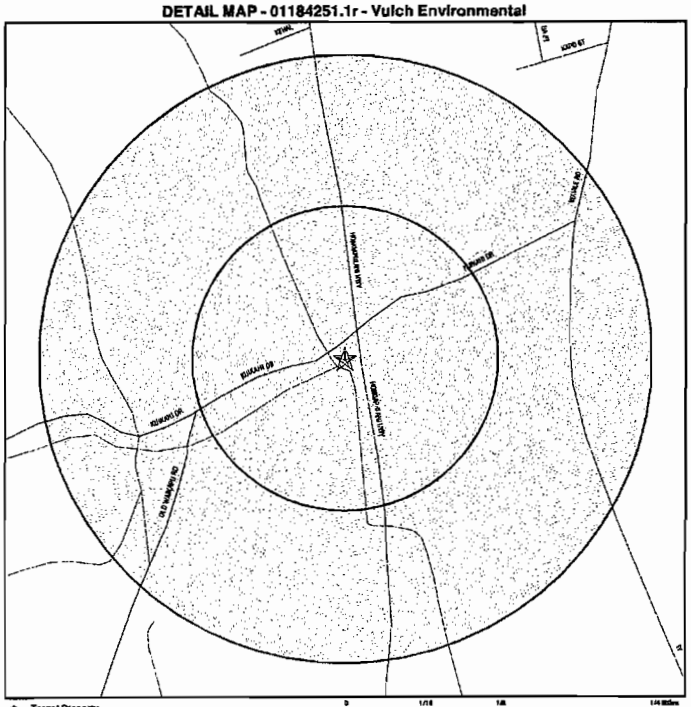
Site Name	Database(s)
SMILE'S AUTO SPECIALISTS	SHWS
KANAHA POND EAST	CERC-NFRAP, SHWS
RAINBOW HAULING	SHWS
E & E BLACK CONTRACTORS	SHWS
HOBRON AVENUE AREA	SHWS, SPILLS
MAUI PALMS HOTEL UST	SHWS
ALEXANDER AND BALDWIN DUMP SITE	SHWS
MAUI MEAT FACILITY-FORMER	SHWS
KALAMAULA LANDFILL	SHWS
KAHOOLAWE ISLAND	SHWS
BEN FRANKLIN STORES PROPERTY	SHWS
OLOWALU TRANSFER STATION	SHWS
PICRIC ACID AT MAUI COMMUNITY COLLE	SHWS
PICRIC ACID AT MAUI MEMORIAL HOSPIT	SHWS
MAALAEA	SWF/LF
KAKAMAULA LANDFILL	SWF/LF
KALUAKOI LANDFILL	SWF/LF
MAUNALOA LANDFILL	SWF/LF
CENTRAL MAUI LF, PHASE I&II LF-0034-95)	SWF/LF
DAVID PICO CESSPOOL DIGGING	LUST, UST
PAIA SEWER PUMP STATION	UST

OVERVIEW MAP - 01184251.1r - Vuich Environmental



TARGET PROPERTY:	Kulkahi Drive	CUSTOMER:	Vuich Environmental
ADDRESS:	Corner of Honoapiilani Hwy	CONTACT:	Massy Cashon
CITY/STATE/ZIP:	Wailuku HI 96793	INQUIRY #:	01184251.1r
LAT/LONG:	20.8586 / 156.5031	DATE:	May 04, 2004 9:24 am

DETAIL MAP - 01184251.1r - Vulch Environmental



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- 4 Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone

TARGET PROPERTY:	Kuikahi Drive	CUSTOMER:	Vulch Environmental
ADDRESS:	Corner of Honoapiilani Hwy	CONTACT:	Massy Cashen
CITY/STATE/ZIP:	Wailuku HI 96793	INQUIRY #:	01184251.1r
LAT/LONG:	20.8685 / 156.5031	DATE:	May 04, 2004 8:24 am

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
SHWS		1.000	0	0	0	1	NR	1
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
FUDS		1.000	0	0	0	0	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
SPILLS		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY HISTORICAL DATABASES								
Coal Gas		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
BROWNFIELDS DATABASES								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
BROWNFIELDS		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Distance (ft.) Elevation	Site	Database(s)	EDR ID Number EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

1
NNE
1/2-1
4459 ft.

WAIALE ASH PILE
WAIALE STREET
WAILUKU, HI

SHWS S104557531
N/A

Relative:
Lower

Actual:
251 ft.

SHWS:

File Section :	Central
Type :	Not reported
Department 1 :	Not reported
Department 2 :	Not reported
Department 3 :	Not reported
Table :	Sitelist
Island :	Maui
Zip :	Not reported
Discovery Assesment and Remediation :	5/14/99
Initial Site Screening Team Lead :	Laura Young
ISST Assigned :	3/9/00
ISST Date :	8/10/00
ISST Priority :	High
ISST Letter :	Not reported
Env Justice Eligible :	Not reported
Preliminary Assesment :	No
PA Lead :	Not reported
PA Date :	Not reported
PA Result :	Not reported
Site Investigation :	No
SI Lead :	Not reported
SI Date :	Not reported
SI Result :	Not reported
Remediation Action Planned :	Not reported
VRP :	Not reported
Brownfields :	Not reported
Agreement :	Not reported
Remedial Investigation :	Not reported
RAA :	Not reported
Response Action Memo :	Not reported
REM Lead :	Not reported
REM Date :	Not reported
REM Last Update :	6/14/00
Input By :	Bryce
Case :	Not reported
Fed Id :	Not reported
UST :	Not reported
Permits :	Not reported
RCRA :	Not reported
Program :	Not reported
Priority :	Not reported
Lat/Long :	Not reported
Cost :	Not reported
CU QNTY Site :	Not reported
Enforcement :	Not reported
CU Method :	Not reported
Ownership :	Not reported
Tax Map Key :	Not reported
Form :	Not reported

Map ID / Direction / Distance / Distance (ft.) / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
	WAIALE ASH PILE (Continued)		S104657531

EPCRA :	Not reported
EPCRA FIL :	Not reported
Pathways :	Not reported
Targets :	Not reported
Manager :	Not reported
REM Result :	Not reported
IdentFac :	Not reported
Site Code :	Not reported
Event :	Not reported
Event Type :	Not reported
Notes :	Not reported
Site :	Not reported
Site_ :	Not reported
Operator :	Not reported
Current :	Not reported
Compounds :	Dioxins, heavy metals
Oname :	Not reported

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
KAHULUI	1000816953	SMILE'S AUTO SPECIALISTS	AMALA PLACE	96732	SHWS
KAHULUI	1001475719	KANAHA POND EAST	AMALA PLACE	96732	CERC-NFRAP, SHWS
KAHULUI	1000855952	RAINBOW HAULING	AMALA PL	96732	SHWS
KAHULUI	1000816952	E & E BLACK CONTRACTORS	AMALA PL	96732	SHWS
KAHULUI	S104534200	HOBRON AVENUE AREA	HOBRON AVE	96732	SHWS, SPILLS
KAHULUI	S104534290	MAUI PALMS HOTEL UST	150 KAAHUMANU AVE	96732	SHWS
KAHULUI	U001236769	DAVID PICO CESSPOOL DIGGING	OLD HALEAKALA HWY	96732	LUST, UST
KAHULUI	1001032388	ALEXANDER AND BALDWIN DUMP SITE	W PAPA AVE	96732	SHWS
KAHULUI	U003222223	PAIA SEWER PUMP STATION	PUNA RD/HANA HWY	96732	UST
KAHULUI	S104534289	MAUI MEAT FACILITY-FORMER	601 2ND ST	96732	SHWS
KALAMAULA	S104534228	KALAMAULA LANDFILL	SOUTH MOLOKAI, KALAMAULA	96793	SHWS
MAUI COUNTY	S106100522	MAALAEA	INTERSECTION OF KIHEI RD AND HONOAPIILANI HWY		SWF/LF
MAUI COUNTY	S104534222	KAHOOLAWE ISLAND	KAHOOLAWE ISLAND	96732	SHWS
MAUI COUNTY	S103763653	KAKAMAULA LANDFILL	KALAMAULA MOLOKAI		SWF/LF
MAUI COUNTY	S103763654	KALUAKOI LANDFILL	KALUAKOI ROAD MAUNALOA		SWF/LF
MAUI COUNTY	S104534094	BEN FRANKLIN STORES PROPERTY	KAUNAKAKAI, MOLOKAI		SHWS
MAUI COUNTY	S103763656	MAUNALOA LANDFILL	MAUNALOA MAUI		SWF/LF
MAUI COUNTY	S103763652	CENTRAL MAUI LF, PHASE I&II LF-0034-95)	PUNENE, MAUI		SWF/LF
OLOWALU	1000435092	OLOWALU TRANSFER STATION	OLOWALU	96793	SHWS
WAILUKU	S104657498	PICRIC ACID AT MAUI COMMUNITY COLLE	310 KAAHUMANU AVE	96793	SHWS
WAILUKU	S104657499	PICRIC ACID AT MAUI MEMORIAL HOSPIT	MAUI	96793	SHWS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/29/04
Date Made Active at EDR: 02/27/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 02/06/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 02/06/04

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone: 214-655-6659

EPA Region 6
Telephone: 303-312-6774

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 01/07/04
Date Made Active at EDR: 02/27/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 02/06/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 02/06/04

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 03/22/04

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 02/26/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 03/22/04
Elapsed ASTM days: 11
Date of Last EDR Contact: 03/22/04

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/15/04
Date Made Active at EDR: 04/16/04
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 03/25/04
Elapsed ASTM days: 21
Date of Last EDR Contact: 03/08/04

RCRIS: Resource Conservation and Recovery Information System
Source: EPA
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs): generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. Small quantity generators (SQGs): generate between 100 kg and 1,000 kg of hazardous waste per month. Large quantity generators (LQGs): generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month. Transporters are individuals or entities that move hazardous waste from the generator off-site to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/09/04
Date Made Active at EDR: 04/02/04
Database Release Frequency: Varies

Date of Data Arrival at EDR: 03/18/04
Elapsed ASTM days: 15
Date of Last EDR Contact: 04/20/04

ERNS: Emergency Response Notification System
Source: National Response Center, United States Coast Guard
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/03
Date Made Active at EDR: 03/12/04
Database Release Frequency: Annually

Date of Data Arrival at EDR: 01/26/04
Elapsed ASTM days: 46
Date of Last EDR Contact: 04/28/04

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/01/01
Database Release Frequency: Biennially

Date of Last EDR Contact: 03/16/04
Date of Next Scheduled EDR Contact: 06/14/04

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies

Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

APPENDIX G.

Traffic Impact Assessment Report

TRAFFIC IMPACT ANALYSIS REPORT FOR

PU`UNANI SUBDIVISION

IN MAUI, HAWAII

Prepared For

TOWNE DEVELOPMENT OF HAWAII, INC.,
ENDURANCE INVESTORS, LLC,
and
ASSOCIATION OF II WAI HUI LP
220 South King Street, Suite 2170
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Prepared By

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February 6, 2006
Revised December 3, 2008

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Phillip Rowell and Associates has been retained by Towne Development of Hawaii and Endurance Investors, LLC, to prepare a traffic impact analysis for a proposed residential development in the Waikapu area of Maui. The approximate location of this project on the Island of Maui is shown in Figure 1.

This introductory chapter discusses the location of the project, describes the proposed development, and the study methodology.

Purpose and Objectives of Study

1. Determine and describe the traffic characteristics of the proposed project.
2. Quantify and document the traffic related impacts of the proposed project.
3. Identify and evaluate traffic related improvements required to provide adequate access to and egress from the proposed project and to mitigate the project's traffic impacts.

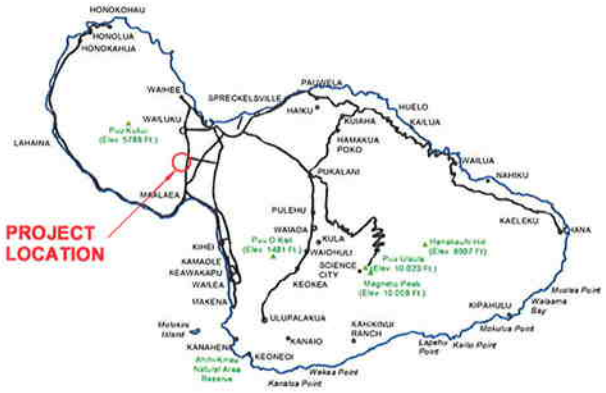


Figure 1
PROJECT LOCATION ON MAUI

Project Location and Description

A preliminary site plan of the project is shown as Appendix A. The following is a summary of the project:

1. The project is located along the west side of Honoapiilani Highway between Kuikahi Drive on the north, and the Waiolani Mauka Subdivision on the south.

2. The project will consist of 278 single family units, 476 multi family units, of which 200 will be senior housing units. For purposes of this traffic study, it was assumed that the multi-family units will be apartments as the trip generation rates for apartments are approximately 10% higher than condominiums.

3. Access will be via three driveways along the south side of Kuikahi Drive and one driveway along the west side of Honoapiilani Highway south of Kuikahi Drive.

Horizon Year

The design horizon year represents a date for which future background traffic projections were estimated. These projections include traffic generated by other planned projects within and adjacent to the study area and background traffic growth.

The year 2015 was used as the horizon year, even though scheduled completion may be earlier. This year was selected to be consistent with the traffic studies for the related projects in the area.

Study Methodology

The following is a summary list of the tasks performed:

1. The study area and the scope of work were defined using criteria established by the Institute of Transportation Engineers[1] for medium size developments. Medium size developments are projects that generate between 500 and 1000 peak hour trips. This was based on the results of a preliminary trip generation analysis that determined the proposed project will generate approximately 475 trips during the morning peak hour and 500 trips during the afternoon peak hour. See Table 1.

2. A site reconnaissance was performed to identify existing roadway cross-sections, intersection lane configurations, traffic control devices, and surrounding land uses.

3. Existing peak-hour traffic volumes for the study intersections were obtained and summarized. The traffic counts were performed during November 2007, after completion of the Waiale Road extension to East Waiko Road and the traffic signals at Pilikan Street and East Waiko Road.

4. Existing levels-of-service of the study intersections was determined using the methodology described in the *Highway Capacity Manual*.

5. A list of related development projects within and adjacent to the study area that will impact traffic conditions at the study intersections was compiled. This list included both development projects and anticipated highway improvement projects.

[1] Institute of Transportation Engineers, *Transportation and Land Development, Second Edition*, Washington, D.C., 2002, pages 3-1 thru 3-16.

6. Future background traffic volumes at the study intersections without traffic generated by the study project were estimated.

7. Peak hour traffic that the proposed project will generate was estimated using trip generation analysis procedures recommended by the Institute of Transportation Engineers.

8. A level-of-service analysis for future traffic conditions with traffic generated by the study project was performed.

9. The impacts of traffic generated by the proposed project at the study intersections was quantified and summarized.

10. Locations that project generated traffic significantly impacts traffic operating conditions were identified.

11. Recommendations, improvements or modifications necessary to mitigate the traffic impacts of the project and to provide adequate access to and egress from the site were formulated.

12. A report documenting the conclusions of the analyses performed and recommendations was prepared.

Table 1 Suggested Requirements for Various Types of Traffic Impact Analyses[2]

	Trip Generation Threshold			
	Access Location & Design Review	Small Development: Traffic Impact Assessment	Medium Development: Traffic Impact Statement	Large Development: Regional Traffic Analysis
	T ≤ 100 *Peak Hour Trips*	100 < T ≤ 500 *Peak Hour Trips*	500 < T ≤ 1000 *Peak Hour Trips*	T > 1000 *Peak Hour Trips*
Pre-application meeting or discussion	✔	✔	✔	✔
Analysis of Roadway Issues				
Existing condition analysis within study area	✔	✔	✔	✔
Sight distance evaluation	✔	✔	✔	✔
Nearby driveway locations	?	✔	✔	✔
Existing traffic conditions at nearby intersections and driveways		✔	✔	✔
Future road improvements		?	✔	✔
Crash experience in proximity to site	?	✔	✔	✔
Trip generation of adjacent development		?	✔	✔
Trip distribution analysis		✔	✔	✔
Background traffic growth		?	✔	✔
Future conditions analysis at nearby intersections		?	✔	✔
Mitigation identification and evaluation		?	?	✔
Site Issues				
Traffic generation	✔	✔	✔	✔
Traffic distribution	?	✔	✔	✔
Evaluate number, location & spacing of access points	?	✔	✔	✔
Evaluate access design, queuing, etc.	✔	✔	✔	✔
Evaluate site circulation	✔	✔	✔	✔
Other Analyses				
Gap analysis for unsignalized locations		?	?	✔
TSM/TDM Mitigation measures (car- or van-pooling, transit, etc.)- transit agency participation			?	✔
Effect on traffic signal progression, analysis of proposed signal locations			?	✔

Notes:
(1) Key: ✔ = required, ? = may be appropriate on a case-by-case basis
(2) Source: Institute of Transportation Engineers, *Transportation and Land Development*, Washington, D.C., 2002, p 3-6
(3) TSM/TDM = Transportation System Management/Transportation Demand Management
(4) A traffic signal should not be permitted

Study Area

The study area for this study is consistent with the study area for other traffic impact studies in Waikapu and Wailuku areas and recent direction from the County of Maui Department of Public Works. The study area is shown on Figure 2. The study intersections are listed in Table 2.

Table 2 Study Intersections and Right-of-Way Control

Number	Intersection	Right-of-Way Control	Jurisdiction
1	Honoapiilani Highway at East Waiko Road	Signalized	State
3	Honoapiilani Highway at Pilkana Street	Signalized	State
4	Honoapiilani Highway at Kuikahi Drive	Signalized	State
5	Waiale Road at East Waiko Road	Unsignalized	County
7	Waiale Road at Kuikahi Drive	Unsignalized	County
10	Waiale Road at Waiinu Road	Unsignalized	County

Order of Presentation

Chapter 2 describes existing traffic conditions, the Level-of-Service (LOS) concept and the results of the Level-of-Service analysis of existing conditions.

Chapter 3 describes the process used to estimate 2015 background traffic volumes and the resulting background traffic projections. Background conditions are defined as future background traffic conditions without traffic generation by the study project.

Chapter 4 describes the methodology used to estimate the traffic characteristics of the proposed project, including 2015 background plus project traffic projections.

Chapter 5 describes the traffic impacts of the proposed project, identifies potential mitigation measures and summarizes the traffic impact study.

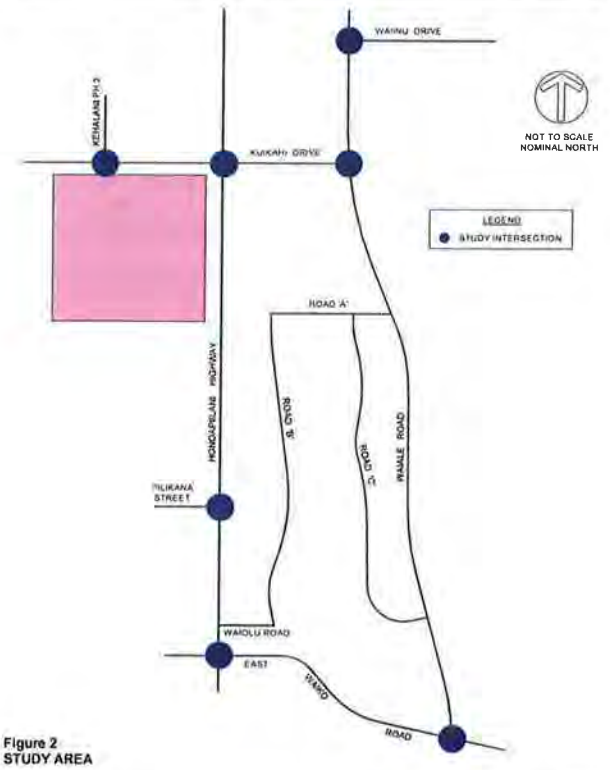


Figure 2
STUDY AREA

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the level-of-service analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Description of Existing Streets and Intersection Controls

The following is a summary of the major roadways in the study area:

Honoapiilani Highway

Honoapiilani Highway is a major State highway connecting Wailuku and Maalaea. In the vicinity of the proposed project, the highway is a two-lane, two-way facility with separate left turn lanes.

East Waiko Road

East Waiko Road is a two-lane, two-way roadway intersecting Honoapiilani Highway approximately one quarter mile south of Pilikana Street. East Waiko Road serves residential development along both sides of Honoapiilani Highway. The intersection of Honoapiilani Highway at East Waiko Road is unsignalized.

Figure 3 is a schematic indicating the lane configurations and right-of-way controls of the study intersections.

Existing Peak Hour Traffic Volumes

The existing peak hour traffic volumes are shown in Figures 4 and 5. The peak hour volumes were determined from traffic counts of the study intersections.

1. The traffic counts were performed during the first week of November, 2007. The counts were performed after Waiale Road was extended from Kuikahi Drive to East Waiko Road and the traffic signals were installed at East Waiko Road and Pilikana Street.
2. The morning counts were performed between 6:30 AM and 9:00 AM. The afternoon counts were performed between 3:30 PM and 6:00 PM.
3. The traffic counts include buses, trucks and other large vehicles. Mopeds and bicycles were not counted.
4. The traffic volumes shown are the peak hourly volume of each movement rather than the peak sum of all approach volumes.
5. The traffic volumes of adjacent intersections may not match the volumes shown for an adjacent intersection because the peak hours of the adjacent intersections may not coincide and there may driveways between the intersections.
6. All volumes are rounded to nearest five (5). For approaches with volumes less than five, a minimum volume of five is shown.
7. Pedestrian activity was negligible.

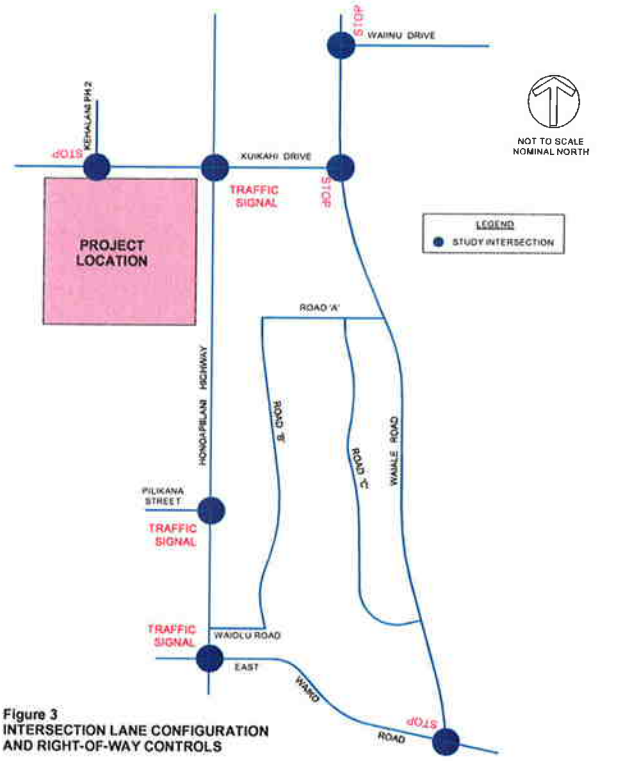


Figure 3
INTERSECTION LANE CONFIGURATION AND RIGHT-OF-WAY CONTROLS

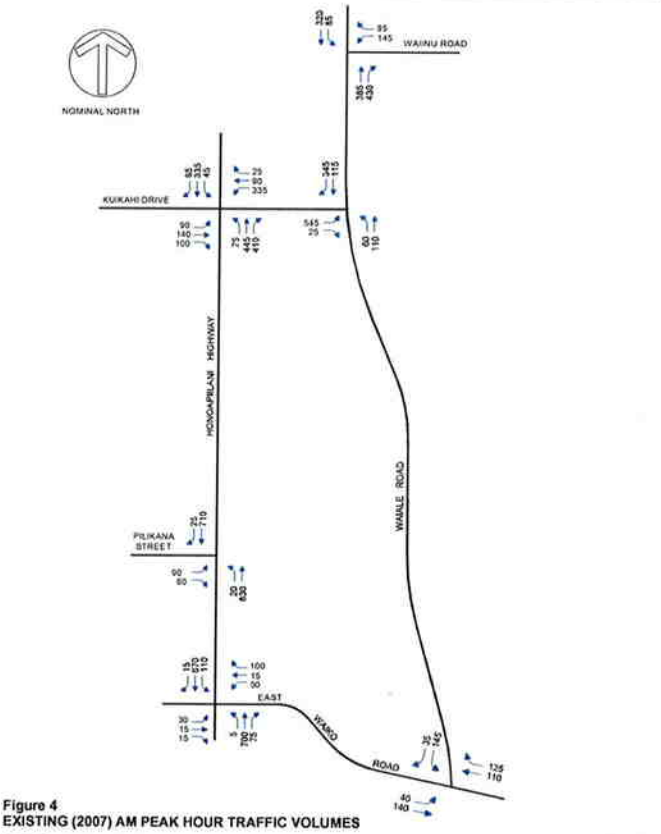


Figure 4
EXISTING (2007) AM PEAK HOUR TRAFFIC VOLUMES

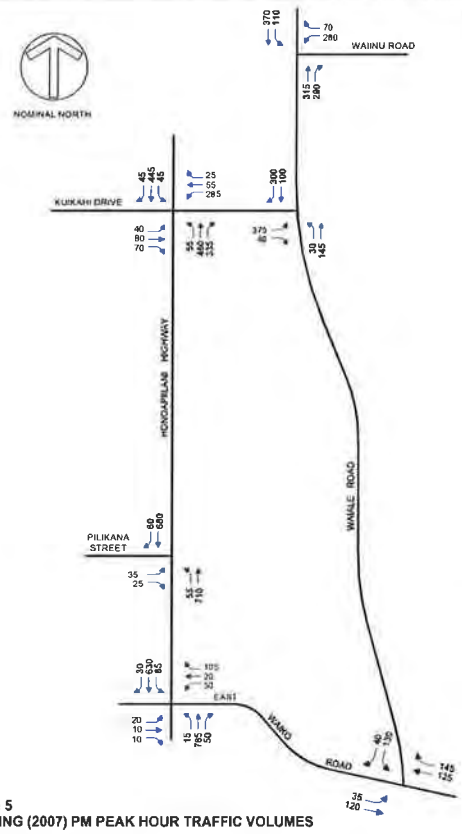


Figure 5
EXISTING (2007) PM PEAK HOUR TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

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

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively The characteristics of traffic operations for each level-of-service are summarized in Table 3 In general, Level-of-Service A represents free-flow conditions with no congestion Level-of-Service F, on the other hand, represents severe congestion with stop-and-go conditions Level-of-Service D is typically considered acceptable for peak hour conditions in urban areas

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

Table 3 Level-of-Service Definitions for Signalized Intersections[1]

Level of Service	Interpretation	Volume-to-Capacity Ratio[2]	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle	0.000-0 700	<20 0
C	Light congestion; occasional backups on critical approaches	0 701-0.800	20 1-35 0
D	Congestion on critical approaches but intersection functional Vehicles must wait through more than one cycle during short periods No long standing lines formed	0 801-0 900	35 1-55 0
E	Severe congestion with some standing lines on critical approaches Blockage of intersection may occur if signal does not provide protected turning movements	0 901-1 000	55 1-80 0
F	Total breakdown with stop-and-go operation	>1 001	>80 0

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

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 4 summarizes the definitions for level-of-service and the corresponding delay

Table 4 Level-of-Service Definitions for Unsignalized Intersections[1]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10 0
B	Short traffic delays	10 1 to 15 0
C	Average traffic delays	15 1 to 25 0
D	Long traffic delays	25 1 to 35 0
E	Very long traffic delays	35 1 to 50 0
F	See note (2) below	>50 1

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

Level-of-Service Analysis of Existing Conditions

Signalized Intersections

State Department of Transportation (Honolulu) requested the Synchro software package be used to performed level-of-service analyses The resulting levels-of-service of the signalized study intersection are summarized in Table 5 The results shown in the table are the volume-to-capacity ratios, delays and levels-of-service of all the controlled movements of the study intersection

Table 5 Existing (2007) Levels-of-Service - Signalized Intersections

Intersection and Movement	AM Peak Hour			PM Peak Hour		
	V/C[1]	Delay[2]	LOS[3]	V/C[1]	Delay[2]	LOS[3]
Honoapiilani Hwy. E. Waiko Rd.	***0.68***	***24.3***	***C***	***0.70***	***28.5***	***C***
Eastbound Left & Thru	0.51	64.2	E	0.31	64.6	E
Eastbound Right	0.01	57.0	E	0.01	61.1	E
Westbound Left, Thru & Right	0.85	95.7	F	0.94	120.4	F
Northbound Left	0.50	104.8	F	0.84	206.9	F
Northbound Thru & Right	0.60	11.0	B	0.62	10.1	B
Southbound Left	0.86	103.3	F	0.99	150.4	F
Southbound Thru	0.47	5.4	A	0.44	5.4	A
Southbound Right	0.01	2.7	A	0.02	2.9	A
Honoapiilani Hwy. at Pilikana St.	***0.55***	***11.7***	***B***	***0.48***	***8.8***	***A***
Eastbound Left	0.63	73.5	E	0.41	68.5	E
Eastbound Right	0.04	62.4	E	0.02	64.2	E
Northbound Left	0.72	134.5	F	0.67	85.4	F
Northbound Thru	0.55	4.1	A	0.45	2.2	A
Southbound Thru	0.40	5.3	A	0.47	4.9	A
Southbound Right	0.02	2.5	A	0.04	2.5	A
Honoapiilani Hwy. at Kuikahi Drive	***0.65***	***33.2***	***C***	***0.57***	***34.8***	***C***
Eastbound Left	0.61	52.2	D	0.48	55.0	D
Eastbound Thru	0.40	43.6	D	0.35	49.8	D
Eastbound Right	0.07	41.8	D	0.05	48.0	D
Westbound Left	0.80	46.2	D	0.92	74.1	E
Westbound Thru	0.10	28.6	C	0.08	35.5	D
Westbound Right	0.02	27.9	C	0.02	35.0	D
Northbound Left	0.65	57.8	E	0.47	52.0	D
Northbound Thru	0.56	23.3	C	0.47	16.4	B
Northbound Right	0.18	30.3	C	0.23	38.3	D
Southbound Left	0.34	49.3	D	0.27	51.0	D
Southbound Thru	0.45	23.0	C	0.47	17.6	B
Southbound Right	0.06	17.7	B	0.03	12.2	B

NOTES
1 V/C denotes ratio of volume to capacity
2 Delay is in seconds per vehicle
3 LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual LOS is based on delay

Unsignalized Intersections

The results of the Level-of-Service analysis of the unsignalized intersections are summarized in Table 6 Shown are the control delays and Levels-of-Service of each movement Volume-to-capacity ratios are not calculated for unsignalized intersections.

Table 6 Existing (2007) Levels-of-Service Analysis for Unsignalized Intersections[4]

Intersection and Movement	AM Peak Hour		PM Peak Hour	
	Delay [1]	LOS [2]	Delay [1]	LOS [2]
Waiale Road at East Waiko Road				
Eastbound Left & Thru	2.0	A	2.0	A
Southbound Left & Right	13.5	B	13.0	B
Waiale Road at Kuikahi Drive				
Eastbound Left & Right	28.5	D	11.6	B
Northbound Left & Thru	9.6	A	8.9	A
Southbound Thru & Right	9.9	A	8.5	A
Waiale Road at Wailinu Road				
Westbound Left	35.3	E	161.4	F
Westbound Right	11.5	B	10.7	B
Southbound Left	10.2	B	9.3	A

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. Level-of-Service is based on delay.
(3) The calculated delay exceeds 999.9 seconds, which is the maximum delay that the model will calculate.
(4) Delays and levels-of-service were not calculated as only two movements are allowed at the intersection.

Conclusions of the Level-of-Service Analysis

1 The intersection of Honoapiilani Highway at East Waiko Road will operate at Level-of-Service C during both the morning and afternoon peak hours The northbound and southbound through movements will operate Level-of-Service A or B, but the side street approaches and minor movements will operate as Level-of-Service E or F This is primarily a result of the long traffic signal cycle length

2 The intersection of Honoapiilani Highway at Pilikana Street will operate at Level-of-Service B during the morning peak hour and Level-of-Service A during the afternoon peak hour

3 At the intersection of Honoapiilani Highway at Kuikahi Drive, all traffic movements operate at Level-of-Service D, or better, except the northbound left during the morning peak hour and the westbound left during the afternoon peak hour, which will operate at Level-of-Service E The overall intersection operates at Level-of-Service C during both peak hours

4 At the intersection of Waiale Road at East Waiko Road, all controlled movements operate at Level-of-Service A or B

5 At the intersection of Waiale Road at Kuikahi Drive, all controlled movements operate at Level-of-Service D, or better

6 At the intersection of Waiale Road at Wailinu Road, the westbound left turn operates at Level-of-Service E during the morning peak hour and Level-of-Service F during the afternoon peak hour All the remaining controlled movements operate at Level-of-Service A or B

3. PROJECTED BACKGROUND TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 2015 background traffic conditions Background traffic conditions are defined as future traffic volumes without the proposed project

Future traffic growth consists of two components The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project

Background Traffic Growth

Data provided in the *Maui Long Range Land Transportation Study* was used to estimate the background growth rate of traffic along Honoapiilani Highway. The AM and PM peak hour traffic estimates for 1990 and 2020 provided in the report were used to calculate separate growth rates for northbound and southbound peak hour traffic This data and the calculations are shown in Table 7

Table 7 Calculation of Background Growth Rate Along Honoapiilani Highway[1]

Year	AM Peak Hour		PM Peak Hour	
	Northbound	Southbound	Northbound	Southbound
1990	903	691	810	1,217
2020	1,401	1,201	1,324	1,845
Growth Rate [2]	1.47%	1.86%	1.65%	1.40%

Notes
1 Source: Kaku & Associates *Maui Long Range Land Transportation Study*, February 1997, p. 66
2 Compounded growth rate

The higher growth rates for AM and PM peak hours were used to estimate the background growth of traffic along Honoapiilani Highway between 2007 and 2015. Therefore, 1.86% per year was used for the AM peak hour growth rate and 1.65% per year was used for the afternoon peak hour growth rate.

Related Projects

The second component in estimating future background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are likely to be constructed within or adjacent to the study project and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

The projects that were identified as related projects and the estimated number of peak hour trips generated by each are summarized in Table 8. The trip generation data was obtained from the traffic impact study for each project.

Table 8 Trip Generation Summary of Related Projects

		AM Peak Hour			PM Peak Hour		
	Related Project	In	Out	Total	In	Out	Total
A	Emmanuel Lutheran Church & School Project	255	215	470	150	165	315
B	Unnamed SF Project	10	20	30	25	15	40
C	Waiolani Mauka	30	85	115	90	55	145
D	Kehalani Phase 2	330	940	1,270	840	445	1,285
E	Not Used	0	0	0	0	0	0
F	Valley Isle Fellowship Church	0	0	0	0	0	0
G	Maui Lani	1,225	1,410	2,635	1,860	1,785	3,645
H	Maalaea Mauka	255	215	470	150	165	315
I	Kehalani Commercial	115	75	190	225	260	485
TOTALS		2,220	2,960	5,180	3,340	2,890	6,230

Notes:
(1) All numbers are rounded to nearest five (5).

There are two traffic signal projects. The intersections of Waiale Road at Kuikahi Drive and Waiale Road at Wainu Road will be signalized as part of the Maui Lane project when the warrants for a traffic signal are satisfied. The warrants are satisfied for the projected 2015 traffic volumes. Therefore, the traffic signal will be installed by 2015. Kuikahi Drive between Honoapiilani Highway at Waiale Road will be widened from two to four lanes to accommodate improvements associated with the traffic signals.

The approximate locations of the related projects are shown in Figure 6.

2015 Background Traffic Projections

2015 background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. The resulting 2015 background peak hour traffic volumes are shown in Figures 7 and 8.

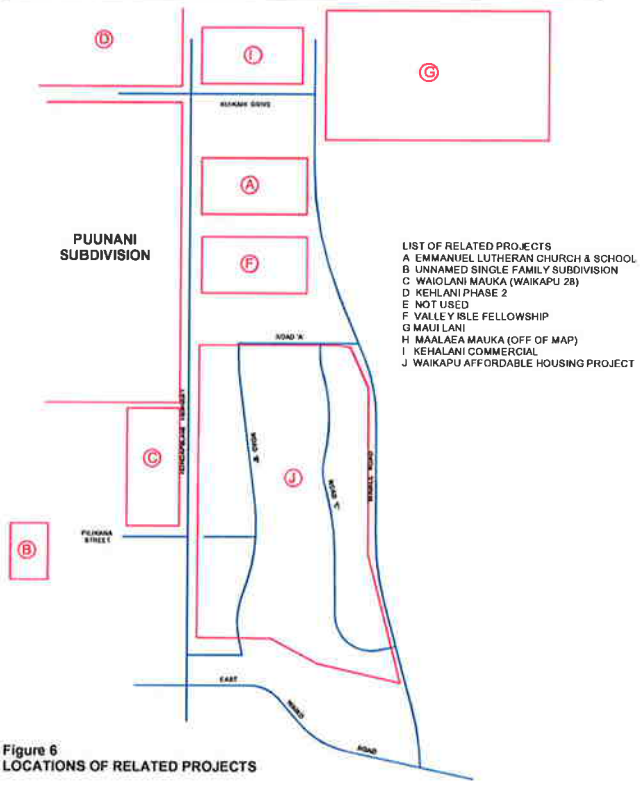


Figure 6
LOCATIONS OF RELATED PROJECTS

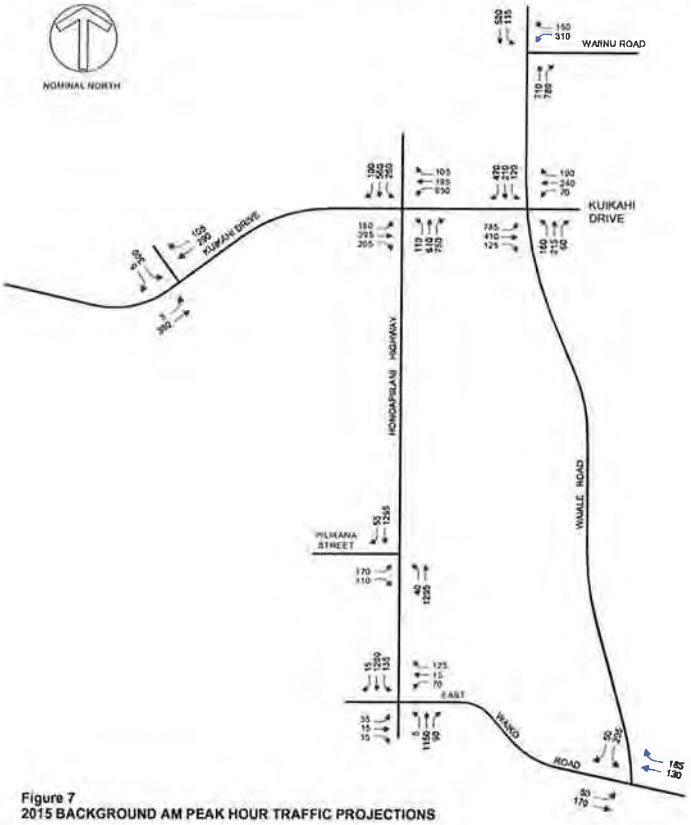


Figure 7
2015 BACKGROUND AM PEAK HOUR TRAFFIC PROJECTIONS

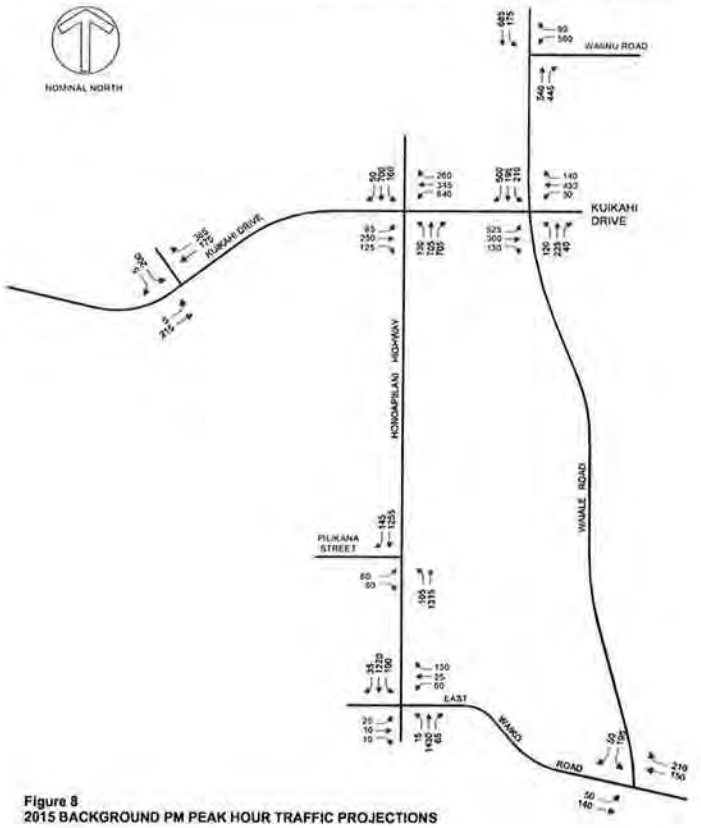


Figure 8
2015 BACKGROUND PM PEAK HOUR TRAFFIC PROJECTIONS

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter presents the generation, distribution and assignment of project generated traffic and the background plus project traffic projections. The result of the level-of-service analysis of background plus project conditions is presented in the following chapter

Project Trip Generation Calculations

Future traffic volumes generated by a proposed project are typically estimated using the procedures described in the *Trip Generation Handbook*,[2] published by the Institute of Transportation Engineers. This method uses trip generation rates to estimate the number of trips that a proposed project will generate during peak hours The standard reference for trip generation data is *Trip Generation*.[3]

The proposed project consists of 278 single family dwelling units and 476 multi-family dwelling units, of which 200 will be senior housing units. Trip generation data provided in *Trip Generation* for single-family detached housing and apartments, respectively, were used for the trip generation analysis. These rates are summarized in Table 9.

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

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

Table 9 Trip Generation Rates (1)

Land Use	Weekday Trips per Unit	AM Peak Hour			PM Peak Hour		
		Trips per Unit	% In	% Out	Trips per Unit	% In	% Out
Single Family Detached Housing	9.57	0.77	26%	74%	1.02	64%	36%
Apartments	6.72	0.55	29%	71%	0.67	61%	39%
Senior Housing Attached	3.48	0.08	45%	55%	0.11	61%	39%

Notes:
(1) Institute of Transportation Engineers, *Trip Generation, 7th Edition*, Washington, D.C., 2003

The project was divided into zones as shown in Figure 9. Trips were generated separately for each zone so that traffic assigned could be estimated for the driveways for each zone. The trip generation analysis for each zone and the total project is summarized in Table 10. The trips shown are the peak hourly trips generated by the project, which typically coincide with the peak hour of the adjacent street.

Table 10 Trip Generation Analysis

Zone	Number of Units			Total Weekday Trips	AM Peak Hour			PM Peak Hour		
	Single Family	Multi Family	Senior Housing		Total	In	Out	Total	In	Out
A	56			536	43	11	32	57	38	21
B			100	348	8	4	4	11	7	4
C			100	348	8	4	4	11	7	4
D	40			383	31	8	23	41	26	15
E	20			191	15	4	11	20	13	7
F	42			402	32	8	24	43	28	15
G		126		647	69	20	49	84	51	33
H	Community Park			0	0	0	0	0	0	0
I		150		1006	83	24	59	101	62	39
J-1	18			172	14	4	10	18	12	6
J-2	15			144	12	3	9	15	10	5
J-3	12			153	12	3	9	16	10	6
J-4	17			153	12	3	9	16	10	6
K	47			450	36	9	27	48	31	17
L	9			57	5	1	4	6	4	2
TOTALS	278	276	200	5192	360	106	274	487	307	180

Trip Distribution and Assignments

The project-related trips were distributed separately for each zone along the anticipated approach routes to and from the project site based on the directional distribution of existing peak hour traffic.

The project morning and afternoon peak hour trip assignments for the external roads are shown in **Figures 10 and 11**.

2015 Background Plus Project Projections

Background plus project traffic conditions are defined as 2015 background traffic conditions plus project related traffic. These projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the 2015 background peak hour traffic volumes presented in Chapter 3.

The traffic projections for 2015 background plus project conditions are shown on **Figures 12 and 13**. The traffic projection worksheets are presented as **Appendix B**.

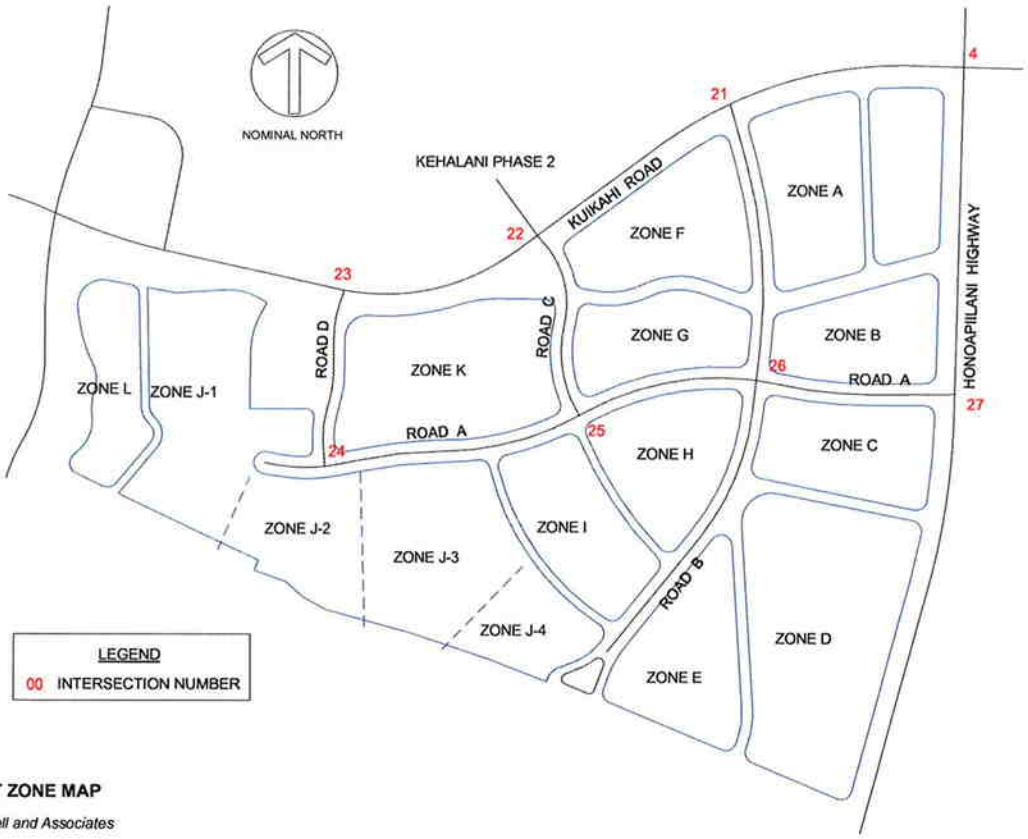


Figure 9
PROJECT ZONE MAP

Phillip Rowell and Associates

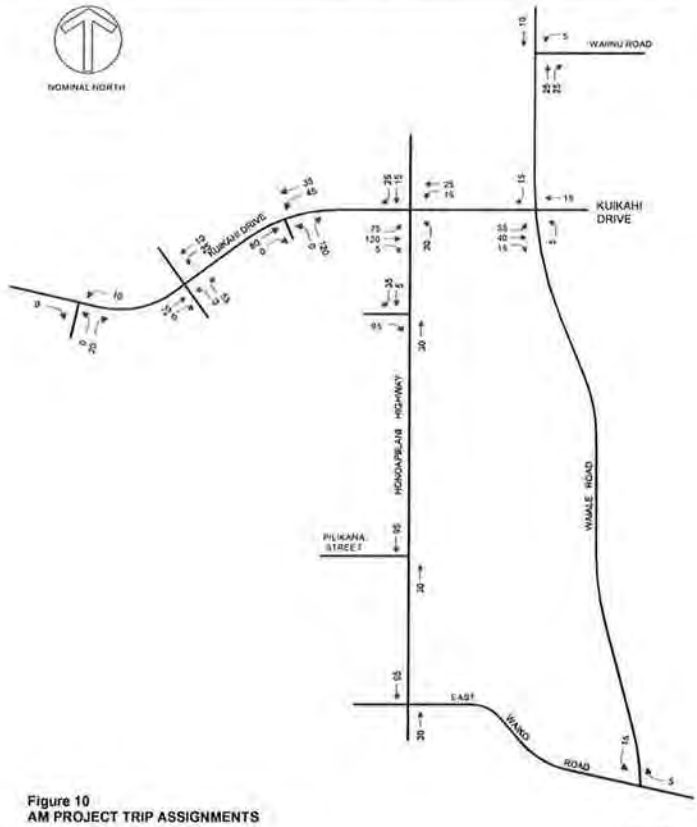


Figure 10
AM PROJECT TRIP ASSIGNMENTS

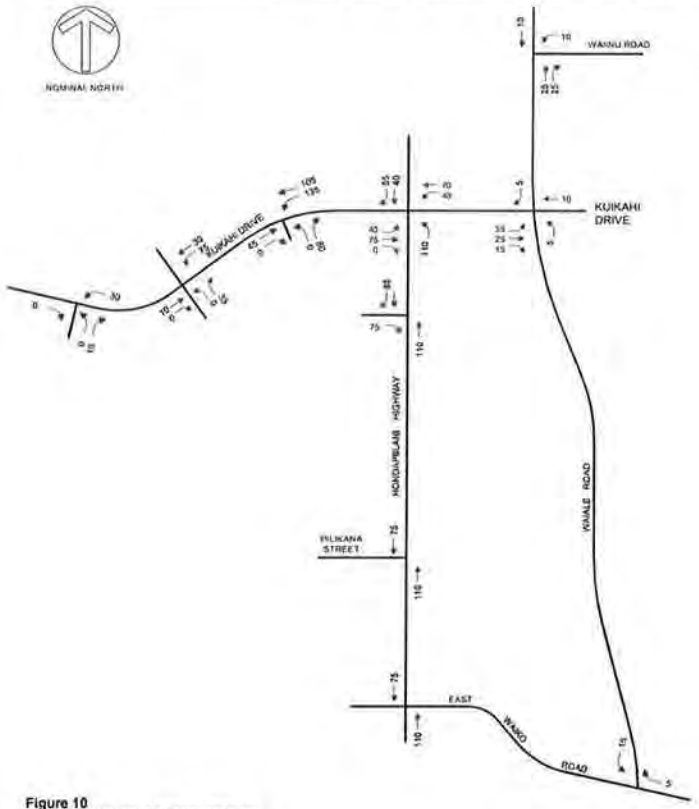


Figure 10
PM PROJECT TRIP ASSIGNMENTS

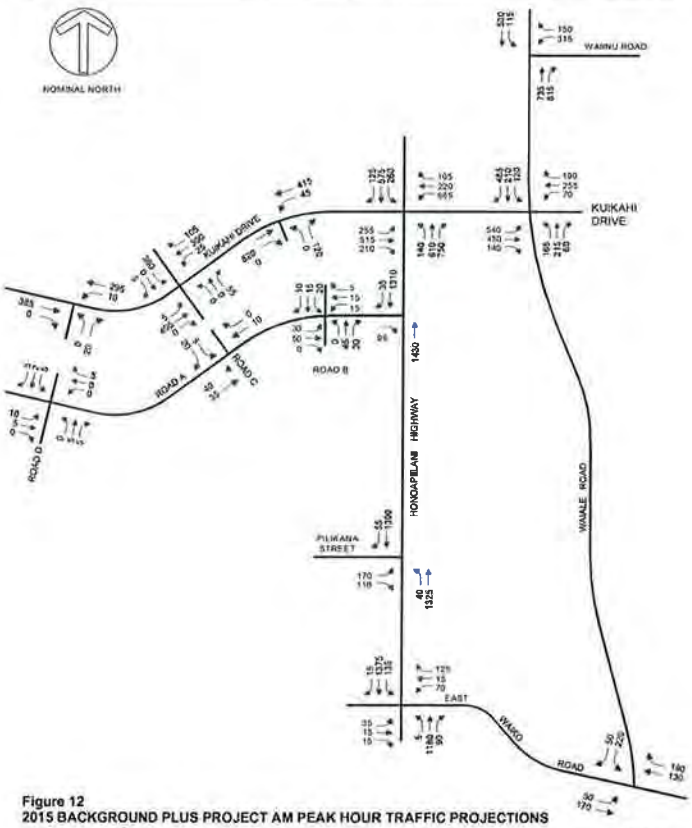


Figure 12
2015 BACKGROUND PLUS PROJECT AM PEAK HOUR TRAFFIC PROJECTIONS

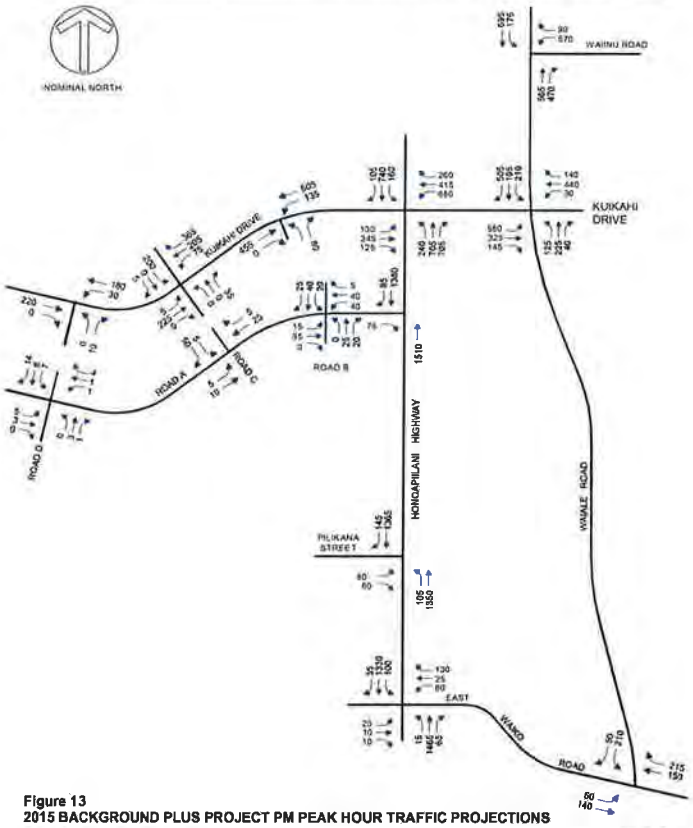


Figure 13
2015 BACKGROUND PLUS PROJECT PM PEAK HOUR TRAFFIC PROJECTIONS

5. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the results of the level-of-service analysis, which identifies the project-related impacts In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed

The impact of the project was assessed by analyzing the changes in traffic volumes and levels-of-service at the study intersections

Changes in Total Intersection Volumes

An analysis of the changes in traffic volumes at the study intersections is summarized in Table 11

An analysis of the project's pro rata share of the increase of traffic volumes between 2005 and 2015 is summarized in Table 12

Table 11 Analysis of Changes of Total Intersection Approach Volumes (1)

Intersection	Period	Existing	2015 Background	2015 Background Plus Project	Percent of 2015 Traffic From: Background Growth & Related Projects	Project
Honoapiilani Hwy at East Waiko Rd	AM	1800	2950	3080	37.3%	4.2%
	PM	1810	3125	3270	40.2%	4.4%
Honoapiilani Hwy at Pakana St	AM	1735	2965	3095	39.7%	4.2%
	PM	1565	2960	3105	44.9%	4.7%
Honoapiilani Hwy at Kuikahi Dr	AM	2175	4120	4425	44.0%	6.9%
	PM	1940	4155	4590	48.3%	8.5%
Waiale Rd at E Waiko Rd	AM	595	790	810	24.1%	2.5%
	PM	595	795	815	24.5%	2.5%
Waiale Rd at Kuikahi Dr	AM	1200	3055	3200	58.0%	4.5%
	PM	990	2845	2965	62.8%	4.0%
Waiale Rd at Wainu Rd	AM	1480	2585	2655	41.6%	2.6%
	PM	1435	2495	2570	41.2%	2.9%

Notes:
(1) Volumes shown are total intersection approach volumes or projections. All volumes are round to nearest five (5).

Table 12 Analysis of Growth of Total Intersection Approach Volumes (1)

Intersection	Period	Existing	2015 Background	2015 Background Plus Project	Background Growth (2) Volume	Background Growth (2) % of 2005 to 2010 Growth	Project Trips (3) Volume (4)	Project Trips (3) % of 2005 to 2010 Growth
Honoapiilani Hwy at East Waiko Rd	AM	1800	2950	3080	1150	89.8%	130	10.2%
	PM	1810	3125	3270	1315	90.1%	145	9.9%
Honoapiilani Hwy at Pakana St	AM	1735	2965	3095	1230	90.4%	130	9.6%
	PM	1565	2960	3105	1395	90.5%	145	9.4%
Honoapiilani Hwy at Kuikahi Dr	AM	2175	4120	4425	1945	86.4%	305	13.6%
	PM	1940	4155	4590	2215	83.6%	435	16.4%
Waiale Rd at E Waiko Rd	AM	595	790	810	195	90.7%	20	9.3%
	PM	595	795	815	200	90.9%	20	9.1%
Waiale Rd at Kuikahi Dr	AM	1200	3055	3200	1855	92.8%	145	7.3%
	PM	990	2845	2965	1855	93.9%	120	6.1%
Waiale Rd at Wainu Rd	AM	1480	2585	2655	1105	94.0%	70	6.0%
	PM	1435	2495	2570	1060	93.4%	75	6.6%

Notes
(1) Volumes shown are total intersection approach volumes or projections
(2) Background versus existing
(3) Background plus project versus background
(4) Project generated traffic

Methodology for Level-of-Service Analysis

1. As previously noted, State Department of Transportation (Honolulu) requested the Synchro software package be used to performed level-of-service analyses. Accordingly, Synchro 6 was used to estimate the levels-of-service

2. In the past, the LA Department of Transportation standard was used to determine the significance of the impacts of project generated traffic. SDOT has consistently responded that they prefer to use the engineering judgement and discretion of their staff to assess the traffic impacts of a project and the effectiveness of possible mitigation measures, along with the standards of the Institute of Transportation Engineers. Accordingly, we have used the Institute of Transportation Engineers standard that a Level-of-Service D is the minimum acceptable level-of-service and that the criteria is applicable to the overall intersection as well as the controlled lane group. If project generated traffic causes the level-of-service to drop below Level-of-Service D (Levels-of-Service E or F), then mitigation should be provided to improve the level-of-service to Level-of-Service D or better. If the Level-of-Service is E or F without project generated traffic and project generated traffic causes the delay of increase, then mitigation should be provided to improve the delay to be equal to or less than the delay for background without project conditions.

3. As the *Highway Capacity Manual* defines level-of-service by delay, we have used the same definition.

Level-of-Service Analysis for Signalized Intersections

The level-of-service analysis of the signalized intersections was performed for background and background plus project conditions and then compared. The incremental difference of the volume-to-capacity ratios between the two conditions is the impact of the project. The assumptions used for the level-of-service analysis are:

1. The existing intersection configurations will be maintained.

2. The intersections of Waiale Road at Kuikahi Drive and Waiale Road Wailnu Road will be signalized.

3. Kuikahi Drive between Honoapiilani Highway and Waiale Road will be widened from two to four lanes.

4. The intersection configurations used for the 2015 level-of-service analysis are shown in Figure 14. Kuikahi Drive between Honoapiilani Highway and the entrance to Kehalani Phase 2 is assumed to be four lanes wide. The roadway has already been widened along the north side of the road to accommodate two lanes in addition to the existing two lanes.

5. It was assumed that the intersections along Road A would be four-way STOP sign controlled intersections. This is recommended as a traffic calming measure to reduce vehicle speeds.

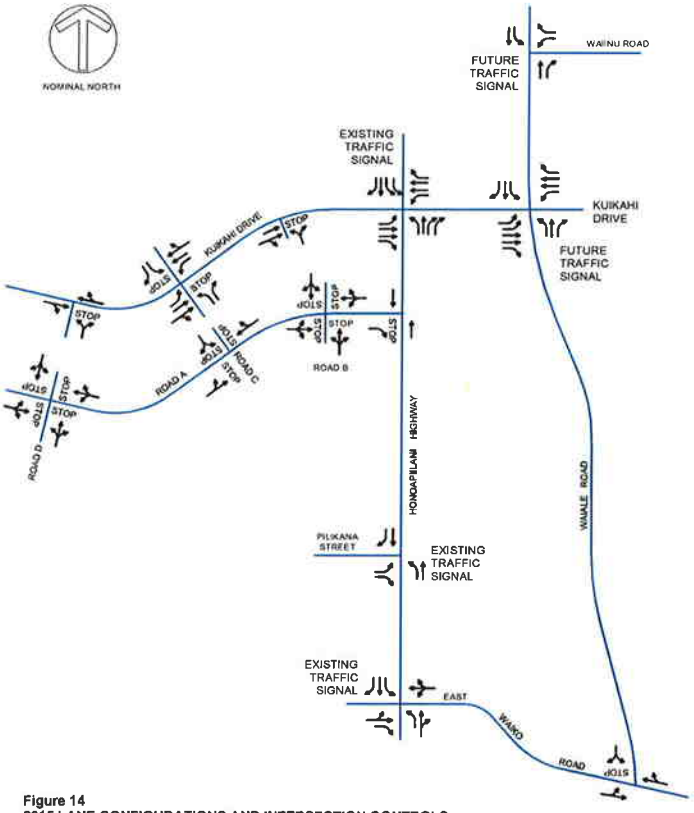


Figure 14
2015 LANE CONFIGURATIONS AND INTERSECTION CONTROLS

Signalized Intersections

The results of the level-of-service analysis of the signalized intersections are summarized in Table 13. The results for three intersections are shown. Shown are the volume-to-capacity ratios, average vehicle delays and levels-of-service. As previously noted, the intersections of Honoapiilani Highway at East Waiko Road and Honoapiilani Highway at Pilikana Street are signalized for 2010 background conditions. The intersection of Honoapiilani Highway at Kuikahi Drive is already signalized.

For all the signalized study intersections, all movements will operate at Level-of-Service D, or better. As Level-of-Service D is the minimum acceptable level-of-service, no mitigation of the signalized intersections is required.

Unsignalized Intersections

The results of the level-of-service analysis of the unsignalized intersections are summarized in Table 14. Shown are the average vehicle delays and levels-of-service of the controlled lane groups. Delays and levels-of-service are not calculated for the overall intersection of the uncontrolled movements of an unsignalized intersection.

With the exception of the intersection of Waiale Road at Kuikahi Drive, all controlled lane groups will operate a Level-of-Service C, or better, during all peak periods. At the intersection of Waiale Road at Kuikahi Drive, the eastbound to northbound left turn will operate at Level-of-Service F during both weekday peak periods, without and with the project. Mitigation will be required for this intersection to operate at an acceptable level-of-service.

Table 13 2015 Levels-of-Service - Signalized Intersections

Intersection, Approach and Movement	AM Peak Hour						PM Peak Hour					
	Without Project			With Project			Without Project			With Project		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Honoapiilani Hwy at Waiko Rd	***1.04***	***44.7***	***D***	***1.04***	***51.0***	***D***	***1.15***	***85.8***	***E***	***1.17***	***72.4***	***E***
Eastbound Left & Thru	0.52	64.9	E	0.52	64.9	E	0.39	60.3	E	0.39	60.3	E
Eastbound Right	0.01	56.6	E	0.01	56.6	E	0.01	61.1	E	0.01	61.1	E
Westbound Left, Thru & Right	1.11	105.1	F	1.11	105.1	F	1.18	197.1	F	1.18	197.1	F
Northbound Left	0.50	105.4	F	0.50	105.4	F	0.84	207.0	F	0.84	207.0	F
Northbound Thru & Right	0.07	37.2	D	1.00	42.9	D	1.11	78.7	E	1.14	89.2	F
Southbound Left	1.04	155.5	F	1.04	155.5	F	1.13	204.6	F	1.13	204.6	F
Southbound Thru	0.01	19.0	B	0.97	30.6	D	0.86	15.7	B	0.93	23.5	C
Southbound Right	0.01	2.9	A	0.01	2.9	A	0.02	3.0	A	0.02	3.0	A
Honoapiilani Hwy at Pilikana Rd	***0.94***	***28.1***	***C***	***1.00***	***35.0***	***D***	***0.89***	***24.1***	***C***	***0.98***	***31.8***	***C***
Eastbound Left	0.95	110.4	F	0.95	110.4	F	0.58	70.1	E	0.58	70.1	E
Eastbound Right	0.07	60.5	E	0.07	60.5	E	0.04	61.9	E	0.04	61.9	E
Northbound Left	0.89	164.0	F	0.89	164.0	F	1.02	150.8	F	1.02	159.8	F
Northbound Thru	0.87	14.1	B	0.89	15.7	B	0.88	11.8	B	0.88	13.2	B
Southbound Thru	0.93	24.5	C	1.00	38.9	D	0.92	23.4	C	1.00	39.2	D
Southbound Right	0.04	3.6	A	0.04	3.9	A	0.10	4.2	A	0.10	4.2	A
Honoapiilani Hwy at Kuikahi Dr	***1.04***	***79.5***	***E***	***1.08***	***88.5***	***F***	***1.08***	***135.2***	***F***	***1.22***	***149.6***	***F***
Eastbound Left	0.77	68.0	E	0.84	68.5	E	0.84	62.9	E	0.74	57.3	E
Eastbound Thru	0.83	65.4	E	1.05	106.3	F	0.61	51.9	D	0.77	56.0	E
Eastbound Right	0.28	50.3	D	0.30	50.2	D	0.08	46.3	D	0.06	46.1	D
Westbound Left	1.13	122.2	F	1.17	135.9	F	2.25	624.2	F	2.41	694.5	F
Westbound Thru	0.17	29.5	C	0.22	33.8	C	0.48	41.4	D	0.64	46.1	D
Westbound Right	0.07	28.6	C	0.07	32.2	C	0.17	38.3	D	0.20	40.6	D
Northbound Left	0.85	94.5	F	1.08	166.6	F	0.66	57.3	E	0.94	89.7	F
Northbound Thru	1.06	96.9	F	1.07	99.7	F	0.79	30.5	C	0.79	31.1	C
Northbound Right	0.44	33.3	C	0.44	33.7	C	0.88	64.6	E	0.88	65.8	E
Southbound Left	1.15	163.8	F	1.15	165.8	F	0.72	64.8	E	0.73	65.3	E
Southbound Thru	1.03	90.1	F	1.03	89.2	F	0.87	40.4	D	0.99	65.3	E
Southbound Right	0.11	31.6	C	0.13	32.3	C	0.04	17.9	B	0.10	21.1	C
Waiale Rd at Kuikahi Dr	***0.89***	***17.7***	***B***	***0.94***	***19.6***	***B***	***0.77***	***17.6***	***B***	***0.92***	***18.3***	***B***
Eastbound Left	0.88	22.0	C	0.93	29.2	C	0.73	15.7	B	0.81	19.0	C
Eastbound Thru	0.40	15.1	B	0.43	15.2	B	0.28	14.4	B	0.28	14.4	B
Eastbound Right	0.08	13.4	B	0.09	13.4	B	0.09	13.5	B	0.10	13.4	B
Westbound Left	0.26	16.8	B	0.29	16.7	B	0.11	10.2	B	0.11	10.1	B
Westbound Thru	0.36	19.0	B	0.37	18.9	B	0.51	19.9	B	0.52	19.8	B
Westbound Right	0.13	18.0	B	0.13	17.9	B	0.09	17.4	B	0.09	17.3	B
Northbound Left	0.40	13.3	B	0.42	13.7	B	0.29	13.8	B	0.30	14.2	B
Northbound Thru	0.41	17.4	B	0.41	17.7	B	0.42	18.1	B	0.43	18.4	B
Northbound Right	0.04	13.7	B	0.04	13.9	B	0.03	14.9	B	0.03	15.0	B
Southbound Left	0.31	12.6	B	0.31	12.8	B	0.53	15.2	B	0.54	15.4	B
Southbound Thru	0.40	17.3	B	0.40	17.5	B	0.35	17.5	B	0.35	17.6	B
Southbound Right	0.38	17.1	B	0.42	18.3	B	0.57	22.0	C	0.60	22.7	C
Waiale Rd at Wainu Rd	***0.76***	***11.3***	***B***	***0.78***	***11.9***	***B***	***0.84***	***20.2***	***C***	***0.89***	***21.7***	***C***
Westbound Left	0.76	27.0	C	0.77	27.9	C	0.86	29.0	C	0.89	34.2	D
Westbound Right	0.10	16.5	B	0.10	16.7	B	0.06	12.7	B	0.06	13.7	B
Northbound Thru	0.82	18.3	B	0.85	19.8	C	0.81	25.6	C	0.86	30.4	C
Northbound Right	0.52	1.2	A	0.54	1.3	A	0.30	0.5	A	0.31	0.5	A
Southbound Left	0.52	10.9	B	0.54	12.0	B	0.83	36.5	D	0.77	27.3	C
Southbound Thru	0.48	6.2	A	0.49	6.3	A	0.79	18.5	B	0.76	18.2	B

NOTES:
1 V/C denotes ratio of volume to capacity.
2 Delay is in seconds per vehicle.
3 LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. LOS is based on delay.

Table 14 2015 Levels-of-Service - Unsignalized Intersections[1]

	AM Peak Hour				PM Peak Hour			
	Without Project		With Project		Without Project		With Project	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS
Waiale Road at East Waiko Rd								
Eastbound Left & Thru	8.0	A	8.0	A	8.2	A	8.2	A
Southbound Left & Right	18.0	C	18.9	C	17.7	C	18.7	C
Kuikahi Rd at Road B								
Westbound Left	See Note 3		10.4	B	See Note 3		9.1	A
Northbound Left & Right			14.1	B			10.6	B
Kuikahi Rd at Kehalani Ph 2 & Road C								
Eastbound Left	8.1	A	8.2	A	8.0	A	8.7	A
Westbound Left			8.2	A			7.8	A
Northbound Left & Thru			0.0	A			0.0	A
Northbound Right			9.9	A			9.1	A
Southbound Left	41.5	E	133.1	F	17.1	C	39.0	E
Southbound Thru & Right	9.5	A	9.5	A	10.0	B	10.2	B
Kuikahi Rd at Road D								
Westbound Left	See Note 3		8.2	A	See Note 3		7.8	A
Northbound Left & Right			11.1	B			9.6	A

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. Level-of-Service is based on delay.
(3) Intersection does not exist until project is constructed.

Mitigation

1. Kuikahi Drive west of Honoapiilani Highway should be widened from two and four lanes. The intersection of Honoapiilani Highway at Kuikahi Drive would be modified to accommodate this widening and to provide separate left and right turn lanes along all four approaches.

2. Kuikahi Drive between Honoapiilani Highway and Waiale Road should be widened from two to four lanes. This widening is primarily to accommodate traffic generated for Maui Lani and Kehalani Commercial project that is to be located along the north side of Kuikahi Drive between Honoapiilani Highway and Waiale Road. Accordingly, this widening should not be the responsibility of Puunani.

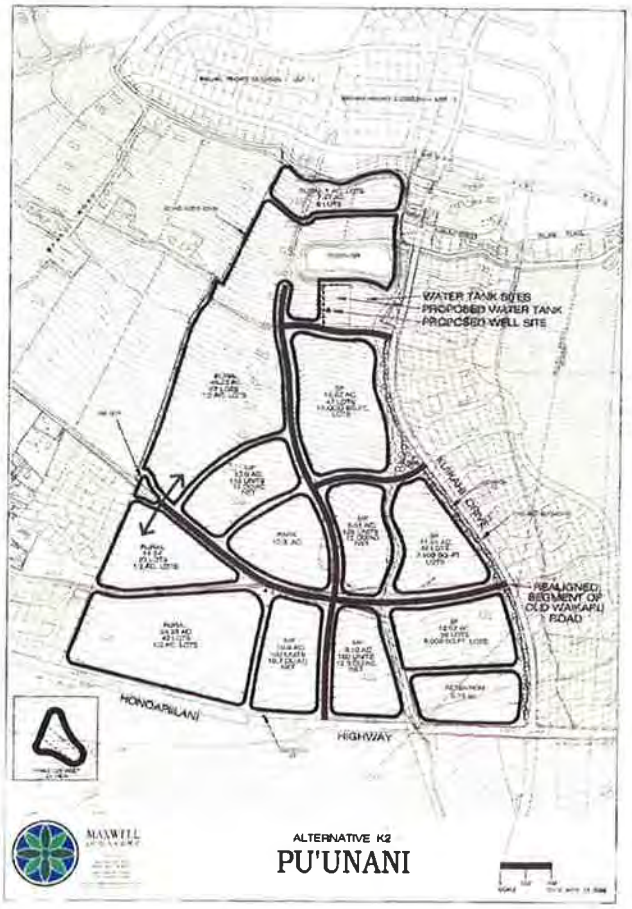
3. The primary reason for the low levels-of-service along Honoapiilani Highway is the heavy northbound and southbound through traffic and the heavy turning movements at the intersections for traffic to get to and from Waiale Road. A new connection between Wailae Road and Honoapiilani Highway in the vicinity of the Maui Tropical Plantation will divert a significant portion of this through traffic. This connection should be pursued jointly by the County of Maui and the developers of Maui Lani, Kehalani, Maalaea Mauka, Puunani and other developers with projects in the area.

4. The connection of Road C at Kuikahi Road should be removed so that the existing intersection configuration can be retained in order to mitigate the reduced level-of-service as a result of adding the northbound approach to the intersection. The traffic generated by Puunani can be accommodated by the adjacent intersections at acceptable levels-of-service.

5. The intersections along Road A should be all-way STOP sign controlled as a traffic calming measure.

APPENDIX A

SITE PLAN



APPENDIX B

TRAFFIC PROJECTION WORKSHEETS

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 3
INTERSECTION OF Honoepiilani Highway at Piikana Street

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT	25	60	5	10	25	75	55	145	0	0	55	145
2	TH	710	660	115	95	470	480	1295	1255	96	110	1391	1365
3	LT			0	0	0	0	0	0	0	0	0	0
4	E- RT			0	0	0	0	0	0	0	0	0	0
5	TH			0	0	0	0	0	0	0	0	0	0
6	LT			0	0	0	0	0	0	0	0	0	0
7	S- RT			0	0	0	0	0	0	0	0	0	0
8	TH	830	710	130	100	335	505	1295	1315	32	37	1327	1352
9	LT	20	55	5	10	15	40	40	105	0	0	40	105
10	W- RT	60	25	10	5	40	30	110	60	0	0	110	60
11	TH			0	0	0	0	0	0	0	0	0	0
12	LT	90	35	15	5	65	40	170	80	0	0	170	80
TOTAL		1735	1585	280	225	950	1170	2965	2960	128	147	3093	3107
Approach Totals													
From North		735	740	120	105	495	555	1350	1400	96	110	1446	1510
From East		0	0	0	0	0	0	0	0	0	0	0	0
From South		850	765	135	110	350	545	1335	1420	32	37	1367	1457
From West		150	80	25	10	105	70	280	140	0	0	280	140
Total		1735	1585	280	225	950	1170	2965	2960	128	147	3093	3107
Departure Totals													
To North		920	745	145	105	400	545	1465	1395	32	37	1497	1432
To East		0	0	0	0	0	0	0	0	0	0	0	0
To South		770	705	125	100	510	510	1405	1315	96	110	1501	1425
To West		45	115	10	20	40	115	95	250	0	0	95	250
Total		1735	1585	280	225	950	1170	2965	2960	128	147	3093	3107
Leg Totals													
North		1655	1485	265	210	895	1100	2815	2795	128	147	2943	2942
East		0	0	0	0	0	0	0	0	0	0	0	0
South		1620	1470	260	210	860	1055	2740	2735	128	147	2868	2882

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 4
INTERSECTION OF Honoapiilani Highway at Kuikahi Drive

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT	85	45	15	5	0	0	100	50	24	56	124	106
2	TH	335	445	55	60	170	195	560	700	14	41	574	741
3	LT	45	45	5	5	210	110	260	160	0	0	260	160
4	E- RT	25	25	5	5	75	230	105	260	0	0	105	260
5	TH	90	55	15	10	90	280	195	345	25	69	220	414
6	LT	335	285	55	40	260	315	650	640	13	42	663	682
7	S- RT	410	335	65	45	275	325	750	705	0	0	750	705
8	TH	445	460	70	65	95	180	610	705	0	0	610	705
9	LT	75	55	10	10	25	65	110	130	32	111	142	241
10	W- RT	100	70	15	10	90	45	205	125	5	0	210	125
11	TH	140	80	20	10	235	160	395	250	121	77	516	327
12	LT	90	40	15	5	75	40	180	85	73	38	253	123
TOTAL		2175	1940	345	270	1600	1945	4120	4155	307	434	4427	4589
Approach Totals													
From North		465	535	75	70	380	305	920	910	38	97	958	1007
From East		450	365	75	55	425	825	950	1245	38	111	988	1356
From South		930	850	145	120	395	570	1470	1540	32	111	1502	1651
From West		330	190	50	25	400	245	780	460	199	115	979	575
Total		2175	1940	345	270	1600	1945	4120	4155	307	434	4427	4589
Departure Totals													
To North		560	525	90	75	245	450	895	1050	73	38	968	1088
To East		595	460	90	60	720	595	1405	1115	121	77	1526	1192
To South		770	800	125	110	520	555	1415	1465	32	83	1447	1548
To West		250	155	40	25	115	345	405	525	81	236	486	761
Total		2175	1940	345	270	1600	1945	4120	4155	307	434	4427	4589
Leg Totals													
North		1025	1060	165	145	625	755	1815	1960	111	135	1926	2095
East		1045	825	165	115	1145	1420	2355	2360	159	188	2514	2548
South		1700	1650	270	230	915	1125	2885	3005	64	184	2949	3189

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 5
INTERSECTION OF Waiale Road at East Waiko Road

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT	35	40	5	5	10	5	50	50	0	0	50	50
2	TH			0	0	0	0	0	0	0	0	0	0
3	LT	145	130	25	20	35	45	205	195	14	14	219	209
4	E- RT	125	145	20	20	40	45	185	210	5	5	190	215
5	TH	110	125	15	15	5	10	130	150	0	0	130	150
6	LT			0	0	0	0	0	0	0	0	0	0
7	S- RT			0	0	0	0	0	0	0	0	0	0
8	TH			0	0	0	0	0	0	0	0	0	0
9	LT			0	0	0	0	0	0	0	0	0	0
10	W- RT			0	0	0	0	0	0	0	0	0	0
11	TH	140	120	20	15	10	5	170	140	0	0	170	140
12	LT	40	35	5	5	5	10	50	50	0	0	50	50
TOTAL		595	595	90	80	105	120	790	795	19	19	809	814
Approach Totals													
From North		180	170	30	25	45	50	255	245	14	14	269	259
From East		235	270	35	35	45	55	315	360	5	5	320	365
From South		0	0	0	0	0	0	0	0	0	0	0	0
From West		180	155	25	20	15	15	220	190	0	0	220	190
Total		595	595	90	80	105	120	790	795	19	19	809	814
Departure Totals													
To North		165	180	25	25	45	55	235	260	5	5	240	265
To East		285	250	45	35	45	50	375	335	14	14	389	349
To South		0	0	0	0	0	0	0	0	0	0	0	0
To West		145	165	20	20	15	15	180	200	0	0	180	200
Total		595	595	90	80	105	120	790	795	19	19	809	814
Leg Totals													
North		345	350	55	50	90	105	490	505	19	19	509	524
East		520	520	80	70	90	105	690	695	19	19	709	714
South		0	0	0	0	0	0	0	0	0	0	0	0

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdvision
December 2008

INTERSECTION NO 6
INTERSECTION OF Waiale Road at Kuikahi Drive

No	Approach & Mvt		Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N-	RT	345	300	55	40	70	160	470	500	16	7	486	507
2		TH	115	100	20	15	75	80	210	195	0	0	210	195
3		LT			0	0	120	210	120	210	0	0	120	210
4	E-	RT			0	0	190	140	190	140	0	0	190	140
5		TH			0	0	240	430	240	430	16	11	256	441
6		LT			0	0	70	30	70	30	0	0	70	30
7	S-	RT			0	0	60	40	60	40	0	0	60	40
8		TH	110	145	15	20	90	60	215	225	0	0	215	225
9		LT	60	30	10	5	90	85	160	120	5	5	165	125
10	W-	RT	25	40	5	5	95	85	125	130	14	14	139	144
11		TH			0	0	410	300	410	300	41	27	451	327
12		LT	545	375	85	50	155	100	785	525	55	55	840	580
TOTAL			1200	990	190	135	1665	1720	3055	2845	147	119	3202	2964
Approach Totals														
From North			460	400	75	55	265	450	800	905	16	7	816	912
From East			0	0	0	0	500	600	500	600	16	11	516	611
From South			170	175	25	25	240	185	435	385	5	5	440	390
From West			570	415	90	55	660	485	1320	955	110	96	1430	1051
Total			1200	990	190	135	1665	1720	3055	2845	147	119	3202	2964
Departure Totals														
To North			655	520	100	70	435	300	1190	890	55	55	1245	945
To East			0	0	0	0	590	550	590	550	41	27	631	577
To South			140	140	25	20	240	195	405	355	14	14	419	369
To West			405	330	65	45	400	675	870	1050	37	23	907	1073
Total			1200	990	190	135	1665	1720	3055	2845	147	119	3202	2964
Leg Totals														
North			1115	920	175	125	700	750	1990	1795	71	62	2061	1857
East			0	0	0	0	1090	1150	1090	1150	57	38	1147	1188
South			310	315	50	45	460	380	840	740	19	19	859	759

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdvision
December 2008

INTERSECTION NO 10
INTERSECTION OF Waiale Road at Wainu Road

No	Approach & Mvt		Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N-	RT			0	0	0	0	0	0	0	0	0	0
2		TH	320	370	50	50	150	265	520	685	11	11	531	696
3		LT	85	110	15	15	15	50	115	175	0	0	115	175
4	E-	RT	85	70	15	10	50	10	150	90	0	0	150	90
5		TH			0	0	0	0	0	0	0	0	0	0
6		LT	145	280	25	40	140	240	310	560	5	11	315	571
7	S-	RT	400	290	75	40	245	115	780	445	27	27	807	472
8		TH	385	315	60	45	265	180	710	540	27	27	737	567
9		LT			0	0	0	0	0	0	0	0	0	0
10	W-	RT			0	0	0	0	0	0	0	0	0	0
11		TH			0	0	0	0	0	0	0	0	0	0
12		LT			0	0	0	0	0	0	0	0	0	0
TOTAL			1480	1435	240	200	865	860	2585	2495	70	76	2655	2571
Approach Totals														
From North			405	480	65	65	165	315	635	860	11	11	646	871
From East			230	350	40	60	190	250	460	650	5	11	465	661
From South			845	605	135	85	510	295	1490	985	54	54	1544	1039
From West			0	0	0	0	0	0	0	0	0	0	0	0
Total			1480	1435	240	200	865	860	2585	2495	70	76	2655	2571
Departure Totals														
To North			470	385	75	55	315	190	860	630	27	27	887	657
To East			545	400	90	55	290	165	895	620	27	27	922	647
To South			465	650	75	90	290	505	830	1245	16	22	846	1267
To West			0	0	0	0	0	0	0	0	0	0	0	0
Total			1480	1435	240	200	865	860	2585	2495	70	76	2655	2571
Leg Totals														
North			875	865	140	120	480	505	1495	1490	38	38	1533	1528
East			775	750	130	105	450	415	1355	1270	32	38	1387	1308
South			1310	1255	210	175	800	800	2320	2230	70	76	2390	2306

TRAFFIC PROJECTIONS WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 21
INTERSECTION OF Kuikahi Drive at Road B

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	0	0	0	0
4	E- RT			0	0			0	0	0	0	0	0
5	TH	250	155	40	20	90	325	380	500	35	107	415	607
6	LT			0	0			0	0	44	136	44	136
7	S- RT			0	0			0	0	119	80	119	80
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH	330	190	50	25	360	195	740	410	80	47	820	457
12	LT			0	0			0	0	0	0	0	0
TOTAL		580	345	90	45	450	520	1120	910	278	370	1398	1280
Approach Totals													
From North		0	0	0	0	0	0	0	0	0	0	0	0
From East		250	155	40	20	90	325	380	500	79	243	459	743
From South		0	0	0	0	0	0	0	0	119	80	119	80
From West		330	190	50	25	360	195	740	410	80	47	820	457
Total		580	345	90	45	450	520	1120	910	278	370	1398	1280
Departure Totals													
To North		0	0	0	0	0	0	0	0	0	0	0	0
To East		330	190	50	25	360	195	740	410	199	127	939	537
To South		0	0	0	0	0	0	0	0	44	136	44	136
To West		250	155	40	20	90	325	380	500	35	107	415	607
Total		580	345	90	45	450	520	1120	910	278	370	1398	1280
Leg Totals													
North		0	0	0	0	0	0	0	0	0	0	0	0
East		580	345	90	45	450	520	1120	910	278	370	1398	1280
South		0	0	0	0	0	0	0	0	163	216	163	216

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 22
INTERSECTION OF Kuikahi Drive at Road C

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0	5	5	5	5	0	0	5	5
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0	360	200	360	200	0	0	360	200
4	E- RT			0	0	105	365	105	365	0	0	105	365
5	TH	250	155	40	20			290	175	10	32	300	207
6	LT			0	0			0	0	27	75	27	75
7	S- RT			0	0			0	0	57	34	57	34
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH	330	190	50	25			380	215	23	12	403	227
12	LT			0	0	5	5	5	5	0	0	5	5
TOTAL		580	345	90	45	475	575	1145	965	117	153	1262	1118
Approach Totals													
From North		0	0	0	0	365	205	365	205	0	0	365	205
From East		250	155	40	20	105	365	395	540	37	107	432	647
From South		0	0	0	0	0	0	0	0	57	34	57	34
From West		330	190	50	25	5	5	385	220	23	12	408	232
Total		580	345	90	45	475	575	1145	965	117	153	1262	1118
Departure Totals													
To North		0	0	0	0	110	370	110	370	0	0	110	370
To East		330	190	50	25	360	200	740	415	80	46	820	461
To South		0	0	0	0	0	0	0	0	27	75	27	75
To West		250	155	40	20	5	5	295	190	10	32	305	212
Total		580	345	90	45	475	575	1145	965	117	153	1262	1118

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 23
INTERSECTION OF Kuikahi Drive at Road D

No	Approach & Mvt	Existing AM	Existing PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	0	0	0	0
4	E- RT			0	0			0	0	0	0	0	0
5	TH	250	155	40	20	5	5	295	180	0	0	295	180
6	LT			0	0			0	0	10	32	10	32
7	S- RT			0	0			0	0	22	12	22	12
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH	330	190	50	25	5	5	385	220	0	0	385	220
12	LT			0	0			0	0	0	0	0	0
TOTAL		580	345	90	45	10	10	680	400	32	44	712	444
Approach Totals													
From North		0	0	0	0	0	0	0	0	0	0	0	0
From East		250	155	40	20	5	5	295	180	10	32	305	212
From South		0	0	0	0	0	0	0	0	22	12	22	12
From West		330	190	50	25	5	5	385	220	0	0	385	220
Total		580	345	90	45	10	10	680	400	32	44	712	444
Departure Totals													
To North		0	0	0	0	0	0	0	0	0	0	0	0
To East		330	190	50	25	5	5	385	220	22	12	407	232
To South		0	0	0	0	0	0	0	0	10	32	10	32
To West		250	155	40	20	5	5	295	180	0	0	295	180
Total		580	345	90	45	10	10	680	400	32	44	712	444
Leg Totals													
North		0	0	0	0	0	0	0	0	0	0	0	0
East		580	345	90	45	10	10	680	400	32	44	712	444
South		0	0	0	0	0	0	0	0	32	44	32	44

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 24
INTERSECTION OF Road A at Road D

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	4	14	4	14
2	TH			0	0			0	0	2	8	2	8
3	LT			0	0			0	0	3	7	3	7
4	E- RT			0	0			0	0	7	4	7	4
5	TH			0	0			0	0	1	2	1	2
6	LT			0	0			0	0	1	2	1	2
7	S- RT			0	0			0	0	4	2	4	2
8	TH			0	0			0	0	6	3	6	3
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	5	3	5	3
12	LT			0	0			0	0	10	5	10	5
TOTAL		0	0	0	0	0	0	0	0	43	50	43	50
Approach Totals													
From North		0	0	0	0	0	0	0	0	9	29	9	29
From East		0	0	0	0	0	0	0	0	9	8	9	8
From South		0	0	0	0	0	0	0	0	10	5	10	5
From West		0	0	0	0	0	0	0	0	15	8	15	8
Total		0	0	0	0	0	0	0	0	43	50	43	50
Departure Totals													
To North		0	0	0	0	0	0	0	0	23	12	23	12
To East		0	0	0	0	0	0	0	0	12	12	12	12
To South		0	0	0	0	0	0	0	0	3	10	3	10
To West		0	0	0	0	0	0	0	0	5	16	5	16
Total		0	0	0	0	0	0	0	0	43	50	43	50
Leg Totals													
North		0	0	0	0	0	0	0	0	32	41	32	41
East		0	0	0	0	0	0	0	0	21	20	21	20
South		0	0	0	0	0	0	0	0	13	15	13	15

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 25
INTERSECTION OF Road A at Road C

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	19	52	19	52
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	5	3	5	3
4	E- RT			0	0			0	0	1	3	1	3
5	TH			0	0			0	0	9	23	9	23
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	33	12	33	12
12	LT			0	0			0	0	39	7	39	7
TOTAL		0	0	0	0	0	0	0	0	106	100	106	100
Approach Totals													
From North		0	0	0	0	0	0	0	0	24	55	24	55
From East		0	0	0	0	0	0	0	0	10	26	10	26
From South		0	0	0	0	0	0	0	0	0	0	0	0
From West		0	0	0	0	0	0	0	0	72	******	72	******
Total		0	0	0	0	0	0	0	0	106	******	106	******
Departure Totals													
To North		0	0	0	0	0	0	0	0	40	10	40	10
To East		0	0	0	0	0	0	0	0	38	******	38	******
To South		0	0	0	0	0	0	0	0	0	0	0	0
To West		0	0	0	0	0	0	0	0	28	75	28	75
Total		0	0	0	0	0	0	0	0	106	******	106	******
Leg Totals													
North		0	0	0	0	0	0	0	0	64	65	64	65
East		0	0	0	0	0	0	0	0	48	******	48	******
South		0	0	0	0	0	0	0	0	0	0	0	0

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 26
INTERSECTION OF Road A at Road B

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	8	23	8	23
2	TH			0	0			0	0	13	42	13	42
3	LT			0	0			0	0	18	21	18	21
4	E- RT			0	0			0	0	6	4	6	4
5	TH			0	0			0	0	16	38	16	38
6	LT			0	0			0	0	14	40	14	40
7	S- RT			0	0			0	0	30	21	30	21
8	TH			0	0			0	0	43	27	43	27
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	49	37	49	37
12	LT			0	0			0	0	28	17	28	17
TOTAL		0	0	0	0	0	0	0	0	225	270	225	270
Approach Totals													
From North		0	0	0	0	0	0	0	0	39	86	39	86
From East		0	0	0	0	0	0	0	0	36	82	36	82
From South		0	0	0	0	0	0	0	0	73	48	73	48
From West		0	0	0	0	0	0	0	0	77	54	77	54
Total		0	0	0	0	0	0	0	0	225	270	225	270
Departure Totals													
To North		0	0	0	0	0	0	0	0	77	48	77	48
To East		0	0	0	0	0	0	0	0	97	79	97	79
To South		0	0	0	0	0	0	0	0	27	82	27	82
To West		0	0	0	0	0	0	0	0	24	61	24	61
Total		0	0	0	0	0	0	0	0	225	270	225	270
Leg Totals													
North		0	0	0	0	0	0	0	0	116	134	116	134
East		0	0	0	0	0	0	0	0	133	161	133	161
South		0	0	0	0	0	0	0	0	100	130	100	130

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 27
INTERSECTION OF Honoapiilani Highway at Road A

No	Approach & Mvt		Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N-	RT			0	0			0	0	33	88	33	88
2		TH	735	740	115	105	455	535	1305	1380	5	0	1310	1380
3		LT			0	0			0	0	0	0	0	0
4	E-	RT			0	0			0	0	0	0	0	0
5		TH			0	0			0	0	0	0	0	0
6		LT			0	0			0	0	0	0	0	0
7	S-	RT			0	0			0	0	0	0	0	0
8		TH	920	745	145	105	335	545	1400	1395	32	117	1432	1512
9		LT			0	0			0	0	0	0	0	0
10	W-	RT			0	0			0	0	95	76	95	76
11		TH			0	0			0	0	0	0	0	0
12		LT			0	0			0	0	0	0	0	0
TOTAL			1655	1485	260	210	790	1080	2705	2775	165	279	2870	3054
Approach Totals														
From North			735	740	115	105	455	535	1305	1380	38	88	1343	1468
From East			0	0	0	0	0	0	0	0	0	0	0	0
From South			920	745	145	105	335	545	1400	1395	32	117	1432	1512
From West			0	0	0	0	0	0	0	0	95	76	95	76
Total			1655	1485	260	210	790	1080	2705	2775	165	279	2870	3054
Departure Totals														
To North			920	745	145	105	335	545	1400	1395	32	117	1432	1512
To East			0	0	0	0	0	0	0	0	0	0	0	0
To South			735	740	115	105	455	535	1305	1380	100	76	1405	1456
To West			0	0	0	0	0	0	0	0	33	86	33	86
Total			1655	1485	260	210	790	1080	2705	2775	165	279	2870	3054
Leg Totals														
North			1655	1485	260	210	790	1080	2705	2775	70	203	2775	2978
East			0	0	0	0	0	0	0	0	0	0	0	0
South			1655	1485	260	210	790	1080	2705	2775	132	193	2837	2968

7

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 31
INTERSECTION OF Road B at Zone A & Zone B

No	Approach & Mvt		Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N-	RT			0	0			0	0	8	28	8	28
2		TH			0	0			0	0	25	72	25	72
3		LT			0	0			0	0	11	36	11	36
4	E-	RT			0	0			0	0	26	13	26	13
5		TH			0	0			0	0	0	0	0	0
6		LT			0	0			0	0	6	8	6	8
7	S-	RT			0	0			0	0	0	0	0	0
8		TH			0	0			0	0	77	48	77	48
9		LT			0	0			0	0	0	0	0	0
10	W-	RT			0	0			0	0	8	6	8	6
11		TH			0	0			0	0	0	0	0	0
12		LT			0	0			0	0	16	9	16	9
TOTAL			0	0	0	0	0	0	0	0	177	220	177	220
Approach Totals														
From North			0	0	0	0	0	0	0	0	44	136	44	136
From East			0	0	0	0	0	0	0	0	32	21	32	21
From South			0	0	0	0	0	0	0	0	77	48	77	48
From West			0	0	0	0	0	0	0	0	24	15	24	15
Total			0	0	0	0	0	0	0	0	177	220	177	220
Departure Totals														
To North			0	0	0	0	0	0	0	0	110	70	110	70
To East			0	0	0	0	0	0	0	0	11	36	11	36
To South			0	0	0	0	0	0	0	0	39	86	39	86
To West			0	0	0	0	0	0	0	0	8	28	8	28
Total			0	0	0	0	0	0	0	0	177	220	177	220
Leg Totals														
North			0	0	0	0	0	0	0	0	163	206	163	206
East			0	0	0	0	0	0	0	0	43	57	43	57
South			0	0	0	0	0	0	0	0	116	134	116	134

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 32
INTERSECTION OF Road B at Zone D & Zone H

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	18	55	18	55
3	LT			0	0			0	0	8	26	8	26
4	E- RT			0	0			0	0	23	15	23	15
5	TH			0	0			0	0	0	0	0	0
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	50	33	50	33
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	0	0	0	0
12	LT			0	0			0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	99	129	99	129
Approach Totals													
From North		0	0	0	0	0	0	0	0	26	81	26	81
From East		0	0	0	0	0	0	0	0	23	15	23	15
From South		0	0	0	0	0	0	0	0	50	33	50	33
From West		0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0	99	129	99	129
Departure Totals													
To North		0	0	0	0	0	0	0	0	73	48	73	48
To East		0	0	0	0	0	0	0	0	8	26	8	26
To South		0	0	0	0	0	0	0	0	18	55	18	55
To West		0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0	99	129	99	129
Leg Totals													
North		0	0	0	0	0	0	0	0	99	129	99	129
East		0	0	0	0	0	0	0	0	31	41	31	41
South		0	0	0	0	0	0	0	0	68	88	68	88

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 33
INTERSECTION OF Road B at Zone E & Zone I

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	8	22	8	22
2	TH			0	0			0	0	6	20	6	20
3	LT			0	0			0	0	4	13	4	13
4	E- RT			0	0			0	0	11	7	11	7
5	TH			0	0			0	0	0	0	0	0
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	18	12	18	12
12	LT			0	0			0	0	21	14	21	14
TOTAL		0	0	0	0	0	0	0	0	68	88	68	88
Approach Totals													
From North		0	0	0	0	0	0	0	0	18	55	18	55
From East		0	0	0	0	0	0	0	0	11	7	11	7
From South		0	0	0	0	0	0	0	0	0	0	0	0
From West		0	0	0	0	0	0	0	0	39	26	39	26
Total		0	0	0	0	0	0	0	0	68	88	68	88
Departure Totals													
To North		0	0	0	0	0	0	0	0	32	21	32	21
To East		0	0	0	0	0	0	0	0	22	25	22	25
To South		0	0	0	0	0	0	0	0	6	20	6	20
To West		0	0	0	0	0	0	0	0	8	22	8	22
Total		0	0	0	0	0	0	0	0	68	88	68	88
Leg Totals													
North		0	0	0	0	0	0	0	0	50	76	50	76
East		0	0	0	0	0	0	0	0	33	32	33	32
South		0	0	0	0	0	0	0	0	6	20	6	20

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 34
INTERSECTION OF Road B at Zone J-4

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	6	20	6	20
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	0	0	0	0
4	E- RT			0	0			0	0	0	0	0	0
5	TH			0	0			0	0	0	0	0	0
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	0	0	0	0
12	LT			0	0			0	0	18	12	18	12
TOTAL		0	0	0	0	0	0	0	0	24	32	24	32
Approach Totals													
From North		0	0	0	0	0	0	0	0	6	20	6	20
From East		0	0	0	0	0	0	0	0	0	0	0	0
From South		0	0	0	0	0	0	0	0	0	0	0	0
From West		0	0	0	0	0	0	0	0	18	12	18	12
Total		0	0	0	0	0	0	0	0	24	32	24	32
Departure Totals													
To North		0	0	0	0	0	0	0	0	18	12	18	12
To East		0	0	0	0	0	0	0	0	0	0	0	0
To South		0	0	0	0	0	0	0	0	0	0	0	0
To West		0	0	0	0	0	0	0	0	6	20	6	20
Total		0	0	0	0	0	0	0	0	24	32	24	32
Leg Totals													
North		0	0	0	0	0	0	0	0	24	32	24	32
East		0	0	0	0	0	0	0	0	0	0	0	0
South		0	0	0	0	0	0	0	0	0	0	0	0

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 35
INTERSECTION OF Road A at Zone B & Zone C

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	3	2	3	2
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	1	2	1	2
4	E- RT			0	0			0	0	1	2	1	2
5	TH			0	0			0	0	29	79	29	79
6	LT			0	0			0	0	3	5	3	5
7	S- RT			0	0			0	0	1	2	1	2
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	3	2	3	2
10	W- RT			0	0			0	0	1	2	1	2
11	TH			0	0			0	0	93	72	93	72
12	LT			0	0			0	0	3	5	3	5
TOTAL		0	0	0	0	0	0	0	0	138	173	138	173
Approach Totals													
From North		0	0	0	0	0	0	0	0	4	4	4	4
From East		0	0	0	0	0	0	0	0	33	86	33	86
From South		0	0	0	0	0	0	0	0	4	4	4	4
From West		0	0	0	0	0	0	0	0	97	79	97	79
Total		0	0	0	0	0	0	0	0	138	173	138	173
Departure Totals													
To North		0	0	0	0	0	0	0	0	4	7	4	7
To East		0	0	0	0	0	0	0	0	95	76	95	76
To South		0	0	0	0	0	0	0	0	4	7	4	7
To West		0	0	0	0	0	0	0	0	35	83	35	83
Total		0	0	0	0	0	0	0	0	138	173	138	173
Leg Totals													
North		0	0	0	0	0	0	0	0	8	11	8	11
East		0	0	0	0	0	0	0	0	128	162	128	162
South		0	0	0	0	0	0	0	0	8	11	8	11

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2005

INTERSECTION NO 36
INTERSECTION OF Road A at Zone G & Zone H

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	16	41	16	41
4	E- RT			0	0			0	0	34	25	34	25
5	TH			0	0			0	0	10	26	10	26
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	38	28	38	28
12	LT			0	0			0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	98	120	98	120
Approach Totals													
From North		0	0	0	0	0	0	0	0	16	41	16	41
From East		0	0	0	0	0	0	0	0	44	51	44	51
From South		0	0	0	0	0	0	0	0	0	0	0	0
From West		0	0	0	0	0	0	0	0	38	28	38	28
Total		0	0	0	0	0	0	0	0	98	120	98	120
Departure Totals													
To North		0	0	0	0	0	0	0	0	34	25	34	25
To East		0	0	0	0	0	0	0	0	54	69	54	69
To South		0	0	0	0	0	0	0	0	0	0	0	0
To West		0	0	0	0	0	0	0	0	10	26	10	26
Total		0	0	0	0	0	0	0	0	98	120	98	120
Leg Totals													
North		0	0	0	0	0	0	0	0	50	66	50	66
East		0	0	0	0	0	0	0	0	98	120	98	120
South		0	0	0	0	0	0	0	0	0	0	0	0

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2005

INTERSECTION NO 37
INTERSECTION OF Road A at Zone I & Zone K

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	0	0	0	0
4	E- RT			0	0			0	0	0	0	0	0
5	TH			0	0			0	0	8	20	8	20
6	LT			0	0			0	0	16	43	16	43
7	S- RT			0	0			0	0	38	25	38	25
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	25	16	25	16
12	LT			0	0			0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	87	104	87	104
Approach Totals													
From North		0	0	0	0	0	0	0	0	0	0	0	0
From East		0	0	0	0	0	0	0	0	24	63	24	63
From South		0	0	0	0	0	0	0	0	38	25	38	25
From West		0	0	0	0	0	0	0	0	25	16	25	16
Total		0	0	0	0	0	0	0	0	87	104	87	104
Departure Totals													
To North		0	0	0	0	0	0	0	0	0	0	0	0
To East		0	0	0	0	0	0	0	0	63	41	63	41
To South		0	0	0	0	0	0	0	0	16	43	16	43
To West		0	0	0	0	0	0	0	0	8	20	8	20
Total		0	0	0	0	0	0	0	0	87	104	87	104
Leg Totals													
North		0	0	0	0	0	0	0	0	0	0	0	0
East		0	0	0	0	0	0	0	0	87	104	87	104
South		0	0	0	0	0	0	0	0	54	68	54	68

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 36
INTERSECTION OF Road A at Zone K & Zone J-3

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	0	0	0	0
3	LT			0	0			0	0	8	5	8	5
4	E- RT			0	0			0	0	3	9	3	9
5	TH			0	0			0	0	3	7	3	7
6	LT			0	0			0	0	4	16	4	16
7	S- RT			0	0			0	0	14	10	14	10
8	TH			0	0			0	0	0	0	0	0
9	LT			0	0			0	0	4	2	4	2
10	W- RT			0	0			0	0	2	4	2	4
11	TH			0	0			0	0	11	7	11	7
12	LT			0	0			0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	49	60	49	60
Approach Totals													
From North		0	0	0	0	0	0	0	0	8	5	8	5
From East		0	0	0	0	0	0	0	0	10	32	10	32
From South		0	0	0	0	0	0	0	0	18	12	18	12
From West		0	0	0	0	0	0	0	0	13	11	13	11
Total		0	0	0	0	0	0	0	0	49	60	49	60
Departure Totals													
To North		0	0	0	0	0	0	0	0	3	9	3	9
To East		0	0	0	0	0	0	0	0	33	22	33	22
To South		0	0	0	0	0	0	0	0	6	20	6	20
To West		0	0	0	0	0	0	0	0	7	9	7	9
Total		0	0	0	0	0	0	0	0	49	60	49	60
Leg Totals													
North		0	0	0	0	0	0	0	0	11	14	11	14
East		0	0	0	0	0	0	0	0	43	54	43	54
South		0	0	0	0	0	0	0	0	24	32	24	32

TRAFFIC PROJECTION WORKSHEET

Pu'unani Subdivision
December 2008

INTERSECTION NO 39
INTERSECTION OF Road C at Zone G & Zone K

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	3	9	3	9
2	TH			0	0			0	0	19	52	19	52
3	LT			0	0			0	0	6	13	6	13
4	E- RT			0	0			0	0	10	7	10	7
5	TH			0	0			0	0	0	0	0	0
6	LT			0	0			0	0	0	0	0	0
7	S- RT			0	0			0	0	0	0	0	0
8	TH			0	0			0	0	39	27	39	27
9	LT			0	0			0	0	1	3	1	3
10	W- RT			0	0			0	0	5	3	5	3
11	TH			0	0			0	0	0	0	0	0
12	LT			0	0			0	0	8	5	8	5
TOTAL		0	0	0	0	0	0	0	0	91	119	91	119
Approach Totals													
From North		0	0	0	0	0	0	0	0	28	74	28	74
From East		0	0	0	0	0	0	0	0	10	7	10	7
From South		0	0	0	0	0	0	0	0	40	30	40	30
From West		0	0	0	0	0	0	0	0	13	8	13	8
Total		0	0	0	0	0	0	0	0	91	119	91	119
Departure Totals													
To North		0	0	0	0	0	0	0	0	57	39	57	39
To East		0	0	0	0	0	0	0	0	6	13	6	13
To South		0	0	0	0	0	0	0	0	24	55	24	55
To West		0	0	0	0	0	0	0	0	4	12	4	12
Total		0	0	0	0	0	0	0	0	91	119	91	119
Leg Totals													
North		0	0	0	0	0	0	0	0	85	113	85	113
East		0	0	0	0	0	0	0	0	16	20	16	20
South		0	0	0	0	0	0	0	0	64	85	64	85

TRAFFIC PROJECTION WORKSHEET
Pu'unani Subdivision
December 2008

INTERSECTION NO 40
INTERSECTION OF Road D at Zone K

No	Approach & Mvt	Total Project AM	Total Project PM	Background Growth AM	Background Growth PM	Related Proj Trips AM	Related Proj Trips PM	Background Trips AM	Background Trips PM	Project Trips AM	Project Trips PM	Bkgrd Plus Project Trips AM	Bkgrd Plus Project Trips PM
1	N- RT			0	0			0	0	0	0	0	0
2	TH			0	0			0	0	8	26	8	26
3	LT			0	0			0	0	1	6	1	6
4	E- RT			0	0			0	0	3	2	3	2
5	TH			0	0			0	0	0	0	0	0
6	LT			0	0			0	0	3	2	3	2
7	S- RT			0	0			0	0	1	3	1	3
8	TH			0	0			0	0	17	9	17	9
9	LT			0	0			0	0	0	0	0	0
10	W- RT			0	0			0	0	0	0	0	0
11	TH			0	0			0	0	3	1	3	1
12	LT			0	0			0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	36	49	36	49
Approach Totals													
From North		0	0	0	0	0	0	0	0	9	32	9	32
From East		0	0	0	0	0	0	0	0	0	4	0	4
From South		0	0	0	0	0	0	0	0	18	12	18	12
From West		0	0	0	0	0	0	0	0	3	1	3	1
Total		0	0	0	0	0	0	0	0	36	49	36	49
Departure Totals													
To North		0	0	0	0	0	0	0	0	20	11	20	11
To East		0	0	0	0	0	0	0	0	5	10	5	10
To South		0	0	0	0	0	0	0	0	11	28	11	28
To West		0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0	36	49	36	49
Leg Totals													
North		0	0	0	0	0	0	0	0	29	43	29	43
East		0	0	0	0	0	0	0	0	11	14	11	14
South		0	0	0	0	0	0	0	0	29	40	29	40

APPENDIX C

LEVEL-OF-SERVICE CALCULATIONS

LEVEL-OF-SERVICE CALCULATIONS FOR EXISTING CONDITIONS

HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1803	1583		1685		1770	1836		1770	1863	1583
Flt Permitted		0.49	1.00		0.88		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		907	1583		1506		1770	1836		1770	1863	1583
Volume (vph)	30	15	16	50	15	100	5	700	75	110	670	16
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	32	16	16	53	16	105	5	737	79	116	705	16
RTOR Reduction (vph)	0	0	14	0	39	0	0	3	0	0	0	3
Lane Group Flow (vph)	0	48	2	0	135	0	5	813	0	116	705	13
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		14.9	14.9		14.9		0.6	104.3		10.8	114.3	114.3
Effective Green, g (s)		14.9	14.9		14.9		0.8	104.3		10.8	114.3	114.3
Actuated g/C Ratio		0.10	0.10		0.10		0.01	0.73		0.08	0.80	0.80
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		95	166		158		10	1349		135	1500	1274
v/s Ratio Prot							0.00	c0.44		c0.07	0.38	
v/s Ratio Perm		0.05	0.01		c0.12							0.01
v/c Ratio		0.51	0.01		0.85		0.50	0.60		0.86	0.47	0.01
Uniform Delay, d1		60.1	56.9		62.5		70.4	9.0		64.8	4.3	2.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.2	0.0		33.2		34.4	2.0		38.5	1.1	0.0
Delay (s)		64.2	57.0		95.7		104.8	11.0		103.3	5.4	2.7
Level of Service		E	E		F		F	B		F	A	A
Approach Delay (s)		62.4			95.7			11.6			18.9	
Approach LOS		E			F			B			B	

Intersection Summary				
HCM Average Control Delay	24.3	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.68			
Actuated Cycle Length (s)	142.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
3: PILIKANA STREET & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	90	60	20	830	710	25
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	63	21	874	747	26
RTOR Reduction (vph)	0	58	0	0	0	5
Lane Group Flow (vph)	95	5	21	874	747	21
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.7	12.7	2.4	127.7	121.3	121.3
Effective Green, g (s)	12.7	12.7	2.4	127.7	121.3	121.3
Actuated g/C Ratio	0.09	0.09	0.02	0.86	0.82	0.82
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	151	135	29	1603	1523	1294
v/s Ratio Prot	c0.05		0.01	c0.47	0.40	
v/s Ratio Perm		0.04				0.02
v/c Ratio	0.63	0.04	0.72	0.55	0.49	0.02
Uniform Delay, d1	65.6	62.3	72.7	2.7	4.1	2.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.1	61.8	1.3	1.1	0.0
Delay (s)	73.5	62.4	134.5	4.1	5.3	2.5
Level of Service	E	E	F	A	A	A
Approach Delay (s)	69.1			7.1	5.2	
Approach LOS	E			A	A	

Intersection Summary				
HCM Average Control Delay	11.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	148.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	55.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: KUIKAHI DRIVE & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	90	140	100	335	90	25	75	445	410	45	335	95
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	147	105	353	95	26	79	468	432	47	353	89
RTOR Reduction (vph)	0	0	94	0	0	19	0	0	319	0	0	51
Lane Group Flow (vph)	95	147	11	353	95	7	79	468	113	47	353	38
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	9.0	10.6	10.6	25.6	27.2	27.2	7.1	46.3	25.6	4.2	43.4	43.4
Effective Green, g (s)	9.0	10.6	10.6	25.6	27.2	27.2	7.1	46.3	25.6	4.2	43.4	43.4
Actuated g/C Ratio	0.09	0.10	0.10	0.25	0.26	0.26	0.07	0.45	0.25	0.04	0.42	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	155	365	163	441	937	419	122	840	695	140	787	669
v/s Ratio Prot	0.05	0.04		c0.20	0.03		c0.04	c0.25	0.16	0.01	0.19	
v/s Ratio Perm			0.07			0.02						0.06
v/c Ratio	0.61	0.40	0.07	0.80	0.10	0.02	0.65	0.56	0.16	0.34	0.45	0.06
Uniform Delay, d1	45.2	43.1	41.6	36.2	28.5	27.9	46.6	20.7	30.2	47.9	21.1	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.0	0.7	0.2	10.0	0.0	0.0	11.2	2.7	0.1	1.4	1.8	0.2
Delay (s)	52.2	43.8	41.8	46.2	28.6	27.9	57.8	23.3	30.3	49.3	23.0	17.7
Level of Service	D	D	D	D	C	C	E	C	C	D	C	B
Approach Delay (s)		45.5			41.6			29.2			24.5	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM Average Control Delay	33.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	102.7	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	62.5%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	40	140	125	110	145	35
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	147	132	116	153	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	247				421	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	247				421	189
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				73	96
cM capacity (veh/h)	1318				570	852

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	189	247	189
Volume Left	42	0	153
Volume Right	0	118	37
cSH	1318	1700	610
Volume to Capacity	0.03	0.15	0.31
Queue Length (ft)	2	0	33
Control Delay (s)	2.0	0.0	13.5
Lane LOS	A		B
Approach Delay (s)	2.0	0.0	13.5
Approach LOS			B

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	545	25	60	110	115	345
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	574	26	63	116	121	363

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	574	26	63	116	121	363
Volume Left (vph)	574	0	63	0	0	0
Volume Right (vph)	0	26	0	0	0	363
Hadj (s)	0.5	-0.7	0.5	0.0	0.0	-0.7
Departure Headway (s)	6.9	5.7	7.7	7.2	6.8	6.1
Degree Utilization, x	1.09	0.04	0.13	0.23	0.23	0.61
Capacity (veh/h)	522	614	457	489	521	587
Control Delay (s)	29.4	7.5	9.8	9.5	9.1	10.2
Approach Delay (s)	28.5		9.6		9.9	
Approach LOS	D		A		A	

Intersection Summary			
Delay	18.7		
HCM Level of Service	C		
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
10: WAIINU ROAD & WAIALE ROAD 12/12/2008

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	145	85	385	430	85	320
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	153	89	405	453	89	337
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	921	405			858	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	921	405			858	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	43	86			89	
cM capacity (veh/h)	266	646			783	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	153	89	405	453	89	337
Volume Left	153	0	0	0	89	0
Volume Right	0	89	0	453	0	0
cSH	266	646	1700	1700	783	1700
Volume to Capacity	0.57	0.14	0.24	0.27	0.11	0.20
Queue Length (ft)	82	12	0	0	10	0
Control Delay (s)	35.3	11.5	0.0	0.0	10.2	0.0
Lane LOS	E	B			B	
Approach Delay (s)	26.5		0.0		2.1	
Approach LOS	D					

Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	43.0%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1804	1583		1688		1770	1846		1770	1863	1583
Flt Permitted		0.54	1.00		0.89		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1000	1583		1527		1770	1846		1770	1863	1583
Volume (vph)	20	10	10	50	20	105	15	785	50	85	630	30
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	11	11	53	21	111	16	826	53	89	663	32
RTOR Reduction (vph)	0	0	10	0	36	0	0	1	0	0	0	6
Lane Group Flow (vph)	0	32	1	0	149	0	16	878	0	89	663	26
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		15.9	15.9		15.9		1.6	116.4		8.0	122.8	122.8
Effective Green, g (s)		15.9	15.9		15.9		1.6	116.4		8.0	122.8	122.8
Actuated g/C Ratio		0.10	0.10		0.10		0.01	0.76		0.05	0.81	0.81
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		104	165		159		19	1411		93	1502	1276
v/s Ratio Prot							0.01	c0.48		c0.05	0.36	
v/s Ratio Perm		0.03	0.01		c0.12							0.02
v/c Ratio		0.31	0.01		0.94		0.84	0.62		0.96	0.44	0.02
Uniform Delay, d1		63.1	61.1		67.7		75.2	8.1		72.0	4.4	2.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.7	0.0		52.7		131.7	2.1		78.4	0.9	0.0
Delay (s)		64.8	61.1		120.4		206.9	10.1		150.4	5.4	2.9
Level of Service		E	E		F		F	B		F	A	A
Approach Delay (s)		63.9			120.4			13.7			21.7	
Approach LOS		E			F			B			C	

Intersection Summary					
HCM Average Control Delay	28.5	HCM Level of Service		C	
HCM Volume to Capacity ratio	0.70				
Actuated Cycle Length (s)	152.3	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	76.0%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
3: PILIKANA STREET & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	35	25	55	710	680	60
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	26	58	747	716	63
RTOR Reduction (vph)	0	25	0	0	0	12
Lane Group Flow (vph)	37	1	58	747	716	51
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	7.2	7.2	6.9	127.0	116.1	116.1
Effective Green, g (s)	7.2	7.2	6.9	127.0	116.1	116.1
Actuated g/C Ratio	0.05	0.05	0.05	0.89	0.82	0.82
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	90	80	86	1664	1521	1292
v/s Ratio Prot	c0.02		c0.03	0.40	c0.38	
v/s Ratio Perm		0.02				0.04
v/c Ratio	0.41	0.02	0.67	0.45	0.47	0.04
Uniform Delay, d1	65.4	64.1	66.5	1.4	3.9	2.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.1	18.9	0.9	1.0	0.1
Delay (s)	68.5	64.2	85.4	2.2	4.9	2.5
Level of Service	E	E	F	A	A	A
Approach Delay (s)	66.7			8.2	4.7	
Approach LOS	E			A	A	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	142.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: KUIKAHI DRIVE & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	40	80	70	285	55	25	55	460	335	45	445	45
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	42	84	74	300	58	26	58	484	353	47	468	47
RTOR Reduction (vph)	0	0	69	0	0	21	0	0	236	0	0	22
Lane Group Flow (vph)	42	84	5	300	58	5	58	484	117	47	468	25
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	5.4	7.4	7.4	20.2	22.2	22.2	7.6	60.6	20.2	5.5	58.5	58.5
Effective Green, g (s)	5.4	7.4	7.4	20.2	22.2	22.2	7.6	60.6	20.2	5.5	58.5	58.5
Actuated g/C Ratio	0.05	0.07	0.07	0.18	0.20	0.20	0.07	0.55	0.18	0.05	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	87	239	107	326	716	320	123	1029	513	172	993	844
v/s Ratio Prot	0.02	0.02		c0.17	0.02		c0.03	c0.26	0.13	0.01	0.25	
v/s Ratio Perm			0.05			0.02						0.03
v/c Ratio	0.48	0.35	0.05	0.92	0.08	0.02	0.47	0.47	0.23	0.27	0.47	0.03
Uniform Delay, d1	50.8	48.9	47.9	44.0	35.5	35.0	49.1	14.8	38.1	50.2	16.0	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	0.9	0.2	30.2	0.0	0.0	2.8	1.5	0.2	0.9	1.6	0.1
Delay (s)	55.0	49.8	48.0	74.1	35.5	35.0	52.0	16.4	38.3	51.0	17.6	12.2
Level of Service	D	D	D	E	D	D	D	B	D	D	B	B
Approach Delay (s)		50.2			65.7			27.4			19.9	
Approach LOS		D			E			C			B	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	109.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

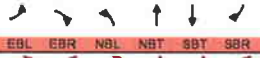
HCM Unsignalized Intersection Capacity Analysis
5: EAST WAIKO ROAD & WAIALE ROAD 12/12/2008

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	35	120	125	145	130	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	126	132	153	137	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	284				408	208
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	284				408	208
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				76	95
cM capacity (veh/h)	1278				582	832

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	163	284	179
Volume Left	37	0	137
Volume Right	0	153	42
cSH	1278	1700	627
Volume to Capacity	0.03	0.17	0.29
Queue Length (ft)	2	0	29
Control Delay (s)	2.0	0.0	13.0
Lane LOS	A		B
Approach Delay (s)	2.0	0.0	13.0
Approach LOS			B

Intersection Summary				
Average Delay		4.2		
Intersection Capacity Utilization		43.4%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
6: KUIKAHI DRIVE & WAIALE ROAD 12/12/2008



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	375	40	30	145	100	300
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	395	42	32	153	105	316

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	395	42	32	153	105	316
Volume Left (vph)	395	0	32	0	0	0
Volume Right (vph)	0	42	0	0	0	316
Hadj (s)	0.5	-0.7	0.5	0.0	0.0	-0.7
Departure Headway (s)	6.6	5.4	7.0	6.5	6.2	5.5
Degree Utilization, x	0.72	0.06	0.06	0.28	0.18	0.48
Capacity (veh/h)	533	634	485	524	549	627
Control Delay (s)	12.3	7.3	8.9	8.9	8.4	8.6
Approach Delay (s)	11.8		8.9		8.5	
Approach LOS	B		A		A	

Intersection Summary				
Delay		10.0		
HCM Level of Service		A		
Intersection Capacity Utilization		35.8%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	280	70	315	290	110	370
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	295	74	332	305	116	389
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	953	332			637	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	953	332			637	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	90			88	
cM capacity (veh/h)	252	710			947	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	295	74	332	305	116	389
Volume Left	295	0	0	0	116	0
Volume Right	0	74	0	305	0	0
cSH	252	710	1700	1700	947	1700
Volume to Capacity	1.17	0.10	0.20	0.18	0.12	0.23
Queue Length (ft)	337	9	0	0	10	0
Control Delay (s)	151.4	10.7	0.0	0.0	9.3	0.0
Lane LOS	F	B			A	
Approach Delay (s)	123.3		0.0		2.1	
Approach LOS	F					

Intersection Summary				
Average Delay	30.8			
Intersection Capacity Utilization	48.2%	ICU Level of Service		A
Analysis Period (min)	15			

LEVEL-OF-SERVICE CALCULATIONS FOR 2015 BACKGROUND CONDITIONS

HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1800	1583		1685		1770	1842		1770	1863	1583
Flt Permitted		0.48	1.00		0.87		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		902	1583		1487		1770	1842		1770	1863	1583
Volume (vph)	35	15	15	70	15	125	5	1150	90	135	1280	15
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	16	16	74	16	132	5	1211	95	142	1347	16
RTOR Reduction (vph)	0	0	14	0	38	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	53	2	0	154	0	5	1304	0	142	1347	13
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		16.0	16.0		16.0		0.8	104.2		11.0	114.4	114.4
Effective Green, g (s)		16.0	16.0		16.0		0.8	104.2		11.0	114.4	114.4
Actuated g/C Ratio		0.11	0.11		0.11		0.01	0.73		0.08	0.80	0.80
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		101	177		166		10	1340		136	1488	1265
v/s Ratio Prot					c0.15		0.00	c0.71		c0.08	0.72	
v/s Ratio Perm		0.06	0.01									0.01
v/c Ratio		0.52	0.01		1.11		0.50	0.97		1.04	0.91	0.01
Uniform Delay, d1		60.0	56.6		63.6		71.0	18.2		66.1	10.5	2.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.8	0.0		101.5		34.4	19.0		89.4	9.5	0.0
Delay (s)		64.9	56.6		165.1		105.4	37.2		155.5	19.9	2.9
Level of Service		E	E		F		F	D		F	B	A
Approach Delay (s)		62.9			165.1			37.4			32.5	
Approach LOS		E			F			D			C	

Intersection Summary				
HCM Average Control Delay	44.7	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	143.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	102.5%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
3: PILIKANA STREET & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	170	110	40	1295	1295	55
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	116	42	1363	1363	58
RTOR Reduction (vph)	0	104	0	0	0	11
Lane Group Flow (vph)	179	12	42	1363	1363	47
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	16.0	16.0	4.0	126.0	116.0	116.0
Effective Green, g (s)	16.0	16.0	4.0	126.0	116.0	116.0
Actuated g/C Ratio	0.11	0.11	0.03	0.84	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	189	169	47	1565	1466	1245
v/s Ratio Prot	c0.10		0.02	c0.73	c0.73	
v/s Ratio Perm		0.07				0.04
v/c Ratio	0.95	0.07	0.89	0.87	0.93	0.04
Uniform Delay, d1	66.6	60.3	72.8	7.2	12.7	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	49.8	0.2	91.2	6.9	11.8	0.1
Delay (s)	116.4	60.5	164.0	14.1	24.5	3.6
Level of Service	F	E	F	B	C	A
Approach Delay (s)	94.4			18.6	23.7	
Approach LOS	F			B	C	

Intersection Summary				
HCM Average Control Delay	28.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	84.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: KUIKAHI DRIVE & HONOAPIILANI HIGHWAY

12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	180	395	205	650	195	105	110	610	750	260	580	100
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	189	416	216	684	205	111	116	642	789	274	611	105
RTOR Reduction (vph)	0	0	155	0	0	73	0	0	373	0	0	52
Lane Group Flow (vph)	189	416	61	684	205	38	116	642	416	274	611	53
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	17.8	18.2	18.2	44.0	44.4	44.4	10.0	42.0	44.0	9.0	41.0	41.0
Effective Green, g (s)	17.8	18.2	18.2	44.0	44.4	44.4	10.0	42.0	44.0	9.0	41.0	41.0
Actuated g/C Ratio	0.14	0.14	0.14	0.34	0.34	0.34	0.08	0.33	0.34	0.07	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	244	499	223	603	1216	544	137	606	949	239	591	502
v/s Ratio Prot	0.11	0.12		c0.39	0.06		0.07	c0.34	0.28	c0.08	0.33	
v/s Ratio Perm			0.14			0.07						0.07
v/c Ratio	0.77	0.83	0.28	1.13	0.17	0.07	0.85	1.06	0.44	1.15	1.03	0.11
Uniform Delay, d1	53.8	54.0	49.6	42.6	29.5	28.5	58.8	43.6	33.0	60.1	44.1	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.2	11.4	0.7	79.6	0.1	0.1	35.6	53.3	0.3	103.5	46.0	0.4
Delay (s)	68.0	65.4	50.3	122.2	29.6	28.6	94.5	96.9	33.3	163.6	90.1	31.6
Level of Service	E	E	D	F	C	C	F	F	C	F	F	C
Approach Delay (s)		62.0			92.8			64.3			104.2	
Approach LOS		E			F			E			F	

Intersection Summary				
HCM Average Control Delay	79.5	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	129.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	99.8%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
6: KUIKAHI DRIVE & WAIALE ROAD

12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.44	1.00	1.00	0.50	1.00	1.00	0.57	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	1573	3539	1583	933	3539	1583	1060	1863	1583	1046	1863	1583
Volume (vph)	785	410	125	70	240	190	160	215	60	120	210	470
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	826	432	132	74	253	200	168	226	63	126	221	495
RTOR Reduction (vph)	0	0	91	0	0	160	0	0	44	0	0	324
Lane Group Flow (vph)	826	432	41	74	253	40	168	226	19	126	221	171
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	23.0	16.7	16.7	13.2	10.9	10.9	19.3	16.2	16.2	19.3	16.2	16.2
Effective Green, g (s)	23.0	16.7	16.7	13.2	10.9	10.9	19.3	16.2	16.2	19.3	16.2	16.2
Actuated g/C Ratio	0.42	0.31	0.31	0.24	0.20	0.20	0.36	0.30	0.30	0.36	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	944	1088	487	262	710	318	417	556	472	413	556	472
v/s Ratio Prot	c0.13	0.12		0.01	0.07		c0.02	0.12		0.02	0.12	
v/s Ratio Perm	c0.24		0.08	0.06		0.13	0.12		0.04	0.09		0.31
v/c Ratio	0.88	0.40	0.08	0.28	0.36	0.13	0.40	0.41	0.04	0.31	0.40	0.36
Uniform Delay, d1	12.9	14.8	13.4	16.2	16.7	17.8	12.7	15.2	13.5	12.2	15.2	15.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.2	0.1	0.6	0.3	0.2	0.6	2.2	0.2	0.4	2.1	2.1
Delay (s)	22.0	15.1	13.4	16.8	19.0	18.0	13.3	17.4	13.7	12.6	17.3	17.1
Level of Service	C	B	B	B	B	B	B	B	B	B	B	B
Approach Delay (s)		19.0			18.3			15.4			16.5	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM Average Control Delay	17.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	54.3	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1770	1583	1863	1583	249	1863
Volume (vph)	310	150	710	780	115	520
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	326	158	747	821	121	547
RTOR Reduction (vph)	0	119	0	0	0	0
Lane Group Flow (vph)	326	39	747	821	121	547
Turn Type		Perm		Free	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		Free	6	
Actuated Green, G (s)	13.6	13.6	27.2	55.8	34.2	34.2
Effective Green, g (s)	13.6	13.6	27.2	55.8	34.2	34.2
Actuated g/C Ratio	0.24	0.24	0.49	1.00	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	431	386	908	1583	234	1142
v/s Ratio Prot	c0.18		c0.40		0.03	0.29
v/s Ratio Perm		0.10		0.52	0.29	
v/c Ratio	0.76	0.10	0.82	0.52	0.52	0.48
Uniform Delay, d1	19.6	16.4	12.2	0.0	8.9	5.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	0.1	6.1	1.2	1.9	0.3
Delay (s)	27.0	16.5	18.3	1.2	10.9	6.2
Level of Service	C	B	B	A	B	A
Approach Delay (s)	23.5		9.4		7.1	
Approach LOS	C		A		A	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case2am.int5
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street:	Waiko Road	North/South Street:	Waiale Road
Intersection Orientation:	East-West	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	50	170			130	185
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	52	178	0	0	136	194
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				205		50
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	215	0	52
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	52						267	
C (m) (veh/h)	1241						541	
v/c	0.04						0.49	
95% queue length	0.13						2.71	
Control Delay (s/veh)	8.0						18.0	
LOS	A						C	
Approach Delay (s/veh)	--	--					18.0	
Approach LOS	--	--					C	

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case2am.Int22
Agency/Co.		Jurisdiction	
Date Performed	11/4/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	380			290	105
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	5	400	0	0	305	110
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				360		5
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	378	0	5
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	5					378		5
C (m) (veh/h)	1155					454		804
v/c	0.00					0.83		0.01
95% queue length	0.01					8.07		0.02
Control Delay (s/veh)	8.1					41.5		9.5
LOS	A					E		A
Approach Delay (s/veh)	--	--				41.1		
Approach LOS	--	--				E		

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HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1800	1583		1687		1770	1851		1770	1863	1583
Flt Permitted		0.48	1.00		0.89		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		903	1583		1527		1770	1851		1770	1863	1583
Volume (vph)	25	10	10	60	25	130	15	1430	65	100	1220	35
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	26	11	11	63	26	137	16	1505	68	105	1284	37
RTOR Reduction (vph)	0	0	10	0	37	0	0	1	0	0	0	7
Lane Group Flow (vph)	0	37	1	0	189	0	16	1572	0	105	1284	30
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		16.0	16.0		16.0		1.6	116.4		8.0	122.8	122.8
Effective Green, g (s)		16.0	16.0		16.0		1.6	116.4		8.0	122.8	122.8
Actuated g/C Ratio		0.10	0.10		0.10		0.01	0.76		0.05	0.81	0.81
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		95	166		160		19	1414		93	1501	1276
v/s Ratio Prot							0.01	c0.85		c0.06	0.69	
v/s Ratio Perm		0.04	0.01		c0.15							0.02
v/c Ratio		0.39	0.01		1.18		0.84	1.11		1.13	0.88	0.02
Uniform Delay, d1		63.6	61.1		68.2		75.3	18.0		72.2	9.3	2.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.6	0.0		128.9		131.7	60.7		132.4	6.5	0.0
Delay (s)		66.3	61.1		197.1		207.0	78.7		204.6	15.7	3.0
Level of Service		E	E		F		F	E		F	B	A
Approach Delay (s)		65.1			197.1			80.0			29.3	
Approach LOS		E			F			F			C	

Intersection Summary			
HCM Average Control Delay	65.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	152.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: PILIKANA STREET & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	80	60	105	1315	1255	145
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	63	111	1384	1321	153
RTOR Reduction (vph)	0	58	0	0	0	28
Lane Group Flow (vph)	84	5	111	1384	1321	125
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.0	12.0	9.0	126.1	113.1	113.1
Effective Green, g (s)	12.0	12.0	9.0	126.1	113.1	113.1
Actuated g/C Ratio	0.08	0.08	0.06	0.86	0.77	0.77
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	145	130	109	1608	1442	1225
v/s Ratio Prot	c0.05		c0.06	0.74	c0.71	
v/s Ratio Perm		0.04				0.10
v/c Ratio	0.58	0.04	1.02	0.86	0.92	0.10
Uniform Delay, d1	64.6	61.7	68.5	5.3	12.8	4.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.1	91.2	6.3	10.6	0.2
Delay (s)	70.1	61.9	159.8	11.6	23.4	4.2
Level of Service	E	E	F	B	C	A
Approach Delay (s)	66.6			22.6	21.5	
Approach LOS	E			C	C	

Intersection Summary				
HCM Average Control Delay	24.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	146.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	86.3%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: KUIKAHI DRIVE & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	85	250	125	640	345	280	130	705	705	160	700	50
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	263	132	674	363	274	137	742	742	168	737	53
RTOR Reduction (vph)	0	0	116	0	0	216	0	0	329	0	0	22
Lane Group Flow (vph)	89	263	16	674	363	58	137	742	413	168	737	31
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	9.2	14.4	14.4	20.0	25.2	25.2	13.9	60.0	20.0	8.0	54.1	54.1
Effective Green, g (s)	9.2	14.4	14.4	20.0	25.2	25.2	13.9	60.0	20.0	8.0	54.1	54.1
Actuated g/C Ratio	0.08	0.12	0.12	0.17	0.21	0.21	0.12	0.51	0.17	0.07	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	138	430	193	299	753	337	208	944	471	232	851	723
v/s Ratio Prot	0.05	0.07		c0.38	0.10		c0.08	0.40	0.27	0.05	c0.40	
v/s Ratio Perm			0.08			0.17						0.03
v/c Ratio	0.64	0.61	0.08	2.25	0.48	0.17	0.66	0.79	0.88	0.72	0.87	0.04
Uniform Delay, d1	53.0	49.3	46.1	49.2	40.9	38.1	50.0	23.9	48.0	54.1	28.9	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.9	2.6	0.2	575.0	0.5	0.2	7.3	6.6	16.6	10.7	11.5	0.1
Delay (s)	62.9	51.9	46.3	624.2	41.4	38.3	57.3	30.5	64.6	64.8	40.4	17.9
Level of Service	E	D	D	F	D	D	E	C	E	E	D	B
Approach Delay (s)		52.4			340.4			48.4			43.4	
Approach LOS		D			F			D			D	

Intersection Summary				
HCM Average Control Delay	135.2	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	118.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	99.7%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
6: KUIKAHI DRIVE & WAIALE ROAD

12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.31	1.00	1.00	0.56	1.00	1.00	0.61	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1128	3539	1583	1043	3539	1583	1141	1863	1583	948	1863	1583
Volume (vph)	525	300	130	30	430	140	120	225	40	210	195	500
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	553	316	137	32	453	147	126	237	42	221	205	526
RTOR Reduction (vph)	0	0	90	0	0	110	0	0	29	0	0	241
Lane Group Flow (vph)	553	316	47	32	453	37	126	237	13	221	205	285
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	25.9	20.4	20.4	16.4	14.9	14.9	21.2	18.0	18.0	22.8	18.8	18.8
Effective Green, g (s)	25.9	20.4	20.4	16.4	14.9	14.9	21.2	18.0	18.0	22.8	18.8	18.8
Actuated g/C Ratio	0.43	0.34	0.34	0.27	0.25	0.25	0.35	0.30	0.30	0.38	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	757	1205	539	304	880	394	437	560	476	416	585	497
v/s Ratio Prot	c0.09	0.09		0.00	0.13		0.02	0.13		c0.04	0.11	
v/s Ratio Perm	c0.23		0.09	0.03		0.09	0.09		0.03	0.17		0.33
v/c Ratio	0.73	0.26	0.09	0.11	0.51	0.09	0.29	0.42	0.03	0.53	0.35	0.57
Uniform Delay, d1	12.1	14.3	13.4	16.1	19.4	17.3	13.5	16.8	14.8	13.9	15.8	17.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6	0.1	0.1	0.2	0.5	0.1	0.4	2.3	0.1	1.3	1.7	4.8
Delay (s)	15.7	14.4	13.5	16.2	19.9	17.4	13.8	19.1	14.9	15.2	17.5	22.0
Level of Service	B	B	B	B	B	B	B	B	B	B	B	C
Approach Delay (s)		15.0			19.1			17.0			19.4	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM Average Control Delay	17.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	63.7%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
10: WAIINU ROAD & WAIALE ROAD

12/10/2008

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.15	1.00
Satd. Flow (perm)	1770	1583	1863	1583	285	1863
Volume (vph)	560	90	540	445	175	685
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	589	95	568	468	184	721
RTOR Reduction (vph)	0	58	0	0	0	0
Lane Group Flow (vph)	589	37	568	468	184	721
Turn Type		Perm		Free	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		Free	6	
Actuated Green, G (s)	25.4	25.4	24.6	65.6	32.2	32.2
Effective Green, g (s)	25.4	25.4	24.6	65.6	32.2	32.2
Actuated g/C Ratio	0.39	0.39	0.38	1.00	0.49	0.49
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	685	613	699	1583	221	914
v/s Ratio Prot	c0.33		0.30		0.05	c0.39
v/s Ratio Perm		0.06		0.30	c0.36	
v/c Ratio	0.86	0.06	0.81	0.30	0.83	0.79
Uniform Delay, d1	18.5	12.6	18.4	0.0	13.9	13.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.5	0.0	7.2	0.5	22.7	4.6
Delay (s)	29.0	12.7	25.6	0.5	36.5	18.5
Level of Service	C	B	C	A	D	B
Approach Delay (s)	26.7		14.2		22.1	
Approach LOS	C		B		C	

Intersection Summary				
HCM Average Control Delay	20.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.84			
Actuated Cycle Length (s)	65.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	79.1%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case2pm.Int5
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street: Waiko Road	North/South Street: Waiale Road
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	50	140			150	210
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	52	147	0	0	157	221
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				195		50
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	205	0	52
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	52						257	
C (m) (veh/h)	1192						537	
v/c	0.04						0.48	
95% queue length	0.14						2.57	
Control Delay (s/veh)	8.2						17.7	
LOS	A						C	
Approach Delay (s/veh)	--	--					17.7	
Approach LOS	--	--					C	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case2pm.Int22
Agency/Co.		Jurisdiction	
Date Performed	11/4/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	215			175	365
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	5	226	0	0	184	384
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				200		5
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	210	0	5
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	5					210		5
C (m) (veh/h)	1014					504		719
v/c	0.00					0.42		0.01
95% queue length	0.01					2.03		0.02
Control Delay (s/veh)	8.6					17.1		10.0
LOS	A					C		B
Approach Delay (s/veh)	--	--				17.0		
Approach LOS	--	--				C		

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LEVEL-OF-SERVICE CALCULATIONS FOR 2015 BACKGROUND PLUS PROJECT CONDITIONS

HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1800	1583		1685		1770	1843		1770	1863	1583
Flt Permitted		0.48	1.00		0.87		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		902	1583		1487		1770	1843		1770	1863	1583
Volume (vph)	35	15	15	70	15	125	5	1180	90	135	1375	15
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	37	16	16	74	16	132	5	1242	95	142	1447	16
RTOR Reduction (vph)	0	0	14	0	38	0	0	2	0	0	0	3
Lane Group Flow (vph)	0	53	2	0	184	0	5	1335	0	142	1447	13
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		16.0	16.0		16.0		0.8	104.2		11.0	114.4	114.4
Effective Green, g (s)		16.0	16.0		16.0		0.8	104.2		11.0	114.4	114.4
Actuated g/C Ratio		0.11	0.11		0.11		0.01	0.73		0.08	0.80	0.80
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		101	177		166		10	1341		136	1488	1265
v/s Ratio Prot							0.00	c0.73		c0.08	0.78	
v/s Ratio Perm		0.06	0.01		c0.15							0.01
v/c Ratio		0.52	0.01		1.11		0.50	1.00		1.04	0.97	0.01
Uniform Delay, d1		60.0	56.6		63.6		71.0	19.3		66.1	13.0	2.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.8	0.0		101.5		34.4	23.6		89.4	17.6	0.0
Delay (s)		64.9	56.6		165.1		105.4	42.6		155.5	30.6	2.9
Level of Service		E	E		F		F	D		F	C	A
Approach Delay (s)		62.9			165.1			43.1			41.4	
Approach LOS		E			F			D			D	

Intersection Summary				
HCM Average Control Delay	51.0	HCM Level of Service	D	
HCM Volume to Capacity ratio	1.04			
Actuated Cycle Length (s)	143.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	104.7%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
3: PILIKANA STREET & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	170	110	40	1325	1390	55
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	116	42	1395	1463	58
RTOR Reduction (vph)	0	104	0	0	0	10
Lane Group Flow (vph)	179	12	42	1395	1463	48
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	16.0	16.0	4.0	126.0	118.0	118.0
Effective Green, g (s)	16.0	16.0	4.0	126.0	118.0	118.0
Actuated g/C Ratio	0.11	0.11	0.03	0.84	0.79	0.79
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	189	169	47	1565	1466	1245
v/s Ratio Prot	c0.10		0.02	c0.75	c0.79	
v/s Ratio Perm		0.07				0.04
v/c Ratio	0.95	0.07	0.89	0.89	1.00	0.04
Uniform Delay, d1	66.6	60.3	72.8	7.6	15.9	3.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	49.8	0.2	91.2	8.1	23.0	0.1
Delay (s)	116.4	60.5	164.0	15.7	38.9	3.6
Level of Service	F	E	F	B	D	A
Approach Delay (s)	94.4			20.1	37.6	
Approach LOS	F			C	D	

Intersection Summary				
HCM Average Control Delay	35.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	1.00			
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	89.2%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
4: KUIKAHI DRIVE & HONOAPIILANI HIGHWAY 12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	255	515	210	665	220	105	140	610	750	260	575	125
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	268	542	221	700	232	111	147	642	789	274	605	132
RTOR Reduction (vph)	0	0	153	0	0	77	0	0	374	0	0	66
Lane Group Flow (vph)	268	542	68	700	232	34	147	642	415	274	605	66
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	23.5	19.0	19.0	44.0	39.5	39.5	10.0	42.0	44.0	9.0	41.0	41.0
Effective Green, g (s)	23.5	19.0	19.0	44.0	39.5	39.5	10.0	42.0	44.0	9.0	41.0	41.0
Actuated g/C Ratio	0.18	0.15	0.15	0.34	0.30	0.30	0.08	0.32	0.34	0.07	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	320	517	231	599	1075	481	136	602	943	238	588	499
v/s Ratio Prot	0.15	c0.15		c0.40	0.07		c0.08	c0.34	0.28	0.08	0.32	
v/s Ratio Perm			0.14			0.07						0.08
v/c Ratio	0.84	1.05	0.30	1.17	0.22	0.07	1.08	1.07	0.44	1.15	1.03	0.13
Uniform Delay, d1	51.4	55.5	49.5	43.0	33.7	32.2	60.0	44.0	33.4	60.5	44.5	31.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.1	52.8	0.7	92.9	0.1	0.1	100.5	55.7	0.3	105.3	44.7	0.5
Delay (s)	68.5	108.3	50.2	135.9	33.8	32.2	160.5	99.7	33.7	165.8	89.2	32.3
Level of Service	E	F	D	F	C	C	F	F	C	F	F	C
Approach Delay (s)		85.5			102.2			72.4			102.5	
Approach LOS		F			F			E			F	

Intersection Summary				
HCM Average Control Delay	88.5	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.08			
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	103.9%	ICU Level of Service	G	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
6: KUIKAHI DRIVE & WAIALE ROAD

12/10/2008

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.43	1.00	1.00	0.48	1.00	1.00	0.57	1.00	1.00	0.58	1.00	1.00
Satd. Flow (perm)	1565	3539	1583	895	3539	1583	1056	1863	1583	1042	1863	1583
Volume (vph)	840	450	140	70	255	190	165	215	60	120	210	485
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	884	474	147	74	268	200	174	226	63	126	221	511
RTOR Reduction (vph)	0	0	101	0	0	159	0	0	44	0	0	313
Lane Group Flow (vph)	884	474	46	74	268	41	174	226	19	126	221	198
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	23.4	17.1	17.1	13.6	11.3	11.3	19.3	16.2	16.2	19.3	16.2	16.2
Effective Green, g (s)	23.4	17.1	17.1	13.6	11.3	11.3	19.3	16.2	16.2	19.3	16.2	16.2
Actuated g/C Ratio	0.43	0.31	0.31	0.25	0.21	0.21	0.35	0.30	0.30	0.35	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	946	1106	495	259	731	327	413	552	469	409	552	469
v/s Ratio Prot	c0.14	0.13		0.01	0.08		c0.02	0.12		0.02	0.12	
v/s Ratio Perm	c0.26		0.09	0.06		0.13	0.12		0.04	0.09		0.32
v/c Ratio	0.93	0.43	0.09	0.29	0.37	0.13	0.42	0.41	0.04	0.31	0.40	0.42
Uniform Delay, d1	13.5	14.9	13.3	16.1	16.6	17.7	13.0	15.4	13.7	12.4	15.4	15.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.7	0.3	0.1	0.6	0.3	0.2	0.7	2.2	0.2	0.4	2.2	2.8
Delay (s)	29.2	15.2	13.4	16.7	16.9	17.9	13.7	17.7	13.9	12.8	17.5	18.3
Level of Service	C	B	B	B	B	B	B	B	B	B	B	B
Approach Delay (s)		23.3			16.2			15.6			17.3	
Approach LOS		C			B			B			B	

Intersection Summary				
HCM Average Control Delay	19.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	64.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
10: WAIINU ROAD & WAIALE ROAD

12/10/2008

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1770	1583	1863	1583	234	1863
Volume (vph)	315	150	735	805	115	530
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	332	158	774	847	121	558
RTOR Reduction (vph)	0	119	0	0	0	0
Lane Group Flow (vph)	332	39	774	847	121	558
Turn Type		Perm		Free	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		Free	6	
Actuated Green, G (s)	13.8	13.8	27.8	56.6	34.8	34.8
Effective Green, g (s)	13.8	13.8	27.8	56.6	34.8	34.8
Actuated g/C Ratio	0.24	0.24	0.49	1.00	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	432	386	915	1583	225	1145
v/s Ratio Prot	c0.19		c0.42		0.03	0.30
v/s Ratio Perm		0.10		0.53	0.30	
v/c Ratio	0.77	0.10	0.85	0.54	0.54	0.49
Uniform Delay, d1	19.9	16.6	12.5	0.0	9.5	6.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	0.1	7.3	1.3	2.5	0.3
Delay (s)	27.9	16.7	19.8	1.3	12.0	6.3
Level of Service	C	B	B	A	B	A
Approach Delay (s)	24.3		10.1		7.3	
Approach LOS	C		B		A	

Intersection Summary				
HCM Average Control Delay	11.9	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	72.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3am.int5
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description:

East/West Street: Waiko Road	North/South Street: Waiale Road
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	50	170			130	190
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	52	178	0	0	136	200
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				220		50
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	231	0	52
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	52						283	
C (m) (veh/h)	1235						537	
v/c	0.04						0.53	
95% queue length	0.13						3.05	
Control Delay (s/veh)	8.0						18.9	
LOS	A						C	
Approach Delay (s/veh)	--	--					18.9	
Approach LOS	--	--					C	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3am.int21
Agency/Co.		Jurisdiction	
Date Performed	11/7/2008	Analysis Year	
Analysis Time Period			

Project Description:

East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		820	0	45	415	
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	964	0	52	488	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		120			
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	141	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		52		141				
C (m) (veh/h)		722		536				
v/c		0.07		0.26				
95% queue length		0.23		1.05				
Control Delay (s/veh)		10.4		14.1				
LOS		B		B				
Approach Delay (s/veh)	--	--		14.1				
Approach LOS	--	--		B				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Int 22 am
Agency/Co.		Jurisdiction	
Date Performed	11/4/2008	Analysis Year	
Analysis Time Period			

Project Description	
East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	405	0	25	300	105
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	5	426	0	26	315	110
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	0	55	360	0	5
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	57	378	0	5
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	L		TR
v (veh/h)	5	26	0		57	378		5
C (m) (veh/h)	1145	1144			798	328		800
v/c	0.00	0.02			0.07	1.15		0.01
95% queue length	0.01	0.07			0.23	15.43		0.02
Control Delay (s/veh)	8.2	8.2			9.9	133.1		9.5
LOS	A	A			A	F		A
Approach Delay (s/veh)	--	--				131.5		
Approach LOS	--	--				F		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3am.Int23
Agency/Co.		Jurisdiction	
Date Performed	11/7/2008	Analysis Year	
Analysis Time Period			

Project Description	
East/West Street: Kuikahi Drive	North/South Street: Road D
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		385	0	10	295	
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	452	0	11	347	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		20			
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	23	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		11		23				
C (m) (veh/h)		1119		612				
v/c		0.01		0.04				
95% queue length		0.03		0.12				
Control Delay (s/veh)		8.2		11.1				
LOS		A		B				
Approach Delay (s/veh)	--	--		11.1				
Approach LOS	--	--		B				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3am Int27
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street: Road 'A'	North/South Street:
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1510			1415	45
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	126	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration		T			T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)			120			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	1489	47	0	1589	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			1			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration								R
v (veh/h)								126
C (m) (veh/h)								154
v/c								0.82
95% queue length								5.34
Control Delay (s/veh)								88.9
LOS								F
Approach Delay (s/veh)	--	--				88.9		
Approach LOS	--	--				F		

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HCM Signalized Intersection Capacity Analysis
1: EAST WAIKO ROAD & HONOAPIILANI HIGHWAY 12/10/2006

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1800	1583		1687		1770	1851		1770	1863	1583
Flt Permitted		0.48	1.00		0.89		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		903	1583		1527		1770	1851		1770	1863	1583
Volume (vph)	25	10	10	60	25	130	15	1465	65	100	1330	35
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	26	11	11	63	26	137	16	1542	68	105	1400	37
RTOR Reduction (vph)	0	0	10	0	37	0	0	1	0	0	0	6
Lane Group Flow (vph)	0	37	1	0	189	0	16	1609	0	105	1400	31
Turn Type	Perm		Perm	Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		16.0	16.0		16.0		1.6	116.4		8.0	122.8	122.8
Effective Green, g (s)		16.0	16.0		16.0		1.6	116.4		8.0	122.8	122.8
Actuated g/C Ratio		0.10	0.10		0.10		0.01	0.76		0.05	0.81	0.81
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		95	166		160		19	1414		93	1501	1276
v/s Ratio Prot							0.01	c0.87		c0.06	0.75	
v/s Ratio Perm		0.04	0.01		c0.15							0.02
v/c Ratio		0.39	0.01		1.18		0.84	1.14		1.13	0.93	0.02
Uniform Delay, d1		63.6	61.1		68.2		75.3	18.0		72.2	11.6	2.9
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.6	0.0		128.9		131.7	71.2		132.4	11.9	0.0
Delay (s)		66.3	61.1		197.1		207.0	89.2		204.8	23.5	3.0
Level of Service		E	E		F		F	F		F	C	A
Approach Delay (s)		65.1			197.1			90.4			35.3	
Approach LOS		E			F			F			D	

Intersection Summary			
HCM Average Control Delay	72.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	152.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	80	60	105	1350	1365	145
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	63	111	1421	1437	153
RTOR Reduction (vph)	0	58	0	0	0	26
Lane Group Flow (vph)	84	5	111	1421	1437	127
Turn Type		Perm	Prot			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Actuated Green, G (s)	12.0	12.0	9.0	126.1	113.1	113.1
Effective Green, g (s)	12.0	12.0	9.0	126.1	113.1	113.1
Actuated g/C Ratio	0.08	0.08	0.06	0.86	0.77	0.77
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	145	130	109	1608	1442	1225
v/s Ratio Prot	c0.05		0.06	c0.76	c0.77	
v/s Ratio Perm		0.04				0.10
v/c Ratio	0.58	0.04	1.02	0.88	1.00	0.10
Uniform Delay, d1	64.6	61.7	66.5	5.8	16.3	4.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.1	91.2	7.4	22.9	0.2
Delay (s)	70.1	61.9	159.8	13.2	39.2	4.2
Level of Service	E	E	F	B	D	A
Approach Delay (s)	66.6			23.8	35.8	
Approach LOS	E			C	D	

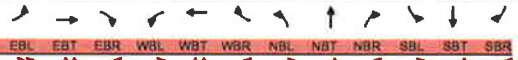
Intersection Summary			
HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	146.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	125	325	125	680	415	260	240	705	705	160	740	105
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	132	342	132	716	437	274	253	742	742	168	779	111
RTOR Reduction (vph)	0	0	115	0	0	213	0	0	329	0	0	47
Lane Group Flow (vph)	132	342	17	716	437	61	253	742	413	168	779	64
Turn Type	Prot		Perm	Prot		Perm	Prot		Over	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	12.0	15.0	15.0	20.0	23.0	23.0	18.0	60.0	20.0	8.0	50.0	50.0
Effective Green, g (s)	12.0	15.0	15.0	20.0	23.0	23.0	18.0	60.0	20.0	8.0	50.0	50.0
Actuated g/C Ratio	0.10	0.13	0.13	0.17	0.19	0.19	0.15	0.50	0.17	0.07	0.42	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	178	446	200	297	684	306	268	939	468	231	783	665
v/s Ratio Prot	0.07	0.10		c0.40	0.12		c0.14	0.40	0.27	0.05	c0.42	
v/s Ratio Perm			0.08			0.17						0.07
v/c Ratio	0.74	0.77	0.08	2.41	0.64	0.20	0.94	0.79	0.88	0.73	0.99	0.10
Uniform Delay, d1	52.0	50.3	45.9	49.5	44.2	40.3	50.0	24.3	48.3	54.4	34.4	20.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.3	7.7	0.2	645.0	2.0	0.3	39.7	6.7	17.4	10.8	31.0	0.3
Delay (s)	67.3	58.0	46.1	694.5	46.1	40.6	89.7	31.1	65.8	65.3	65.3	21.1
Level of Service	E	E	D	F	D	D	F	C	E	E	E	C
Approach Delay (s)		57.4			370.4			54.4			60.7	
Approach LOS		E			F			D			E	

Intersection Summary			
HCM Average Control Delay	149.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	119.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	112.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: KUIKAHI DRIVE & WAIALE ROAD

12/10/2008



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.31	1.00	1.00	0.55	1.00	1.00	0.61	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	1113	3539	1583	1017	3539	1583	1146	1863	1583	939	1863	1583
Volume (vph)	580	325	145	30	440	140	125	225	40	210	195	505
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	611	342	153	32	463	147	132	237	42	221	205	532
RTOR Reduction (vph)	0	0	100	0	0	110	0	0	29	0	0	236
Lane Group Flow (vph)	611	342	53	32	463	37	132	237	13	221	205	296
Turn Type	pm+pl		Perm	pm+pl		Perm	pm+pl		Perm	pm+pl		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	26.2	20.7	20.7	16.7	15.2	15.2	21.0	17.9	17.9	22.8	18.8	18.8
Effective Green, g (s)	26.2	20.7	20.7	16.7	15.2	15.2	21.0	17.9	17.9	22.8	18.8	18.8
Actuated g/C Ratio	0.44	0.34	0.34	0.28	0.25	0.25	0.35	0.30	0.30	0.38	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	755	1219	545	301	895	400	433	555	471	412	583	495
v/s Ratio Prot	c0.09	0.10		0.00	0.13		0.02	0.13		c0.04	0.11	
v/s Ratio Perm	c0.26		0.10	0.03		0.09	0.09		0.03	0.17		0.34
v/c Ratio	0.81	0.28	0.10	0.11	0.52	0.09	0.30	0.43	0.03	0.54	0.35	0.60
Uniform Delay, d1	12.5	14.3	13.4	16.0	19.3	17.2	13.8	17.0	14.9	14.0	15.9	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	0.1	0.1	0.2	0.5	0.1	0.4	2.4	0.1	1.3	1.7	5.2
Delay (s)	19.0	14.4	13.4	16.1	19.8	17.3	14.2	19.4	15.0	15.4	17.6	22.7
Level of Service	B	B	B	B	B	B	B	B	B	B	B	C
Approach Delay (s)		16.8			19.0			17.3			19.9	
Approach LOS		B			B			B			B	

Intersection Summary				
HCM Average Control Delay	18.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	65.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
10: WAINU ROAD & WAIALE ROAD

12/10/2008

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1770	1583	1863	1583	250	1863
Volume (vph)	570	90	565	470	175	695
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	600	95	595	495	184	732
RTOR Reduction (vph)	0	59	0	0	0	0
Lane Group Flow (vph)	600	36	595	495	184	732
Turn Type		Perm		Free	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		Free	6	
Actuated Green, G (s)	26.4	26.4	25.8	69.4	35.0	35.0
Effective Green, g (s)	26.4	26.4	25.8	69.4	35.0	35.0
Actuated g/C Ratio	0.38	0.38	0.37	1.00	0.50	0.50
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	673	602	693	1583	240	940
v/s Ratio Prot	c0.34		c0.32		0.06	c0.39
v/s Ratio Perm		0.06		0.31	0.33	
v/c Ratio	0.89	0.06	0.86	0.31	0.77	0.78
Uniform Delay, d1	20.2	13.6	20.1	0.0	13.7	14.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.1	0.0	10.3	0.5	13.6	4.1
Delay (s)	34.2	13.7	30.4	0.5	27.3	18.2
Level of Service	C	B	C	A	C	B
Approach Delay (s)	31.4		16.8		20.0	
Approach LOS	C		B		C	

Intersection Summary				
HCM Average Control Delay	21.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	69.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	81.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3pm.int5
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description:

East/West Street: Waiko Road	North/South Street: Waiale Road
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	50	140			150	215
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	52	147	0	0	157	226
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				210		50
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	0	221	0	52
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	52						273	
C (m) (veh/h)	1187						532	
v/c	0.04						0.51	
95% queue length	0.14						2.90	
Control Delay (s/veh)	8.2						18.7	
LOS	A						C	
Approach Delay (s/veh)	--	--					18.7	
Approach LOS	--	--					C	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3pm.int21
Agency/Co.		Jurisdiction	
Date Performed	11/7/2008	Analysis Year	
Analysis Time Period			

Project Description:

East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		455	0	135	605	
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	535	0	158	711	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	1	2	0
Configuration		T	TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		80			
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	94	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		158		94				
C (m) (veh/h)		1043		736				
v/c		0.15		0.13				
95% queue length		0.53		0.44				
Control Delay (s/veh)		9.1		10.6				
LOS		A		B				
Approach Delay (s/veh)	--	--		10.6				
Approach LOS	--	--		B				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Int 22 pm
Agency/Co.		Jurisdiction	
Date Performed	11/4/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street:	North/South Street:
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	225	0	75	205	365
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	5	236	0	78	215	384
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	0	35	200	0	5
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	36	210	0	5
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	1	1	1	0
Configuration	LT		R	L		TR

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	L		TR
v (veh/h)	5	78	0		36	210		5
C (m) (veh/h)	988	1343			918	306		702
v/c	0.01	0.06			0.04	0.69		0.01
95% queue length	0.02	0.18			0.12	4.71		0.02
Control Delay (s/veh)	8.7	7.8			9.1	39.0		10.2
LOS	A	A			A	E		B
Approach Delay (s/veh)	--	--				38.3		
Approach LOS	--	--				E		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3pm.Int23
Agency/Co.		Jurisdiction	
Date Performed	11/7/2008	Analysis Year	
Analysis Time Period			

Project Description

East/West Street: Kuikahi Drive	North/South Street: Road D
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		220	0	30	180	
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	258	0	35	211	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0		10			
Peak-Hour Factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR (veh/h)	0	0	11	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		35		11				
C (m) (veh/h)		1318		786				
v/c		0.03		0.01				
95% queue length		0.08		0.04				
Control Delay (s/veh)		7.8		9.6				
LOS		A		A				
Approach Delay (s/veh)	--	--		9.6				
Approach LOS	--	--		A				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	Case3pm.Int27
Agency/Co.		Jurisdiction	
Date Performed	11/5/2008	Analysis Year	
Analysis Time Period			

Project Description	
East/West Street: Road 'A'	North/South Street:
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1675			1060	120
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	0	94	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration		T			T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)			90			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR (veh/h)	0	1115	126	0	1763	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			1			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration								R
v (veh/h)								94
C (m) (veh/h)								255
v/c								0.37
95% queue length								1.62
Control Delay (s/veh)								27.1
LOS								D
Approach Delay (s/veh)	--	--				27.1		
Approach LOS	--	--				D		

APPENDIX H.

Preliminary Engineering Report and Preliminary Drainage Report

Established 1969

Preliminary Engineering Report for

PU'UNANI

Waikapu, Wailuku, Maui, Hawaii
TMK: (2) 3-5-02: parcels 2 and 3

Prepared For: Wailuku Kuikahi LLC
220 S. King Street, Suite 2170
Honolulu, Hawaii 96813

Date: November 2008

WARREN S. UNEMORI ENGINEERING, INC.
Civil and Structural Engineers - Land Surveyors
Wells Street Professional Center - Suite 403
2145 Wells Street
Wailuku, Maui, Hawaii 96793

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TABLE OF CONTENTS

Preliminary Engineering Report
for
Pu'unani

I. PROJECT LOCATION

The project is located on the south side of Kuikahi Drive between Honoapiilani Highway and Wailuku Heights. It is comprised of two parcels TMK (2) 3-5-02:parcels 2 and 3. The site slopes from an elevation of 815 feet at the mauka (Wailuku Heights boundary) to 350 feet at Honoapiilani Highway. This translates to an overall cross slope of approximately 11.0%. Waihee Ditch, owned by Wailuku Water Company and located approximately 1,000 feet west and mauka of Honoapiilani Highway, bifurcates the project site in a north-south direction. Two natural drainage gullies also cut across the site in a west to east (mauka-makai) direction and converge to a single gully before crossing Waihee Ditch and Honoapiilani Highway. Runoff in these gullies end up in Waiale Reservoir located below Honoapiilani Highway and Waiale Road.

This report briefly describes existing infrastructure in the project vicinity. It also summarizes infrastructural improvements that may be needed to support the project.

II. PROJECT DESCRIPTION

The applicant is asking for a change in zoning of subject parcels from agricultural to rural and urban uses. Approximately 20 acres of TMK 3-5-02:02 will be rezoned from agricultural to urban residential as designated in the current Wailuku-Kahului Community plan. The remaining 34.5 acres ± will be redesignated from agricultural to rural. The rural lots will have a minimum area of 21,780 square feet.

The applicant is also asking to rezone approximately 86± acres of TMK (2) 3-5-02:parcel 03 from agricultural to urban residential, park and open space with the remaining 52 acres as rural.

The urban single residential lots sizes will range between 4,000 and 10,000 square feet.

Improvements for the rural lots will consist of 22 feet wide paved streets. Collector roads will have a 24 feet wide pavement section. Urban residential streets will have a 28 feet wide curb to curb travel way with curb and gutter on both sides and a 4 feet wide sidewalk on one side. For cul-de-sac streets, the travel way will be 32 feet per the Fire Department's requirement. Infrastructure will consist of underground electrical, telephone and CATV distribution systems, an 8-inch water distribution system with fire hydrants, a gravity sewer collector system, and a storm drain system with catch basins, mass grading and landscaping. The existing drainageway along the northerly boundary will be retained as an open channel for the most part except at roadway and ditch crossings.

III. EXISTING INFRASTRUCTURE

3.1 Water System

The closest County owned water system is at Wailuku Heights which borders the project site on the west. The applicant has participated with Stanford Carr Development (SCD) in constructing the water system improvements for the Kehalani Mauka project located on the north side of Kuikahi Drive. The mid-level water system for Pu'unani will be tied into this system after it is completed and dedicated to the County Department of Water Supply .

3.2 Sewer System

There is a County owned sewer system on Kuikahi Drive down to its intersection with Waiale Road. All wastewater from Wailuku is conveyed to the Kahului Wastewater Reclamation Facility (KWWRF) in Kahului. This facility was expanded from 6.0 MGD to 7.9 MG several years ago. According to the Division of Wastewater Management for the County of Maui, as of December 2005, the average daily flow through the KWWRF was around 5.00 MGD.

3.3 Drainage

Current offsite runoff from the mauka drainage areas will be conveyed across the project site in accordance with the provisions of Article 15-04-06, Condition 14 of the County Rules for Design of Storm Drainage Facilities. Total offsite runoff for a 100-year, 24-hour rainfall is estimated to be around 1,300 cfs. Another 400 cfs from the project site is also discharging into the existing drainageway. The total onsite/offsite runoff leaving the project site at the Honoapiilani Highway crossing during a 100-year, 24-hour storm is estimated to be 1,700 cfs.

According to the Flood Insurance Rate Map prepared by FEMA, the entire project site is situated in Zone C which represents areas subject to minimal flooding.

3.4 Electrical, Telephone and CATV Systems

There are existing overhead electrical, telephone, and CATV transmission lines along the easterly boundary on the mauka side of Honoapiilani Highway. Underground electrical lines are also available along the Kuikahi Drive frontage abutting the project site.

3.5 Access Road

The main access to the project site will be from west Kuikahi Drive. Kuikahi Drive is a County collector road that serves Wailuku Heights and the Kehalani projects. Kuikahi Drive is being widened from a two-lane agricultural collector to a three-lane urban collector by Kehalani Mauka LLC. Curb, gutter and sidewalk are being installed on the north side of this road. In addition, the existing pavement is being widened by 12 feet to provide for left turn lanes at intersections. The Kuikahi/Honoapiilani Highway intersection is also being redesigned by Kehalani Mauka LLC. Improvements will consist of the addition of an exclusive left turn lane and dedicated through and right turn lanes at the Kuikahi west bound approach. The east bound approach is also being redesigned to provide exclusive left, through and right turn lanes.

IV. PROPOSED IMPROVEMENTS

4.1 Water System

Due to the significant difference in elevation across the site, the project will be divided into three (3) water service levels. The high- level service (HLS) area will include lots between elevation 725 and 815 feet. Lots between elevation 560 and 725 feet will be in the mid-level service (MLS) area. The low-level service (LLS) area will include all lots located between elevation 560 feet and Honoapiilani Highway at elevation 350 feet. Subject to the approval of the Department of Water Supply, water for the HLS area will be connected to the existing Wailuku Heights distribution system. Since there will be only 15 lots in the HLS area, storage will be provided by the existing 300,000 gallon tank in Wailuku Heights. Water for the MLS area will be from the HLS area for the Kehalani Mauka project. The applicant has participated in enlarging the 300,000 gallon storage tank for Kehalani to a 500,000 gallon storage tank to provide storage for the MLS area in Pu'unani. Based on the 1,000 gallon per rural lot consumption rate agreed to by Department of Water Supply, preliminary indications are that a 1,000,000 gallon storage tank will be required for the LLS area. The applicant will be constructing this tank next to the 1.5 MG tank being installed by Kehalani Mauka LLC at elevation 670 feet.

The source of water for Puunani will be a new well at elevation 660 feet ± that will be constructed next to the 1.0 MG storage for the LLS area.

The applicant has a letter of intent executed by the Director of Water Supply and the Mayor for the County of Maui. This agreement calls for the applicant to provide the land and pay for the drilling, testing and installation of all equipment for the new well in return for receiving a 25% allocation from the well. According to the hydrogeologist, the expected sustainable yield of the well is 2.0 MGD. This agreement is subject to review and approval of the Commission of Water Resource

Management of State Department of Natural Resources and the Maui County Council before it can be implemented.

Although this well will be tapping the Iao Aquifer, it will be in keeping with the Commission of Water Resources Management's recommendation to disperse the locations of wells to minimize intrusion of brackish water into the aquifer.

Water from the surface water treatment plant at the Iao tank site and the Waikapu well, whenever it is completed, will serve as backup for this well. The applicant participated in installing the transmission line from the Waikapu Well and the construction of the 1.5 MG tank, Iao booster station and transmission system with Kehalani Mauka LLC to make the foregoing possible.

4.2 Wastewater Systems

Pu'unani is projected to generate around 272,300 gpd of wastewater when fully built out. An 8-inch gravity collection system will be installed within the subdivision streets and along the easterly boundary of the project site along Honoapiilani Highway and connected to the existing 8-inch sewerline on East Kuikahi Drive. The applicant will also pay the assessment for Facility Expansion of the Wailuku/Kuikahi Wastewater Treatment System as provided for in Chapter 14.35 of the Maui County Code. The applicant is aware of and is prepared to pay for his fair-share cost of offsite sewer improvements.

4.3 Drainage

Preliminary indications are that the capacities of the existing drainage gullies will need to be increased to convey the offsite runoff across the project site. However, because of the topography and erosion potential, this may not be feasible. Consequently offsite flow may have to be conveyed across the site in a sizeable closed conduits.

An onsite drainage system consisting of catch basins, drain manholes, and drainlines will be installed to collect and convey post-development onsite runoff into

a detention basin with a capacity of approximately 15 acre-feet to be constructed at the northeast corner of the project site.

The release line for the basin will be sized to ensure that the total flow leaving the project site does not exceed the total offsite and pre-development onsite runoff of 1,700 cfs. This is in keeping with the provisions of Article 15-04-06, Paragraph 14 which states that "offsite flows may be passed safely through a development provided there are no additional adverse effects resulting from the new development to adjacent and downstream properties."

4.4 Electrical, Telephone and CATV System

Underground Electrical, telephone and CATV distribution systems will be extended into the project from existing distribution systems on Honopiilani Highway and Kuikahi Drive.

4.5 Access Road

Pending resolution of the old Government Road right-of-way issue with the State and County Governments, the applicant proposes to realign and improve that portion of this road that runs through Pu'unani, and utilize it as one of three (3) access roads for the project from Kuikahi Drive. This first access will be located approximately 1,100 mauka of the Kuikahi/Honoapiilani Highway intersection. A second access will be provided directly across the Kehalani Parkway intersection on Kuikahi Drive. The third access on Kuikahi Drive will be around 1,000 feet mauka of the second access.

A right turn in/out only access will also be provided on Honoapiilani Highway approximately 1,600 feet south of the Kuikahi Intersection.

In the rural zoned area of the project, collector roads will have a minimum paved width of 24 feet. Pavement on the subdivision street will be 22 feet wide. No curb and gutter is required on rural streets. However, the developer may opt to install rolled curb and gutter on all streets to curtail erosion, mitigate maintenance problems,

and comply with MECO requirements. Streets on urban residential areas will have a curb to curb travel way of 28 feet with sidewalk on one side. Travel ways on cul-de-sac streets will be 32 feet wide in keeping with Fire Department requirements. Traffic calming measures will also be installed at appropriate intervals to discourage speeding.

V. SUMMARY AND CONCLUSION

Conveying offsite runoff across the project site appears to be the most challenging issue from the design and economic prospective. Project will also require construction of two potable storage tanks. However, this cost will be offset by the storage tank allocation in the comprehensive water meter fee.

Sizing and designing the detention basin to serve as a community soccer or little league ball field as well as a detention facility will be beneficial to the residents of the project.

Based on the foregoing, it is our professional opinion that excellent view planes, soil conditions, topography, and proximity to existing infrastructure all make the site suitable to be developed for the intended purpose.

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VI. REFERENCES

1. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* August 1972. United States Department of Agriculture, Soil Conservation Service.

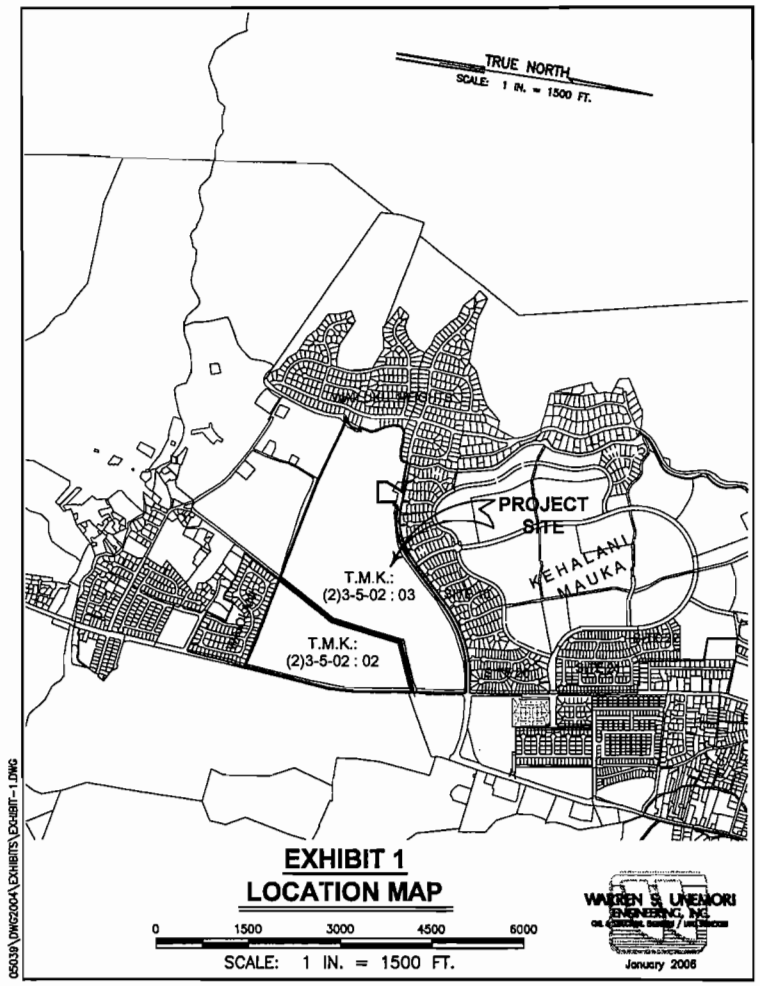
2. *Flood Insurance Rate Map, Maui County, Hawaii.* Community-Panel Number 150003 0139B. June 1, 1981. Federal Emergency Management Agency, Federal Insurance Administration.

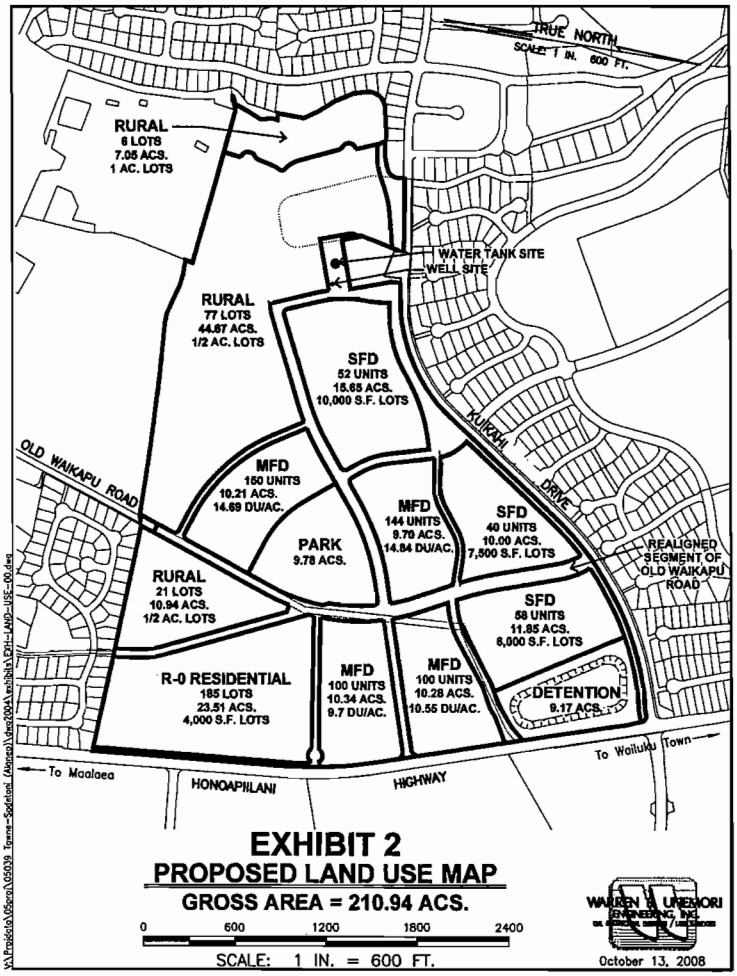
3. *Rainfall Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43.* 1962. U.S. Department of Commerce, Weather Bureau.

4. *Rules for the Design of Storm Drainage Facilities in the County of Maui.* July 1995. Department of Public Works and Waste Management, County of Maui.

EXHIBITS

1. Location Map
2. Proposed Land Use Map





ADDENDUM

Preliminary Drainage Report

Established 1969

Preliminary Drainage Report for

PU'UNANI

Waikapu, Wailuku, Maui, Hawaii
TMK: (2) 3-5-02: parcels 2 and 3

Prepared For: Wailuku Kuikahi LLC
220 S. King Street, Suite 2170
Honolulu, Hawaii 96813

Date: January 2006
November 2008

WARREN S. UNEMORI ENGINEERING, INC.
Civil and Structural Engineers - Land Surveyors
Wells Street Professional Center - Suite 403
2145 Wells Street
Wailuku, Maui, Hawaii 96793

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TABLE OF CONTENTS

Preliminary Drainage Report
for
Pu'unani

I. PURPOSE:

The purpose of this report is to describe existing drainage conditions associated with the project site and present a plan which will mitigate the impact of the proposed development.

II. PROPOSED PROJECT:

A. Location:

The 208 acre project area affects two land parcels[1] located in Wailuku, Maui. These two land parcels are bounded by the Wailuku Heights residential subdivision to the west, Kuikahi Drive to the north, and Honoapiilani Highway to the east.

B. Project Description:

The applicants plan to subdivide the 208 acre project area into a mixture of single- and multi-family homesites. Approximately 93 acres will be subdivided into ½ and 1 acre rural houselots; 47 acres will be subdivided into 6,000 to 10,000 sq.ft. urban single-family houselots; 47 acres will be designated for apartment sites; and 21 acres will be used for parks and open space.

[1]Tax Map Key (2) 3-5-02: Parcels 002 and 003.

III. EXISTING CONDITIONS:

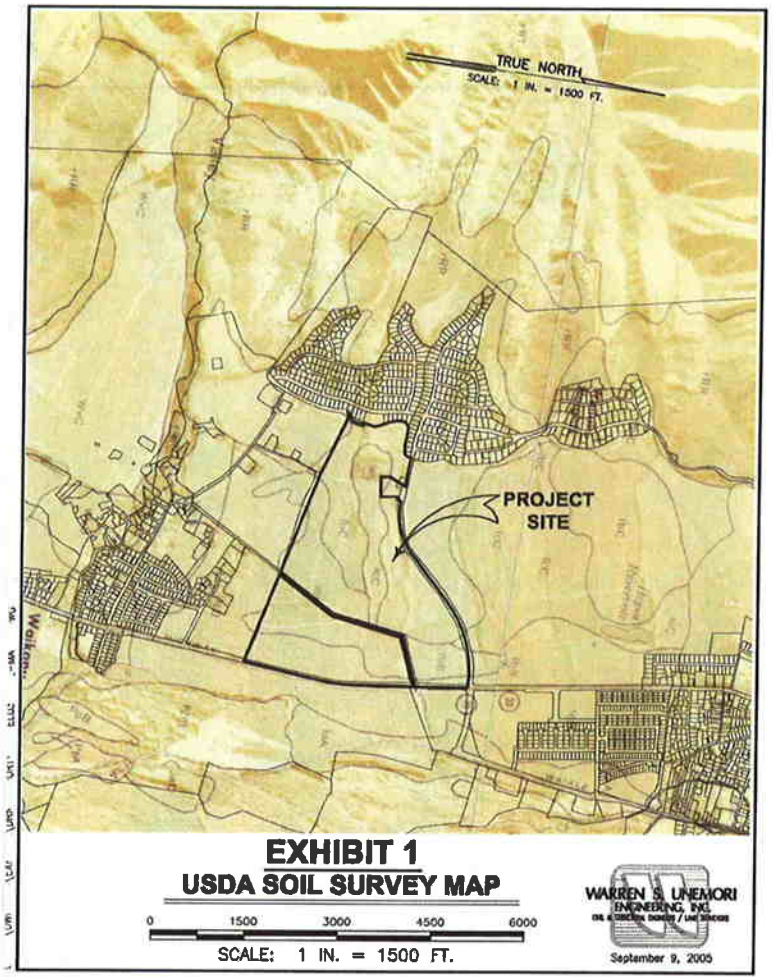
A. Topography and Soil Conditions:

The project site was previously used for cultivation of sugar cane and pineapple. The land is presently fallow and no longer in productive use.

The existing terrain slopes steadily downward from west to east at grades between 8 and 12 percent. Elevations across the project site range from approximately 810 feet above mean sea level at its western end, to roughly 350 feet at its eastern end. Notable topographic features found on the site include an existing 3 acre irrigation reservoir located at elevation 725 ft., and an existing irrigation ditch which crossed the site at elevation 450 ft. Two gullies running west-to-east cut across the upper portion of the project site before converging into a single gully at elevation 450 ft. which continues down to Honoapiilani Highway.

The USDA Natural Resources Conservation Service identifies Iao Clay (IcB, IcC) and Iao Silty Clay (IbB, IbC) as the predominant soil types found on the project site. (See Exhibit 1) These Iao clay soils are reported to produce a medium amount of runoff and represent a slight to moderate erosion hazard.[2]

[2]United States Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, (Washington D.C.: U.S. Government printing Office), August 1972, pp. 46-47, map sheets 99 and 100.



B. Flood and Tsunami Zone:

Current Flood Insurance Rate Maps[3] indicate that the project site is situated within Zone C, and subject to only a minimal hazard of flooding. (See Exhibit 2)

C. Existing Drainage Conditions:

1. Onsite Runoff:

Onsite surface runoff generated by the undeveloped 208 acre project area flows eastward toward Honoapiilani Highway in the form of both overland sheet flow and concentrated flows conveyed by the existing gullies. (See Exhibit 3) The 100-year 24-hour peak runoff generated by the project site in its current, undeveloped state is estimated to be 400 cfs.[4]

2. Offsite Runoff:

Approximately 339 acres of forested mountainside and portions of the Wailuku Heights residential subdivision drain through the project site, conveyed by existing gullies to a culvert crossing at Honoapiilani Highway. (See Exhibit 4) The magnitude of the 100-year 24-hour peak runoff generated by this offsite drainage area is estimated to be 1300 cfs at the mauka boundary of the project site.[5]

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[3]Federal Emergency Management Agency, "National Flood Insurance Program; Flood Insurance Rate Map; Maui County, Hawaii," Community Panel Number 150003 0170B Panel 170 of 400, June 1, 1981, and Community Panel Number 150003 0190D, Panel 190 of 400, Revised March 16, 1995.

[4]Supporting calculations may be found in Appendix A-1.

[5]Supporting calculations may be found in Appendix B.

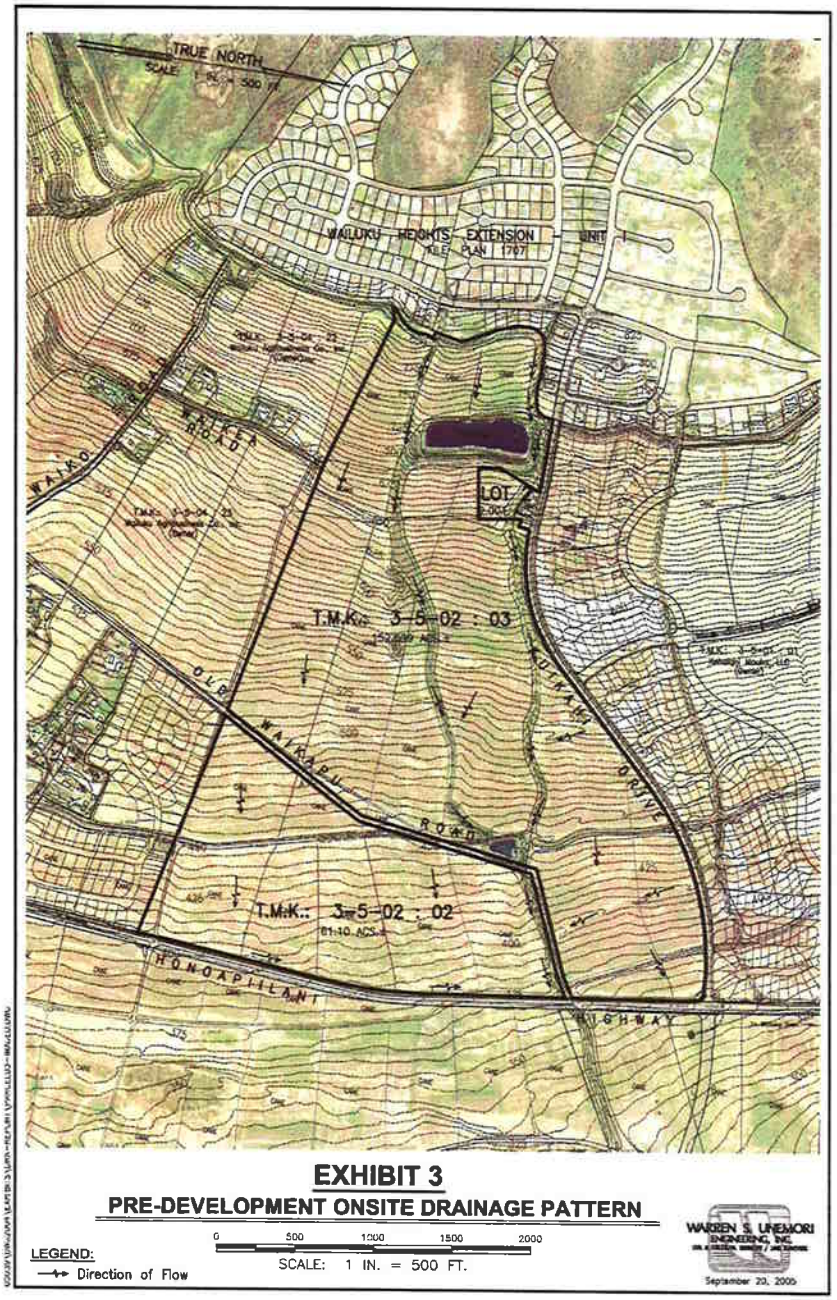


EXHIBIT 3

PRE-DEVELOPMENT ONSITE DRAINAGE PATTERN

LEGEND:

Direction of Flow

0 500 1000 1500 2000

SCALE: 1 IN. = 500 FT.

WARREN S. UNEMORI ENGINEERING, INC.

September 20, 2005

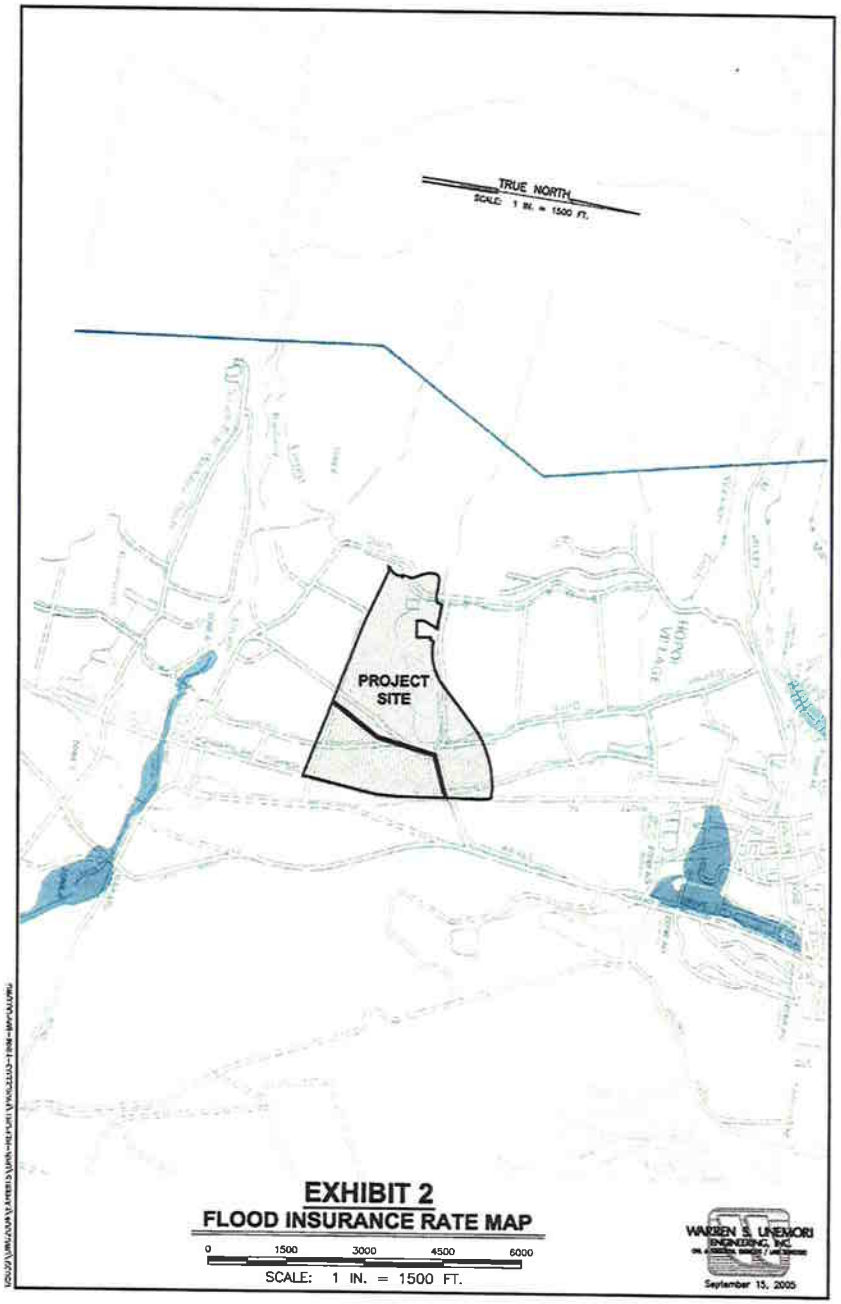


EXHIBIT 2

FLOOD INSURANCE RATE MAP

0 1500 3000 4500 6000

SCALE: 1 IN. = 1500 FT.

WARREN S. UNEMORI ENGINEERING, INC.

September 15, 2005

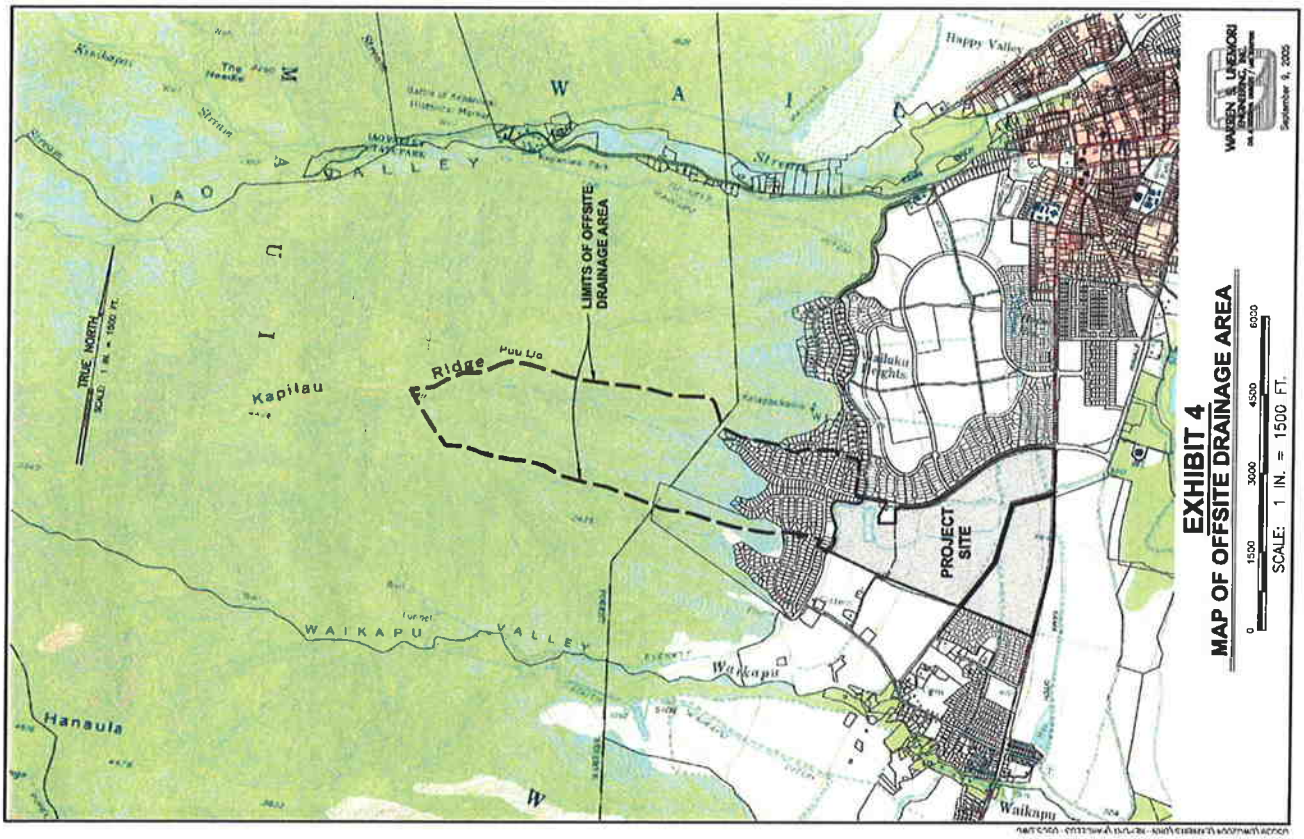


TABLE 1
EXISTING STORM RUNOFF

(Based on a 100 yr. - 24 hr. storm)

Drainage Area	Size	Peak Flow
Onsite	208 Ac.	400 cfs
Offsite	339 Ac.	1300 cfs

IV. DRAINAGE PLAN:

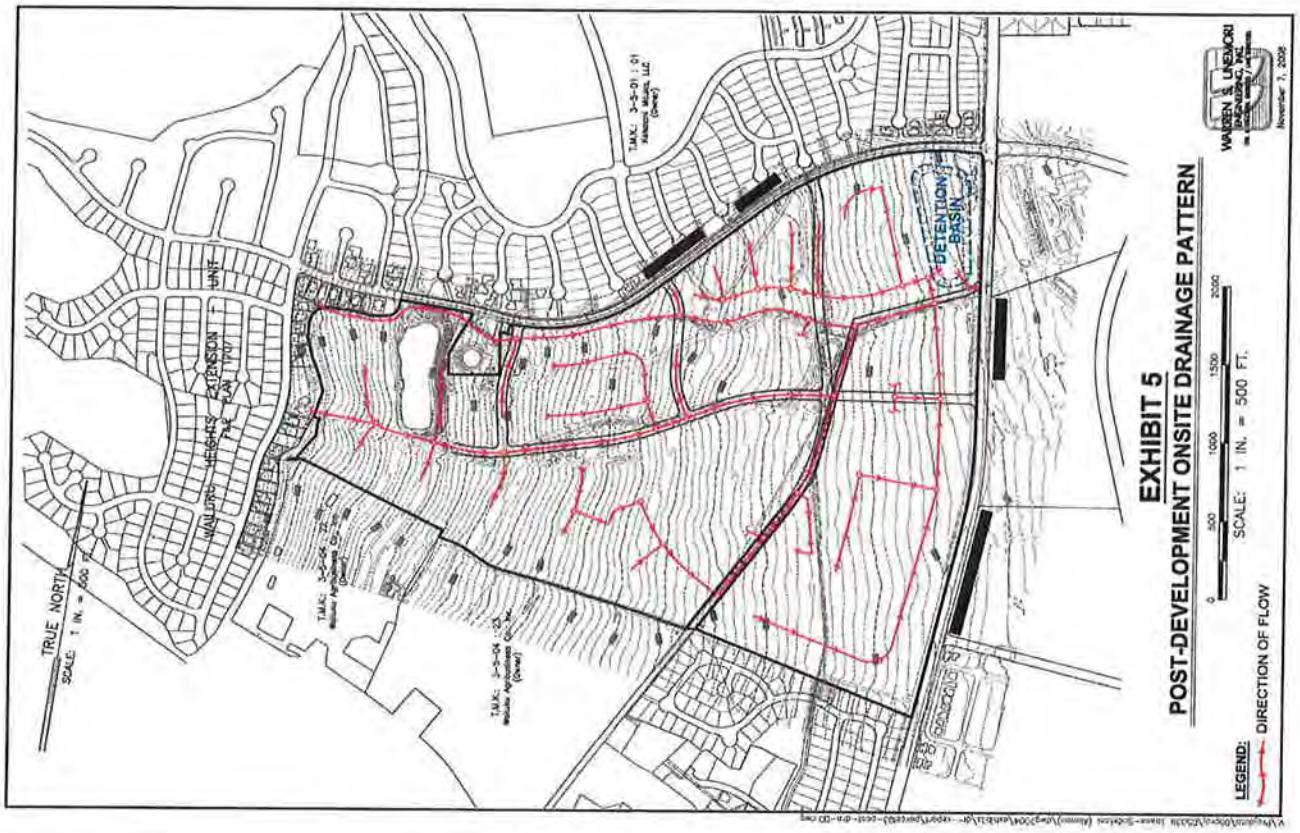
A. Description:

1. Onsite Runoff:

Post-development runoff from developed project site is expected to be 570 cfs.[6] The impact of developing the project site may be mitigated by constructing a detention basin to limit post-development discharges to pre-development levels. Runoff from the project area can be collected and conveyed by an underground storm drainage system to a detention basin located at the northeast corner of the project site. A detention basin with approximately 15 acre-feet of storage capacity[7] can reduce the post-development peak runoff to pre-development levels prior to discharge into the existing drainageway. Exhibit 5 illustrates the Post-Development drainage condition; Table 2 below summarizes the net impact of development on peak discharge.

[6]Supporting calculations may be found in Appendix A-2.

[7]Preliminary detention basin sizing calculations may be found in Appendix A-3.



2. Offsite Runoff:

Offsite runoff will be passed through the project site and continue to drain toward the culvert crossing at Honoapiilani Highway as it presently does.

TABLE 2
COMPARISON OF PRE- AND POST-DEVELOPMENT STORM FLOWS

(Based on a 100 yr. - 24 hr. storm)

Drainage Area	Size	Pre-Dev. Peak Flow:	Post-Dev. Peak Flow:	Change
Onsite	208 Ac.	400 cfs	570 cfs	+170 cfs
Offsite	339 Ac.	1300 cfs	1300 cfs	0 cfs
Combined Downstream Discharge		1700 cfs	1700 cfs*	0 cfs*

**Discharge after routing through detention basin.*

B. Conclusion:

The impact of developing the project site for residential use can be mitigated by constructing a drainage system which collects storm runoff from across the project site and conveys it to a detention basin with a storage capacity of at least 15 acre-ft. A detention basin of this size can limit post-development discharges from the project site to pre-development levels for the requisite 100-yr 24 hr. design storm, and thus enable the proposed subdivision to be developed without increasing the peak 100 yr. flow rate received by downstream properties.

APPENDIX A

PRE- AND POST-DEVELOPMENT HYDROLOGIC CALCULATIONS

Background

The hydrologic calculations contained in this report are based on the hydrograph method developed by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS)[8] and described in the "SCS National Engineering Handbook, Section 4, Hydrology (NEH-4)". Calculations were carried out using the "SCS Computer Program for Project Formulation, Hydrology (TR-20)", which utilizes the computational procedure described in NEH-4.

The curve numbers (CN) used in the hydrologic calculations were derived from USDA soil series and hydrologic group information and existing and proposed land uses for the relevant study area as recommended by USDA-NRCS in its publications entitled "Erosion and Sediment Control Guide for Hawaii"[9] and "Urban Hydrology for Small Watersheds"[10]. Weighted curve numbers were computed whenever a study area possessed a non-homogeneous mix of characteristics.

Concentration times used in hydrologic calculations were derived using the Curve Number (Lag) Method described in NEH-4.

100 yr.-24 hr. rainfall was obtained from Figure 56 in the Rainfall Frequency Atlas of the Hawaiian Islands.[11] A 100 yr.-24 hr. rainfall of 10 inches was used for onsite drainage area computations; 12 inches was used for the offsite drainage area to reflect the higher elevation of the offsite watershed.

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[8]Formerly known as the USDA Soil Conservation Service (SCS)

[9]United States Department of Agriculture, Soil Conservation Service, Erosion and Sediment Control, March 1981.

[10]United States Department of Agriculture, Soil Conservation Service, Urban Hydrology for Small Watersheds, June 1986.

[11]U.S. Weather Bureau, U.S. Department of Commerce, Rainfall Frequency Atlas of the Hawaiian Islands, Washington D.C.: U.S. Government Printing Office, 1962, p. 57.

APPENDIX A-1

100 yr-24 hr Pre-Development Hydrologic Calculations

TABLE 3

PRE-DEVELOPMENT ONSITE RUNOFF

Computation of Weighted Runoff Curve Numbers (CN)

Land Use	Land Area	Hydrologic Soil Type	Base CN	Weighted CN
Fallow Cropland / Pasture	208 Ac.	*B (IbB, IbC, IcB, IcC)*	75	75.0
Total	208 Ac.			75

MASTER DESIGN STORM SUMMARY

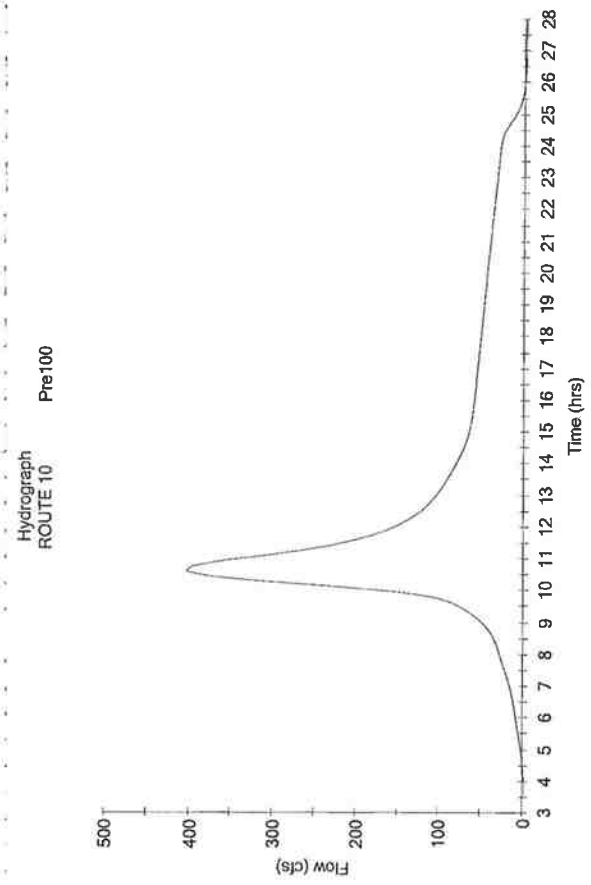
Network Storm Collection: Wailuku Heights

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	10.0000	Synthetic Curve	TypeI 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUT 10		JCT	100	120.923		10.6000	403.19		
POND 10	IN	POND	100	120.923		10.6000	403.19		
POND 10	OUT	POND	100	120.923		10.6000	403.19		
SUBAREA 10		AREA	100	120.923		10.6000	403.19		



TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: SCS Lag

Hydraulic Length	7100.00 ft
Runoff CN	75
Slope	.060000 ft/ft
Avg. Velocity	1.64 ft/sec

Segment #1 Time: 1.2042 hrs

Total Tc: 1.2042 hrs

Tc Equations used...

SCS Lag

$$Tc = 0.000877 * (Lf^{0.8}) * ((1000/CN) - 9)^{0.7} * (Sf^{-0.5})$$

Where: Tc = Time of concentration, hrs
Lf = Flow length, ft
CN = SCS Curve Number
Sf = Slope, ft/ft

DIVERTED HYDROGRAPH...
HYG file = V:\GENDATA\Users\alu\PondPackData\Puunani\work_pad.hyg
HYG ID = ROUTE 10
HYG Tag = Prel00

Peak Discharge =	403.19 cfs
Time to Peak =	10.6000 hrs
HYG Volume =	120.923 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
3.5500	.00	.00	.00	.00	.01
3.8000	.02	.03	.05	.08	.10
4.0500	.15	.21	.27	.35	.46
4.3000	.56	.68	.83	.98	1.14
4.5500	1.34	1.53	1.73	1.96	2.19
4.8000	2.42	2.67	2.93	3.19	3.45
5.0500	3.73	4.00	4.28	4.57	4.85
5.3000	5.14	5.43	5.72	6.02	6.31
5.5500	6.61	6.91	7.21	7.51	7.81
5.8000	8.11	8.41	8.71	9.01	9.31
6.0500	9.61	9.91	10.22	10.53	10.83
6.3000	11.15	11.48	11.80	12.14	12.50
6.5500	12.85	13.23	13.63	14.04	14.45
6.8000	14.92	15.38	15.84	16.36	16.89
7.0500	17.41	17.98	18.56	19.14	19.74
7.3000	20.36	20.98	21.60	22.25	22.89
7.5500	23.53	24.17	24.81	25.45	26.08
7.8000	26.70	27.33	27.95	28.56	29.17
8.0500	29.78	30.40	31.01	31.64	32.32
8.3000	33.00	33.68	34.52	35.36	36.20
8.5500	37.26	38.38	39.49	40.80	42.25
8.8000	43.70	45.20	47.07	48.87	50.73
9.0500	52.80	55.02	57.17	59.66	62.17
9.3000	64.68	67.51	70.44	73.37	76.78
9.5500	80.61	84.44	89.12	95.57	102.02
9.8000	109.27	122.73	136.19	149.64	170.40
10.0500	191.95	213.50	238.71	265.56	292.40
10.3000	316.58	337.06	359.15	377.10	386.01
10.5500	394.92	403.19	400.88	398.56	396.25
10.8000	387.12	376.75	366.38	353.00	337.89
11.0500	322.78	308.11	294.02	279.93	266.45

Type.... Diverted Hydrograph
Name.... ROUTE 10
File.... V:\GENDATA\Users\alu\PondPackData\Puunani\OnsitePre.ppw
Storm... TypeI 24hr Tag: Prel00

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
11.3000	255.28	244.10	232.93	224.17	215.42
11.5500	206.66	199.21	192.11	185.00	178.79
11.8000	173.23	167.67	162.52	158.06	153.61
12.0500	149.29	145.69	142.08	138.48	135.51
12.3000	132.57	129.64	127.06	124.61	122.16
12.5500	119.90	117.83	115.75	113.76	111.99
12.8000	110.21	108.45	106.92	105.39	103.86
13.0500	102.48	101.12	99.77	98.49	97.26
13.3000	96.03	94.82	93.65	92.47	91.31
13.5500	90.18	89.04	87.91	86.83	85.75
13.8000	84.67	83.67	82.69	81.71	80.75
14.0500	79.80	78.86	77.93	77.01	76.10
14.3000	75.20	74.34	73.48	72.62	71.85
14.5500	71.08	70.31	69.62	68.96	68.29
14.8000	67.69	67.14	66.59	66.07	65.61
15.0500	65.16	64.72	64.35	63.97	63.60
15.3000	63.28	62.96	62.65	62.36	62.08
15.5500	61.81	61.54	61.30	61.05	60.81
15.8000	60.58	60.35	60.13	59.92	59.70
16.0500	59.49	59.29	59.09	58.88	58.69
16.3000	58.49	58.30	58.10	57.91	57.72
16.5500	57.54	57.35	57.16	56.98	56.79
16.8000	56.61	56.42	56.24	56.06	55.88
17.0500	55.69	55.51	55.33	55.15	54.97
17.3000	54.79	54.60	54.42	54.24	54.06
17.5500	53.88	53.70	53.52	53.34	53.15
17.8000	52.97	52.79	52.61	52.43	52.25
18.0500	52.06	51.88	51.70	51.52	51.33
18.3000	51.15	50.97	50.78	50.60	50.42
18.5500	50.23	50.05	49.86	49.68	49.49
18.8000	49.31	49.12	48.94	48.75	48.57
19.0500	48.38	48.20	48.01	47.83	47.64
19.3000	47.45	47.27	47.08	46.90	46.71
19.5500	46.52	46.33	46.15	45.96	45.77
19.8000	45.59	45.40	45.21	45.02	44.83
20.0500	44.65	44.46	44.27	44.08	43.89
20.3000	43.70	43.52	43.33	43.14	42.95
20.5500	42.76	42.57	42.38	42.19	42.00
20.8000	41.81	41.62	41.43	41.24	41.05
21.0500	40.86	40.67	40.48	40.29	40.10
21.3000	39.91	39.72	39.52	39.33	39.14
21.5500	38.95	38.76	38.57	38.38	38.19
21.8000	37.99	37.80	37.61	37.42	37.23
22.0500	37.03	36.84	36.65	36.46	36.26
22.3000	36.07	35.88	35.69	35.49	35.30

HYDROGRAPH ORDINATES (cfs)
Output Time Increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
22.5500	35.11	34.91	34.72	34.53	34.33
22.8000	34.14	33.95	33.75	33.56	33.37
23.0500	33.17	32.98	32.79	32.59	32.40
23.3000	32.20	32.01	31.81	31.62	31.43
23.5500	31.23	31.04	30.84	30.65	30.45
23.8000	30.26	30.06	29.87	29.64	29.38
24.0500	29.13	28.81	28.37	27.92	27.45
24.3000	26.67	25.90	25.12	24.03	22.91
24.5500	21.78	20.54	19.24	17.94	16.66
24.8000	15.40	14.13	12.91	11.80	10.70
25.0500	9.61	8.75	7.89	7.01	6.39
25.3000	5.78	5.17	4.68	4.25	3.82
25.5500	3.44	3.12	2.81	2.52	2.29
25.8000	2.07	1.84	1.68	1.51	1.35
26.0500	1.22	1.10	.99	.89	.80
26.3000	.72	.64	.58	.52	.46
26.5500	.42	.38	.33	.30	.27
26.8000	.24	.21	.19	.17	.15
27.0500	.13	.11	.10	.09	.07
27.3000	.06	.05	.04	.04	.03
27.5500	.02	.02	.01	.01	.01
27.8000	.00	.00	.00		

APPENDIX A-2

100 yr-24 hr Post-Development Hydrologic Calculations

TABLE 4

POST-DEVELOPMENT ONSITE RUNOFF

Computation of Weighted Runoff Curve Numbers (CN)

Land Use	Land Area	Hydrologic Soil Type	Base CN	Weighted CN
Rural (1 acre lots)	7 Ac.	*B (IbC, IcC)*	70	2.4
Rural (1/2 acre lots)	86 Ac.	*B (IbB, IbC, IcC)*	72	29.8
R-3 (10,000 s.f. lots)	21 Ac.	*B (IbB, IbC, IcC)*	77	7.8
R-2 (7,500 s.f. lots)	13 Ac.	*B (IbB, IbC, IcC)*	82	5.1
R-1 (6,000 s.f. lots)	13 Ac.	*B (IbB, IbC)*	87	5.4
Multi-Family Apartments	47 Ac.	*B (IbB, IbC, IcB, IcC)*	95	21.5
Parks and Open Space	21 Ac.	*B (IbB, IbC, IcB)*	69	7.0
Total	208 Ac.			79

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Type.... Master Network Summary   Page 1.01
Name.... Watershed
File.... V:\GENDATA\Users\alu\PondPackData\Puunani\OnsitePost.ppw

MASTER DESIGN STORM SUMMARY

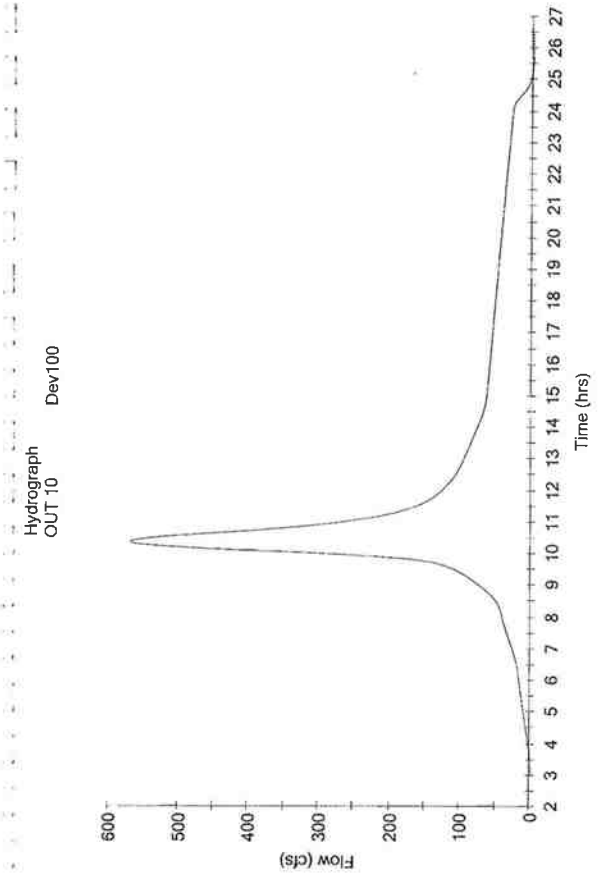
Network Storm Collection: Wailuku Heights

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev100	10.0000	Synthetic Curve	TypeI 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUT 10		JCT	100	129.979		10.3500	567.89		
POND 10	IN	POND	100	129.979		10.3500	567.89		
POND 10	OUT	POND	100	129.979		10.3500	567.89		
SUBAREA 10		AREA	100	129.979		10.3500	567.89		



TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: SCS Lag

Hydraulic Length	5600.00 ft
Runoff CN	79
Slope	.080000 ft/ft
Avg.Velocity	2.03 ft/sec

Segment #1 Time: .7661 hrs

Total Tc: .7661 hrs

Tc Equations used...

---- SCS Lag ----

Tc = 0.000877 * (Lf**0.8) * ((1000/CN) - 9)**0.7) * (Sf**-0.5)

Where: Tc = Time of concentration, hrs
Lf = Flow length, ft
CN = SCS Curve Number
Sf = Slope, ft/ft

DIVERTED HYDROGRAPH...
HYG file =
HYG ID = ROUTE 10
HYG Tag = Dev100

Peak Discharge =	567.89 cfs
Time to Peak =	10.3500 hrs
HYG Volume =	129.979 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
2.9500	.00	.00	.00	.02	.03
3.2000	.06	.10	.16	.25	.36
3.4500	.49	.65	.83	1.03	1.24
3.7000	1.50	1.77	2.04	2.34	2.64
3.9500	2.95	3.27	3.60	3.94	4.28
4.2000	4.62	4.98	5.33	5.69	6.04
4.4500	6.40	6.76	7.12	7.48	7.83
4.7000	8.15	8.54	8.90	9.25	9.60
4.9500	9.95	10.29	10.64	10.98	11.33
5.2000	11.67	12.01	12.35	12.68	13.02
5.4500	13.35	13.69	14.02	14.35	14.67
5.7000	15.00	15.32	15.65	15.97	16.29
5.9500	16.61	16.93	17.25	17.57	17.89
6.2000	18.23	18.58	18.95	19.33	19.76
6.4500	20.20	20.68	21.18	21.74	22.30
6.7000	22.92	23.54	24.21	24.89	25.61
6.9500	26.33	27.08	27.84	28.63	29.41
7.2000	30.21	31.01	31.80	32.59	33.35
7.4500	34.11	34.84	35.57	36.26	36.95
7.7000	37.61	38.26	38.89	39.51	40.12
7.9500	40.72	41.32	41.92	42.55	43.20
8.2000	43.92	44.70	45.61	46.64	47.84
8.4500	49.21	50.75	52.50	54.40	56.52
8.7000	58.74	61.17	63.68	66.36	69.08
8.9500	71.96	74.86	77.91	80.99	84.24
9.2000	87.54	91.09	94.69	98.66	102.66
9.4500	107.14	111.62	117.16	122.70	130.89
9.7000	139.19	153.84	169.06	196.80	226.33
9.9500	269.58	315.59	368.58	424.34	472.47
10.2000	518.14	545.48	565.07	567.89	562.69
10.4500	545.67	522.66	494.14	461.52	429.07

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
10.7000	396.77	367.48	341.35	317.65	296.99
10.9500	277.82	260.86	245.07	231.35	218.52
11.2000	207.62	197.31	188.58	180.25	173.31
11.4500	166.63	161.08	155.69	151.21	146.82
11.7000	143.17	139.56	136.53	133.51	130.92
11.9500	128.33	126.01	123.71	121.57	119.44
12.2000	117.44	115.46	113.64	111.85	110.27
12.4500	108.74	107.37	106.04	104.80	103.58
12.7000	102.42	101.29	100.20	99.13	98.09
12.9500	97.06	96.05	95.05	94.06	93.06
13.2000	92.10	91.13	90.17	89.20	88.24
13.4500	87.29	86.33	85.37	84.42	83.46
13.7000	82.51	81.56	80.60	79.64	78.69
13.9500	77.73	76.78	75.82	74.87	73.94
14.2000	73.01	72.13	71.26	70.47	69.68
14.4500	69.00	68.32	67.74	67.18	66.70
14.7000	66.24	65.84	65.46	65.12	64.79
14.9500	64.49	64.21	63.94	63.68	63.44
15.2000	63.20	62.97	62.75	62.54	62.33
15.4500	62.12	61.92	61.71	61.52	61.32
15.7000	61.13	60.93	60.74	60.55	60.36
15.9500	60.17	59.98	59.79	59.60	59.42
16.2000	59.23	59.04	58.85	58.67	58.48
16.4500	58.29	58.11	57.92	57.73	57.54
16.7000	57.35	57.17	56.98	56.79	56.60
16.9500	56.41	56.22	56.03	55.85	55.66
17.2000	55.47	55.28	55.09	54.90	54.71
17.4500	54.52	54.33	54.14	53.95	53.75
17.7000	53.56	53.37	53.18	52.99	52.80
17.9500	52.61	52.42	52.22	52.03	51.84
18.2000	51.65	51.46	51.26	51.07	50.88
18.4500	50.69	50.49	50.30	50.11	49.91
18.7000	49.72	49.53	49.33	49.14	48.95
18.9500	48.75	48.56	48.37	48.17	47.98
19.2000	47.78	47.59	47.39	47.20	47.00
19.4500	46.81	46.61	46.42	46.22	46.02
19.7000	45.83	45.63	45.44	45.24	45.05
19.9500	44.85	44.65	44.46	44.26	44.07
20.2000	43.87	43.67	43.48	43.28	43.08
20.4500	42.89	42.69	42.49	42.30	42.10
20.7000	41.90	41.71	41.51	41.31	41.12
20.9500	40.92	40.72	40.52	40.33	40.13
21.2000	39.93	39.73	39.54	39.34	39.14
21.4500	38.94	38.74	38.55	38.35	38.15
21.7000	37.95	37.75	37.56	37.36	37.16

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
21.9500	36.96	36.76	36.56	36.36	36.17
22.2000	35.97	35.77	35.57	35.37	35.17
22.4500	34.97	34.77	34.57	34.37	34.18
22.7000	33.98	33.78	33.58	33.38	33.18
22.9500	32.98	32.78	32.58	32.38	32.18
23.2000	31.98	31.78	31.58	31.38	31.18
23.4500	30.98	30.78	30.58	30.38	30.18
23.7000	29.98	29.78	29.58	29.38	29.18
23.9500	28.97	28.76	28.37	27.95	27.19
24.2000	26.36	25.01	23.53	21.69	19.72
24.4500	17.70	15.65	13.72	11.84	10.17
24.7000	8.61	7.32	6.20	5.27	4.49
24.9500	3.83	3.27	2.77	2.36	2.00
25.2000	1.71	1.44	1.23	1.04	.88
25.4500	.74	.63	.53	.45	.38
25.7000	.32	.26	.22	.18	.15
25.9500	.12	.10	.08	.06	.05
26.2000	.04	.02	.02	.01	.00
26.4500	.00				

APPENDIX A-3

Preliminary Detention Basin Sizing Calculations

DETENTION STORAGE ESTIMATES -- Target Peak Outflow Rate

Return Events	Peak In (cfs)	Target (cfs)	Lower (ac-ft)	Linear (ac-ft)	Upper (ac-ft)	Total (ac-ft)
100	1804.677	1620.770	2.952	14.231	129.658	398.240

CALCULATION TIME RANGES

Return Events	Lower From (hrs)	Lower To (hrs)	Linear From (hrs)	Linear To (hrs)	Upper From (hrs)	Upper To (hrs)	Total From (hrs)	Total To (hrs)
100	10.17	10.46	9.85	10.46	2.60	10.46	2.60	27.05

MASTER DESIGN STORM SUMMARY

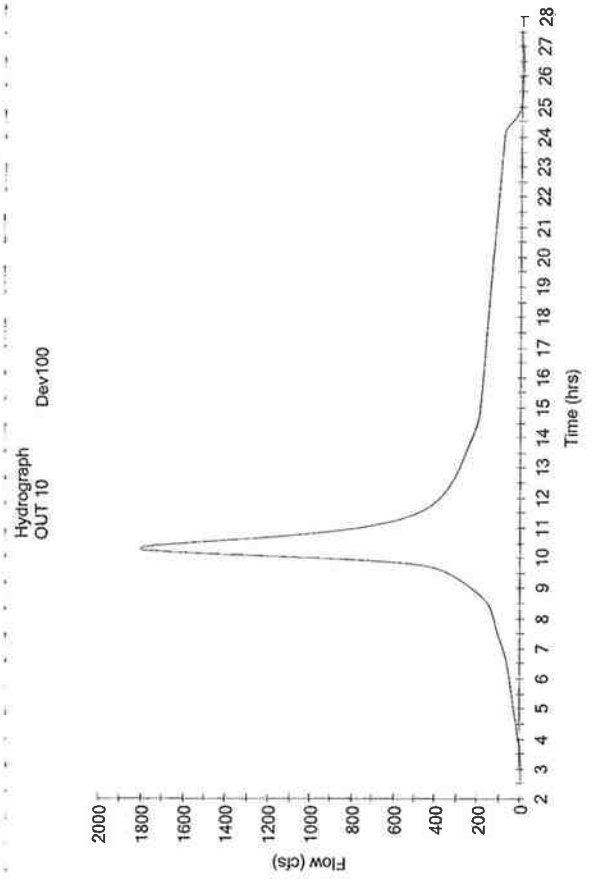
Network Storm Collection: Wailuku Heights

Return Event	Total Depth in	Rainfall Type	RNF ID
Dev100	11.6160	Synthetic Curve	TypeI 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= hYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
JUNC 20		JCT	100	241.033		10.2000	1246.47		
*OUT 10		JCT	100	398.240		10.3000	1804.68		
POND 10	IN	POND	100	398.240		10.3000	1804.68		
POND 10	OUT	POND	100	398.240		10.3000	1804.68		
POND 20	IN	POND	100	241.033		10.2000	1246.47		
POND 20	OUT	POND	100	241.033		10.2000	1246.47		
SUBAREA 10		AREA	100	157.206		10.4500	611.99		
SUBAREA 20		AREA	100	241.033		10.2000	1246.47		



DIVERTED HYDROGRAPH...
HYG file = V:\GENDATA\Users\alu\PondPackData\Puunani\work_pad.hyg
HYG ID = ROUTE 10
HYG Tag = Dev100

Peak Discharge =	1804.68 cfs
Time to Peak =	10.3000 hrs
HYG Volume =	398.240 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
2.6000	.00	.00	.01	.02	.04
2.8500	.06	.11	.16	.24	.34
3.1000	.46	.63	.82	1.08	1.38
3.3500	1.77	2.25	2.77	3.43	4.13
3.6000	4.88	5.73	6.60	7.51	8.47
3.8500	9.45	10.46	11.49	12.54	13.61
4.1000	14.70	15.80	16.90	18.03	19.15
4.3500	20.27	21.40	22.52	23.64	24.76
4.6000	25.87	26.97	28.07	29.17	30.26
4.8500	31.34	32.41	33.49	34.55	35.61
5.1000	36.67	37.72	38.76	39.80	40.84
5.3500	41.86	42.88	43.90	44.91	45.93
5.6000	46.93	47.93	48.92	49.91	50.90
5.8500	51.87	52.85	53.82	54.78	55.75
6.1000	56.72	57.70	58.72	59.76	60.88
6.3500	62.10	63.37	64.80	66.32	67.90
6.6000	69.65	71.46	73.36	75.37	77.43
6.8500	79.59	81.81	84.09	86.42	88.81
7.1000	91.25	93.72	96.20	98.69	101.16
7.3500	103.57	105.94	108.24	110.47	112.65
7.6000	114.75	116.81	118.80	120.76	122.67
7.8500	124.54	126.39	128.20	130.01	131.82
8.1000	133.67	135.58	137.69	140.09	142.84
8.3500	146.09	149.86	154.32	159.27	164.96
8.6000	171.14	177.77	185.12	192.64	200.65
8.8500	209.00	217.53	226.50	235.58	244.95
9.1000	254.56	264.44	274.77	285.52	297.03
9.3500	309.00	321.93	335.66	349.97	366.55
9.6000	384.87	406.07	435.75	473.17	527.29
9.8500	605.33	710.65	844.02	1012.82	1202.03
10.1000	1399.54	1567.07	1698.27	1796.75	1804.68

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
10.3500	1787.76	1733.48	1642.12	1549.75	1440.79
10.6000	1345.63	1251.78	1161.79	1081.73	1004.39
10.8500	932.28	870.74	814.57	763.24	721.21
11.1000	681.37	646.64	615.81	586.95	562.02
11.3500	538.88	518.73	500.46	483.90	469.36
11.6000	455.52	443.61	432.35	421.97	412.96
11.8500	404.23	396.62	389.31	382.34	375.85
12.1000	369.44	363.55	357.77	352.26	347.02
12.3500	341.90	337.20	332.59	328.22	324.05
12.6000	319.94	316.08	312.27	308.59	305.03
12.8500	301.52	298.22	294.93	291.77	288.68
13.1000	285.62	282.60	279.59	276.61	273.63
13.3500	270.67	267.73	264.79	261.87	258.93
13.6000	256.00	253.08	250.16	247.25	244.34
13.8500	241.41	238.49	235.56	232.64	229.73
14.1000	226.83	223.96	221.13	218.40	215.82
14.3500	213.37	211.09	209.00	207.13	205.38
14.6000	203.84	202.43	201.09	199.95	198.94
14.8500	197.82	196.88	195.97	195.15	194.34
15.1000	193.58	192.84	192.13	191.44	190.77
15.3500	190.11	189.47	188.83	188.21	187.59
15.6000	186.99	186.38	185.78	185.19	184.60
15.8500	184.01	183.43	182.85	182.27	181.69
16.1000	181.11	180.53	179.95	179.38	178.80
16.3500	178.23	177.65	177.08	176.50	175.93
16.6000	175.35	174.78	174.20	173.62	173.05
16.8500	172.48	171.90	171.32	170.75	170.17
17.1000	169.59	169.01	168.44	167.86	167.28
17.3500	166.70	166.12	165.54	164.96	164.38
17.6000	163.79	163.21	162.63	162.05	161.46
17.8500	160.88	160.30	159.71	159.13	158.54
18.1000	157.96	157.37	156.79	156.20	155.61
18.3500	155.03	154.44	153.85	153.26	152.68
18.6000	152.09	151.50	150.91	150.32	149.73
18.8500	149.14	148.55	147.96	147.37	146.78
19.1000	146.19	145.60	145.00	144.41	143.82
19.3500	143.23	142.63	142.04	141.45	140.85
19.6000	140.26	139.66	139.07	138.47	137.88
19.8500	137.28	136.69	136.09	135.50	134.90
20.1000	134.30	133.71	133.11	132.51	131.92
20.3500	131.32	130.72	130.12	129.52	128.92
20.6000	128.33	127.73	127.13	126.53	125.93
20.8500	125.33	124.73	124.13	123.52	122.92
21.1000	122.32	121.72	121.12	120.52	119.92
21.3500	119.32	118.71	118.11	117.51	116.91

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
21.6000	116.30	115.70	115.10	114.49	113.89
21.8500	113.29	112.68	112.08	111.47	110.87
22.1000	110.27	109.66	109.06	108.45	107.85
22.3500	107.24	106.64	106.03	105.42	104.82
22.6000	104.21	103.61	103.00	102.39	101.79
22.8500	101.18	100.57	99.96	99.36	98.75
23.1000	98.14	97.53	96.93	96.32	95.71
23.3500	95.10	94.50	93.89	93.28	92.67
23.6000	92.06	91.45	90.84	90.23	89.62
23.8500	89.01	88.41	87.80	87.09	86.18
24.1000	84.86	82.96	79.88	75.57	70.34
24.3500	64.04	57.33	50.59	44.14	38.07
24.6000	32.57	28.03	23.88	20.45	17.46
24.8500	14.85	12.67	10.72	9.23	7.86
25.1000	6.75	5.80	4.94	4.29	3.66
25.3500	3.15	2.72	2.32	2.01	1.72
25.6000	1.48	1.27	1.08	.93	.79
25.8500	.69	.59	.51	.45	.38
26.1000	.33	.29	.24	.21	.18
26.3500	.15	.13	.11	.09	.07
26.6000	.06	.04	.03	.02	.02
26.8500	.01	.01	.00	.00	.00

APPENDIX B

OFFSITE HYDROLOGIC CALCULATIONS

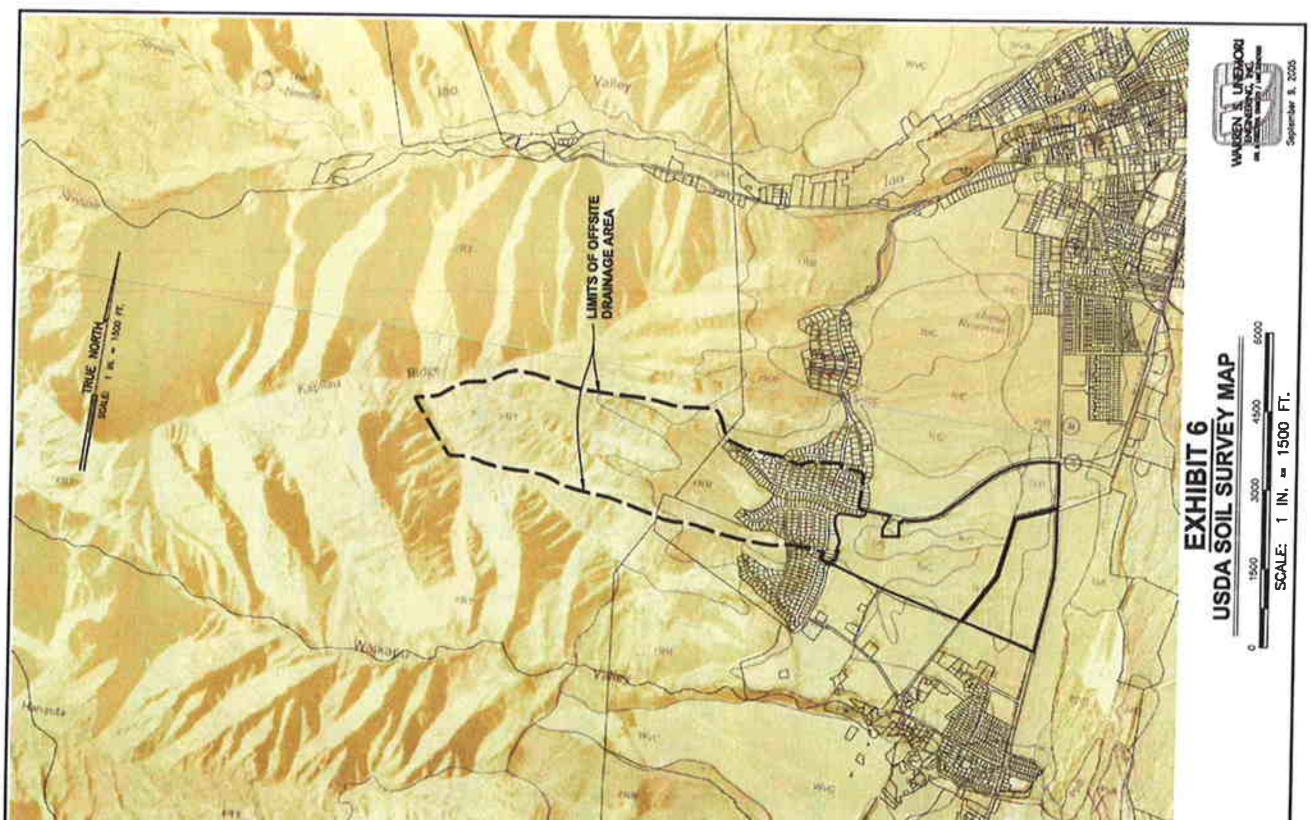
TABLE 5

OFFSITE RUNOFF

Computation of Weighted Runoff Curve Numbers (CN)

Land Use	Land Area	Hydrologic Soil Type	Base CN	Weighted CN
Forest	173 Ac.	*D (rRT)*	77	39.3
Forest	93 Ac.	*C (rRR)*	70	19.2
Residential (1/6 acre)	10 Ac.	*C (rRR)*	87	2.6
Residential (1/6 acre)	61 Ac.	*B (IbC)*	80	14.4
Water Tank Site	2 Ac.	*B (IbC, IcC)*	80	0.5
Total	339 Ac.			76

[illegible]



MASTER DESIGN STORM SUMMARY

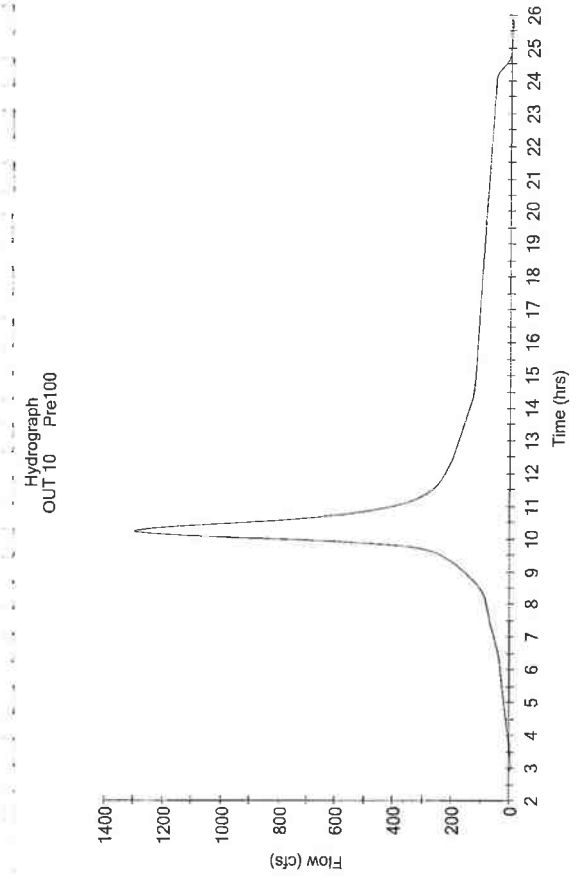
Network Storm Collection: Wailuku Heights

Return Event	Total Depth in	Rainfall Type	RNF ID
Pre100	12.0000	Synthetic Curve	Type1 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*OUT 10		JCT	100	251.356		10.2000	1300.10		
POND 10	IN	POND	100	251.356		10.2000	1300.10		
POND 10	OUT	POND	100	251.356		10.2000	1300.10		
SUBAREA 10		AREA	100	251.356		10.2000	1300.10		



File.... V:\GENDATA\Users\alu\PondPackData\Towne-Sodetani Waikapu\OFFSITE.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: SCS Lag

Hydraulic Length 7000.00 ft
Runoff CN 76
Slope .250000 ft/ft

Avg. Velocity 3.43 ft/sec

Segment #1 Time: .5667 hrs

Total Tc: .5667 hrs

File.... V:\GENDATA\Users\alu\PondPackData\Towne-Sodetani Waikapu\OFFSITE.PPW

Tc Equations used...

**** SCS Lag ****

Tc = 0.600877 * (Lf**0.8) * ((1000/CN) - 9)**0.7) * (Sf**-0.5)

Where: Tc = Time of concentration, hrs
Lf = Flow length, ft
CN = SCS Curve Number
Sf = Slope, ft/ft

SUMMARY FOR HYDROGRAPH ADDITION
at Node: OUT 10

HYG Directory: V:\GENDATA\Users\alu\PondPackData\Towne-Sodetani Waikapu\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ROUTE 10	POND 10	IN work_pad.hyg	ROUTE 10	Pre100

INFLOWS TO: OUT 10

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	ROUTE 10	Pre100	251.356	10.2000	1300.10

TOTAL FLOW INTO: OUT 10

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
work_pad.hyg	OUT 10	Pre100	251.356	10.2000	1300.10

TOTAL NODE INFLOW...
HYG file = V:\GENDATA\Users\alu\PondPackData\Towne-Sodetani Waikapu\work_pad.hyg
HYG ID = OUT 10
HYG Tag = Pre100

Peak Discharge =	1300.10 cfs
Time to Peak =	10.2000 hrs
HYG Volume =	251.356 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
2.9500	.00	.01	.03	.06	.15
3.2000	.28	.45	.72	1.04	1.40
3.4500	1.85	2.33	2.84	3.40	3.98
3.7000	4.59	5.21	5.86	6.51	7.18
3.9500	7.86	8.55	9.25	9.95	10.66
4.2000	11.38	12.10	12.81	13.52	14.23
4.4500	14.94	15.64	16.34	17.03	17.72
4.7000	18.41	19.09	19.76	20.44	21.10
4.9500	21.77	22.44	23.10	23.75	24.41
5.2000	25.06	25.71	26.35	26.99	27.62
5.4500	28.26	28.89	29.52	30.15	30.78
5.7000	31.40	32.02	32.63	33.24	33.85
5.9500	34.45	35.06	35.67	36.29	36.93
6.2000	37.60	38.34	39.14	39.99	40.97
6.4500	42.00	43.10	44.29	45.54	46.83
6.7000	48.25	49.61	51.05	52.54	54.06
6.9500	55.60	57.19	58.79	60.41	62.04
7.2000	63.65	65.24	66.77	68.26	69.71
7.4500	71.07	72.40	73.69	74.92	76.13
7.7000	77.32	78.47	79.61	80.72	81.83
7.9500	82.94	84.04	85.18	86.38	87.69
8.2000	89.30	91.15	93.40	96.19	99.30
8.4500	102.93	107.07	111.50	116.35	121.50
8.7000	126.82	132.38	138.13	144.00	150.03
8.9500	156.17	162.39	168.77	175.35	182.13
9.2000	189.33	196.98	205.00	213.73	223.05
9.4500	232.86	243.78	256.19	270.19	290.14
9.7000	318.18	353.80	412.80	493.81	594.02
9.9500	731.08	877.92	1032.35	1156.96	1245.60
10.2000	1300.10	1282.12	1238.72	1169.21	1073.44
10.4500	977.40	881.56	800.16	726.64	662.05

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs

Time hrs	Time on left represents time for first value in each row.				
10.7000	608.04	556.80	515.00	478.73	445.97
10.9500	417.38	393.81	372.53	353.86	338.28
11.2000	323.96	311.30	300.51	290.67	282.04
11.4500	274.62	267.78	261.66	256.16	251.00
11.7000	246.31	242.19	238.34	234.84	231.53
11.9500	228.31	225.17	222.12	219.12	216.20
12.2000	213.37	210.61	207.98	205.47	203.06
12.4500	200.75	198.55	196.41	194.35	192.35
12.7000	190.38	188.46	186.56	184.67	182.80
12.9500	180.95	179.10	177.26	175.43	173.60
13.2000	171.76	169.92	168.09	166.27	164.44
13.4500	162.61	160.77	158.93	157.10	155.26
13.7000	153.43	151.59	149.74	147.89	146.04
13.9500	144.19	142.35	140.51	138.69	136.92
14.2000	135.19	133.62	132.14	130.78	129.61
14.4500	128.54	127.60	126.80	126.07	125.42
14.7000	124.83	124.28	123.77	123.30	122.84
14.9500	122.41	121.99	121.59	121.19	120.81
15.2000	120.43	120.05	119.68	119.31	118.94
15.4500	118.58	118.22	117.86	117.50	117.14
15.7000	116.73	116.42	116.06	115.70	115.34
15.9500	114.98	114.62	114.26	113.90	113.54
16.2000	113.18	112.82	112.46	112.09	111.73
16.4500	111.37	111.01	110.64	110.28	109.92
16.7000	109.55	109.19	108.82	108.46	108.09
16.9500	107.73	107.36	106.99	106.63	106.26
17.2000	105.89	105.53	105.16	104.79	104.42
17.4500	104.06	103.69	103.32	102.95	102.58
17.7000	102.21	101.84	101.47	101.10	100.73
17.9500	100.36	99.99	99.62	99.24	98.87
18.2000	98.50	98.13	97.75	97.38	97.01
18.4500	96.64	96.26	95.89	95.52	95.14
18.7000	94.77	94.40	94.02	93.65	93.27
18.9500	92.90	92.52	92.15	91.77	91.39
19.2000	91.02	90.64	90.27	89.89	89.51
19.4500	89.14	88.76	88.38	88.01	87.63
19.7000	87.25	86.87	86.49	86.12	85.74
19.9500	85.36	84.98	84.60	84.22	83.84
20.2000	83.47	83.09	82.71	82.33	81.95
20.4500	81.57	81.19	80.81	80.43	80.05
20.7000	79.66	79.28	78.90	78.52	78.14
20.9500	77.76	77.38	77.00	76.62	76.23
21.2000	75.85	75.47	75.09	74.70	74.32
21.4500	73.94	73.56	73.17	72.79	72.41
21.7000	72.03	71.64	71.26	70.88	70.49

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs

Time hrs	Time on left represents time for first value in each row.				
21.9500	70.11	69.72	69.34	68.96	68.57
22.2000	68.19	67.80	67.42	67.03	66.65
22.4500	66.27	65.88	65.49	65.11	64.73
22.7000	64.35	63.95	63.57	63.18	62.80
22.9500	62.41	62.03	61.64	61.25	60.87
23.2000	60.48	60.10	59.71	59.32	58.94
23.4500	58.55	58.16	57.78	57.39	57.01
23.7000	56.62	56.23	55.84	55.46	55.07
23.9500	54.68	54.12	53.23	51.98	49.49
24.2000	46.23	42.11	37.07	31.96	26.87
24.4500	22.18	17.96	14.29	11.57	9.25
24.7000	7.42	6.02	4.82	3.85	3.12
24.9500	2.49	1.98	1.60	1.27	1.01
25.2000	.81	.63	.50	.39	.30
25.4500	.23	.17	.12	.09	.06
25.7000	.03	.01	.01	.00	

APPENDIX I.

Letter of Intent Regarding Proposed Pu`unani Well

CHARMAINE TAVARES
Mayor

JEFFREY K. ENG
Director

ERIC H. YAMASHIGE, P.E., L.S.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

April 23, 2008

Mr. Blaine Kobayashi
Carlsmith Ball LLP
2200 Maint Street, Suite 400
Wailuku, Hawaii 96793

Dear Mr. Kobayashi:

SUBJECT: Pu'unani Well

Transmitted herewith as requested is fully executed original Letter of Intent for your use.

If you have any questions, please call Wendy Taomoto of our Engineering Division at 270-7835.

Sincerely,

Jeffrey K. Eng
Director

WKT:pf

enclosure

"By Water All Things Find Life"

RECEIVED
2008 APR -1 PM 4:12
DEPT. OF WATER SUPPLY
COUNTY OF MAUI

March 5, 2008

Mr. Jeffrey K. Eng, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Re: Letter of Intent Regarding Water Source Agreement

Dear Mr. Eng:

The purpose of this letter of intent is to outline some of the major terms of an agreement to be drafted and executed by and between the County of Maui, Department of Water Supply ("DWS") and Association of Ii Wai Hui LP, Endurance Investors, LLC and Wailuku Kuikahi LLC (collectively "Pu'unani Developers") for the development of a water source (the "Pu'unani Well") on a portion of the Pu'unani Subdivision, Wailuku, Maui, Hawaii, designated as Tax Map Key Nos. (2) 3-5-002:002 and (2) 3-5-002:003. The contemplated agreement will be expressly subject to approval by the Maui County Council pursuant to Section 14.03.025, Maui County Code.

Wailuku Kuikahi LLC owns the parcel of land (TMK (2) 3-5-002:003) on which the Pu'unani Well will be located. A map of the approximately location of the Pu'unani Well is attached with this letter of intent. Pu'unani Developers will assume, fund and pay for all costs, fees and expenses (including engineering, environmental, and hydrology studies, permitting, and construction) relating to the drilling, development, and completion of the Pu'unani Well and connection to the existing DWS water system. Pu'unani Developers will also construct and fund all costs for either a stand-alone chlorination and well controls facility for the "Pu'unani Well, or an expansion of the control building to be constructed by Kehalani Mauka, LLC at the Pu'unani Well site.

The water source agreement is conditional upon DWS receiving approval from the State Commission on Water Resource Management of a new-use permit for additional source allocation from the Iao Aquifer.

Upon completion, final inspection, and acceptance of the Pu'unani Well, DWS will allocate twenty-five percent (25%) of the total pump capacity from the Pu'unani Well as water source allocation for the Pu'unani Subdivision. It is estimated that the Pu'unani Well will have a pump capacity of 2.0 million gallons per day. Pu'unani Developers will have twenty (20) years from the date of the County's acceptance of the Pu'unani Well to use its allocation.

Within said period of twenty (20) years, Pu'unani Developers may assign its right to any portion of its water source allocation, provided any assignee shall use such allocation before the expiration of the twenty (20) year term. At the expiration of the twenty (20) year term, any remaining water source allocation not used by Pu'unani or its assignees shall be forfeited, and shall revert back to the DWS.

The parties hereby expressly understand and agree that this letter of intent is merely an expression of interest by the parties to enter into a water source agreement for the Pu'unani Well, and that no party shall be obligated in any manner unless and until a water source agreement for the Pu'unani Well is approved by the Maui County Council pursuant to Section 14.03.025, Maui County Code.

Sincerely,

PU'UNANI DEVELOPERS

ASSOCIATION OF II WAI HUI LP

By _____
Name: [illegible]
Its: MANAGING GENERAL PARTNER

ENDURANCE INVESTORS, LLC
By JSG Management, Inc., Manager

By _____
Name: J. Stephen Gemmell
Its: President

TOWNE DEVELOPMENT OF HAWAII, INC. for
WAILUKU KUIKAHI LLC

By _____
Name: Marcus Ohlheiser
Its: Vice President

APPROVED AS TO FORM AND LEGALITY:

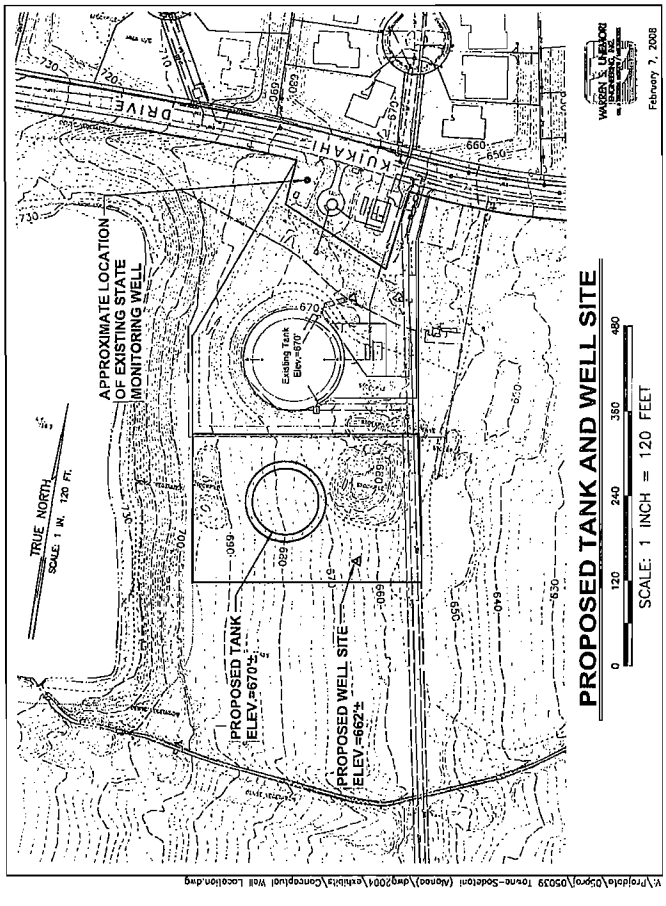
_____
EDWARD S. KUSHI, JR.
Deputy Corporation Counsel
County of Maui

APPROVAL RECOMMENDED:

_____
JEFFREY K. ENG
Director of Water Supply

COUNTY OF MAUI

By _____
CHARMAINE TAVARES
Its Mayor



APPENDIX J.

Letter to Neighboring Resident and Meeting Memorandums Regarding Meeting With Waikapu and Waiolani/Wailuku Heights/Kehalani Community Residents

Letter to Waikapu and Waiolani Residents Dated October 17, 2008
and
October 28, 2008 Waikapu and Waiolani Residents Meeting Memorandum

MUNEKIYO & HIRAGA, INC.

October 17, 2008

TO: NEIGHBORING RESIDENT

SUBJECT: Informational Meeting for Proposed Residential Subdivision at Wailuku, Hawai'i TMK 3-5-02:02 and 03

Dear Resident:

Endurance Investors, LLC, the Association of Il Wai Hui, LLP, and Towne Development of Hawaii, Inc., are proposing to develop a rural residential subdivision on approximately 210 acres of land, located mauka of Honoapiilani Highway and south of Kuikahi Drive between Wailuku and Waikapu. The project area is identifiable as Tax Map Key 3-5-02:02 and 03. See Figure 1.

The project will provide for approximately six (6) one acre rural lots, 127 half acre rural lots, 145 single-family lots, 476 multi-family units, a 10 acre park, and an approximate 8.75 acre stormwater retention area. See Figure 2.

The applicants are nearing completion of the draft environmental impact statement (EIS), which will ultimately be used to obtain County land use entitlements, as well as support the petition for State Land Use Commission District Boundary Amendment. To inform you of the project's progress, we have scheduled a neighborhood informational meeting. The meeting details are as follows:

Date: October 28, 2008
Time: 7:00 p.m. to 8:30 p.m.
Place: Waikapu Community Center

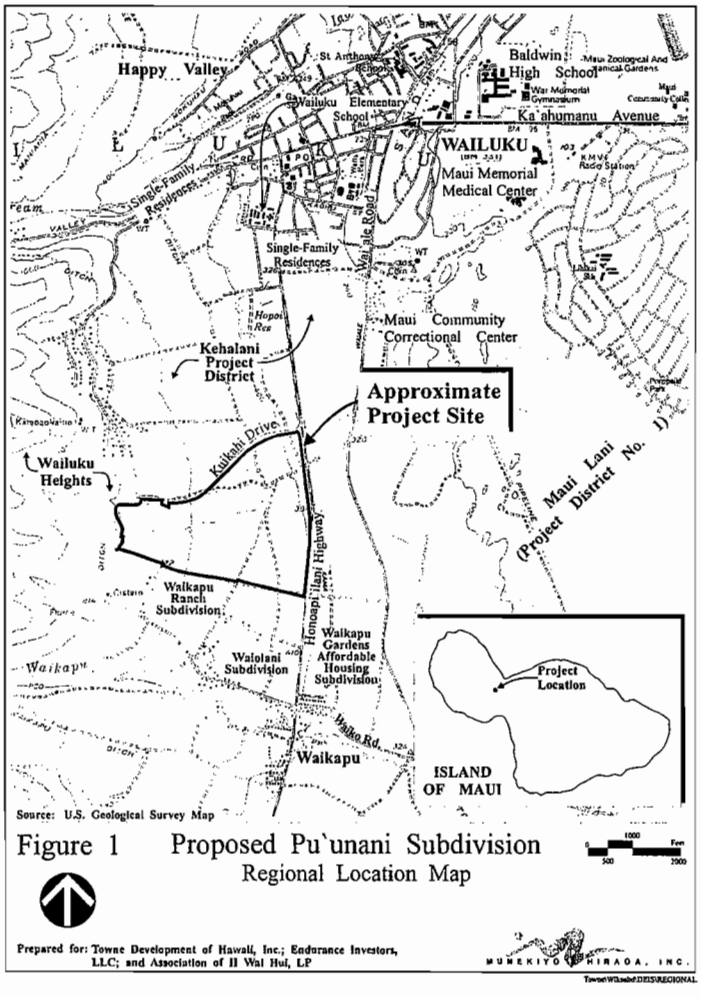
305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

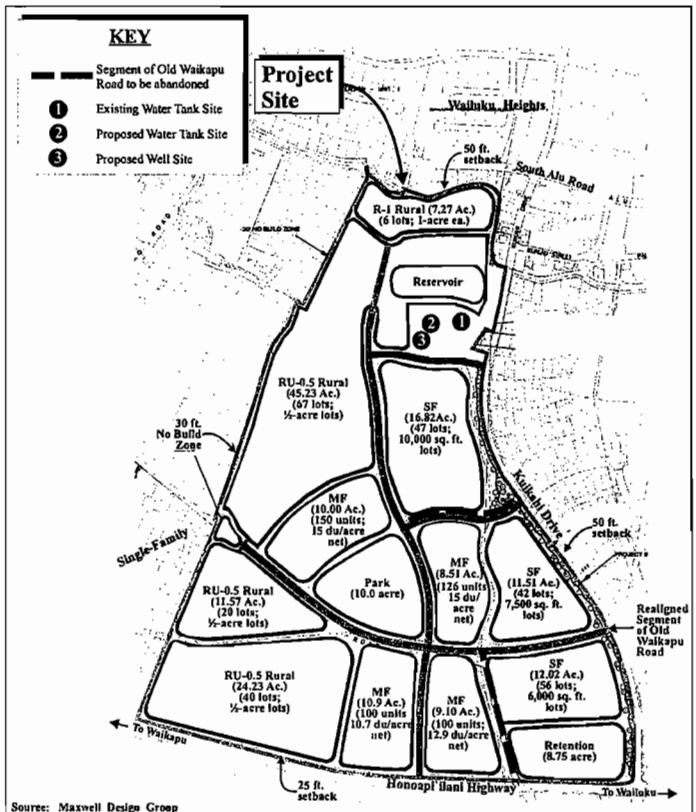
We invite you to join us, as we will be explaining the project in further detail. Meanwhile, should you have any questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
Enclosures
F:\DATA\Towne\WAS\Subd\2008\Waikapu\Waiolani\community mtg.wpd





Source: Maxwell Design Group

Figure 2 Proposed Pu`unani Subdivision
Conceptual Land Use Map

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Il Wai Hui, LP

MUNEKIYO & HIRAGA, INC.

TowneWkshpConceptual.mxd

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN KAWAHARA

MARK ALEXANDER ROY
KYLE GINOZA

November 3, 2008

WAIKAPU AND WAIOLANI RESIDENTS
Waikapu Community Center
October 28, 2008 at 7:00 p.m.

MEETING MEMORANDUM

Project Team Attendees:	Lloyd Sodetani, Chris Lau, Darren Unemori, Takeshi Matsukata, Rowena Dagdag, Colleen Suyama
Presenter:	Colleen Suyama
Recorder:	Rowena Dagdag
Attendees:	See attached list

The meeting started at approximately 7:10 p.m.

A meeting was held at the Waikapu Community Center to provide residents of the Waikapu and Waiolani communities with a status update to the proposed Pu`unani Project. C. Suyama began the presentation with an introduction of the project team and the landowners.

C. Suyama showed a colored conceptual plan of the project when it was first presented to the residents in April 2006. She also displayed the plan in its current form with revisions based on comments received at that April 2006 meeting. She provided the audience members with an overview of the features in the current plan. C. Suyama added that the project is moving forward with an application for reclassification of the State Land Use designation, which will be then followed by a Change in Zoning and Community Plan Amendment with the Maui County Planning Commission and County Council.

The following is a summary of the questions and comments received at the meeting.

1. ***What will happen to all the parks in the Waikapu area?***

   C. Suyama stated that park assessments are done prior to the development of a residential subdivision. Landowners and developers can provide land to the County

for park purposes or provide an in-lieu contribution used toward the development of park areas. In addition, landowners are required to provide a comfort station and parking. In some instances, a waiver is requested to waive the requirements for a comfort station and parking.

2. ***Will the community park within the proposed subdivision be dedicated to the county?***

   C. Suyama stated that the County will review the dedication of the park land. In some cases, developers have asked for waivers from the requirements of a comfort station and parking. For this project, the developers intend on providing a comfort station along with parking, irrigation, and landscaping.

3. ***Where will the water come from?***

   C. Suyama stated that the developers of the Pu`unani project participated in regional improvements which include the upgrading of storage capacity and source development. They are also participating with County in source development. A letter of intent for the development of a new on-site well has been executed by the County of Maui and the developers. An agreement for the development of the well between the County and the developers had been prepared and is now being reviewed. The agreement will allow for a partnership between the County and the developers in the development of this new water source. The agreement would also provide Pu`unani Subdivision with approximately 25 percent of the yield; the rest of the yield would be for the County of Maui. A storage tank will be built as well. This system will connect to the county system. Water will come from Iao Aquifer. This was based on a recommendation that the county disperse the water from the Iao Aquifer.

4. ***W. Pellegrino expressed frustration with development in the Waikapu area during recent years. She stated that views along Honoapi`ilani Highway have been destroyed as a result of the development of Waiolani Mauka subdivision. She wanted to know if fill would be used on the portion along Honoapi`ilani Highway and wanted to know how many stories high.***

   She also added that there needs to be an open space distinction between Waikapu and Wailuku.

   C. Suyama stated that urbanization will occur on the Makai side of Honoapi`ilani Highway. The location of the project provides for urban infill. Proposed in the plan is rural buffer along the Waikapu side of the project. The project will be heard by the Maui Planning Commission and the Maui County Council. There is a process for placing conditions on the property when it gets heard by the Commission and the Council. C. Suyama added that when the public hearings are scheduled, residents have the opportunity to make concerns known to the Council and the Commission.

L. Sodetani stated that members present at the first Waikapu/Waiolani community meeting requested that a buffer be provided, showing a separation between Waikapu and Wailuku. Since that meeting, the County passed the Residential Workforce Housing Policy which affected the density of the project. L. Sodetani stated that he would like to see an affordable component for senior housing, such as Hale Mahaolu. In the senior residential component of the project, L. Sodetani added that approximately 20 to 25 percent of the affordable units will be set aside for veterans. He added that he would like to see housing provisions made for veterans. He added that he will work with Hale Mahaolu toward the creation of a development similar to theirs. He added that he does not want to see additional traffic lights at Honoapi`ilani Highway or within the subdivision. The project will be providing on site, with approximately 25 percent of the yield being provided to the development, the rest will be given to the County.

5. ***R. Gushi asked if the project's edge along Honoapi`ilani Higway would have a gradual edge, unlike other developments in the area. Have you considered stepping back using one (1) story design along the highway and then gradually moving back with higher density?***

   L. Sodetani stated that he did not want to see a huge embankment either and will consider different options for maintaining views along the highway.

6. ***Parks have been lost in Waikapu. A resident expressed interest in having the developers be consistent in their support of maintaining park space by providing additional funds or working with the County Council to ensure that park spaces will not be lost.***

   C. Lau stated that Towne Development of Hawaii, Inc. (TDH) is very committed to building parks. In another project in Kihei, a park was constructed with a comfort station, parking lot, grassing, and irrigation. TDH built the park and is maintaining it for 10 years before dedicating it to the County. The development is committed to parks instead of in-lieu fees.

7. ***A resident expressed concerns regarding the impact that development has had on the Waikapu area in recent years. What will be done to mitigate the impacts of the development on traffic?***

   C. Suyama stated that there are improvements to the roadway systems within the Maui Lani project district in Kahului that will alleviate traffic in the Waikapu area. With the development of new roadway systems connecting Wailuku and Kahului, it is anticipated that Kahului traffic will be diverted down to Kuikahi Drive and on to Kuihelani Highway. When that roadway is completed, there may be some relief in traffic issues. This project will be constructed after the Kuikahi Extension is completed.

8. ***A resident expressed concern over the use of the Old Waikapu Road and potential connection to Waiko Road. Although the conceptual map shows that access to adjacent properties would be blocked off by something that looks like a "plug", the resident expressed concern over the longevity of the closure of this road. Assurances would need to be made so that the road stays closed and will not allow access to properties on the southern boundary of the project.***

   C. Suyama stated that the property blocking off access to residents on the southern border will be zoned for open space. She presented a plan prepared by the landscape architect showing that a barricade will be provided on the Waikapu side of the lot, and that this lot will be landscaped.

9. ***A resident indicated that another developer said the same thing about their property. The resident requested assurance that this road stays closed, or that options be considered to divert the alignment of the road toward other portions of the subdivision so that it would not connect to Waiko Road in the future.***

   L. Sodetani stated that the landowners are working with the Department of Public Works to resolve ownership issues associated with this road. At this time, the landowners do not own the road and do not have control over what happens to the roadway and do not have control over what happens to the roadway.

10. ***A resident stated that he was aware of two test wells on the makai portion of the property. He believed that the State will not allow for a new well on the site near the punawai. How will water be supplied to these properties?***

    L. Sodetani stated that the County has informed the developers that they will shut down Shaft 33. The County informed the developers that they will need assistance in drilling a new well to replace Shaft 33. L. Sodetani further indicated that the County has an application with the State Water Resources Commission for permits to drill the new water source.

11. ***A resident expressed concern that Waikapu is an aging community. It takes a generation to build a community. He was concerned about the impacts of traffic and that traffic will bring a demise to the character of Waikapu. The resident asked about the measures to be taken to have the community be livable. He stated that the project appears to be a "bedroom community" and that he would like to see a more sustainable community developed in this area.***

    L. Sodetani stated that there are issues regarding the ownership of the Old Waikapu Road. He will discuss possible ways of diverting traffic elsewhere to lessen the

opportunity to connect into the Waiko area with the other landowners and the project team.

12. ***How does the project fit into the General Plan?***

    It was noted that the Maui Island Plan is being reviewed and revised with the General Plan Advisory Committee. The area was not included in the Planning Department's version of the proposed Urban Growth Boundaries. The Landowners have put in a request for consideration in the growth boundaries. A final decision has not been made on these growth boundaries and is subject for additional reviews by the Planning Commission and the County Council.

L. Sodetani thanked the group for their attendance.

The meeting ended at approximately 8:00 p.m.

Rowena Dagdag, Planner

RD:lfm
Attachment
cc: Chris Lau, Towne Development of Hawaii, Inc. (w/attachment)
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC (w/attachment)
Lloyd Sodetani, Association of II Wai Hui (w/attachment)
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Waikoou and Waiolani Communities
10/28/08

	NAME	ADDRESS	Phone #
1)	Randy Piltz	376 W. Waiko Rd	244-5665
2)	Cynthia Fernandez	52 Ku'uhoa PL. Kahului	873-9699
3)	Geri Kimoto	1265 Moohele St. Wailuku	986 8024
4)	James Dodd	1421 Honua	244-5300
5)	Yvette Kakaualpua	✓	✓
6)	Helene Shiigi	244 W. WAIKO	244-9036
7)	Wayland Kunitake	1375 Kawika St.	244-8834
8)	Victor & Nanette Pellegrino	PO Box 967 WKu	242-4642
9)	Russel Gushi	185 W. Waiko Rd.	242-6503
10)	Dennis & Susan Hopkins	946 Mokuola Drive Wailuku	244-7585
11)	STEPHEN & MOMI MAGLENTE	50E WAIKO RD Wailuku	244-9381
12)	Ted & Zelie Harkers	1415 Kilohi Wailuku	244 9874
13)	Danny Suzuki	29 Kuwanai St	244 1351
14)	Andrea Jaques	115 E. LIPOA St Kihei	214 8535
15)	Walter Clur	1593 N. AlaniuA Kihei	276 5176
16)	FRED SLOSSER	382 W. WAIKO RD	244 4502
17)	Hokano Pellegrino	P.O. Box 967	480-4534
18)	Bob COFFEY	477-A Pilau Pl. Wailuku	244-5547
19)			
20)			
21)			
22)			
23)			
24)			

Letter to Wailuku Heights Residents Dated October 17, 2008
and
October 29, 2008 Wailuku Heights Meeting Memorandum

MUNEKIYO & HIRABA, INC.

October 17, 2008

TO: NEIGHBORING RESIDENT

SUBJECT: Informational Meeting for Proposed Residential Subdivision at Wailuku, Hawai`i TMK 3-5-02:02 and 03

Dear Resident:

Endurance Investors, LLC, the Association of Il Wai Hui, LLP, and Towne Development of Hawaii, Inc., are proposing to develop a rural residential subdivision on approximately 210 acres of land, located mauka of Honoapiilani Highway and south of Kuikahi Drive between Wailuku and Waikapu. The project area is identifiable as Tax Map Key 3-5-02:02 and 03. See Figure 1.

The project will provide for approximately six (6) one acre rural lots, 127 half acre rural lots, 145 single-family lots, 476 multi-family units, a 10 acre park, and an approximate 8.75 acre stormwater retention area. See Figure 2.

The applicants are nearing completion of the draft environmental impact statement (EIS), which will ultimately be used to obtain County land use entitlements, as well as support the petition for State Land Use Commission District Boundary Amendment. To inform you of the project's progress, we have scheduled a neighborhood informational meeting. The meeting details are as follows:

Date: October 29, 2008
Time: 7:00 p.m. to 8:30 p.m.
Place: Wailuku Hongwanji Mission
1828 Vineyard Street
Conference Room (2nd floor of social hall building)
Wailuku, Hawai`i 96793

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

We invite you to join us, as we will be explaining the project in further detail. Meanwhile, should you have any questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
Enclosures
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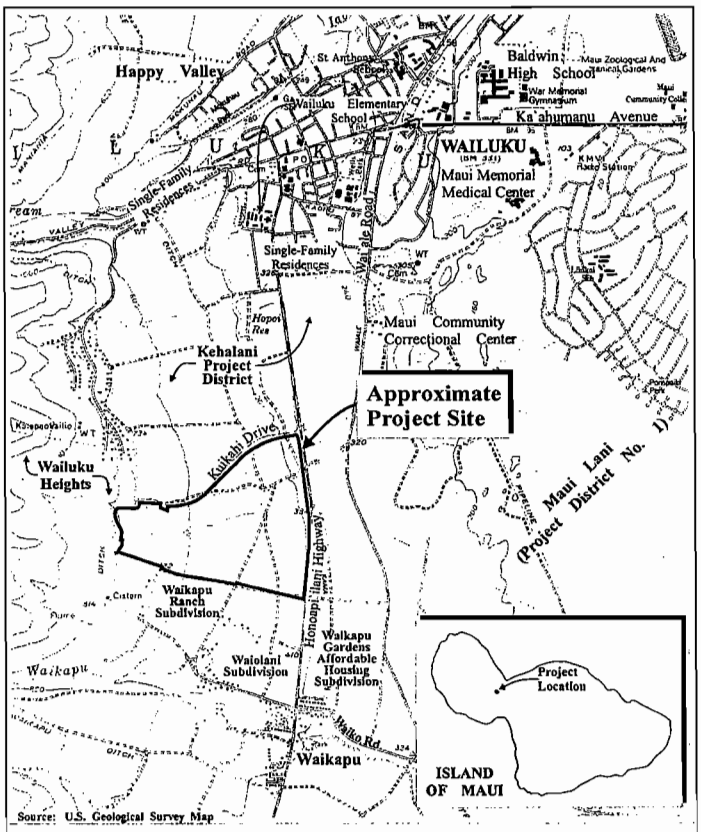

Figure 1 Proposed Pu`unani Subdivision
Regional Location Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

MUNEKIYO HIRAOA, INC.

Towne\Wailuku\DESIGN\REGIONAL

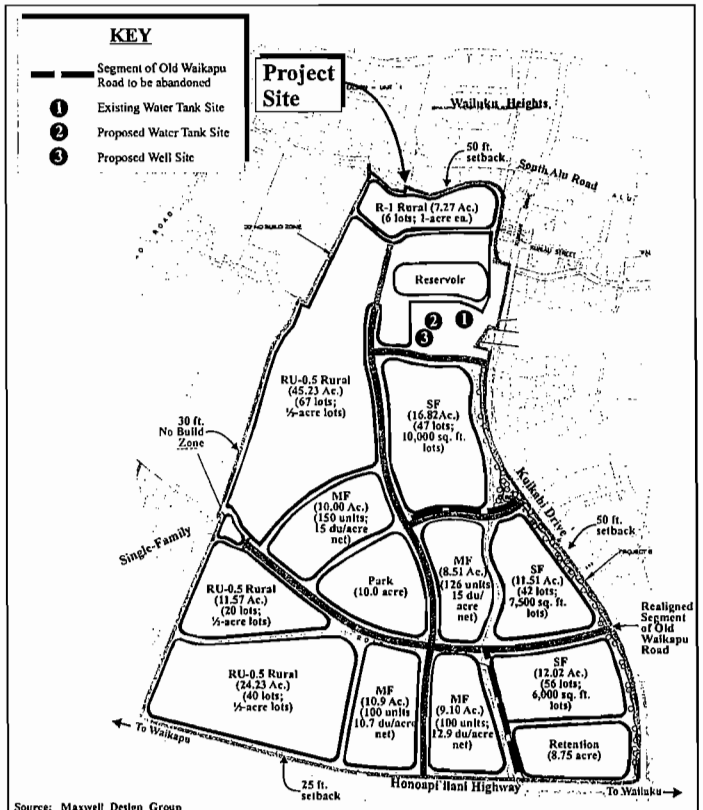

Figure 2 Proposed Pu`unani Subdivision
Conceptual Land Use Map

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of H Wai Hui, LP

MUNEKIYO HIRAOA, INC.

Towne\Wailuku\conceptual neigh

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN KAWAHARA

MARK ALEXANDER ROY
KYLE GINOZA

November 3, 2008

WAILUKU HEIGHTS RESIDENTS
Wailuku Hongwanji Conference Room
October 29, 2008 at 7:00 p.m.

MEETING MEMORANDUM

Project Team Attendees:	Lloyd Sodetani, Chris Lau, Darren Unemori, Takeshi Matsukata, Colleen Suyama, Michael Munekiyo
Presenter:	Colleen Suyama
Recorder:	Michael Munekiyo
Attendees:	See attached list

The meeting started at approximately 7:10 p.m.

A meeting was held at the Wailuku Hongwanji Conference Room to provide residents of Wailuku Heights with a status update to the proposed Pu`unani Project. C. Suyama began the presentation with an introduction of the project team and the landowners.

C. Suyama showed a colored conceptual plan of the project when it was first presented to the residents in April 2006. She also displayed the plan in its current form with revisions based on comments received at that April 2006 meeting. She provided the audience members with an overview of the features in the current plan. Points covered in her presentation included an explanation of senior and veterans housing, parks dedication scenarios, and the water system development concept.

C. Suyama added that the project is moving forward with an application for reclassification of the State Land Use designation, which will be then followed by a Change in Zoning and Community Plan Amendment with the Maui County Planning Commission and County Council.

The following is a summary of key questions and comments received at the meeting.

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808) 244-2015 • fax: (808) 244-8729 • planning@mhplanning.com

1. ***An audience member requested clarification regarding the buffer/setback provision between the Wailuku Heights homes along South Alu Road and the six (6) 1-acre lots.***

   In referring to the board depicting the sectional view of the relationship between the Wailuku Heights lots and the 1-acre lots, C. Suyama stated that there will be a minimum 50-ft. buffer or setback from the property line of the 1-acre lot to the building wall of a home constructed on that lot. She noted that the sewerline easement along the mauka common boundary lies outside of the 1-acre lots.

2. ***As a follow up to the first question, the audience member asked if there are assurances that the conditions represented at the Wailuku Heights-1-acre lot interface will remain in place as the project advances.***

   C. Suyama indicated that the representations made will be carried forward through the land entitlements processes. The public will have an opportunity to be a part of this process to ensure that representations made are adhered to.

3. ***A member of the audience asked if there will be any modifications to the sewer system serving Wailuku Heights.***

   D. Unemori explained that there will be no changes to the Wailuku Heights sewer system. The current easement along the lower edge of the Wailuku Heights subdivsion (below South Alu Road) will remain in place. The Pu`unani project's sewer system will ultimately connect to the County system without adversely affecting the Wailuku Heights system.

4. ***A meeting participant noted that traffic along Kuikahi Drive is a concern, as the project will result in more cars using this roadway.***

   L. Sodetani referred to the project site plan to explain that the second connection to Honoapi`ilani Highway will provide for a right-turn in and right-turn out access for project residents. This new access will help to mitigate traffic on Kuikahi Drive. He noted that the traffic study is being conducted for the project and will be looking into traffic impacts and mitigation measures needed. C. Lau noted that the plan for senior housing will serve as a trip generating mitigation measure as well, since seniors are generally less reliant on individual cars.

In concluding the meeting at 7:55 p.m., the audience was asked to contact C. Suyama, L. Sodetani or C. Lau if there were any questions regarding the project.

Michael T. Munekiyo, Principal
Project Manager

MTM:lfm
Attachment
cc: Chris Lau, Towne Development of Hawaii, Inc. (w/attachment)
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC (w/attachment)
Lloyd Sodetani, Association of Il Wai Hui (w/attachment)
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SIGN-IN SHEET

NAME	MAILING ADDRESS	PHONE, FAX NO. & E-MAIL
m/m Ernest A. Cabral	P.O. Box 1723 Wailuku, HI 96793	Ph: (808) 244-3632 FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:

PLEASE PRINT LEGIBLY

SIGN-IN SHEET

NAME	MAILING ADDRESS	PHONE, FAX NO. & E-MAIL
Korkes	675 S. Ala Rd. Wailuku 96793	Ph: 242-4446 FAX: Email:
CHOI	787 MAKAAHI ST. 96793	Ph: 243 2248 FAX: Email:
J. Kimura	140 N. Market St. #200 Wailuku 96793	Ph: 242-9100 FAX: 244-1375 Email:
~~Rudy Tabbal~~ B. Tabbal	369 - Kuikahi Dr. Wailuku 369 - Kuikahi Dr. Wailuku	Ph: 3445929 FAX: 2445929 Email:
K. Ishizu	625 S. Ala Rd., Wailuku	Ph: 244-5259 FAX: Email:
Kelly Yokouchi	730 Kakaina Pl. Wailuku 96793	Ph: 244-0685 FAX: Email: kcha keliwatake@hotmail.com
Jolynne Yokouchi	730 Kakaina Pl. #1704 Wailuku, HI 96793	Ph: 357-0300 FAX: Email:

PLEASE PRINT LEGIBLY

SIGN-IN SHEET

NAME	MAILING ADDRESS	PHONE, FAX NO. & E-MAIL
Allan Raikes	637 MAPUANA PL	Ph: 244-7119 FAX: Email: raikes001@hawaii.rr.com
Dawn M. Ueda	492 Polalani Drive	Ph: FAX: Email:
Greg Heyd	551 Niho St.	Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:
		Ph: FAX: Email:

PLEASE PRINT LEGIBLY

Letter to Kehalani Community Residents Dated October 22, 2008
and
November 5, 2008 Kehalani Community Meeting Memorandum

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

October 22, 2008

TO: NEIGHBORING RESIDENT

SUBJECT: Informational Meeting for Proposed Residential Subdivision at Wailuku, Hawai'i TMK 3-5-02:02 and 03

Dear Resident:

Endurance Investors, LLC, the Association of Il Wai Hui, LLP, and Towne Development of Hawaii, Inc., are proposing to develop a rural residential subdivision on approximately 210 acres of land, located mauka of Honoapiilani Highway and south of Kuikahi Drive between Wailuku and Waikapu. The project area is identifiable as Tax Map Key 3-5-02:02 and 03. See Figure 1.

The project will provide for approximately six (6) one acre rural lots, 127 half acre rural lots, 145 single-family lots, 476 multi-family units, a 10 acre park, and an approximate 8.75 acre stormwater retention area. See Figure 2.

The applicants are nearing completion of the draft environmental impact statement (EIS), which will ultimately be used to obtain County land use entitlements, as well as support the petition for State Land Use Commission District Boundary Amendment. To inform you of the project's progress, we have scheduled a neighborhood informational meeting. The meeting details are as follows:

Date: November 5, 2008
Time: 7:00 p.m. to 8:30 p.m.
Place: Wailuku Elementary School (cafeteria)

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhplanning.com · www.mhplanning.com

We invite you to join us, as we will be explaining the project in further detail. Meanwhile, should you have any questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Colleen Suyama
Project Manager

CS:yp
Enclosures
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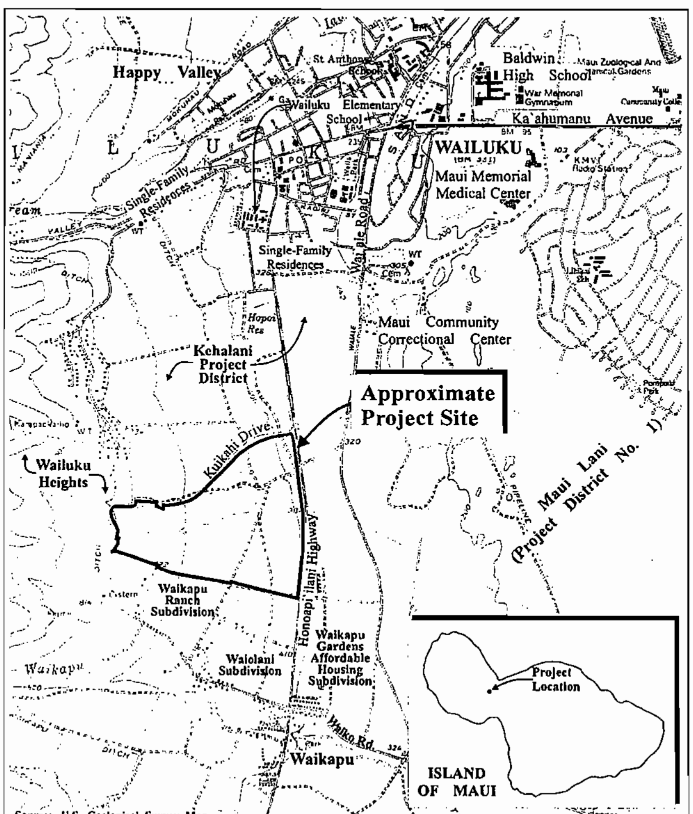
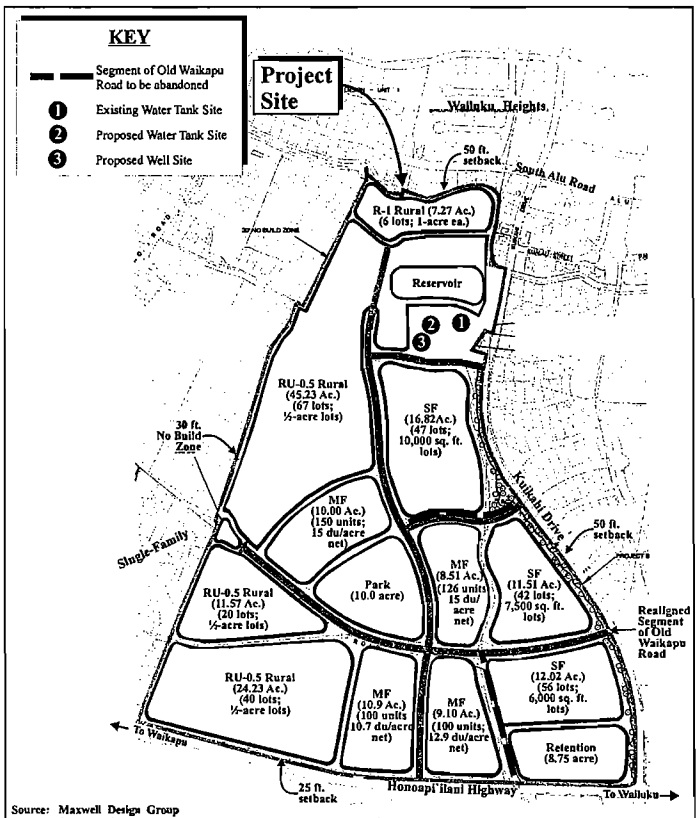


Figure 1 Proposed Pu`unani Subdivision
Regional Location Map

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of II Wai Hui, LP

MUNEKIYO HIRAGA, INC.



Source: Maxwell Design Group

Figure 2 Proposed Pu`unani Subdivision
Conceptual Land Use Map

NOT TO SCALE

Prepared for: Towne Development of Hawaii, Inc.; Endurance Investors, LLC; and Association of Ii Wai Hui, LP

MUNEKIYO HIRAGA, INC.

Towne Wkshp5-conceptual.ai/gh

MUNEKIYO HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN KAWAHARA

MARK ALEXANDER ROY
KYLE GINOZA

December 1, 2008

KEHALANI COMMUNITY RESIDENTS
Wailuku Elementary School Cafeteria
November 5, 2008 at 7:00 p.m.

MEETING MEMORANDUM

Project Team Attendees:	Chris Lau, ***Towne Development of Hawaii, Inc.*** Takeshi Matsukata, ***Towne Development of Hawaii, Inc.*** Donna Clayton, ***Endurance Investors LLC*** Lloyd Sodetani, ***Association of Ii Wai Hui*** Warren Unemori, ***Warren S. Unemori Engineering, Inc.*** Colleen Suyama, ***Munekiyo & Hiraga, Inc.*** Rowena Dagdag, ***Munekiyo & Hiraga, Inc.***
Presenter:	Colleen Suyama, Project Manager
Recorder:	Rowena Dagdag, Planner
Attendees:	Approximately 12 members of the community were present. Please see Sign-In Sheet for the names and contact information of the individuals present at this meeting.

The meeting started at approximately 7:00 p.m.

C. Suyama began the meeting by noting that similar meetings were held recently with residents living in Waikapu and with the Wailuku Heights community. The project was first brought to the attention of these groups in 2006. This meeting is the first meeting held with Kehalani Community members.

A. C. Suyama continued her presentation with an overview of the project:

1. Dedication of approximately 20 percent multi-family units to senior and veteran housing.

2. At least 50 percent of housing units will meet the County of Maui Residential Workforce Housing Policy.

3. 10-acre park will be included in the master plan. This is considered an active park.

4. Park dedication to include the installation of comfort station and parking

5. The realignment of the Old Waikapu Road at Honoapi`ilani Highway will be available as a right-turn in and right-turn out.

6. A closure will be maintained at the end of Waikapu road. Residents of the Waikapu Community asked that there be no connection be made toward Waiko Road.

7. A 30-ft. no build zone is provided along Waikapu boundary

8. A 25 ft. no build zone is provided along Honoapi`ilani Highway,

9. A 50-ft. landscaped setback is provided along Kuikahi Drive,

10. Reservoir at the project site will be maintained. Water from the reservoir will be diverted to a drop drain that will convey water to Waihee Ditch, and is currently used as irrigation water for Wailuku Agribusiness lands south of Waikapu.

11. A recommendation was made to incorporate bus stops in project area to encourage use of public transportation.

B. The following were questions presented by audience members and the responses provided by the project team:

1. **What is the total amount of units? Was there a meeting with the Wailuku Heights community?**

   a. C. Suyama responded that the project will be designed for approximately 724 units. The units will be a mix of affordable multi-family units, senior and veteran housing, residential lots, and rural lots.

   b. C. Suyama added that a community meeting was held with residents of the Wailuku Heights community. Individual notices were sent to landowners. Approximately 20 to 25 people attended this meeting. Residents of Waikapu and the Waiolani Subdivision were also informed of meeting held separately at the Waikapu Community Center on October 28, 2008.

   c. Approximately 900 people in Kehalani Project District were notified of the evening's meeting. C. Suyama stated that efforts were made to notify residents of the meeting and to provide information about the proposed Pu`unani Subdivision. Information regarding landowner contact information was provided by the Real Property Tax division of the County's Finance Department and a Kehalani Community Association ownership list.

2. **Were concerns voiced at these meetings?**

   a. Residents who attended the meetings voiced concerns regarding traffic, setbacks, and connectivity into their neighborhoods. The project's plans have been amended to consider the issues and concerns presented by the neighboring residents.

3. **The project will put a tremendous strain on Kuikahi Drive. Has a traffic study been done?**

   a. The traffic study will consider the existing traffic and proposed traffic and impacts. All traffic counts were considered from various traffic impacts, and based on numbers and standards by State Department of Transportation (DOT). The traffic study will provide recommendations on how to maintain the level-of-service at the intersections or to mitigate future impacts. One of the recommendations is to construct four (4) lanes on Kuikahi Drive and to do roadway improvements at intersections.

4. **What is the level of service?**

   a. The current LOS is at C. With traffic improvements, the LOS is expected to remain the same. LOS D is experienced at peak hours.

5. **Will there be traffic lights along Kuikahi drive?**

   a. No. Stop signs will be placed at intersections along Kuikahi Drive. There will be no new traffic signals along this roadway.

6. **What's the possibility of doing a left-turn at Honoapi`ilani Higway?**

   a. The possibilty of a left-turn on to Honoapi`ilani Highway from the realigned Waikapu Road is dictated by State DOT.

   b. C. Suyama added that the approvals for the project will include a change in State land use designation from "Agricultural" use to "Rural" and "Urban" use. The filing of the Draft Environmental Impact

Statement will occur sometime at the end of November or early December. A public hearing process will be required as part of the proceedings. The County processes involve a Change in Zoning, and Community Plan Amendment. The project will need an approval from the County Council for the proposed land use plan.

c. The County's zoning and community plan process will require that residents within 500 feet of property be notified of the public hearing for the proposed land use changes. Members of the public will have the opportunity to testify in support of or in opposition to the project.

d. C. Suyama added that the Planning Commission is the first body that hears the application for both the Change in Zoning and Community Plan Amendment. It'll then get transmitted to the County Council.

7. **Will there be any notification by the State Land Use Commission about the proposed project?**

a. There will be no notices provided to individual landowner. The only notice provided by the State Land Use Commission is a public notice in major newspapers distributed in the State.

8. **What's the impact of the well site on aquifer?**

a. The new well site will replace an existing well called Shaft 33. The developers are pursuing an agreement with the County of Maui to co-develop the new well. Once the 2 million gallon well site is developed, Shaft 33 will be shut down. This is recommended by the Commission on Water Resources Management to disperse the well sites using the Iao Aquifer. The developer will get 25 percent of the water from the well site. The rest of the yield will be put in to the County water system. The County of Maui will maintain the well.

9. **Will this development be part of the Kehalani Community Association?**

a. No. The new subdivision will have its own community association.

10. **When and where are grocery stores going to be?**

a. C. Suyama stated that Stanford Carr is in discussions with the County for a "B-2, Commercial" site next to the residential areas.

11. **What is the timetable for this project?**

a. C. Suyama stated that entitlements will take several years. It is anticipated that construction will commence in the next five (5) years.

12. **When you say apartments, what do you mean?**

a. C. Suyama stated that the apartments will be two-story type apartments. Some of the units will be town homes. The senior residential units may also be one-story structures. The developers are looking toward a one to two story concept such as the units developed by Hale Mahaolu.

13. **Will there be walkways within the setbacks? In the 50 foot setback.**

a. There are County standards for these walkways. Sidewalks are to be placed in the County right-of-way.

14. **Is this a gated community?**

a. At this time, the project is not intended to be a gated community.

15. **What are the issues in front of State Land Use Commission?**

a. C. Suyama stated that the issues are unknown at this juncture since it hasn't been formally reviewed by the State Land Use Commission (SLUC). When the item goes before the SLUC, the applicants will present their case, as do the County and State in a quasi-judicial proceeding. The applicant is subject to cross examination and questions from State Office of Planning and County Planning Department. The position of the SLUC is unknown until the application is ready to be scheduled for hearing. The Draft EIS will explain potential impacts and mitigation.

16. **A resident expressed concern about the conversion of agricultural land. What are the impacts?**

a. C. Suyama stated that there is an abundance of fallow agricultural land. The challenging issue surrounding diversified agricultural is that the market is not there for the product. In County zoning ordinance, there are three (3) criteria outlined for retaining agricultural lands. This project meets only one (1) criteria, that the lands are designated prime ag lands. Currently, the State doesn't have its own criteria for retaining agricultural land.

17. **What about schools?**

    a. C. Suyama stated that the State Department of Education (DOE) is asking for monetary contribution. The Kehalani Project District already has a school planned in their community. In lieu of another school site, the project will make a monetary contribution based on the current assessment rate. State DOE has not asked for an intermediate school site. The developers will enter into an agreement with State DOE.

18. **Is 25 percent of the allocation from the new tank enough for the project?**

    a. The capacity of the tank is approximately 500,000 gallons. One of the benefits resulting from this new tank is that there will be more pressure flow in the Kehalani project area.

    b. The high level water tank is above Kehalani. The developers will help in enlarging the tank. New pump station will also be placed.

19. **How long before high level water tank be in service?**

    a. C. Suyama stated that the high level water tank will first need approval from the County. Once that's done, the pump station and transmission line from the tank will be extended out to the project area. New line will go through the Koa subdivision.

    b. L. Sodetani stated that when project first started, Kehalani wasn't fully established. The developers met with the Wailuku Heights and Waikapu Communities in 2006. He and the other partners felt the need to inform the Kehalani Community Association of the proposed project. He added that a sincere effort was made in getting notices out to residents in the area. Notices were also sent out to Kehalani Makai residents.

    c. L. Sodetani expressed thanks for attendance in meeting and interest in project. He stated his interest and concern for veteran housing on Maui.

    d. C. Lau indicated that he shares the same sentiment for senior and veteran housing, but this all depends on the market demand.

    e. L. Sodetani stated that developers will continue to work with Hale Mahaolu.

20. **Is there going to be a big solar development?**

    a. L. Sodetani stated that green energy alternatives to the project which included solar panels, methane gas, agricultural live stock hydroelectric energy, and windmills. Alternative energy will be considered as a feature for this project.

Rowena Dagdag, Planner

RD:yp
Attachment
cc: Chris Lau, Towne Development of Hawaii, Inc. (w/attachment)
Donna Clayton, Pacific Rim Land/Endurance Investors, LLC (w/attachment) via email
Lloyd Sodetani, Association of II Wai Hui (w/attachment)
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Community Meeting - Nov 5, 2008 KEHALANI COMMUNITY		
NAME	ADDRESS	PHONE
1. Tracy [illegible]	65 HAKALANI PL	357-6207
2. Jarneskys	153 Kinohi Loa Lp.	—
3. S. Polid	564 Kane Olu St, Wlk	silot2000@yahoo.com
4. GARY ELSTER	12 MALIHINI PL.	250-3726
5. Donna CLAYTON	POBox 220 Kihei	357 6603
6. Suzette Espiritu	10 KAPALAIA PL	249-8462
7. Catherine ~~Espiritu~~ Estabillo	10 Kapalaia Pl	249-8462
8. JAKE & LEAH BELMONTE	PO BOX 6159 KAH.	870-7163
9. Minh Khang Ngoc Ikeda J.	5 Uahaa Pl Wailuku.	(W) 5718550 (Cell) 298729[illegible]
10.		
11.		
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